

RMOL

0.25.3

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## 1 RMOL Documentation

### 1.1 Getting Started

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- [Linking with RMOL](#)
- [Users Guide](#)
- [Tutorials](#)
- [Copyright and License](#)
- [Make a Difference](#)
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### 1.2 RMOL at SourceForge

- [Project page](#)
- [Download RMOL](#)
- [Open a ticket for a bug or feature](#)
- [Mailing lists](#)
- [Forums](#)
  - [Discuss about Development issues](#)

- [Ask for Help](#)
- [Discuss RMOL](#)

### 1.3 RMOL Development

- [Git Repository](#) (Subversion is deprecated)
- [Coding Rules](#)
- [Documentation Rules](#)
- [Test Rules](#)

### 1.4 External Libraries

- [Boost](#) (C++ STL extensions)
- [Python](#)
- [MySQL client](#)
- [SOI](#) (C++ DB API)

### 1.5 Support RMOL

### 1.6 About RMOL

[RMOL](#) is a C++ library of revenue management and optimisation classes and functions. [RMOL](#) mainly targets simulation purposes. [N](#)

[RMOL](#) makes an extensive use of existing open-source libraries for increased functionality, speed and accuracy. In particular [GSL](#) (*GNU Scientific Library*) and [Boost](#) (*C++ Standard Extensions*) libraries are used.

The [RMOL](#) library originates from the department of Operational Research and Innovation at [Amadeus](#), Sophia Antipolis, France. [RMOL](#) is released under the terms of the [GNU Lesser General Public License](#) (LGPLv2.1) for you to enjoy.

[RMOL](#) should work on [GNU/Linux](#), [Sun Solaris](#), Microsoft Windows (with [Cygwin](#), [MinGW/MSYS](#), or [Microsoft Visual C++ .NET](#)) and [Mac OS X](#) operating systems.

#### Note

(N) - The [RMOL](#) library is **NOT** intended, in any way, to be used by airlines for production systems. If you want to report issue, bug or feature request, or if you just want to give feedback, have a look on the right-hand side of this page for the preferred reporting methods. In any case, please do not contact Amadeus directly for any matter related to [RMOL](#).

## 2 People

### 2.1 Project Admins

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#### Note

(N) - **Amadeus** employees.

## 3 Coding Rules

In the following sections we describe the naming conventions which are used for files, classes, structures, local variables, and global variables.

### 3.1 Default Naming Rules for Variables

Variables names follow Java naming conventions. Examples:

- `lNumberOfPassengers`
- `lSeatAvailability`

### 3.2 Default Naming Rules for Functions

Function names follow Java naming conventions. Example:

- `int myFunctionName (const int& a, int b)`

### 3.3 Default Naming Rules for Classes and Structures

Each new word in a class or structure name should always start with a capital letter and the words should be separated with an under-score. Abbreviations are written with capital letters. Examples:

- `MyClassName`
- `MyStructName`

### 3.4 Default Naming Rules for Files

Files are named after the C++ class names.

Source files are named using `.cpp` suffix, whereas header files end with `.hpp` extension. Examples:

- `FlightDate.hpp`
- `SegmentDate.cpp`

### 3.5 Default Functionality of Classes

All classes that are configured by input parameters should include:

- default empty constructor



- one or more additional constructor(s) that takes input parameters and initializes the class instance
- setup function, preferably named `'setup'` or `'set_parameters'`

Explicit destructor functions are not required, unless they are needed. It shall not be possible to use any of the other member functions unless the class has been properly initiated with the input parameters.

## 4 Copyright and License

### 4.1 GNU LESSER GENERAL PUBLIC LICENSE

#### 4.1.1 Version 2.1, February 1999

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[This is the first released version of the Lesser GPL. It also counts  
as the successor of the GNU Library Public License, version 2, hence  
the version number 2.1.]

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For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link other code with the library, you must

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To protect each distributor, we want to make it very clear that there is no warranty for the free library. Also, if the library is modified by someone else and passed on, the recipients should know that what they have is not the original version, so that the original author's reputation will not be affected by problems that might be introduced by others.

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When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the "Lesser" General Public License because it does Less to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

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Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay

close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

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If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

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- a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)
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c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

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b) Give prominent notice with the combined library of the fact that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.

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#### 4.3.2 END OF TERMS AND CONDITIONS

### 4.4 How to Apply These Terms to Your New Programs

If you develop a new library, and you want it to be of the greatest possible use to the public, we recommend making it free software that everyone can redistribute and change. You can do so by permitting redistribution under these terms (or, alternatively, under the terms of the ordinary General Public License).

To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

```
<one line to give the library's name and a brief idea of what it does.>
Copyright (C) <year>  <name of author>
```

```
This library is free software; you can redistribute it and/or
modify it under the terms of the GNU Lesser General Public
License as published by the Free Software Foundation; either
version 2.1 of the License, or (at your option) any later version.
```

```
This library is distributed in the hope that it will be useful,
but WITHOUT ANY WARRANTY; without even the implied warranty of
MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the GNU
Lesser General Public License for more details.
```

```
You should have received a copy of the GNU Lesser General Public
License along with this library; if not, write to the Free Software
```



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Also add information on how to contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the library, if necessary. Here is a sample; alter the names:

```
Yoyodyne, Inc., hereby disclaims all copyright interest in the
library 'Frob' (a library for tweaking knobs) written by James Random Hacker.
```

```
<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice
```

That's all there is to it!

Source

## 5 Documentation Rules

### 5.1 General Rules

All classes in [RMOL](#) should be properly documented with Doxygen comments in include (.hpp) files. Source (.cpp) files should be documented according to a normal standard for well documented C++ code.

An example of how the interface of a class shall be documented in [RMOL](#) is shown here:

```
/*!
 * \brief Brief description of MyClass here
 *
 * Detailed description of MyClass here. With example code if needed.
 */
class MyClass {
public:
    //! Default constructor
    MyClass(void) { setup_done = false; }

    /*!
     * \brief Constructor that initializes the class with parameters
     *
     * Detailed description of the constructor here if needed
     *
     * \param[in] param1 Description of \a param1 here
     * \param[in] param2 Description of \a param2 here
     */
    MyClass(TYPE1 param1, TYPE2 param2) { setup(param1, param2); }

    /*!
     * \brief Setup function for MyClass
     *
     * Detailed description of the setup function here if needed
     *
     * \param[in] param1 Description of \a param1 here
```

```

    * \param[in] param2 Description of \a param2 here
    */
void setup(TYPE1 param1, TYPE2 param2);

/*!
 * \brief Brief description of memberFunction1
 *
 * Detailed description of memberFunction1 here if needed
 *
 * \param[in]      param1 Description of \a param1 here
 * \param[in]      param2 Description of \a param2 here
 * \param[in,out] param3 Description of \a param3 here
 * \return Description of the return value here
 */
TYPE4 memberFunction1(TYPE1 param1, TYPE2 param2, TYPE3 &param3);

private:

    bool _setupDone;          /*!< Variable that checks if the class is properly
                               initialized with parameters */
    TYPE1 _privateVariable1; /*!< Short description of _privateVariable1 here
    TYPE2 _privateVariable2; /*!< Short description of _privateVariable2 here
};

```

## 5.2 File Header

All files should start with the following header, which include Doxygen's `\file`, `\brief` and `\author` tags, `$Date$` and `$Revisions$` CVS tags, and a common copyright note:

```

/*!
 * \file
 * \brief Brief description of the file here
 * \author Names of the authors who contributed to this code
 * \date Date
 *
 * Detailed description of the file here if needed.
 *
 * -----
 *
 * RMOL - C++ Revenue Management Object Library
 *
 * Copyright (C) 2007-2010 (\see authors file for a list of contributors)
 *
 * \see copyright file for license information
 *
 * -----
 */

```

## 5.3 Grouping Various Parts

All functions must be added to a Doxygen group in order to appear in the documentation. The following code example defines the group `'my_group'`:

```

/*!
 * \defgroup my_group Brief description of the group here

```

```
*  
* Detailed description of the group here  
*/
```

The following example shows how to document the function `myFunction` and how to add it to the group `my_group`:

```
/*!  
* \brief Brief description of myFunction here  
* \ingroup my_group  
*  
* Detailed description of myFunction here  
*  
* \param[in] param1 Description of \a param1 here  
* \param[in] param2 Description of \a param2 here  
* \return Description of the return value here  
*/  
TYPE3 myFunction(TYPE1 param1, TYPE2 &param2);
```

## 6 Main features

A short list of the main features of [RMOL](#) is given below sorted in different categories. Many more features and functions exist and for these we refer to the reference documentation.

### 6.1 Optimisation features

- [Dynamic Programming \(DP\)](#)
- [EMSRa](#) and [EMSRb](#)
- Network optimisation with [Linear Programming \(LP\)](#)

### 6.2 Unconstraining

- Inventory censorflag and guillotine
- E-M (Expectation Maximisation)

### 6.3 Forecasting features

- [Exponential Smoothing](#)
- [Moving Average](#)

## 6.4 Overbooking features

- Cancellations and No-Shows
- Cost-based optimisation
- Service-based optimisation

## 6.5 Other features

- CSV input file parsing

# 7 Make a Difference

**Do not ask what [RMOL](#) can do for you. Ask what you can do for [RMOL](#).**

You can help us to develop the [RMOL](#) library. There are always a lot of things you can do:

- Start using [RMOL](#)
- Tell your friends about [RMOL](#) and help them to get started using it
- If you find a bug, report it to us. Without your help we can never hope to produce a bug free code.
- Help us to improve the documentation by providing information about documentation bugs
- Answer support requests in the [RMOL](#) discussion forums on SourceForge. If you know the answer to a question, help others to overcome their [RMOL](#) problems.
- Help us to improve our algorithms. If you know of a better way (e.g. that is faster or requires less memory) to implement some of our algorithms, then let us know.
- Help us to port [RMOL](#) to new platforms. If you manage to compile [RMOL](#) on a new platform, then tell us how you did it.
- Send us your code. If you have a good [RMOL](#) compatible code, which you can release under the LGPL, and you think it should be included in [RMOL](#), then send it to us.
- Become an [RMOL](#) developer. Send us an e-mail and tell what you can do for [RMOL](#).

# 8 Make a new release

## 8.1 Introduction

This document describes briefly the recommended procedure of releasing a new version of [RMOL](#) using a Linux development machine and the SourceForge project site.

The following steps are required to make a release of the distribution package.

- [Initialisation](#)
- [Release branch maintenance](#)
- [Commit and publish the release branch](#)
- [Create source packages \(tar-balls\)](#)
- [Upload the HTML documentation to SourceForge](#)
- [Generate the RPM packages](#)
- [Update distributed change log](#)
- [Create the binary package, including the documentation](#)
- [Upload the files to SourceForge](#)
- [Make a new post](#)
- [Send an email on the announcement mailing-list](#)

## 8.2 Initialisation

Clone locally the full [Git project](#):

```
cd ~
mkdir -p dev/sim
cd ~/dev/sim
git clone git://rmol.git.sourceforge.net/gitroot/rmol/rmol rmolgit
cd rmolgit
git checkout trunk
```

## 8.3 Release branch maintenance

Switch to the release branch, on your local clone, and merge the latest updates from the trunk. Decide about the new version to be released.

```
cd ~/dev/sim/rmolgit
git checkout releases
git merge trunk
```

Update the version in the various build system files, replacing the old version numbers by the correct ones:

```
vi CMakeLists.txt
vi autogen.sh
vi README
```

Update the version, add some news in the NEWS file, add a change-log in the ChangeLog file and in the RPM specification files:

```
vi NEWS
vi ChangeLog
vi rmol.spec
```

## 8.4 Commit and publish the release branch

Commit the new release:

```
cd ~/dev/sim/rmolgit
git add -A
git commit -m "[Release 0.5.0] Release of the 0.5.0 version of RMOL."
git push
```

## 8.5 Create source packages (tar-balls)

Create the distribution packages using the following command:

```
cd ~/dev/sim/rmolgit
git checkout releases
rm -rf build && mkdir -p build
cd build
export INSTALL_BASEDIR=/home/user/dev/deliveries
export LIBSUFFIX_4_CMAKE="-DLIB_SUFFIX=64"
cmake -DCMAKE_INSTALL_PREFIX=${INSTALL_BASEDIR}/rmol-0.5.0 \
-DWITH_STDAIR_PREFIX=${INSTALL_BASEDIR}/stdair-stable \
-DWITH_AIRAC_PREFIX=${INSTALL_BASEDIR}/airac-stable \
-DWITH_AIRAC_PREFIX=${INSTALL_BASEDIR}/airrac-stable \
-DWITH_RMOL_PREFIX=${INSTALL_BASEDIR}/rmol-stable \
-DWITH_RMOL_PREFIX=${INSTALL_BASEDIR}/airinv-stable \
-DWITH_RMOL_PREFIX=${INSTALL_BASEDIR}/simfqt-stable \
-DCMAKE_BUILD_TYPE:STRING=Debug -DINSTALL_DOC:BOOL=ON \
${LIBSUFFIX_4_CMAKE} ..
make check && make dist
make install
```

This will configure, compile and check the package. The output packages will be named, for instance, `rmol-0.5.0.tar.gz` and `rmol-0.5.0.tar.bz2`.

## 8.6 Upload the HTML documentation to SourceForge

In order to update the Web site files, either:

- **synchronise them with rsync and SSH:** Upload the just generated HTML (and PDF) documentation onto the **SourceForge Web site**.

```
cd ~/dev/sim/rmolgit/build
git checkout releases
rsync -aiv ${INSTALL_BASEDIR}/rmol-0.5.0/share/doc/rmol-0.5.0/html/ \
your_sf_user,rmol@web.sourceforge.net:htdocs/
```

where `-ai` options mean:

- `-a`: archive/mirror mode; equals `-rlptgoD` (no `-H`, `-A`, `-X`)
- `-v`: increase verbosity
- `-i`: output a change-summary for all updates
- Note the trailing slashes (/) at the end of both the source and target directories. It means that the content of the source directory (`doc/html`), rather than the directory itself, has to be copied into the content of the target directory.

- or use the [SourceForge Shell service](#).

## 8.7 Generate the RPM packages

Optionally, generate the RPM package (for instance, for [Fedora/RedHat](#)):

```
cd ~/dev/sim/rmolgit/build
git checkout releases
make dist
```

To perform this step, `rpm-build`, `rpmlint` and `rpmdevtools` have to be available on the system.

```
cp ../rmol.spec ~/dev/packages/SPECS \
  && cp rmol-0.5.0.tar.bz2 ~/dev/packages/SOURCES
cd ~/dev/packages/SPECS
rpmbuild -ba rmol.spec
cd ~/dev/packages
rpmlint -i SPECS/rmol.spec SRPMS/rmol-0.5.0-1.fc16.src.rpm \
  RPMS/noarch/rmol-* RPMS/i686/rmol-*
```

## 8.8 Update distributed change log

Update the `NEWS` and `ChangeLog` files with appropriate information, including what has changed since the previous release. Then commit and push the changes into the [RMOL's Git repository](#).

## 8.9 Create the binary package, including the documentation

Create the binary package, which includes HTML and PDF documentation, using the following command:

```
cd ~/dev/sim/rmolgit/build
git checkout releases
make package
```

The output binary package will be named, for instance, `rmol-0.5.0-Linux.tar.bz2`. That package contains both the HTML and PDF documentation. The binary package contains also the executables and shared libraries, as well as C++ header files, but all of those do not interest us for now.

## 8.10 Upload the files to SourceForge

Upload the distribution and documentation packages to the SourceForge server. Check [SourceForge help page on uploading software](#).

## 8.11 Make a new post

- submit a new entry in the [SourceForge project-related news feed](#)
- make a new post on the [SourceForge hosted WordPress blog](#)
- and update, if necessary, [Trac tickets](#).

## 8.12 Send an email on the announcement mailing-list

Finally, you should send an announcement to [rmol-announce@lists.sourceforge.net](mailto:rmol-announce@lists.sourceforge.net) (see <https://lists.sourceforge.net/lists/listinfo/rmol-announce> for the archives)

# 9 Installation

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## 9.2 Fedora/RedHat Linux distributions

Note that on [Fedora/RedHat](#) Linux distributions, RPM packages are available and can be installed with your usual package manager. For instance:

```
yum -y install rmol-devel rmol-doc
```

RPM packages can also be available on the [SourceForge download site](#).

## 9.3 RMOL Requirements

[RMOL](#) should compile without errors or warnings on most GNU/Linux systems, on UNIX systems like Solaris SunOS, and on POSIX based environments for Microsoft Windows like Cygwin or MinGW with MSYS. It can be also built on Microsoft Windows NT/2000/XP/Vista/7 using Microsoft's Visual C++ .NET, but our support for this compiler is limited. For GNU/Linux, SunOS, Cygwin and MinGW we assume that you have at least the following GNU software installed on your computer:

- GNU Autotools:
  - [autoconf](#),
  - [automake](#),
  - [libtool](#),
  - [make](#), version 3.72.1 or later (check version with ``make --version``)
- [GCC](#) - GNU C++ Compiler (g++), version 4.3.x or later (check version with ``gcc --version``)
- [Boost](#) - C++ STL extensions, version 1.35 or later (check version with ``grep "define BOOST_LIB_VERSION" /usr/include/boost/version.hpp``)
- [MySQL](#) - Database client libraries, version 5.0 or later (check version with ``mysql --version``)
- [SOI](#) - C++ database client library wrapper, version 3.0.0 or later (check version with ``soci-config --version``)

Optionally, you might need a few additional programs: [Doxygen](#), [LaTeX](#), [Dvips](#) and [Ghostscript](#), to generate the HTML and PDF documentation.

We strongly recommend that you use recent stable releases of the GCC, if possible. We do not actively work on supporting older versions of the GCC, and they may therefore (without prior notice) become unsupported in future releases of [RMOL](#).

## 9.4 Basic Installation

Briefly, the shell commands ``./cmake .. && make install`` should configure, build and install this package. The following more-detailed instructions are generic; see the ``README`` file for instructions specific to this package. Some packages provide this ``INSTALL`` file but do not implement all of the features documented below.

The lack of an optional feature in a given package is not necessarily a bug. More recommendations for GNU packages can be found in the info page corresponding to "Makefile Conventions: (standards)Makefile Conventions".

The `'cmake'` shell script attempts to guess correct values for various system-dependent variables used during compilation. It uses those values to create a `'Makefile'` in each directory of the package. It may also create one or more `'h'` files containing system-dependent definitions. Finally, it creates a `'CMakeCache.txt'` cache file that you can refer to in the future to recreate the current configuration, and files `'CMakeFiles'` containing compiler output (useful mainly for debugging `'cmake'`).

It can also use an optional file (typically called `'config.cache'` and enabled with `'--cache-file=config.cache'` or simply `'-C'`) that saves the results of its tests to speed up reconfiguring. Caching is disabled by default to prevent problems with accidental use of stale cache files.

If you need to do unusual things to compile the package, please try to figure out how `'configure'` could check whether to do them, and mail diffs or instructions to the address given in the `'README'` so they can be considered for the next release. If you are using the cache, and at some point `'config.cache'` contains results you don't want to keep, you may remove or edit it.

The file `'CMakeLists.txt'` is used to create the `'Makefile'` files.

The simplest way to compile this package is:

1. `'cd'` to the directory containing the package's source code and type  `'./cmake . '` to configure the package for your system. Running `'cmake'` is generally fast. While running, it prints some messages telling which features it is checking for.
2. Type `'make'` to compile the package.
3. Optionally, type `'make check'` to run any self-tests that come with the package, generally using the just-built uninstalled binaries.
4. Type `'make install'` to install the programs and any data files and documentation. When installing into a prefix owned by root, it is recommended that the package be configured and built as a regular user, and only the `'make install'` phase executed with root privileges.
5. You can remove the program binaries and object files from the source code directory by typing `'make clean'`. To also remove the files that `'configure'` created (so you can compile the package for a different kind of computer), type `'make distclean'`. There is also a `'make maintainer-clean'` target, but that is intended mainly for the package's developers. If you use it, you may have to get all sorts of other programs in order to regenerate files that came with the distribution.
6. Often, you can also type `'make uninstall'` to remove the installed files again. In practice, not all packages have

tested that uninstallation works correctly, even though it is required by the GNU Coding Standards.

## 9.5 Compilers and Options

Some systems require unusual options for compilation or linking that the 'cmake' script does not know about. Run './cmake --help' for details on some of the pertinent environment variables.

You can give 'cmake' initial values for configuration parameters by setting variables in the command line or in the environment. Here is an example:

```
./cmake CC=c99 CFLAGS=-g LIBS=-lposix
```

### See also

[Defining Variables](#) for more details.

## 9.6 Compiling For Multiple Architectures

You can compile the package for more than one kind of computer at the same time, by placing the object files for each architecture in their own directory. To do this, you can use GNU 'make'. 'cd' to the directory where you want the object files and executables to go and run the 'configure' script. 'configure' automatically checks for the source code in the directory that 'configure' is in and in '..'. This is known as a "VPATH" build.

With a non-GNU 'make', it is safer to compile the package for one architecture at a time in the source code directory. After you have installed the package for one architecture, use 'make distclean' before reconfiguring for another architecture.

On MacOS X 10.5 and later systems, you can create libraries and executables that work on multiple system types--known as "fat" or "universal" binaries--by specifying multiple '-arch' options to the compiler but only a single '-arch' option to the preprocessor. Like this:

```
./configure CC="gcc -arch i386 -arch x86_64 -arch ppc -arch ppc64" \  
           CXX="g++ -arch i386 -arch x86_64 -arch ppc -arch ppc64" \  
           CPP="gcc -E" CXXCPP="g++ -E"
```

This is not guaranteed to produce working output in all cases, you may have to build one architecture at a time and combine the results using the 'lipo' tool if you have problems.

## 9.7 Installation Names

By default, `'make install'` installs the package's commands under `'/usr/local/bin'`, include files under `'/usr/local/include'`, etc. You can specify an installation prefix other than `'/usr/local'` by giving `'configure'` the option `'--prefix=PREFIX'`, where `PREFIX` must be an absolute file name.

You can specify separate installation prefixes for architecture-specific files and architecture-independent files. If you pass the option `'--exec-prefix=PREFIX'` to `'configure'`, the package uses `PREFIX` as the prefix for installing programs and libraries. Documentation and other data files still use the regular prefix.

In addition, if you use an unusual directory layout you can give options like `'--bindir=DIR'` to specify different values for particular kinds of files. Run `'configure --help'` for a list of the directories you can set and what kinds of files go in them. In general, the default for these options is expressed in terms of `'${prefix}'`, so that specifying just `'--prefix'` will affect all of the other directory specifications that were not explicitly provided.

The most portable way to affect installation locations is to pass the correct locations to `'configure'`; however, many packages provide one or both of the following shortcuts of passing variable assignments to the `'make install'` command line to change installation locations without having to reconfigure or recompile.

The first method involves providing an override variable for each affected directory. For example, `'make install prefix=/alternate/directory'` will choose an alternate location for all directory configuration variables that were expressed in terms of `'${prefix}'`. Any directories that were specified during `'configure'`, but not in terms of `'${prefix}'`, must each be overridden at install time for the entire installation to be relocated. The approach of makefile variable overrides for each directory variable is required by the GNU Coding Standards, and ideally causes no recompilation. However, some platforms have known limitations with the semantics of shared libraries that end up requiring recompilation when using this method, particularly noticeable in packages that use GNU Libtool.

The second method involves providing the `'DESTDIR'` variable. For example, `'make install DESTDIR=/alternate/directory'` will prepend `'/alternate/directory'` before all installation names. The approach of `'DESTDIR'` overrides is not required by the GNU Coding Standards, and does not work on platforms that have drive letters. On the other hand, it does better at avoiding recompilation issues, and works well even when some directory options were not specified in terms of `'${prefix}'` at `'configure'` time.

## 9.8 Optional Features

If the package supports it, you can cause programs to be installed with an extra prefix or suffix on their names by giving `'cmake'` the option `'--program-prefix=PREFIX'` or `'--program-suffix=SUFFIX'`.

Some packages pay attention to `'--enable-FEATURE'` options to `'configure'`, where `FEATURE` indicates an optional part of the package. They may also pay attention to `'--with-PACKAGE'` options, where `PACKAGE` is something like `'gnu-as'` or `'x'` (for the X Window System). The `'README'` should mention any `'--enable-'` and `'--with-'` options that the package recognizes.

For packages that use the X Window System, `'configure'` can usually find the X include and library files automatically, but if it doesn't, you can use the `'configure'` options `'--x-includes=DIR'` and `'--x-libraries=DIR'` to specify their locations.

Some packages offer the ability to configure how verbose the execution of `'make'` will be. For these packages, running `./configure --enable-silent-rules` sets the default to minimal output, which can be overridden with `'make V=1'`; while running `./configure --disable-silent-rules` sets the default to verbose, which can be overridden with `'make V=0'`.

## 9.9 Particular systems

On HP-UX, the default C compiler is not ANSI C compatible. If GNU CC is not installed, it is recommended to use the following options in order to use an ANSI C compiler:

```
./configure CC="cc -Ae -D_XOPEN_SOURCE=500"
```

and if that doesn't work, install pre-built binaries of GCC for HP-UX.

On OSF/1 a.k.a. Tru64, some versions of the default C compiler cannot parse its `'<wchar.h>'` header file. The option `'-nodtk'` can be used as a workaround. If GNU CC is not installed, it is therefore recommended to try

```
./configure CC="cc"
```

and if that doesn't work, try

```
./configure CC="cc -nodtk"
```

On Solaris, don't put `'/usr/ucb'` early in your `'PATH'`. This directory contains several dysfunctional programs; working

variants of these programs are available in `"/usr/bin"`. So, if you need `"/usr/ucb"` in your `"PATH"`, put it `_after_` `"/usr/bin"`.

On Haiku, software installed for all users goes in `"/boot/common"`, not `"/usr/local"`. It is recommended to use the following options:

```
./cmake -DCMAKE_INSTALL_PREFIX=/boot/common
```

## 9.10 Specifying the System Type

There may be some features `'configure'` cannot figure out automatically, but needs to determine by the type of machine the package will run on. Usually, assuming the package is built to be run on the `_same_` architectures, `'configure'` can figure that out, but if it prints a message saying it cannot guess the machine type, give it the `'--build=TYPE'` option. TYPE can either be a short name for the system type, such as `'sun4'`, or a canonical name which has the form CPU-COMPANY-SYSTEM

where SYSTEM can have one of these forms:

- OS
- KERNEL-OS

See the file `'config.sub'` for the possible values of each field. If `'config.sub'` isn't included in this package, then this package doesn't need to know the machine type.

If you are `_building_` compiler tools for cross-compiling, you should use the option `'--target=TYPE'` to select the type of system they will produce code for.

If you want to `_use_` a cross compiler, that generates code for a platform different from the build platform, you should specify the `"host"` platform (i.e., that on which the generated programs will eventually be run) with `'--host=TYPE'`.

## 9.11 Sharing Defaults

If you want to set default values for `'configure'` scripts to share, you can create a site shell script called `'config.site'` that gives default values for variables like `'CC'`, `'cache_file'`, and `'prefix'`. `'configure'` looks for `'PREFIX/share/config.site'` if it exists, then `'PREFIX/etc/config.site'` if it exists. Or, you can set the `'CONFIG_SITE'` environment variable to the location of the site script. A warning: not all `'configure'` scripts look for a site script.

## 9.12 Defining Variables

Variables not defined in a site shell script can be set in the environment passed to 'configure'. However, some packages may run configure again during the build, and the customized values of these variables may be lost. In order to avoid this problem, you should set them in the 'configure' command line, using 'VAR=value'. For example:

```
./configure CC=/usr/local2/bin/gcc
```

causes the specified 'gcc' to be used as the C compiler (unless it is overridden in the site shell script).

Unfortunately, this technique does not work for 'CONFIG\_SHELL' due to an Autoconf bug. Until the bug is fixed you can use this workaround:

```
CONFIG_SHELL=/bin/bash /bin/bash ./configure CONFIG_SHELL=/bin/bash
```

## 9.13 'cmake' Invocation

'cmake' recognizes the following options to control how it operates.

- '--help', '-h' print a summary of all of the options to 'configure', and exit.
- '--help=short', '--help=recursive' print a summary of the options unique to this package's 'configure', and exit. The 'short' variant lists options used only in the top level, while the 'recursive' variant lists options also present in any nested packages.
- '--version', '-V' print the version of Autoconf used to generate the 'configure' script, and exit.
- '--cache-file=FILE' enable the cache: use and save the results of the tests in FILE, traditionally 'config.cache'. FILE defaults to '/dev/null' to disable caching.
- '--config-cache', '-C' alias for '--cache-file=config.cache'.
- '--quiet', '--silent', '-q' do not print messages saying which checks are being made. To suppress all normal output, redirect it to '/dev/null' (any error messages will still be shown).
- '--srcdir=DIR' look for the package's source code in directory DIR. Usually 'configure' can determine that directory automatically.
- '--prefix=DIR' use DIR as the installation prefix.

**See also**

[Installation Names](#) for more details, including other options available for fine-tuning the installation locations.

- '--no-create', '-n' run the configure checks, but stop before creating any output files.

'cmake' also accepts some other, not widely useful, options. Run 'cmake --help' for more details.

The 'cmake' script produces an output like this:

```
cmake -DCMAKE_INSTALL_PREFIX=/home/user/dev/deliveries/rmol-99.99.99 -DLIB_SUFFIX=64 -DCMAKE_BUILD
-- The C compiler identification is GNU
-- The CXX compiler identification is GNU
-- Check for working C compiler: /usr/lib64/ccache/gcc
-- Check for working C compiler: /usr/lib64/ccache/gcc -- works
-- Detecting C compiler ABI info
-- Detecting C compiler ABI info - done
-- Check for working CXX compiler: /usr/lib64/ccache/c++
-- Check for working CXX compiler: /usr/lib64/ccache/c++ -- works
-- Detecting CXX compiler ABI info
-- Detecting CXX compiler ABI info - done
-- Requires Git without specifying any version
-- Current Git revision name: 56c6c98cf2cfb4008a0acd35d08075cf5f79e693 trunk
-- Requires Boost-1.41
-- Boost version: 1.46.0
-- Found the following Boost libraries:
--   program_options
--   date_time
--   iostreams
--   serialization
--   filesystem
--   unit_test_framework
--   python
-- Found Boost version: 1.46.0
-- Found BoostWrapper: /usr/include (Required is at least version "1.41")
-- Requires MySQL without specifying any version
-- Using mysql-config: /usr/bin/mysql_config
-- Found MySQL: /usr/lib64/mysql/libmysqlclient.so
-- Found MySQL version: 5.5.14
-- Requires SOCI-3.0
-- Using soci-config: /usr/bin/soci-config
-- SOCI headers are buried
-- Found SOCI: /usr/lib64/libsoci_core.so (Required is at least version "3.0")
-- Found SOCIMySQL: /usr/lib64/libsoci_mysql.so (Required is at least version "3.0")
-- Found SOCI with MySQL back-end support version: 3.0.0
-- Requires StdAir-0.35
-- Found StdAir version: 0.37.1
-- Requires Doxygen without specifying any version
-- Found Doxygen: /usr/bin/doxygen
-- Found DoxygenWrapper: /usr/bin/doxygen
-- Found Doxygen version: 1.7.4
-- Had to set the linker language for 'airraclib' to CXX
-- Had to set the linker language for 'rmollib' to CXX
-- Test 'UnconstrainerTest' to be built with 'UnconstrainerTestSuite.cpp'
-- Test 'ForecasterTest' to be built with 'ForecasterTestSuite.cpp'
-- Test 'OptimiseTest' to be built with 'OptimiseTestSuite.cpp'
-- Test 'BOMsForForecasterTest' to be built with 'bomsforforecaster.cpp'
```



```

--
-- =====
-- -----
-- ---      Project Information      ---
-- -----
-- PROJECT_NAME ..... : rmol
-- PACKAGE_PRETTY_NAME ..... : RMOL
-- PACKAGE ..... : rmol
-- PACKAGE_NAME ..... : RMOL
-- PACKAGE_BRIEF ..... : C++ library of Revenue Management and Optimisation classes and
-- PACKAGE_VERSION ..... : 99.99.99
-- GENERIC_LIB_VERSION ..... : 99.99.99
-- GENERIC_LIB_SOVERSION ..... : 99.99
--
-- -----
-- ---      Build Configuration      ---
-- -----
-- Modules to build ..... : airrac;rmol
-- Libraries to build/install ..... : airraclib;rmollib
-- Binaries to build/install ..... : airrac;rmol
-- Modules to test ..... : rmol
-- Binaries to test ..... : UnconstrainerTesttst;UnconstrainerTesttst;ForecasterTesttst;
--
-- * Module ..... : airrac
--   + Layers to build ..... : .;basic;bom;factory;command;service
--   + Dependencies on other layers :
--   + Libraries to build/install . : airraclib
--   + Executables to build/install : airrac
--   + Tests to perform ..... :
-- * Module ..... : rmol
--   + Layers to build ..... : .;basic;bom;factory;command;service
--   + Dependencies on other layers : airraclib
--   + Libraries to build/install . : rmollib
--   + Executables to build/install : rmol
--   + Tests to perform ..... : UnconstrainerTesttst;UnconstrainerTesttst;ForecasterTesttst;
--
-- BUILD_SHARED_LIBS ..... : ON
-- CMAKE_BUILD_TYPE ..... : Debug
-- * CMAKE_C_FLAGS ..... :
-- * CMAKE_CXX_FLAGS ..... : -Wall -Werror
-- * BUILD_FLAGS ..... :
-- * COMPILE_FLAGS ..... :
-- CMAKE_MODULE_PATH ..... : /home/user/dev/sim/rmol/rmolgithub/config/
-- CMAKE_INSTALL_PREFIX ..... : /home/user/dev/deliveries/rmol-99.99.99
--
-- * Doxygen:
--   - DOXYGEN_VERSION ..... : 1.7.4
--   - DOXYGEN_EXECUTABLE ..... : /usr/bin/doxygen
--   - DOXYGEN_DOT_EXECUTABLE ..... : /usr/bin/dot
--   - DOXYGEN_DOT_PATH ..... : /usr/bin
--
-- -----
-- ---      Installation Configuration      ---
-- -----
-- INSTALL_LIB_DIR ..... : /home/user/dev/deliveries/rmol-99.99.99/lib64
-- INSTALL_BIN_DIR ..... : /home/user/dev/deliveries/rmol-99.99.99/bin
-- INSTALL_INCLUDE_DIR ..... : /home/user/dev/deliveries/rmol-99.99.99/include
-- INSTALL_DATA_DIR ..... : /home/user/dev/deliveries/rmol-99.99.99/share
-- INSTALL_SAMPLE_DIR ..... : /home/user/dev/deliveries/rmol-99.99.99/share/rmol/samples
-- INSTALL_DOC ..... : ON
--
-- -----

```

```

-- --- Packaging Configuration ---
-- -----
-- CPACK_PACKAGE_CONTACT ..... : Denis Arnaud <denis_arnaud - at - users dot sourceforge dot net>
-- CPACK_PACKAGE_VENDOR ..... : Denis Arnaud
-- CPACK_PACKAGE_VERSION ..... : 99.99.99
-- CPACK_PACKAGE_DESCRIPTION_FILE . : /home/user/dev/sim/rmol/rmolgithub/README
-- CPACK_RESOURCE_FILE_LICENSE .... : /home/user/dev/sim/rmol/rmolgithub/COPYING
-- CPACK_GENERATOR ..... : TBZ2
-- CPACK_DEBIAN_PACKAGE_DEPENDS ... :
-- CPACK_SOURCE_GENERATOR ..... : TBZ2;TGZ
-- CPACK_SOURCE_PACKAGE_FILE_NAME . : rmol-99.99.99
--
-- -----
-- --- External libraries ---
-- -----
--
-- * Boost:
--   - Boost_VERSION ..... : 104600
--   - Boost_LIB_VERSION ..... : 1_46
--   - Boost_HUMAN_VERSION ..... : 1.46.0
--   - Boost_INCLUDE_DIRS ..... : /usr/include
--   - Boost required components .. : program_options;date_time;iostreams;serialization;filesystem;atomic
--   - Boost required libraries ... : optimized;/usr/lib64/libboost_iostreams-mt.so;debug;/usr/lib64/libboost_atomic-mt.so
--
-- * MySQL:
--   - MYSQL_VERSION ..... : 5.5.14
--   - MYSQL_INCLUDE_DIR ..... : /usr/include/mysql
--   - MYSQL_LIBRARIES ..... : /usr/lib64/mysql/libmysqlclient.so
--
-- * SOCI:
--   - SOCI_VERSION ..... : 3.0.0
--   - SOCI_INCLUDE_DIR ..... : /usr/include/soci
--   - SOCI_MYSQL_INCLUDE_DIR ..... : /usr/include/soci
--   - SOCI_LIBRARIES ..... : /usr/lib64/libsoci_core.so
--   - SOCI_MYSQL_LIBRARIES ..... : /usr/lib64/libsoci_mysql.so
--
-- * StdAir:
--   - STDAIR_VERSION ..... : 0.37.1
--   - STDAIR_BINARY_DIRS ..... : /home/user/dev/deliveries/stdair-0.37.1/bin
--   - STDAIR_EXECUTABLES ..... : stdair
--   - STDAIR_LIBRARY_DIRS ..... : /home/user/dev/deliveries/stdair-0.37.1/lib64
--   - STDAIR_LIBRARIES ..... : stdairlib;stdairuiclib
--   - STDAIR_INCLUDE_DIRS ..... : /home/user/dev/deliveries/stdair-0.37.1/include
--   - STDAIR_SAMPLE_DIR ..... : /home/user/dev/deliveries/stdair-0.37.1/share/stdair/samples
--
-- Change a value with: cmake -D<Variable>=<Value>
-- =====
--
-- Configuring done
-- Generating done
-- Build files have been written to: /home/user/dev/sim/rmol/rmolgithub/build

```

It is recommended that you check if your library has been compiled and linked properly and works as expected. To do so, you should execute the testing process 'make check'. As a result, you should obtain a similar report:

```

[ 0%] Built target hdr_cfg_rmol
[ 0%] Built target hdr_cfg_airrac
[ 30%] Built target airraclib
[ 86%] Built target rmolllib

```

```
[ 90%] Built target BOMsForForecasterTesttst
[ 93%] Built target UnconstrainerTesttst
[ 96%] Built target ForecasterTesttst
[100%] Built target OptimiseTesttst
Scanning dependencies of target check_rmoltst
Test project /home/user/dev/sim/rmol/rmolgithub/build/test/rmol
  Start 1: UnconstrainerTesttst
1/4 Test #1: UnconstrainerTesttst ..... Passed    0.04 sec
  Start 2: ForecasterTesttst
2/4 Test #2: ForecasterTesttst ..... Passed    0.04 sec
  Start 3: OptimiseTesttst
3/4 Test #3: OptimiseTesttst ..... Passed    0.44 sec
  Start 4: BOMsForForecasterTesttst
4/4 Test #4: BOMsForForecasterTesttst ..... Passed    0.02 sec

100% tests passed, 0 tests failed out of 4

Total Test time (real) = 0.78 sec
[100%] Built target check_rmoltst
Scanning dependencies of target check
[100%] Built target check
```

Check if all the executed tests PASSED. If not, please contact us by filling a [bug-report](#).

Finally, you should install the compiled and linked library, include files and (optionally) HTML and PDF documentation by typing:

```
make install
```

Depending on the PREFIX settings during configuration, you might need the root (administrator) access to perform this step.

Eventually, you might invoke the following command

```
make clean
```

to remove all files created during compilation process, or even

```
cd ~/dev/sim/rmolgit
rm -rf build && mkdir build
cd build
```

to remove everything.

## 10 Linking with RMOL

### 10.1 Table of Contents

- [Introduction](#)

- [Using the pkg-config command](#)
- [Using the rmol-config script](#)
- [M4 macro for the GNU Autotools](#)
- [Using RMOL with dynamic linking](#)

## 10.2 Introduction

There are two convenient methods of linking your programs with the [RMOL](#) library. The first one employs the `'pkg-config'` command (see <http://pkgconfig.freedesktop.org/>), whereas the second one uses `'rmol-config'` script. These methods are shortly described below.

### 10.3 Using the pkg-config command

`'pkg-config'` is a helper tool used when compiling applications and libraries. It helps you insert the correct compiler and linker options. The syntax of the `'pkg-config'` is as follows:

```
pkg-config <options> <library_name>
```

For instance, assuming that you need to compile an [RMOL](#) based program `'my_prog.cpp'`, you should use the following command:

```
g++ `pkg-config --cflags rmol` -o my_prog my_prog.cpp `pkg-config --libs rmol`
```

For more information see the `'pkg-config'` man pages.

### 10.4 Using the rmol-config script

[RMOL](#) provides a shell script called `'rmol-config'`, which is installed by default in `'$prefix/bin'` (`'/usr/local/bin'`) directory. It can be used to simplify compilation and linking of [RMOL](#) based programs. The usage of this script is quite similar to the usage of the `'pkg-config'` command.

Assuming that you need to compile the program `'my_prog.cpp'` you can now do that with the following command:

```
g++ `rmol-config --cflags` -o my_prog_opt my_prog.cpp `rmol-config --libs`
```

A list of `'rmol-config'` options can be obtained by typing:

```
rmol-config --help
```

If the `'rmol-config'` command is not found by your shell, you should add its location `'$prefix/bin'` to the `PATH` environment variable, e.g.:

```
export PATH=/usr/local/bin:$PATH
```

## 10.5 M4 macro for the GNU Autotools

A M4 macro file is delivered with [RMOL](#), namely 'rmol.m4', which can be found in, e.g., '/usr/share/aclocal'. When used by a 'configure' script, thanks to the 'AM\_PATH\_RMOL' macro (specified in the M4 macro file), the following Makefile variables are then defined:

- 'RMOL\_VERSION' (e.g., defined to 0.23.0)
- 'RMOL\_CFLAGS' (e.g., defined to '-I\${prefix}/include')
- 'RMOL\_LIBS' (e.g., defined to '-L\${prefix}/lib -lrmol')

## 10.6 Using RMOL with dynamic linking

When using static linking some of the library routines in [RMOL](#) are copied into your executable program. This can lead to unnecessary large executables. To avoid having too large executable files you may use dynamic linking instead. Dynamic linking means that the actual linking is performed when the program is executed. This requires that the system is able to locate the shared [RMOL](#) library file during your program execution. If you install the [RMOL](#) library using a non-standard prefix, the 'LD\_LIBRARY\_PATH' environment variable might be used to inform the linker of the dynamic library location, e.g.:

```
export LD_LIBRARY_PATH=<RMOL installation prefix>/lib:$LD_LIBRARY_PATH
```

## 11 Test Rules

This section describes rules how the functionality of the IT++ library should be verified. In the 'tests' subdirectory test files are provided. All functionality should be tested using these test files.

### 11.1 The Test File

Each new IT++ module/class should be accompanied with a test file. The test file is an implementation in C++ that tests the functionality of a function/class or a group of functions/classes called modules. The test file should test relevant parameter settings and input/output relations to guarantee correct functionality of the corresponding classes/functions. The test files should be maintained using version control and updated whenever new functionality is added to the IT++ library.

The test file should print relevant data to a standard output that can be used to verify the functionality. All relevant parameter settings should be tested.

The test file should be placed in the 'tests' subdirectory and should have a name ending with '\_test.cpp'.

## 11.2 The Reference File

Consider a test file named `'module_test.cpp'`. A reference file named `'module_test.ref'` should accompany the test file. The reference file contains a reference printout of the standard output generated when running the test program. The reference file should be maintained using version control and updated according to the test file.

## 11.3 Testing IT++ Library

One can compile and execute all test programs from `'tests'` subdirectory by typing

```
% make check
```

after successful compilation of the IT++ library.

# 12 Users Guide

## 12.1 Table of Contents

- [Introduction](#)
- [Get Started](#)
  - [Get the RMOL library](#)
  - [Build the RMOL project](#)
  - [Build and Run the Tests](#)
  - [Install the RMOL Project \(Binaries, Documentation\)](#)
- [Exploring the Predefined BOM Tree](#)
  - [Forecaster BOM Tree](#)
  - [Optimiser BOM Tree](#)
- [Extending the BOM Tree](#)

## 12.2 Introduction

The [RMOL](#) library contains classes for revenue management. This document does not cover all the aspects of the [RMOL](#) library. It does however explain the most important things you need to know in order to start using [RMOL](#).

## 12.3 Get Started

### 12.3.1 Get the RMOL library

### 12.3.2 Build the RMOL project

To run the configuration script the first time, go to the top directory (where the [RMOL](#) package has been un-packed), and issue the following command:

- `mkdir -p build && cd build && cmake ..`
- `make`

#### Note

The [RMOL](#) project can either be cloned from the [Git Repository](#) or downloaded as a tar-ball package from the [Sourceforge Web site](#).

### 12.3.3 Build and Run the Tests

### 12.3.4 Install the RMOL Project (Binaries, Documentation)

## 12.4 Exploring the Predefined BOM Tree

[RMOL](#) predefines a BOM (Business Object Model) tree specific to the airline IT arena.

### 12.4.1 Forecaster BOM Tree

- [RMOL::EMDetruncator](#)
- [RMOL::Detruncator](#)
- [RMOL::Forecaster](#)

### 12.4.2 Optimiser BOM Tree

- [RMOL::DPOptimiser](#)
- [RMOL::MCOptimiser](#)
- [RMOL::Optimiser](#)

## 12.5 Extending the BOM Tree

# 13 Supported Systems

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    - \* [Gentoo Linux with ATLAS](#)
    - \* [Gentoo Linux with MKL](#)
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- [RMOL 3.9.1](#)
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  - [RMOL 3.8.1](#)

## 13.2 Introduction

This page is intended to provide a list of [RMOL](#) supported systems, i.e. the systems on which configuration, installation and testing process of the [RMOL](#) library has been successful. Results are grouped based on minor release number. Therefore, only the latest tests for bug-fix releases are included. Besides, the information on this page is divided into sections dependent on the operating system.

Where necessary, some extra information is given for each tested configuration, e.g. external libraries installed, configuration commands used, etc.

If you manage to compile, install and test the [RMOL](#) library on a system not mentioned below, please let us know, so we could update this database.

## 13.3 RMOL 0.23.x

### 13.3.1 Linux Systems

#### 13.3.1.1 Fedora Core 4 with ATLAS

- **Platform:** Intel Pentium 4



- **Operating System:** Fedora Core 4 (x86)
- **Compiler:** g++ (GCC) 4.0.2 20051125
- **RMOL release:** 0.23.0
- **External Libraries:** From FC4 distribution:
  - fftw3.i386-3.0.1-3
  - fftw3-devel.i386-3.0.1-3
  - atlas-sse2.i386-3.6.0-8.fc4
  - atlas-sse2-devel.i386-3.6.0-8.fc4
  - blas.i386-3.0-35.fc4
  - lapack.i386-3.0-35.fc4
- **Tests Status:** All tests PASSED
- **Comments:** RMOL configured with:

```
% CXXFLAGS="-O3 -pipe -march=pentium4" ./configure
```
- **Date:** March 7, 2006
- **Tester:** Tony Ottosson

#### 13.3.1.2 Gentoo Linux with ACML

- **Platform:** AMD Sempron 3000+
- **Operating System:** Gentoo Linux 2006.0 (x86 arch)
- **Compiler(s):** g++ (GCC) 3.4.5
- **RMOL release:** 0.23.1
- **External Libraries:** Compiled and installed from portage tree:
  - sci-libs/acml-3.0.0
- **Tests Status:** All tests PASSED
- **Comments:** BLAS and LAPACK libs set by using the following system commands:

```
% eselect blas set ACML
% eselect lapack set ACML
```

RMOL configured with:

```
% export CPPFLAGS="-I/usr/include/acml"
% ./configure --with-blas="-lblas"
```
- **Date:** March 31, 2006
- **Tester:** Adam Piatyszek (ediap)

## 13.3.1.3 Gentoo Linux with ATLAS

- **Platform:** Intel Pentium M Centrino
- **Operating System:** Gentoo Linux 2006.0 (x86)
- **Compiler:** g++ (GCC) 3.4.5
- **RMOL release:** 0.23.1
- **External Libraries:** Compiled and installed from portage tree:
  - sci-libs/fftw-3.1
  - sci-libs/blas-atlas-3.6.0-r1
  - sci-libs/lapack-atlas-3.6.0
- **Tests Status:** All tests PASSED
- **Comments:** BLAS and LAPACK libs set by using the following system commands:

```
% eselect blas set ATLAS
% eselect lapack set ATLAS
```

RMOL configured with:

```
% ./configure --with-blas="-lblas"
```
- **Date:** March 31, 2006
- **Tester:** Adam Piatyszek (ediap)

## 13.3.1.4 Gentoo Linux with MKL

- **Platform:** Intel Pentium M Centrino
- **Operating System:** Gentoo Linux 2006.0 (x86 arch)
- **Compiler:** g++ (GCC) 3.4.5
- **RMOL release:** 0.23.0
- **External Libraries:** Intel Math Kernel Library (MKL) 8.0.1 installed manually in the following directory: /opt/intel/mkl/8.0.1
- **Tests Status:** All tests PASSED
- **Comments:** RMOL configured using the following commands:

```
% export LDFLAGS="-L/opt/intel/mkl/8.0.1/lib/32"
% export CPPFLAGS="-I/opt/intel/mkl/8.0.1/include"
% ./configure
```
- **Date:** February 28, 2006
- **Tester:** Adam Piatyszek (ediap)

## 13.3.1.5 Gentoo Linux with NetLib's BLAS and LAPACK

- **Platform:** Intel Pentium M Centrino
- **Operating System:** Gentoo Linux 2006.0 (x86)
- **Compiler:** g++ (GCC) 3.4.5
- **RMOL release:** 0.23.1
- **External Libraries:** Compiled and installed from portage tree:
  - sci-libs/fftw-3.1
  - sci-libs/blas-reference-19940131-r2
  - sci-libs/cblas-reference-20030223
  - sci-libs/lapack-reference-3.0-r2
- **Tests Status:** All tests PASSED
- **Comments:** BLAS and LAPACK libs set by using the following system commands:

```
% blas-config reference
% lapack-config reference
```

RMOL configured with:

```
% ./configure --with-blas="-lblas"
```
- **Date:** March 31, 2006
- **Tester:** Adam Piatyszek (ediap)

## 13.3.1.6 Red Hat Enterprise Linux with RMOL External

- **Platform:** Intel Pentium 4
- **Operating System:** Red Hat Enterprise Linux AS release 4 (Nahant Update 2)
- **Compiler:** g++ (GCC) 3.4.4 20050721 (Red Hat 3.4.4-2)
- **RMOL release:** 0.23.0
- **External Libraries:** BLAS, CBLAS, LAPACK and FFTW libraries from [RMOL External 2.1.1](#) package
- **Tests Status:** All tests PASSED
- **Date:** March 7, 2006
- **Tester:** Erik G. Larsson

## 13.3.1.7 SUSE Linux 10.0 with NetLib's BLAS and LAPACK

- **Platform:** Intel Pentium 4 CPU 3.20GHz (64-bit)
- **Operating System:** SUSE Linux 10.0 (x86\_64)
- **Compiler(s):** g++ (GCC) 4.0.2
- **RMOL release:** 0.23.0
- **External Libraries:** BLAS, LAPACK and FFTW libraries installed from OpenSuse 10.0 RPM repository:
  - blas-3.0-926
  - lapack-3.0-926
  - fftw3-3.0.1-114
  - fftw3-threads-3.0.1-114
  - fftw3-devel-3.0.1-114
- **Tests Status:** All tests PASSED
- **Comments:** RMOL configured with:

```
% export CXXFLAGS="-m64 -march=nocona -O3 -pipe"
% ./configure --with-lapack="/usr/lib64/liblapack.so.3"
```
- **Date:** March 1, 2006
- **Tester:** Adam Piatyszek (ediap)

## 13.3.1.8 SUSE Linux 10.0 with MKL

- **Platform:** Intel Pentium 4 CPU 3.20GHz (64-bit)
- **Operating System:** SUSE Linux 10.0 (x86\_64)
- **Compiler(s):** g++ (GCC) 4.0.2
- **RMOL release:** 0.23.0
- **External Libraries:** Intel Math Kernel Library (MKL) 8.0.1 installed manually in the following directory: /opt/intel/mkl/8.0.1
- **Tests Status:** All tests PASSED
- **Comments:** RMOL configured with:

```
% export CXXFLAGS="-m64 -march=nocona -O3 -pipe"
% export LDFLAGS="-L/opt/intel/mkl/8.0.1/lib/em64t"
% export CPPFLAGS="-I/opt/intel/mkl/8.0.1/include"
% ./configure
```
- **Date:** March 1, 2006
- **Tester:** Adam Piatyszek (ediap)

### 13.3.2 Windows Systems

#### 13.3.2.1 Microsoft Windows XP with Cygwin

- **Platform:** AMD Sempron 3000+
- **Operating System:** Microsoft Windows XP SP2, Cygwin 1.5.19-4
- **Compiler(s):** g++ (GCC) 3.4.4 (cygming special)
- **RMOL release:** 0.23.1
- **External Libraries:** Installed from Cygwin's repository:
  - fftw-3.0.1-2
  - fftw-dev-3.0.1-1
  - lapack-3.0-4
- **Tests Status:** All tests PASSED
- **Comments:** Only static library can be built. [RMOL](#) configured with:

```
% ./configure
```
- **Date:** March 31, 2006
- **Tester:** Adam Piatyszek (ediap)

#### 13.3.2.2 Microsoft Windows XP with Cygwin and ATLAS

- **Platform:** AMD Sempron 3000+
- **Operating System:** Microsoft Windows XP SP2, Cygwin 1.5.19-4
- **Compiler(s):** g++ (GCC) 3.4.4 (cygming special)
- **RMOL release:** 0.23.1
- **External Libraries:** Installed from Cygwin's repository:
  - fftw-3.0.1-2
  - fftw-dev-3.0.1-1

ATLAS BLAS and LAPACK libraries from [RMOL](#) External 2.1.1 package configured using:

```
% ./configure --enable-atlas --disable-fftw
```
- **Tests Status:** All tests PASSED
- **Comments:** Only static library can be built. [RMOL](#) configured with:

```
% export LDFLAGS="-L/usr/local/lib"
% ./configure
```
- **Date:** March 31, 2006
- **Tester:** Adam Piatyszek (ediap)

## 13.3.2.3 Microsoft Windows XP with Cygwin and ACML

- **Platform:** AMD Sempron 3000+
- **Operating System:** Microsoft Windows XP SP2, Cygwin 1.5.19-4
- **Compiler(s):** g++ (GCC) 3.4.4 (cygming special)
- **RMOL release:** 0.23.2
- **External Libraries:** ACML version 3.1.0 (acml3.1.0-32-win32-g77.exe) installed into a default directory, i.e. "c:\Program Files\AMD\acml3.1.0"
- **Tests Status:** All tests PASSED
- **Comments:** Only static library can be built. [RMOL](#) configured with:

```
% export LDFLAGS="-L/cygdrive/c/Progra~1/AMD/acml3.1.0/gnu32/lib"
% export CPPFLAGS="-I/cygdrive/c/Progra~1/AMD/acml3.1.0/gnu32/include"
% ./configure --enable-debug
```
- **Date:** May 15, 2006
- **Tester:** Adam Piatyszek (ediap)

## 13.3.2.4 Microsoft Windows XP with MinGW, MSYS and ACML

- **Platform:** AMD Sempron 3000+
- **Operating System:** Microsoft Windows XP SP2, MinGW 5.0.2, MSYS 1.0.10
- **Compiler(s):** g++ (GCC) 3.4.4 (mingw special)
- **RMOL release:** 0.23.2
- **External Libraries:** ACML version 3.1.0 (acml3.1.0-32-win32-g77.exe) installed into a default directory, i.e. "c:\Program Files\AMD\acml3.1.0"
- **Tests Status:** All tests PASSED
- **Comments:** Only static library can be built. [RMOL](#) configured with:

```
% export LDFLAGS="-L/c/Progra~1/AMD/acml3.1.0/gnu32/lib"
% export CPPFLAGS="-I/c/Progra~1/AMD/acml3.1.0/gnu32/include"
% ./configure --enable-debug
```
- **Date:** May 15, 2006
- **Tester:** Adam Piatyszek (ediap)

## 13.3.2.5 Microsoft Windows XP with MinGW, MSYS and RMOL External

- **Platform:** AMD Sempron 3000+
- **Operating System:** Microsoft Windows XP SP2, MinGW 5.0.2, MSYS 1.0.10
- **Compiler(s):** g++ (GCC) 3.4.4 (mingw special)
- **RMOL release:** 0.23.5
- **External Libraries:** BLAS, CBLAS, LAPACK and FFTW libraries from [RMOL External 2.2.0](#) package
- **Tests Status:** All tests PASSED
- **Comments:** Only static library can be built. [RMOL](#) configured with:

```
% export LDFLAGS="-L/usr/local/lib"
% export CPPFLAGS="-I/usr/local/include"
% export CXXFLAGS="-Wall -O3 -march=athlon-tbird -pipe"
% ./configure --disable-html-doc
```

- **Date:** August 11, 2006
- **Tester:** Adam Piatyszek (ediap)

## 13.3.2.6 Microsoft Windows XP with MS Visual C++ and Intel MKL

- **Platform:** AMD Sempron 3000+
- **Operating System:** Microsoft Windows XP SP2
- **Compiler(s):** Microsoft Visual C++ 2005 .NET
- **RMOL release:** 0.23.5
- **External Libraries:** Intel Math Kernel Library (MKL) 8.1 installed manually in the following directory: "C:\Program Files\Intel\MKL\8.1"
- **Tests Status:** Not fully tested. Some [RMOL](#) based programs compiled and run with success.
- **Comments:** Only static library can be built. [RMOL](#) built by opening the "win32\rmol.vcproj" project file in MSVC++ and executing "Build -> Build Solution" command from menu.
- **Date:** August 11, 2006
- **Tester:** Adam Piatyszek (ediap)

### 13.3.3 Unix Systems

#### 13.3.3.1 SunOS 5.9 with RMOL External

- **Platform:** SUNW, Sun-Blade-100 (SPARC)
- **Operating System:** SunOS 5.9 Generic\_112233-10
- **Compiler(s):** g++ (GCC) 3.4.5
- **RMOL release:** 0.23.2
- **External Libraries:** BLAS, CBLAS, LAPACK and FFTW libraries from [RMOL External 2.1.1](#) package. The following configuration command has been used:

```
% export CFLAGS="-mcpu=ultrasparc -O2 -pipe -funroll-all-loops"  
% ./configure
```

- **Tests Status:** All tests PASSED
- **Comments:** [RMOL](#) configured with:

```
% export LDFLAGS="-L/usr/local/lib"  
% export CPPFLAGS="-I/usr/local/include"  
% export CXXFLAGS="-mcpu=ultrasparc -O2 -pipe"  
% ./configure --enable-debug
```

- **Date:** May 15, 2006
- **Tester:** Adam Piatyszek (ediap)

## 14 RMOL Supported Systems (Previous Releases)

### 14.1 RMOL 3.9.1

### 14.2 RMOL 3.9.0

### 14.3 RMOL 3.8.1

## 15 Tutorials

### 15.1 Table of Contents

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  - [Preparing the StdAir Project for Development](#)
- [Build a Predefined BOM Tree](#)
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- Instantiate the (Airline) Inventory Object
  - Link the Inventory Object with the BOM Root
  - Build Another Airline Inventory
  - Dump The BOM Tree Content
  - Result of the Tutorial Program
- Extend the Pre-Defined BOM Tree
  - Extend an Airline Inventory Object
  - Build the Specific BOM Objects
  - Result of the Tutorial Program

## 15.2 Introduction

This page contains some tutorial examples that will help you getting started using StdAir. Most examples show how to construct some simple business objects, i.e., instances of the so-named Business Object Model (BOM).

### 15.2.1 Preparing the StdAir Project for Development

The source code for these examples can be found in the `batches` and `test/stdair` directories. They are compiled along with the rest of the StdAir project. See the User Guide ([Users Guide](#)) for more details on how to build the StdAir project.

## 15.3 Build a Predefined BOM Tree

A few steps:

- Instantiate the BOM Root Object
- Instantiate the (Airline) Inventory Object
- Link the Inventory Object with the BOM Root

### 15.3.1 Instantiate the BOM Root Object

First, a BOM root object (i.e., a root for all the classes in the project) is instantiated by the `stdair::STDAIR_ServiceContext` context object, when the `stdair::STDAIR_Service` is itself instantiated. The corresponding StdAir type (class) is `stdair::BomRoot`.

In the following sample, that object is named `ioBomRoot`, and is given as input/output parameter of the `stdair::CmdBomManager::buildSampleBom()` method:

### 15.3.2 Instantiate the (Airline) Inventory Object

An airline inventory object can then be instantiated. Let us give it the "BA" airline code (corresponding to **British Airways**) as the object key. That is, an object (let us name it `lBAKey`) of type (class) `stdair::InventoryKey` has first to be instantiated.

Thanks to that key, an airline inventory object, i.e. of type (class) `stdair::Inventory`, can be instantiated. Let us name that airline inventory object `lBAInv`.

### 15.3.3 Link the Inventory Object with the BOM Root

Then, both objects have to be linked: the airline inventory object (`stdair::Inventory`) has to be linked with the root of the BOM tree (`stdair::BomRoot`). That operation is as simple as using the `stdair::FacBomManager::addToListAndMap()` method:

### 15.3.4 Build Another Airline Inventory

Another airline inventory object, corresponding to the Air France (**Air France**) company, is instantiated the same way:

See the corresponding full program (`cmd_bom_manager_cpp`) for more details.

### 15.3.5 Dump The BOM Tree Content

From the `BomRoot` (of type `stdair::BomRoot`) object instance, the list of airline inventories (of type `stdair::Inventory`) can then be retrieved...

... and browsed:

See the corresponding full program (`bom_display_cpp`) for more details.

## 15.3.6 Result of the Tutorial Program

When the `stdair.cpp` program is run (with the `-b` option), the output should look like:

```
[D]../batches/stdair.cpp:243: Welcome to stdair
[D]../batches/stdair/command/StdBomManager.cpp:41: StdAir will build the BOM tree from
built-in specifications.
[D]../batches/stdair.cpp:286:
=====
BomRoot:  -- ROOT --
=====
+++++
Inventory: BA
+++++
*****
FlightDate: BA9, 2011-Jun-10
*****
*****
Leg-Dates:
-----
Flight, Leg, BoardDate, BoardTime, OffDate, OffTime, Date Offset, Time Offset, El
apsed, Distance, Capacity,
BA9 2011-Jun-10, LHR-BKK, 2011-Jun-10, 21:45:00, 2011-Jun-11, 15:40:00, 11:05:00,
1, 06:50:00, 9900, 0,
BA9 2011-Jun-10, BKK-SYD, 2011-Jun-11, 17:05:00, 2011-Jun-12, 15:40:00, 09:05:00,
1, 13:30:00, 8100, 0,
*****
*****
LegCabins:
-----
Flight, Leg, Cabin, OffedCAP, PhyCAP, RgdADJ, AU, UPR, SS, Staff, WL, Group, Comm
Space, AvPool, Avl, NAV, GAV, ACP, ETB, BidPrice,
BA9 2011-Jun-10, LHR-BKK 2011-Jun-10, Y, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 9, 9, 0, 0
, 3.52965e-319, 0, 0,
BA9 2011-Jun-10, BKK-SYD 2011-Jun-11, Y, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 9, 9, 0, 0
, 0, 0, 0,
*****
*****
Buckets:
-----
Flight, Leg, Cabin, Yield, AU/SI, SS, AV,
*****
*****
SegmentCabins:
-----
Flight, Segment, Cabin, FF, Bkgs, MIN, UPR, CommSpace, AvPool, BP,
BA9 2011-Jun-10, LHR-SYD 2011-Jun-10, Y, EcoSaver, 0, 0, 0, 0, 9, 0,
BA9 2011-Jun-10, LHR-BKK 2011-Jun-10, Y, EcoSaver, 0, 0, 0, 0, 9, 0,
BA9 2011-Jun-10, BKK-SYD 2011-Jun-11, Y, EcoSaver, 0, 0, 0, 0, 9, 0,
*****
*****
Subclasses:
-----
Flight, Segment, Cabin, FF, Subclass, MIN/AU (Prot), Nego, NS%, OB%, Bkgs, GrpBks
(pdg), StfBkgs, WLBkgs, ETB, ClassAvl, RevAvl, SegAvl,
BA9 2011-Jun-10, LHR-SYD 2011-Jun-10, Y, EcoSaver, Q, 0 (0), 0, 0, 0, 0, 0 (0), 0
, 0, 0, 0, 0, 0,
+++++
Inventory: AF
+++++
```

```

*****
FlightDate: AF84, 2011-Mar-20
*****
*****
Leg-Dates:
-----
Flight, Leg, BoardDate, BoardTime, OffDate, OffTime, Date Offset, Time Offset, El
apsed, Distance, Capacity,
AF84 2011-Mar-20, CDG-SFO, 2011-Mar-20, 10:40:00, 2011-Mar-20, 12:50:00, 11:10:00
, 0, -09:00:00, 9900, 0,
*****
*****
LegCabins:
-----
Flight, Leg, Cabin, OffedCAP, PhyCAP, RgdADJ, AU, UPR, SS, Staff, WL, Group, Comm
Space, AvPool, Avl, NAV, GAV, ACP, ETB, BidPrice,
AF84 2011-Mar-20, CDG-SFO 2011-Mar-20, Y, 0, 0, 0, 0, 0, 0, 0, 0, 0, 9, 9, 0,
0, 0, 0, 0,
*****
*****
Buckets:
-----
Flight, Leg, Cabin, Yield, AU/SI, SS, AV,
*****
*****
SegmentCabins:
-----
Flight, Segment, Cabin, FF, Bkgs, MIN, UPR, CommSpace, AvPool, BP,
AF84 2011-Mar-20, CDG-SFO 2011-Mar-20, Y, EcoSaver, 0, 0, 0, 0, 9, 0,
*****
*****
Subclasses:
-----
Flight, Segment, Cabin, FF, Subclass, MIN/AU (Prot), Nego, NS%, OB%, Bkgs, GrpBks
(pdg), StfBkgs, WLBkgs, ETB, ClassAvl, RevAvl, SegAvl,
AF84 2011-Mar-20, CDG-SFO 2011-Mar-20, Y, EcoSaver, Q, 0 (0), 0, 0, 0, 0, 0 (0),
0, 0, 0, 0, 0, 0,

```

See the corresponding full program (batch\_stdair\_cpp) for more details.

## 15.4 Extend the Pre-Defined BOM Tree

Now that we master how to instantiate the pre-defined StdAir classes, let us see how to extend that BOM.

### 15.4.1 Extend an Airline Inventory Object

For instance, let us assume that some (IT) provider (e.g., you) would like to have a specific implementation of the `Inventory` object. The corresponding class has just to extend the `stdair::Inventory` class:

The STL containers have to be defined accordingly too:

See the full class definition (`test_archi_inv.hpp`) and implementation (`test_archi_inv.cpp`) for more details.

#### 15.4.2 Build the Specific BOM Objects

The BOM root object (`stdair::BomRoot`) is instantiated the classical way:

Then, the specific implementation of the airline inventory object (`myprovider::Inventory`) can be instantiated the same way as a standard `Inventory` (`stdair::Inventory`) would be:

Then, the specific implementation of the airline inventory object (`myprovider::Inventory`) is linked to the root of the BOM tree (`stdair::BomRoot`) the same way as the standard `Inventory` (`stdair::Inventory`) would be:

Another specific airline inventory object is instantiated the same way:

From the `BomRoot` (of type `stdair::BomRoot`) object instance, the list of specific airline inventories (of type `stdair::Inventory`) can then be retrieved...

... and browsed:

#### 15.4.3 Result of the Tutorial Program

When this program is run, the output should look like:

```
Inventory: BA
Inventory: AF
```

See the corresponding full program (`StandardAirlineITTestSuite.cpp`) for more details.

## 16 Command-Line Test to Demonstrate How To Test the RMOL Project

```

*/
// ////////////////////////////////////////
// Import section
// ////////////////////////////////////////
// STL
#include <cassert>
#include <limits>
#include <sstream>
#include <fstream>
#include <string>
// Boost Unit Test Framework (UTF)
#define BOOST_TEST_DYN_LINK
#define BOOST_TEST_MAIN
#define BOOST_TEST_MODULE OptimiseTestSuite
#include <boost/test/unit_test.hpp>
// StdAir
#include <stdair/basic/BasLogParams.hpp>
#include <stdair/basic/BasDBParams.hpp>
#include <stdair/service/Logger.hpp>
// RMOL
#include <rmol/RMOL_Service.hpp>
#include <rmol/config/rmol-paths.hpp>

namespace boost_utf = boost::unit_test;

// (Boost) Unit Test XML Report
std::ofstream utfReportStream ("bomsforforecaster_utfresults.xml");

struct UnitTestConfig {
    UnitTestConfig() {
        boost_utf::unit_test_log.set_stream (utfReportStream);
        boost_utf::unit_test_log.set_format (boost_utf::XML);
        boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
        //boost_utf::unit_test_log.set_threshold_level (boost_utf::log_successful_test);
    }

    ~UnitTestConfig() {
    }
};

namespace RMOL {

    struct BookingClassData {

        // Attributes
        double _bookingCount;
        double _fare;
        double _sellupFactor;
        bool _censorshipFlag;

        // Constructor
        BookingClassData (const double iBookingCount, const double iFare,
                         const double iSellupFactor, const bool iCensorshipFlag)
            : _bookingCount(iBookingCount), _fare(iFare),
              _sellupFactor(iSellupFactor), _censorshipFlag(iCensorshipFlag) {
        }

        // Getters
        double getFare () const {

```

```

        return _fare;
    }

    bool getCensorshipFlag () const {
        return _censorshipFlag;
    }

    // Display
    std::string toString() const {
        std::ostringstream oStr;
        oStr << std::endl
            << "[Booking class data information]" << std::endl
            << "Booking counter: " << _bookingCount << std::endl
            << "Fare: " << _fare << std::endl
            << "Sell-up Factor: " << _sellupFactor << std::endl
            << "censorshipFlag: " << _censorshipFlag << std::endl;
        return oStr.str();
    }
};

struct BookingClassDataSet {

    typedef std::vector<BookingClassData*> BookingClassDataList_T;

    // Attributes
    int _numberOfClass;
    double _minimumFare;
    bool _censorshipFlag; // true if any of the classes is censored
    BookingClassDataList_T _bookingClassDataList;

    // Constructor
    BookingClassDataSet ()
        : _numberOfClass(0), _minimumFare(0),
          _censorshipFlag(false) {
    }

    // Add BookingClassData
    void addBookingClassData (BookingClassData& ioBookingClassData) {
        _bookingClassDataList.push_back (&ioBookingClassData);
    }

    // Getters
    unsigned int getNumberOfClass () const {
        return _bookingClassDataList.size();
    }

    double getMinimumFare () const {
        return _minimumFare;
    }

    bool getCensorshipFlag () const {
        return _censorshipFlag;
    }

    // Setters
    void setMinimumFare (const double iMinFare) {
        _minimumFare = iMinFare;
    }

    void setCensorshipFlag (const bool iCensorshipFlag) {
        _censorshipFlag = iCensorshipFlag;
    }
};

```

```

    }

    // compute minimum fare
    void updateMinimumFare() {
        double minFare = std::numeric_limits<double>::max();
        BookingClassDataList_T::iterator itBookingClassDataList;
        for (itBookingClassDataList = _bookingClassDataList.begin();
            itBookingClassDataList != _bookingClassDataList.end();
            ++itBookingClassDataList) {
            BookingClassData* lBookingClassData = *itBookingClassDataList;
            assert (lBookingClassData != NULL);

            const double lFare = lBookingClassData->getFare();
            if (lFare < minFare) {
                minFare = lFare;
            }
        }
        //
        setMinimumFare(minFare);
    }

    // compute censorship flag for the data set
    void updateCensorshipFlag () {
        bool censorshipFlag = false;
        BookingClassDataList_T::iterator itBookingClassDataList;
        for (itBookingClassDataList = _bookingClassDataList.begin();
            itBookingClassDataList != _bookingClassDataList.end();
            ++itBookingClassDataList) {
            BookingClassData* lBookingClassData = *itBookingClassDataList;
            assert (lBookingClassData != NULL);

            const bool lCensorshipFlagOfAClass =
                lBookingClassData->getCensorshipFlag();
            if (lCensorshipFlagOfAClass) {
                censorshipFlag = true;
                break;
            }
        }
        //
        setCensorshipFlag(censorshipFlag);
    }

    // Display
    std::string toString() const {
        std::ostringstream oStr;
        oStr << std::endl
            << "[Booking class data set information]" << std::endl
            << "Number of classes: " << _numberOfClass << std::endl
            << "Minimum fare: " << _minimumFare << std::endl
            << "The data of the class set are sensed: " << _censorshipFlag
            << std::endl;
        return oStr.str();
    }
}

};

// /**----- BOM : Q-Forecaster ----- */
// struct QForecaster {

//     // Function focused BOM

//     // 1. calculate sell up probability for Q-eq

```



```
// // 2. calculate Q-Equivalent Booking
// double calculateQEqBooking (BookingClassDataSet& iBookingClassDataSet) {
//     double lQEqBooking = 0.0;
//     double lMinFare = iBookingClassDataSet.getMinimumFare();

//     return lQEqBooking;
// }

// /* Calculate Q-equivalent demand
//     [<- performed by unconstrainer if necessary (Using ExpMax BOM)]
// */

// // 3. Partition to each class
// //

// };

}

// ////////////////////////////////// Main: Unit Test Suite //////////////////////////////////

// Set the UTF configuration (re-direct the output to a specific file)
BOOST_GLOBAL_FIXTURE (UnitTestFixture);

BOOST_AUTO_TEST_SUITE (master_test_suite)

BOOST_AUTO_TEST_CASE (rmol_forecaster) {

    // Output log File
    std::string lLogFilename ("bomsforforecaster.log");
    std::ofstream logOutputFile;

    // Open and clean the log outputfile
    logOutputFile.open (lLogFilename.c_str());
    logOutputFile.clear();

    // Initialise the RMOL service
    const stdair::BasLogParams lLogParams (stdair::LOG::DEBUG, logOutputFile);

    // Initialise the RMOL service
    RMOL::RMOL_Service rmolService (lLogParams);

    // Build a sample BOM tree
    rmolService.buildSampleBom();

    // Register BCDDataSet
    RMOL::BookingClassDataSet lBookingClassDataSet;

    // Register BookingClassData
    RMOL::BookingClassData QClassData (10, 100, 1, false);
    RMOL::BookingClassData MClassData (5, 150, 0.8, true);
    RMOL::BookingClassData BClassData (0, 200, 0.6, false);
    RMOL::BookingClassData YClassData (0, 300, 0.3, false);

    // Display
    STDAIR_LOG_DEBUG (QClassData.toString());
    STDAIR_LOG_DEBUG (MClassData.toString());
```

```

STDAlR_LOG_DEBUG (BClassData.toString());
STDAlR_LOG_DEBUG (YClassData.toString());

// Add BookingClassData into the BCDataset
lBookingClassDataSet.addBookingClassData (QClassData);
lBookingClassDataSet.addBookingClassData (MClassData);
lBookingClassDataSet.addBookingClassData (BClassData);
lBookingClassDataSet.addBookingClassData (YClassData);

// DEBUG
STDAlR_LOG_DEBUG (lBookingClassDataSet.toString());

// Number of classes
const unsigned int lNoOfClass = lBookingClassDataSet.getNumberOfClass();

// DEBUG
STDAlR_LOG_DEBUG ("Number of Classes: " << lNoOfClass);

// Minimum fare
BOOST_CHECK_NO_THROW (lBookingClassDataSet.updateMinimumFare());
const double lMinFare = lBookingClassDataSet.getMinimumFare();

// DEBUG
STDAlR_LOG_DEBUG ("Minimum fare: " << lMinFare);

// Censorship flag
BOOST_CHECK_NO_THROW (lBookingClassDataSet.updateCensorshipFlag());
const bool lCensorshipFlag = lBookingClassDataSet.getCensorshipFlag();

// DEBUG
STDAlR_LOG_DEBUG ("Censorship Flag: " << lCensorshipFlag);

// Close the log output file
logOutputFile.close();
}

// End the test suite
BOOST_AUTO_TEST_SUITE_END()

/*!

```

## 17 Command-Line Test to Demonstrate How To Test the RMOL Project

```

*/
// ////////////////////////////////////////
// Import section
// ////////////////////////////////////////
// STL
#include <sstream>
#include <fstream>
#include <string>
#include <vector>
#include <cmath>
// Boost Unit Test Framework (UTF)
#define BOOST_TEST_DYN_LINK
#define BOOST_TEST_MAIN
#define BOOST_TEST_MODULE ForecasterTestSuite
#include <boost/test/unit_test.hpp>
// StdAir
#include <stdair/basic/BasLogParams.hpp>

```

```

#include <stdair/basic/BasDBParams.hpp>
#include <stdair/basic/BasFileMgr.hpp>
#include <stdair/service/Logger.hpp>
// RMOL
#include <rmol/RMOL_Service.hpp>

namespace boost_utf = boost::unit_test;

// (Boost) Unit Test XML Report
std::ofstream utfReportStream ("ForecasterTestSuite_utfresults.xml");

struct UnitTestConfig {
    UnitTestConfig() {
        boost_utf::unit_test_log.set_stream (utfReportStream);
        boost_utf::unit_test_log.set_format (boost_utf::XML);
        boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
        //boost_utf::unit_test_log.set_threshold_level (boost_utf::log_successful_tests);
    }

    ~UnitTestConfig() {
    }
};

// //////////// Main: Unit Test Suite ////////////

// Set the UTF configuration (re-direct the output to a specific file)
BOOST_GLOBAL_FIXTURE (UnitTestConfig);

BOOST_AUTO_TEST_SUITE (master_test_suite)

BOOST_AUTO_TEST_CASE (rmol_forecaster_q_forecasting) {
    const bool lTestFlag = true; //testForecasterHelper(0);
    BOOST_CHECK_EQUAL (lTestFlag, true);
    BOOST_CHECK_MESSAGE (lTestFlag == true,
        "The test has failed. Please see the log file for "
        "<< \"more details\"");
}

// End the test suite
BOOST_AUTO_TEST_SUITE_END()

/*!

```

## 18 Command-Line Test to Demonstrate How To Test the RMOL Project

```

*/
// //////////////////////////////////////
// Import section
// //////////////////////////////////////
// STL
#include <sstream>
#include <fstream>
#include <string>
// Boost Unit Test Framework (UTF)
#define BOOST_TEST_DYN_LINK
#define BOOST_TEST_MAIN
#define BOOST_TEST_MODULE OptimiseTestSuite

```

```

#include <boost/test/unit_test.hpp>
// StdAir
#include <stdair/basic/BasLogParams.hpp>
#include <stdair/basic/BasDBParams.hpp>
#include <stdair/basic/BasFileMgr.hpp>
#include <stdair/service/Logger.hpp>
// RMOL
#include <rmol/RMOL_Service.hpp>
#include <rmol/config/rmol-paths.hpp>

namespace boost_utf = boost::unit_test;

// (Boost) Unit Test XML Report
std::ofstream utfReportStream ("OptimiseTestSuite_utfresults.xml");

struct UnitTestConfig {
    UnitTestConfig() {
        boost_utf::unit_test_log.set_stream (utfReportStream);
        boost_utf::unit_test_log.set_format (boost_utf::XML);
        boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
        //boost_utf::unit_test_log.set_threshold_level (boost_utf::log_successful_tests);
    }

    ~UnitTestConfig() {
    }
};

// ////////////////////////////////////////
int testOptimiseHelper (const unsigned short optimisationMethodFlag,
                        const bool isBuiltin) {

    // Return value
    int oExpectedBookingLimit = 0;

    // Output log File
    std::ostringstream oStr;
    oStr << "OptimiseTestSuite_" << optimisationMethodFlag << ".log";
    const stdair::Filename_T lLogFilename (oStr.str());

    // Number of random draws to be generated (best if greater than 100)
    const int K = 100000;

    // Methods of optimisation (0 = Monte-Carlo, 1 = Dynamic Programming,
    // 2 = EMSR, 3 = EMSR-a, 4 = EMSR-b, 5 = EMSR-a with sellup prob.)
    const unsigned short METHOD_FLAG = optimisationMethodFlag;

    // Cabin Capacity (it must be greater then 100 here)
    const double cabinCapacity = 100.0;

    // Set the log parameters
    std::ofstream logOutputFile;
    // Open and clean the log outputfile
    logOutputFile.open (lLogFilename.c_str());
    logOutputFile.clear();

    // Initialise the RMOL service
    const stdair::BasLogParams lLogParams (stdair::LOG::DEBUG, logOutputFile);
    RMOL::RMOL_Service rmolService (lLogParams);

    // Check whether or not a (CSV) input file should be read

```

```
if (isBuiltin == true) {

    // Build the default sample BOM tree and build a dummy BOM tree.
    rmolService.buildSampleBom();

} else {

    // Parse the optimisation data and build a dummy BOM tree
    const stdair::Filename_T lRMInputFileName (STDAIR_SAMPLE_DIR "/rm02.csv");
    rmolService.parseAndLoad (cabinCapacity, lRMInputFileName);
}

switch (METHOD_FLAG) {
case 0: {
    // DEBUG
    STDAIR_LOG_DEBUG ("Optimisation by Monte-Carlo (MC)");

    // Calculate the optimal protections by the Monte Carlo
    // Integration approach
    rmolService.optimalOptimisationByMCIntegration (K);
    break;
}

case 1: {
    // DEBUG
    STDAIR_LOG_DEBUG ("Optimisation by Dynamic Programming (DP)");

    // Calculate the optimal protections by DP.
    rmolService.optimalOptimisationByDP ();
    break;
}

case 2: {
    // DEBUG
    STDAIR_LOG_DEBUG ("Calculate the Bid-Price Vectors (BPV) by EMSR");

    // Calculate the Bid-Price Vector by EMSR
    rmolService.heuristicOptimisationByEmsr ();
    break;
}

case 3: {
    // DEBUG
    STDAIR_LOG_DEBUG ("Calculate the Authorisation Levels (AUs) by EMSRa");

    // Calculate the protections by EMSR-a
    // Test the EMSR-a algorithm implementation
    rmolService.heuristicOptimisationByEmsrA ();

    // Return a cumulated booking limit value to test
    // oExpectedBookingLimit = static_cast<int> (lBookingLimitVector.at(2));
    break;
}

case 4: {
    // DEBUG
    STDAIR_LOG_DEBUG ("Calculate the Authorisation Levels (AUs) by EMSRb");

    // Calculate the protections by EMSR-b
    rmolService.heuristicOptimisationByEmsrB ();
    break;
}
```

```

    default: rmolService.optimalOptimisationByMCIntegration (K);
}

// Close the log file
logOutputFile.close();

return oExpectedBookingLimit;
}

// ////////////////////////////////// Main: Unit Test Suite //////////////////////////////////

// Set the UTF configuration (re-direct the output to a specific file)
BOOST_GLOBAL_FIXTURE (UnitTestFixture);

// ////////////////////////////////////////
// Tests are based on the following input values
// price; mean; standard deviation;
// 1050; 17.3; 5.8;
// 567; 45.1; 15.0;
// 534; 39.6; 13.2;
// 520; 34.0; 11.3;
// ////////////////////////////////////////

BOOST_AUTO_TEST_SUITE (master_test_suite)

BOOST_AUTO_TEST_CASE (rmol_optimisation_monte_carlo) {

    // State whether the BOM tree should be built-in or parsed from an input file
    const bool isBuiltin = false;

    BOOST_CHECK_NO_THROW (testOptimiseHelper(0, isBuiltin));
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_dynamic_programming) {

    // State whether the BOM tree should be built-in or parsed from an input file
    const bool isBuiltin = false;

    BOOST_CHECK_NO_THROW (testOptimiseHelper(1, isBuiltin));
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_bpv) {

    // State whether the BOM tree should be built-in or parsed from an input file
    const bool isBuiltin = false;

    BOOST_CHECK_NO_THROW (testOptimiseHelper(2, isBuiltin));
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_a) {

    // State whether the BOM tree should be built-in or parsed from an input file
    const bool isBuiltin = false;

    BOOST_CHECK_NO_THROW (testOptimiseHelper(3, isBuiltin));
    // const int lBookingLimit = testOptimiseHelper(3);
    // const int lExpectedBookingLimit = 61;
    // BOOST_CHECK_EQUAL (lBookingLimit, lExpectedBookingLimit);
    // BOOST_CHECK_MESSAGE (lBookingLimit == lExpectedBookingLimit,

```

```
//          "The booking limit is " << lBookingLimit
//          << ", but it is expected to be "
//          << lExpectedBookingLimit);
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_b) {

    // State whether the BOM tree should be built-in or parsed from an input file
    const bool isBuiltin = false;

    BOOST_CHECK_NO_THROW (testOptimiseHelper(4, isBuiltin));
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_monte_carlo_built_in) {

    // State whether the BOM tree should be built-in or parsed from an input file
    const bool isBuiltin = true;

    BOOST_CHECK_NO_THROW (testOptimiseHelper(5, isBuiltin));
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_dynamic_programming_built_in) {

    // State whether the BOM tree should be built-in or parsed from an input file
    const bool isBuiltin = true;

    BOOST_CHECK_NO_THROW (testOptimiseHelper(6, isBuiltin));
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_bpv_built_in) {

    // State whether the BOM tree should be built-in or parsed from an input file
    const bool isBuiltin = true;

    BOOST_CHECK_NO_THROW (testOptimiseHelper(7, isBuiltin));
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_a_built_in) {

    // State whether the BOM tree should be built-in or parsed from an input file
    const bool isBuiltin = true;

    BOOST_CHECK_NO_THROW (testOptimiseHelper(8, isBuiltin));
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_b_built_in) {

    // State whether the BOM tree should be built-in or parsed from an input file
    const bool isBuiltin = true;

    BOOST_CHECK_NO_THROW (testOptimiseHelper(9, isBuiltin));
}

// End the test suite
BOOST_AUTO_TEST_SUITE_END()

/*!
```

## 19 Command-Line Test to Demonstrate How To Test the RMOL Project

```

*/
// ////////////////////////////////////////
// Import section
// ////////////////////////////////////////
// STL
#include <sstream>
#include <fstream>
#include <string>
// Boost Unit Test Framework (UTF)
#define BOOST_TEST_DYN_LINK
#define BOOST_TEST_MAIN
#define BOOST_TEST_MODULE UnconstrainerTestSuite
#include <boost/test/unit_test.hpp>
// StdAir
#include <stdair/basic/BasLogParams.hpp>
#include <stdair/basic/BasDBParams.hpp>
#include <stdair/basic/BasFileMgr.hpp>
#include <stdair/service/Logger.hpp>
// RMOL
#include <rmol/RMOL_Service.hpp>

namespace boost_utf = boost::unit_test;

// (Boost) Unit Test XML Report
std::ofstream utfReportStream ("UnconstrainerTestSuite_utfresults.xml");

struct UnitTestConfig {
    UnitTestConfig() {
        boost_utf::unit_test_log.set_stream (utfReportStream);
        boost_utf::unit_test_log.set_format (boost_utf::XML);
        boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
        //boost_utf::unit_test_log.set_threshold_level (boost_utf::log_successful_tests);
    }

    ~UnitTestConfig() {
    }
};

// ////////////////////////////////// Main: Unit Test Suite //////////////////////////////////

// Set the UTF configuration (re-direct the output to a specific file)
BOOST_GLOBAL_FIXTURE (UnitTestConfig);

BOOST_AUTO_TEST_SUITE (master_test_suite)

BOOST_AUTO_TEST_CASE (rmol_unconstraining_em) {
    const bool lTestFlag = true; // testUnconstrainerHelper(0);
    BOOST_CHECK_EQUAL (lTestFlag, true);
    BOOST_CHECK_MESSAGE (lTestFlag == true,
        "The test has failed. Please see the log file for "
        "<< \"more details\"");
}

// End the test suite
BOOST_AUTO_TEST_SUITE_END()

/*!

```



## 20 Directory Hierarchy

### 20.1 Directories

This directory hierarchy is sorted roughly, but not completely, alphabetically:

<b>rmol</b>	<b>69</b>
<b>basic</b>	<b>67</b>
<b>batches</b>	<b>67</b>
<b>bom</b>	<b>67</b>
<b>old</b>	<b>68</b>
<b>command</b>	<b>68</b>
<b>config</b>	<b>68</b>
<b>factory</b>	<b>68</b>
<b>service</b>	<b>69</b>
<b>test</b>	<b>69</b>
<b>rmol</b>	<b>68</b>

## 21 Namespace Index

### 21.1 Namespace List

Here is a list of all namespaces with brief descriptions:

<b>RMOL</b>	<b>69</b>
<b>stdair</b>	<b>73</b>

## 22 Class Index

### 22.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

```
std::basic_fstream< char >  
std::basic_fstream< wchar_t >  
std::basic_ifstream< char >  
std::basic_ifstream< wchar_t >
```

```

std::basic_ios< char >
std::basic_ios< wchar_t >
std::basic_iostream< char >
std::basic_iostream< wchar_t >
std::basic_istream< char >
std::basic_istream< wchar_t >
std::basic_istreamstream< char >
std::basic_istreamstream< wchar_t >
std::basic_ofstream< char >
std::basic_ofstream< wchar_t >
std::basic_ostream< char >
std::basic_ostream< wchar_t >
std::basic_ostreamstream< char >
std::basic_ostreamstream< wchar_t >
std::basic_string< char >
std::basic_string< wchar_t >
std::basic_stringstream< char >
std::basic_stringstream< wchar_t >

```

<b>CmdAbstract</b>	<b>74</b>
<b>RMOL::InventoryParser</b>	<b>95</b>
<b>RMOL::DefaultDCPList</b>	<b>74</b>
<b>RMOL::DefaultMap</b>	<b>75</b>
<b>RMOL::DemandGeneratorList</b>	<b>75</b>
<b>RMOL::Detruncator</b>	<b>76</b>
<b>RMOL::DPOptimiser</b>	<b>78</b>
<b>RMOL::EMDetruncator</b>	<b>79</b>
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### 24.1 File List

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## 25 Directory Documentation

### 25.1 rmol/basic/ Directory Reference

#### Files

- file [BasConst.cpp](#)
- file [BasConst\\_Curves.hpp](#)
- file [BasConst\\_General.hpp](#)
- file [BasConst\\_RMOL\\_Service.hpp](#)

### 25.2 rmol/batches/ Directory Reference

#### Files

- file [rmol.cpp](#)

### 25.3 rmol/bom/ Directory Reference

#### Directories

- directory [old](#)

#### Files

- file [BucketHolderTypes.hpp](#)
- file [DistributionParameterList.hpp](#)
- file [DPOptimiser.cpp](#)
- file [DPOptimiser.hpp](#)
- file [EMDetruncator.cpp](#)
- file [EMDetruncator.hpp](#)
- file [Emsr.cpp](#)
- file [Emsr.hpp](#)
- file [EmsrUtils.cpp](#)
- file [EmsrUtils.hpp](#)
- file [GuillotineBlockHelper.cpp](#)
- file [GuillotineBlockHelper.hpp](#)
- file [HistoricalBooking.cpp](#)
- file [HistoricalBooking.hpp](#)
- file [HistoricalBookingHolder.cpp](#)
- file [HistoricalBookingHolder.hpp](#)
- file [MCOptimiser.cpp](#)
- file [MCOptimiser.hpp](#)
- file [Utilities.cpp](#)
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## 25.4 rmol/command/ Directory Reference

### Files

- file [Detruncator.cpp](#)
- file [Detruncator.hpp](#)
- file [Forecaster.cpp](#)
- file [Forecaster.hpp](#)
- file [InventoryParser.cpp](#)
- file [InventoryParser.hpp](#)
- file [Optimiser.cpp](#)
- file [Optimiser.hpp](#)

## 25.5 rmol/config/ Directory Reference

### Files

- file [rmol-paths.hpp](#)

## 25.6 rmol/factory/ Directory Reference

### Files

- file [FacRmolServiceContext.cpp](#)
- file [FacRmolServiceContext.hpp](#)

## 25.7 rmol/bom/old/ Directory Reference

### Files

- file [DemandGeneratorList.cpp](#)
- file [DemandGeneratorList.hpp](#)

## 25.8 test/rmol/ Directory Reference

### Files

- file [bomsforforecaster.cpp](#)
- file [ForecasterTestSuite.cpp](#)
- file [ForecasterTestSuite.hpp](#)
- file [OptimiseTestSuite.cpp](#)
- file [OptimiseTestSuite.hpp](#)
- file [UnconstrainerTestSuite.cpp](#)
- file [UnconstrainerTestSuite.hpp](#)



## 25.9 rmol/ Directory Reference

### Directories

- directory [basic](#)
- directory [batches](#)
- directory [bom](#)
- directory [command](#)
- directory [config](#)
- directory [factory](#)
- directory [service](#)

### Files

- file [RMOL\\_Service.hpp](#)
- file [RMOL\\_Types.hpp](#)

## 25.10 rmol/service/ Directory Reference

### Files

- file [RMOL\\_Service.cpp](#)
- file [RMOL\\_ServiceContext.cpp](#)
- file [RMOL\\_ServiceContext.hpp](#)

## 25.11 test/ Directory Reference

### Directories

- directory [rmol](#)

## 26 Namespace Documentation

### 26.1 RMOL Namespace Reference

#### Classes

- struct [DefaultMap](#)
- struct [DefaultDCPList](#)
- class [DPOptimiser](#)
- class [EMDetruncator](#)
- class [Emsr](#)
- class [EmsrUtils](#)
- class [GuillotineBlockHelper](#)

- struct [HistoricalBooking](#)  
*Structure keeping track, for a given class, of the number of historical bookings and of the censorship flag.*
- struct [HistoricalBookingHolder](#)
- class [MCOptimiser](#)
- class [DemandGeneratorList](#)
- class [Utilities](#)
- class [Detruncator](#)
- class [Forecaster](#)
- class [InventoryParser](#)  
*Class filling the virtual class list (representing a list of classes/buckets) from a given input inventory.*
- class [Optimiser](#)
- class [FacRmolServiceContext](#)  
*Factory for the service context.*
- class [RMOL\\_Service](#)  
*Interface for the RMOL Services.*
- class [OverbookingException](#)  
*Overbooking-related exception.*
- class [UnconstrainingException](#)  
*Unconstraining-related exception.*
- class [ForecastException](#)  
*Forecast-related exception.*
- class [OptimisationException](#)  
*Optimisation-related exception.*
- class [RMOL\\_ServiceContext](#)  
*Inner class holding the context for the RMOL Service object.*

#### Typedefs

- typedef std::list< BucketHolder \* > [BucketHolderList\\_T](#)
- typedef std::list< FldDistributionParameters > [DistributionParameterList\\_T](#)
- typedef std::vector< [HistoricalBooking](#) > [HistoricalBookingVector\\_T](#)
- typedef boost::shared\_ptr< [RMOL\\_Service](#) > [RMOL\\_ServicePtr\\_T](#)
- typedef std::vector< stdair::NbOfRequests\_T > [UnconstrainedDemandVector\\_T](#)
- typedef std::vector< stdair::NbOfBookings\_T > [BookingVector\\_T](#)
- typedef std::vector< stdair::Flag\_T > [FlagVector\\_T](#)
- typedef std::map< stdair::BookingClass \*, [UnconstrainedDemandVector\\_T](#) > [BookingClassUnconstrainedDemandVector\\_T](#)
- typedef std::map< stdair::BookingClass \*, stdair::NbOfRequests\_T > [BookingClassUnconstrainedDemandMap\\_T](#)
- typedef std::map< const stdair::DTD\_T, double > [FRAT5Curve\\_T](#)

## Variables

- const stdair::AirlineCode\_T [DEFAULT\\_RMOL\\_SERVICE\\_AIRLINE\\_CODE](#) = "BA"
- const double [DEFAULT\\_RMOL\\_SERVICE\\_CAPACITY](#) = 1.0
- const int [DEFAULT\\_NUMBER\\_OF\\_DRAWS\\_FOR\\_MC\\_SIMULATION](#) = 100000
- const int [DEFAULT\\_PRECISION](#) = 10
- const double [DEFAULT\\_EPSILON](#) = 0.0001
- const double [DEFAULT\\_STOPPING\\_CRITERION](#) = 0.01
- const double [DEFAULT\\_INITIALIZER\\_DOUBLE\\_NEGATIVE](#) = -10.0
- const [FRAT5Curve\\_T](#) [DEFAULT\\_CUMULATIVE\\_FRAT5\\_CURVE](#)
- const stdair::DCPList\_T [DEFAULT\\_DCP\\_LIST](#) = DefaultDCPList::init()

## 26.1.1 Typedef Documentation

26.1.1.1 `typedef std::list<BucketHolder*> RMOL::BucketHolderList_T`

Define a vector (ordered list) of N bucket/classe holders.

Definition at line 16 of file [BucketHolderTypes.hpp](#).

26.1.1.2 `typedef std::list<FldDistributionParameters>  
RMOL::DistributionParameterList_T`

Define the set of parameters, each of one wrapping a pair of distribution parameters (i.e., mean and standard deviation).

Definition at line 16 of file [DistributionParameterList.hpp](#).

26.1.1.3 `typedef std::vector<HistoricalBooking> RMOL::HistoricalBookingVector_T`

Define a vector (ordered list) of N HistoricalBookings.

Definition at line 16 of file [HistoricalBookingHolder.hpp](#).

26.1.1.4 `typedef boost::shared_ptr<RMOL_Service> RMOL::RMOL_ServicePtr_T`

Pointer on the [RMOL](#) Service handler.

Definition at line 73 of file [RMOL\\_Types.hpp](#).

26.1.1.5 `typedef std::vector<stdair::NbOfRequests_T>  
RMOL::UnconstrainedDemandVector_T`

Define the vector of historical unconstrained demand.

Definition at line 76 of file [RMOL\\_Types.hpp](#).

26.1.1.6 `typedef std::vector<stdair::NbOfBookings_T> RMOL::BookingVector_T`

Define the vector of historical bookings.

Definition at line 79 of file [RMOL\\_Types.hpp](#).

**26.1.1.7** `typedef std::vector<stdair::Flag_T> RMOL::FlagVector_T`

Define the vector of censorship flags.

Definition at line 82 of file [RMOL\\_Types.hpp](#).

**26.1.1.8** `typedef std::map<stdair::BookingClass*, UnconstrainedDemandVector_T>  
RMOL::BookingClassUnconstrainedDemandVectorMap_T`

Define the map between the booking class and it's corresponding unconstrained demand vector.

Definition at line 86 of file [RMOL\\_Types.hpp](#).

**26.1.1.9** `typedef std::map<stdair::BookingClass*, stdair::NbOfRequests_T>  
RMOL::BookingClassUnconstrainedDemandMap_T`

Define the map between the booking class and it's corresponding unconstrained demand.

Definition at line 90 of file [RMOL\\_Types.hpp](#).

**26.1.1.10** `typedef std::map<const stdair::DTD_T, double> RMOL::FRAT5Curve_T`

Define the FRAT5 curve.

Definition at line 93 of file [RMOL\\_Types.hpp](#).

## 26.1.2 Variable Documentation

**26.1.2.1** `const stdair::AirlineCode_T RMOL::DEFAULT_RMOL_SERVICE_AIRLINE_  
CODE = "BA"`

Default airline code for the [RMOL\\_Service](#).

Definition at line 11 of file [BasConst.cpp](#).

**26.1.2.2** `const double RMOL::DEFAULT_RMOL_SERVICE_CAPACITY = 1.0`

Default capacity for the [RMOL\\_Service](#).

Definition at line 14 of file [BasConst.cpp](#).

**26.1.2.3** `const int RMOL::DEFAULT_NUMBER_OF_DRAWS_FOR_MC_SIMULATION  
= 100000`

Default value for the number of draws within the Monte-Carlo Integration algorithm.

Definition at line 18 of file [BasConst.cpp](#).

**26.1.2.4** `const int RMOL::DEFAULT_PRECISION = 10`

Default value for the precision of the integral computation in the Dynamic Programming algorithm (100 means that the precision will be 0.01).

Default value for the precision of the integral computation in the Dynamic Programming algorithm.

Definition at line 23 of file [BasConst.cpp](#).

**26.1.2.5** `const double RMOL::DEFAULT_EPSILON = 0.0001`

Default epsilon value to qualify a denominator

Definition at line 26 of file [BasConst.cpp](#).

**26.1.2.6** `const double RMOL::DEFAULT_STOPPING_CRITERION = 0.01`

Default stopping value for an iterative algorithm.

Definition at line 29 of file [BasConst.cpp](#).

**26.1.2.7** `const double RMOL::DEFAULT_INITIALIZER_DOUBLE_NEGATIVE = -10.0`

Default negative value used to initialize a double variable.

Definition at line 32 of file [BasConst.cpp](#).

**26.1.2.8** `const FRAT5Curve_T RMOL::DEFAULT_CUMULATIVE_FRAT5_CURVE`

**Initial value:**

```
DefaultMap::createCumulativeFRAT5Curve()
```

Default cumulative[for the remaining period] FRAT5 curve for forecasting and optimisation.

Default cumulative (for the remaining period) FRAT5 curve for forecasting and optimisation.

Definition at line 36 of file [BasConst.cpp](#).

**26.1.2.9** `const stdair::DCPList_T RMOL::DEFAULT_DCP_LIST = DefaultDCPList::init()`

Default data collection point list.

Definition at line 69 of file [BasConst.cpp](#).

Referenced by [RMOL::Utilities::buildRemainingDCPList\(\)](#), [RMOL::Utilities::buildRemainingDCPList2\(\)](#), [RMOL::RMOL\\_Service::forecastOnD\(\)](#), [RMOL::RMOL\\_Service::optimiseOnD\(\)](#), [RMOL::RMOL\\_Service::optimiseOnDUsingAdvancedRMCooperation\(\)](#), [RMOL::RMOL\\_Service::optimiseOnDUsingRMCooperation\(\)](#), [RMOL::RMOL\\_Service::projectAggregatedDemandOnLegCabins\(\)](#), [RMOL::RMOL\\_Service::projectOnDDemandOnLegCabins\(\)](#), [RMOL::RMOL\\_Service::projectOnDDemandOnLegCabinsUsingDYP\(\)](#), [RMOL::RMOL\\_Service::projectOnDDemandOnLegCabinsUsingYP\(\)](#), [RMOL::RMOL\\_Service::resetDemandInformation\(\)](#), and [RMOL::RMOL\\_Service::updateBidPrice\(\)](#).

## 26.2 stdair Namespace Reference

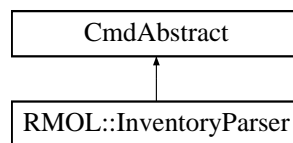
### 26.2.1 Detailed Description

Forward declarations.

## 27 Class Documentation

### 27.1 CmdAbstract Class Reference

Inheritance diagram for CmdAbstract:



The documentation for this class was generated from the following file:

- [rmol/command/InventoryParser.hpp](#)

### 27.2 RMOL::DefaultDCPList Struct Reference

```
#include <rmol/basic/BasConst_General.hpp>
```

#### Static Public Member Functions

- static `stdair::DCPList_T` [init](#) ()

#### 27.2.1 Detailed Description

Definition at line [31](#) of file [BasConst\\_General.hpp](#).

#### 27.2.2 Member Function Documentation

**27.2.2.1** `stdair::DCPList_T RMOL::DefaultDCPList::init ( )` [`static`]

Definition at line [70](#) of file [BasConst.cpp](#).

The documentation for this struct was generated from the following files:

- [rmol/basic/BasConst\\_General.hpp](#)
- [rmol/basic/BasConst.cpp](#)

## 27.3 RMOL::DefaultMap Struct Reference

```
#include <rmol/basic/BasConst_Curves.hpp>
```

### Static Public Member Functions

- static [FRAT5Curve\\_T createCumulativeFRAT5Curve](#) ()

#### 27.3.1 Detailed Description

Default PoS probability mass.

Definition at line 17 of file [BasConst\\_Curves.hpp](#).

#### 27.3.2 Member Function Documentation

**27.3.2.1** [FRAT5Curve\\_T RMOL::DefaultMap::createCumulativeFRAT5Curve](#) ( )  
[static]

Definition at line 38 of file [BasConst.cpp](#).

The documentation for this struct was generated from the following files:

- [rmol/basic/BasConst\\_Curves.hpp](#)
- [rmol/basic/BasConst.cpp](#)

## 27.4 RMOL::DemandGeneratorList Class Reference

```
#include <rmol/bom/old/DemandGeneratorList.hpp>
```

### Public Member Functions

- [DemandGeneratorList](#) ()
- [DemandGeneratorList](#) (const [DemandGeneratorList](#) &)
- [DemandGeneratorList](#) (const [DistributionParameterList\\_T](#) &)
- virtual [~DemandGeneratorList](#) ()
- void [generateVariateList](#) ([VariateList\\_T](#) &) const

### Protected Types

- typedef std::list< [Gaussian](#) > [DemandGeneratorList\\_T](#)

#### 27.4.1 Detailed Description

Wrapper around a set of Gaussian Random Generators.

Definition at line 17 of file [DemandGeneratorList.hpp](#).

### 27.4.2 Member Typedef Documentation

27.4.2.1 `typedef std::list<Gaussian> RMOL::DemandGeneratorList::DemandGeneratorList_  
T [protected]`

Define a (ordered) set of Gaussian Random Generators.

Definition at line 20 of file [DemandGeneratorList.hpp](#).

### 27.4.3 Constructor & Destructor Documentation

27.4.3.1 `RMOL::DemandGeneratorList::DemandGeneratorList ( )`

Constructors.

Definition at line 10 of file [DemandGeneratorList.cpp](#).

27.4.3.2 `RMOL::DemandGeneratorList::DemandGeneratorList ( const  
DemandGeneratorList & iDemandGeneratorList )`

Definition at line 17 of file [DemandGeneratorList.cpp](#).

27.4.3.3 `RMOL::DemandGeneratorList::DemandGeneratorList ( const  
DistributionParameterList_T & iDistributionParameterList )`

List of distribution parameters (mean, standard deviation).

Definition at line 25 of file [DemandGeneratorList.cpp](#).

27.4.3.4 `RMOL::DemandGeneratorList::~~DemandGeneratorList ( ) [virtual]`

Destructors.

Definition at line 30 of file [DemandGeneratorList.cpp](#).

### 27.4.4 Member Function Documentation

27.4.4.1 `void RMOL::DemandGeneratorList::generateVariateList ( VariateList_T & ioVariateList )  
const`

Definition at line 50 of file [DemandGeneratorList.cpp](#).

The documentation for this class was generated from the following files:

- [rmol/bom/old/DemandGeneratorList.hpp](#)
- [rmol/bom/old/DemandGeneratorList.cpp](#)

## 27.5 RMOL::Detruncator Class Reference

```
#include <rmol/command/Detruncator.hpp>
```



## Static Public Member Functions

- static void [unconstrainUsingAdditivePickUp](#) (const stdair::SegmentCabin &, [BookingClassUnconstrainedDemandVectorMap\\_T](#) &, [UnconstrainedDemandVector\\_T](#) &, const stdair::DCP\_T &, const stdair::DCP\_T &, const stdair::Date\_T &)
- static void [unconstrainUsingMultiplicativePickUp](#) (const stdair::SegmentCabin &, [BookingClassUnconstrainedDemandVectorMap\\_T](#) &, [UnconstrainedDemandVector\\_T](#) &, const stdair::DCP\_T &, const stdair::DCP\_T &, const stdair::Date\_T &, const stdair::NbOfSegments\_T &)
- static void [retrieveUnconstrainedDemandForFirstDCP](#) (const stdair::SegmentCabin &, [BookingClassUnconstrainedDemandVectorMap\\_T](#) &, [UnconstrainedDemandVector\\_T](#) &, const stdair::DCP\_T &, const stdair::NbOfSegments\_T &, const stdair::NbOfSegments\_T &)
- static void [unconstrainUsingMultiplicativePickUp](#) ([HistoricalBookingHolder](#) &)

## 27.5.1 Detailed Description

Class wrapping the principal unconstraining algorithms and some accessory algorithms.

Definition at line 24 of file [Detruncator.hpp](#).

## 27.5.2 Member Function Documentation

**27.5.2.1** void RMOL::Detruncator::unconstrainUsingAdditivePickUp  
 ( const stdair::SegmentCabin & *iSegmentCabin*,  
**BookingClassUnconstrainedDemandVectorMap\_T** &  
*ioBkgClassUncDemMap*, **UnconstrainedDemandVector\_T** &  
*ioQEquivalentDemandVector*, const stdair::DCP\_T & *iDCPBegin*, const stdair::DCP\_T &  
*iDCPEnd*, const stdair::Date\_T & *iCurrentDate* ) [static]

Unconstrain booking figures between two DCP's.

Definition at line 25 of file [Detruncator.cpp](#).

References [RMOL::GuillotineBlockHelper::getNbOfSegmentAlreadyPassedThisDTD\(\)](#).

**27.5.2.2** void RMOL::Detruncator::unconstrainUsingMultiplicativePickUp  
 ( const stdair::SegmentCabin & *iSegmentCabin*,  
**BookingClassUnconstrainedDemandVectorMap\_T** &  
*ioBkgClassUncDemMap*, **UnconstrainedDemandVector\_T** &  
*ioQEquivalentDemandVector*, const stdair::DCP\_T & *iDCPBegin*, const stdair::DCP\_T &  
*iDCPEnd*, const stdair::Date\_T & *iCurrentDate*, const stdair::NbOfSegments\_T &  
*iNbOfDepartedSegments* ) [static]

Unconstrain booking figures between two DCP's.

Definition at line 317 of file [Detruncator.cpp](#).

References [RMOL::GuillotineBlockHelper::getNbOfSegmentAlreadyPassedThisDTD\(\)](#).

```
27.5.2.3 void RMOL::Detruncator::retrieveUnconstrainedDemandForFirstDCP
( const stdair::SegmentCabin & iSegmentCabin,
  BookingClassUnconstrainedDemandVectorMap_T &
  ioBkgClassUncDemVectorMap, UnconstrainedDemandVector_T
  & ioQEquivalentDemandVector, const stdair::DCP_T & iFirstDCP, const
  stdair::NbOfSegments_T & iNbOfSegments, const stdair::NbOfSegments_T &
  iNbOfUsedSegments ) [static]
```

Retrieve unconstrained demand figures for the first DCP.

Definition at line 239 of file [Detruncator.cpp](#).

```
27.5.2.4 void RMOL::Detruncator::unconstrainUsingMultiplicativePickUp (
  HistoricalBookingHolder & ioHBHolder ) [static]
```

Unconstrain the product-oriented booking figures for a given class ou Q-equivalent class.

Definition at line 558 of file [Detruncator.cpp](#).

References [RMOL::HistoricalBookingHolder::getCensorshipFlag\(\)](#), [RMOL::HistoricalBookingHolder::getHistoricalBookingClass\(\)](#), [RMOL::HistoricalBookingHolder::getNbOfFlights\(\)](#), [RMOL::HistoricalBookingHolder::getNbOfUncensoredData\(\)](#), and [RMOL::HistoricalBookingHolder::setUnconstrainedDemand\(\)](#).

The documentation for this class was generated from the following files:

- [rmol/command/Detruncator.hpp](#)
- [rmol/command/Detruncator.cpp](#)

## 27.6 RMOL::DPOptimiser Class Reference

```
#include <rmol/bom/DPOptimiser.hpp>
```

### Static Public Member Functions

- static void [optimalOptimisationByDP](#) (stdair::LegCabin &)
- static double [cdfGaussianQ](#) (const double, const double)

### 27.6.1 Detailed Description

Utility methods for the Dynamic Programming algorithms.

Definition at line 17 of file [DPOptimiser.hpp](#).

### 27.6.2 Member Function Documentation

27.6.2.1 void RMOL::DPOptimiser::optimalOptimisationByDP ( *stdair::LegCabin & ioLegCabin* )  
[static]

Dynamic Programming to compute the cumulative protection levels and booking limits (described in the book Revenue Management - Talluri & Van Ryzin, p.41-42).

Definition at line 22 of file [DPOptimiser.cpp](#).

27.6.2.2 static double RMOL::DPOptimiser::cdfGaussianQ ( const double , const double )  
[static]

Compute the cdf\_Q of a gaussian.

The documentation for this class was generated from the following files:

- [rmol/bom/DPOptimiser.hpp](#)
- [rmol/bom/DPOptimiser.cpp](#)

## 27.7 RMOL::EMDetruncator Class Reference

```
#include <rmol/bom/EMDetruncator.hpp>
```

### Static Public Member Functions

- static void [unconstrainUsingEMMethod](#) ([HistoricalBookingHolder](#) &)

### 27.7.1 Detailed Description

Utility for the Expectation-Maximisation algorithm.

Definition at line 12 of file [EMDetruncator.hpp](#).

### 27.7.2 Member Function Documentation

27.7.2.1 void RMOL::EMDetruncator::unconstrainUsingEMMethod ( *HistoricalBookingHolder & ioHistoricalBookingHolder* ) [static]

Unconstrain the censored booking data using the Expection-Maximisation algorithm.

Definition at line 20 of file [EMDetruncator.cpp](#).

References [RMOL::HistoricalBookingHolder::getDemandMean\(\)](#), [RMOL::HistoricalBookingHolder::getListOfToBeUncensored\(\)](#), [RMOL::HistoricalBookingHolder::getNbOfFlights\(\)](#), [RMOL::HistoricalBookingHolder::getNbOfUncensoredBookings\(\)](#), [RMOL::HistoricalBookingHolder::getNbOfUncensoredData\(\)](#), [RMOL::HistoricalBookingHolder::getStandardDeviation\(\)](#), [RMOL::HistoricalBookingHolder::getUncensoredStandardDeviation\(\)](#), [RMOL::HistoricalBookingHolder::getUnconstrainedDemand\(\)](#) and [RMOL::HistoricalBookingHolder::setUnconstrainedDemand\(\)](#).

The documentation for this class was generated from the following files:

- [rmol/bom/EMDetruncator.hpp](#)
- [rmol/bom/EMDetruncator.cpp](#)

## 27.8 RMOL::Emsr Class Reference

```
#include <rmol/bom/Emsr.hpp>
```

### Static Public Member Functions

- static void [heuristicOptimisationByEmsr](#) (stdair::LegCabin &)
- static void [heuristicOptimisationByEmsrA](#) (stdair::LegCabin &)
- static void [heuristicOptimisationByEmsrB](#) (stdair::LegCabin &)

### 27.8.1 Detailed Description

Class Implementing the EMSR algorithm for Bid-Price Vector computing.

Definition at line 18 of file [Emsr.hpp](#).

### 27.8.2 Member Function Documentation

**27.8.2.1** void RMOL::Emsr::heuristicOptimisationByEmsr ( stdair::LegCabin & *ioLegCabin* )  
[static]

Compute the Bid-Price Vector using the EMSR algorithm. Then compute the protection levels and booking limits by using the BPV.

For each class/bucket  $j$  with yield  $p_j$  and demand  $D_j$ , compute  $p_j \cdot \Pr(D_j \geq x)$  with  $x$  the capacity index. This value is called the EMSR (Expected Marginal Seat Revenue) of the class/bucket  $j$  with the remaining capacity of  $x$ . Thus, we have for each class/bucket a list of EMSR values. We merge all these lists and sort the values from high to low in order to obtain the BPV.

Definition at line 108 of file [Emsr.cpp](#).

References [RMOL::EmsrUtils::computeEmsrValue\(\)](#).

**27.8.2.2** void RMOL::Emsr::heuristicOptimisationByEmsrA ( stdair::LegCabin & *ioLegCabin* )  
[static]

Calculate the optimal protections for the set of buckets/classes given in input, and update those buckets accordingly.

Definition at line 21 of file [Emsr.cpp](#).

References [RMOL::EmsrUtils::computeProtectionLevel\(\)](#).

**27.8.2.3** void RMOL::Emsr::heuristicOptimisationByEmsrB ( stdair::LegCabin & *ioLegCabin* )  
[static]

Compute the protection levels and booking limites by using the EMSR-b algorithm.

Definition at line 64 of file [Emsr.cpp](#).

References [RMOL::EmsrUtils::computeAggregatedVirtualClass\(\)](#), and [RMOL::EmsrUtils::computeProtectionLevel\(\)](#).

The documentation for this class was generated from the following files:

- [rmol/bom/Emsr.hpp](#)
- [rmol/bom/Emsr.cpp](#)

## 27.9 RMOL::EmsrUtils Class Reference

```
#include <rmol/bom/EmsrUtils.hpp>
```

### Static Public Member Functions

- static void [computeAggregatedVirtualClass](#) (stdair::VirtualClassStruct &, stdair::VirtualClassStruct &)
- static const stdair::ProtectionLevel\_T [computeProtectionLevel](#) (stdair::VirtualClassStruct &, stdair::VirtualClassStruct &)
- static const double [computeEmsrValue](#) (double, stdair::VirtualClassStruct &)

#### 27.9.1 Detailed Description

Forward declarations.

Definition at line 19 of file [EmsrUtils.hpp](#).

#### 27.9.2 Member Function Documentation

**27.9.2.1** void RMOL::EmsrUtils::computeAggregatedVirtualClass ( stdair::VirtualClassStruct & *ioAggregatedVirtualClass*, stdair::VirtualClassStruct & *ioCurrentVirtualClass* )  
[static]

Compute the aggregated class/bucket of classes/buckets 1,...j for EMSR-b algorithm.

Definition at line 19 of file [EmsrUtils.cpp](#).

Referenced by [RMOL::Emsr::heuristicOptimisationByEmsrB\(\)](#).

**27.9.2.2** const stdair::ProtectionLevel\_T RMOL::EmsrUtils::computeProtectionLevel ( stdair::VirtualClassStruct & *ioAggregatedVirtualClass*, stdair::VirtualClassStruct & *ioNextVirtualClass* ) [static]

Compute the protection level using the Little-Wood formular.

Definition at line 53 of file [EmsrUtils.cpp](#).

Referenced by [RMOL::Emsr::heuristicOptimisationByEmsrA\(\)](#), and [RMOL::Emsr::heuristicOptimisationByEmsrB\(\)](#).

**27.9.2.3** const double RMOL::EmsrUtils::computeEmsrValue ( double *iCapacity*, stdair::VirtualClassStruct & *ioVirtualClass* ) [static]

Compute the EMSR value of a class/bucket.

Definition at line 80 of file [EmsrUtils.cpp](#).

Referenced by [RMOL::Emsr::heuristicOptimisationByEmsr\(\)](#).

The documentation for this class was generated from the following files:

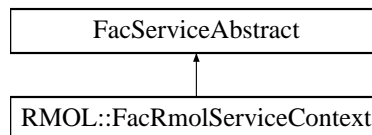
- [rmol/bom/EmsrUtils.hpp](#)
- [rmol/bom/EmsrUtils.cpp](#)

## 27.10 RMOL::FacRmolServiceContext Class Reference

Factory for the service context.

```
#include <rmol/factory/FacRmolServiceContext.hpp>
```

Inheritance diagram for RMOL::FacRmolServiceContext:



### Public Member Functions

- [~FacRmolServiceContext\(\)](#)
- [RMOL\\_ServiceContext & create\(\)](#)

### Static Public Member Functions

- static [FacRmolServiceContext & instance\(\)](#)

### Protected Member Functions

- [FacRmolServiceContext\(\)](#)

#### 27.10.1 Detailed Description

Factory for the service context.

Definition at line 22 of file [FacRmolServiceContext.hpp](#).

#### 27.10.2 Constructor & Destructor Documentation

##### 27.10.2.1 RMOL::FacRmolServiceContext::~~FacRmolServiceContext()

Destructor.

The Destruction put the `_instance` to NULL in order to be clean for the next `FacSimfqt-ServiceContext::instance()`.

Definition at line 17 of file [FacRmolServiceContext.cpp](#).

**27.10.2.2** `RMOL::FacRmolServiceContext::FacRmolServiceContext ( )` [`inline`, `protected`]

Default Constructor.

This constructor is protected in order to ensure the singleton pattern.

Definition at line 57 of file [FacRmolServiceContext.hpp](#).

Referenced by [instance\(\)](#).

### 27.10.3 Member Function Documentation

**27.10.3.1** `FacRmolServiceContext & RMOL::FacRmolServiceContext::instance ( )` [`static`]

Provide the unique instance.

The singleton is instantiated when first used.

#### Returns

`FacServiceContext&`

Definition at line 22 of file [FacRmolServiceContext.cpp](#).

References [FacRmolServiceContext\(\)](#).

**27.10.3.2** `RMOL_ServiceContext & RMOL::FacRmolServiceContext::create ( )`

Create a new `ServiceContext` object.

This new object is added to the list of instantiated objects.

#### Returns

`ServiceContext&` The newly created object.

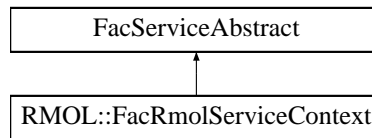
Definition at line 34 of file [FacRmolServiceContext.cpp](#).

The documentation for this class was generated from the following files:

- `rmol/factory/FacRmolServiceContext.hpp`
- `rmol/factory/FacRmolServiceContext.cpp`

## 27.11 FacServiceAbstract Class Reference

Inheritance diagram for `FacServiceAbstract`:



The documentation for this class was generated from the following file:

- [rmol/factory/FacRmolServiceContext.hpp](#)

## 27.12 RMOL::Forecaster Class Reference

```
#include <rmol/command/Forecaster.hpp>
```

### Static Public Member Functions

- static bool [forecastUsingAdditivePickUp](#) (stdair::FlightDate &, const stdair::DateTime\_  
T &)
- static bool [forecastUsingMultiplicativePickUp](#) (stdair::FlightDate &, const stdair::DateTime\_  
T &)

### 27.12.1 Detailed Description

Class wrapping the optimisation algorithms.

Definition at line 23 of file [Forecaster.hpp](#).

### 27.12.2 Member Function Documentation

**27.12.2.1** bool RMOL::Forecaster::forecastUsingAdditivePickUp ( stdair::FlightDate &  
*ioFlightDate*, const stdair::DateTime\_T & *iEventTime* ) [static]

Forecast demand for a flight-date using additive pick-up method.

Definition at line 35 of file [Forecaster.cpp](#).

References [RMOL::Utilities::buildRemainingDCPList\(\)](#), and [RMOL::Utilities::buildRemainingDCPList2\(\)](#).

Referenced by [RMOL::RMOL\\_Service::optimise\(\)](#).

**27.12.2.2** bool RMOL::Forecaster::forecastUsingMultiplicativePickUp ( stdair::FlightDate &  
*ioFlightDate*, const stdair::DateTime\_T & *iEventTime* ) [static]

Forecast demand for a flight-date using multiplicative pick-up method.

Definition at line 276 of file [Forecaster.cpp](#).

Referenced by [RMOL::RMOL\\_Service::optimise\(\)](#).

The documentation for this class was generated from the following files:

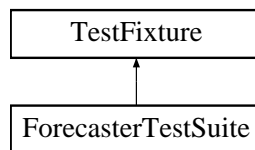


- [rmol/command/Forecaster.hpp](#)
- [rmol/command/Forecaster.cpp](#)

### 27.13 ForecasterTestSuite Class Reference

```
#include <test/rmol/ForecasterTestSuite.hpp>
```

Inheritance diagram for ForecasterTestSuite:



#### Public Member Functions

- void [testQForecaster](#) ()
- [ForecasterTestSuite](#) ()

#### Protected Attributes

- `std::stringstream` [\\_describeKey](#)

#### 27.13.1 Detailed Description

Definition at line 6 of file [ForecasterTestSuite.hpp](#).

#### 27.13.2 Constructor & Destructor Documentation

##### 27.13.2.1 [ForecasterTestSuite::ForecasterTestSuite](#) ( )

Constructor.

#### 27.13.3 Member Function Documentation

##### 27.13.3.1 `void` [ForecasterTestSuite::testQForecaster](#) ( )

Test Q-forecaster.

#### 27.13.4 Member Data Documentation

##### 27.13.4.1 `std::stringstream` [ForecasterTestSuite::\\_describeKey](#) [protected]

Definition at line 19 of file [ForecasterTestSuite.hpp](#).

The documentation for this class was generated from the following file:

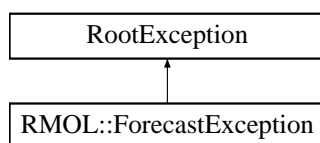
- test/rmol/[ForecasterTestSuite.hpp](#)

## 27.14 RMOL::ForecastException Class Reference

Forecast-related exception.

```
#include <rmol/RMOL_Types.hpp>
```

Inheritance diagram for RMOL::ForecastException:



### Public Member Functions

- [ForecastException](#) (const std::string &iWhat)

#### 27.14.1 Detailed Description

Forecast-related exception.

Definition at line 51 of file [RMOL\\_Types.hpp](#).

#### 27.14.2 Constructor & Destructor Documentation

##### 27.14.2.1 RMOL::ForecastException::ForecastException ( const std::string &iWhat ) [inline]

Constructor.

Definition at line 54 of file [RMOL\\_Types.hpp](#).

The documentation for this class was generated from the following file:

- rmol/[RMOL\\_Types.hpp](#)

## 27.15 RMOL::GuillotineBlockHelper Class Reference

```
#include <rmol/bom/GuillotineBlockHelper.hpp>
```

## Static Public Member Functions

- static stdair::NbOfSegments\_T [getNbOfSegmentAlreadyPassedThisDTD](#) (const stdair::GuillotineBlock &, const stdair::DTD\_T &, const stdair::Date\_T &)
- static bool [hasPassedThisDTD](#) (const stdair::SegmentCabin &, const stdair::DTD\_T &, const stdair::Date\_T &)

## 27.15.1 Detailed Description

Class representing the actual business functions for an airline guillotine block.

Definition at line 23 of file [GuillotineBlockHelper.hpp](#).

## 27.15.2 Member Function Documentation

27.15.2.1 `stdair::NbOfSegments_T RMOL::GuillotineBlockHelper::getNbOfSegmentAlreadyPassedThisDTD ( const stdair::GuillotineBlock & iGB, const stdair::DTD_T & iDTD, const stdair::Date_T & iCurrentDate ) [static]`

Retrieve the number of similar segments which already passed the given DTD.

Definition at line 20 of file [GuillotineBlockHelper.cpp](#).

References [hasPassedThisDTD\(\)](#).

Referenced by [RMOL::Utilities::getNbOfDepartedSimilarSegments\(\)](#), [RMOL::Detruncator::unconstrainUsingAdditivePickUp\(\)](#) and [RMOL::Detruncator::unconstrainUsingMultiplicativePickUp\(\)](#).

27.15.2.2 `bool RMOL::GuillotineBlockHelper::hasPassedThisDTD ( const stdair::SegmentCabin & iSegmentCabin, const stdair::DTD_T & iDTD, const stdair::Date_T & iCurrentDate ) [static]`

Check if the given segment has passed the given DTD.

Definition at line 42 of file [GuillotineBlockHelper.cpp](#).

Referenced by [getNbOfSegmentAlreadyPassedThisDTD\(\)](#).

The documentation for this class was generated from the following files:

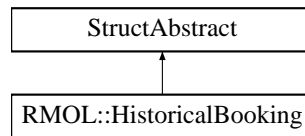
- [rmol/bom/GuillotineBlockHelper.hpp](#)
- [rmol/bom/GuillotineBlockHelper.cpp](#)

## 27.16 RMOL::HistoricalBooking Struct Reference

Structure keeping track, for a given class, of the number of historical bookings and of the censorship flag.

```
#include <rmol/bom/HistoricalBooking.hpp>
```

Inheritance diagram for RMOL::HistoricalBooking:



### Public Member Functions

- const stdair::NbOfBookings\_T & [getNbOfBookings](#) () const
- const stdair::NbOfBookings\_T & [getUnconstrainedDemand](#) () const
- const stdair::Flag\_T & [getFlag](#) () const
- void [setUnconstrainedDemand](#) (const stdair::NbOfBookings\_T &iDemand)
- void [setParameters](#) (const stdair::NbOfBookings\_T, const stdair::Flag\_T)
- void [toStream](#) (std::ostream &ioOut) const
- const std::string [describe](#) () const
- void [display](#) () const
- [HistoricalBooking](#) (const stdair::NbOfBookings\_T, const stdair::Flag\_T)
- [HistoricalBooking](#) ()
- [HistoricalBooking](#) (const [HistoricalBooking](#) &)
- virtual [~HistoricalBooking](#) ()

#### 27.16.1 Detailed Description

Structure keeping track, for a given class, of the number of historical bookings and of the censorship flag.

Definition at line 17 of file [HistoricalBooking.hpp](#).

#### 27.16.2 Constructor & Destructor Documentation

##### 27.16.2.1 RMOL::HistoricalBooking::HistoricalBooking ( const stdair::NbOfBookings\_T iNbOfBookings, const stdair::Flag\_T iFlag )

Main constructor.

Definition at line 21 of file [HistoricalBooking.cpp](#).

##### 27.16.2.2 RMOL::HistoricalBooking::HistoricalBooking ( )

Default constructor.

Definition at line 15 of file [HistoricalBooking.cpp](#).

##### 27.16.2.3 RMOL::HistoricalBooking::HistoricalBooking ( const HistoricalBooking & iHistoricalBooking )

Copy constructor.

Definition at line 29 of file [HistoricalBooking.cpp](#).

## 27.16.2.4 RMOL::HistoricalBooking::~~HistoricalBooking ( ) [virtual]

Destructor.

Definition at line 36 of file [HistoricalBooking.cpp](#).

## 27.16.3 Member Function Documentation

## 27.16.3.1 const stdair::NbOfBookings\_T&amp; RMOL::HistoricalBooking::getNbOfBookings ( ) const [inline]

Getter for the booking.

Definition at line 22 of file [HistoricalBooking.hpp](#).

Referenced by [RMOL::HistoricalBookingHolder::calculateExpectedDemand\(\)](#), [RMOL::HistoricalBookingHolder::getHistoricalBooking\(\)](#), [RMOL::HistoricalBookingHolder::getNbOfUncensoredBookings\(\)](#), [RMOL::HistoricalBookingHolder::getUncensoredStar\(\)](#), [RMOL::HistoricalBookingHolder::toStream\(\)](#), and [toStream\(\)](#).

## 27.16.3.2 const stdair::NbOfBookings\_T&amp; RMOL::HistoricalBooking::getUnconstrainedDemand ( ) const [inline]

Getter for the unconstrained bookings.

Definition at line 26 of file [HistoricalBooking.hpp](#).

Referenced by [RMOL::HistoricalBookingHolder::getDemandMean\(\)](#), [RMOL::HistoricalBookingHolder::getStandardDeviation\(\)](#), [RMOL::HistoricalBookingHolder::getUnconstrainedDemand\(\)](#), [RMOL::HistoricalBookingHolder::toStream\(\)](#), and [toStream\(\)](#).

## 27.16.3.3 const stdair::Flag\_T&amp; RMOL::HistoricalBooking::getFlag ( ) const [inline]

Getter for the flag of censorship: "false" means that the bookings are not censored.

Definition at line 31 of file [HistoricalBooking.hpp](#).

Referenced by [RMOL::HistoricalBookingHolder::getCensorshipFlag\(\)](#), [RMOL::HistoricalBookingHolder::getListOfToBeUncensored\(\)](#), [RMOL::HistoricalBookingHolder::getNbOfUncensoredBookings\(\)](#), [RMOL::HistoricalBookingHolder::toStream\(\)](#), and [toStream\(\)](#).

## 27.16.3.4 void RMOL::HistoricalBooking::setUnconstrainedDemand ( const stdair::NbOfBookings\_T &amp; iDemand ) [inline]

Setter for the unconstraining demand.

Definition at line 38 of file [HistoricalBooking.hpp](#).

## 27.16.3.5 void RMOL::HistoricalBooking::setParameters ( const stdair::NbOfBookings\_T iNbOfBookings, const stdair::Flag\_T iFlag )

Setter for all parameters.

Definition at line 41 of file [HistoricalBooking.cpp](#).

27.16.3.6 void RMOL::HistoricalBooking::toStream ( std::ostream & *ioOut* ) const

Dump a Business Object into an output stream.

#### Parameters

<i>ostream&amp;</i> the output stream
---------------------------------------

#### Returns

*ostream&* the output stream.

Definition at line 57 of file [HistoricalBooking.cpp](#).

References [getFlag\(\)](#), [getNbOfBookings\(\)](#), and [getUnconstrainedDemand\(\)](#).

Referenced by [display\(\)](#).

27.16.3.7 const std::string RMOL::HistoricalBooking::describe ( ) const

Give a description of the structure (for display purposes).

Definition at line 48 of file [HistoricalBooking.cpp](#).

27.16.3.8 void RMOL::HistoricalBooking::display ( ) const

Display on standard output.

Definition at line 66 of file [HistoricalBooking.cpp](#).

References [toStream\(\)](#).

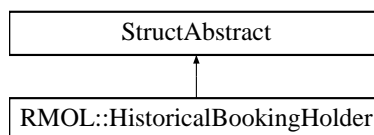
The documentation for this struct was generated from the following files:

- [rmol/bom/HistoricalBooking.hpp](#)
- [rmol/bom/HistoricalBooking.cpp](#)

## 27.17 RMOL::HistoricalBookingHolder Struct Reference

```
#include <rmol/bom/HistoricalBookingHolder.hpp>
```

Inheritance diagram for RMOL::HistoricalBookingHolder:



#### Public Member Functions

- const short [getNbOfFlights](#) ( ) const

- const short [getNbOfUncensoredData](#) () const
- const stdair::NbOfBookings\_T [getNbOfUncensoredBookings](#) () const
- const double [getUncensoredStandardDeviation](#) (const double &iMeanOfUncensoredBookings, const short iNbOfUncensoredData) const
- const double [getDemandMean](#) () const
- const double [getStandardDeviation](#) (const double) const
- const std::vector< bool > [getListOfToBeUnconstrainedFlags](#) () const
- const stdair::NbOfBookings\_T & [getHistoricalBooking](#) (const short i) const
- const stdair::NbOfBookings\_T & [getUnconstrainedDemand](#) (const short i) const
- const stdair::Flag\_T & [getCensorshipFlag](#) (const short i) const
- const stdair::NbOfBookings\_T & [getUnconstrainedDemandOnFirstElement](#) () const
- const stdair::NbOfBookings\_T [calculateExpectedDemand](#) (const double, const double, const short, const stdair::NbOfBookings\_T) const
- void [setUnconstrainedDemand](#) (const stdair::NbOfBookings\_T &iExpectedDemand, const short i)
- void [addHistoricalBooking](#) (const [HistoricalBooking](#) &iHistoricalBooking)
- void [toStream](#) (std::ostream &ioOut) const
- const std::string [describe](#) () const
- void [display](#) () const
- virtual [~HistoricalBookingHolder](#) ()
- [HistoricalBookingHolder](#) ()

### 27.17.1 Detailed Description

Holder of a HistoricalBookingList object (for memory allocation and recollection purposes).

Definition at line 23 of file [HistoricalBookingHolder.hpp](#).

### 27.17.2 Constructor & Destructor Documentation

#### 27.17.2.1 RMOL::HistoricalBookingHolder::~~HistoricalBookingHolder ( ) [virtual]

Destructor.

Definition at line 23 of file [HistoricalBookingHolder.cpp](#).

#### 27.17.2.2 RMOL::HistoricalBookingHolder::HistoricalBookingHolder ( )

Constructor.

Protected to force the use of the Factory.

Definition at line 19 of file [HistoricalBookingHolder.cpp](#).

## 27.17.3 Member Function Documentation

## 27.17.3.1 const short RMOL::HistoricalBookingHolder::getNbOfFlights ( ) const

Get number of flights.

Definition at line 28 of file [HistoricalBookingHolder.cpp](#).

Referenced by [RMOL::EMDetruncator::unconstrainUsingEMMethod\(\)](#), and [RMOL::Detruncator::unconstrainUsingMultipleEMMethod\(\)](#).

## 27.17.3.2 const short RMOL::HistoricalBookingHolder::getNbOfUncensoredData ( ) const

Get number of uncensored booking data.

Definition at line 33 of file [HistoricalBookingHolder.cpp](#).

Referenced by [RMOL::EMDetruncator::unconstrainUsingEMMethod\(\)](#), and [RMOL::Detruncator::unconstrainUsingMultipleEMMethod\(\)](#).

## 27.17.3.3 const std::pair&lt;NbOfBookings,T&gt; RMOL::HistoricalBookingHolder::getNbOfUncensoredBookings ( ) const

Get number of uncensored bookings.

Definition at line 49 of file [HistoricalBookingHolder.cpp](#).

References [RMOL::HistoricalBooking::getFlag\(\)](#), and [RMOL::HistoricalBooking::getNbOfBookings\(\)](#).

Referenced by [RMOL::EMDetruncator::unconstrainUsingEMMethod\(\)](#).

## 27.17.3.4 const double RMOL::HistoricalBookingHolder::getUncensoredStandardDeviation ( const double &amp; iMeanOfUncensoredBookings, const short iNbOfUncensoredData ) const

Get standard deviation of uncensored bookings.

Definition at line 69 of file [HistoricalBookingHolder.cpp](#).

References [RMOL::HistoricalBooking::getNbOfBookings\(\)](#).

Referenced by [RMOL::EMDetruncator::unconstrainUsingEMMethod\(\)](#).

## 27.17.3.5 const double RMOL::HistoricalBookingHolder::getDemandMean ( ) const

Get mean of historical demand.

Definition at line 95 of file [HistoricalBookingHolder.cpp](#).

References [RMOL::HistoricalBooking::getUnconstrainedDemand\(\)](#).

Referenced by [RMOL::EMDetruncator::unconstrainUsingEMMethod\(\)](#).

## 27.17.3.6 const double RMOL::HistoricalBookingHolder::getStandardDeviation ( const double iDemandMean ) const

Get standard deviation of demand.

Definition at line 116 of file [HistoricalBookingHolder.cpp](#).

References [RMOL::HistoricalBooking::getUnconstrainedDemand\(\)](#).



Referenced by [RMOL::EMDetruncator::unconstrainUsingEMMethod\(\)](#).

27.17.3.7 `const std::vector< bool > RMOL::HistoricalBookingHolder::getListOfToBeUnconstrainedFlags ( ) const`

Get the list of flags of need to be unconstrained.

Definition at line 140 of file [HistoricalBookingHolder.cpp](#).

References [RMOL::HistoricalBooking::getFlag\(\)](#).

Referenced by [RMOL::EMDetruncator::unconstrainUsingEMMethod\(\)](#).

27.17.3.8 `const stdair::NbOfBookings_T & RMOL::HistoricalBookingHolder::getHistoricalBooking ( const short i ) const`

Get the historical booking of the (i+1)-th flight.

Definition at line 161 of file [HistoricalBookingHolder.cpp](#).

References [RMOL::HistoricalBooking::getNbOfBookings\(\)](#).

Referenced by [RMOL::Detruncator::unconstrainUsingMultiplicativePickUp\(\)](#).

27.17.3.9 `const stdair::NbOfBookings_T & RMOL::HistoricalBookingHolder::getUnconstrainedDemand ( const short i ) const`

Get the unconstraining demand of the (i+1)-th flight.

Definition at line 169 of file [HistoricalBookingHolder.cpp](#).

References [RMOL::HistoricalBooking::getUnconstrainedDemand\(\)](#).

Referenced by [getUnconstrainedDemandOnFirstElement\(\)](#), and [RMOL::EMDetruncator::unconstrainUsingEMMethod\(\)](#).

27.17.3.10 `const stdair::Flag_T & RMOL::HistoricalBookingHolder::getCensorshipFlag ( const short i ) const`

Get the flag of the (i+1)-th flight.

Definition at line 177 of file [HistoricalBookingHolder.cpp](#).

References [RMOL::HistoricalBooking::getFlag\(\)](#).

Referenced by [RMOL::Detruncator::unconstrainUsingMultiplicativePickUp\(\)](#).

27.17.3.11 `const stdair::NbOfBookings_T& RMOL::HistoricalBookingHolder::getUnconstrainedDemandOnFirstElement ( ) const [inline]`

Get the unconstraining demand of the first flight.

Definition at line 60 of file [HistoricalBookingHolder.hpp](#).

References [getUnconstrainedDemand\(\)](#).

27.17.3.12 `const stdair::NbOfBookings_T RMOL::HistoricalBookingHolder::calculateExpectedDemand ( const double iMean, const double iSD, const short i, const stdair::NbOfBookings_T iDemand ) const`

Calculate the expected demand.

Definition at line 191 of file [HistoricalBookingHolder.cpp](#).

References [RMOL::HistoricalBooking::getNbOfBookings\(\)](#).

27.17.3.13 `void RMOL::HistoricalBookingHolder::setUnconstrainedDemand ( const stdair::NbOfBookings_T & iExpectedDemand, const short i )`

Set the expected historical demand of the (i+1)-th flight.

Definition at line 185 of file [HistoricalBookingHolder.cpp](#).

Referenced by [RMOL::EMDetruncator::unconstrainUsingEMMethod\(\)](#), and [RMOL::Detruncator::unconstrainUsingMultipleEMMethod\(\)](#).

27.17.3.14 `void RMOL::HistoricalBookingHolder::addHistoricalBooking ( const HistoricalBooking & iHistoricalBooking )`

Add a [HistoricalBooking](#) object to the holder.

Definition at line 236 of file [HistoricalBookingHolder.cpp](#).

27.17.3.15 `void RMOL::HistoricalBookingHolder::toStream ( std::ostream & ioOut ) const`

Dump a Business Object into an output stream.

#### Parameters

<code>ostream&amp;</code> the output stream
---

#### Returns

`ostream&` the output stream.

Definition at line 241 of file [HistoricalBookingHolder.cpp](#).

References [RMOL::HistoricalBooking::getFlag\(\)](#), [RMOL::HistoricalBooking::getNbOfBookings\(\)](#), and [RMOL::HistoricalBooking::getUnconstrainedDemand\(\)](#).

Referenced by [display\(\)](#).

27.17.3.16 `const std::string RMOL::HistoricalBookingHolder::describe ( ) const`

Give a description of the structure (for display purposes).

Definition at line 265 of file [HistoricalBookingHolder.cpp](#).

27.17.3.17 `void RMOL::HistoricalBookingHolder::display ( ) const`

Display on standard output.

Definition at line 273 of file [HistoricalBookingHolder.cpp](#).

References [toStream\(\)](#).

The documentation for this struct was generated from the following files:

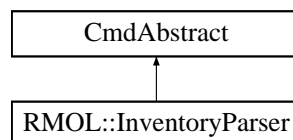
- [rmol/bom/HistoricalBookingHolder.hpp](#)
- [rmol/bom/HistoricalBookingHolder.cpp](#)

## 27.18 RMOL::InventoryParser Class Reference

Class filling the virtual class list (representing a list of classes/buckets) from a given input inventory.

```
#include <rmol/command/InventoryParser.hpp>
```

Inheritance diagram for RMOL::InventoryParser:



### Static Public Member Functions

- static bool [parseInputFileAndBuildBom](#) (const std::string &iInputFileName, stdair::BomRoot &)

#### 27.18.1 Detailed Description

Class filling the virtual class list (representing a list of classes/buckets) from a given input inventory.

Definition at line 25 of file [InventoryParser.hpp](#).

#### 27.18.2 Member Function Documentation

**27.18.2.1** bool RMOL::InventoryParser::parseInputFileAndBuildBom ( const std::string &iInputFileName, stdair::BomRoot & ioBomRoot ) [static]

Parse the input values from a CSV-formatted inventory file.

#### Parameters

<i>const</i>	std::string& iInputFileName	Inventory file to be parsed.
		The BOM tree.
<i>stdair::BomRc</i>		

#### Returns

bool Whether or not the parsing was successful.

Definition at line 36 of file [InventoryParser.cpp](#).

Referenced by [RMOL::RMOL\\_Service::parseAndLoad\(\)](#).

The documentation for this class was generated from the following files:

- [rmol/command/InventoryParser.hpp](#)
- [rmol/command/InventoryParser.cpp](#)

## 27.19 RMOL::MCOptimiser Class Reference

```
#include <rmol/bom/MCOptimiser.hpp>
```

### Static Public Member Functions

- static void [optimalOptimisationByMCIntegration](#) (stdair::LegCabin &)
- static stdair::GeneratedDemandVector\_T [generateDemandVector](#) (const stdair::MeanValue\_T &, const stdair::StdDevValue\_T &, const unsigned int &)
- static void [optimisationByMCIntegration](#) (stdair::LegCabin &)

### 27.19.1 Detailed Description

Utility methods for the Monte-Carlo algorithms.

Definition at line 19 of file [MCOptimiser.hpp](#).

### 27.19.2 Member Function Documentation

**27.19.2.1** void RMOL::MCOptimiser::optimalOptimisationByMCIntegration ( stdair::LegCabin & *ioLegCabin* ) [static]

Calculate the optimal protections for the set of buckets/classes given in input, and update those buckets accordingly.

The Monte Carlo Integration algorithm (see The Theory and Practice of Revenue Management, by Kalyan T. Talluri and Garret J. van Ryzin, Kluwer Academic Publishers, for the details) is used.

Definition at line 28 of file [MCOptimiser.cpp](#).

**27.19.2.2** stdair::GeneratedDemandVector\_T RMOL::MCOptimiser::generateDemandVector ( const stdair::MeanValue\_T & *iMean*, const stdair::StdDevValue\_T & *iStdDev*, const unsigned int & *K* ) [static]

Monte-Carlo

Definition at line 154 of file [MCOptimiser.cpp](#).

Referenced by [optimisationByMCIntegration\(\)](#).

27.19.2.3 void RMOL::MCOptimiser::optimisationByMCIntegration ( stdair::LegCabin & *ioLegCabin* ) [static]

Definition at line 175 of file [MCOptimiser.cpp](#).

References [generateDemandVector\(\)](#).

Referenced by [RMOL::Optimiser::optimiseUsingOnDForecast\(\)](#).

The documentation for this class was generated from the following files:

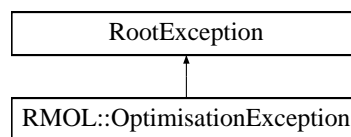
- [rmol/bom/MCOptimiser.hpp](#)
- [rmol/bom/MCOptimiser.cpp](#)

## 27.20 RMOL::OptimisationException Class Reference

Optimisation-related exception.

```
#include <rmol/RMOL_Types.hpp>
```

Inheritance diagram for RMOL::OptimisationException:



### Public Member Functions

- [OptimisationException](#) (const std::string &iWhat)

#### 27.20.1 Detailed Description

Optimisation-related exception.

Definition at line 61 of file [RMOL\\_Types.hpp](#).

#### 27.20.2 Constructor & Destructor Documentation

27.20.2.1 RMOL::OptimisationException::OptimisationException ( const std::string & *iWhat* ) [inline]

Constructor.

Definition at line 64 of file [RMOL\\_Types.hpp](#).

The documentation for this class was generated from the following file:

- [rmol/RMOL\\_Types.hpp](#)

## 27.21 RMOL::Optimiser Class Reference

```
#include <rmol/command/Optimiser.hpp>
```

### Static Public Member Functions

- static void [optimalOptimisationByMCIntegration](#) (const int K, stdair::LegCabin &)
- static void [optimalOptimisationByDP](#) (stdair::LegCabin &)
- static void [heuristicOptimisationByEmsr](#) (stdair::LegCabin &)
- static void [heuristicOptimisationByEmsrA](#) (stdair::LegCabin &)
- static void [heuristicOptimisationByEmsrB](#) (stdair::LegCabin &)
- static void [optimise](#) (stdair::FlightDate &)
- static void [buildVirtualClassListForLegBasedOptimisation](#) (stdair::LegCabin &)
- static double [optimiseUsingOnDForecast](#) (stdair::FlightDate &, const bool &iReduceFluctuations=false)

#### 27.21.1 Detailed Description

Class wrapping the optimisation algorithms.

Definition at line 18 of file [Optimiser.hpp](#).

#### 27.21.2 Member Function Documentation

**27.21.2.1** void RMOL::Optimiser::optimalOptimisationByMCIntegration ( const int K, stdair::LegCabin & *ioLegCabin* ) [static]

Monte Carlo Integration algorithm.

Calculate the optimal protections for the set of buckets/classes given in input, and update those buckets accordingly.

The Monte Carlo Integration algorithm (see The Theory and Practice of Revenue Management, by Kalyan T. Talluri and Garret J. van Ryzin, Kluwer Academic Publishers, for the details) is used. Hence, K is the number of random draws to perform. 100 is a minimum for K, as statistics must be drawn from those random generations.

Definition at line 29 of file [Optimiser.cpp](#).

Referenced by [optimise\(\)](#).

**27.21.2.2** void RMOL::Optimiser::optimalOptimisationByDP ( stdair::LegCabin & *ioLegCabin* ) [static]

Dynamic Programming.

Definition at line 63 of file [Optimiser.cpp](#).

27.21.2.3 void RMOL::Optimiser::heuristicOptimisationByEmsr ( stdair::LegCabin & *ioLegCabin* ) [static]

EMRS algorithm.

Definition at line 68 of file [Optimiser.cpp](#).

27.21.2.4 void RMOL::Optimiser::heuristicOptimisationByEmsrA ( stdair::LegCabin & *ioLegCabin* ) [static]

EMRS-a algorithm.

Definition at line 73 of file [Optimiser.cpp](#).

27.21.2.5 void RMOL::Optimiser::heuristicOptimisationByEmsrB ( stdair::LegCabin & *ioLegCabin* ) [static]

EMRS-b algorithm.

Definition at line 78 of file [Optimiser.cpp](#).

27.21.2.6 void RMOL::Optimiser::optimise ( stdair::FlightDate & *ioFlightDate* ) [static]

Optimise a flight-date using leg-based Monte Carlo Integration.

Definition at line 83 of file [Optimiser.cpp](#).

References [buildVirtualClassListForLegBasedOptimisation\(\)](#), and [optimalOptimisation-ByMCIntegration\(\)](#).

27.21.2.7 void RMOL::Optimiser::buildVirtualClassListForLegBasedOptimisation ( stdair::LegCabin & *ioLegCabin* ) [static]

Build the virtual class list for the given leg-cabin.

Definition at line 112 of file [Optimiser.cpp](#).

Referenced by [optimise\(\)](#).

27.21.2.8 double RMOL::Optimiser::optimiseUsingOnDForecast ( stdair::FlightDate & *ioFlightDate*, const bool & *iReduceFluctuations* = false ) [static]

## Optimiser

Definition at line 156 of file [Optimiser.cpp](#).

References [RMOL::MCOptimiser::optimisationByMCIntegration\(\)](#).

Referenced by [RMOL::RMOL\\_Service::optimiseOnD\(\)](#), [RMOL::RMOL\\_Service::optimiseOnDUsingAdvancedRMCooperation\(\)](#), and [RMOL::RMOL\\_Service::optimiseOnDUsingRMCooperation\(\)](#).

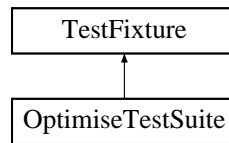
The documentation for this class was generated from the following files:

- [rmol/command/Optimiser.hpp](#)
- [rmol/command/Optimiser.cpp](#)

## 27.22 OptimiseTestSuite Class Reference

```
#include <test/rmol/OptimiseTestSuite.hpp>
```

Inheritance diagram for OptimiseTestSuite:



### Public Member Functions

- void [testOptimiseMC](#) ()
- void [testOptimiseDP](#) ()
- void [testOptimiseEMSR](#) ()
- void [testOptimiseEMSRa](#) ()
- void [testOptimiseEMSRb](#) ()
- [OptimiseTestSuite](#) ()

### Protected Attributes

- `std::stringstream` [\\_describeKey](#)

#### 27.22.1 Detailed Description

Definition at line 6 of file [OptimiseTestSuite.hpp](#).

#### 27.22.2 Constructor & Destructor Documentation

##### 27.22.2.1 OptimiseTestSuite::OptimiseTestSuite ( )

Test some error detection functionalities. Constructor.

#### 27.22.3 Member Function Documentation

##### 27.22.3.1 void OptimiseTestSuite::testOptimiseMC ( )

Test the Monte-Carlo (MC) Optimisation functionality.

##### 27.22.3.2 void OptimiseTestSuite::testOptimiseDP ( )

Test the Dynamic Programming (DP) Optimisation functionality.



## 27.22.3.3 void OptimiseTestSuite::testOptimiseEMSR ( )

Test the Expected Marginal Seat Revenue (EMSR) Optimisation functionality.

## 27.22.3.4 void OptimiseTestSuite::testOptimiseEMSRa ( )

Test the Expected Marginal Seat Revenue, variant a (EMSR-a), Optimisation functionality.

## 27.22.3.5 void OptimiseTestSuite::testOptimiseEMSRb ( )

Test the Expected Marginal Seat Revenue, variant b (EMSR-b), Optimisation functionality.

## 27.22.4 Member Data Documentation

## 27.22.4.1 std::stringstream OptimiseTestSuite::\_describeKey [protected]

Definition at line 43 of file [OptimiseTestSuite.hpp](#).

The documentation for this class was generated from the following file:

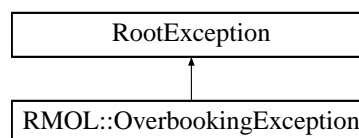
- [test/rmol/OptimiseTestSuite.hpp](#)

## 27.23 RMOL::OverbookingException Class Reference

Overbooking-related exception.

```
#include <rmol/RMOL_Types.hpp>
```

Inheritance diagram for RMOL::OverbookingException:



## Public Member Functions

- [OverbookingException](#) (const std::string &iWhat)

## 27.23.1 Detailed Description

Overbooking-related exception.

Definition at line 31 of file [RMOL\\_Types.hpp](#).

## 27.23.2 Constructor &amp; Destructor Documentation

27.23.2.1 RMOL::OverbookingException::OverbookingException ( const std::string & *iWhat* )  
[inline]

Constructor.

Definition at line 34 of file [RMOL\\_Types.hpp](#).

The documentation for this class was generated from the following file:

- [rmol/RMOL\\_Types.hpp](#)

## 27.24 RMOL::RMOL\_Service Class Reference

Interface for the [RMOL](#) Services.

```
#include <rmol/RMOL_Service.hpp>
```

## Public Member Functions

- [RMOL\\_Service](#) (const stdair::BasLogParams &, const stdair::BasDBParams &)
- [RMOL\\_Service](#) (const stdair::BasLogParams &)
- [RMOL\\_Service](#) (stdair::STDAIR\_ServicePtr\_T)
- void [parseAndLoad](#) (const stdair::CabinCapacity\_T & iCabinCapacity, const stdair::Filename\_T & iDemandAndClassDataFile)
- void [setUpStudyStatManager](#) ()
- [~RMOL\\_Service](#) ()
- void [buildSampleBom](#) ()
- void [optimalOptimisationByMCIntegration](#) (const int K)
- void [optimalOptimisationByDP](#) ()
- void [heuristicOptimisationByEmsr](#) ()
- void [heuristicOptimisationByEmsrA](#) ()
- void [heuristicOptimisationByEmsrB](#) ()
- bool [optimise](#) (stdair::FlightDate &, const stdair::DateTime\_T &, const stdair::ForecastingMethod &, const stdair::PartnershipTechnique &)
- void [forecastOnD](#) (const stdair::DateTime\_T &)
- stdair::YieldFeatures \* [getYieldFeatures](#) (const stdair::OnDDate &, const stdair::CabinCode\_T &, stdair::BomRoot &)
- void [forecastOnD](#) (const stdair::YieldFeatures &, stdair::OnDDate &, const stdair::CabinCode\_T &, const stdair::DTD\_T &, stdair::BomRoot &)
- void [setOnDForecast](#) (const stdair::AirlineClassList &, const stdair::MeanValue\_T &, const stdair::StdDevValue\_T &, stdair::OnDDate &, const stdair::CabinCode\_T &, stdair::BomRoot &)
- void [setOnDForecast](#) (const stdair::AirlineCode\_T &, const stdair::Date\_T &, const stdair::AirportCode\_T &, const stdair::AirportCode\_T &, const stdair::CabinCode\_T &, const stdair::ClassCode\_T &, const stdair::MeanValue\_T &, const stdair::StdDevValue\_T &, const stdair::Yield\_T &, stdair::BomRoot &)

- void [setOnDForecast](#) (const stdair::AirlineCodeList\_T &, const stdair::AirlineCode\_T &, const stdair::Date\_T &, const stdair::AirportCode\_T &, const stdair::AirportCode\_T &, const stdair::CabinCode\_T &, const stdair::ClassCodeList\_T &, const stdair::MeanValue\_T &, const stdair::StdDevValue\_T &, const stdair::Yield\_T &, stdair::BomRoot &)
- void [resetDemandInformation](#) (const stdair::DateTime\_T &)
- void [resetDemandInformation](#) (const stdair::DateTime\_T &, const stdair::Inventory &)
- void [projectAggregatedDemandOnLegCabins](#) (const stdair::DateTime\_T &)
- void [projectOnDDemandOnLegCabinsUsingYP](#) (const stdair::DateTime\_T &)
- void [projectOnDDemandOnLegCabinsUsingDA](#) (const stdair::DateTime\_T &)
- void [projectOnDDemandOnLegCabinsUsingDYP](#) (const stdair::DateTime\_T &)
- void [projectOnDDemandOnLegCabinsUsingDYP](#) (const stdair::DateTime\_T &, const stdair::Inventory &)
- void [optimiseOnD](#) (const stdair::DateTime\_T &)
- void [optimiseOnDUsingRMCooperation](#) (const stdair::DateTime\_T &)
- void [optimiseOnDUsingAdvancedRMCooperation](#) (const stdair::DateTime\_T &)
- void [updateBidPrice](#) (const stdair::DateTime\_T &)
- void [updateBidPrice](#) (const stdair::FlightDate &, stdair::BomRoot &)
- std::string [jsonExport](#) (const stdair::AirlineCode\_T &, const stdair::FlightNumber\_T &, const stdair::Date\_T & iDepartureDate) const
- std::string [csvDisplay](#) () const

### 27.24.1 Detailed Description

Interface for the [RMOL](#) Services.

Definition at line 39 of file [RMOL\\_Service.hpp](#).

### 27.24.2 Constructor & Destructor Documentation

#### 27.24.2.1 RMOL::RMOL\_Service::RMOL\_Service ( const stdair::BasLogParams & *iLogParams*, const stdair::BasDBParams & *iDBParams* )

Constructor.

The `initRmolService()` method is called; see the corresponding documentation for more details.

A reference on an output stream is given, so that log outputs can be directed onto that stream.

Moreover, database connection parameters are given, so that a session can be created on the corresponding database.

#### Parameters

<i>const</i> stdair::BasLogParams&	Parameters for the output log stream.
<i>const</i> stdair::BasDBParams&	Parameters for the database access.

Definition at line 84 of file [RMOL\\_Service.cpp](#).

#### 27.24.2.2 RMOL::RMOL\_Service::RMOL\_Service ( const stdair::BasLogParams & *iLogParams* )

Constructor.

The `initRmolService()` method is called; see the corresponding documentation for more details.

Moreover, a reference on an output stream is given, so that log outputs can be directed onto that stream.

##### Parameters

<i>const</i> stdair::BasLogParams&	Parameters for the output log stream.
------------------------------------	---------------------------------------

Definition at line 63 of file [RMOL\\_Service.cpp](#).

#### 27.24.2.3 RMOL::RMOL\_Service::RMOL\_Service ( stdair::STDAIR\_ServicePtr\_T *ioSTDAIRServicePtr* )

Constructor.

The `initRmolService()` method is called; see the corresponding documentation for more details.

Moreover, as no reference on any output stream is given, it is assumed that the StdAir log service has already been initialised with the proper log output stream by some other methods in the calling chain (for instance, when the [RMOL\\_Service](#) is itself being initialised by another library service such as [AIRINV\\_Service](#)).

##### Parameters

<i>STDAIR_ServicePtr_T</i>	the shared pointer of stdair service.
----------------------------	---------------------------------------

Definition at line 106 of file [RMOL\\_Service.cpp](#).

#### 27.24.2.4 RMOL::RMOL\_Service::~~RMOL\_Service ( )

Destructor.

Definition at line 123 of file [RMOL\\_Service.cpp](#).

### 27.24.3 Member Function Documentation

#### 27.24.3.1 void RMOL::RMOL\_Service::parseAndLoad ( const stdair::CabinCapacity\_T & *iCabinCapacity*, const stdair::Filename\_T & *iDemandAndClassDataFile* )

Parse the optimisation-related data and load them into memory.

First, the `STDAIR_Service::buildDummyInventory()` method is called, for [RMOL](#) and with the given cabin capacity, in order to build the minimum required flight-date structure

in order to perform an optimisation on a leg-cabin.

The CSV input file describes the problem to be optimised, i.e.:

- the demand specifications for all the booking classes (mean and standard deviations for the demand distribution); the yields corresponding to those booking classes.

That CSV file is parsed and instantiated in memory accordingly. The leg-cabin capacity has been set at the initialisation of the ([RMOL](#)) service.

#### Parameters

<i>const</i>	<code>stdair::CabinCapacity&amp;</code> Capacity of the leg-cabin to be optimised.
<i>const</i>	<code>stdair::Filename_T&amp;</code> (CSV) input file.

Definition at line 200 of file [RMOL\\_Service.cpp](#).

References [RMOL::InventoryParser::parseInputFileAndBuildBom\(\)](#).

Referenced by [main\(\)](#).

#### 27.24.3.2 void RMOL::RMOL\_Service::setUpStudyStatManager ( )

Set up the StudyStatManager.

#### 27.24.3.3 void RMOL::RMOL\_Service::buildSampleBom ( )

Build a sample BOM tree, and attach it to the BomRoot instance.

#### See also

`stdair::CmdBomManager::buildSampleBom()` for more details.

Definition at line 224 of file [RMOL\\_Service.cpp](#).

Referenced by [main\(\)](#).

#### 27.24.3.4 void RMOL::RMOL\_Service::optimalOptimisationByMCIntegration ( const int K )

Single resource optimization using the Monte Carlo algorithm.

Definition at line 272 of file [RMOL\\_Service.cpp](#).

Referenced by [optimise\(\)](#).

#### 27.24.3.5 void RMOL::RMOL\_Service::optimalOptimisationByDP ( )

Single resource optimization using dynamic programming.

Definition at line 312 of file [RMOL\\_Service.cpp](#).

Referenced by [optimise\(\)](#).

## 27.24.3.6 void RMOL::RMOL\_Service::heuristicOptimisationByEmsr ( )

Single resource optimization using EMSR heuristic.

Definition at line 316 of file [RMOL\\_Service.cpp](#).

Referenced by [optimise\(\)](#).

## 27.24.3.7 void RMOL::RMOL\_Service::heuristicOptimisationByEmsrA ( )

Single resource optimization using EMSR-a heuristic.

Definition at line 357 of file [RMOL\\_Service.cpp](#).

Referenced by [optimise\(\)](#).

## 27.24.3.8 void RMOL::RMOL\_Service::heuristicOptimisationByEmsrB ( )

Single resource optimization using EMSR-b heuristic.

Definition at line 378 of file [RMOL\\_Service.cpp](#).

Referenced by [optimise\(\)](#).

27.24.3.9 bool RMOL::RMOL\_Service::optimise ( stdair::FlightDate & *ioFlightDate*, const stdair::DateTime\_T & *iRMEventTime*, const stdair::ForecastingMethod & *iForecastingMethod*, const stdair::PartnershipTechnique & *iPartnershipTechnique* )

Optimise (revenue management) an flight-date/network-date

Definition at line 399 of file [RMOL\\_Service.cpp](#).

References [forecastOnD\(\)](#), [RMOL::Forecaster::forecastUsingAdditivePickUp\(\)](#), [RMOL::Forecaster::forecastUsingMultiplePickUp\(\)](#), [optimiseOnD\(\)](#), [optimiseOnDUsingAdvancedRMCooperation\(\)](#), [optimiseOnDUsingRMCooperation\(\)](#), [projectAggregatedDemandOnLegCabins\(\)](#), [projectOnDDemandOnLegCabinsUsingDYP\(\)](#), [projectOnDDemandOnLegCabinsUsingYP\(\)](#), [resetDemandInformation\(\)](#), and [updateBidPrice\(\)](#).

27.24.3.10 void RMOL::RMOL\_Service::forecastOnD ( const stdair::DateTime\_T & *iRMEventTime* )

[Forecaster](#)

Definition at line 500 of file [RMOL\\_Service.cpp](#).

References [RMOL::DEFAULT\\_DCP\\_LIST](#), and [getYieldFeatures\(\)](#).

Referenced by [optimise\(\)](#).

27.24.3.11 stdair::YieldFeatures \* RMOL::RMOL\_Service::getYieldFeatures ( const stdair::OnDDate & *iOnDDate*, const stdair::CabinCode\_T & *iCabinCode*, stdair::BomRoot & *iBomRoot* )

Definition at line 573 of file [RMOL\\_Service.cpp](#).

Referenced by [forecastOnD\(\)](#).

27.24.3.12 void RMOL::RMOL\_Service::forecastOnD ( const stdair::YieldFeatures & *iYieldFeatures*, stdair::OnDDate & *iOnDDate*, const stdair::CabinCode\_T & *iCabinCode*, const stdair::DTD\_T & *iDTD*, stdair::BomRoot & *iBomRoot* )

Definition at line 646 of file [RMOL\\_Service.cpp](#).

References [setOnDForecast\(\)](#).

27.24.3.13 void RMOL::RMOL\_Service::setOnDForecast ( const stdair::AirlineClassList & *iAirlineClassList*, const stdair::MeanValue\_T & *iMeanValue*, const stdair::StdDevValue\_T & *iStdDevValue*, stdair::OnDDate & *iOnDDate*, const stdair::CabinCode\_T & *iCabinCode*, stdair::BomRoot & *iBomRoot* )

Definition at line 761 of file [RMOL\\_Service.cpp](#).

Referenced by [forecastOnD\(\)](#).

27.24.3.14 void RMOL::RMOL\_Service::setOnDForecast ( const stdair::AirlineCode\_T & *iAirlineCode*, const stdair::Date\_T & *iDepartureDate*, const stdair::AirportCode\_T & *iOrigin*, const stdair::AirportCode\_T & *iDestination*, const stdair::CabinCode\_T & *iCabinCode*, const stdair::ClassCode\_T & *iClassCode*, const stdair::MeanValue\_T & *iMeanValue*, const stdair::StdDevValue\_T & *iStdDevValue*, const stdair::Yield\_T & *iYield*, stdair::BomRoot & *iBomRoot* )

Definition at line 820 of file [RMOL\\_Service.cpp](#).

27.24.3.15 void RMOL::RMOL\_Service::setOnDForecast ( const stdair::AirlineCodeList\_T & *iAirlineCodeList*, const stdair::AirlineCode\_T & *iAirlineCode*, const stdair::Date\_T & *iDepartureDate*, const stdair::AirportCode\_T & *iOrigin*, const stdair::AirportCode\_T & *iDestination*, const stdair::CabinCode\_T & *iCabinCode*, const stdair::ClassCodeList\_T & *iClassCodeList*, const stdair::MeanValue\_T & *iMeanValue*, const stdair::StdDevValue\_T & *iStdDevValue*, const stdair::Yield\_T & *iYield*, stdair::BomRoot & *iBomRoot* )

Definition at line 882 of file [RMOL\\_Service.cpp](#).

27.24.3.16 void RMOL::RMOL\_Service::resetDemandInformation ( const stdair::DateTime\_T & *iRMEventTime* )

Definition at line 997 of file [RMOL\\_Service.cpp](#).

Referenced by [optimise\(\)](#), [optimiseOnDUsingAdvancedRMCooperation\(\)](#), and [optimiseOnDUsingRMCooperation\(\)](#).

27.24.3.17 void RMOL::RMOL\_Service::resetDemandInformation ( const stdair::DateTime\_T & *iRMEventTime*, const stdair::Inventory & *iInventory* )

Definition at line 1023 of file [RMOL\\_Service.cpp](#).

References [RMOL::DEFAULT\\_DCP\\_LIST](#).

27.24.3.18 void RMOL::RMOL\_Service::projectAggregatedDemandOnLegCabins ( const stdair::DateTime\_T & *iRMEventTime* )

Definition at line 1071 of file [RMOL\\_Service.cpp](#).

References [RMOL::DEFAULT\\_DCP\\_LIST](#).

Referenced by [optimise\(\)](#).

27.24.3.19 void RMOL::RMOL\_Service::projectOnDDemandOnLegCabinsUsingYP ( const stdair::DateTime\_T & *iRMEventTime* )

Definition at line 1176 of file [RMOL\\_Service.cpp](#).

References [RMOL::DEFAULT\\_DCP\\_LIST](#).

Referenced by [optimise\(\)](#).

27.24.3.20 void RMOL::RMOL\_Service::projectOnDDemandOnLegCabinsUsingDA ( const stdair::DateTime\_T & *iRMEventTime* )

Definition at line 1451 of file [RMOL\\_Service.cpp](#).

References [RMOL::DEFAULT\\_DCP\\_LIST](#).

27.24.3.21 void RMOL::RMOL\_Service::projectOnDDemandOnLegCabinsUsingDYP ( const stdair::DateTime\_T & *iRMEventTime* )

Definition at line 1607 of file [RMOL\\_Service.cpp](#).

Referenced by [optimise\(\)](#), [optimiseOnDUsingAdvancedRMCooperation\(\)](#), and [optimiseOnDUsingRMCooperation\(\)](#).

27.24.3.22 void RMOL::RMOL\_Service::projectOnDDemandOnLegCabinsUsingDYP ( const stdair::DateTime\_T & *iRMEventTime*, const stdair::Inventory & *ilInventory* )

Definition at line 1633 of file [RMOL\\_Service.cpp](#).

References [RMOL::DEFAULT\\_DCP\\_LIST](#).

27.24.3.23 void RMOL::RMOL\_Service::optimiseOnD ( const stdair::DateTime\_T & *iRMEventTime* )

#### [Optimiser](#)

Definition at line 1275 of file [RMOL\\_Service.cpp](#).

References [RMOL::DEFAULT\\_DCP\\_LIST](#), and [RMOL::Optimiser::optimiseUsingOnDForecast\(\)](#).

Referenced by [optimise\(\)](#).

27.24.3.24 void RMOL::RMOL\_Service::optimiseOnDUsingRMCooperation ( const stdair::DateTime\_T & *iRMEventTime* )

Definition at line 1749 of file [RMOL\\_Service.cpp](#).

References [RMOL::DEFAULT\\_DCP\\_LIST](#), [RMOL::Optimiser::optimiseUsingOnDForecast\(\)](#),



[projectOnDDemandOnLegCabinsUsingDYP\(\)](#), and [resetDemandInformation\(\)](#).

Referenced by [optimise\(\)](#).

27.24.3.25 void RMOL::RMOL\_Service::optimiseOnDUsingAdvancedRMCooperation ( const stdair::DateTime\_T & iRMEventTime )

Definition at line 1809 of file [RMOL\\_Service.cpp](#).

References [RMOL::DEFAULT\\_DCP\\_LIST](#), [RMOL::Optimiser::optimiseUsingOnDForecast\(\)](#), [projectOnDDemandOnLegCabinsUsingDYP\(\)](#), [resetDemandInformation\(\)](#), and [updateBidPrice\(\)](#).

Referenced by [optimise\(\)](#).

27.24.3.26 void RMOL::RMOL\_Service::updateBidPrice ( const stdair::DateTime\_T & iRMEventTime )

Definition at line 1324 of file [RMOL\\_Service.cpp](#).

References [RMOL::DEFAULT\\_DCP\\_LIST](#).

Referenced by [optimise\(\)](#), and [optimiseOnDUsingAdvancedRMCooperation\(\)](#).

27.24.3.27 void RMOL::RMOL\_Service::updateBidPrice ( const stdair::FlightDate & iFlightDate, stdair::BomRoot & iBomRoot )

Definition at line 1372 of file [RMOL\\_Service.cpp](#).

27.24.3.28 std::string RMOL::RMOL\_Service::jsonExport ( const stdair::AirlineCode\_T & , const stdair::FlightNumber\_T & , const stdair::Date\_T & iDepartureDate ) const

Recursively dump, in the returned string and in JSON format, the flight-date corresponding to the parameters given as input.

#### Parameters

<i>const</i>	stdair::AirlineCode_T & Airline code of the flight to dump.
<i>const</i>	stdair::FlightNumber_T & Flight number of the flight to dump.
<i>const</i>	stdair::Date_T & Departure date of a flight to dump.

#### Returns

std::string Output string in which the BOM tree is JSON-ified.

27.24.3.29 std::string RMOL::RMOL\_Service::csvDisplay ( ) const

Recursively display (dump in the returned string) the objects of the BOM tree.

#### Returns

std::string Output string in which the BOM tree is logged/dumped.

The documentation for this class was generated from the following files:

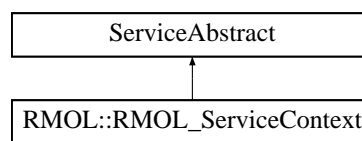
- [rmol/RMOL\\_Service.hpp](#)
- [rmol/service/RMOL\\_Service.cpp](#)

## 27.25 RMOL::RMOL\_ServiceContext Class Reference

Inner class holding the context for the [RMOL](#) Service object.

```
#include <rmol/service/RMOL_ServiceContext.hpp>
```

Inheritance diagram for RMOL::RMOL\_ServiceContext:



### Friends

- class [RMOL\\_Service](#)
- class [FacRmolServiceContext](#)

### 27.25.1 Detailed Description

Inner class holding the context for the [RMOL](#) Service object.

Definition at line 29 of file [RMOL\\_ServiceContext.hpp](#).

### 27.25.2 Friends And Related Function Documentation

#### 27.25.2.1 friend class [RMOL\\_Service](#) [friend]

The [RMOL\\_Service](#) class should be the sole class to get access to ServiceContext content: general users do not want to bother with a context interface.

Definition at line 35 of file [RMOL\\_ServiceContext.hpp](#).

#### 27.25.2.2 friend class [FacRmolServiceContext](#) [friend]

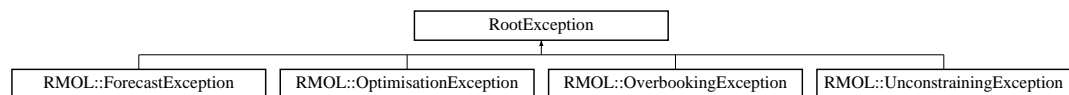
Definition at line 36 of file [RMOL\\_ServiceContext.hpp](#).

The documentation for this class was generated from the following files:

- [rmol/service/RMOL\\_ServiceContext.hpp](#)
- [rmol/service/RMOL\\_ServiceContext.cpp](#)

## 27.26 RootException Class Reference

Inheritance diagram for RootException:

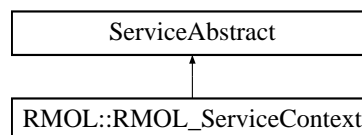


The documentation for this class was generated from the following file:

- [rmol/RMOL\\_Types.hpp](#)

## 27.27 ServiceAbstract Class Reference

Inheritance diagram for ServiceAbstract:

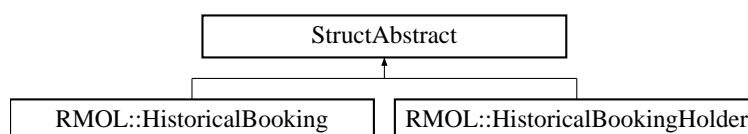


The documentation for this class was generated from the following file:

- [rmol/service/RMOL\\_ServiceContext.hpp](#)

## 27.28 StructAbstract Class Reference

Inheritance diagram for StructAbstract:

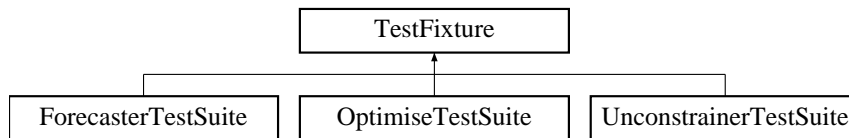


The documentation for this class was generated from the following file:

- [rmol/bom/HistoricalBooking.hpp](#)

## 27.29 TestFixture Class Reference

Inheritance diagram for TestFixture:



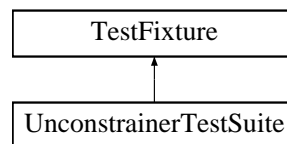
The documentation for this class was generated from the following file:

- [test/rmol/OptimiseTestSuite.hpp](#)

## 27.30 UnconstrainerTestSuite Class Reference

```
#include <test/rmol/UnconstrainerTestSuite.hpp>
```

Inheritance diagram for UnconstrainerTestSuite:



### Public Member Functions

- void [testUnconstrainingByEM](#) ()
- [UnconstrainerTestSuite](#) ()

### Protected Attributes

- `std::stringstream` [\\_describeKey](#)

#### 27.30.1 Detailed Description

Definition at line 6 of file [UnconstrainerTestSuite.hpp](#).

#### 27.30.2 Constructor & Destructor Documentation

##### 27.30.2.1 UnconstrainerTestSuite::UnconstrainerTestSuite ( )

Constructor.

### 27.30.3 Member Function Documentation

#### 27.30.3.1 void UnconstrainerTestSuite::testUnconstrainingByEM ( )

Test data unconstraining by Expectation Maximization.

### 27.30.4 Member Data Documentation

#### 27.30.4.1 std::stringstream UnconstrainerTestSuite::\_describeKey [protected]

Definition at line 19 of file [UnconstrainerTestSuite.hpp](#).

The documentation for this class was generated from the following file:

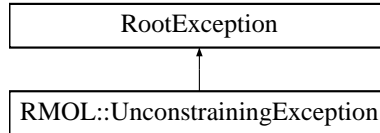
- test/rmol/[UnconstrainerTestSuite.hpp](#)

## 27.31 RMOL::UnconstrainingException Class Reference

Unconstraining-related exception.

```
#include <rmol/RMOL_Types.hpp>
```

Inheritance diagram for RMOL::UnconstrainingException:



### Public Member Functions

- [UnconstrainingException](#) (const std::string &iWhat)

#### 27.31.1 Detailed Description

Unconstraining-related exception.

Definition at line 41 of file [RMOL\\_Types.hpp](#).

#### 27.31.2 Constructor & Destructor Documentation

##### 27.31.2.1 RMOL::UnconstrainingException::UnconstrainingException ( const std::string &iWhat ) [inline]

Constructor.

Definition at line 44 of file [RMOL\\_Types.hpp](#).

The documentation for this class was generated from the following file:

- [rmol/RMOL\\_Types.hpp](#)

## 27.32 RMOL::Utilities Class Reference

```
#include <rmol/bom/Utilities.hpp>
```

### Static Public Member Functions

- static void [computeDistributionParameters](#) (const [UnconstrainedDemandVector\\_T](#) &, double &, double &)
- static stdair::DCPList\_T [buildRemainingDCPList](#) (const stdair::DTD\_T &)
- static stdair::DCPList\_T [buildRemainingDCPList2](#) (const stdair::DTD\_T &)
- static stdair::NbOfSegments\_T [getNbOfDepartedSimilarSegments](#) (const stdair::SegmentCabin &, const stdair::Date\_T &)

### 27.32.1 Detailed Description

Class holding helper methods.

Definition at line 19 of file [Utilities.hpp](#).

### 27.32.2 Member Function Documentation

**27.32.2.1** void RMOL::Utilities::computeDistributionParameters ( const [UnconstrainedDemandVector\\_T](#) & *iVector*, double & *ioMean*, double & *ioStdDev* ) [static]

Compute the mean and the standard deviation from a set of samples.

Definition at line 24 of file [Utilities.cpp](#).

**27.32.2.2** stdair::DCPList\_T RMOL::Utilities::buildRemainingDCPList ( const stdair::DTD\_T & *iDTD* ) [static]

Build the list of remaining DCP's for the segment-date.

Definition at line 55 of file [Utilities.cpp](#).

References [RMOL::DEFAULT\\_DCP\\_LIST](#).

Referenced by [RMOL::Forecaster::forecastUsingAdditivePickUp\(\)](#).

**27.32.2.3** stdair::DCPList\_T RMOL::Utilities::buildRemainingDCPList2 ( const stdair::DTD\_T & *iDTD* ) [static]

Definition at line 80 of file [Utilities.cpp](#).

References [RMOL::DEFAULT\\_DCP\\_LIST](#).

Referenced by [RMOL::Forecaster::forecastUsingAdditivePickUp\(\)](#).

27.32.2.4 `stdair::NbOfSegments_T RMOL::Utilities::getNbOfDepartedSimilarSegments ( const  
stdair::SegmentCabin & iSegmentCabin, const stdair::Date_T & iEventDate )  
[static]`

Retrieve the number of departed similar segments.

Definition at line 105 of file [Utilities.cpp](#).

References [RMOL::GuillotineBlockHelper::getNbOfSegmentAlreadyPassedThisDTD\(\)](#).

The documentation for this class was generated from the following files:

- [rmol/bom/Utilities.hpp](#)
- [rmol/bom/Utilities.cpp](#)

## 28 File Documentation

28.1 [doc/local/authors.doc](#) File Reference

28.2 [doc/local/codingrules.doc](#) File Reference

28.3 [doc/local/copyright.doc](#) File Reference

28.4 [doc/local/documentation.doc](#) File Reference

28.5 [doc/local/features.doc](#) File Reference

28.6 [doc/local/help\\_wanted.doc](#) File Reference

28.7 [doc/local/howto\\_release.doc](#) File Reference

28.8 [doc/local/index.doc](#) File Reference

28.9 [doc/local/installation.doc](#) File Reference

28.10 [doc/local/linking.doc](#) File Reference

28.11 [doc/local/test.doc](#) File Reference

28.12 [doc/local/users\\_guide.doc](#) File Reference

28.13 [doc/local/verification.doc](#) File Reference

28.14 [doc/tutorial/tutorial.doc](#) File Reference

## 28.15 rmol/basic/BasConst.cpp File Reference

```
#include <rmol/basic/BasConst_General.hpp>
#include <rmol/basic/BasConst_Curves.hpp>
#include <rmol/basic/BasConst_RMOL_Service.hpp>
```

### Namespaces

- namespace [RMOL](#)

### Variables

- const stdair::AirlineCode\_T [RMOL::DEFAULT\\_RMOL\\_SERVICE\\_AIRLINE\\_CODE](#) = "BA"
- const double [RMOL::DEFAULT\\_RMOL\\_SERVICE\\_CAPACITY](#) = 1.0
- const int [RMOL::DEFAULT\\_NUMBER\\_OF\\_DRAWS\\_FOR\\_MC\\_SIMULATION](#) = 100000
- const int [RMOL::DEFAULT\\_PRECISION](#) = 10
- const double [RMOL::DEFAULT\\_EPSILON](#) = 0.0001
- const double [RMOL::DEFAULT\\_STOPPING\\_CRITERION](#) = 0.01
- const double [RMOL::DEFAULT\\_INITIALIZER\\_DOUBLE\\_NEGATIVE](#) = -10.0
- const FRAT5Curve\_T [RMOL::DEFAULT\\_CUMULATIVE\\_FRAT5\\_CURVE](#)
- const stdair::DCPList\_T [RMOL::DEFAULT\\_DCP\\_LIST](#) = DefaultDCPList::init()

## 28.16 BasConst.cpp

```
00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 #include <rmol/basic/BasConst_General.hpp>
00005 #include <rmol/basic/BasConst_Curves.hpp>
00006 #include <rmol/basic/BasConst_RMOL_Service.hpp>
00007
00008 namespace RMOL {
00009
00011     const stdair::AirlineCode_T DEFAULT_RMOL_SERVICE_AIRLINE_CODE = "BA";
00012
00014     const double DEFAULT_RMOL_SERVICE_CAPACITY = 1.0;
00015
00018     const int DEFAULT_NUMBER_OF_DRAWS_FOR_MC_SIMULATION = 100000;
00019
00023     const int DEFAULT_PRECISION = 10;
00024
00026     const double DEFAULT_EPSILON = 0.0001;
00027
00029     const double DEFAULT_STOPPING_CRITERION = 0.01;
00030
00032     const double DEFAULT_INITIALIZER_DOUBLE_NEGATIVE = -10.0;
00033
00036     const FRAT5Curve_T DEFAULT_CUMULATIVE_FRAT5_CURVE =
00037         DefaultMap::createCumulativeFRAT5Curve();
```



```

00038 FRAT5Curve_T DefaultMap::createCumulativeFRAT5Curve() {
00039     FRAT5Curve_T oCurve;
00040     // oCurve[63] = 1.4; oCurve[56] = 1.45;
00041     // oCurve[49] = 1.5; oCurve[42] = 1.55; oCurve[35] = 1.6;
00042     // oCurve[31] = 1.7; oCurve[27] = 1.8; oCurve[23] = 2.0;
00043     // oCurve[19] = 2.3; oCurve[16] = 2.6; oCurve[13] = 3.0;
00044     // oCurve[10] = 3.3; oCurve[7] = 3.4; oCurve[5] = 3.44;
00045     // oCurve[3] = 3.47; oCurve[1] = 3.5;
00046     oCurve[63] = 1.1; oCurve[56] = 1.11;
00047     oCurve[49] = 1.17; oCurve[42] = 1.27;
00048     oCurve[35] = 1.28; oCurve[31] = 1.28; oCurve[27] = 1.28;
00049     oCurve[23] = 1.37; oCurve[19] = 1.37;
00050     oCurve[16] = 1.6; oCurve[13] = 1.6;
00051     oCurve[10] = 1.8; oCurve[7] = 1.8;
00052     oCurve[5] = 2.23; oCurve[3] = 2.23;
00053     oCurve[1] = 2.5;
00054     // oCurve[63] = 1.05; oCurve[56] = 1.07;
00055     // oCurve[49] = 1.09; oCurve[42] = 1.11; oCurve[35] = 1.14;
00056     // oCurve[31] = 1.16; oCurve[27] = 1.18; oCurve[23] = 1.21;
00057     // oCurve[19] = 1.24; oCurve[16] = 1.27; oCurve[13] = 1.3;
00058     // oCurve[10] = 1.33; oCurve[7] = 1.37; oCurve[5] = 1.4;
00059     // oCurve[3] = 1.45; oCurve[1] = 1.5;
00060     // oCurve[63] = 1.4;
00061     // oCurve[49] = 1.5; oCurve[35] = 1.6;
00062     // oCurve[23] = 2.0; oCurve[16] = 2.6;
00063     // oCurve[10] = 3.3; oCurve[5] = 3.44;
00064     // oCurve[1] = 3.5;
00065     return oCurve;
00066 };
00067
00069 const stdair::DCPList_T DEFAULT_DCP_LIST = DefaultDCPList::init();
00070 stdair::DCPList_T DefaultDCPList::init() {
00071     stdair::DCPList_T oDCPList;
00072     oDCPList.push_back (63); oDCPList.push_back (49);
00073     oDCPList.push_back (35); oDCPList.push_back (23);
00074     oDCPList.push_back (16); oDCPList.push_back (10);
00075     oDCPList.push_back (5); oDCPList.push_back (1);
00076     oDCPList.push_back (0);
00077     return oDCPList;
00078 }
00079
00080 }

```

## 28.17 rmol/basic/BasConst\_Curves.hpp File Reference

```
#include <rmol/RMOL_Types.hpp>
```

### Classes

- struct [RMOL::DefaultMap](#)

### Namespaces

- namespace [RMOL](#)

**28.18 BasConst\_Curves.hpp**

```

00001 #ifndef __RMOL_BAS_BASCONST_CURVES_HPP
00002 #define __RMOL_BAS_BASCONST_CURVES_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // RMOL
00008 #include <rmol/RMOL_Types.hpp>
00009
00010 namespace RMOL {
00011
00014     extern const FRAT5Curve_T DEFAULT_CUMULATIVE_FRAT5_CURVE;
00015
00017     struct DefaultMap {
00018         static FRAT5Curve_T createCumulativeFRAT5Curve();
00019     };
00020 }
00021 #endif // __RMOL_BAS_BASCONST_CURVES_HPP

```

**28.19 rmol/basic/BasConst\_General.hpp File Reference**

```
#include <stdair/stdair_types.hpp>
```

**Classes**

- struct [RMOL::DefaultDCPList](#)

**Namespaces**

- namespace [RMOL](#)

**28.20 BasConst\_General.hpp**

```

00001 #ifndef __RMOL_BAS_BASCONST_GENERAL_HPP
00002 #define __RMOL_BAS_BASCONST_GENERAL_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // StdAir
00008 #include <stdair/stdair_types.hpp>
00009
00010 namespace RMOL {
00011
00014     extern const int DEFAULT_NUMBER_OF_DRAWS_FOR_MC_SIMULATION;
00015
00018     extern const int DEFAULT_PRECISION;
00019
00021     extern const double DEFAULT_EPSILON;
00022
00024     extern const double DEFAULT_STOPPING_CRITERION;
00025

```

```

00027  extern const double DEFAULT_INITIALIZER_DOUBLE_NEGATIVE;
00028
00030  extern const stdair::DCPList_T DEFAULT_DCP_LIST;
00031  struct DefaultDCPList { static stdair::DCPList_T init(); };
00032 }
00033 #endif // __RMOL_BAS_BASCONST_GENERAL_HPP

```

## 28.21 rmol/basic/BasConst\_RMOL\_Service.hpp File Reference

```

#include <vector>
#include <stdair/stdair_basic_types.hpp>
#include <rmol/RMOL_Types.hpp>

```

### Namespaces

- namespace [RMOL](#)

## 28.22 BasConst\_RMOL\_Service.hpp

```

00001 #ifndef __RMOL_BAS_BASCONST_RMOL_SERVICE_HPP
00002 #define __RMOL_BAS_BASCONST_RMOL_SERVICE_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // STL
00008 #include <vector>
00009 // StdAir
00010 #include <stdair/stdair_basic_types.hpp>
00011 // RMOL
00012 #include <rmol/RMOL_Types.hpp>
00013
00014 namespace RMOL {
00015
00017  extern const stdair::AirlineCode_T DEFAULT_RMOL_SERVICE_AIRLINE_CODE;
00018
00020  extern const double DEFAULT_RMOL_SERVICE_CAPACITY;
00021
00022 }
00023 #endif // __RMOL_BAS_BASCONST_RMOL_SERVICE_HPP

```

## 28.23 rmol/batches/rmol.cpp File Reference

```

#include <cassert>
#include <iostream>
#include <sstream>
#include <fstream>
#include <string>

```

```
#include <boost/date_time/posix_time/posix_time.hpp>
#include <boost/date_time/gregorian/gregorian.hpp>
#include <boost/program_options.hpp>
#include <stdair/service/Logger.hpp>
#include <rmol/RMOL_Service.hpp>
#include <rmol/config/rmol-paths.hpp>
```

### Functions

- const std::string [K\\_RMOL\\_DEFAULT\\_LOG\\_FILENAME](#) ("rmol.log")
- const std::string [K\\_RMOL\\_DEFAULT\\_INPUT\\_FILENAME](#) (STDAIR\_SAMPLE\_DIR"/rm01.csv")
- template<class T >  
std::ostream & [operator<<](#) (std::ostream &os, const std::vector< T > &v)
- int [readConfiguration](#) (int argc, char \*argv[], int &ioRandomDraws, double &ioCapacity, short &ioMethod, bool &iolsBuiltin, std::string &ioInputFilename, std::string &ioLogFilename)
- void [optimise](#) (RMOL::RMOL\_Service &rmolService, const short &iMethod, const int &iRandomDraws)
- int [main](#) (int argc, char \*argv[])

### Variables

- const bool [K\\_RMOL\\_DEFAULT\\_BUILT\\_IN\\_INPUT](#) = false
- const int [K\\_RMOL\\_DEFAULT\\_RANDOM\\_DRAWS](#) = 100000
- const double [K\\_RMOL\\_DEFAULT\\_CAPACITY](#) = 500.0
- const short [K\\_RMOL\\_DEFAULT\\_METHOD](#) = 0
- const int [K\\_RMOL\\_EARLY\\_RETURN\\_STATUS](#) = 99

#### 28.23.1 Function Documentation

##### 28.23.1.1 const std::string K\_RMOL\_DEFAULT\_LOG\_FILENAME ( "rmol.log" )

Default name and location for the log file.

Referenced by [readConfiguration\(\)](#).

##### 28.23.1.2 const std::string K\_RMOL\_DEFAULT\_INPUT\_FILENAME ( STDAIR\_SAMPLE\_DIR"/rm01.csv" )

Default name and location for the (CSV) input file.

Referenced by [readConfiguration\(\)](#).

28.23.1.3 `template<class T> std::ostream& operator<< ( std::ostream & os, const  
std::vector< T> & v )`

Definition at line 47 of file [rmol.cpp](#).

28.23.1.4 `int readConfiguration ( int argc, char * argv[], int & ioRandomDraws, double &  
ioCapacity, short & ioMethod, bool & iolsBuiltin, std::string & ioInputFilename,  
std::string & ioLogFilename )`

Read and parse the command line options.

Definition at line 57 of file [rmol.cpp](#).

References [K\\_RMOL\\_DEFAULT\\_BUILT\\_IN\\_INPUT](#), [K\\_RMOL\\_DEFAULT\\_CAPACITY](#), [K\\_RMOL\\_DEFAULT\\_INPUT\\_FILENAME\(\)](#), [K\\_RMOL\\_DEFAULT\\_LOG\\_FILENAME\(\)](#), [K\\_RMOL\\_DEFAULT\\_METHOD](#), [K\\_RMOL\\_DEFAULT\\_RANDOM\\_DRAWS](#), [K\\_RMOL\\_EARLY\\_RETURN\\_STATUS](#), [PACKAGE\\_NAME](#), [PACKAGE\\_VERSION](#), and [PREFIXDIR](#).

Referenced by [main\(\)](#).

28.23.1.5 `void optimise ( RMOL::RMOL_Service & rmolService, const short & iMethod,  
const int & iRandomDraws )`

Definition at line 167 of file [rmol.cpp](#).

References [RMOL::RMOL\\_Service::heuristicOptimisationByEmsr\(\)](#), [RMOL::RMOL\\_Service::heuristicOptimisationByEmsrB\(\)](#), [RMOL::RMOL\\_Service::optimalOptimisationByDP\(\)](#), and [RMOL::RMOL\\_Service::optimalOptimisationByMCIntegration\(\)](#).

Referenced by [main\(\)](#).

28.23.1.6 `int main ( int argc, char * argv[] )`

Definition at line 204 of file [rmol.cpp](#).

References [RMOL::RMOL\\_Service::buildSampleBom\(\)](#), [K\\_RMOL\\_EARLY\\_RETURN\\_STATUS](#), [optimise\(\)](#), [RMOL::RMOL\\_Service::parseAndLoad\(\)](#), and [readConfiguration\(\)](#).

## 28.23.2 Variable Documentation

28.23.2.1 `const bool K_RMOL_DEFAULT_BUILT_IN_INPUT = false`

Default for the input type. It can be either built-in or provided by an input file. That latter must then be given with the `-i/--input` option.

Definition at line 23 of file [rmol.cpp](#).

Referenced by [readConfiguration\(\)](#).

28.23.2.2 `const int K_RMOL_DEFAULT_RANDOM_DRAWS = 100000`

Default number of random draws to be generated (best if over 100).

Definition at line 29 of file [rmol.cpp](#).

Referenced by [readConfiguration\(\)](#).

**28.23.2.3** `const double K_RMOL_DEFAULT_CAPACITY = 500.0`

Default value for the capacity of the resource (e.g., a flight cabin).

Definition at line [32](#) of file [rmol.cpp](#).

Referenced by [readConfiguration\(\)](#).

**28.23.2.4** `const short K_RMOL_DEFAULT_METHOD = 0`

Default name and location for the Revenue Management method to be used.

- 0 = Monte-Carlo
- 1 = Dynamic Programming
- 2 = EMSR
- 3 = EMSR-a
- 4 = EMSR-b

Definition at line [43](#) of file [rmol.cpp](#).

Referenced by [readConfiguration\(\)](#).

**28.23.2.5** `const int K_RMOL_EARLY_RETURN_STATUS = 99`

Early return status (so that it can be differentiated from an error).

Definition at line [54](#) of file [rmol.cpp](#).

Referenced by [main\(\)](#), and [readConfiguration\(\)](#).

## 28.24 rmol.cpp

```
00001 // STL
00002 #include <cassert>
00003 #include <iostream>
00004 #include <sstream>
00005 #include <fstream>
00006 #include <string>
00007 // Boost (Extended STL)
00008 #include <boost/date_time/posix_time/posix_time.hpp>
00009 #include <boost/date_time/gregorian/gregorian.hpp>
00010 #include <boost/program_options.hpp>
00011 // StdAir
00012 #include <stdair/service/Logger.hpp>
00013 // RMOL
00014 #include <rmol/RMOL_Service.hpp>
00015 #include <rmol/config/rmol-paths.hpp>
00016
00017 // ////////// Constants //////////
00019 const std::string K_RMOL_DEFAULT_LOG_FILENAME ("rmol.log");
00020
```

```

00023 const bool K_RMOL_DEFAULT_BUILT_IN_INPUT = false;
00024
00026 const std::string K_RMOL_DEFAULT_INPUT_FILENAME (STDAIR_SAMPLE_DIR "/rm01.csv");
00027
00029 const int K_RMOL_DEFAULT_RANDOM_DRAWS = 100000;
00030
00032 const double K_RMOL_DEFAULT_CAPACITY = 500.0;
00033
00043 const short K_RMOL_DEFAULT_METHOD = 0;
00044
00045 // ////////// Parsing of Options & Configuration //////////
00046 // A helper function to simplify the main part.
00047 template<class T> std::ostream& operator<< (std::ostream& os,
00048                                           const std::vector<T>& v) {
00049     std::copy (v.begin(), v.end(), std::ostream_iterator<T> (std::cout, " "));
00050     return os;
00051 }
00052
00054 const int K_RMOL_EARLY_RETURN_STATUS = 99;
00055
00057 int readConfiguration(int argc, char* argv[],
00058                     int& ioRandomDraws, double& ioCapacity,
00059                     short& ioMethod, bool& ioIsBuiltin,
00060                     std::string& ioInputFilename, std::string& ioLogFilename){
00061
00062     // Default for the built-in input
00063     ioIsBuiltin = K_RMOL_DEFAULT_BUILT_IN_INPUT;
00064
00065     // Declare a group of options that will be allowed only on command line
00066     boost::program_options::options_description generic ("Generic options");
00067     generic.add_options()
00068         ("prefix", "print installation prefix")
00069         ("version,v", "print version string")
00070         ("help,h", "produce help message");
00071
00072     // Declare a group of options that will be allowed both on command
00073     // line and in config file
00074     boost::program_options::options_description config ("Configuration");
00075     config.add_options()
00076         ("draws,d",
00077          boost::program_options::value<int>(&ioRandomDraws)->default_value(
00078              K_RMOL_DEFAULT_RANDOM_DRAWS),
00079          "Number of to-be-generated random draws")
00080         ("capacity,c",
00081          boost::program_options::value<double>(&ioCapacity)->default_value(
00082              K_RMOL_DEFAULT_CAPACITY),
00083          "Resource capacity (e.g., for a flight leg)")
00084         ("method,m",
00085          boost::program_options::value<short>(&ioMethod)->default_value(
00086              K_RMOL_DEFAULT_METHOD),
00087          "Revenue Management method to be used (0 = Monte-Carlo, 1 = Dynamic Programm
00088          ing, 2 = EMSR, 3 = EMSR-a, 4 = EMSR-b)")
00089         ("builtin,b",
00090          "The cabin set up can be either built-in or parsed from an input file. That
00091          latter must then be given with the -i/--input option")
00092         ("input,i",
00093          boost::program_options::value< std::string >(&ioInputFilename)->default_valu
00094          e(K_RMOL_DEFAULT_INPUT_FILENAME),
00095          "(CSV) input file for the demand distribution parameters and resource (leg-c
00096          abin) capacities")
00097         ("log,l",
00098          boost::program_options::value< std::string >(&ioLogFilename)->default_value(

```

```

        K_RMOL_DEFAULT_LOG_FILENAME),
00092     "Filename for the logs")
00093     ;
00094
00095     // Hidden options, will be allowed both on command line and
00096     // in config file, but will not be shown to the user.
00097     boost::program_options::options_description hidden ("Hidden options");
00098     hidden.add_options()
00099         ("copyright",
00100          boost::program_options::value< std::vector<std::string> >(),
00101          "Show the copyright (license)");
00102
00103     boost::program_options::options_description cmdline_options;
00104     cmdline_options.add(generic).add(config).add(hidden);
00105
00106     boost::program_options::options_description config_file_options;
00107     config_file_options.add(config).add(hidden);
00108
00109     boost::program_options::options_description visible ("Allowed options");
00110     visible.add(generic).add(config);
00111
00112     boost::program_options::positional_options_description p;
00113     p.add ("copyright", -1);
00114
00115     boost::program_options::variables_map vm;
00116     boost::program_options::
00117         store (boost::program_options::command_line_parser (argc, argv).
00118                options (cmdline_options).positional(p).run(), vm);
00119
00120     std::ifstream ifs ("rmol.cfg");
00121     boost::program_options::store (parse_config_file (ifs, config_file_options),
00122                                    vm);
00123     boost::program_options::notify (vm);
00124
00125     if (vm.count ("help")) {
00126         std::cout << visible << std::endl;
00127         return K_RMOL_EARLY_RETURN_STATUS;
00128     }
00129
00130     if (vm.count ("version")) {
00131         std::cout << PACKAGE_NAME << ", version " << PACKAGE_VERSION << std::endl;
00132         return K_RMOL_EARLY_RETURN_STATUS;
00133     }
00134
00135     if (vm.count ("prefix")) {
00136         std::cout << "Installation prefix: " << PREFIXDIR << std::endl;
00137         return K_RMOL_EARLY_RETURN_STATUS;
00138     }
00139
00140     if (vm.count ("builtin")) {
00141         ioIsBuiltin = true;
00142     }
00143     const std::string isBuiltinStr = (ioIsBuiltin == true)? "yes": "no";
00144     std::cout << "The BOM should be built-in? " << isBuiltinStr << std::endl;
00145
00146     if (ioIsBuiltin == false) {
00147         if (vm.count ("input")) {
00148             ioInputFilename = vm["input"].as< std::string >();
00149             std::cout << "Input filename is: " << ioInputFilename << std::endl;
00150         }
00151     }
00152

```



```

00153     if (vm.count ("log")) {
00154         ioLogFilename = vm["log"].as< std::string >();
00155         std::cout << "Log filename is: " << ioLogFilename << std::endl;
00156     }
00157
00158     std::cout << "The number of random draws is: " << ioRandomDraws << std::endl;
00159     std::cout << "The resource capacity is: " << ioCapacity << std::endl;
00160     std::cout << "The optimisation method is: " << ioMethod << std::endl;
00161     std::cout << std::endl;
00162
00163     return 0;
00164 }
00165
00166 // //////////////////////////////////////
00167 void optimise (RMOL::RMOL_Service& rmolService,
00168               const short& iMethod, const int& iRandomDraws) {
00169
00170     switch (iMethod) {
00171     case 0: {
00172         // Calculate the optimal protections by the Monte Carlo
00173         // Integration approach
00174         rmolService.optimalOptimisationByMCIntegration (iRandomDraws);
00175         break;
00176     }
00177     case 1: {
00178         // Calculate the optimal protections by DP.
00179         rmolService.optimalOptimisationByDP ();
00180         break;
00181     }
00182     case 2: {
00183         // Calculate the Bid-Price Vector by EMSR
00184         rmolService.heuristicOptimisationByEmsr ();
00185         break;
00186     }
00187     case 3: {
00188         // Calculate the protections by EMSR-a
00189         rmolService.heuristicOptimisationByEmsrA ();
00190         break;
00191     }
00192     case 4: {
00193         // Calculate the protections by EMSR-b
00194         rmolService.heuristicOptimisationByEmsrB ();
00195         break;
00196     }
00197     default: {
00198         rmolService.optimalOptimisationByMCIntegration (iRandomDraws);
00199     }
00200 }
00201 }
00202
00203 // /////////// M A I N ///////////
00204 int main (int argc, char* argv[]) {
00205
00206     // Number of random draws to be generated (best if greater than 100)
00207     int lRandomDraws = 0;
00208
00209     // Cabin Capacity (it must be greater then 100 here)
00210     double lCapacity = 0.0;
00211
00212     // Methods of optimisation (0 = Monte-Carlo, 1 = Dynamic Programming,
00213     // 2 = EMSR, 3 = EMSR-a, 4 = EMSR-b)
00214     short lMethod = 0;

```

```

00215
00216 // Built-in
00217 bool isBuiltin;
00218
00219 // Input file name
00220 std::string lInputFilename;
00221
00222 // Output log File
00223 std::string lLogFilename;
00224
00225 // Call the command-line option parser
00226 const int lOptionParserStatus =
00227     readConfiguration (argc, argv, lRandomDraws, lCapacity, lMethod,
00228         isBuiltin, lInputFilename, lLogFilename);
00229
00230 if (lOptionParserStatus == K_RMOL_EARLY_RETURN_STATUS) {
00231     return 0;
00232 }
00233
00234 // Set the log parameters
00235 std::ofstream logOutputFile;
00236 // Open and clean the log outputfile
00237 logOutputFile.open (lLogFilename.c_str());
00238 logOutputFile.clear();
00239
00240 // Initialise the log stream
00241 const stdair::BasLogParams lLogParams (stdair::LOG::DEBUG, logOutputFile);
00242
00243 // Initialise the RMOL service
00244 RMOL::RMOL_Service rmolService (lLogParams);
00245
00246 if (isBuiltin == true) {
00247     // DEBUG
00248     STDAIR_LOG_DEBUG ("No input file has been given."
00249         "A sample BOM tree will therefore be built.");
00250
00251     // Build a sample BOM tree
00252     rmolService.buildSampleBom();
00253 } else {
00254     // DEBUG
00255     STDAIR_LOG_DEBUG ("RMOL will parse " << lInputFilename
00256         << " and build the corresponding BOM tree.");
00257
00258     //
00259     rmolService.parseAndLoad (lCapacity, lInputFilename);
00260 }
00261
00262 // Launch the optimisation
00263 optimise (rmolService, lMethod, lRandomDraws);
00264
00265 //
00266 logOutputFile.close();
00267
00268 return 0;
00269
00270 }

```

## 28.25 rmol/bom/BucketHolderTypes.hpp File Reference

```
#include <list>
```

```
#include <map>
#include <stdair/stdair_basic_types.hpp>
```

#### Namespaces

- namespace [RMOL](#)

#### Typedefs

- typedef std::list< BucketHolder \* > [RMOL::BucketHolderList\\_T](#)

### 28.26 BucketHolderTypes.hpp

```
00001 #ifndef __RMOL_BUCKETHOLDERTYPES_HPP
00002 #define __RMOL_BUCKETHOLDERTYPES_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // STL
00008 #include <list>
00009 #include <map>
00010 // STDAIR
00011 #include <stdair/stdair_basic_types.hpp>
00012
00013 namespace RMOL {
00014
00016     class BucketHolder;
00017
00019     typedef std::list<BucketHolder*> BucketHolderList_T;
00020
00023     typedef std::map<const stdair::MapKey_T, BucketHolder*>;
00024 }
00025 #endif // __RMOL_BUCKETHOLDERTYPES_HPP
```

### 28.27 rmol/bom/DistributionParameterList.hpp File Reference

```
#include <list>
#include <rmol/field/FldDistributionParameters.hpp>
```

#### Namespaces

- namespace [RMOL](#)

#### Typedefs

- typedef std::list< FldDistributionParameters > [RMOL::DistributionParameterList\\_T](#)

**28.28 DistributionParameterList.hpp**

```

00001 #ifndef __RMOL_DISTRIBUTIONPARAMETERLIST_HPP
00002 #define __RMOL_DISTRIBUTIONPARAMETERLIST_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // STL
00008 #include <list>
00009 // RMOL
00010 #include <rmol/field/FldDistributionParameters.hpp>
00011
00012 namespace RMOL {
00013
00016     typedef std::list<FldDistributionParameters> DistributionParameterList_T;
00017
00018 }
00019 #endif // __RMOL_DISTRIBUTIONPARAMETERLIST_HPP

```

**28.29 rmol/bom/DPOptimiser.cpp File Reference**

```

#include <cassert>
#include <sstream>
#include <vector>
#include <cmath>
#include <boost/math/distributions/normal.hpp>
#include <stdair/bom/LegCabin.hpp>
#include <stdair/bom/VirtualClassStruct.hpp>
#include <stdair/service/Logger.hpp>
#include <rmol/basic/BasConst_General.hpp>
#include <rmol/bom/DPOptimiser.hpp>

```

**Namespaces**

- namespace [RMOL](#)

**28.30 DPOptimiser.cpp**

```

00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 #include <sstream>
00007 #include <vector>
00008 #include <cmath>
00009 // Boost Math

```

```

00010 #include <boost/math/distributions/normal.hpp>
00011 // StdAir
00012 #include <stdair/bom/LegCabin.hpp>
00013 #include <stdair/bom/VirtualClassStruct.hpp>
00014 #include <stdair/service/Logger.hpp>
00015 // RMOL
00016 #include <rmol/basic/BasConst_General.hpp>
00017 #include <rmol/bom/DPOptimiser.hpp>
00018
00019 namespace RMOL {
00020
00021 // ////////////////////////////////////////
00022 void DPOptimiser::optimalOptimisationByDP (stdair::LegCabin& ioLegCabin) {
00023     // // Number of classes/buckets: n
00024     // const short nbOfClasses = ioBucketHolder.getSize();
00025
00026     // // Number of values of x to compute for each Vj(x).
00027     // const int maxValue = static_cast<int> (iCabinCapacity * DEFAULT_PRECISION)
00028     ;
00029
00030     // // Vector of the Expected Maximal Revenue (Vj).
00031     // std::vector< std::vector<double> > MERVectorHolder;
00032
00033     // // Vector of V_0(x).
00034     // std::vector<double> initialMERVector (maxValue+1, 0.0);
00035     // MERVectorHolder.push_back (initialMERVector);
00036
00037     // // Current cumulative protection level (y_j * DEFAULT_PRECISION).
00038     // // Initialise with y_0 = 0.
00039     // int currentProtection = 0;
00040
00041     // int currentBucketIndex = 1;
00042     // ioBucketHolder.begin();
00043
00044     // while (currentProtection < maxValue && currentBucketIndex < nbOfClasses) {
00045
00046     // //while (currentBucketIndex == 1) {
00047     //     bool protectionChanged = false;
00048     //     double nextProtection = 0.0;
00049     //     std::vector<double> currentMERVector;
00050     //     // double testGradient = 10000;
00051
00052     //     Bucket& currentBucket = ioBucketHolder.getCurrentBucket();
00053     //     const double meanDemand = currentBucket.getMean();
00054     //     const double SDDemand = currentBucket.getStandardDeviation();
00055     //     const double currentYield = currentBucket.getAverageYield();
00056     //     const double errorFactor = 1.0;
00057
00058     //     Bucket& nextBucket = ioBucketHolder.getNextBucket();
00059     //     const double nextYield = nextBucket.getAverageYield();
00060
00061     //     // For x <= currentProtection (y_(j-1)), V_j(x) = V_(j-1)(x).
00062     //     for (int x = 0; x <= currentProtection; ++x) {
00063     //         const double MERValue = MERVectorHolder.at(currentBucketIndex-1).at(x)
00064     //         ;
00065     //         currentMERVector.push_back (MERValue);
00066     //     }
00067
00068     //     //
00069     //     boost::math::normal lNormalDistribution (meanDemand, SDDemand);
00070
00071     //     // Vector of gaussian pdf values.

```

```

00069    // std::vector<double> pdfVector;
00070    // for (int s = 0; s <= maxValue - currentProtection; ++s) {
00071    //     const double pdfValue =
00072    //         boost::math::pdf (lNormalDistribution, s/DEFAULT_PRECISION);
00073    //     pdfVector.push_back (pdfValue);
00074    // }
00075
00076    // // Vector of gaussian cdf values.
00077    // std::vector<double> cdfVector;
00078    // for (int s = 0; s <= maxValue - currentProtection; ++s) {
00079    //     const double cdfValue =
00080    //         boost::math::cdf (boost::math::complement (lNormalDistribution,
00081    //                                                     s/DEFAULT_PRECISION));
00082    //     cdfVector.push_back (cdfValue);
00083    // }
00084
00085    // // Compute V_j(x) for x > currentProtection (y_(j-1)).
00086    // for (int x = currentProtection + 1; x <= maxValue; ++x) {
00087    //     const double lowerBound = static_cast<double> (x - currentProtection);
00088
00089    //     // Compute the first integral in the V_j(x) formulation (see
00090    //     // the memo of Jerome Contant).
00091    //     const double power1 =
00092    //         - 0.5 * meanDemand * meanDemand / (SDDemand * SDDemand);
00093    //     const double e1 = std::exp (power1);
00094    //     const double power2 =
00095    //         - 0.5 * (lowerBound / DEFAULT_PRECISION - meanDemand)
00096    //         * (lowerBound / DEFAULT_PRECISION - meanDemand)
00097    //         / (SDDemand * SDDemand);
00098    //     const double e2 = std::exp (power2);
00099
00100    //     const double cdfValue0 =
00101    //         boost::math::cdf (boost::math::complement (lNormalDistribution,
00102    //                                                     0.0));
00103    //     const double cdfValue1 =
00104    //         boost::math::cdf (boost::math::complement (lNormalDistribution,
00105    //                                                     lowerBound/DEFAULT_PRECISIO
00106    // N));
00107    //     const double integralResult1 = currentYield
00108    //         * ((e1 - e2) * SDDemand / sqrt (2 * 3.14159265)
00109    //           + meanDemand * (cdfValue0 - cdfValue1));
00110    //     double integralResult2 = 0.0;
00111
00112    //     for (int s = 0; s < lowerBound; ++s) {
00113    //         const double partialResult =
00114    //             2 * MERVectorHolder.at (currentBucketIndex-1).at (x-s)
00115    //             * pdfVector.at (s);
00116    //         integralResult2 += partialResult;
00117    //     }
00118    //     integralResult2 -= MERVectorHolder.at (currentBucketIndex-1).at (x) *
00119    //         pdfVector.at (0);
00120
00121    //     const int intLowerBound = static_cast<int> (lowerBound);
00122    //     integralResult2 +=
00123    //         MERVectorHolder.at (currentBucketIndex-1).at (x - intLowerBound) *
00124    //         pdfVector.at (intLowerBound);
00125
00126    //     integralResult2 /= 2 * DEFAULT_PRECISION;
00127    //     /*

```

```

00129 //      for (int s = 0; s < lowerBound; ++s) {
00130 //          const double partialResult =
00131 //              (MERVectorHolder.at(currentBucketIndex-1).at(x-s) +
00132 //               MERVectorHolder.at(currentBucketIndex-1).at(x-s-1)) *
00133 //              (cdfVector.at(s+1) - cdfVector.at(s)) / 2;
00134 //          integralResult2 += partialResult;
00135 //      }
00136 //      */
00137 //      const double firstElement = integralResult1 + integralResult2;
00138
00139 //      // Compute the second integral in the V_j(x) formulation (see
00140 //      // the memo of Jerome Contant).
00141 //      const double constCoefOfSecondElement =
00142 //          currentYield * lowerBound / DEFAULT_PRECISION
00143 //          + MERVectorHolder.at(currentBucketIndex-1).at(currentProtection);
00144
00145 //      const double secondElement = constCoefOfSecondElement
00146 //          * boost::math::cdf(boost::math::complement(lNormalDistribution,
00147 //              lowerBound/DEFAULT_PRECIS
00148 //              ION));
00149 //      const double MERValue = (firstElement + secondElement) / errorFactor;
00150
00151
00152 //      assert (currentMERVector.size() > 0);
00153 //      const double lastMERValue = currentMERVector.back();
00154
00155 //      const double currentGradient =
00156 //          (MERValue - lastMERValue) * DEFAULT_PRECISION;
00157
00158 //      //assert (currentGradient >= 0);
00159 //      if (currentGradient < -0) {
00160 //          std::ostringstream ostr;
00161 //          ostr << currentGradient << std::endl
00162 //              << "x = " << x << std::endl
00163 //              << "class: " << currentBucketIndex << std::endl;
00164 //          STDAIR_LOG_DEBUG (ostr.str());
00165 //      }
00166
00167 //      /*
00168 //      assert (currentGradient <= testGradient);
00169 //      testGradient = currentGradient;
00170 //      */
00171 //      if (protectionChanged == false && currentGradient <= nextYield) {
00172 //          nextProtection = x - 1;
00173 //          protectionChanged = true;
00174 //      }
00175
00176 //      if (protectionChanged == true && currentGradient > nextYield) {
00177 //          protectionChanged = false;
00178 //      }
00179
00180 //      if (protectionChanged == false && x == maxValue) {
00181 //          nextProtection = maxValue;
00182 //      }
00183
00184 //      currentMERVector.push_back (MERValue);
00185 //      }
00186
00187 //      // DEBUG
00188 //      STDAIR_LOG_DEBUG ("Vmaxindex = " << currentMERVector.back());
00189

```

```

00190    //  MERVectorHolder.push_back (currentMERVector);
00191
00192    //  const double realProtection = nextProtection / DEFAULT_PRECISION;
00193    //  const double bookingLimit = iCabinCapacity - realProtection;
00194
00195    //  currentBucket.setCumulatedProtection (realProtection);
00196    //  nextBucket.setCumulatedBookingLimit (bookingLimit);
00197
00198    //  currentProtection = static_cast<int> (std::floor (nextProtection));
00199
00200    //  ioBucketHolder.iterate();
00201    //  ++currentBucketIndex;
00202    // }
00203 }
00204
00205 }
```

## 28.31 rmol/bom/DPOptimiser.hpp File Reference

```
#include <rmol/RMOL_Types.hpp>
```

### Classes

- class [RMOL::DPOptimiser](#)

### Namespaces

- namespace [stdair](#)
- namespace [RMOL](#)

## 28.32 DPOptimiser.hpp

```

00001 #ifndef __RMOL_BOM_DPOPTIMISER_HPP
00002 #define __RMOL_BOM_DPOPTIMISER_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // RMOL
00008 #include <rmol/RMOL_Types.hpp>
00009
00011 namespace stdair {
00012     class LegCabin;
00013 }
00014
00015 namespace RMOL {
00017     class DPOptimiser {
00018     public:
00019
00025         static void optimalOptimisationByDP (stdair::LegCabin&);
00026
00030         static double cdfGaussianQ (const double, const double);
00031     };
00032 }
00033 #endif // __RMOL_BOM_DPOPTIMISER_HPP
```



**28.33 rmol/bom/EMDetruncator.cpp File Reference**

```

#include <iostream>
#include <cmath>
#include <vector>
#include <cassert>
#include <stdair/stdair_basic_types.hpp>
#include <stdair/service/Logger.hpp>
#include <rmol/bom/HistoricalBookingHolder.hpp>
#include <rmol/bom/EMDetruncator.hpp>

```

**Namespaces**

- namespace [RMOL](#)

**28.34 EMDetruncator.cpp**

```

00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <iostream>
00006 #include <cmath>
00007 #include <vector>
00008 #include <cassert>
00009 // StdAir
00010 #include <stdair/stdair_basic_types.hpp>
00011 #include <stdair/service/Logger.hpp>
00012 // RMOL
00013 #include <rmol/bom/HistoricalBookingHolder.hpp>
00014 #include <rmol/bom/EMDetruncator.hpp>
00015
00016 namespace RMOL {
00017
00018 // //////////////////////////////////////
00019 void EMDetruncator::unconstrainUsingEMMethod
00020 (HistoricalBookingHolder& ioHistoricalBookingHolder) {
00021
00022     // Number of flights.
00023     const short lNbOfFlights =
00024         ioHistoricalBookingHolder.getNbOfFlights();
00025
00026     // Number of uncensored booking data.
00027     const short lNbOfUncensoredData =
00028         ioHistoricalBookingHolder.getNbOfUncensoredData();
00029
00030     if (lNbOfUncensoredData > 1) {
00031         // Number of uncensored bookings.
00032         const stdair::NbOfBookings_T lNbOfUncensoredBookings =
00033             ioHistoricalBookingHolder.getNbOfUncensoredBookings();
00034
00035         const double lMeanOfUncensoredBookings =

```

```

00036         static_cast<double>(lNbOfUncensoredBookings/lNbOfUncensoredData);
00037
00038     const double lStdDevOfUncensoredBookings =
00039         ioHistoricalBookingHolder.getUncensoredStandardDeviation
00040         (lMeanOfUncensoredBookings, lNbOfUncensoredData);
00041
00042     std::vector<bool> toBeUnconstrained =
00043         ioHistoricalBookingHolder.getListOfToBeUnconstrainedFlags();
00044
00045     double lDemandMean = lMeanOfUncensoredBookings;
00046     double lStdDev = lStdDevOfUncensoredBookings;
00047
00048     // DEBUG
00049     STDAIR_LOG_DEBUG ("mean: " << lDemandMean << ", std: " << lStdDev);
00050
00051     if (lStdDev != 0) {
00052         bool stopUnconstraining = false;
00053         while (stopUnconstraining == false) {
00054             stopUnconstraining = true;
00055
00056             for (short i = 0; i < lNbOfFlights; ++i) {
00057                 if (toBeUnconstrained.at(i) == true) {
00058                     // Get the unconstrained demand of the (i+1)-th flight.
00059                     const stdair::NbOfBookings_T demand =
00060                         ioHistoricalBookingHolder.getUnconstrainedDemand (i);
00061                     //STDAIR_LOG_DEBUG ("demand: " << demand);
00062
00063                     // Execute the Expectation step.
00064                     const stdair::NbOfBookings_T expectedDemand =
00065                         ioHistoricalBookingHolder.
00066                         calculateExpectedDemand (lDemandMean, lStdDev, i, demand);
00067                     //STDAIR_LOG_DEBUG ("expected: " << expectedDemand);
00068                     assert (expectedDemand >= 0 || expectedDemand < 0);
00069
00070                     double absDiff =
00071                         static_cast<double>(expectedDemand - demand);
00072
00073                     if (absDiff < 0) {
00074                         absDiff = - absDiff;
00075                     }
00076                     if (absDiff < 0.001) {
00077                         toBeUnconstrained.at (i) = false;
00078                     }
00079                     else {
00080                         stopUnconstraining = false;
00081                     }
00082
00083                     ioHistoricalBookingHolder.setUnconstrainedDemand (expectedDemand,
00084                                                                 i);
00085                 }
00086             }
00087
00088             if (stopUnconstraining == false) {
00089                 lDemandMean = ioHistoricalBookingHolder.getDemandMean();
00090                 lStdDev =
00091                     ioHistoricalBookingHolder.getStandardDeviation (lDemandMean);
00092             }
00093         }
00094     }
00095 }
00096
00097 }

```

```
00098 }
```

## 28.35 rmol/bom/EMDetruncator.hpp File Reference

### Classes

- class [RMOL::EMDetruncator](#)

### Namespaces

- namespace [RMOL](#)

## 28.36 EMDetruncator.hpp

```
00001 #ifndef __RMOL_BOM_EMDETRUNCATOR_HPP
00002 #define __RMOL_BOM_EMDETRUNCATOR_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 namespace RMOL {
00008     // Forward declarations.
00009     struct HistoricalBookingHolder;
00010
00011     class EMDetruncator {
00012     public:
00013         static void unconstrainUsingEMMethod (HistoricalBookingHolder&);
00014     };
00015 }
00016 #endif // __RMOL_BOM_EMDETRUNCATOR_HPP
```

## 28.37 rmol/bom/Emsr.cpp File Reference

```
#include <assert.h>
#include <iostream>
#include <cmath>
#include <list>
#include <algorithm>
#include <stdair/stdair_rm_types.hpp>
#include <stdair/bom/LegCabin.hpp>
#include <stdair/bom/VirtualClassStruct.hpp>
#include <rmol/bom/Emsr.hpp>
#include <rmol/bom/EmsrUtils.hpp>
```

## Namespaces

- namespace **RMOL**

## 28.38 Emsr.cpp

```

00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // C
00005 #include <assert.h>
00006 // STL
00007 #include <iostream>
00008 #include <cmath>
00009 #include <list>
00010 #include <algorithm>
00011 // StdAir
00012 #include <stdair/stdair_rm_types.hpp>
00013 #include <stdair/bom/LegCabin.hpp>
00014 #include <stdair/bom/VirtualClassStruct.hpp>
00015 // RMOL
00016 #include <rmol/bom/Emsr.hpp>
00017 #include <rmol/bom/EmsrUtils.hpp>
00018
00019 namespace RMOL {
00020 // //////////////////////////////////////
00021 void Emsr::heuristicOptimisationByEmsrA (stdair::LegCabin& ioLegCabin) {
00022     stdair::VirtualClassList_T& lVirtualClassList =
00023         ioLegCabin.getVirtualClassList ();
00024     const stdair::CabinCapacity_T& lCabinCapacity =
00025         ioLegCabin.getOfferedCapacity();
00026
00032     stdair::VirtualClassList_T::iterator itVC = lVirtualClassList.begin();
00033     assert (itVC != lVirtualClassList.end());
00034
00035     stdair::VirtualClassStruct& lFirstVC = *itVC;
00036     lFirstVC.setCumulatedBookingLimit (lCabinCapacity);
00037     ++itVC;
00038     for (; itVC != lVirtualClassList.end(); ++itVC) {
00039         stdair::VirtualClassStruct& lNextVC = *itVC;
00040
00041         // Initialise the protection for class/bucket j.
00042         stdair::ProtectionLevel_T lProtectionLevel = 0.0;
00043
00044         for(stdair::VirtualClassList_T::iterator itHigherVC =
00045             lVirtualClassList.begin(); itHigherVC != itVC; ++itHigherVC) {
00046             stdair::VirtualClassStruct& lHigherVC = *itHigherVC;
00047             const double lPartialProtectionLevel =
00048                 EmsrUtils::computeProtectionLevel (lHigherVC, lNextVC);
00049             lProtectionLevel += lPartialProtectionLevel;
00050         }
00051         stdair::VirtualClassList_T::iterator itCurrentVC = itVC; --itCurrentVC;
00052         stdair::VirtualClassStruct& lCurrentVC = *itCurrentVC;
00053         lCurrentVC.setCumulatedProtection (lProtectionLevel);
00054
00055         // Compute the booking limit for the class/bucket j+1 (can be negative).
00056         const double lBookingLimit = lCabinCapacity - lProtectionLevel;
00057
00058         // Set the booking limit for class/bucket j+1.
00059         lNextVC.setCumulatedBookingLimit (lBookingLimit);

```

```

00060     }
00061 }
00062
00063 // //////////////////////////////////////
00064 void Emsr::heuristicOptimisationByEmsrB (stdair::LegCabin& ioLegCabin) {
00065     stdair::VirtualClassList_T& lVirtualClassList =
00066         ioLegCabin.getVirtualClassList ();
00067     const stdair::CabinCapacity_T& lCabinCapacity =
00068         ioLegCabin.getOfferedCapacity();
00069
00070     stdair::VirtualClassList_T::iterator itVC = lVirtualClassList.begin();
00071     assert (itVC != lVirtualClassList.end());
00072
00073     stdair::VirtualClassStruct& lFirstVC = *itVC;
00074     lFirstVC.setCumulatedBookingLimit (lCabinCapacity);
00075     ++itVC;
00076     stdair::VirtualClassStruct lAggregatedVC = lFirstVC;
00077     for (; itVC != lVirtualClassList.end(); ++itVC) {
00078         stdair::VirtualClassStruct& lNextVC = *itVC;
00079
00080         // Compute the protection level for the aggregated class/bucket
00081         // using the Little-Wood formular.
00082         const stdair::ProtectionLevel_T lProtectionLevel =
00083             EmsrUtils::computeProtectionLevel (lAggregatedVC, lNextVC);
00084
00085         // Set the protection level for class/bucket j.
00086         stdair::VirtualClassList_T::iterator itCurrentVC = itVC; --itCurrentVC;
00087         stdair::VirtualClassStruct& lCurrentVC = *itCurrentVC;
00088         lCurrentVC.setCumulatedProtection (lProtectionLevel);
00089
00090         // Compute the booking limit for class/bucket j+1 (can be negative).
00091         const double lBookingLimit = lCabinCapacity - lProtectionLevel;
00092
00093         // Set the booking limit for class/bucket j+1.
00094         lNextVC.setCumulatedBookingLimit (lBookingLimit);
00095
00096         // Compute the aggregated class/bucket of classes/buckets 1,...,j.
00097         EmsrUtils::computeAggregatedVirtualClass (lAggregatedVC, lNextVC);
00098     }
00099 }
00100
00101 // //////////////////////////////////////
00102 void Emsr::heuristicOptimisationByEmsr (stdair::LegCabin& ioLegCabin) {
00103     stdair::VirtualClassList_T& lVirtualClassList =
00104         ioLegCabin.getVirtualClassList ();
00105     const stdair::CabinCapacity_T& lCapacity = ioLegCabin.getOfferedCapacity();
00106     ioLegCabin.emptyBidPriceVector();
00107     stdair::BidPriceVector_T& lBidPriceVector =
00108         ioLegCabin.getBidPriceVector();
00109
00110     // Cabin capacity in integer.
00111     const int lCabinCapacity = static_cast<const int> (lCapacity);
00112
00113     // List of all EMSR values.
00114     stdair::EmsrValueList_T lEmsrValueList;
00115
00116     for (stdair::VirtualClassList_T::iterator itVC = lVirtualClassList.begin();
00117          itVC != lVirtualClassList.end(); ++itVC) {
00118         stdair::VirtualClassStruct& lCurrentVC = *itVC;
00119         for (int k = 1; k <= lCabinCapacity; ++k) {
00120             const double emsrValue = EmsrUtils::computeEmsrValue (k, lCurrentVC);

```

```

00132         lEmsrValueList.push_back(emsrValue);
00133     }
00134 }
00135
00136 // Sort the EMSR values from high to low.
00137 std::sort(lEmsrValueList.rbegin(), lEmsrValueList.rend());
00138
00139 // Sanity check
00140 const int lEmsrValueListSize = lEmsrValueList.size();
00141 assert (lEmsrValueListSize >= lCabinCapacity);
00142
00143 // Copy the EMSR sorted values to the BPV.
00144 stdair::EmsrValueList_T::const_iterator itCurrentValue =
00145     lEmsrValueList.begin();
00146 for (int j = 0; j < lCabinCapacity; ++j, ++itCurrentValue) {
00147     const double lBidPrice = *itCurrentValue;
00148     lBidPriceVector.push_back (lBidPrice);
00149 }
00150 lEmsrValueList.clear();
00151
00152 // Build the protection levels and booking limits.
00153 if (lVirtualClassList.size() > 1) {
00154     int lCapacityIndex = 0;
00155     for (stdair::VirtualClassList_T::iterator itVC = lVirtualClassList.begin();
00156          itVC != lVirtualClassList.end(); ) {
00157         stdair::VirtualClassStruct& lCurrentVC = *itVC;
00158         if (itVC != lVirtualClassList.end()) {
00159             ++itVC;
00160         }
00161         stdair::VirtualClassStruct& lNextVC = *itVC;
00162         const stdair::Yield_T lNextYield = lNextVC.getYield();
00163         while ((lCapacityIndex < lCabinCapacity)
00164              && (lBidPriceVector.at(lCapacityIndex) > lNextYield)) {
00165             ++lCapacityIndex;
00166         }
00167         lCurrentVC.setCumulatedProtection (lCapacityIndex);
00168         lNextVC.setCumulatedBookingLimit (lCapacity - lCapacityIndex);
00169     }
00170 }
00171 }
00172
00173 }

```

## 28.39 rmol/bom/Emsr.hpp File Reference

```
#include <rmol/RMOL_Types.hpp>
```

### Classes

- class [RMOL::Emsr](#)

### Namespaces

- namespace [stdair](#)
- namespace [RMOL](#)

## 28.40 Emsr.hpp

```

00001 #ifndef __RMOL_EMSR_HPP
00002 #define __RMOL_EMSR_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // RMOL
00008 #include <rmol/RMOL_Types.hpp>
00009
00010 namespace stdair {
00011     class LegCabin;
00012 }
00013
00014 namespace RMOL {
00015
00016     class Emsr {
00017     public:
00018         static void heuristicOptimisationByEmsr (stdair::LegCabin&);
00019         static void heuristicOptimisationByEmsrA (stdair::LegCabin&);
00020         static void heuristicOptimisationByEmsrB (stdair::LegCabin&);
00021     };
00022 }
00023 #endif // __RMOL_EMSR_HPP

```

## 28.41 rmol/bom/EmsrUtils.cpp File Reference

```

#include <cassert>
#include <cmath>
#include <boost/math/distributions/normal.hpp>
#include <stdair/stdair_maths_types.hpp>
#include <stdair/bom/VirtualClassStruct.hpp>
#include <rmol/bom/EmsrUtils.hpp>
#include <rmol/basic/BasConst_General.hpp>

```

## Namespaces

- namespace [RMOL](#)

## 28.42 EmsrUtils.cpp

```

00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 #include <cmath>

```

```

00007 // Boost Math
00008 #include <boost/math/distributions/normal.hpp>
00009 // StdAir
00010 #include <stdair/stdair_maths_types.hpp>
00011 #include <stdair/bom/VirtualClassStruct.hpp>
00012 // RMOL
00013 #include <rmol/bom/EmsrUtils.hpp>
00014 #include <rmol/basic/BasConst_General.hpp>
00015
00016 namespace RMOL {
00017 ///////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
00018 void EmsrUtils::computeAggregatedVirtualClass
00019 (stdair::VirtualClassStruct& ioAggregatedVirtualClass,
00020  stdair::VirtualClassStruct& ioCurrentVirtualClass) {
00021     // Retrieve the demand mean, demand standard deviation and average
00022     // yield of the classes/buckets.
00023     const stdair::MeanValue_T lAggregatedMean =
00024         ioAggregatedVirtualClass.getMean();
00025     const stdair::MeanValue_T lCurrentMean = ioCurrentVirtualClass.getMean();
00026     const stdair::StdDevValue_T lAggregatedSD =
00027         ioAggregatedVirtualClass.getStdDev();
00028     const stdair::StdDevValue_T lCurrentSD = ioCurrentVirtualClass.getStdDev();
00029     const stdair::Yield_T lAggregatedYield =
00030         ioAggregatedVirtualClass.getYield();
00031     const stdair::Yield_T lCurrentYield = ioCurrentVirtualClass.getYield();
00032
00033     // Compute the new demand mean, new demand standard deviation and
00034     // new average yield for the new aggregated class/bucket.
00035     const stdair::MeanValue_T lNewMean = lAggregatedMean + lCurrentMean;
00036     const stdair::StdDevValue_T lNewSD =
00037         sqrt (lAggregatedSD*lAggregatedSD + lCurrentSD*lCurrentSD);
00038     stdair::Yield_T lNewYield = lCurrentYield;
00039     if (lNewMean > 0) {
00040         lNewYield = (lAggregatedYield*lAggregatedMean +
00041                     lCurrentYield*lCurrentMean) / lNewMean;
00042     }
00043     // Set the new yield range for the new aggregated class/bucket.
00044     ioAggregatedVirtualClass.setYield(lNewYield);
00045
00046     // Set the new demand for the new aggregated class/bucket.
00047     ioAggregatedVirtualClass.setMean (lNewMean);
00048     ioAggregatedVirtualClass.setStdDev (lNewSD);
00049 }
00050
00051 ///////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
00052 const stdair::ProtectionLevel_T EmsrUtils::
00053 computeProtectionLevel (stdair::VirtualClassStruct& ioAggregatedVirtualClass,
00054                        stdair::VirtualClassStruct& ioNextVirtualClass) {
00055     // Retrive the mean & standard deviation of the aggregated
00056     // class/bucket and the average yield of all the two
00057     // classes/buckets.
00058     const stdair::MeanValue_T lMean = ioAggregatedVirtualClass.getMean();
00059     const stdair::StdDevValue_T lSD = ioAggregatedVirtualClass.getStdDev();
00060     const stdair::Yield_T lAggregatedYield = ioAggregatedVirtualClass.getYield();
00061     const stdair::Yield_T lNextYield = ioNextVirtualClass.getYield();
00062     assert (lAggregatedYield != 0);
00063
00064     // Compute the yield ratio between the higher bucket and the current one
00065     const double lYieldRatio = lNextYield / lAggregatedYield;
00066
00067     boost::math::normal lNormalDistribution (lMean, lSD);
00071     const stdair::ProtectionLevel_T lProtection =

```



```

00072         boost::math::quantile (boost::math::complement (lNormalDistribution,
00073                                                         lYieldRatio));
00074
00075     return lProtection;
00076 }
00077
00078 // //////////////////////////////////////
00079 const double EmsrUtils::
00080 computeEmsrValue (double iCapacity,
00081                  stdair::VirtualClassStruct& ioVirtualClass){
00082     // Retrieve the average yield, mean and standard deviation of the
00083     // demand of the class/bucket.
00084     const stdair::MeanValue_T lMean = ioVirtualClass.getMean();
00085     const stdair::StdDevValue_T lSD = ioVirtualClass.getStdDev();
00086     const stdair::Yield_T lYield = ioVirtualClass.getYield();
00087
00088     // Compute the EMSR value = lYield * Pr (demand >= iCapacity).
00089     boost::math::normal lNormalDistribution (lMean, lSD);
00090     const double emsrValue =
00091         lYield * boost::math::cdf (boost::math::complement (lNormalDistribution,
00092                                                             iCapacity));
00093
00094     return emsrValue;
00095 }
00096 }

```

## 28.43 `rmol/bom/EmsrUtils.hpp` File Reference

```
#include <stdair/stdair_inventory_types.hpp>
```

### Classes

- class `RMOL::EmsrUtils`

### Namespaces

- namespace `stdair`
- namespace `RMOL`

## 28.44 `EmsrUtils.hpp`

```

00001 #ifndef __RMOL_EMSRUTILS_HPP
00002 #define __RMOL_EMSRUTILS_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // StdAir
00008 #include <stdair/stdair_inventory_types.hpp>
00009
00010 // Forward declarations.
00011 namespace stdair {
00012     struct VirtualClassStruct;
00013 }

```

```

00014
00015 namespace RMOL {
00016
00019     class EmsrUtils {
00020     public:
00023         static void computeAggregatedVirtualClass (stdair::VirtualClassStruct&,
00024                                                     stdair::VirtualClassStruct&);
00025
00027         static const stdair::ProtectionLevel_T computeProtectionLevel (stdair::VirtualClassStruct&, stdair::VirtualClassStruct&);
00028
00030         static const double computeEmsrValue (double, stdair::VirtualClassStruct&);
00031     };
00032 }
00033 #endif // __RMOL EMSRUTILS_HPP

```

## 28.45 rmol/bom/GuillotineBlockHelper.cpp File Reference

```

#include <cassert>
#include <stdair/basic/BasConst_Inventory.hpp>
#include <stdair/bom/BomManager.hpp>
#include <stdair/bom/SegmentDate.hpp>
#include <stdair/bom/SegmentCabin.hpp>
#include <stdair/bom/BookingClass.hpp>
#include <stdair/bom/GuillotineBlock.hpp>
#include <stdair/service/Logger.hpp>
#include <rmol/bom/GuillotineBlockHelper.hpp>

```

### Namespaces

- namespace [RMOL](#)

## 28.46 GuillotineBlockHelper.cpp

```

00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 // StdAir
00007 #include <stdair/basic/BasConst_Inventory.hpp>
00008 #include <stdair/bom/BomManager.hpp>
00009 #include <stdair/bom/SegmentDate.hpp>
00010 #include <stdair/bom/SegmentCabin.hpp>
00011 #include <stdair/bom/BookingClass.hpp>
00012 #include <stdair/bom/GuillotineBlock.hpp>
00013 #include <stdair/service/Logger.hpp>
00014 // RMOL
00015 #include <rmol/bom/GuillotineBlockHelper.hpp>

```

```

00016
00017 namespace RMOL {
00018 ///////////////////////////////////////////////////////////////////
00019 stdair::NbOfSegments_T GuillotineBlockHelper::
00020 getNbOfSegmentAlreadyPassedThisDTD (const stdair::GuillotineBlock& iGB,
00021                                     const stdair::DTD_T& iDTD,
00022                                     const stdair::Date_T& iCurrentDate) {
00023     stdair::NbOfSegments_T oNbOfSegments = 0;
00024
00025     // Browse the list of segments and check if it has passed the given DTD.
00026     const stdair::SegmentCabinIndexMap_T& lSCMap=iGB.getSegmentCabinIndexMap();
00027     for (stdair::SegmentCabinIndexMap_T::const_iterator itSC = lSCMap.begin();
00028          itSC != lSCMap.end(); ++itSC) {
00029         const stdair::SegmentCabin* lSC_ptr = itSC->first;
00030         assert (lSC_ptr != NULL);
00031
00032         if (hasPassedThisDTD (*lSC_ptr, iDTD, iCurrentDate) == true) {
00033             ++oNbOfSegments;
00034         }
00035     }
00036
00037     return oNbOfSegments;
00038 }
00039
00040 ///////////////////////////////////////////////////////////////////
00041 bool GuillotineBlockHelper::
00042 hasPassedThisDTD (const stdair::SegmentCabin& iSegmentCabin,
00043                  const stdair::DTD_T& iDTD,
00044                  const stdair::Date_T& iCurrentDate) {
00045     // Retrieve the boarding date.
00046     const stdair::SegmentDate& lSegmentDate =
00047         stdair::BomManager::getParent<stdair::SegmentDate> (iSegmentCabin);
00048     const stdair::Date_T& lBoardingDate = lSegmentDate.getBoardingDate();
00049
00050     // Compare the date offset between the boarding date and the current date
00051     // to the DTD.
00052     stdair::DateOffset_T lDateOffset = lBoardingDate - iCurrentDate;
00053     stdair::DTD_T lDateOffsetInDays = lDateOffset.days();
00054     if (iDTD < lDateOffsetInDays) {
00055         return false;
00056     } else {
00057         return true;
00058     }
00059 }
00060 }

```

## 28.47 rmol/bom/GuillotineBlockHelper.hpp File Reference

```

#include <string>
#include <stdair/stdair_inventory_types.hpp>
#include <stdair/stdair_date_time_types.hpp>

```

### Classes

- class [RMOL::GuillotineBlockHelper](#)

## Namespaces

- namespace `stdair`
- namespace `RMOL`

## 28.48 GuillotineBlockHelper.hpp

```

00001 #ifndef __RMOL_BOM_GUILLOTINEBLOCKHELPER_HPP
00002 #define __RMOL_BOM_GUILLOTINEBLOCKHELPER_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // STL
00008 #include <string>
00009 // StdAir
00010 #include <stdair/stdair_inventory_types.hpp>
00011 #include <stdair/stdair_date_time_types.hpp>
00012
00013 // Forward declarations
00014 namespace stdair {
00015     class GuillotineBlock;
00016     class SegmentCabin;
00017 }
00018
00019 namespace RMOL {
00020
00023     class GuillotineBlockHelper {
00024     public:
00025         // ////////// Business Methods //////////
00030         static stdair::NbOfSegments_T getNbOfSegmentAlreadyPassedThisDTD (const stdair::GuillotineBlock&, const stdair::DTD_T&, const stdair::Date_T&);
00031
00035         static bool hasPassedThisDTD (const stdair::SegmentCabin&, const stdair::DTD_T&, const stdair::Date_T&);
00036
00037     };
00038
00039 }
00040 #endif // __RMOL_BOM_GUILLOTINEBLOCKHELPER_HPP

```

## 28.49 rmol/bom/HistoricalBooking.cpp File Reference

```

#include <sstream>
#include <cassert>
#include <iomanip>
#include <iostream>
#include <rmol/bom/HistoricalBooking.hpp>

```

## Namespaces

- namespace `RMOL`

## 28.50 HistoricalBooking.cpp

```

00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <sstream>
00006 #include <cassert>
00007 #include <iomanip>
00008 #include <iostream>
00009 // RMOL
00010 #include <rmol/bom/HistoricalBooking.hpp>
00011
00012 namespace RMOL {
00013
00014 // //////////////////////////////////////
00015 HistoricalBooking::HistoricalBooking () :
00016     _numberOfBookings (0.0), _unconstrainedDemand (0.0), _flag (false) {
00017 }
00018
00019 // //////////////////////////////////////
00020 HistoricalBooking::
00021 HistoricalBooking (const stdair::NbOfBookings_T iNbOfBookings,
00022                  const stdair::Flag_T iFlag)
00023     : _numberOfBookings (iNbOfBookings),
00024       _unconstrainedDemand (iNbOfBookings), _flag (iFlag) {
00025 }
00026
00027 // //////////////////////////////////////
00028 HistoricalBooking::HistoricalBooking
00029 (const HistoricalBooking& iHistoricalBooking) :
00030     _numberOfBookings (iHistoricalBooking.getNbOfBookings()),
00031     _unconstrainedDemand (iHistoricalBooking.getUnconstrainedDemand()),
00032     _flag (iHistoricalBooking.getFlag()) {
00033 }
00034
00035 // //////////////////////////////////////
00036 HistoricalBooking::~HistoricalBooking() {
00037 }
00038
00039 // //////////////////////////////////////
00040 void HistoricalBooking::setParameters
00041 (const stdair::NbOfBookings_T iNbOfBookings, const stdair::Flag_T iFlag) {
00042     _numberOfBookings = iNbOfBookings;
00043     _unconstrainedDemand = iNbOfBookings;
00044     _flag = iFlag;
00045 }
00046
00047 // //////////////////////////////////////
00048 const std::string HistoricalBooking::describe() const {
00049     std::ostringstream ostr;
00050     ostr << "Struct of hitorical booking, unconstrained demand and flag of "
00051           << "censorship for a FlightDate/Class.";
00052
00053     return ostr.str();
00054 }
00055
00056 // //////////////////////////////////////
00057 void HistoricalBooking::toStream (std::ostream& ioOut) const {
00058     const stdair::NbOfBookings_T bj = getNbOfBookings();
00059     const stdair::NbOfBookings_T uj = getUnconstrainedDemand();
00060     const stdair::Flag_T fj = getFlag();

```

```

00061     ioOut << std::fixed << std::setprecision (2)
00062         << bj << "; " << uj << "; " << fj << std::endl;
00063 }
00064
00065 // //////////////////////////////////////
00066 void HistoricalBooking::display () const {
00067     toStream (std::cout);
00068 }
00069 }

```

## 28.51 rmol/bom/HistoricalBooking.hpp File Reference

```

#include <stdair/stdair_basic_types.hpp>
#include <stdair/basic/StructAbstract.hpp>

```

### Classes

- struct [RMOL::HistoricalBooking](#)  
*Structure keeping track, for a given class, of the number of historical bookings and of the censorship flag.*

### Namespaces

- namespace [RMOL](#)

## 28.52 HistoricalBooking.hpp

```

00001 #ifndef __RMOL_BOM_HISTORICALBOOKING_HPP
00002 #define __RMOL_BOM_HISTORICALBOOKING_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // StdAir
00008 #include <stdair/stdair_basic_types.hpp>
00009 #include <stdair/basic/StructAbstract.hpp>
00010
00011 namespace RMOL {
00012
00017     struct HistoricalBooking : public stdair::StructAbstract {
00018
00019     public:
00020         // ////////////////////////////////////// Getters //////////////////////////////////////
00022         const stdair::NbOfBookings_T& getNbOfBookings() const {
00023             return _numberOfBookings;
00024         }
00026         const stdair::NbOfBookings_T& getUnconstrainedDemand() const {
00027             return _unconstrainedDemand;
00028         }
00031         const stdair::Flag_T& getFlag() const {
00032             return _flag;
00033         }
00034

```

```

00035 public:
00036     // //////////// Setters ////////////
00038     void setUnconstrainedDemand (const stdair::NbOfBookings_T& iDemand) {
00039         _unconstrainedDemand = iDemand;
00040     }
00041
00043     void setParameters (const stdair::NbOfBookings_T, const stdair::Flag_T);
00044
00045 public:
00046     // //////////// Display Methods ////////////
00052     void toStream (std::ostream& ioOut) const;
00053
00057     const std::string describe() const;
00058
00062     void display () const;
00063
00064 public:
00065     // //////////// Constructors and destructor. ////////////
00069     HistoricalBooking (const stdair::NbOfBookings_T, const stdair::Flag_T);
00073     HistoricalBooking ();
00077     HistoricalBooking (const HistoricalBooking&);
00078
00082     virtual ~HistoricalBooking ();
00083
00084 private:
00085     // //////////// Attributes ////////////
00089     stdair::NbOfBookings_T _numberOfBookings;
00090
00094     stdair::NbOfBookings_T _unconstrainedDemand;
00095
00099     stdair::Flag_T _flag;
00100 };
00101 }
00102 #endif // __RMOL_BOM_HISTORICALBOOKING_HPP

```

## 28.53 rmol/bom/HistoricalBookingHolder.cpp File Reference

```

#include <sstream>
#include <iostream>
#include <iomanip>
#include <cmath>
#include <cassert>
#include <stdair/service/Logger.hpp>
#include <rmol/bom/HistoricalBooking.hpp>
#include <rmol/bom/HistoricalBookingHolder.hpp>

```

### Namespaces

- namespace [RMOL](#)

## 28.54 HistoricalBookingHolder.cpp

```

00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <sstream>
00006 #include <iostream>
00007 #include <iomanip>
00008 #include <cmath>
00009 #include <cassert>
00010 // StdAir
00011 #include <stdair/service/Logger.hpp>
00012 // RMOL
00013 #include <rmol/bom/HistoricalBooking.hpp>
00014 #include <rmol/bom/HistoricalBookingHolder.hpp>
00015
00016 namespace RMOL {
00017
00018 // //////////////////////////////////////
00019 HistoricalBookingHolder::HistoricalBookingHolder () {
00020 }
00021
00022 // //////////////////////////////////////
00023 HistoricalBookingHolder::~HistoricalBookingHolder () {
00024     _historicalBookingVector.clear();
00025 }
00026
00027 // //////////////////////////////////////
00028 const short HistoricalBookingHolder::getNbOfFlights () const {
00029     return _historicalBookingVector.size();
00030 }
00031
00032 // //////////////////////////////////////
00033 const short HistoricalBookingHolder::getNbOfUncensoredData () const {
00034     short lResult = 0;
00035     const short lSize = _historicalBookingVector.size();
00036
00037     for (short ite = 0; ite < lSize; ++ite) {
00038         const stdair::Flag_T lFlag = _historicalBookingVector.at(ite).getFlag ();
00039         if (lFlag == false) {
00040             ++ lResult;
00041         }
00042     }
00043
00044     return lResult;
00045 }
00046
00047 // //////////////////////////////////////
00048 const stdair::NbOfBookings_T HistoricalBookingHolder::
00049 getNbOfUncensoredBookings () const {
00050     stdair::NbOfBookings_T lResult = 0;
00051     const short lSize = _historicalBookingVector.size();
00052
00053     for (short ite = 0; ite < lSize; ++ite) {
00054         const HistoricalBooking& lHistorialBooking =
00055             _historicalBookingVector.at (ite);
00056         const stdair::Flag_T lFlag = lHistorialBooking.getFlag ();
00057         if (lFlag == false) {
00058             const stdair::NbOfBookings_T& lBooking =
00059                 lHistorialBooking.getNbOfBookings ();
00060             lResult += lBooking;

```



```

00061     }
00062 }
00063
00064     return lResult;
00065 }
00066
00067 // //////////////////////////////////////
00068 const double HistoricalBookingHolder::
00069 getUncensoredStandardDeviation (const double& iMeanOfUncensoredBookings,
00070                                 const short iNbOfUncensoredData) const {
00071
00072     double lResult = 0;
00073     const short lSize = _historicalBookingVector.size();
00074
00075     for (short ite = 0; ite < lSize; ++ite) {
00076         const stdair::Flag_T lFlag = _historicalBookingVector.at(ite).getFlag ();
00077         if (lFlag == false) {
00078             const HistoricalBooking& lHistorialBooking =
00079                 _historicalBookingVector.at (ite);
00080
00081             const stdair::NbOfBookings_T& lBooking =
00082                 lHistorialBooking.getNbOfBookings ();
00083
00084             lResult += (lBooking - iMeanOfUncensoredBookings)
00085                 * (lBooking - iMeanOfUncensoredBookings);
00086         }
00087     }
00088     lResult /= (iNbOfUncensoredData - 1);
00089     lResult = sqrt (lResult);
00090
00091     return lResult;
00092 }
00093
00094 // //////////////////////////////////////
00095 const double HistoricalBookingHolder::getDemandMean () const {
00096     double lResult = 0;
00097     const short lSize = _historicalBookingVector.size();
00098
00099     for (short ite = 0; ite < lSize; ++ite) {
00100         const HistoricalBooking& lHistorialBooking =
00101             _historicalBookingVector.at(ite);
00102
00103         const stdair::NbOfBookings_T& lDemand =
00104             lHistorialBooking.getUnconstrainedDemand ();
00105
00106         lResult += static_cast<double>(lDemand);
00107     }
00108
00109     lResult /= lSize;
00110
00111     return lResult;
00112 }
00113
00114 // //////////////////////////////////////
00115 const double HistoricalBookingHolder::getStandardDeviation
00116 (const double iDemandMean) const {
00117     double lResult = 0;
00118     const short lSize = _historicalBookingVector.size();
00119
00120     for (short ite = 0; ite < lSize; ++ite) {
00121         const HistoricalBooking& lHistorialBooking =
00122             _historicalBookingVector.at(ite);

```

```

00123
00124         const stdair::NbOfBookings_T& lDemand =
00125             lHistorialBooking.getUnconstrainedDemand ();
00126
00127         const double lDoubleDemand = static_cast<double> (lDemand);
00128         lResult += (lDoubleDemand - iDemandMean) * (lDoubleDemand - iDemandMean);
00129     }
00130
00131     lResult /= (lSize - 1);
00132
00133     lResult = sqrt (lResult);
00134
00135     return lResult;
00136 }
00137
00138 // //////////////////////////////////////
00139 const std::vector<bool> HistoricalBookingHolder::
00140 getListOfToBeUnconstrainedFlags () const {
00141     std::vector<bool> lResult;
00142     const short lSize = _historicalBookingVector.size();
00143
00144     for (short ite = 0; ite < lSize; ++ite) {
00145         const HistoricalBooking& lHistorialBooking =
00146             _historicalBookingVector.at(ite);
00147         const stdair::Flag_T lFlag = lHistorialBooking.getFlag ();
00148         if (lFlag == true) {
00149             lResult.push_back(true);
00150         }
00151         else {
00152             lResult.push_back(false);
00153         }
00154     }
00155
00156     return lResult;
00157 }
00158
00159 // //////////////////////////////////////
00160 const stdair::NbOfBookings_T& HistoricalBookingHolder::
00161 getHistoricalBooking (const short i) const {
00162     const HistoricalBooking& lHistorialBooking =
00163         _historicalBookingVector.at(i);
00164     return lHistorialBooking.getNbOfBookings();
00165 }
00166
00167 // //////////////////////////////////////
00168 const stdair::NbOfBookings_T& HistoricalBookingHolder::
00169 getUnconstrainedDemand (const short i) const {
00170     const HistoricalBooking& lHistorialBooking =
00171         _historicalBookingVector.at(i);
00172     return lHistorialBooking.getUnconstrainedDemand();
00173 }
00174
00175 // //////////////////////////////////////
00176 const stdair::Flag_T& HistoricalBookingHolder::
00177 getCensorshipFlag (const short i) const {
00178     const HistoricalBooking& lHistorialBooking =
00179         _historicalBookingVector.at(i);
00180     return lHistorialBooking.getFlag();
00181 }
00182
00183 // //////////////////////////////////////
00184 void HistoricalBookingHolder::setUnconstrainedDemand

```

```

00185     (const stdair::NbOfBookings_T& iExpectedDemand, const short i) {
00186         _historicalBookingVector.at(i).setUnconstrainedDemand(iExpectedDemand);
00187     }
00188
00189     // //////////////////////////////////////
00190     const stdair::NbOfBookings_T HistoricalBookingHolder::calculateExpectedDemand
00191     (const double iMean, const double iSD,
00192      const short i, const stdair::NbOfBookings_T iDemand) const {
00193
00194         const HistoricalBooking lHistorialBooking =
00195             _historicalBookingVector.at(i);
00196         const double lBooking =
00197             static_cast<double> (lHistorialBooking.getNbOfBookings());
00198         double e, d1, d2;
00199
00200         e = - (lBooking - iMean) * (lBooking - iMean) * 0.625 / (iSD * iSD);
00201         //STDAIR_LOG_DEBUG ("e: " << e);
00202         e = exp (e);
00203         //STDAIR_LOG_DEBUG ("e: " << e);
00204
00205         double s = sqrt (1 - e);
00206         //STDAIR_LOG_DEBUG ("s: " << s);
00207
00208         if (lBooking >= iMean) {
00209             if (e < 0.01) {
00210                 return iDemand;
00211             }
00212             d1 = 0.5 * (1 - s);
00213         }
00214         else {
00215             d1 = 0.5 * (1 + s);
00216         }
00217         //STDAIR_LOG_DEBUG ("d1: " << d1);
00218
00219         e = - (lBooking - iMean) * (lBooking - iMean) * 0.5 / (iSD * iSD);
00220         e = exp (e);
00221         d2 = e * iSD / sqrt (2 * 3.14159265);
00222         //STDAIR_LOG_DEBUG ("d2: " << d2);
00223
00224         if (d1 == 0) {
00225             return iDemand;
00226         }
00227
00228         const stdair::NbOfBookings_T lDemand =
00229             static_cast<stdair::NbOfBookings_T> (iMean + d2/d1);
00230
00231         return lDemand;
00232     }
00233
00234     // //////////////////////////////////////
00235     void HistoricalBookingHolder::addHistoricalBooking
00236     (const HistoricalBooking& iHistoricalBooking) {
00237         _historicalBookingVector.push_back(iHistoricalBooking);
00238     }
00239
00240     // //////////////////////////////////////
00241     void HistoricalBookingHolder::toStream (std::ostream& ioOut) const {
00242         const short lSize = _historicalBookingVector.size();
00243
00244         ioOut << "Historical Booking; Unconstrained Demand; Flag" << std::endl;
00245
00246         for (short ite = 0; ite < lSize; ++ite) {

```

```

00247     const HistoricalBooking& lHistorialBooking =
00248         _historicalBookingVector.at(ite);
00249
00250     const stdair::NbOfBookings_T& lBooking =
00251         lHistorialBooking.getNbOfBookings();
00252
00253     const stdair::NbOfBookings_T& lDemand =
00254         lHistorialBooking.getUnconstrainedDemand();
00255
00256     const stdair::Flag_T lFlag = lHistorialBooking.getFlag();
00257
00258     ioOut << lBooking << "      "
00259         << lDemand << "      "
00260         << lFlag << std::endl;
00261 }
00262 }
00263
00264 // //////////////////////////////////////
00265 const std::string HistoricalBookingHolder::describe() const {
00266     std::ostringstream ostr;
00267     ostr << "Holder of HistoricalBooking structs.";
00268
00269     return ostr.str();
00270 }
00271
00272 // //////////////////////////////////////
00273 void HistoricalBookingHolder::display() const {
00274     toStream (std::cout);
00275 }
00276 }

```

## 28.55 rmol/bom/HistoricalBookingHolder.hpp File Reference

```

#include <iostream>
#include <vector>
#include <stdair/stdair_basic_types.hpp>
#include <stdair/basic/StructAbstract.hpp>

```

### Classes

- struct [RMOL::HistoricalBookingHolder](#)

### Namespaces

- namespace [RMOL](#)

### Typedefs

- typedef std::vector< [HistoricalBooking](#) > [RMOL::HistoricalBookingVector\\_T](#)

## 28.56 HistoricalBookingHolder.hpp

```

00001 #ifndef __RMOL_BOM_HISTORICALBOOKINGHOLDER_HPP
00002 #define __RMOL_BOM_HISTORICALBOOKINGHOLDER_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // STL
00008 #include <iostream>
00009 #include <vector>
00010 // StdAir
00011 #include <stdair/stdair_basic_types.hpp>
00012 #include <stdair/basic/StructAbstract.hpp>
00013
00014 namespace RMOL {
00016     struct HistoricalBooking;
00017
00019     typedef std::vector<HistoricalBooking> HistoricalBookingVector_T;
00020
00023     struct HistoricalBookingHolder : public stdair::StructAbstract {
00024
00025     public:
00026         // ===== Getters =====
00028         const short getNbOfFlights () const;
00029
00031         const short getNbOfUncensoredData () const;
00032
00034         const stdair::NbOfBookings_T getNbOfUncensoredBookings () const;
00035
00037         const double getUncensoredStandardDeviation
00038         (const double& iMeanOfUncensoredBookings,
00039          const short iNbOfUncensoredData) const;
00040
00042         const double getDemandMean () const;
00043
00045         const double getStandardDeviation (const double) const;
00046
00048         const std::vector<bool> getListOfToBeUnconstrainedFlags() const;
00049
00051         const stdair::NbOfBookings_T& getHistoricalBooking (const short i) const;
00052
00054         const stdair::NbOfBookings_T& getUnconstrainedDemand (const short i) const;
00055
00057         const stdair::Flag_T& getCensorshipFlag (const short i) const;
00058
00060         const stdair::NbOfBookings_T& getUnconstrainedDemandOnFirstElement() const {
00061             return getUnconstrainedDemand (0);
00062         }
00063
00065         const stdair::NbOfBookings_T calculateExpectedDemand (const double,
00066                                                                const double,
00067                                                                const short,
00068                                                                const stdair::NbOfBookings_T) const;
00069
00071         void setUnconstrainedDemand (const stdair::NbOfBookings_T& iExpectedDemand,
00072                                     const short i);
00073
00075         void addHistoricalBooking (const HistoricalBooking& iHistoricalBooking);
00076
00080         void toStream (std::ostream& ioOut) const;
00081

```

```

00082 // ////////// Display Methods //////////
00083 const std::string describe() const;
00084
00085 void display () const;
00086
00087 virtual ~HistoricalBookingHolder();
00088
00089 public:
00090     HistoricalBookingHolder ();
00091
00092 private:
00093     HistoricalBookingVector_T _historicalBookingVector;
00094
00095 protected:
00096 };
00097 }
00098 #endif // __RMOL_BOM_HISTORICALBOOKINGHOLDER_HPP
00099

```

## 28.57 rmol/bom/MCOptimiser.cpp File Reference

```

#include <cassert>
#include <string>
#include <sstream>
#include <algorithm>
#include <cmath>
#include <stdair/stdair_basic_types.hpp>
#include <stdair/bom/BomManager.hpp>
#include <stdair/bom/LegCabin.hpp>
#include <stdair/bom/SegmentCabin.hpp>
#include <stdair/bom/BookingClass.hpp>
#include <stdair/bom/VirtualClassStruct.hpp>
#include <stdair/service/Logger.hpp>
#include <stdair/basic/RandomGeneration.hpp>
#include <stdair/basic/BasConst_General.hpp>
#include <rmol/bom/MCOptimiser.hpp>

```

### Namespaces

- namespace [RMOL](#)

## 28.58 MCOptimiser.cpp

```

00001 // //////////////////////////////////////

```

```

00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 #include <string>
00007 #include <sstream>
00008 #include <algorithm>
00009 #include <cmath>
00010 // StdAir
00011 #include <stdair/stdair_basic_types.hpp>
00012 #include <stdair/bom/BomManager.hpp>
00013 #include <stdair/bom/LegCabin.hpp>
00014 #include <stdair/bom/SegmentCabin.hpp>
00015 #include <stdair/bom/BookingClass.hpp>
00016 #include <stdair/bom/VirtualClassStruct.hpp>
00017 #include <stdair/service/Logger.hpp>
00018
00019 #include <stdair/basic/RandomGeneration.hpp>
00020 #include <stdair/basic/BasConst_General.hpp>
00021 // RMOL
00022 #include <rmol/bom/MCOptimiser.hpp>
00023
00024 namespace RMOL {
00025
00026 // // //////////////////////////////////////
00027 void MCOptimiser::
00028 optimalOptimisationByMCIntegration (stdair::LegCabin& ioLegCabin) {
00029     // Retrieve the segment-cabin
00030     const stdair::SegmentCabinList_T lSegmentCabinList =
00031         stdair::BomManager::getList<stdair::SegmentCabin> (ioLegCabin);
00032     stdair::SegmentCabinList_T::const_iterator itSC = lSegmentCabinList.begin();
00033     assert (itSC != lSegmentCabinList.end());
00034     const stdair::SegmentCabin* lSegmentCabin_ptr = *itSC;
00035     assert (lSegmentCabin_ptr != NULL);
00036
00037     // Retrieve the class list.
00038     const stdair::BookingClassList_T lBookingClassList =
00039         stdair::BomManager::getList<stdair::BookingClass> (*lSegmentCabin_ptr);
00040
00041     // Retrieve the remaining cabin capacity.
00042     const stdair::Availability_T& lCap = ioLegCabin.getAvailabilityPool();
00043     const int lCapacity = static_cast<const int> (lCap);
00044     const stdair::UnsignedIndex_T lCapacityIndex =
00045         static_cast<const stdair::UnsignedIndex_T> ((lCapacity+abs(lCapacity))/2);
00046
00047     // Retrieve the virtual class list.
00048     stdair::VirtualClassList_T& lVCList = ioLegCabin.getVirtualClassList();
00049
00050     // Parse the virtual class list and compute the protection levels.
00051     stdair::VirtualClassList_T::iterator itCurrentVC = lVCList.begin();
00052     assert (itCurrentVC != lVCList.end());
00053     stdair::VirtualClassList_T::iterator itNextVC = itCurrentVC; ++itNextVC;
00054
00055     // Initialise the partial sum holder with the demand sample of the first
00056     // virtual class.
00057     stdair::VirtualClassStruct& lFirstVC = *itCurrentVC;
00058     stdair::GeneratedDemandVector_T lPartialSumHolder =
00059         lFirstVC.getGeneratedDemandVector();
00060
00061     // Initialise the booking limit for the first class, which is equal to
00062     // the remaining capacity.
00063     lFirstVC.setCumulatedBookingLimit (lCap);

```

```

00064
00065 // Initialise bid price vector with the first element (index 0) equal to
00066 // the highest yield.
00067 ioLegCabin.emptyBidPriceVector();
00068 stdair::BidPriceVector_T& lBPV = ioLegCabin.getBidPriceVector();
00069 //const stdair::Yield_T& y1 = lFirstVC.getYield ();
00070 //lBPV.push_back (y1);
00071 stdair::UnsignedIndex_T idx = 1;
00072
00073 for (; itNextVC != lVCList.end(); ++itCurrentVC, ++itNextVC) {
00074 // Get the yields of the two classes.
00075 stdair::VirtualClassStruct& lCurrentVC = *itCurrentVC;
00076 stdair::VirtualClassStruct& lNextVC = *itNextVC;
00077 const stdair::Yield_T& yj = lCurrentVC.getYield ();
00078 const stdair::Yield_T& yj1 = lNextVC.getYield ();
00079
00080 // Consistency check: the yield/price of a higher class/bucket
00081 // (with the j index lower) must be higher.
00082 assert (yj > yj1);
00083
00084 // Sort the partial sum holder.
00085 std::sort (lPartialSumHolder.begin(), lPartialSumHolder.end());
00086 const stdair::UnsignedIndex_T K = lPartialSumHolder.size ();
00087
00088 // Compute the optimal index lj = floor {[y(j)-y(j+1)]/y(j) . K}
00089 const double ljdoube = std::floor (K * (yj - yj1) / yj);
00090 stdair::UnsignedIndex_T lj =
00091     static_cast<stdair::UnsignedIndex_T> (ljdoube);
00092
00093 // Consistency check.
00094 assert (lj >= 1 && lj < K);
00095
00096 // The optimal protection: p(j) = 1/2 [S(j,lj) + S(j, lj+1)]
00097 const double sj1 = lPartialSumHolder.at (lj - 1);
00098 const double sjlp1 = lPartialSumHolder.at (lj + 1 - 1);
00099 const double pj = (sj1 + sjlp1) / 2;
00100
00101 // Set the cumulated protection level for the current class.
00102 lCurrentVC.setCumulatedProtection (pj);
00103 // Set the cumulated booking limit for the next class.
00104 lNextVC.setCumulatedBookingLimit (lCap - pj);
00105
00110 const stdair::UnsignedIndex_T pjint = static_cast<const int> (pj);
00111 stdair::GeneratedDemandVector_T::iterator itLowerBound =
00112     lPartialSumHolder.begin();
00113 for (; idx <= pjint && idx <= lCapacityIndex; ++idx) {
00114     itLowerBound =
00115         std::lower_bound (itLowerBound, lPartialSumHolder.end(), idx);
00116     const stdair::UnsignedIndex_T pos =
00117         itLowerBound - lPartialSumHolder.begin();
00118
00119     const stdair::BidPrice_T lBP = yj * (K - pos) / K;
00120     lBPV.push_back (lBP);
00121 }
00122
00123 // Update the partial sum holder.
00124 const stdair::GeneratedDemandVector_T& lNextPSH =
00125     lNextVC.getGeneratedDemandVector();
00126 assert (K <= lNextPSH.size());
00127 for (stdair::UnsignedIndex_T i = 0; i < K - lj; ++i) {
00128     lPartialSumHolder.at(i) = lPartialSumHolder.at(i + lj) + lNextPSH.at(i);
00129 }

```



```

00130         lPartialSumHolder.resize (K - lj);
00131     }
00132
00137     stdair::VirtualClassStruct& lLastVC = *itCurrentVC;
00138     const stdair::Yield_T& yn = lLastVC.getYield();
00139     stdair::GeneratedDemandVector_T::iterator itLowerBound =
00140         lPartialSumHolder.begin();
00141     for (; idx <= lCapacityIndex; ++idx) {
00142         itLowerBound =
00143             std::lower_bound (itLowerBound, lPartialSumHolder.end(), idx);
00144         const stdair::UnsignedIndex_T pos =
00145             itLowerBound - lPartialSumHolder.begin();
00146         const stdair::UnsignedIndex_T K = lPartialSumHolder.size();
00147         const stdair::BidPrice_T lBP = yn * (K - pos) / K;
00148         lBPV.push_back (lBP);
00149     }
00150 }
00151
00152 //////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
00153 stdair::GeneratedDemandVector_T MCOptimiser::
00154 generateDemandVector (const stdair::MeanValue_T& iMean,
00155                     const stdair::StdDevValue_T& iStdDev,
00156                     const unsigned int& K) {
00157     stdair::GeneratedDemandVector_T oDemandVector;
00158     if (iStdDev > 0) {
00159         stdair::RandomGeneration lGenerator (stdair::DEFAULT_RANDOM_SEED);
00160         for (unsigned int i = 0; i < K; ++i) {
00161             stdair::RealNumber_T lDemandSample =
00162                 lGenerator.generateNormal (iMean, iStdDev);
00163             oDemandVector.push_back (lDemandSample);
00164         }
00165     } else {
00166         for (unsigned int i = 0; i < K; ++i) {
00167             oDemandVector.push_back (iMean);
00168         }
00169     }
00170     return oDemandVector;
00171 }
00172
00173 //////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
00174 void MCOptimiser::
00175 optimisationByMCIntegration (stdair::LegCabin& ioLegCabin) {
00176     // Number of MC samples
00177     unsigned int K = 100000;
00178
00179     const stdair::YieldLevelDemandMap_T& lYieldDemandMap =
00180         ioLegCabin.getYieldLevelDemandMap();
00181     assert (!lYieldDemandMap.empty());
00182
00183     std::ostream oStr;
00184     oStr << "Yield list ";
00185     for (stdair::YieldLevelDemandMap_T::const_iterator itYD =
00186         lYieldDemandMap.begin();
00187         itYD != lYieldDemandMap.end(); ++itYD) {
00188         const stdair::Yield_T& y = itYD->first;
00189         oStr << y << " ";
00190     }
00191
00192     STDAIR_LOG_DEBUG (oStr.str());
00193     ioLegCabin.emptyBidPriceVector();
00194     stdair::BidPriceVector_T& lBidPriceVector =
00195         ioLegCabin.getBidPriceVector();

```

```

00196     const stdair::Availability_T& lAvailabilityPool =
00197         ioLegCabin.getAvailabilityPool();
00198     // Initialise the minimal bid price to 1.0 (just to avoid problems
00199     // of division by zero).
00200     const stdair::BidPrice_T& lMinBP = 1.0;
00201
00202     stdair::YieldLevelDemandMap_T::const_reverse_iterator itCurrentYD =
00203         lYieldDemandMap.rbegin();
00204     stdair::YieldLevelDemandMap_T::const_reverse_iterator itNextYD = itCurrentYD;
00205
00206     ++itNextYD;
00207
00208     // Initialise the partial sum holder
00209     stdair::MeanStdDevPair_T lMeanStdDevPair = itCurrentYD->second;
00210     stdair::GeneratedDemandVector_T lPartialSumHolder =
00211         generateDemandVector(lMeanStdDevPair.first, lMeanStdDevPair.second, K);
00212
00213     stdair::UnsignedIndex_T idx = 1;
00214     for (; itNextYD!=lYieldDemandMap.rend(); ++itCurrentYD, ++itNextYD) {
00215         const stdair::Yield_T& yj = itCurrentYD->first;
00216         const stdair::Yield_T& yj1 = itNextYD->first;
00217         // Consistency check: the yield/price of a higher class/bucket
00218         // (with the j index lower) must be higher.
00219         assert (yj > yj1);
00220         // Sort the partial sum holder.
00221         std::sort (lPartialSumHolder.begin(), lPartialSumHolder.end());
00222         // STDAIR_LOG_DEBUG ("Partial sums : max = " << lPartialSumHolder.back()
00223         //                  << " min = " << lPartialSumHolder.front());
00224         K = lPartialSumHolder.size ();
00225         // Compute the optimal index lj = floor {[y(j)-y(j+1)]/y(j) . K}
00226         const double ljdoube = std::floor (K * (yj - yj1) / yj);
00227         stdair::UnsignedIndex_T lj =
00228             static_cast<stdair::UnsignedIndex_T> (ljdoube);
00229         // Consistency check.
00230         assert (lj >= 1 && lj < K);
00231         // The optimal protection: p(j) = 1/2 [S(j,lj) + S(j, lj+1)]
00232         const double sjl = lPartialSumHolder.at (lj - 1);
00233         const double sjlp1 = lPartialSumHolder.at (lj + 1 - 1);
00234         const double pj = (sjl + sjlp1) / 2;
00235         const stdair::UnsignedIndex_T pjint = static_cast<const int> (pj);
00236         stdair::GeneratedDemandVector_T::iterator itLowerBound =
00237             lPartialSumHolder.begin();
00238         for (; idx <= pjint && idx <= lAvailabilityPool; ++idx) {
00239             itLowerBound =
00240                 std::lower_bound (itLowerBound, lPartialSumHolder.end(), idx);
00241             const stdair::UnsignedIndex_T pos =
00242                 itLowerBound - lPartialSumHolder.begin();
00243
00244             const stdair::BidPrice_T lBP = yj * (K - pos) / K;
00245             lBidPriceVector.push_back (lBP);
00246         }
00247         // Update the partial sum holder.
00248         lMeanStdDevPair = itNextYD->second;
00249         const stdair::GeneratedDemandVector_T& lNextDV =
00250             generateDemandVector (lMeanStdDevPair.first,
00251                                 lMeanStdDevPair.second, K - lj);
00252         for (stdair::UnsignedIndex_T i = 0; i < K - lj; ++i) {
00253             lPartialSumHolder.at(i) = lPartialSumHolder.at(i + lj) + lNextDV.at(i);
00254         }
00255         lPartialSumHolder.resize (K - lj);
00256     }
00257     // STDAIR_LOG_DEBUG ("Partial sums : max = " << lPartialSumHolder.back()

```

```

00269         //                                     << " min = " << lPartialSumHolder.front());
00270
00271         std::sort (lPartialSumHolder.begin(), lPartialSumHolder.end());
00272         const stdair::Yield_T& yn = itCurrentYD->first;
00273         stdair::GeneratedDemandVector_T::iterator itLowerBound =
00274             lPartialSumHolder.begin();
00275         K = lPartialSumHolder.size();
00276
00277         bool lMinBPReached = false;
00278         for (; idx <= lAvailabilityPool; ++idx) {
00279             itLowerBound =
00280                 std::lower_bound (itLowerBound, lPartialSumHolder.end(), idx);
00281
00282             if (!lMinBPReached) {
00283                 const stdair::UnsignedIndex_T pos =
00284                     itLowerBound - lPartialSumHolder.begin();
00285                 stdair::BidPrice_T lBP = yn * (K - pos) / K;
00286
00287                 if (lBP < lMinBP) {
00288                     lBP = lMinBP; lMinBPReached = true;
00289                 }
00290
00291                 lBidPriceVector.push_back (lBP);
00292
00293             } else {
00294                 lBidPriceVector.push_back (lMinBP);
00295             }
00296         }
00297     }
00298
00299     // Updating the bid price values
00300     ioLegCabin.updatePreviousBidPrice();
00301     ioLegCabin.setCurrentBidPrice (lBidPriceVector.back());
00302
00303     // Compute and display the bid price variation after optimisation
00304     const stdair::BidPrice_T lPreviousBP = ioLegCabin.getPreviousBidPrice();
00305     stdair::BidPrice_T lNewBP = ioLegCabin.getCurrentBidPrice();
00306     // Check
00307     assert (lPreviousBP != 0);
00308     stdair::BidPrice_T lBidPriceDelta = lNewBP - lPreviousBP;
00309
00310     double lBidPriceVariation = 100*lBidPriceDelta/lPreviousBP;
00311
00312     STDAIR_LOG_DEBUG ("Bid price: previous value " << lPreviousBP
00313                     << ", new value " << lNewBP
00314                     << ", variation " << lBidPriceVariation << " %"
00315                     << ", BPV size " << lBidPriceVector.size());
00316 }
00317
00318 }

```

## 28.59 rmol/bom/MCOptimiser.hpp File Reference

```

#include <rmol/RMOL_Types.hpp>
#include <stdair/stdair_maths_types.hpp>
#include <stdair/stdair_rm_types.hpp>

```

## Classes

- class [RMOL::MCOptimiser](#)

## Namespaces

- namespace [stdair](#)
- namespace [RMOL](#)

## 28.60 MCOptimiser.hpp

```

00001 #ifndef __RMOL_BOM_MCUTILS_HPP
00002 #define __RMOL_BOM_MCUTILS_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // RMOL
00008 #include <rmol/RMOL_Types.hpp>
00009 #include <stdair/stdair_maths_types.hpp>
00010 #include <stdair/stdair_rm_types.hpp>
00011
00012 // Forward declarations.
00013 namespace stdair {
00014     class LegCabin;
00015 }
00016
00017 namespace RMOL {
00018     class MCOptimiser {
00019     public:
00020
00021         static void optimalOptimisationByMCIntegration (stdair::LegCabin&);
00022
00023         static stdair::GeneratedDemandVector_T
00024         generateDemandVector (const stdair::MeanValue_T&,
00025                             const stdair::StdDevValue_T&, const unsigned int&);
00026
00027         static void optimisationByMCIntegration (stdair::LegCabin&);
00028
00029     };
00030 }
00031 #endif // __RMOL_BOM_MCUTILS_HPP

```

## 28.61 rmol/bom/old/DemandGeneratorList.cpp File Reference

```
#include <rmol/bom/DemandGeneratorList.hpp>
```

## Namespaces

- namespace [RMOL](#)

## 28.62 DemandGeneratorList.cpp

```

00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // RMOL
00005 #include <rmol/bom/DemandGeneratorList.hpp>
00006
00007 namespace RMOL {
00008
00009 // //////////////////////////////////////
00010 DemandGeneratorList::DemandGeneratorList () {
00011     const DistributionParameterList_T aDistributionParameterList;
00012     init (aDistributionParameterList);
00013 }
00014
00015 // //////////////////////////////////////
00016 DemandGeneratorList::
00017 DemandGeneratorList (const DemandGeneratorList& iDemandGeneratorList) {
00018     // TODO: copy the distribution parameters of the input generator list
00019     const DistributionParameterList_T aDistributionParameterList;
00020     init (aDistributionParameterList);
00021 }
00022
00023 // //////////////////////////////////////
00024 DemandGeneratorList::
00025 DemandGeneratorList (const DistributionParameterList_T& iDistributionParameterL
00026 ist) {
00027     init (iDistributionParameterList);
00028 }
00029
00030 // //////////////////////////////////////
00031 DemandGeneratorList::~DemandGeneratorList () {
00032 }
00033
00034 // //////////////////////////////////////
00035 void DemandGeneratorList::
00036 init (const DistributionParameterList_T& iDistributionParameterList) {
00037     DistributionParameterList_T::const_iterator itParams =
00038         iDistributionParameterList.begin();
00039     for ( ; itParams != iDistributionParameterList.end(); itParams++) {
00040         const FldDistributionParameters& aParams = *itParams;
00041
00042         const Gaussian gaussianGenerator (aParams);
00043
00044         _demandGeneratorList.push_back (gaussianGenerator);
00045     }
00046 }
00047
00048 // //////////////////////////////////////
00049 void DemandGeneratorList::
00050 generateVariateList (VariateList_T& ioVariateList) const {
00051
00052     // Iterate on the (number of) classes/buckets, n
00053     DemandGeneratorList_T::const_iterator itGenerator =
00054         _demandGeneratorList.begin();
00055     for ( ; itGenerator != _demandGeneratorList.end(); itGenerator++) {
00056         const Gaussian& gaussianGenerator = *itGenerator;
00057
00058         // Generate a random variate following the Gaussian distribution
00059         const double generatedVariate = gaussianGenerator.generateVariate ();

```

```

00060         ioVariateList.push_back (generatedVariate);
00061     }
00062 }
00063
00064 }
```

## 28.63 rmol/bom/old/DemandGeneratorList.hpp File Reference

```

#include <list>
#include <rmol/bom/VariateList.hpp>
#include <rmol/bom/DistributionParameterList.hpp>
#include <rmol/bom/Gaussian.hpp>
```

### Classes

- class [RMOL::DemandGeneratorList](#)

### Namespaces

- namespace [RMOL](#)

## 28.64 DemandGeneratorList.hpp

```

00001 #ifndef __RMOL_DEMANDGENERATORLIST_HPP
00002 #define __RMOL_DEMANDGENERATORLIST_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // STL
00008 #include <list>
00009 // RMOL
00010 #include <rmol/bom/VariateList.hpp>
00011 #include <rmol/bom/DistributionParameterList.hpp>
00012 #include <rmol/bom/Gaussian.hpp>
00013
00014 namespace RMOL {
00015
00016     class DemandGeneratorList {
00017     protected:
00020         typedef std::list<Gaussian> DemandGeneratorList_T;
00021
00022     public:
00024         DemandGeneratorList ();
00025         DemandGeneratorList (const DemandGeneratorList&);
00027         DemandGeneratorList (const DistributionParameterList_T&);
00028
00030         virtual ~DemandGeneratorList ();
00031
00033         void generateVariateList (VariateList_T&) const;
00034
00035     private:
```

```

00036     DemandGeneratorList_T _demandGeneratorList;
00037
00039     void init (const DistributionParameterList_T&);
00040
00041 };
00042 }
00043 #endif // __RMOL_DEMANDGENERATORLIST_HPP

```

## 28.65 rmol/bom/Utilities.cpp File Reference

```

#include <cassert>
#include <string>
#include <numeric>
#include <algorithm>
#include <cmath>
#include <stdair/basic/BasConst_Inventory.hpp>
#include <stdair/bom/BomManager.hpp>
#include <stdair/bom/SegmentCabin.hpp>
#include <stdair/service/Logger.hpp>
#include <rmol/basic/BasConst_General.hpp>
#include <rmol/bom/Utilities.hpp>
#include <rmol/bom/GuillotineBlockHelper.hpp>

```

### Namespaces

- namespace [RMOL](#)

## 28.66 Utilities.cpp

```

00001
00002 // //////////////////////////////////////
00003 // Import section
00004 // //////////////////////////////////////
00005 // STL
00006 #include <cassert>
00007 #include <string>
00008 #include <numeric>
00009 #include <algorithm>
00010 #include <cmath>
00011 // StdAir
00012 #include <stdair/basic/BasConst_Inventory.hpp>
00013 #include <stdair/bom/BomManager.hpp>
00014 #include <stdair/bom/SegmentCabin.hpp>
00015 #include <stdair/service/Logger.hpp>
00016 // RMOL
00017 #include <rmol/basic/BasConst_General.hpp>
00018 #include <rmol/bom/Utilities.hpp>

```

```

00019 #include <rmol/bom/GuillotineBlockHelper.hpp>
00020
00021 namespace RMOL {
00022 // //////////////////////////////////////
00023 void Utilities::
00024 computeDistributionParameters (const UnconstrainedDemandVector_T& iVector,
00025                               double& ioMean, double& ioStdDev) {
00026     ioMean = 0.0; ioStdDev = 0.0;
00027     unsigned int lNbOfSamples = iVector.size();
00028     assert (lNbOfSamples > 1);
00029
00030     // Compute the mean
00031     for (UnconstrainedDemandVector_T::const_iterator itSample = iVector.begin();
00032          itSample != iVector.end(); ++itSample) {
00033         //STDAIR_LOG_NOTIFICATION (*itSample);
00034         ioMean += *itSample;
00035     }
00036     ioMean /= lNbOfSamples;
00037
00038     // Compute the standard deviation
00039     for (UnconstrainedDemandVector_T::const_iterator itSample = iVector.begin();
00040          itSample != iVector.end(); ++itSample) {
00041         const double& lSample = *itSample;
00042         ioStdDev += ((lSample - ioMean) * (lSample - ioMean));
00043     }
00044     ioStdDev /= (lNbOfSamples - 1);
00045     ioStdDev = sqrt (ioStdDev);
00046
00047     // Sanity check
00048     if (ioStdDev == 0) {
00049         ioStdDev = 0.1;
00050     }
00051 }
00052
00053 // //////////////////////////////////////
00054 stdair::DCPLList_T Utilities::
00055 buildRemainingDCPLList (const stdair::DTD_T& iDTD) {
00056     stdair::DCPLList_T oDCPLList;
00057
00058     const stdair::DCPLList_T lWholeDCPLList = stdair::DEFAULT_DCP_LIST;
00059     stdair::DCPLList_T::const_iterator itDCP = lWholeDCPLList.begin();
00060     while (itDCP != lWholeDCPLList.end()) {
00061         const stdair::DCP_T& lDCP = *itDCP;
00062         if (iDTD >= lDCP) {
00063             break;
00064         }
00065         ++itDCP;
00066     }
00067     assert (itDCP != lWholeDCPLList.end());
00068
00069     oDCPLList.push_back (iDTD);
00070     ++itDCP;
00071     for (; itDCP != lWholeDCPLList.end(); ++itDCP) {
00072         oDCPLList.push_back (*itDCP);
00073     }
00074
00075     return oDCPLList;
00076 }
00077
00078 // //////////////////////////////////////
00079 stdair::DCPLList_T Utilities::
00080 buildRemainingDCPLList2 (const stdair::DTD_T& iDTD) {

```



```

00081     stdair::DCPList_T oDCPList;
00082
00083     const stdair::DCPList_T lWholeDCPList = RMOL::DEFAULT_DCP_LIST;
00084     stdair::DCPList_T::const_iterator itDCP = lWholeDCPList.begin();
00085     while (itDCP != lWholeDCPList.end()) {
00086         const stdair::DCP_T& lDCP = *itDCP;
00087         if (iDTD >= lDCP) {
00088             break;
00089         }
00090         ++itDCP;
00091     }
00092     assert (itDCP != lWholeDCPList.end());
00093
00094     oDCPList.push_back (iDTD);
00095     ++itDCP;
00096     for (; itDCP != lWholeDCPList.end(); ++itDCP) {
00097         oDCPList.push_back (*itDCP);
00098     }
00099
00100     return oDCPList;
00101 }
00102
00103 // //////////////////////////////////////
00104 stdair::NbOfSegments_T Utilities::
00105 getNbOfDepartedSimilarSegments (const stdair::SegmentCabin& iSegmentCabin,
00106                                 const stdair::Date_T& iEventDate) {
00107     stdair::DTD_T lDTD = 0;
00108     // Retrieve the guillotine block.
00109     const stdair::GuillotineBlock& lGuillotineBlock =
00110         iSegmentCabin.getGuillotineBlock();
00111     return GuillotineBlockHelper::
00112         getNbOfSegmentAlreadyPassedThisDTD (lGuillotineBlock, lDTD, iEventDate);
00113 }
00114
00115 }

```

## 28.67 rmol/bom/Utilities.hpp File Reference

```
#include <stdair/stdair_inventory_types.hpp>
```

```
#include <rmol/RMOL_Types.hpp>
```

### Classes

- class [RMOL::Utilities](#)

### Namespaces

- namespace [stdair](#)
- namespace [RMOL](#)

## 28.68 Utilities.hpp

```
00001 #ifndef __RMOL_BOM_UTILITIES_HPP
```

```

00002 #define __RMOL_BOM_UTILITIES_HPP
00003 // //////////////////////////////////////
00004 // Import section
00005 // //////////////////////////////////////
00006 // StdAir
00007 #include <stdair/stdair_inventory_types.hpp>
00008 // RMOL
00009 #include <rmol/RMOL_Types.hpp>
00010
00011 // Forward declarations
00012 namespace stdair {
00013     class SegmentCabin;
00014 }
00015
00016 namespace RMOL {
00017
00019     class Utilities {
00020     public:
00022         static void computeDistributionParameters (const UnconstrainedDemandVector_T&
00023             , double&, double&);
00027         static stdair::DCPList_T buildRemainingDCPList (const stdair::DTD_T&);
00028         static stdair::DCPList_T buildRemainingDCPList2 (const stdair::DTD_T&);
00029
00033         static stdair::NbOfSegments_T getNbOfDepartedSimilarSegments (const stdair::S
00034             egmentCabin&, const stdair::Date_T&);
00035     };
00036
00037 }
00038
00039 #endif // __RMOL_BOM_UTILITIES_HPP

```

## 28.69 rmol/command/Detruncator.cpp File Reference

```

#include <cassert>
#include <stdair/basic/BasConst_Inventory.hpp>
#include <stdair/bom/GuillotineBlock.hpp>
#include <stdair/bom/BomManager.hpp>
#include <stdair/bom/FlightDate.hpp>
#include <stdair/bom/SegmentDate.hpp>
#include <stdair/bom/SegmentCabin.hpp>
#include <stdair/bom/BookingClass.hpp>
#include <stdair/service/Logger.hpp>
#include <rmol/bom/GuillotineBlockHelper.hpp>
#include <rmol/bom/HistoricalBookingHolder.hpp>
#include <rmol/bom/HistoricalBooking.hpp>
#include <rmol/bom/EMDetruncator.hpp>
#include <rmol/command/Detruncator.hpp>

```

## Namespaces

- namespace **RMOL**

## 28.70 Detruncator.cpp

```

00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 // StdAir
00007 #include <stdair/basic/BasConst_Inventory.hpp>
00008 #include <stdair/bom/GuillotineBlock.hpp>
00009 #include <stdair/bom/BomManager.hpp>
00010 #include <stdair/bom/FlightDate.hpp>
00011 #include <stdair/bom/SegmentDate.hpp>
00012 #include <stdair/bom/SegmentCabin.hpp>
00013 #include <stdair/bom/BookingClass.hpp>
00014 #include <stdair/service/Logger.hpp>
00015 // RMOL
00016 #include <rmol/bom/GuillotineBlockHelper.hpp>
00017 #include <rmol/bom/HistoricalBookingHolder.hpp>
00018 #include <rmol/bom/HistoricalBooking.hpp>
00019 #include <rmol/bom/EMDetruncator.hpp>
00020 #include <rmol/command/Detruncator.hpp>
00021
00022 namespace RMOL {
00023 // //////////////////////////////////////
00024 void Detruncator::
00025     unconstrainUsingAdditivePickUp (const stdair::SegmentCabin& iSegmentCabin,
00026                                     BookingClassUnconstrainedDemandVectorMap_T& ioBkgClassUncDemMap,
00027                                     UnconstrainedDemandVector_T& ioQEquivalentDemandVector,
00028                                     const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,
00029                                     const stdair::Date_T& iCurrentDate) {
00030
00031     // Retrieve the guillotine block.
00032     const stdair::GuillotineBlock& lGuillotineBlock =
00033         iSegmentCabin.getGuillotineBlock();
00034
00035     // Build the historical booking holders for the product-oriented bookings
00036     // of the casses and the Q-equivalent (price-oriented) bookings of the cabin
00037     const stdair::NbOfSegments_T lNbOfUsableSegments = GuillotineBlockHelper::
00038         getNbOfSegmentAlreadyPassedThisDTD (lGuillotineBlock, iDCPEnd,
00039                                             iCurrentDate);
00040
00041     // Parse the booking class list and unconstrain historical bookings.
00042     for (BookingClassUnconstrainedDemandVectorMap_T::iterator itBCUDV =
00043          ioBkgClassUncDemMap.begin(); itBCUDV != ioBkgClassUncDemMap.end();
00044          ++itBCUDV) {
00045         stdair::BookingClass* lBC_ptr = itBCUDV->first;
00046         assert (lBC_ptr != NULL);
00047         const stdair::MapKey_T& lBCKey = lBC_ptr->describeKey();
00048         const stdair::BlockIndex_T& lBlockIdx =
00049             lGuillotineBlock.getBlockIndex (lBCKey);
00050         UnconstrainedDemandVector_T& lUncDemVector = itBCUDV->second;
00051
00052         STDAIR_LOG_DEBUG ("Unconstrain product-oriented bookings for " << lBCKey);
00053         // STDAIR_LOG_NOTIFICATION (lBCKey << ";" << iDCPBegin
00054         //                             << ";" << iDCPEnd);

```

```

00055         unconstrainUsingAdditivePickUp (lGuillotineBlock, lUncDemVector,
00056                                         iDCPBegin, iDCPEnd,
00057                                         lNbOfUsableSegments, lBlockIdx);
00058     }
00059
00060     // Unconstrain the Q-equivalent bookings.
00061     // Retrieve the block index of the segment-cabin.
00062     std::ostream lSCMapKey;
00063     lSCMapKey << stdair::DEFAULT_SEGMENT_CABIN_VALUE_TYPE
00064               << iSegmentCabin.describeKey();
00065     const stdair::BlockIndex_T& lCabinIdx =
00066         lGuillotineBlock.getBlockIndex (lSCMapKey.str());
00067
00068     STDAIR_LOG_DEBUG ("Unconstrain price-oriented bookings");
00069     //STDAIR_LOG_NOTIFICATION (iDCPBegin << " " << iDCPEnd);
00070     unconstrainUsingAdditivePickUp (lGuillotineBlock, ioQEquivalentDemandVector,
00071                                     iDCPBegin, iDCPEnd, lNbOfUsableSegments,
00072                                     lCabinIdx, iSegmentCabin, iCurrentDate);
00073 }
00074
00075 // //////////////////////////////////////
00076 void Detruncator::unconstrainUsingAdditivePickUp
00077 (const stdair::GuillotineBlock& iGuillotineBlock,
00078  UnconstrainedDemandVector_T& ioUncDemVector,
00079  const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,
00080  const stdair::NbOfSegments_T& iNbOfUsableSegments,
00081  const stdair::BlockIndex_T& iBlockIdx) {
00082     // TODO:
00083     stdair::NbOfSegments_T lSegBegin = 0;
00084     if (iNbOfUsableSegments > 52) lSegBegin = iNbOfUsableSegments - 52;
00085     // Retrieve the gross daily booking and availability snapshots.
00086     stdair::ConstSegmentCabinDTDRangeSnapshotView_T lBookingView =
00087         iGuillotineBlock.getConstSegmentCabinDTDRangeProductAndPriceOrientedBooking
00088         SnapshotView (lSegBegin, iNbOfUsableSegments - 1, iDCPEnd, iDCPBegin);
00089     stdair::ConstSegmentCabinDTDRangeSnapshotView_T lAvlView =
00090         iGuillotineBlock.getConstSegmentCabinDTDRangeAvailabilitySnapshotView (lSeg
00091         Begin, iNbOfUsableSegments - 1, iDCPEnd, iDCPBegin);
00092
00093     // Browse the list of segments and build the historical booking holder.
00094     const stdair::ValueTypeIndexMap_T& lVTIdxMap =
00095         iGuillotineBlock.getValueTypeIndexMap();
00096     const unsigned int lNbOfValueTypes = lVTIdxMap.size();
00097     HistoricalBookingHolder lHBHolder;
00098     for (short i = 0; i < iNbOfUsableSegments - lSegBegin; ++i) {
00099         stdair::Flag_T lCensorshipFlag = false;
00100         stdair::NbOfBookings_T lNbOfHistoricalBkgs = 0.0;
00101         const short lNbOfDTDs = iDCPBegin - iDCPEnd + 1;
00102
00103         // Parse the DTDs during the period
00104         for (short j = 0; j < lNbOfDTDs; ++j) {
00105             // Check if the data has been censored during this day.
00106             // STDAIR_LOG_DEBUG ("i: " << i << ", NbOfValues: " << lNbOfValueTypes
00107             // << ", BlockIdx: " << iBlockIdx << ", j: " << j);
00108             if (lCensorshipFlag == false) {
00109                 if (lAvlView[i * lNbOfValueTypes + iBlockIdx][j] < 1.0) {
00110                     lCensorshipFlag = true;
00111                 }
00112             }
00113         }
00114
00115         // Get the bookings of the day.
00116         //STDAIR_LOG_DEBUG ("Bookings of the day: " << lBookingView[i * lNbOfValueT
00117         ypes + iBlockIdx][j]);

```

```

00114         lNbOfHistoricalBkgs += lBookingView[i*lNbOfValueTypes + iBlockIdx][j];
00115     }
00116
00117     HistoricalBooking lHistoricalBkg (lNbOfHistoricalBkgs, lCensorshipFlag);
00118     lHBHolder.addHistoricalBooking (lHistoricalBkg);
00119
00120     // DEBUG
00121     STDAIR_LOG_DEBUG ("Historical bkgs: " << lNbOfHistoricalBkgs
00122                     << ", censored: " << lCensorshipFlag);
00123     // STDAIR_LOG_NOTIFICATION (lNbOfHistoricalBkgs
00124     //                             << "; " << lCensorshipFlag);
00125 }
00126
00127 // DEBUG
00128 STDAIR_LOG_DEBUG ("Unconstrain by EM");
00129
00130 // Unconstrain the booking figures
00131 EMDetruncator::unconstrainUsingEMMethod (lHBHolder);
00132
00133 // Add the unconstrained demand of the period to the unconstrained demand
00134 // vector.
00135 short idx = 0;
00136 for (UnconstrainedDemandVector_T::iterator itUD = ioUncDemVector.begin();
00137      itUD != ioUncDemVector.end(); ++itUD, ++idx) {
00138     *itUD += lHBHolder.getUnconstrainedDemand (idx);
00139     //STDAIR_LOG_NOTIFICATION (lHBHolder.getUnconstrainedDemand (idx));
00140 }
00141 }
00142
00143 // //////////////////////////////////////
00144 void Detruncator::unconstrainUsingAdditivePickUp
00145 (const stdair::GuillotineBlock& iGuillotineBlock,
00146  UnconstrainedDemandVector_T& ioUncDemVector,
00147  const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,
00148  const stdair::NbOfSegments_T& iNbOfUsableSegments,
00149  const stdair::BlockIndex_T& iBlockIdx,
00150  const stdair::SegmentCabin& iSegmentCabin,
00151  const stdair::Date_T& iCurrentDate) {
00152     // TODO
00153     stdair::NbOfSegments_T lSegBegin = 0;
00154     if (iNbOfUsableSegments > 52) lSegBegin = iNbOfUsableSegments - 52;
00155     // Retrieve the gross daily booking and availability snapshots.
00156     stdair::ConstSegmentCabinDTDRangeSnapshotView_T lBookingView =
00157         iGuillotineBlock.getConstSegmentCabinDTDRangeProductAndPriceOrientedBooking
00158         SnapshotView (lSegBegin, iNbOfUsableSegments - 1, iDCPEnd, iDCPBegin);
00159     stdair::ConstSegmentCabinDTDRangeSnapshotView_T lAvlView =
00160         iGuillotineBlock.getConstSegmentCabinDTDRangeAvailabilitySnapshotView (lSeg
00161         Begin, iNbOfUsableSegments - 1, iDCPEnd, iDCPBegin);
00162
00163     // Browse the list of segments and build the historical booking holder.
00164     const stdair::ValueTypeIndexMap_T& lVTIdxMap =
00165         iGuillotineBlock.getValueTypeIndexMap();
00166     const unsigned int lNbOfValueTypes = lVTIdxMap.size();
00167     HistoricalBookingHolder lHBHolder;
00168     for (short i = 0; i < iNbOfUsableSegments - lSegBegin; ++i) {
00169         stdair::Flag_T lCensorshipFlag = false;
00170         stdair::NbOfBookings_T lNbOfHistoricalBkgs = 0.0;
00171         const short lNbOfDTDs = iDCPBegin - iDCPEnd + 1;
00172
00173         // Parse the DTDs during the period
00174         for (short j = 0; j < lNbOfDTDs; ++j) {
00175             // Check if the data has been censored during this day.

```

```

00174         // STDAIR_LOG_DEBUG ("i: " << i << ", NbOfValues: " << lNbOfValueTypes
00175         //         << ", BlockIdx: " << iBlockIdx << ", j: " << j);
00176         if (lCensorshipFlag == false) {
00177             if (lAvlView[i*lNbOfValueTypes + iBlockIdx][j] < 1.0) {
00178                 lCensorshipFlag = true;
00179             }
00180         }
00181
00182         // Get the bookings of the day.
00183         //STDAIR_LOG_DEBUG ("Bookings of the day: " << lBookingView[i*lNbOfValueT
types + iBlockIdx][j]);
00184         lNbOfHistoricalBkgs += lBookingView[i*lNbOfValueTypes + iBlockIdx][j];
00185     }
00186
00187     HistoricalBooking lHistoricalBkg (lNbOfHistoricalBkgs, lCensorshipFlag);
00188     lHBHolder.addHistoricalBooking (lHistoricalBkg);
00189
00190     // DEBUG
00191     STDAIR_LOG_DEBUG ("Historical bkgs: " << lNbOfHistoricalBkgs
00192     << ", censored: " << lCensorshipFlag);
00193     // STDAIR_LOG_NOTIFICATION (lNbOfHistoricalBkgs
00194     //         << "; " << lCensorshipFlag);
00195 }
00196
00197 // DEBUG
00198 STDAIR_LOG_DEBUG ("Unconstrain by EM");
00199
00200 // Unconstrain the booking figures
00201 EMDetruncator::unconstrainUsingEMMethod (lHBHolder);
00202
00203 // Add the unconstrained demand of the period to the unconstrained demand
00204 // vector.
00205 // LOG
00206 const stdair::SegmentDate& lSegmentDate = stdair::BomManager::
00207     getParent<stdair::SegmentDate, stdair::SegmentCabin> (iSegmentCabin);
00208 const stdair::FlightDate& lFlightDate = stdair::BomManager::
00209     getParent<stdair::FlightDate, stdair::SegmentDate> (lSegmentDate);
00210 const stdair::Date_T& lDepDate = lFlightDate.getDepartureDate();
00211 const boost::gregorian::date_duration lDD = lDepDate - iCurrentDate;
00212 const long lDTD = lDD.days();
00213 stdair::Date_T lRefDate (2012, boost::gregorian::Jan, 01);
00214
00215 short idx = 0;
00216 for (UnconstrainedDemandVector_T::iterator itUD = ioUncDemVector.begin();
00217     itUD != ioUncDemVector.end(); ++itUD, ++idx) {
00218     *itUD += lHBHolder.getUnconstrainedDemand (idx);
00219     if (lDepDate > lRefDate) {
00220         const stdair::DateOffset_T lDateOffset (7 *(52 - idx) + 420);
00221         const stdair::Date_T lHDate = lDepDate - lDateOffset;
00222         STDAIR_LOG_NOTIFICATION (boost::gregorian::to_iso_string(lDepDate)
00223         << "; " << lDTD << "; " << iDCPBegin << "; "
00224         << iDCPEnd << "; "
00225         << boost::gregorian::to_iso_string (lHDate)
00226         << "; "<<lHBHolder.getUnconstrainedDemand (idx));
00227
00228         STDAIR_LOG_NOTIFICATION (boost::gregorian::to_iso_string(lDepDate)
00229         << "; " << lDTD << "; " << iDCPBegin << "; "
00230         << iDCPEnd << "; "
00231         << boost::gregorian::to_iso_string (lHDate)
00232         << "; "<<lHBHolder.getHistoricalBooking (idx));
00233     }
00234 }

```

```

00235 }
00236
00237 // //////////////////////////////////////
00238 void Detruncator::retrieveUnconstrainedDemandForFirstDCP
00239 (const stdair::SegmentCabin& iSegmentCabin,
00240  BookingClassUnconstrainedDemandVectorMap_T& ioBkgClassUncDemVectorMap,
00241  UnconstrainedDemandVector_T& ioQEquivalentDemandVector,
00242  const stdair::DCP_T& iFirstDCP, const stdair::NbOfSegments_T& iNbOfSegments,
00243  const stdair::NbOfSegments_T& iNbOfUsedSegments) {
00244
00245     // Retrieve the guillotine block.
00246     const stdair::GuillotineBlock& lGuillotineBlock =
00247         iSegmentCabin.getGuillotineBlock();
00248
00249     // Parse the booking class list and unconstrain historical bookings.
00250     for (BookingClassUnconstrainedDemandVectorMap_T::iterator itBCUDV =
00251          ioBkgClassUncDemVectorMap.begin();
00252          itBCUDV != ioBkgClassUncDemVectorMap.end(); ++itBCUDV) {
00253         stdair::BookingClass* lBC_ptr = itBCUDV->first;
00254         assert (lBC_ptr != NULL);
00255         const stdair::MapKey_T& lBCKey = lBC_ptr->describeKey();
00256         const stdair::BlockIndex_T& lBlockIdx =
00257             lGuillotineBlock.getBlockIndex (lBCKey);
00258         UnconstrainedDemandVector_T& lUncDemVector = itBCUDV->second;
00259
00260         STDAIR_LOG_DEBUG("Retrieve the unconstrained product-oriented demand for "
00261             << lBCKey);
00262         retrieveUnconstrainedDemandForFirstDCP (lGuillotineBlock, lUncDemVector,
00263             iFirstDCP, lBlockIdx,
00264             iNbOfSegments, iNbOfUsedSegments);
00265     }
00266
00267     // Unconstrain the Q-equivalent bookings.
00268     // Retrieve the block index of the segment-cabin.
00269     std::ostream lSCMapKey;
00270     lSCMapKey << stdair::DEFAULT_SEGMENT_CABIN_VALUE_TYPE
00271         << iSegmentCabin.describeKey();
00272     const stdair::BlockIndex_T& lCabinValueIdx =
00273         lGuillotineBlock.getBlockIndex (lSCMapKey.str());
00274
00275     STDAIR_LOG_DEBUG ("Retrieve the unconstrained price-oriented demand");
00276     retrieveUnconstrainedDemandForFirstDCP (lGuillotineBlock,
00277         ioQEquivalentDemandVector, iFirstDCP,
00278         lCabinValueIdx, iNbOfSegments,
00279         iNbOfUsedSegments);
00280 }
00281
00282 // //////////////////////////////////////
00283 void Detruncator::retrieveUnconstrainedDemandForFirstDCP
00284 (const stdair::GuillotineBlock& iGuillotineBlock,
00285  UnconstrainedDemandVector_T& ioUnconstrainedDemandVector,
00286  const stdair::DCP_T& iFirstDCP, const stdair::BlockIndex_T& iValueIdx,
00287  const stdair::NbOfSegments_T& iNbOfSegments,
00288  const stdair::NbOfSegments_T& iNbOfUsedSegments) {
00289
00290     //TODO
00291     stdair::NbOfSegments_T lSegBegin = iNbOfSegments - iNbOfUsedSegments;
00292
00293     // Retrieve the snapshots of the corresponding booking value from the
00294     // first DTD (usually 365) till the given iFirstDCP.
00295     stdair::ConstSegmentCabinDTDRangeSnapshotView_T lRangeBookingView =
00296         iGuillotineBlock.getConstSegmentCabinDTDRangeProductAndPriceOrientedBooking

```

```

SnapshotView (lSegBegin, iNbOfSegments -1, iFirstDCP, stdair::DEFAULT_MAX_DTD);
00297
00298 // Sum the bookings from the first day till the given iFirstDCP in order to
00299 // get the supposing unconstrained demand for this period.
00300 const stdair::ValueTypeIndexMap_T& lVTIdxMap =
00301     iGuillotineBlock.getValueTypeIndexMap();
00302 const unsigned int lNbOfValueTypes = lVTIdxMap.size();
00303 for (int itSegment = 0; itSegment < iNbOfSegments-lSegBegin; ++itSegment) {
00304     for (int i = iFirstDCP; i <= stdair::DEFAULT_MAX_DTD; ++i) {
00305         stdair::NbOfRequests_T& lUncDemand =
00306             ioUnconstrainedDemandVector.at(itSegment);
00307         lUncDemand +=
00308             lRangeBookingView[iValueIdx + itSegment*lNbOfValueTypes][i-iFirstDCP];
00309     }
00310     // STDAIR_LOG_NOTIFICATION (ioUnconstrainedDemandVector.at(itSegment)
00311     // << " " << itSegment);
00312 }
00313 }
00314
00315 // //////////////////////////////////////
00316 void Detruncator::unconstrainUsingMultiplicativePickUp
00317 (const stdair::SegmentCabin& iSegmentCabin,
00318  BookingClassUnconstrainedDemandVectorMap_T& ioBkgClassUncDemMap,
00319  UnconstrainedDemandVector_T& ioQEquivalentDemandVector,
00320  const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,
00321  const stdair::Date_T& iCurrentDate,
00322  const stdair::NbOfSegments_T& iNbOfDepartedSegments) {
00323
00324     // Retrieve the guillotine block.
00325     const stdair::GuillotineBlock& lGuillotineBlock =
00326         iSegmentCabin.getGuillotineBlock();
00327
00328     // Build the historical booking holders for the product-oriented bookings
00329     // of the casses and the Q-equivalent (price-oriented) bookings of the cabin
00330     const stdair::NbOfSegments_T lNbOfUsableSegments = GuillotineBlockHelper::
00331         getNbOfSegmentAlreadyPassedThisDTD (lGuillotineBlock, iDCPEnd,
00332         iCurrentDate);
00333
00334     // Parse the booking class list and unconstrain historical bookings.
00335     for (BookingClassUnconstrainedDemandVectorMap_T::iterator itBCUDV =
00336         ioBkgClassUncDemMap.begin(); itBCUDV != ioBkgClassUncDemMap.end();
00337         ++itBCUDV) {
00338         stdair::BookingClass* lBC_ptr = itBCUDV->first;
00339         assert (lBC_ptr != NULL);
00340         const stdair::MapKey_T& lBCKey = lBC_ptr->describeKey();
00341         const stdair::BlockIndex_T& lBlockIdx =
00342             lGuillotineBlock.getBlockIndex (lBCKey);
00343         UnconstrainedDemandVector_T& lUncDemVector = itBCUDV->second;
00344
00345         STDAIR_LOG_DEBUG ("Unconstrain product-oriented bookings for " << lBCKey);
00346         unconstrainUsingMultiplicativePickUp (lGuillotineBlock, lUncDemVector,
00347         iDCPBegin, iDCPEnd,
00348         lNbOfUsableSegments, lBlockIdx,
00349         iNbOfDepartedSegments);
00350     }
00351
00352     // Unconstrain the Q-equivalent bookings.
00353     // Retrieve the block index of the segment-cabin.
00354     std::ostream lSCMapKey;
00355     lSCMapKey << stdair::DEFAULT_SEGMENT_CABIN_VALUE_TYPE
00356         << iSegmentCabin.describeKey();
00357     const stdair::BlockIndex_T& lCabinIdx =

```



```

00358         lGuillotineBlock.getBlockIndex (lSCMapKey.str());
00359
00360     STDAIR_LOG_DEBUG ("Unconstrain price-oriented bookings");
00361     unconstrainUsingMultiplicativePickUp (lGuillotineBlock,
00362                                           ioQEquivalentDemandVector,
00363                                           iDCPBegin, iDCPEnd,
00364                                           lNbOfUsableSegments, lCabinIdx,
00365                                           iNbOfDepartedSegments,
00366                                           iSegmentCabin, iCurrentDate);
00367 }
00368
00369 ///////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
00370 void Detruncator::unconstrainUsingMultiplicativePickUp
00371 (const stdair::GuillotineBlock& iGuillotineBlock,
00372  UnconstrainedDemandVector_T& ioUncDemVector,
00373  const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,
00374  const stdair::NbOfSegments_T& iNbOfUsableSegments,
00375  const stdair::BlockIndex_T& iBlockIdx,
00376  const stdair::NbOfSegments_T& iNbOfDepartedSegments) {
00377     // TODO:
00378     stdair::NbOfSegments_T lSegBegin = 0;
00379     if (iNbOfDepartedSegments > 52) {
00380         lSegBegin = iNbOfDepartedSegments - 52;
00381     }
00382
00383     // Retrieve the gross daily booking and availability snapshots.
00384     stdair::ConstSegmentCabinDTDRangeSnapshotView_T lBookingView =
00385         iGuillotineBlock.getConstSegmentCabinDTDRangeProductAndPriceOrientedBooking
00386         SnapshotView (lSegBegin, iNbOfUsableSegments - 1, iDCPEnd, iDCPBegin);
00387     stdair::ConstSegmentCabinDTDRangeSnapshotView_T lAvlView =
00388         iGuillotineBlock.getConstSegmentCabinDTDRangeAvailabilitySnapshotView (lSeg
00389         Begin, iNbOfUsableSegments - 1, iDCPEnd, iDCPBegin);
00388
00389     // Browse the list of segments and build the historical booking holder.
00390     const stdair::ValueTypeIndexMap_T& lVTIdxMap =
00391         iGuillotineBlock.getValueTypeIndexMap();
00392     const unsigned int lNbOfValueTypes = lVTIdxMap.size();
00393     HistoricalBookingHolder lHBHolder;
00394     std::vector<short> lDataIndexList;
00395     for (short i = 0; i < iNbOfUsableSegments - lSegBegin; ++i) {
00396         stdair::Flag_T lCensorshipFlag = false;
00397         stdair::NbOfBookings_T lNbOfHistoricalBkgs = 0.0;
00398         const short lNbOfDTDs = iDCPBegin - iDCPEnd + 1;
00399
00400         // Parse the DTDs during the period
00401         for (short j = 0; j < lNbOfDTDs; ++j) {
00402             // Check if the data has been censored during this day.
00403             // STDAIR_LOG_DEBUG ("i: " << i << ", NbOfValues: " << lNbOfValueTypes
00404             // << ", BlockIdx: " << iBlockIdx << ", j: " << j);
00405             if (lCensorshipFlag == false) {
00406                 if (lAvlView[i * lNbOfValueTypes + iBlockIdx][j] < 1.0) {
00407                     lCensorshipFlag = true;
00408                 }
00409             }
00410
00411             // Get the bookings of the day.
00412             //STDAIR_LOG_DEBUG ("Bookings of the day: " << lBookingView[i * lNbOfValueT
00413             ypes + iBlockIdx][j]);
00414             lNbOfHistoricalBkgs += lBookingView[i * lNbOfValueTypes + iBlockIdx][j];
00415         }
00416
00417         // If there is no booking till now for this class and for this segment,

```

```

00417         // there will be no unconstraining process.
00418         stdair::NbOfRequests_T& lUncDemand = ioUncDemVector.at (i);
00419         if (lUncDemand < 1.0) {
00420             lUncDemand += lNbOfHistoricalBkgs;
00421         } else {
00422             double lBkgDemandFactor = lNbOfHistoricalBkgs / lUncDemand;
00423             HistoricalBooking lHistoricalBkg (lBkgDemandFactor, lCensorshipFlag);
00424             lHBHolder.addHistoricalBooking (lHistoricalBkg);
00425             lDataIndexList.push_back (i);
00426         }
00427
00428         // DEBUG
00429         STDAIR_LOG_DEBUG ("Historical bkgs: " << lNbOfHistoricalBkgs
00430             << ", censored: " << lCensorshipFlag);
00431     }
00432
00433     // DEBUG
00434     STDAIR_LOG_DEBUG ("Unconstrain by multiplicative pick-up using EM");
00435
00436     // Unconstrain the booking figures
00437     unconstrainUsingMultiplicativePickUp (lHBHolder);
00438
00439     // Update the unconstrained demand vector.
00440     short i = 0;
00441     for (std::vector<short>::iterator itIdx = lDataIndexList.begin();
00442         itIdx != lDataIndexList.end(); ++itIdx, ++i) {
00443         short lIdx = *itIdx;
00444         stdair::NbOfRequests_T& lPastDemand = ioUncDemVector.at (lIdx);
00445         const stdair::NbOfRequests_T& lUncDemandFactorOfThisPeriod =
00446             lHBHolder.getUnconstrainedDemand (i);
00447         lPastDemand *= (1+lUncDemandFactorOfThisPeriod);
00448     }
00449 }
00450
00451 // //////////////////////////////////////
00452 void Detruncator::unconstrainUsingMultiplicativePickUp
00453 (const stdair::GuillotineBlock& iGuillotineBlock,
00454  UnconstrainedDemandVector_T& ioUncDemVector,
00455  const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,
00456  const stdair::NbOfSegments_T& iNbOfUsableSegments,
00457  const stdair::BlockIndex_T& iBlockIdx,
00458  const stdair::NbOfSegments_T& iNbOfDepartedSegments,
00459  const stdair::SegmentCabin& iSegmentCabin,
00460  const stdair::Date_T& iCurrentDate) {
00461     // TODO:
00462     stdair::NbOfSegments_T lSegBegin = 0;
00463     if (iNbOfDepartedSegments > 52) {
00464         lSegBegin = iNbOfDepartedSegments - 52;
00465     }
00466
00467     // Retrieve the gross daily booking and availability snapshots.
00468     stdair::ConstSegmentCabinDTDRangeSnapshotView_T lBookingView =
00469         iGuillotineBlock.getConstSegmentCabinDTDRangeProductAndPriceOrientedBooking
00470         SnapshotView (lSegBegin, iNbOfUsableSegments -1, iDCPEnd, iDCPBegin);
00471     stdair::ConstSegmentCabinDTDRangeSnapshotView_T lAvlView =
00472         iGuillotineBlock.getConstSegmentCabinDTDRangeAvailabilitySnapshotView (lSeg
00473         Begin, iNbOfUsableSegments -1, iDCPEnd, iDCPBegin);
00474
00475     // Browse the list of segments and build the historical booking holder.
00476     const stdair::ValueTypeIndexMap_T& lVTIdxMap =
00477         iGuillotineBlock.getValueTypeIndexMap();
00478     const unsigned int lNbOfValueTypes = lVTIdxMap.size();

```

```

00477     HistoricalBookingHolder lHBHolder;
00478     std::vector<short> lDataIndexList;
00479     for (short i = 0; i < iNbOfUsableSegments-lSegBegin; ++i) {
00480         stdair::Flag_T lCensorshipFlag = false;
00481         stdair::NbOfBookings_T lNbOfHistoricalBkgs = 0.0;
00482         const short lNbOfDTDs = iDCPBegin - iDCPEnd + 1;
00483
00484         // Parse the DTDs during the period
00485         for (short j = 0; j < lNbOfDTDs; ++j) {
00486             // Check if the data has been censored during this day.
00487             // STDAIR_LOG_DEBUG ("i: " << i << ", NbOfValues: " << lNbOfValueTypes
00488             //                  << ", BlockIdx: " << iBlockIdx << ", j: " << j);
00489             if (lCensorshipFlag == false) {
00490                 if (lAvlView[i*lNbOfValueTypes + iBlockIdx][j] < 1.0) {
00491                     lCensorshipFlag = true;
00492                 }
00493             }
00494
00495             // Get the bookings of the day.
00496             //STDAIR_LOG_DEBUG ("Bookings of the day: " << lBookingView[i*lNbOfValueT
00497             ypes + iBlockIdx][j]);
00498             lNbOfHistoricalBkgs += lBookingView[i*lNbOfValueTypes + iBlockIdx][j];
00499         }
00500
00501         // If there is no booking till now for this class and for this segment,
00502         // there will be no unconstraining process.
00503         stdair::NbOfRequests_T& lUncDemand = ioUncDemVector.at (i);
00504         if (lUncDemand < 1.0) {
00505             lUncDemand += lNbOfHistoricalBkgs;
00506         } else {
00507             double lBkgDemandFactor = lNbOfHistoricalBkgs / lUncDemand;
00508             HistoricalBooking lHistoricalBkg (lBkgDemandFactor, lCensorshipFlag);
00509             lHBHolder.addHistoricalBooking (lHistoricalBkg);
00510             lDataIndexList.push_back (i);
00511         }
00512
00513         // DEBUG
00514         STDAIR_LOG_DEBUG ("Historical bkgs: " << lNbOfHistoricalBkgs
00515         << ", censored: " << lCensorshipFlag);
00516     }
00517
00518     // DEBUG
00519     STDAIR_LOG_DEBUG ("Unconstrain by multiplicative pick-up");
00520
00521     // Unconstrain the booking figures
00522     unconstrainUsingMultiplicativePickUp (lHBHolder);
00523
00524     // Update the unconstrained demand vector.
00525     // LOG
00526     const stdair::SegmentDate& lSegmentDate = stdair::BomManager::
00527     getParent<stdair::SegmentDate, stdair::SegmentCabin> (iSegmentCabin);
00528     const stdair::FlightDate& lFlightDate = stdair::BomManager::
00529     getParent<stdair::FlightDate, stdair::SegmentDate> (lSegmentDate);
00530     const stdair::Date_T& lDepDate = lFlightDate.getDepartureDate();
00531     const boost::gregorian::date_duration lDD = lDepDate - iCurrentDate;
00532     const long lDTD = lDD.days();
00533     stdair::Date_T lRefDate (2012, boost::gregorian::Jan, 01);
00534
00535     short i = 0;
00536     for (std::vector<short>::iterator itIdx = lDataIndexList.begin();
00537         itIdx != lDataIndexList.end(); ++itIdx, ++i) {
00538         short lIdx = *itIdx;

```

```

00538     stdair::NbOfRequests_T& lPastDemand = ioUncDemVector.at (lIdx);
00539     const stdair::NbOfRequests_T& lUncDemandFactorOfThisPeriod =
00540         lHBHolder.getUnconstrainedDemand (i);
00541     const double lUncDemThisPeriod =
00542         lPastDemand * lUncDemandFactorOfThisPeriod;
00543     lPastDemand *= (1+lUncDemandFactorOfThisPeriod);
00544     if (lDepDate > lRefDate) {
00545         const stdair::DateOffset_T lDateOffset (7 *(53 - lIdx) + 420);
00546         const stdair::Date_T lHDate = lDepDate - lDateOffset;
00547         STDAIR_LOG_NOTIFICATION (boost::gregorian::to_iso_string(lDepDate)
00548             << ";" << LDTD << ";" << iDCPBegin << ";"
00549             << iDCPEnd << ";"
00550             << boost::gregorian::to_iso_string (lHDate)
00551             << ";" << lUncDemThisPeriod);
00552     }
00553 }
00554 }
00555
00556 ///////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
00557 void Detruncator::
00558 unconstrainUsingMultiplicativePickUp (HistoricalBookingHolder& ioHBHolder) {
00559     // We use two loops in this algorithm. The first one is for calculating the
00560     // average of unconstrained data. The second one is fore calculating the
00561     // average of unconstrained data and the constrained data which are higher
00562     // than the first average.
00563     short lNbOfUsedData = ioHBHolder.getNbOfUncensoredData();
00564     if (lNbOfUsedData > 0) {
00565         double lSumOfValues = 0.0;
00566         const short lNbOfData = ioHBHolder.getNbOfFlights();
00567
00568         // First loop
00569         for (short i = 0; i < lNbOfData; ++i) {
00570             if (ioHBHolder.getCensorshipFlag (i) == false) {
00571                 lSumOfValues += ioHBHolder.getHistoricalBooking (i);
00572             }
00573         }
00574         double lFirstAverage = lSumOfValues / lNbOfUsedData;
00575
00576         // Second loop
00577         for (short i = 0; i < lNbOfData; ++i) {
00578             if (ioHBHolder.getCensorshipFlag (i) == true) {
00579                 const stdair::NbOfBookings_T& lBkgs =
00580                     ioHBHolder.getHistoricalBooking (i);
00581                 if (lBkgs >= lFirstAverage) {
00582                     lSumOfValues += lBkgs;
00583                     ++lNbOfUsedData;
00584                 }
00585             }
00586         }
00587         double lSecondAverage = lSumOfValues / lNbOfUsedData;
00588
00589         // Last loop for updating the demand.
00590         for (short i = 0; i < lNbOfData; ++i) {
00591             if (ioHBHolder.getCensorshipFlag (i) == true) {
00592                 const stdair::NbOfBookings_T& lBkgs =
00593                     ioHBHolder.getHistoricalBooking (i);
00594                 if (lBkgs < lSecondAverage) {
00595                     ioHBHolder.setUnconstrainedDemand (lSecondAverage, i);
00596                 }
00597             }
00598         }
00599     }

```

```
00600     }
00601 }
00602
```

## 28.71 rmol/command/Detruncator.hpp File Reference

```
#include <stdair/stdair_inventory_types.hpp>
#include <rmol/RMOL_Types.hpp>
```

### Classes

- class [RMOL::Detruncator](#)

### Namespaces

- namespace [stdair](#)
- namespace [RMOL](#)

## 28.72 Detruncator.hpp

```
00001 #ifndef __RMOL_COMMAND_DETRUNCATOR_HPP
00002 #define __RMOL_COMMAND_DETRUNCATOR_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // StdAir
00008 #include <stdair/stdair_inventory_types.hpp>
00009 // RMOL
00010 #include <rmol/RMOL_Types.hpp>
00011
00012 // Forward declarations.
00013 namespace stdair {
00014     class GuillotineBlock;
00015     class SegmentCabin;
00016 }
00017
00018 namespace RMOL {
00019     // Forward declarations.
00020     struct HistoricalBookingHolder;
00021
00024     class Detruncator {
00025     public:
00029         static void unconstrainUsingAdditivePickUp (const stdair::SegmentCabin&,
00030                                                     BookingClassUnconstrainedDemandVectorMap_T&,
00031                                                     UnconstrainedDemandVector_T&,
00032                                                     const stdair::DCP_T&, const stdair::DCP_T&,
00033                                                     const stdair::Date_T&);
00034
00038         static void unconstrainUsingMultiplicativePickUp
00039         (const stdair::SegmentCabin&, BookingClassUnconstrainedDemandVectorMap_T&,
00040          UnconstrainedDemandVector_T&, const stdair::DCP_T&, const stdair::DCP_T&,
00041          const stdair::Date_T&, const stdair::NbOfSegments_T&);
```

```

00042
00043     static void retrieveUnconstrainedDemandForFirstDCP
00044     (const stdair::SegmentCabin&,
00045      BookingClassUnconstrainedDemandVectorMap_T&,
00046      UnconstrainedDemandVector_T&, const stdair::DCP_T&,
00047      const stdair::NbOfSegments_T&, const stdair::NbOfSegments_T&);
00048
00049     static void unconstrainUsingMultiplicativePickUp (HistoricalBookingHolder&);
00050
00051 private:
00052     static void unconstrainUsingAdditivePickUp (const stdair::GuillotineBlock&,
00053         UnconstrainedDemandVector_T&,
00054         const stdair::DCP_T&,
00055         const stdair::DCP_T&,
00056         const stdair::NbOfSegments_T&,
00057         const stdair::BlockIndex_T&);
00058     static void unconstrainUsingAdditivePickUp (const stdair::GuillotineBlock&,
00059         UnconstrainedDemandVector_T&,
00060         const stdair::DCP_T&,
00061         const stdair::DCP_T&,
00062         const stdair::NbOfSegments_T&,
00063         const stdair::BlockIndex_T&,
00064         const stdair::SegmentCabin&,
00065         const stdair::Date_T&);
00066
00067     static void unconstrainUsingMultiplicativePickUp
00068     (const stdair::GuillotineBlock&, UnconstrainedDemandVector_T&,
00069      const stdair::DCP_T&, const stdair::DCP_T&,
00070      const stdair::NbOfSegments_T&, const stdair::BlockIndex_T&,
00071      const stdair::NbOfSegments_T&);
00072
00073     static void unconstrainUsingMultiplicativePickUp
00074     (const stdair::GuillotineBlock&, UnconstrainedDemandVector_T&,
00075      const stdair::DCP_T&, const stdair::DCP_T&,
00076      const stdair::NbOfSegments_T&, const stdair::BlockIndex_T&,
00077      const stdair::NbOfSegments_T&,
00078      const stdair::SegmentCabin&, const stdair::Date_T&);
00079
00080     static void retrieveUnconstrainedDemandForFirstDCP
00081     (const stdair::GuillotineBlock&, UnconstrainedDemandVector_T&,
00082      const stdair::DCP_T&, const stdair::BlockIndex_T&,
00083      const stdair::NbOfSegments_T&, const stdair::NbOfSegments_T&);
00084 };
00085 }
00086 #endif // __RMOL_COMMAND_DETRUNCATOR_HPP
00087
00088
00089

```

## 28.73 rmol/command/Forecaster.cpp File Reference

```

#include <cassert>

#include <sstream>

#include <cmath>

#include <stdair/basic/BasConst_General.hpp>

#include <stdair/basic/BasConst_Inventory.hpp>

#include <stdair/basic/RandomGeneration.hpp>

```

```

#include <stdair/bom/BomManager.hpp>
#include <stdair/bom/FlightDate.hpp>
#include <stdair/bom/LegDate.hpp>
#include <stdair/bom/SegmentDate.hpp>
#include <stdair/bom/LegCabin.hpp>
#include <stdair/bom/SegmentCabin.hpp>
#include <stdair/bom/GuillotineBlock.hpp>
#include <stdair/bom/BookingClass.hpp>
#include <stdair/service/Logger.hpp>
#include <rmol/basic/BasConst_Curves.hpp>
#include <rmol/bom/Utilities.hpp>
#include <rmol/bom/GuillotineBlockHelper.hpp>
#include <rmol/bom/HistoricalBookingHolder.hpp>
#include <rmol/bom/HistoricalBooking.hpp>
#include <rmol/bom/EMDetruncator.hpp>
#include <rmol/command/Forecaster.hpp>
#include <rmol/command/Detruncator.hpp>

```

#### Namespaces

- namespace [RMOL](#)

#### 28.74 Forecaster.cpp

```

00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 #include <sstream>
00007 #include <cmath>
00008 // StdAir
00009 #include <stdair/basic/BasConst_General.hpp>
00010 #include <stdair/basic/BasConst_Inventory.hpp>
00011 #include <stdair/basic/RandomGeneration.hpp>
00012 #include <stdair/bom/BomManager.hpp>
00013 #include <stdair/bom/FlightDate.hpp>
00014 #include <stdair/bom/LegDate.hpp>
00015 #include <stdair/bom/SegmentDate.hpp>
00016 #include <stdair/bom/LegCabin.hpp>
00017 #include <stdair/bom/SegmentCabin.hpp>
00018 #include <stdair/bom/GuillotineBlock.hpp>
00019 #include <stdair/bom/BookingClass.hpp>
00020 #include <stdair/service/Logger.hpp>
00021 // RMOL

```

```

00022 #include <rmol/basic/BasConst_Curves.hpp>
00023 #include <rmol/bom/Utilities.hpp>
00024 #include <rmol/bom/GuillotineBlockHelper.hpp>
00025 #include <rmol/bom/HistoricalBookingHolder.hpp>
00026 #include <rmol/bom/HistoricalBooking.hpp>
00027 #include <rmol/bom/EMDetruncator.hpp>
00028 #include <rmol/command/Forecaster.hpp>
00029 #include <rmol/command/Detruncator.hpp>
00030
00031 namespace RMOL {
00032
00033     // //////////////////////////////////////
00034     bool Forecaster::
00035     forecastUsingAdditivePickUp (stdair::FlightDate& ioFlightDate,
00036                                 const stdair::DateTime_T& iEventTime) {
00037         // Build the offset dates.
00038         const stdair::Date_T& lEventDate = iEventTime.date();
00039         stdair::Date_T lRefDate (2012, boost::gregorian::Jan, 01);
00040
00041         //
00042         bool isSucceeded = true;
00043         const stdair::SegmentDateList_T& lSDList =
00044             stdair::BomManager::getList<stdair::SegmentDate> (ioFlightDate);
00045         for (stdair::SegmentDateList_T::const_iterator itSD = lSDList.begin();
00046             itSD != lSDList.end(); ++itSD) {
00047             stdair::SegmentDate* lSD_ptr = *itSD;
00048             assert (lSD_ptr != NULL);
00049
00050             const stdair::Date_T& lBoardingDate = lSD_ptr->getBoardingDate();
00051             const stdair::DateOffset_T lSegmentDateOffset =
00052                 lBoardingDate - lEventDate;
00053             const stdair::DTD_T lSegmentDTD = lSegmentDateOffset.days();
00054
00055             // Build remaining DCP's for the segment-date.
00056             // TODO: treat the case where the segment departure is not the
00057             // same as the flight-date departure.
00058             stdair::DCPList_T lDCPList;
00059
00060             if (lEventDate < lRefDate) {
00061                 lDCPList = Utilities::buildRemainingDCPList (lSegmentDTD);
00062             } else {
00063                 lDCPList = Utilities::buildRemainingDCPList2 (lSegmentDTD);
00064             }
00065
00066             //
00067             const stdair::SegmentCabinList_T& lSCList =
00068                 stdair::BomManager::getList<stdair::SegmentCabin> (*lSD_ptr);
00069             for (stdair::SegmentCabinList_T::const_iterator itSC = lSCList.begin();
00070                 itSC != lSCList.end(); ++itSC) {
00071                 stdair::SegmentCabin* lSC_ptr = *itSC;
00072                 assert (lSC_ptr != NULL);
00073
00074                 //
00075                 // STDAIR_LOG_NOTIFICATION (ioFlightDate.getDepartureDate()
00076                 // << ";" << lSegmentDTD);
00077                 bool isForecasted = forecastUsingAdditivePickUp (*lSC_ptr, lDCPList,
00078                                                                 lEventDate);
00079                 if (isForecasted == false) {
00080                     isSucceeded = false;
00081                 }
00082             }
00083         }
00084     }

```



```

00084
00085     return isSucceeded;
00086 }
00087
00088 ///////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
00089 bool Forecaster::
00090 forecastUsingAdditivePickUp (stdair::SegmentCabin& ioSegmentCabin,
00091                             const stdair::DCPList_T& iDCPList,
00092                             const stdair::Date_T& iEventDate) {
00093     // Retrieve the number of departed similar segments.
00094     stdair::NbOfSegments_T lNbOfDepartedSegments =
00095         Utilities::getNbOfDepartedSimilarSegments (ioSegmentCabin, iEventDate);
00096     // TODO
00097     if (lNbOfDepartedSegments > 52) lNbOfDepartedSegments = 52;
00098
00099     // DEBUG
00100     STDAIR_LOG_DEBUG ("Nb of similar departed segments: "
00101                      << lNbOfDepartedSegments);
00102
00103     // If the DCP list includes only DTD0 or the number of departed
00104     // segments are less than two, remaining demand for all classes
00105     // will be set to zero.
00106     stdair::DCPList_T::const_iterator itDCP = iDCPList.begin();
00107     assert (itDCP != iDCPList.end());
00108     const stdair::DCP_T& lCurrentDTD = *itDCP;
00109     if (iDCPList.size() == 1 || lNbOfDepartedSegments < 2) {
00110         setRemainingDemandForecastToZero (ioSegmentCabin);
00111         return false;
00112     } else {
00113         // Initialise a holder for the unconstrained demand.
00114         UnconstrainedDemandVector_T lQEquivalentDemandVector (lNbOfDepartedSegments
00115             , 0.0);
00116         BookingClassUnconstrainedDemandVectorMap_T lBkgClassUncDemMap;
00117         const stdair::BookingClassList_T& lBCList =
00118             stdair::BomManager::getList<stdair::BookingClass> (ioSegmentCabin);
00119         for (stdair::BookingClassList_T::const_iterator itBC = lBCList.begin();
00120              itBC != lBCList.end(); ++itBC) {
00121             stdair::BookingClass* lBC_ptr = *itBC;
00122             assert (lBC_ptr != NULL);
00123             std::vector<stdair::NbOfRequests_T> lUncDemandVector (lNbOfDepartedSegmen
00124                 ts, 0.0);
00125             bool insertionSucceeded = lBkgClassUncDemMap.insert
00126                 (BookingClassUnconstrainedDemandVectorMap_T::
00127                  value_type (lBC_ptr, lUncDemandVector)).second;
00128             assert (insertionSucceeded == true);
00129         }
00130
00131         // Build the DCP intervals and unconstrain censored booking figures for
00132         // each interval.
00133         stdair::DCPList_T::const_iterator itNextDCP = itDCP; ++itNextDCP;
00134         for (; itNextDCP != iDCPList.end(); ++itDCP, ++itNextDCP) {
00135             const stdair::DCP_T& lCurrentDCP = *itDCP;
00136             const stdair::DCP_T& lNextDCP = *itNextDCP;
00137
00138             // DEBUG
00139             STDAIR_LOG_DEBUG ("Unconstrain demand for "
00140                              << ioSegmentCabin.describeKey()
00141                              << " and the DCP's " << lCurrentDCP << ", "
00142                              << lNextDCP);
00143             Detruncator::unconstrainUsingAdditivePickUp (ioSegmentCabin,
00144                                                         lBkgClassUncDemMap,
00145                                                         lQEquivalentDemandVector,

```

```

00144                                     lCurrentDCP-1, lNextDCP,
00145                                     iEventDate);
00146     STDAIR_LOG_DEBUG ("Detruction successful");
00147 }
00148
00149 // Retrieve the FRAT5 coefficient and compute the sell-up coef.
00150 FRAT5Curve_T::const_iterator itFRAT5 =
00151     DEFAULT_CUMULATIVE_FRAT5_CURVE.lower_bound (lCurrentDTD);
00152 assert (itFRAT5 != DEFAULT_CUMULATIVE_FRAT5_CURVE.end());
00153 const double lFRAT5Coef = itFRAT5->second;
00154 const double lSellUpCoef = -log(0.5) / (lFRAT5Coef - 1);
00155
00156 forecastUsingAdditivePickUp (ioSegmentCabin, lBkgClassUncDemMap,
00157                             lQEquivalentDemandVector, lSellUpCoef);
00158 return true;
00159 }
00160 }
00161
00162 // //////////////////////////////////////
00163 void Forecaster::
00164 forecastUsingAdditivePickUp (stdair::SegmentCabin& ioSegmentCabin,
00165                             const BookingClassUnconstrainedDemandVectorMap_T&
00166 iClassUncDemMap,
00167                             const UnconstrainedDemandVector_T& iUncDemVector,
00168                             const double& iSellUpFactor) {
00169     double lPriceOriMean; double lPriceOriStdDev;
00170     Utilities::computeDistributionParameters (iUncDemVector, lPriceOriMean,
00171                                             lPriceOriStdDev);
00172
00173     // DEBUG
00174     //STDAIR_LOG_NOTIFICATION (lPriceOriMean << " " << lPriceOriStdDev);
00175
00176     // Retrieve the classes from low to high and compute the distributions of
00177     // product-oriented and price-oriented demand.
00178     // Retrieve the lowest class.
00179     const stdair::BookingClassList_T& lBCList =
00180         stdair::BomManager::getList<stdair::BookingClass> (ioSegmentCabin);
00181     stdair::BookingClassList_T::const_reverse_iterator itCurrentClass =
00182         lBCList.rbegin();
00183     assert (itCurrentClass != lBCList.rend());
00184     stdair::BookingClassList_T::const_reverse_iterator itNextClass =
00185         itCurrentClass;
00186     ++itNextClass;
00187     // If there is only one class in the cabin, the demand distribution of this
00188     // class is equal to the price-oriented demand distribution of the cabin.
00189     if (itNextClass == lBCList.rend()) {
00190         stdair::BookingClass* lLowestBC_ptr = *itCurrentClass;
00191         lLowestBC_ptr->setMean (lPriceOriMean);
00192         lLowestBC_ptr->setStdDev (lPriceOriStdDev);
00193     } else {
00194         // Compute the demand for higher class using the formula
00195         // Pro_sell_up_from_Q_to_F = e ^ ((y_F/y_Q - 1) * ln (0.5) / (FRAT5 - 1))
00196         for (; itNextClass != lBCList.rend(); ++itCurrentClass, ++itNextClass) {
00197             stdair::BookingClass* lCurrentBC_ptr = *itCurrentClass;
00198             assert (lCurrentBC_ptr != NULL);
00199             const stdair::Yield_T& lCurrentYield = lCurrentBC_ptr->getYield();
00200             stdair::BookingClass* lNextBC_ptr = *itNextClass;
00201             assert (lNextBC_ptr != NULL);
00202             const stdair::Yield_T& lNextYield = lNextBC_ptr->getYield();
00203
00204             // Compute the part of price-oriented demand distributed to the
00205             // current class.

```

```

00205         const double lSellUp =
00206             exp ((1.0 - lNextYield/lCurrentYield) * iSellUpFactor);
00207         const double lPriceOriDemMeanFrac = lPriceOriMean * (1.0 - lSellUp);
00208         const double lPriceOriDemStdDevFrac = lPriceOriStdDev * (1.0 - lSellUp);
00209
00210         // Compute the product-oriented demand distribution for the
00211         // current class.
00212         BookingClassUnconstrainedDemandVectorMap_T::const_iterator itBCUD =
00213             iClassUncDemMap.find (lCurrentBC_ptr);
00214         assert (itBCUD != iClassUncDemMap.end());
00215         const UnconstrainedDemandVector_T& lDemandVector = itBCUD->second;
00216         double lMean; double lStdDev;
00217         Utilities::computeDistributionParameters(lDemandVector, lMean, lStdDev);
00218
00219         // Compute the demand distribution for the current class;
00220         lMean += lPriceOriDemMeanFrac;
00221         lStdDev = sqrt (lStdDev * lStdDev +
00222             lPriceOriDemStdDevFrac * lPriceOriDemStdDevFrac);
00223         lCurrentBC_ptr->setMean (lMean);
00224         lCurrentBC_ptr->setStdDev (lStdDev);
00225
00226         // DEBUG
00227         // STDAIR_LOG_NOTIFICATION ("Class " << lCurrentBC_ptr->describeKey()
00228         //                             << ", mean = " << lMean
00229         //                             << ", stddev = " << lStdDev);
00230
00231         // Update the price-oriented demand
00232         lPriceOriMean *= lSellUp;
00233         lPriceOriStdDev *= lSellUp;
00234     }
00235
00236     // Compute the demand distribution for the highest class (which is the
00237     // "current class")
00238     stdair::BookingClass* lCurrentBC_ptr = *itCurrentClass;
00239     assert (lCurrentBC_ptr != NULL);
00240     BookingClassUnconstrainedDemandVectorMap_T::const_iterator itBCUD =
00241         iClassUncDemMap.find (lCurrentBC_ptr);
00242     assert (itBCUD != iClassUncDemMap.end());
00243     const UnconstrainedDemandVector_T& lDemandVector = itBCUD->second;
00244     double lMean; double lStdDev;
00245     Utilities::computeDistributionParameters(lDemandVector, lMean, lStdDev);
00246
00247     // Compute the demand distribution for the current class;
00248     lMean += lPriceOriMean;
00249     lStdDev = sqrt (lStdDev * lStdDev + lPriceOriStdDev * lPriceOriStdDev);
00250     lCurrentBC_ptr->setMean (lMean);
00251     lCurrentBC_ptr->setStdDev (lStdDev);
00252
00253     // DEBUG
00254     // STDAIR_LOG_NOTIFICATION ("Class " << lCurrentBC_ptr->describeKey()
00255     //                             << ", mean = " << lMean
00256     //                             << ", stddev = " << lStdDev);
00257 }
00258 }
00259
00260 // //////////////////////////////////////
00261 void Forecaster::
00262 setRemainingDemandForecastToZero (const stdair::SegmentCabin& iSegmentCabin) {
00263     // Set the demand forecast for all classes to zero.
00264     const stdair::BookingClassList_T& lBCList =
00265         stdair::BomManager::getList<stdair::BookingClass> (iSegmentCabin);
00266     for (stdair::BookingClassList_T::const_iterator itBC = lBCList.begin();

```

```

00267         itBC != lBCList.end(); ++itBC) {
00268             stdair::BookingClass* lBC_ptr = *itBC;
00269             assert (lBC_ptr != NULL);
00270             lBC_ptr->setMean (0.0);
00271         }
00272     }
00273
00274     // //////////////////////////////////////
00275     bool Forecaster::
00276     forecastUsingMultiplicativePickUp (stdair::FlightDate& ioFlightDate,
00277                                       const stdair::DateTime_T& iEventTime) {
00278         // Build the offset dates.
00279         const stdair::Date_T& lEventDate = iEventTime.date();
00280
00281         //
00282         bool isSucceeded = true;
00283         const stdair::SegmentDateList_T& lSDList =
00284             stdair::BomManager::getList<stdair::SegmentDate> (ioFlightDate);
00285         for (stdair::SegmentDateList_T::const_iterator itSD = lSDList.begin();
00286             itSD != lSDList.end(); ++itSD) {
00287             stdair::SegmentDate* lSD_ptr = *itSD;
00288             assert (lSD_ptr != NULL);
00289
00290             const stdair::Date_T& lBoardingDate = lSD_ptr->getBoardingDate();
00291             const stdair::DateOffset_T lSegmentDateOffset =
00292                 lBoardingDate - lEventDate;
00293             const stdair::DTD_T lSegmentDTD = lSegmentDateOffset.days();
00294
00295             //
00296             const stdair::SegmentCabinList_T& lSCList =
00297                 stdair::BomManager::getList<stdair::SegmentCabin> (*lSD_ptr);
00298             for (stdair::SegmentCabinList_T::const_iterator itSC = lSCList.begin();
00299                 itSC != lSCList.end(); ++itSC) {
00300                 stdair::SegmentCabin* lSC_ptr = *itSC;
00301                 assert (lSC_ptr != NULL);
00302
00303                 bool isForecasted = forecastUsingMultiplicativePickUp (*lSC_ptr,
00304                                                                       lEventDate,
00305                                                                       lSegmentDTD);
00306
00307                 if (isForecasted == false) {
00308                     isSucceeded = false;
00309                 }
00310             }
00311             return isSucceeded;
00312         }
00313
00314     // //////////////////////////////////////
00315     bool Forecaster::
00316     forecastUsingMultiplicativePickUp (stdair::SegmentCabin& ioSegmentCabin,
00317                                       const stdair::Date_T& iEventDate,
00318                                       const stdair::DTD_T& iSegmentDTD) {
00319         // Retrieving the number of anterior similar segments.
00320         const stdair::GuillotineBlock& lGuillotineBlock =
00321             ioSegmentCabin.getGuillotineBlock();
00322         stdair::NbOfSegments_T lNbOfAnteriorSimilarSegments =
00323             GuillotineBlockHelper::
00324             getNbOfSegmentAlreadyPassedThisDTD (lGuillotineBlock, iSegmentDTD,
00325                                                 iEventDate) - 1;
00326         // Retrieve the number of departed similar segments.
00327         stdair::NbOfSegments_T lNbOfDepartedSegments =
00328             Utilities::getNbOfDepartedSimilarSegments (ioSegmentCabin, iEventDate);

```

```

00329     // TODO:
00330     if (lNbOfDepartedSegments > 52) {
00331         lNbOfAnteriorSimilarSegments =
00332             lNbOfAnteriorSimilarSegments - lNbOfDepartedSegments + 52;
00333     }
00334
00335     // DEBUG
00336     STDAIR_LOG_DEBUG ("Nb of anterior similar segments: "
00337         << lNbOfAnteriorSimilarSegments);
00338
00339     // If the iSegmentDTD is the last DCP or there is no anterior similar
00340     // segment, remaining demand for all classes will be set to zero
00341     stdair::DCPLIST_T::const_reverse_iterator itLastDCP =
00342         stdair::DEFAULT_DCP_LIST.rbegin();
00343     assert (itLastDCP != stdair::DEFAULT_DCP_LIST.rend());
00344     const stdair::DCP_T& lLastDCP = *itLastDCP;
00345     if (lNbOfAnteriorSimilarSegments < 1.0 || iSegmentDTD <= lLastDCP) {
00346         setRemainingDemandForecastToZero (ioSegmentCabin);
00347         return false;
00348     } else {
00349         // Retrieve the booking figures of the first DCP and consider them
00350         // as unconstrained demand figures.
00351         stdair::DCPLIST_T::const_iterator itDCP = stdair::DEFAULT_DCP_LIST.begin();
00352         assert (itDCP != stdair::DEFAULT_DCP_LIST.end());
00353         const stdair::DCP_T& lFirstDCP = *itDCP;
00354
00355         // Initialise the unconstrained demand for classes.
00356         stdair::NbOfSegments_T lNbOfUsableSegments =
00357             GuillotineBlockHelper::
00358                 getNbOfSegmentAlreadyPassedThisDTD (lGuillotineBlock, lFirstDCP,
00359                     iEventDate);
00360         // TODO
00361         unsigned short lSize = lNbOfUsableSegments;
00362         if (lNbOfDepartedSegments > 52) {
00363             lSize = lNbOfUsableSegments - lNbOfDepartedSegments + 52;
00364         }
00365
00366         STDAIR_LOG_DEBUG ("Nb of usable similar segments: "
00367             << lNbOfUsableSegments);
00368
00369         UnconstrainedDemandVector_T lQEquivalentDemandVector (lSize, 0.0);
00370         stdair::NbOfBookings_T lCurrentSegmentQEquivalentDemand = 0.0;
00371         BookingClassUnconstrainedDemandVectorMap_T lBkgClassUncDemVectorMap;
00372         BookingClassUnconstrainedDemandMap_T lCurrentSegmentBkgClassDemMap;
00373         const stdair::BookingClassList_T& lBCLIST =
00374             stdair::BomManager::getList<stdair::BookingClass> (ioSegmentCabin);
00375         for (stdair::BookingClassList_T::const_iterator itBC = lBCLIST.begin();
00376             itBC != lBCLIST.end(); ++itBC) {
00377             stdair::BookingClass* lBC_ptr = *itBC;
00378             assert (lBC_ptr != NULL);
00379
00380             UnconstrainedDemandVector_T lUncDemandVector (lSize, 0.0);
00381             bool insertionSucceeded = lBkgClassUncDemVectorMap.
00382                 insert (BookingClassUnconstrainedDemandVectorMap_T::
00383                     value_type (lBC_ptr, lUncDemandVector)).second;
00384             assert (insertionSucceeded == true);
00385             insertionSucceeded =
00386                 lCurrentSegmentBkgClassDemMap.
00387                 insert (BookingClassUnconstrainedDemandMap_T::
00388                     value_type (lBC_ptr, 0.0)).second;
00389             assert (insertionSucceeded == true);
00390         }

```

```

00391     Detruncator::
00392         retrieveUnconstrainedDemandForFirstDCP (ioSegmentCabin,
00393                                                 lBkgClassUncDemVectorMap,
00394                                                 lQEquivalentDemandVector,
00395                                                 lFirstDCP, lNbOfUsableSegments,
00396                                                 lSize);
00397
00398     // Unconstrain the booking figures.
00399     stdair::DCPList_T::const_iterator itNextDCP = itDCP; ++itNextDCP;
00400     while (itNextDCP != stdair::DEFAULT_DCP_LIST.end()) {
00401         const stdair::DCP_T& lCurrentDCP = *itDCP;
00402         const stdair::DCP_T& lNextDCP = *itNextDCP;
00403         if (lCurrentDCP <= iSegmentDTD) {
00404             break;
00405         }
00406         Detruncator::
00407             unconstrainUsingMultiplicativePickUp (ioSegmentCabin,
00408                                                  lBkgClassUncDemVectorMap,
00409                                                  lQEquivalentDemandVector,
00410                                                  lCurrentDCP-1, lNextDCP,
00411                                                  iEventDate,
00412                                                  lNbOfDepartedSegments);
00413         ++itNextDCP; ++itDCP;
00414     }
00415
00416     // Update the unconstrained demand for all the classes of the current
00417     // segment.
00418     lCurrentSegmentQEquivalentDemand =
00419         lQEquivalentDemandVector.at (lNbOfAnteriorSimilarSegments);
00420     BookingClassUnconstrainedDemandMap_T::iterator itBCUD =
00421         lCurrentSegmentBkgClassDemMap.begin();
00422     for (BookingClassUnconstrainedDemandVectorMap_T::iterator itBCUDV =
00423          lBkgClassUncDemVectorMap.begin();
00424          itBCUDV != lBkgClassUncDemVectorMap.end(); ++itBCUDV, ++itBCUD) {
00425         assert (itBCUD != lCurrentSegmentBkgClassDemMap.end());
00426         assert (itBCUD->first == itBCUDV->first);
00427         stdair::NbOfRequests_T& lUncDem = itBCUD->second;
00428         UnconstrainedDemandVector_T& lUncDemVector = itBCUDV->second;
00429         lUncDem = lUncDemVector.at (lNbOfAnteriorSimilarSegments);
00430     }
00431
00432     // Forecast the remaining demand for all classes
00433     const stdair::DCP_T& lCurrentDTD = *itDCP;
00434     for (; itNextDCP != stdair::DEFAULT_DCP_LIST.end(); ++itNextDCP, ++itDCP){
00435         const stdair::DCP_T& lCurrentDCP = *itDCP;
00436         const stdair::DCP_T& lNextDCP = *itNextDCP;
00437         forecastUsingMultiplicativePickUp (ioSegmentCabin,
00438                                          lBkgClassUncDemVectorMap,
00439                                          lQEquivalentDemandVector,
00440                                          lCurrentDCP-1, lNextDCP, iEventDate,
00441                                          lNbOfAnteriorSimilarSegments,
00442                                          lNbOfDepartedSegments);
00443     }
00444
00445     // Update the remaining demand for all classes
00446     lCurrentSegmentQEquivalentDemand =
00447         lQEquivalentDemandVector.at (lNbOfAnteriorSimilarSegments)
00448         - lCurrentSegmentQEquivalentDemand;
00449     itBCUD = lCurrentSegmentBkgClassDemMap.begin();
00450     for (BookingClassUnconstrainedDemandVectorMap_T::iterator itBCUDV =
00451          lBkgClassUncDemVectorMap.begin();
00452          itBCUDV != lBkgClassUncDemVectorMap.end(); ++itBCUDV, ++itBCUD) {

```

```

00453         assert (itBCUD != lCurrentSegmentBkgClassDemMap.end());
00454         assert (itBCUD->first == itBCUDV->first);
00455         stdair::NbOfRequests_T& lUncDem = itBCUD->second;
00456         UnconstrainedDemandVector_T& lUncDemVector = itBCUDV->second;
00457         lUncDem = lUncDemVector.at (lNbOfAnteriorSimilarSegments) - lUncDem;
00458     }
00459
00460     // Retrieve the FRAT5 coefficient and compute the sell-up coef.
00461     FRAT5Curve_T::const_iterator itFRAT5 =
00462         DEFAULT_CUMULATIVE_FRAT5_CURVE.lower_bound (lCurrentDTD);
00463     assert (itFRAT5 != DEFAULT_CUMULATIVE_FRAT5_CURVE.end());
00464     const double lFRAT5Coef = itFRAT5->second;
00465     const double lSellUpCoef = -log(0.5) / (lFRAT5Coef - 1);
00466
00467     return forecastUsingMultiplicativePickUp(ioSegmentCabin,
00468                                             lCurrentSegmentBkgClassDemMap,
00469                                             lCurrentSegmentQEquivalentDemand,
00470                                             lSellUpCoef);
00471 }
00472 }
00473 }
00474
00475 // //////////////////////////////////////
00476 void Forecaster::forecastUsingMultiplicativePickUp
00477 (const stdair::SegmentCabin& iSegmentCabin,
00478  BookingClassUnconstrainedDemandVectorMap_T& ioBkgClassUncDemMap,
00479  UnconstrainedDemandVector_T& ioQEquivalentDemandVector,
00480  const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,
00481  const stdair::Date_T& iCurrentDate,
00482  const stdair::NbOfSegments_T& iNbOfAnteriorSimilarSegments,
00483  const stdair::NbOfSegments_T& iNbOfDepartedSegments) {
00484
00485     // Retrieve the guillotine block.
00486     const stdair::GuillotineBlock& lGuillotineBlock =
00487         iSegmentCabin.getGuillotineBlock();
00488
00489     // Build the historical booking holders for the product-oriented bookings
00490     // of the casses and the Q-equivalent (price-oriented) bookings of the cabin
00491     const stdair::NbOfSegments_T lNbOfUsableSegments = GuillotineBlockHelper::
00492         getNbOfSegmentAlreadyPassedThisDTD (lGuillotineBlock, iDCPEnd,
00493                                             iCurrentDate);
00494
00495     STDAIR_LOG_DEBUG ("Nb of usable similar segments: "
00496                      << lNbOfUsableSegments);
00497
00498     if (lNbOfUsableSegments > 0) {
00499
00500         // Parse the booking class list and unconstrain historical bookings.
00501         for (BookingClassUnconstrainedDemandVectorMap_T::iterator itBCUDV =
00502             ioBkgClassUncDemMap.begin(); itBCUDV != ioBkgClassUncDemMap.end();
00503             ++itBCUDV) {
00504             stdair::BookingClass* lBC_ptr = itBCUDV->first;
00505             assert (lBC_ptr != NULL);
00506             const stdair::MapKey_T& lBCKey = lBC_ptr->describeKey();
00507             const stdair::BlockIndex_T& lBlockIdx =
00508                 lGuillotineBlock.getBlockIndex (lBCKey);
00509             UnconstrainedDemandVector_T& lUncDemVector = itBCUDV->second;
00510
00511             STDAIR_LOG_DEBUG ("Unconstrain product-oriented bookings for "<<lBCKey);
00512             forecastUsingMultiplicativePickUp (lGuillotineBlock, lUncDemVector,
00513                                             iDCPBegin, iDCPEnd,
00514                                             lNbOfUsableSegments, lBlockIdx,

```

```

00515                                     iNbOfAnteriorSimilarSegments,
00516                                     iNbOfDepartedSegments);
00517     }
00518
00519     // Unconstrain the Q-equivalent bookings.
00520     // Retrieve the block index of the segment-cabin.
00521     std::ostream lSCMapKey;
00522     lSCMapKey << stdair::DEFAULT_SEGMENT_CABIN_VALUE_TYPE
00523         << iSegmentCabin.describeKey();
00524     const stdair::BlockIndex_T& lCabinIdx =
00525         lGuillotineBlock.getBlockIndex (lSCMapKey.str());
00526
00527     STDAIR_LOG_DEBUG ("Unconstrain price-oriented bookings");
00528     forecastUsingMultiplicativePickUp (lGuillotineBlock,
00529         ioQEquivalentDemandVector,
00530         iDCPBegin, iDCPEnd,
00531         lNbOfUsableSegments, lCabinIdx,
00532         iNbOfAnteriorSimilarSegments,
00533         iNbOfDepartedSegments,
00534         iSegmentCabin, iCurrentDate);
00535     }
00536 }
00537
00538 ///////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
00539 void Forecaster::forecastUsingMultiplicativePickUp
00540 (const stdair::GuillotineBlock& iGuillotineBlock,
00541     UnconstrainedDemandVector_T& ioUncDemVector,
00542     const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,
00543     const stdair::NbOfSegments_T& iNbOfUsableSegments,
00544     const stdair::BlockIndex_T& iBlockIdx,
00545     const stdair::NbOfSegments_T& iNbOfAnteriorSimilarSegments,
00546     const stdair::NbOfSegments_T& iNbOfDepartedSegments) {
00547     // TODO
00548     stdair::NbOfSegments_T lSegBegin = 0;
00549     if (iNbOfDepartedSegments > 52) {
00550         lSegBegin = iNbOfDepartedSegments - 52;
00551     }
00552     // Retrieve the gross daily booking and availability snapshots.
00553     stdair::ConstSegmentCabinDTDRangeSnapshotView_T lBookingView =
00554         iGuillotineBlock.getConstSegmentCabinDTDRangeProductAndPriceOrientedBooking
00555         SnapshotView (lSegBegin, iNbOfUsableSegments - 1, iDCPEnd, iDCPBegin);
00556     stdair::ConstSegmentCabinDTDRangeSnapshotView_T lAvlView =
00557         iGuillotineBlock.getConstSegmentCabinDTDRangeAvailabilitySnapshotView (lSeg
00558         Begin, iNbOfUsableSegments - 1, iDCPEnd, iDCPBegin);
00559
00560     // Browse the list of segments and build the historical booking holder.
00561     const stdair::ValueTypeIndexMap_T& lVTIdxMap =
00562         iGuillotineBlock.getValueTypeIndexMap();
00563     const unsigned int lNbOfValueTypes = lVTIdxMap.size();
00564     HistoricalBookingHolder lHBHolder;
00565     std::vector<short> lDataIndexList;
00566     for (short i = 0; i < iNbOfUsableSegments - lSegBegin; ++i) {
00567         stdair::Flag_T lCensorshipFlag = false;
00568         stdair::NbOfBookings_T lNbOfHistoricalBkgs = 0.0;
00569         const short lNbOfDTDs = iDCPBegin - iDCPEnd + 1;
00570
00571         // Parse the DTDs during the period
00572         for (short j = 0; j < lNbOfDTDs; ++j) {
00573             // Check if the data has been censored during this day.
00574             // STDAIR_LOG_DEBUG ("i: " << i << ", NbOfValues: " << lNbOfValueTypes
00575             // << ", BlockIdx: " << iBlockIdx << ", j: " << j);
00576             if (lCensorshipFlag == false) {

```



```

00575         if (lAvlView[i*1NbOfValueTypes + iBlockIdx][j] < 1.0) {
00576             lCensorshipFlag = true;
00577         }
00578     }
00579
00580     // Get the bookings of the day.
00581     // STDAIR_LOG_DEBUG ("Bookings of the day: " << lBookingView[i*1NbOfValue
Types + iBlockIdx][j]);
00582     lNbOfHistoricalBkgs += lBookingView[i*1NbOfValueTypes + iBlockIdx][j];
00583 }
00584
00585 // If there is no booking till now for this class and for this segment,
00586 // there will be no unconstraining process.
00587 stdair::NbOfRequests_T& lUncDemand = ioUncDemVector.at (i);
00588 if (lUncDemand < 1.0) {
00589     lUncDemand += lNbOfHistoricalBkgs;
00590 } else {
00591     double lBkgDemandFactor = lNbOfHistoricalBkgs / lUncDemand;
00592     HistoricalBooking lHistoricalBkg (lBkgDemandFactor, lCensorshipFlag);
00593     lHBHolder.addHistoricalBooking (lHistoricalBkg);
00594     lDataIndexList.push_back (i);
00595 }
00596
00597 // DEBUG
00598 STDAIR_LOG_DEBUG ("Historical bkgs: " << lNbOfHistoricalBkgs
00599                 << ", censored: " << lCensorshipFlag);
00600 }
00601
00602 // DEBUG
00603 STDAIR_LOG_DEBUG ("Unconstrain by multiplicative pick-up using EM");
00604
00605 // Unconstrain the booking figures
00606 Detruncator::unconstrainUsingMultiplicativePickUp (lHBHolder);
00607
00608 // Update the unconstrained demand vector.
00609 short i = 0;
00610 for (std::vector<short>::iterator itIdx = lDataIndexList.begin();
00611      itIdx != lDataIndexList.end(); ++itIdx, ++i) {
00612     short lIdx = *itIdx;
00613     stdair::NbOfRequests_T& lPastDemand = ioUncDemVector.at (lIdx);
00614     const stdair::NbOfRequests_T& lUncDemandFactorOfThisPeriod =
00615         lHBHolder.getUnconstrainedDemand (i);
00616     lPastDemand *= (1+lUncDemandFactorOfThisPeriod);
00617 }
00618
00619 // Update the unconstrained demand for the current segment.
00620 if (lHBHolder.getNbOfFlights() > 0) {
00621     const stdair::NbOfRequests_T& lUncDemandFactorMean =
00622         lHBHolder.getDemandMean();
00623     stdair::NbOfRequests_T& lPastDemand =
00624         ioUncDemVector.at (iNbOfAnteriorSimilarSegments);
00625     lPastDemand *= (1+lUncDemandFactorMean);
00626 }
00627 }
00628
00629 // //////////////////////////////////////
00630 void Forecaster::forecastUsingMultiplicativePickUp
00631 (const stdair::GuillotineBlock& iGuillotineBlock,
00632  UnconstrainedDemandVector_T& ioUncDemVector,
00633  const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,
00634  const stdair::NbOfSegments_T& iNbOfUsableSegments,
00635  const stdair::BlockIndex_T& iBlockIdx,

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00636     const stdair::NbOfSegments_T& iNbOfAnteriorSimilarSegments,
00637     const stdair::NbOfSegments_T& iNbOfDepartedSegments,
00638     const stdair::SegmentCabin& iSegmentCabin,
00639     const stdair::Date_T& iCurrentDate) {
00640     // TODO
00641     stdair::NbOfSegments_T lSegBegin = 0;
00642     if (iNbOfDepartedSegments > 52) {
00643         lSegBegin = iNbOfDepartedSegments - 52;
00644     }
00645     // Retrieve the gross daily booking and availability snapshots.
00646     stdair::ConstSegmentCabinDTDRangeSnapshotView_T lBookingView =
00647         iGuillotineBlock.getConstSegmentCabinDTDRangeProductAndPriceOrientedBooking
SnapshotView (lSegBegin, iNbOfUsableSegments -1, iDCPEnd, iDCPBegin);
00648     stdair::ConstSegmentCabinDTDRangeSnapshotView_T lAvlView =
00649         iGuillotineBlock.getConstSegmentCabinDTDRangeAvailabilitySnapshotView (lSeg
Begin, iNbOfUsableSegments -1, iDCPEnd, iDCPBegin);
00650
00651     // Browse the list of segments and build the historical booking holder.
00652     const stdair::ValueTypeIndexMap_T& lVTIdxMap =
00653         iGuillotineBlock.getValueTypeIndexMap();
00654     const unsigned int lNbOfValueTypes = lVTIdxMap.size();
00655     HistoricalBookingHolder lHBHolder;
00656     std::vector<short> lDataIndexList;
00657     for (short i = 0; i < iNbOfUsableSegments-lSegBegin; ++i) {
00658         stdair::Flag_T lCensorshipFlag = false;
00659         stdair::NbOfBookings_T lNbOfHistoricalBkgs = 0.0;
00660         const short lNbOfDTDs = iDCPBegin - iDCPEnd + 1;
00661
00662         // Parse the DTDs during the period
00663         for (short j = 0; j < lNbOfDTDs; ++j) {
00664             // Check if the data has been censored during this day.
00665             // STDAIR_LOG_DEBUG ("i: " << i << ", NbOfValues: " << lNbOfValueTypes
00666             // << ", BlockIdx: " << iBlockIdx << ", j: " << j);
00667             if (lCensorshipFlag == false) {
00668                 if (lAvlView[i*lNbOfValueTypes + iBlockIdx][j] < 1.0) {
00669                     lCensorshipFlag = true;
00670                 }
00671             }
00672
00673             // Get the bookings of the day.
00674             // STDAIR_LOG_DEBUG ("Bookings of the day: " << lBookingView[i*lNbOfValue
Types + iBlockIdx][j]);
00675             lNbOfHistoricalBkgs += lBookingView[i*lNbOfValueTypes + iBlockIdx][j];
00676         }
00677
00678         // If there is no booking till now for this class and for this segment,
00679         // there will be no unconstraining process.
00680         stdair::NbOfRequests_T& lUncDemand = ioUncDemVector.at (i);
00681         if (lUncDemand < 1.0) {
00682             lUncDemand += lNbOfHistoricalBkgs;
00683         } else {
00684             double lBkgDemandFactor = lNbOfHistoricalBkgs / lUncDemand;
00685             HistoricalBooking lHistoricalBkg (lBkgDemandFactor, lCensorshipFlag);
00686             lHBHolder.addHistoricalBooking (lHistoricalBkg);
00687             lDataIndexList.push_back (i);
00688         }
00689
00690         // DEBUG
00691         STDAIR_LOG_DEBUG ("Historical bkgs: " << lNbOfHistoricalBkgs
00692             << ", censored: " << lCensorshipFlag);
00693     }
00694 }

```

```

00695 // DEBUG
00696 STDAIR_LOG_DEBUG ("Unconstrain by multiplicative pick-up using EM");
00697
00698 // Unconstrain the booking figures
00699 Detruncator::unconstrainUsingMultiplicativePickUp (lHBHolder);
00700
00701 // Update the unconstrained demand vector.
00702 // LOG
00703 const stdair::SegmentDate& lSegmentDate = stdair::BomManager::
00704     getParent<stdair::SegmentDate, stdair::SegmentCabin> (iSegmentCabin);
00705 const stdair::FlightDate& lFlightDate = stdair::BomManager::
00706     getParent<stdair::FlightDate, stdair::SegmentDate> (lSegmentDate);
00707 const stdair::Date_T& lDepDate = lFlightDate.getDepartureDate();
00708 const boost::gregorian::date_duration lDD = lDepDate - iCurrentDate;
00709 const long lDTD = lDD.days();
00710 stdair::Date_T lRefDate (2012, boost::gregorian::Jan, 01);
00711 short i = 0;
00712 for (std::vector<short>::iterator itIdx = lDataIndexList.begin();
00713      itIdx != lDataIndexList.end(); ++itIdx, ++i) {
00714     short lIdx = *itIdx;
00715     stdair::NbOfRequests_T& lPastDemand = ioUncDemVector.at (lIdx);
00716     const stdair::NbOfRequests_T& lUncDemandFactorOfThisPeriod =
00717         lHBHolder.getUnconstrainedDemand (i);
00718     const double lUncDemThisPeriod =
00719         lPastDemand * lUncDemandFactorOfThisPeriod;
00720     const double lQEBkgThisPeriod =
00721         lPastDemand * lHBHolder.getHistoricalBooking (i);
00722     lPastDemand *= (1+lUncDemandFactorOfThisPeriod);
00723     if (lDepDate > lRefDate) {
00724         const stdair::DateOffset_T lDateOffset (7 * (52 - i) + 420);
00725         const stdair::Date_T lHDate = lDepDate - lDateOffset;
00726         STDAIR_LOG_NOTIFICATION (boost::gregorian::to_iso_string(lDepDate)
00727             << ";" << lDTD << ";" << iDCPBegin << ";"
00728             << iDCPEnd << ";"
00729             << boost::gregorian::to_iso_string (lHDate)
00730             << ";" << lUncDemThisPeriod);
00731         STDAIR_LOG_NOTIFICATION (boost::gregorian::to_iso_string(lDepDate)
00732             << ";" << lDTD << ";" << iDCPBegin << ";"
00733             << iDCPEnd << ";"
00734             << boost::gregorian::to_iso_string (lHDate)
00735             << ";" << lQEBkgThisPeriod);
00736     }
00737 }
00738
00739 // Update the unconstrained demand for the current segment.
00740 if (lHBHolder.getNbOfFlights() > 0) {
00741     const stdair::NbOfRequests_T& lUncDemandFactorMean =
00742         lHBHolder.getDemandMean();
00743     stdair::NbOfRequests_T& lPastDemand =
00744         ioUncDemVector.at (iNbOfAnteriorSimilarSegments);
00745     lPastDemand *= (1+lUncDemandFactorMean);
00746 }
00747 }
00748
00749 // //////////////////////////////////////
00750 bool Forecaster::
00751 forecastUsingMultiplicativePickUp (stdair::SegmentCabin& ioSegmentCabin,
00752     const BookingClassUnconstrainedDemandMap_T&
00753     iClassUncDemMap,
00754     const stdair::NbOfRequests_T& iUncDem,
00755     const double& iSellUpFactor) {
00756     double lPriceOriMean = iUncDem;

```

```

00756     double lPriceOriStdDev = sqrt (iUncDem);
00757
00758     // DEBUG
00759     STDAIR_LOG_DEBUG ("Price-oriented demand: mean = " << lPriceOriMean
00760                     << ", stddev = " << lPriceOriStdDev);
00761
00762     // Retrieve the classes from low to high and compute the distributions of
00763     // product-oriented and price-oriented demand.
00764     // Retrieve the lowest class.
00765     const stdair::BookingClassList_T& lBCList =
00766         stdair::BomManager::getList<stdair::BookingClass> (ioSegmentCabin);
00767     stdair::BookingClassList_T::const_reverse_iterator itCurrentClass =
00768         lBCList.rbegin();
00769     assert (itCurrentClass != lBCList.rend());
00770     stdair::BookingClassList_T::const_reverse_iterator itNextClass =
00771         itCurrentClass;
00772     ++itNextClass;
00773     // If there is only one class in the cabin, the demand distribution of this
00774     // class is equal to the price-oriented demand distribution of the cabin.
00775     if (itNextClass == lBCList.rend()) {
00776         stdair::BookingClass* lLowestBC_ptr = *itCurrentClass;
00777         lLowestBC_ptr->setMean (lPriceOriMean);
00778         lLowestBC_ptr->setStdDev (lPriceOriStdDev);
00779         if (lPriceOriMean > 0) {
00780             return true;
00781         } else {
00782             return false;
00783         }
00784     } else {
00785         bool isSucceeded = false;
00786         // Compute the demand for higher class using the formula
00787         // Pro_sell_up_from_Q_to_F = e ^ ((y_F/y_Q - 1) * ln (0.5) / (FRAT5 - 1))
00788         for (; itNextClass != lBCList.rend(); ++itCurrentClass, ++itNextClass) {
00789             stdair::BookingClass* lCurrentBC_ptr = *itCurrentClass;
00790             assert (lCurrentBC_ptr != NULL);
00791             const stdair::Yield_T& lCurrentYield = lCurrentBC_ptr->getYield();
00792             stdair::BookingClass* lNextBC_ptr = *itNextClass;
00793             assert (lNextBC_ptr != NULL);
00794             const stdair::Yield_T& lNextYield = lNextBC_ptr->getYield();
00795
00796             // Compute the part of price-oriented demand distributed to the
00797             // current class.
00798             const double lSellUp =
00799                 exp ((1.0 - lNextYield/lCurrentYield) * iSellUpFactor);
00800             const double lPriceOriDemMeanFrac = lPriceOriMean * (1.0 - lSellUp);
00801             const double lPriceOriDemStdDevFrac = lPriceOriStdDev * (1.0 - lSellUp);
00802
00803             // Compute the product-oriented demand distribution for the
00804             // current class.
00805             BookingClassUnconstrainedDemandMap_T::const_iterator itBCUD =
00806                 iClassUncDemMap.find (lCurrentBC_ptr);
00807             assert (itBCUD != iClassUncDemMap.end());
00808             double lMean = itBCUD->second;
00809             double lStdDev = sqrt (lMean);
00810
00811             // Compute the demand distribution for the current class;
00812             lMean += lPriceOriDemMeanFrac;
00813             lStdDev = sqrt (lStdDev * lStdDev +
00814                             lPriceOriDemStdDevFrac * lPriceOriDemStdDevFrac);
00815             lCurrentBC_ptr->setMean (lMean);
00816             lCurrentBC_ptr->setStdDev (lStdDev);
00817

```

```

00818         if (lMean > 0) {
00819             isSucceeded = true;
00820         }
00821
00822         // DEBUG
00823         STDAIR_LOG_DEBUG ("Class " << lCurrentBC_ptr->describeKey()
00824             << ", mean = " << lMean
00825             << ", stddev = " << lStdDev);
00826
00827         // Update the price-oriented demand
00828         lPriceOriMean *= lSellUp;
00829         lPriceOriStdDev *= lSellUp;
00830     }
00831
00832     // Compute the demand distribution for the highest class (which is the
00833     // "current class")
00834     stdair::BookingClass* lCurrentBC_ptr = *itCurrentClass;
00835     assert (lCurrentBC_ptr != NULL);
00836     BookingClassUnconstrainedDemandMap_T::const_iterator itBCUD =
00837         iClassUncDemMap.find (lCurrentBC_ptr);
00838     assert (itBCUD != iClassUncDemMap.end());
00839     double lMean = itBCUD->second;
00840     double lStdDev = sqrt (lMean);
00841
00842     // Compute the demand distribution for the current class;
00843     lMean += lPriceOriMean;
00844     lStdDev = sqrt (lStdDev * lStdDev + lPriceOriStdDev * lPriceOriStdDev);
00845     lCurrentBC_ptr->setMean (lMean);
00846     lCurrentBC_ptr->setStdDev (lStdDev);
00847
00848     if (lMean > 0) {
00849         isSucceeded = true;
00850     }
00851
00852     // DEBUG
00853     STDAIR_LOG_DEBUG ("Class " << lCurrentBC_ptr->describeKey()
00854         << ", mean = " << lMean
00855         << ", stddev = " << lStdDev);
00856     return isSucceeded;
00857 }
00858 }
00859
00860 }

```

## 28.75 rmol/command/Forecaster.hpp File Reference

```

#include <map>
#include <stdair/stdair_inventory_types.hpp>
#include <rmol/RMOL_Types.hpp>

```

### Classes

- class [RMOL::Forecaster](#)

## Namespaces

- namespace [stdair](#)
- namespace [RMOL](#)

## 28.76 Forecaster.hpp

```

00001 #ifndef __RMOL_COMMAND_FORECASTER_HPP
00002 #define __RMOL_COMMAND_FORECASTER_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // STL
00008 #include <map>
00009 // StdAir
00010 #include <stdair/stdair_inventory_types.hpp>
00011 // RMOL
00012 #include <rmol/RMOL_Types.hpp>
00013
00014 // Forward declarations
00015 namespace stdair {
00016     class FlightDate;
00017     class SegmentCabin;
00018     class GuillotineBlock;
00019 }
00020
00021 namespace RMOL {
00022     class Forecaster {
00023     public:
00024         static bool forecastUsingAdditivePickUp (stdair::FlightDate&,
00025                                                 const stdair::DateTime_T&);
00026
00027         static bool forecastUsingMultiplicativePickUp (stdair::FlightDate&,
00028                                                       const stdair::DateTime_T&);
00029
00030     private:
00031         static bool forecastUsingAdditivePickUp (stdair::SegmentCabin&,
00032                                                 const stdair::DCPList_T&,
00033                                                 const stdair::Date_T&);
00034
00035         static void forecastUsingAdditivePickUp (stdair::SegmentCabin&,
00036                                                 const
00037 BookingClassUnconstrainedDemandVectorMap_T&, const UnconstrainedDemandVector_T&,
00038 const double&);
00039
00040         static bool forecastUsingMultiplicativePickUp (stdair::SegmentCabin&,
00041                                                       const stdair::Date_T&,
00042                                                       const stdair::DTD_T&);
00043
00044         static void forecastUsingMultiplicativePickUp (const stdair::SegmentCabin&,
00045 BookingClassUnconstrainedDemandVectorMap_T&,
00046 UnconstrainedDemandVector_T&,
00047 const stdair::DCP_T&,
00048 const stdair::DCP_T&,
00049 const stdair::Date_T&,
00050 const stdair::NbOfSegments_T&,
00051 const stdair::NbOfSegments_T&);

```

```

00070
00074     static void forecastUsingMultiplicativePickUp(const stdair::GuillotineBlock&,
00075
00076                                     UnconstrainedDemandVector_T&,
00077                                     const stdair::DCP_T&,
00078                                     const stdair::DCP_T&,
00079                                     const stdair::NbOfSegments_T&,
00080                                     const stdair::BlockIndex_T&,
00081                                     const stdair::NbOfSegments_T&,
00082                                     const stdair::NbOfSegments_T&);
00082
00086     static void forecastUsingMultiplicativePickUp(const stdair::GuillotineBlock&,
00087
00088                                     UnconstrainedDemandVector_T&,
00089                                     const stdair::DCP_T&,
00090                                     const stdair::DCP_T&,
00091                                     const stdair::NbOfSegments_T&,
00092                                     const stdair::BlockIndex_T&,
00093                                     const stdair::NbOfSegments_T&,
00094                                     const stdair::NbOfSegments_T&,
00095                                     const stdair::SegmentCabin&,
00096                                     const stdair::Date_T&);
00101     static bool forecastUsingMultiplicativePickUp(stdair::SegmentCabin&,
00102     const
00103     BookingClassUnconstrainedDemandMap_T&,
00104     const stdair::NbOfRequests_T&,
00105     const double&);
00109     static void setRemainingDemandForecastToZero (const stdair::SegmentCabin&);
00110 };
00111 }
00112 #endif // __RMOL_COMMAND_FORECASTER_HPP

```

## 28.77 rmol/command/InventoryParser.cpp File Reference

```

#include <sstream>
#include <fstream>
#include <cassert>
#include <stdair/stdair_inventory_types.hpp>
#include <stdair/stdair_maths_types.hpp>
#include <stdair/stdair_exceptions.hpp>
#include <stdair/basic/BasConst_DefaultObject.hpp>
#include <stdair/basic/BasConst_Inventory.hpp>
#include <stdair/basic/BasFileMgr.hpp>
#include <stdair/bom/BomRetriever.hpp>
#include <stdair/bom/BomManager.hpp>
#include <stdair/bom/BomRoot.hpp>
#include <stdair/bom/Inventory.hpp>

```

```

#include <stdair/bom/FlightDate.hpp>
#include <stdair/bom/SegmentDate.hpp>
#include <stdair/bom/SegmentCabin.hpp>
#include <stdair/bom/LegDate.hpp>
#include <stdair/bom/LegCabin.hpp>
#include <stdair/bom/BookingClass.hpp>
#include <stdair/bom/VirtualClassStruct.hpp>
#include <stdair/factory/FacBom.hpp>
#include <stdair/factory/FacBomManager.hpp>
#include <stdair/service/Logger.hpp>
#include <rmol/command/InventoryParser.hpp>

```

#### Namespaces

- namespace [RMOL](#)

#### 28.78 InventoryParser.cpp

```

00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <sstream>
00006 #include <fstream>
00007 #include <cassert>
00008 // StdAir
00009 #include <stdair/stdair_inventory_types.hpp>
00010 #include <stdair/stdair_maths_types.hpp>
00011 #include <stdair/stdair_exceptions.hpp>
00012 #include <stdair/basic/BasConst_DefaultObject.hpp>
00013 #include <stdair/basic/BasConst_Inventory.hpp>
00014 #include <stdair/basic/BasFileMgr.hpp>
00015 #include <stdair/bom/BomRetriever.hpp>
00016 #include <stdair/bom/BomManager.hpp>
00017 #include <stdair/bom/BomRoot.hpp>
00018 #include <stdair/bom/Inventory.hpp>
00019 #include <stdair/bom/FlightDate.hpp>
00020 #include <stdair/bom/SegmentDate.hpp>
00021 #include <stdair/bom/SegmentCabin.hpp>
00022 #include <stdair/bom/LegDate.hpp>
00023 #include <stdair/bom/LegCabin.hpp>
00024 #include <stdair/bom/BookingClass.hpp>
00025 #include <stdair/bom/VirtualClassStruct.hpp>
00026 #include <stdair/factory/FacBom.hpp>
00027 #include <stdair/factory/FacBomManager.hpp>
00028 #include <stdair/service/Logger.hpp>
00029 // RMOL
00030 #include <rmol/command/InventoryParser.hpp>
00031
00032 namespace RMOL {

```



```

00033
00034 // //////////////////////////////////////
00035 bool InventoryParser::
00036 parseInputFileAndBuildBom (const std::string& iInputFileName,
00037                             stdair::BomRoot& ioBomRoot) {
00038     bool hasReadBeenSuccessful = false;
00039
00040     // Check that the file path given as input corresponds to an actual file
00041     const bool doesExistAndIsReadable =
00042         stdair::BasFileMgr::doesExistAndIsReadable (iInputFileName);
00043     if (doesExistAndIsReadable == false) {
00044         std::ostringstream oMessage;
00045         oMessage << "The input file, '" << iInputFileName
00046             << "', can not be retrieved on the file-system";
00047         throw stdair::FileNotFoundException (oMessage.str());
00048     }
00049
00050     // Retrieve the (sample) leg-cabin
00051     stdair::LegCabin& lLegCabin =
00052         stdair::BomRetriever::retrieveDummyLegCabin (ioBomRoot);
00053
00054     // Retrieve the (sample) segment-cabin
00055     stdair::SegmentCabin& lSegmentCabin =
00056         stdair::BomRetriever::retrieveDummySegmentCabin (ioBomRoot);
00057
00058     // Open the input file
00059     std::ifstream inputFile (iInputFileName.c_str());
00060     if (! inputFile) {
00061         STDAIR_LOG_ERROR ("Can not open input file '" << iInputFileName << "'");
00062         throw new stdair::FileNotFoundException ("Can not open input file '"
00063             + iInputFileName + "'");
00064     }
00065
00066     char buffer[80];
00067     double dval;
00068     short i = 1;
00069     bool hasAllPArms = true;
00070     stdair::Yield_T lYield;
00071     stdair::MeanValue_T lMean;
00072     stdair::StdDevValue_T lStdDev;
00073     stdair::BookingClassKey lBCKey (stdair::DEFAULT_CLASS_CODE);
00074
00075     while (inputFile.getline (buffer, sizeof (buffer), ';')) {
00076         std::istringstream iStringStr (buffer);
00077
00078         if (i == 1) {
00079             hasAllPArms = true;
00080         }
00081
00082         if (iStringStr >> dval) {
00083             if (i == 1) {
00084                 lYield = dval;
00085                 // std::cout << "Yield[" << i << "] = '" << dval << "'" << std::endl;
00086
00087             } else if (i == 2) {
00088                 lMean = dval;
00089                 // std::cout << "Mean[" << i << "] = '" << dval << "'" << std::endl;
00090
00091             } else if (i == 3) {
00092                 lStdDev = dval;
00093                 //std::cout << "stdDev[" << i << "] = '" << dval << "'" << std::endl;
00094                 i = 0;

```

```

00095         }
00096         i++;
00097
00098     } else {
00099         hasAllParams = false;
00100     }
00101
00102     if (hasAllParams && i == 1) {
00103         stdair::BookingClass& lBookingClass =
00104             stdair::FacBom<stdair::BookingClass>::instance().create (lBCKey);
00105         stdair::FacBomManager::addToList (lSegmentCabin, lBookingClass);
00106         lBookingClass.setYield (lYield);
00107         lBookingClass.setMean (lMean);
00108         lBookingClass.setStdDev (lStdDev);
00109
00110         stdair::VirtualClassStruct lVirtualClass (lBookingClass);
00111         lVirtualClass.setYield (lYield);
00112         lVirtualClass.setMean (lMean);
00113         lVirtualClass.setStdDev (lStdDev);
00114         lLegCabin.addVirtualClass (lVirtualClass);
00115     }
00116 }
00117
00118 //
00119 if (!inputFile.eof()) {
00120     STDAIR_LOG_ERROR ("Problem when reading input file '" << iInputFileName
00121                     << "'");
00122     return hasReadBeenSuccessful;
00123 }
00124
00125 //
00126 hasReadBeenSuccessful = true;
00127 return hasReadBeenSuccessful;
00128 }
00129
00130 }

```

## 28.79 rmol/command/InventoryParser.hpp File Reference

```
#include <string>
```

```
#include <stdair/command/CmdAbstract.hpp>
```

### Classes

- class [RMOL::InventoryParser](#)

*Class filling the virtual class list (representing a list of classes/buckets) from a given input inventory.*

### Namespaces

- namespace [stdair](#)
- namespace [RMOL](#)

## 28.80 InventoryParser.hpp

```

00001 #ifndef __RMOL_CMD_INVENTORYPARSER_HPP
00002 #define __RMOL_CMD_INVENTORYPARSER_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // STL
00008 #include <string>
00009 // StdAir
00010 #include <stdair/command/CmdAbstract.hpp>
00011
00012 namespace stdair {
00013     class BomRoot;
00014     class LegCabin;
00015     class SegmentCabin;
00016 }
00017
00018 namespace RMOL {
00019     class InventoryParser : public stdair::CmdAbstract {
00020     public:
00021         static bool parseInputFileAndBuildBom (const std::string& iInputFileName,
00022                                                stdair::BomRoot&);
00023     };
00024 }
00025 #endif // __RMOL_CMD_INVENTORYPARSER_HPP

```

## 28.81 rmol/command/Optimiser.cpp File Reference

```

#include <cassert>
#include <sstream>
#include <stdair/basic/BasConst_General.hpp>
#include <stdair/basic/RandomGeneration.hpp>
#include <stdair/bom/BomManager.hpp>
#include <stdair/bom/FlightDate.hpp>
#include <stdair/bom/LegDate.hpp>
#include <stdair/bom/SegmentDate.hpp>
#include <stdair/bom/LegCabin.hpp>
#include <stdair/bom/SegmentCabin.hpp>
#include <stdair/bom/FareFamily.hpp>
#include <stdair/bom/BookingClass.hpp>
#include <stdair/service/Logger.hpp>
#include <rmol/bom/MCOptimiser.hpp>
#include <rmol/bom/Emsr.hpp>

```

```
#include <rmol/bom/DPOptimiser.hpp>
#include <rmol/command/Optimiser.hpp>
```

### Namespaces

- namespace [RMOL](#)

### 28.82 Optimiser.cpp

```
00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 #include <sstream>
00007 // StdAir
00008 #include <stdair/basic/BasConst_General.hpp>
00009 #include <stdair/basic/RandomGeneration.hpp>
00010 #include <stdair/bom/BomManager.hpp>
00011 #include <stdair/bom/FlightDate.hpp>
00012 #include <stdair/bom/LegDate.hpp>
00013 #include <stdair/bom/SegmentDate.hpp>
00014 #include <stdair/bom/LegCabin.hpp>
00015 #include <stdair/bom/SegmentCabin.hpp>
00016 #include <stdair/bom/FareFamily.hpp>
00017 #include <stdair/bom/BookingClass.hpp>
00018 #include <stdair/service/Logger.hpp>
00019 // RMOL
00020 #include <rmol/bom/MCOptimiser.hpp>
00021 #include <rmol/bom/Emsr.hpp>
00022 #include <rmol/bom/DPOptimiser.hpp>
00023 #include <rmol/command/Optimiser.hpp>
00024
00025 namespace RMOL {
00026
00027 // //////////////////////////////////////
00028 void Optimiser::
00029 optimalOptimisationByMCIntegration (const int K,
00030                                     stdair::LegCabin& ioLegCabin) {
00031     // Retrieve the segment-cabin
00032     const stdair::SegmentCabinList_T lSegmentCabinList =
00033         stdair::BomManager::getList<stdair::SegmentCabin> (ioLegCabin);
00034     stdair::SegmentCabinList_T::const_iterator itSC = lSegmentCabinList.begin();
00035     assert (itSC != lSegmentCabinList.end());
00036     const stdair::SegmentCabin* lSegmentCabin_ptr = *itSC;
00037     assert (lSegmentCabin_ptr != NULL);
00038
00039     // Retrieve the class list.
00040     const stdair::BookingClassList_T lBookingClassList =
00041         stdair::BomManager::getList<stdair::BookingClass> (*lSegmentCabin_ptr);
00042     stdair::RandomGeneration lSeedGenerator (stdair::DEFAULT_RANDOM_SEED);
00043
00044     // Generate the demand samples for the booking classes.
00045     for (stdair::BookingClassList_T::const_iterator itBC =
00046         lBookingClassList.begin(); itBC != lBookingClassList.end(); ++itBC) {
00047         stdair::RandomSeed_T lRandomSeed =
00048             lSeedGenerator.generateUniform01 () * 1e9;
00049         stdair::BookingClass* lBookingClass_ptr = *itBC;
```

```

00050     assert (lBookingClass_ptr != NULL);
00051     lBookingClass_ptr->generateDemandSamples (K, lRandomSeed);
00052
00053     // DEBUG
00054     //STDAIR_LOG_DEBUG ("Generating " << K << " demand samples for the class "
00055     //                  << lBookingClass_ptr->describeKey());
00056 }
00057
00058 // Call the class performing the actual algorithm
00059 MCOptimiser::optimalOptimisationByMCIntegration (ioLegCabin);
00060 }
00061
00062 // //////////////////////////////////////
00063 void Optimiser::optimalOptimisationByDP (stdair::LegCabin& ioLegCabin) {
00064     DPOptimiser::optimalOptimisationByDP (ioLegCabin);
00065 }
00066
00067 // //////////////////////////////////////
00068 void Optimiser::heuristicOptimisationByEmsr (stdair::LegCabin& ioLegCabin) {
00069     Emsr::heuristicOptimisationByEmsr (ioLegCabin);
00070 }
00071
00072 // //////////////////////////////////////
00073 void Optimiser::heuristicOptimisationByEmsrA (stdair::LegCabin& ioLegCabin) {
00074     Emsr::heuristicOptimisationByEmsrA (ioLegCabin);
00075 }
00076
00077 // //////////////////////////////////////
00078 void Optimiser::heuristicOptimisationByEmsrB (stdair::LegCabin& ioLegCabin) {
00079     Emsr::heuristicOptimisationByEmsrB (ioLegCabin);
00080 }
00081
00082 // //////////////////////////////////////
00083 void Optimiser::optimise (stdair::FlightDate& ioFlightDate) {
00084     // Browse the leg-cabin list and build the virtual class list for
00085     // each cabin.
00086     const stdair::LegDateList_T& lLDList =
00087         stdair::BomManager::getList<stdair::LegDate> (ioFlightDate);
00088     for (stdair::LegDateList_T::const_iterator itLD = lLDList.begin();
00089          itLD != lLDList.end(); ++itLD) {
00090         stdair::LegDate* lLD_ptr = *itLD;
00091         assert (lLD_ptr != NULL);
00092
00093         //
00094         const stdair::LegCabinList_T& lLCList =
00095             stdair::BomManager::getList<stdair::LegCabin> (*lLD_ptr);
00096         for (stdair::LegCabinList_T::const_iterator itLC = lLCList.begin();
00097              itLC != lLCList.end(); ++itLC) {
00098             stdair::LegCabin* lLC_ptr = *itLC;
00099             assert (lLC_ptr != NULL);
00100
00101             // Build the virtual class list.
00102             buildVirtualClassListForLegBasedOptimisation (*lLC_ptr);
00103
00104             // Optimise using Monte-Carlo Integration method.
00105             optimalOptimisationByMCIntegration (10000, *lLC_ptr);
00106         }
00107     }
00108 }
00109
00110 // //////////////////////////////////////
00111 void Optimiser::

```

```

00112 buildVirtualClassListForLegBasedOptimisation (stdair::LegCabin& ioLegCabin) {
00113     // The map holding all virtual classes to be created.
00114     stdair::VirtualClassMap_T lVirtualClassMap;
00115
00116     // Retrieve the segment-cabin
00117     const stdair::SegmentCabinList_T lSegmentCabinList =
00118         stdair::BomManager::getList<stdair::SegmentCabin> (ioLegCabin);
00119     stdair::SegmentCabinList_T::const_iterator itSC = lSegmentCabinList.begin();
00120     assert (itSC != lSegmentCabinList.end());
00121     const stdair::SegmentCabin* lSegmentCabin_ptr = *itSC;
00122     assert (lSegmentCabin_ptr != NULL);
00123
00124     // Retrieve the class list.
00125     const stdair::BookingClassList_T lBookingClassList =
00126         stdair::BomManager::getList<stdair::BookingClass> (*lSegmentCabin_ptr);
00127
00128     // Generate the demand samples for the booking classes.
00129     for (stdair::BookingClassList_T::const_iterator itBC =
00130         lBookingClassList.begin(); itBC != lBookingClassList.end(); ++itBC) {
00131         stdair::BookingClass* lBookingClass_ptr = *itBC;
00132         assert (lBookingClass_ptr != NULL);
00133
00134         const stdair::Yield_T& lYield = lBookingClass_ptr->getYield();
00135         stdair::VirtualClassStruct lVirtualClass (*lBookingClass_ptr);
00136         lVirtualClass.setYield (lYield);
00137         lVirtualClass.setMean (lBookingClass_ptr->getMean());
00138         lVirtualClass.setStdDev (lBookingClass_ptr->getStdDev());
00139
00140         lVirtualClassMap.insert (stdair::VirtualClassMap_T::
00141             value_type (lYield, lVirtualClass));
00142     }
00143
00144     // Browse the virtual class map from high to low yield.
00145     ioLegCabin.emptyVirtualClassList();
00146     for (stdair::VirtualClassMap_T::reverse_iterator itVC =
00147         lVirtualClassMap.rbegin(); itVC != lVirtualClassMap.rend(); ++itVC) {
00148         stdair::VirtualClassStruct& lVC = itVC->second;
00149
00150         ioLegCabin.addVirtualClass (lVC);
00151     }
00152 }
00153
00154 // //////////////////////////////////////
00155 double Optimiser::
00156 optimiseUsingOnDForecast (stdair::FlightDate& ioFlightDate,
00157     const bool& iReduceFluctuations) {
00158     double lMaxBPVariation = 0.0;
00159     // Check if the flight date holds a list of leg dates.
00160     // If so, retrieve it and optimise the cabins.
00161     if (stdair::BomManager::hasList<stdair::LegDate> (ioFlightDate)) {
00162         STDAIR_LOG_DEBUG ("Optimisation for the flight date: "
00163             << ioFlightDate.toString());
00164         const stdair::LegDateList_T& lLDList =
00165             stdair::BomManager::getList<stdair::LegDate> (ioFlightDate);
00166         for (stdair::LegDateList_T::const_iterator itLD = lLDList.begin();
00167             itLD != lLDList.end(); ++itLD) {
00168             stdair::LegDate* lLD_ptr = *itLD;
00169             assert (lLD_ptr != NULL);
00170
00171             //
00172             const stdair::LegCabinList_T& lLCList =
00173                 stdair::BomManager::getList<stdair::LegCabin> (*lLD_ptr);

```

```

00174         for (stdair::LegCabinList_T::const_iterator itLC = lLCList.begin();
00175              itLC != lLCList.end(); ++itLC) {
00176             stdair::LegCabin* lLC_ptr = *itLC;
00177             assert (lLC_ptr != NULL);
00178             MCOptimiser::optimisationByMCIntegration (*lLC_ptr);
00179             const stdair::BidPrice_T& lCurrentBidPrice =
00180                 lLC_ptr->getCurrentBidPrice();
00181             const stdair::BidPrice_T& lPreviousBidPrice =
00182                 lLC_ptr->getPreviousBidPrice();
00183             assert (lPreviousBidPrice != 0);
00184             const double lBPVariation =
00185                 std::abs((lCurrentBidPrice - lPreviousBidPrice)/lPreviousBidPrice);
00186             lMaxBPVariation = std::max(lMaxBPVariation, lBPVariation);
00187         }
00188     }
00189 }
00190 return lMaxBPVariation;
00191 }
00192
00193 }
```

## 28.83 rmol/command/Optimiser.hpp File Reference

```
#include <rmol/RMOL_Types.hpp>
```

### Classes

- class [RMOL::Optimiser](#)

### Namespaces

- namespace [stdair](#)
- namespace [RMOL](#)

## 28.84 Optimiser.hpp

```

00001 #ifndef __RMOL_COMMAND_OPTIMISER_HPP
00002 #define __RMOL_COMMAND_OPTIMISER_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // RMOL
00008 #include <rmol/RMOL_Types.hpp>
00009
00010 // Forward declarations
00011 namespace stdair {
00012     class FlightDate;
00013     class LegCabin;
00014 }
00015
00016 namespace RMOL {
00018     class Optimiser {
00019     public:
```

```

00020
00032     static void optimalOptimisationByMCIntegration (const int K,
00033                                                    stdair::LegCabin&);
00034
00038     static void optimalOptimisationByDP (stdair::LegCabin&);
00039
00043     static void heuristicOptimisationByEmsr (stdair::LegCabin&);
00044
00048     static void heuristicOptimisationByEmsrA (stdair::LegCabin&);
00049
00053     static void heuristicOptimisationByEmsrB (stdair::LegCabin&);
00054
00058     static void optimise (stdair::FlightDate&);
00059
00063     static void buildVirtualClassListForLegBasedOptimisation (stdair::LegCabin&);
00064
00066     static double optimiseUsingOnDForecast (stdair::FlightDate&,
00067                                           const bool& iReduceFluctuations = fal
se);
00068
00069     };
00070 }
00071 #endif // __RMOL_COMMAND_OPTIMISER_HPP

```

## 28.85 rmol/config/rmol-paths.hpp File Reference

### Defines

- #define [PACKAGE](#) "rmol"
- #define [PACKAGE\\_NAME](#) "RMOL"
- #define [PACKAGE\\_VERSION](#) "0.25.3"
- #define [PREFIXDIR](#) "/usr"
- #define [EXEC\\_PREFIX](#) "/usr"
- #define [BINDIR](#) "/usr/bin"
- #define [LIBDIR](#) "/usr/lib"
- #define [LIBEXECDIR](#) "/usr/libexec"
- #define [SBINDIR](#) "/usr/sbin"
- #define [SYSCONFDIR](#) "/usr/etc"
- #define [INCLUDEDIR](#) "/usr/include"
- #define [DATAROOTDIR](#) "/usr/share"
- #define [DATADIR](#) "/usr/share"
- #define [DOCDIR](#) "/usr/share/doc/rmol-0.25.3"
- #define [MANDIR](#) "/usr/share/man"
- #define [INFODIR](#) "/usr/share/info"
- #define [HTMLDIR](#) "/usr/share/doc/rmol-0.25.3/html"
- #define [PDFDIR](#) "/usr/share/doc/rmol-0.25.3/html"
- #define [STDAIR\\_SAMPLE\\_DIR](#) "/usr/share/stdair/samples"

#### 28.85.1 Define Documentation

##### 28.85.1.1 #define PACKAGE "rmol"

Definition at line 4 of file [rmol-paths.hpp](#).



28.85.1.2 `#define PACKAGE_NAME "RMOL"`

Definition at line 5 of file `rmol-paths.hpp`.

Referenced by `readConfiguration()`.

28.85.1.3 `#define PACKAGE_VERSION "0.25.3"`

Definition at line 6 of file `rmol-paths.hpp`.

Referenced by `readConfiguration()`.

28.85.1.4 `#define PREFIXDIR "/usr"`

Definition at line 7 of file `rmol-paths.hpp`.

Referenced by `readConfiguration()`.

28.85.1.5 `#define EXEC_PREFIX "/usr"`

Definition at line 8 of file `rmol-paths.hpp`.

28.85.1.6 `#define BINDIR "/usr/bin"`

Definition at line 9 of file `rmol-paths.hpp`.

28.85.1.7 `#define LIBDIR "/usr/lib"`

Definition at line 10 of file `rmol-paths.hpp`.

28.85.1.8 `#define LIBEXECDIR "/usr/libexec"`

Definition at line 11 of file `rmol-paths.hpp`.

28.85.1.9 `#define SBINDIR "/usr/sbin"`

Definition at line 12 of file `rmol-paths.hpp`.

28.85.1.10 `#define SYSCONFDIR "/usr/etc"`

Definition at line 13 of file `rmol-paths.hpp`.

28.85.1.11 `#define INCLUDEDIR "/usr/include"`

Definition at line 14 of file `rmol-paths.hpp`.

28.85.1.12 `#define DATAROOTDIR "/usr/share"`

Definition at line 15 of file `rmol-paths.hpp`.

28.85.1.13 `#define DATADIR "/usr/share"`

Definition at line 16 of file `rmol-paths.hpp`.

28.85.1.14 `#define DOCDIR "/usr/share/doc/rmol-0.25.3"`

Definition at line 17 of file [rmol-paths.hpp](#).

28.85.1.15 `#define MANDIR "/usr/share/man"`

Definition at line 18 of file [rmol-paths.hpp](#).

28.85.1.16 `#define INFODIR "/usr/share/info"`

Definition at line 19 of file [rmol-paths.hpp](#).

28.85.1.17 `#define HTMLDIR "/usr/share/doc/rmol-0.25.3/html"`

Definition at line 20 of file [rmol-paths.hpp](#).

28.85.1.18 `#define PDFDIR "/usr/share/doc/rmol-0.25.3/html"`

Definition at line 21 of file [rmol-paths.hpp](#).

28.85.1.19 `#define STDAIR_SAMPLE_DIR "/usr/share/stdair/samples"`

Definition at line 22 of file [rmol-paths.hpp](#).

## 28.86 rmol-paths.hpp

```
00001 #ifndef __RMOL_PATHS_HPP__
00002 #define __RMOL_PATHS_HPP__
00003
00004 #define PACKAGE "rmol"
00005 #define PACKAGE_NAME "RMOL"
00006 #define PACKAGE_VERSION "0.25.3"
00007 #define PREFIXDIR "/usr"
00008 #define EXEC_PREFIX "/usr"
00009 #define BINDIR "/usr/bin"
00010 #define LIBDIR "/usr/lib"
00011 #define LIBEXECDIR "/usr/libexec"
00012 #define SBINDIR "/usr/sbin"
00013 #define SYSCONFDIR "/usr/etc"
00014 #define INCLUDEDIR "/usr/include"
00015 #define DATAROOTDIR "/usr/share"
00016 #define DATADIR "/usr/share"
00017 #define DOCDIR "/usr/share/doc/rmol-0.25.3"
00018 #define MANDIR "/usr/share/man"
00019 #define INFODIR "/usr/share/info"
00020 #define HTMLDIR "/usr/share/doc/rmol-0.25.3/html"
00021 #define PDFDIR "/usr/share/doc/rmol-0.25.3/html"
00022 #define STDAIR_SAMPLE_DIR "/usr/share/stdair/samples"
00023
00024 #endif // __RMOL_PATHS_HPP__
```

## 28.87 rmol/factory/FacRmolServiceContext.cpp File Reference

```
#include <cassert>
```

```
#include <stdair/service/FacSupervisor.hpp>
#include <rmol/factory/FacRmolServiceContext.hpp>
#include <rmol/service/RMOL_ServiceContext.hpp>
```

### Namespaces

- namespace **RMOL**

### 28.88 FacRmolServiceContext.cpp

```
00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 // StdAir
00007 #include <stdair/service/FacSupervisor.hpp>
00008 // RMOL
00009 #include <rmol/factory/FacRmolServiceContext.hpp>
00010 #include <rmol/service/RMOL_ServiceContext.hpp>
00011
00012 namespace RMOL {
00013
00014     FacRmolServiceContext* FacRmolServiceContext::_instance = NULL;
00015
00016     // //////////////////////////////////////
00017     FacRmolServiceContext::~FacRmolServiceContext() {
00018         _instance = NULL;
00019     }
00020
00021     // //////////////////////////////////////
00022     FacRmolServiceContext& FacRmolServiceContext::instance() {
00023
00024         if (_instance == NULL) {
00025             _instance = new FacRmolServiceContext();
00026             assert (_instance != NULL);
00027
00028             stdair::FacSupervisor::instance().registerServiceFactory (_instance);
00029         }
00030         return *_instance;
00031     }
00032
00033     // //////////////////////////////////////
00034     RMOL_ServiceContext& FacRmolServiceContext::create() {
00035         RMOL_ServiceContext* aServiceContext_ptr = NULL;
00036
00037         aServiceContext_ptr = new RMOL_ServiceContext();
00038         assert (aServiceContext_ptr != NULL);
00039
00040         // The new object is added to the Bom pool
00041         _pool.push_back (aServiceContext_ptr);
00042
00043         return *aServiceContext_ptr;
00044     }
00045 }
00046 }
```

**28.89 rmol/factory/FacRmolServiceContext.hpp File Reference**

```
#include <string>
#include <stdair/stdair_basic_types.hpp>
#include <stdair/service/FacServiceAbstract.hpp>
```

**Classes**

- class [RMOL::FacRmolServiceContext](#)  
*Factory for the service context.*

**Namespaces**

- namespace [RMOL](#)

**28.90 FacRmolServiceContext.hpp**

```
00001 #ifndef __RMOL_FAC_FACRMOLSERVICECONTEXT_HPP
00002 #define __RMOL_FAC_FACRMOLSERVICECONTEXT_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // STL
00008 #include <string>
00009 // StdAir
00010 #include <stdair/stdair_basic_types.hpp>
00011 #include <stdair/service/FacServiceAbstract.hpp>
00012
00013 namespace RMOL {
00014
00016     class RMOL_ServiceContext;
00017
00018
00022     class FacRmolServiceContext : public stdair::FacServiceAbstract {
00023     public:
00024
00031         static FacRmolServiceContext& instance();
00032
00039         ~FacRmolServiceContext();
00040
00048         RMOL_ServiceContext& create();
00049
00050
00051     protected:
00057         FacRmolServiceContext() {}
00058
00059
00060     private:
00064         static FacRmolServiceContext* _instance;
00065     };
00066
00067 }
00068 #endif // __RMOL_FAC_FACRMOLSERVICECONTEXT_HPP
```

## 28.91 rmol/RMOL\_Service.hpp File Reference

```
#include <string>
#include <stdair/stdair_basic_types.hpp>
#include <stdair/stdair_inventory_types.hpp>
#include <stdair/stdair_service_types.hpp>
#include <stdair/stdair_maths_types.hpp>
#include <stdair/basic/ForecastingMethod.hpp>
#include <stdair/basic/PartnershipTechnique.hpp>
#include <rmol/RMOL_Types.hpp>
```

### Classes

- class [RMOL::RMOL\\_Service](#)  
*Interface for the RMOL Services.*

### Namespaces

- namespace [stdair](#)
- namespace [RMOL](#)

## 28.92 RMOL\_Service.hpp

```
00001 #ifndef __RMOL_SVC_RMOL_SERVICE_HPP
00002 #define __RMOL_SVC_RMOL_SERVICE_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // STL
00008 #include <string>
00009 // StdAir
00010 #include <stdair/stdair_basic_types.hpp>
00011 #include <stdair/stdair_inventory_types.hpp>
00012 #include <stdair/stdair_service_types.hpp>
00013 #include <stdair/stdair_maths_types.hpp>
00014 #include <stdair/basic/ForecastingMethod.hpp>
00015 #include <stdair/basic/PartnershipTechnique.hpp>
00016 // RMOL
00017 #include <rmol/RMOL_Types.hpp>
00018
00020 namespace stdair {
00021     class FlightDate;
00022     struct BasLogParams;
00023     struct BasDBParams;
00024     class BomRoot;
00025     class AirlineClassList;
00026     class YieldFeatures;
00027     class Inventory;
```

```

00028     class OnDDate;
00029 }
00030
00031 namespace RMOL {
00032
00033     class RMOL_ServiceContext;
00034
00035
00036 class RMOL_Service {
00037 public:
00038     // ////////// Constructors and destructors //////////
00039     RMOL_Service (const stdair::BasLogParams&, const stdair::BasDBParams&);
00040
00041     RMOL_Service (const stdair::BasLogParams&);
00042
00043     RMOL_Service (stdair::STDAIR_ServicePtr_T);
00044
00045     void parseAndLoad (const stdair::CabinCapacity_T& iCabinCapacity,
00046                       const stdair::Filename_T& iDemandAndClassDataFile);
00047
00048     void setUpStudyStatManager();
00049
00050     ~RMOL_Service();
00051
00052 public:
00053     // ////////// Business Methods //////////
00054     void buildSampleBom();
00055
00056     void optimalOptimisationByMCIntegration (const int K);
00057
00058     void optimalOptimisationByDP();
00059
00060     void heuristicOptimisationByEmsr();
00061
00062     void heuristicOptimisationByEmsrA();
00063
00064     void heuristicOptimisationByEmsrB();
00065
00066     bool optimise (stdair::FlightDate&, const stdair::DateTime_T&,
00067                   const stdair::ForecastingMethod&, const stdair::PartnershipTec
00068 hnique&);
00069
00070     // O&D based forecast
00071     void forecastOnD (const stdair::DateTime_T&);
00072
00073     stdair::YieldFeatures* getYieldFeatures(const stdair::OnDDate&, const stdair:
00074 :CabinCode_T&,
00075                                           stdair::BomRoot&);
00076
00077     void forecastOnD (const stdair::YieldFeatures&, stdair::OnDDate&,
00078                     const stdair::CabinCode_T&, const stdair::DTD_T&,
00079                     stdair::BomRoot&);
00080
00081     void setOnDForecast (const stdair::AirlineClassList&, const stdair::MeanValue
00082 _T&,
00083                         const stdair::StdDevValue_T&, stdair::OnDDate&, const st
00084 dair::CabinCode_T&,
00085                         stdair::BomRoot&);
00086
00087     // Single segment O&D
00088     void setOnDForecast (const stdair::AirlineCode_T&, const stdair::Date_T&, con
00089 st stdair::AirportCode_T&,

```

```

00186         const stdair::AirportCode_T&, const stdair::CabinCode_T&
00187     , const stdair::ClassCode_T&,
00188         const stdair::MeanValue_T&, const stdair::StdDevValue_T&
00189     , const stdair::Yield_T&, stdair::BomRoot&);
00190
00191     // Multiple segment O&D
00192     void setOnDForecast (const stdair::AirlineCodeList_T&, const stdair::AirlineC
00193     ode_T&,const stdair::Date_T&,
00194         const stdair::AirportCode_T&, const stdair::AirportCode_
00195     T&, const stdair::CabinCode_T&,
00196         const stdair::ClassCodeList_T&, const stdair::MeanValue_
00197     T&, const stdair::StdDevValue_T&,
00198         const stdair::Yield_T&, stdair::BomRoot&);
00199
00200     // Initialise (or re-initialise) the demand projections in all leg cabins
00201     void resetDemandInformation (const stdair::DateTime_T&);
00202
00203     void resetDemandInformation (const stdair::DateTime_T&, const stdair::Invento
00204     ry&);
00205
00206     /* Projection of demand */
00207
00208     // Aggregated demand at booking class level.
00209     void projectAggregatedDemandOnLegCabins(const stdair::DateTime_T&);
00210
00211     // Static rule prorated yield
00212     void projectOnDDemandOnLegCabinsUsingYP(const stdair::DateTime_T&);
00213
00214     // Displacement-adjusted yield
00215     void projectOnDDemandOnLegCabinsUsingDA(const stdair::DateTime_T&);
00216
00217     // Dynamic yield proration (PF = BP_i/BP_{total}, where BP_{total} = sum(BP_i
00218     ))
00219     void projectOnDDemandOnLegCabinsUsingDYP(const stdair::DateTime_T&);
00220
00221     void projectOnDDemandOnLegCabinsUsingDYP(const stdair::DateTime_T&, const std
00222     air::Inventory&);
00223
00224     // O&D-based optimisation (using demand aggregation or demand aggregation).
00225     void optimiseOnD (const stdair::DateTime_T&);
00226
00227     // O&D-based optimisation using displacement-adjusted yield.
00228     void optimiseOnDUUsingRMCooperation (const stdair::DateTime_T&);
00229
00230     // Advanced version of O&D-based optimisation using displacement-adjusted yie
00231     ld.
00232     // Network optimisation instead of separate inventory optimisation.
00233     void optimiseOnDUUsingAdvancedRMCooperation (const stdair::DateTime_T&);
00234
00235     // Update bid price and send to partners
00236     void updateBidPrice (const stdair::DateTime_T&);
00237     void updateBidPrice (const stdair::FlightDate&, stdair::BomRoot&);
00238
00239 public:
00240     // ////////////////////////////////// Export support methods //////////////////////////////////
00241     std::string jsonExport (const stdair::AirlineCode_T&,
00242         const stdair::FlightNumber_T&,
00243         const stdair::Date_T& iDepartureDate) const;
00244
00245 public:
00246     // ////////////////////////////////// Display support methods //////////////////////////////////

```

```

00257     std::string csvDisplay() const;
00258
00259
00260 private:
00261     // ////////// Construction and Destruction helper methods //////////
00262     RMOL_Service();
00263
00264     RMOL_Service (const RMOL_Service&);
00265
00266     stdair::STDAIR_ServicePtr_T initStdAirService (const stdair::BasLogParams&,
00267                                                    const stdair::BasDBParams&);
00268
00269     stdair::STDAIR_ServicePtr_T initStdAirService (const stdair::BasLogParams&);
00270
00271     void addStdAirService (stdair::STDAIR_ServicePtr_T,
00272                           const bool iOwnStdairService);
00273
00274     void initServiceContext();
00275
00276     void initRmolService();
00277
00278     void finalise();
00279
00280 private:
00281     // ////////// Service Context //////////
00282     RMOL_ServiceContext* _rmolServiceContext;
00283
00284     stdair::Date_T _previousForecastDate;
00285 };
00286 }
00287 #endif // __RMOL_SVC_RMOL_SERVICE_HPP

```

## 28.93 rmol/RMOL\_Types.hpp File Reference

```

#include <map>
#include <vector>
#include <boost/shared_ptr.hpp>
#include <stdair/stdair_inventory_types.hpp>
#include <stdair/stdair_exceptions.hpp>

```

### Classes

- class [RMOL::OverbookingException](#)  
*Overbooking-related exception.*
- class [RMOL::UnconstrainingException](#)  
*Unconstraining-related exception.*
- class [RMOL::ForecastException](#)  
*Forecast-related exception.*
- class [RMOL::OptimisationException](#)  
*Optimisation-related exception.*



## Namespaces

- namespace [stdair](#)
- namespace [RMOL](#)

## Typedefs

- typedef boost::shared\_ptr< RMOL\_Service > [RMOL::RMOL\\_ServicePtr\\_T](#)
- typedef std::vector< stdair::NbOfRequests\_T > [RMOL::UnconstrainedDemandVector\\_T](#)
- typedef std::vector< stdair::NbOfBookings\_T > [RMOL::BookingVector\\_T](#)
- typedef std::vector< stdair::Flag\_T > [RMOL::FlagVector\\_T](#)
- typedef std::map< stdair::BookingClass \*, UnconstrainedDemandVector\_T > [RMOL::BookingClassUnconstrainedDemandVector\\_T](#)
- typedef std::map< stdair::BookingClass \*, stdair::NbOfRequests\_T > [RMOL::BookingClassUnconstrainedDemandVector\\_T](#)
- typedef std::map< const stdair::DTD\_T, double > [RMOL::FRAT5Curve\\_T](#)

## 28.94 RMOL\_Types.hpp

```

00001 #ifndef __RMOL_RMOL_TYPES_HPP
00002 #define __RMOL_RMOL_TYPES_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // STL
00008 #include <map>
00009 #include <vector>
00010 // Boost
00011 #include <boost/shared_ptr.hpp>
00012 // StdAir
00013 #include <stdair/stdair_inventory_types.hpp>
00014 #include <stdair/stdair_exceptions.hpp>
00015
00016 // Forward declarations.
00017 namespace stdair {
00018     class BookingClass;
00019 }
00020
00021 namespace RMOL {
00022
00023     // Forward declarations
00024     class RMOL_Service;
00025
00026     // /////////// Exceptions ///////////
00031     class OverbookingException : public stdair::RootException {
00032     public:
00034         OverbookingException (const std::string& iWhat)
00035             : stdair::RootException (iWhat) {}
00036     };
00037
00041     class UnconstrainingException : public stdair::RootException {
00042     public:

```

```

00044     UnconstrainingException (const std::string& iWhat)
00045         : stdair::RootException (iWhat) {}
00046 };
00047
00051 class ForecastException : public stdair::RootException {
00052 public:
00054     ForecastException (const std::string& iWhat)
00055         : stdair::RootException (iWhat) {}
00056 };
00057
00061 class OptimisationException : public stdair::RootException {
00062 public:
00064     OptimisationException (const std::string& iWhat)
00065         : stdair::RootException (iWhat) {}
00066 };
00067
00068
00069 // ////////// Type definitions //////////
00073 typedef boost::shared_ptr<RMOL_Service> RMOL_ServicePtr_T;
00074
00076 typedef std::vector<stdair::NbOfRequests_T> UnconstrainedDemandVector_T;
00077
00079 typedef std::vector<stdair::NbOfBookings_T> BookingVector_T;
00080
00082 typedef std::vector<stdair::Flag_T> FlagVector_T;
00083
00086 typedef std::map<stdair::BookingClass*, UnconstrainedDemandVector_T>
BookingClassUnconstrainedDemandVectorMap_T;
00087
00090 typedef std::map<stdair::BookingClass*, stdair::NbOfRequests_T>
BookingClassUnconstrainedDemandMap_T;
00091
00093 typedef std::map<const stdair::DTD_T, double> FRAT5Curve_T;
00094
00095 }
00096 #endif // __RMOL_RMOL_TYPES_HPP

```

## 28.95 rmol/service/RMOL\_Service.cpp File Reference

```

#include <cassert>
#include <boost/make_shared.hpp>
#include <stdair/stdair_inventory_types.hpp>
#include <stdair/basic/BasChronometer.hpp>
#include <stdair/basic/ContinuousAttributeLite.hpp>
#include <stdair/bom/BomManager.hpp>
#include <stdair/bom/BomRetriever.hpp>
#include <stdair/bom/BomRoot.hpp>
#include <stdair/bom/Inventory.hpp>
#include <stdair/bom/FlightDate.hpp>
#include <stdair/bom/LegCabin.hpp>
#include <stdair/bom/LegDate.hpp>

```

```

#include <stdair/bom/YieldFeatures.hpp>
#include <stdair/bom/AirportPair.hpp>
#include <stdair/bom/PosChannel.hpp>
#include <stdair/bom/DatePeriod.hpp>
#include <stdair/bom/TimePeriod.hpp>
#include <stdair/bom/AirlineClassList.hpp>
#include <stdair/basic/BasConst_Request.hpp>
#include <stdair/basic/BasConst_Inventory.hpp>
#include <stdair/bom/SegmentDate.hpp>
#include <stdair/bom/SegmentCabin.hpp>
#include <stdair/bom/BookingClass.hpp>
#include <stdair/bom/OnDDate.hpp>
#include <stdair/bom/OnDDateTypes.hpp>
#include <stdair/command/CmdBomManager.hpp>
#include <stdair/service/Logger.hpp>
#include <stdair/STDAIR_Service.hpp>
#include <rmol/basic/BasConst_RMOL_Service.hpp>
#include <rmol/factory/FacRmolServiceContext.hpp>
#include <rmol/command/InventoryParser.hpp>
#include <rmol/command/Optimiser.hpp>
#include <rmol/command/Forecaster.hpp>
#include <rmol/service/RMOL_ServiceContext.hpp>
#include <rmol/RMOL_Service.hpp>

```

### Namespaces

- namespace [RMOL](#)

### 28.96 RMOL\_Service.cpp

```

00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 // Boost
00007 #include <boost/make_shared.hpp>
00008 // StdAir
00009 #include <stdair/stdair_inventory_types.hpp>
00010 #include <stdair/basic/BasChronometer.hpp>

```

```

00011 #include <stdair/basic/ContinuousAttributeLite.hpp>
00012 #include <stdair/bom/BomManager.hpp>
00013 #include <stdair/bom/BomRetriever.hpp>
00014 #include <stdair/bom/BomRoot.hpp>
00015 #include <stdair/bom/Inventory.hpp>
00016 #include <stdair/bom/FlightDate.hpp>
00017 #include <stdair/bom/LegCabin.hpp>
00018 #include <stdair/bom/LegDate.hpp>
00019 #include <stdair/bom/YieldFeatures.hpp>
00020 #include <stdair/bom/AirportPair.hpp>
00021 #include <stdair/bom/PosChannel.hpp>
00022 #include <stdair/bom/DatePeriod.hpp>
00023 #include <stdair/bom/TimePeriod.hpp>
00024 #include <stdair/bom/AirlineClassList.hpp>
00025 #include <stdair/basic/BasConst_Request.hpp>
00026 #include <stdair/basic/BasConst_Inventory.hpp>
00027 #include <stdair/bom/Inventory.hpp>
00028 #include <stdair/bom/FlightDate.hpp>
00029 #include <stdair/bom/SegmentDate.hpp>
00030 #include <stdair/bom/SegmentCabin.hpp>
00031 #include <stdair/bom/BookingClass.hpp>
00032 #include <stdair/bom/OnDDate.hpp>
00033 #include <stdair/bom/OnDDateTypes.hpp>
00034 #include <stdair/command/CmdBomManager.hpp>
00035 #include <stdair/service/Logger.hpp>
00036 #include <stdair/STDAIR_Service.hpp>
00037 // RMOL
00038 #include <rmol/basic/BasConst_RMOL_Service.hpp>
00039 #include <rmol/factory/FacRmolServiceContext.hpp>
00040 #include <rmol/command/InventoryParser.hpp>
00041 #include <rmol/command/Optimiser.hpp>
00042 #include <rmol/command/Forecaster.hpp>
00043 #include <rmol/service/RMOL_ServiceContext.hpp>
00044 #include <rmol/RMOL_Service.hpp>
00045
00046 namespace RMOL {
00047
00048 //////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
00049 RMOL_Service::RMOL_Service()
00050 : _rmolServiceContext (NULL),
00051   _previousForecastDate (stdair::Date_T (2000, 1, 1)) {
00052     assert (false);
00053 }
00054
00055 //////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
00056 RMOL_Service::RMOL_Service (const RMOL_Service& iService) :
00057   _rmolServiceContext (NULL),
00058   _previousForecastDate (stdair::Date_T (2000, 1, 1)) {
00059     assert (false);
00060 }
00061
00062 //////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
00063 RMOL_Service::RMOL_Service (const stdair::BasLogParams& iLogParams) :
00064   _rmolServiceContext (NULL),
00065   _previousForecastDate (stdair::Date_T (2000, 1, 1)) {
00066
00067     // Initialise the STDAIR service handler
00068     stdair::STDAIR_ServicePtr_T lSTDAIR_Service_ptr =
00069       initStdAirService (iLogParams);
00070
00071     // Initialise the service context
00072     initServiceContext ();

```

```

00073
00074     // Add the StdAir service context to the RMOL service context
00075     // \note RMOL owns the STDAIR service resources here.
00076     const bool ownStdairService = true;
00077     addStdAirService (lSTDAIR_Service_ptr, ownStdairService);
00078
00079     // Initialise the (remaining of the) context
00080     initRmolService();
00081 }
00082
00083 // //////////////////////////////////////
00084 RMOL_Service::RMOL_Service (const stdair::BasLogParams& iLogParams,
00085                             const stdair::BasDBParams& iDBParams) :
00086     _rmolServiceContext (NULL),
00087     _previousForecastDate (stdair::Date_T (2000, 1, 1)) {
00088
00089     // Initialise the STDAIR service handler
00090     stdair::STDAIR_ServicePtr_T lSTDAIR_Service_ptr =
00091         initStdAirService (iLogParams, iDBParams);
00092
00093     // Initialise the service context
00094     initServiceContext();
00095
00096     // Add the StdAir service context to the RMOL service context
00097     // \note RMOL owns the STDAIR service resources here.
00098     const bool ownStdairService = true;
00099     addStdAirService (lSTDAIR_Service_ptr, ownStdairService);
00100
00101     // Initialise the (remaining of the) context
00102     initRmolService();
00103 }
00104
00105 // //////////////////////////////////////
00106 RMOL_Service::RMOL_Service (stdair::STDAIR_ServicePtr_T ioSTDAIRServicePtr)
00107     : _rmolServiceContext (NULL),
00108     _previousForecastDate (stdair::Date_T (2000, 1, 1)) {
00109
00110     // Initialise the context
00111     initServiceContext();
00112
00113     // Add the StdAir service context to the RMOL service context.
00114     // \note RMOL does not own the STDAIR service resources here.
00115     const bool doesNotOwnStdairService = false;
00116     addStdAirService (ioSTDAIRServicePtr, doesNotOwnStdairService);
00117
00118     // Initialise the (remaining of the) context
00119     initRmolService();
00120 }
00121
00122 // //////////////////////////////////////
00123 RMOL_Service::~RMOL_Service() {
00124     // Delete/Clean all the objects from memory
00125     finalise();
00126 }
00127
00128 // //////////////////////////////////////
00129 void RMOL_Service::finalise() {
00130     assert (_rmolServiceContext != NULL);
00131     // Reset the (Boost.)Smart pointer pointing on the STDAIR_Service object.
00132     _rmolServiceContext->reset();
00133 }
00134

```

```

00135 ///////////////////////////////////////////////////////////////////
00136 void RMOL_Service::initServiceContext() {
00137     // Initialise the service context
00138     RMOL_ServiceContext& lRMOL_ServiceContext =
00139         FacRmolServiceContext::instance().create();
00140     _rmolServiceContext = &lRMOL_ServiceContext;
00141 }
00142
00143 ///////////////////////////////////////////////////////////////////
00144 void RMOL_Service::
00145 addStdAirService (stdair::STDAIR_ServicePtr_T ioSTDAIR_Service_ptr,
00146                  const bool iOwnStdairService) {
00147
00148     // Retrieve the RMOL service context
00149     assert (_rmolServiceContext != NULL);
00150     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00151
00152     // Store the STDAIR service object within the (AIRINV) service context
00153     lRMOL_ServiceContext.setSTDAIR_Service (ioSTDAIR_Service_ptr,
00154                                             iOwnStdairService);
00155 }
00156
00157 ///////////////////////////////////////////////////////////////////
00158 stdair::STDAIR_ServicePtr_T RMOL_Service::
00159 initStdAirService (const stdair::BasLogParams& iLogParams) {
00160
00161     stdair::STDAIR_ServicePtr_T lSTDAIR_Service_ptr =
00162         boost::make_shared<stdair::STDAIR_Service> (iLogParams);
00163
00164     return lSTDAIR_Service_ptr;
00165 }
00166
00167 ///////////////////////////////////////////////////////////////////
00168 stdair::STDAIR_ServicePtr_T RMOL_Service::
00169 initStdAirService (const stdair::BasLogParams& iLogParams,
00170                  const stdair::BasDBParams& iDBParams) {
00171
00172     stdair::STDAIR_ServicePtr_T lSTDAIR_Service_ptr =
00173         boost::make_shared<stdair::STDAIR_Service> (iLogParams, iDBParams);
00174
00175     return lSTDAIR_Service_ptr;
00176 }
00177
00178 ///////////////////////////////////////////////////////////////////
00179 void RMOL_Service::initRmolService() {
00180     // Do nothing at this stage. A sample BOM tree may be built by
00181     // calling the buildSampleBom() method
00182 }
00183
00184 ///////////////////////////////////////////////////////////////////
00185 void RMOL_Service::
00186 parseAndLoad (const stdair::CabinCapacity_T& iCabinCapacity,
00187              const stdair::Filename_T& iInputFileName) {
00188
00189     // Retrieve the RMOL service context
00190     if (_rmolServiceContext == NULL) {
00191         throw stdair::NonInitialisedServiceException ("The RMOL service has not"
00192                                                         " been initialised");
00193     }
00194     assert (_rmolServiceContext != NULL);
00195     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00196 }

```

```

00211 // Retrieve the StdAir service object from the (RMOL) service context
00212 stdair::STDAIR_Service& lSTDAIR_Service =
00213     lRMOL_ServiceContext.getSTDAIR_Service();
00214 stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
00215
00216 // Build a dummy inventory with a leg-cabin which has the given capacity.
00217 lSTDAIR_Service.buildDummyInventory (iCabinCapacity);
00218
00219 // Complete the BOM tree with the optimisation problem specification
00220 InventoryParser::parseInputFileAndBuildBom (iInputFileName, lBomRoot);
00221 }
00222
00223 // //////////////////////////////////////
00224 void RMOL_Service::buildSampleBom() {
00225
00226     // Retrieve the RMOL service context
00227     if (_rmolServiceContext == NULL) {
00228         throw stdair::NonInitialisedServiceException ("The RMOL service has not"
00229             " been initialised");
00230     }
00231     assert (_rmolServiceContext != NULL);
00232
00233     // Retrieve the RMOL service context and whether it owns the Stdair
00234     // service
00235     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00236     const bool doesOwnStdairService =
00237         lRMOL_ServiceContext.getOwnStdairServiceFlag();
00238
00239     // Retrieve the StdAir service object from the (RMOL) service context
00240     stdair::STDAIR_Service& lSTDAIR_Service =
00241         lRMOL_ServiceContext.getSTDAIR_Service();
00242
00243     if (doesOwnStdairService == true) {
00244         //
00245         lSTDAIR_Service.buildSampleBom();
00246     }
00247 }
00248
00249 // //////////////////////////////////////
00250 void RMOL_Service::optimalOptimisationByMCIntegration (const int K) {
00251     assert (_rmolServiceContext != NULL);
00252     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00253
00254     // Retrieve the StdAir service
00255     stdair::STDAIR_Service& lSTDAIR_Service =
00256         lRMOL_ServiceContext.getSTDAIR_Service();
00257     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
00258
00259     //
00260     stdair::LegCabin& lLegCabin =
00261         stdair::BomRetriever::retrieveDummyLegCabin (lBomRoot);
00262
00263     stdair::BasChronometer lOptimisationChronometer;
00264     lOptimisationChronometer.start();
00265
00266     Optimiser::optimalOptimisationByMCIntegration (K, lLegCabin);
00267
00268     const double lOptimisationMeasure = lOptimisationChronometer.elapsed();
00269
00270     // DEBUG
00271     STDAIR_LOG_DEBUG ("Optimisation by Monte-Carlo performed in "

```

```

00294         << lOptimisationMeasure);
00295     STDAIR_LOG_DEBUG ("Result: " << lLegCabin.displayVirtualClassList());
00296
00297     std::ostream logStream;
00298     stdair::BidPriceVector_T lBidPriceVector = lLegCabin.getBidPriceVector();
00299     logStream << "Bid-Price Vector (BPV): ";
00300     unsigned int size = lBidPriceVector.size();
00301
00302     for (unsigned int i = 0; i < size - 1; ++i) {
00303         const double bidPrice = lBidPriceVector.at(i);
00304         logStream << std::fixed << std::setprecision (2) << bidPrice << ", ";
00305     }
00306     const double bidPrice = lBidPriceVector.at(size - 1);
00307     logStream << std::fixed << std::setprecision (2) << bidPrice;
00308     STDAIR_LOG_DEBUG (logStream.str());
00309 }
00310
00311 // //////////////////////////////////////
00312 void RMOL_Service::optimalOptimisationByDP() {
00313 }
00314
00315 // //////////////////////////////////////
00316 void RMOL_Service::heuristicOptimisationByEmsr() {
00317     assert (_rmolServiceContext != NULL);
00318     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00319
00320     // Retrieve the StdAir service
00321     stdair::STDAIR_Service& lSTDAIR_Service =
00322         lRMOL_ServiceContext.getSTDAIR_Service();
00323     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
00324
00325     //
00326     stdair::LegCabin& lLegCabin =
00327         stdair::BomRetriever::retrieveDummyLegCabin (lBomRoot);
00328
00329     stdair::BasChronometer lOptimisationChronometer;
00330     lOptimisationChronometer.start();
00331
00332     Optimiser::heuristicOptimisationByEmsr (lLegCabin);
00333
00334     const double lOptimisationMeasure = lOptimisationChronometer.elapsed();
00335     // DEBUG
00336     STDAIR_LOG_DEBUG ("Optimisation EMSR performed in "
00337         << lOptimisationMeasure);
00338     STDAIR_LOG_DEBUG ("Result: " << lLegCabin.displayVirtualClassList());
00339
00340     stdair::BidPriceVector_T lBidPriceVector = lLegCabin.getBidPriceVector();
00341     std::ostream logStream;
00342     logStream << "Bid-Price Vector (BPV): ";
00343     unsigned int idx = 0;
00344     for (stdair::BidPriceVector_T::const_iterator itBP = lBidPriceVector.begin();
00345
00346         itBP != lBidPriceVector.end(); ++itBP) {
00347         if (idx != 0) {
00348             logStream << ", ";
00349         }
00350         const stdair::BidPrice_T& lBidPrice = *itBP;
00351         logStream << std::fixed << std::setprecision (2) << lBidPrice;
00352     }
00353     // DEBUG
00354     STDAIR_LOG_DEBUG (logStream.str());
00355 }

```



```

00355
00356 ///////////////////////////////////////////////////////////////////
00357 void RMOL_Service::heuristicOptimisationByEmsrA() {
00358     assert (_rmolServiceContext != NULL);
00359     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00360
00361     // Retrieve the StdAir service
00362     stdair::STDAIR_Service& lSTDAIR_Service =
00363         lRMOL_ServiceContext.getSTDAIR_Service();
00364     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
00365
00366     //
00367     stdair::LegCabin& lLegCabin =
00368         stdair::BomRetriever::retrieveDummyLegCabin (lBomRoot);
00369
00370     Optimiser::heuristicOptimisationByEmsrA (lLegCabin);
00371
00372     // DEBUG
00373     STDAIR_LOG_DEBUG ("Result: " << lLegCabin.displayVirtualClassList());
00374
00375 }
00376
00377 ///////////////////////////////////////////////////////////////////
00378 void RMOL_Service::heuristicOptimisationByEmsrB() {
00379     assert (_rmolServiceContext != NULL);
00380     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00381
00382     // Retrieve the StdAir service
00383     stdair::STDAIR_Service& lSTDAIR_Service =
00384         lRMOL_ServiceContext.getSTDAIR_Service();
00385     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
00386
00387     //
00388     stdair::LegCabin& lLegCabin =
00389         stdair::BomRetriever::retrieveDummyLegCabin (lBomRoot);
00390
00391     Optimiser::heuristicOptimisationByEmsrB (lLegCabin);
00392
00393     // DEBUG
00394     STDAIR_LOG_DEBUG ("Result: " << lLegCabin.displayVirtualClassList());
00395 }
00396
00397 ///////////////////////////////////////////////////////////////////
00398 bool RMOL_Service::
00399 optimise (stdair::FlightDate& ioFlightDate,
00400          const stdair::DateTime_T& iRMEEventTime,
00401          const stdair::ForecastingMethod& iForecastingMethod,
00402          const stdair::PartnershipTechnique& iPartnershipTechnique) {
00403
00404
00405     STDAIR_LOG_DEBUG ("Forecast & Optimisation");
00406
00407     const stdair::PartnershipTechnique::EN_PartnershipTechnique& lPartnershipTech
nique =
00408         iPartnershipTechnique.getTechnique();
00409
00410     switch (lPartnershipTechnique) {
00411     case stdair::PartnershipTechnique::RAE_DA:
00412     case stdair::PartnershipTechnique::IBP_DA: {
00413         if (_previousForecastDate < iRMEEventTime.date()) {
00414             forecastOnD (iRMEEventTime);
00415             resetDemandInformation (iRMEEventTime);

```

```

00416         projectAggregatedDemandOnLegCabins (iRMEventTime);
00417         optimiseOnD (iRMEventTime);
00418     }
00419     break;
00420 }
00421 case stdair::PartnershipTechnique::RAE_YP:
00422 case stdair::PartnershipTechnique::IBP_YP:
00423 case stdair::PartnershipTechnique::IBP_YP_U: {
00424     if (_previousForecastDate < iRMEventTime.date()) {
00425         forecastOnD (iRMEventTime);
00426         resetDemandInformation (iRMEventTime);
00427         projectOnDDemandOnLegCabinsUsingYP (iRMEventTime);
00428         optimiseOnD (iRMEventTime);
00429     }
00430     break;
00431 }
00432 case stdair::PartnershipTechnique::RMC: {
00433     if (_previousForecastDate < iRMEventTime.date()) {
00434         forecastOnD (iRMEventTime);
00435         resetDemandInformation (iRMEventTime);
00436         updateBidPrice (iRMEventTime);
00437         projectOnDDemandOnLegCabinsUsingDYP (iRMEventTime);
00438         optimiseOnDUsingRMCooperation (iRMEventTime);
00439     }
00440     break;
00441 }
00442 case stdair::PartnershipTechnique::A_RMC: {
00443     if (_previousForecastDate < iRMEventTime.date()) {
00444         forecastOnD (iRMEventTime);
00445         resetDemandInformation (iRMEventTime);
00446         updateBidPrice (iRMEventTime);
00447         projectOnDDemandOnLegCabinsUsingDYP (iRMEventTime);
00448         optimiseOnDUsingAdvancedRMCooperation (iRMEventTime);
00449     }
00450     break;
00451 }
00452 case stdair::PartnershipTechnique::NONE: {
00453     // DEBUG
00454     STDAIR_LOG_DEBUG ("Forecast");
00455
00456     // 1. Forecast
00457     bool isForecasted = false;
00458     const stdair::ForecastingMethod& lForecastingMethod=
00459         iForecastingMethod.getMethod();
00460     switch (lForecastingMethod) {
00461     case stdair::ForecastingMethod::ADD_PK: {
00462         isForecasted = Forecaster::forecastUsingAdditivePickUp (ioFlightDate,
00463                                                                 iRMEventTime);
00464         break;
00465     }
00466     case stdair::ForecastingMethod::MUL_PK: {
00467         isForecasted =
00468             Forecaster::forecastUsingMultiplicativePickUp (ioFlightDate,
00469                                                            iRMEventTime);
00470         break;
00471     }
00472     default: {
00473         assert (false);
00474         break;
00475     }
00476 }
00477

```

```

00478         // DEBUG
00479         STDAIR_LOG_DEBUG ("Forecast successful: " << isForecasted);
00480
00481         // 2. Optimisation
00482         if (isForecasted == true) {
00483             // DEBUG
00484             STDAIR_LOG_DEBUG ("Optimise");
00485
00486             Optimiser::optimise (ioFlightDate);
00487             return true;
00488         }
00489         break;
00490     }
00491     default:{
00492         assert (false);
00493         break;
00494     }
00495 }
00496 return false;
00497 }
00498
00499 // //////////////////////////////////////
00500 void RMOL_Service::forecastOnD (const stdair::DateTime_T& iRMEventTime) {
00501
00502     if (_rmolServiceContext == NULL) {
00503         throw stdair::NonInitialisedServiceException ("The Rmol service "
00504                                                     "has not been initialised");
00505     }
00506     assert (_rmolServiceContext != NULL);
00507     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00508
00509     // Retrieve the bom root
00510     stdair::STDAIR_Service& lSTDAIR_Service =
00511         lRMOL_ServiceContext.getSTDAIR_Service();
00512     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
00513
00514     // Retrieve the date from the RM event
00515     const stdair::Date_T lDate = iRMEventTime.date();
00516
00517     _previousForecastDate = lDate;
00518
00519     const stdair::InventoryList_T& lInventoryList =
00520         stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
00521     assert (!lInventoryList.empty());
00522     for (stdair::InventoryList_T::const_iterator itInv = lInventoryList.begin();
00523          itInv != lInventoryList.end(); ++itInv) {
00524         const stdair::Inventory* lInventory_ptr = *itInv;
00525         assert (lInventory_ptr != NULL);
00526         if (stdair::BomManager::hasList<stdair::OnDDate> (*lInventory_ptr)) {
00527             const stdair::OnDDateList_T lOnDDateList =
00528                 stdair::BomManager::getList<stdair::OnDDate> (*lInventory_ptr);
00529
00530             for (stdair::OnDDateList_T::const_iterator itOD = lOnDDateList.begin();
00531                  itOD != lOnDDateList.end(); ++itOD) {
00532                 stdair::OnDDate* lOnDDate_ptr = *itOD;
00533                 assert (lOnDDate_ptr != NULL);
00534
00535                 const stdair::Date_T& lDepartureDate = lOnDDate_ptr->getDate();
00536                 stdair::DateOffset_T lDateOffset = lDepartureDate - lDate;
00537                 stdair::DTD_T lDTD = short (lDateOffset.days());
00538
00539                 stdair::DCPList_T::const_iterator itDCP =

```

```

00540         std::find (stdair::DEFAULT_DCP_LIST.begin(),
00541                   stdair::DEFAULT_DCP_LIST.end(), lDtd);
00542         // Check if the forecast for this O&D date needs to be forecasted.
00543         if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
00544             // Retrieve the total forecast map.
00545             const stdair::CabinForecastMap_T& lTotalForecastMap =
00546                 lOnDDate_ptr->getTotalForecastMap();
00547
00548             // Browse the map and make a forecast for every cabin.
00549             for (stdair::CabinForecastMap_T::const_iterator itCF =
00550                 lTotalForecastMap.begin();
00551                  itCF != lTotalForecastMap.end(); ++itCF) {
00552                 const stdair::CabinCode_T lCabinCode = itCF->first;
00553                 stdair::YieldFeatures* lYieldFeatures_ptr =
00554                     getYieldFeatures(*lOnDDate_ptr, lCabinCode, lBomRoot);
00555                 if (lYieldFeatures_ptr == NULL) {
00556                     STDAIR_LOG_ERROR ("Cannot find yield corresponding to "
00557                                     << "the O&D date"
00558                                     << lOnDDate_ptr->toString()
00559                                     << " Cabin " << lCabinCode);
00560                     assert (false);
00561                 }
00562                 forecastOnD (*lYieldFeatures_ptr, *lOnDDate_ptr, lCabinCode, lDtd,
00563                             lBomRoot);
00564             }
00565         }
00566     }
00567 }
00568 }
00569 }
00570
00571 // //////////////////////////////////////
00572 stdair::YieldFeatures* RMOL_Service::
00573 getYieldFeatures(const stdair::OnDDate& iOnDDate,
00574                 const stdair::CabinCode_T& iCabinCode,
00575                 stdair::BomRoot& iBomRoot) {
00576
00577     const stdair::AirportCode_T& lOrigin = iOnDDate.getOrigin();
00578     const stdair::AirportCode_T& lDestination = iOnDDate.getDestination();
00579
00580     const stdair::Date_T& lDepartureDate = iOnDDate.getDate();
00581
00582     // Build the airport pair key out of O&D and get the airport pair object
00583     const stdair::AirportPairKey lAirportPairKey(lOrigin, lDestination);
00584     stdair::AirportPair* lAirportPair_ptr = stdair::BomManager::
00585         getObjectPtr<stdair::AirportPair> (iBomRoot,
00586                                           lAirportPairKey.toString());
00587     if (lAirportPair_ptr == NULL) {
00588         STDAIR_LOG_ERROR ("Cannot find yield corresponding to the airport "
00589                         << "pair: " << lAirportPairKey.toString());
00590         assert (false);
00591     }
00592
00593     // Retrieve the corresponding date period to lDepartureDate.
00594     const stdair::DatePeriodList_T lDatePeriodList =
00595         stdair::BomManager::getList<stdair::DatePeriod> (*lAirportPair_ptr);
00596     for (stdair::DatePeriodList_T::const_iterator itDatePeriod =
00597         lDatePeriodList.begin();
00598          itDatePeriod != lDatePeriodList.end(); ++itDatePeriod) {
00599         const stdair::DatePeriod* lDatePeriod_ptr = *itDatePeriod;
00600         assert (lDatePeriod_ptr != NULL);
00601     }

```

```

00602     const bool isDepartureDateValid =
00603         lDatePeriod_ptr->isDepartureDateValid (lDepartureDate);
00604
00605     if (isDepartureDateValid == true) {
00606         // Retrieve the PoS-Channel.
00607         // TODO: Use POS and Channel from demand instead of default
00608         const stdair::PosChannelKey lPosChannelKey (stdair::DEFAULT_POS,
00609                                                     stdair::DEFAULT_CHANNEL);
00610         stdair::PosChannel* lPosChannel_ptr = stdair::BomManager::
00611             getObjectPtr<stdair::PosChannel> (*lDatePeriod_ptr,
00612                                               lPosChannelKey.toString());
00613         if (lPosChannel_ptr == NULL) {
00614             STDAIR_LOG_ERROR ("Cannot find yield corresponding to the PoS-"
00615                               << "Channel: " << lPosChannelKey.toString());
00616             assert (false);
00617         }
00618         // Retrieve the yield features.
00619         const stdair::TimePeriodList_T lTimePeriodList = stdair::
00620             BomManager::getList<stdair::TimePeriod> (*lPosChannel_ptr);
00621         for (stdair::TimePeriodList_T::const_iterator itTimePeriod =
00622             lTimePeriodList.begin();
00623             itTimePeriod != lTimePeriodList.end(); ++itTimePeriod) {
00624             const stdair::TimePeriod* lTimePeriod_ptr = *itTimePeriod;
00625             assert (lTimePeriod_ptr != NULL);
00626
00627             // TODO: Use trip type from demand instead of default value.
00628             const stdair::YieldFeaturesKey lYieldFeaturesKey (stdair::TRIP_TYPE_ONE
_WAY,
00629                                                             iCabinCode);
00630             stdair::YieldFeatures* oYieldFeatures_ptr = stdair::BomManager::
00631                 getObjectPtr<stdair::YieldFeatures> (*lTimePeriod_ptr,
00632                                                       lYieldFeaturesKey.toString());
00633             if (oYieldFeatures_ptr != NULL) {
00634                 return oYieldFeatures_ptr;
00635             }
00636         }
00637     }
00638 }
00639 return NULL;
00640
00641 }
00642
00643
00644 // //////////////////////////////////////
00645 void RMOL_Service::
00646 forecastOnD (const stdair::YieldFeatures& iYieldFeatures,
00647             stdair::OnDDate& iOnDDate,
00648             const stdair::CabinCode_T& iCabinCode,
00649             const stdair::DTD_T& iDTD,
00650             stdair::BomRoot& iBomRoot) {
00651
00652     const stdair::AirlineClassListList_T lAirlineClassListList =
00653         stdair::BomManager::getList<stdair::AirlineClassList> (iYieldFeatures);
00654     assert (lAirlineClassListList.begin() != lAirlineClassListList.end());
00655
00656     // Yield order check
00657     stdair::AirlineClassListList_T::const_iterator itACL =
00658         lAirlineClassListList.begin();
00659     stdair::Yield_T lPreviousYield ((*itACL)->getYield());
00660     ++itACL;
00661     for (; itACL != lAirlineClassListList.end(); ++itACL) {
00662         const stdair::AirlineClassList* lAirlineClassList = *itACL;

```

```

00663     const stdair::Yield_T& lYield = lAirlineClassList->getYield();
00664     if (lYield <= lPreviousYield) {
00665         lPreviousYield = lYield;
00666     }
00667     else{
00668         STDAIR_LOG_ERROR ("Yields should be given in a descendant order"
00669             << " in the yield input file") ;
00670         assert (false);
00671     }
00672 }
00673 // Proportion factor list initialisation
00674 // Each element corresponds to a yield rule
00675 stdair::ProportionFactorList_T lProportionFactorList;
00676 stdair::ProportionFactor_T lPreviousProportionFactor = 0;
00677
00678 // Retrieve the minimal willingness to pay associated to the demand
00679 const stdair::WTPDemandPair_T& lTotalForecast =
00680     iOnDDate.getTotalForecast (iCabinCode);
00681 const stdair::WTP_T& lMinWTP = lTotalForecast.first;
00682
00683 // Retrieve the remaining percentage of booking requests
00684 const stdair::ContinuousAttributeLite<stdair::FloatDuration_T>
00685     lArrivalPattern (stdair::DEFAULT_DTD_PROB_MAP);
00686
00687 STDAIR_LOG_DEBUG (lArrivalPattern.displayCumulativeDistribution());
00688 const stdair::Probability_T lRemainingProportion =
00689     lArrivalPattern.getRemainingProportion(-float(iDTD));
00690
00691 // Compute the characteristics (mean and std dev) of the total
00692 // forecast demand to come
00693 const stdair::MeanStdDevPair_T lForecatsMeanStdDevPair =
00694     lTotalForecast.second;
00695 const stdair::MeanValue_T& lMeanValue =
00696     lForecatsMeanStdDevPair.first;
00697 const stdair::MeanValue_T& lRemainingMeanValue =
00698     lRemainingProportion*lMeanValue;
00699 const stdair::StdDevValue_T& lStdDevValue =
00700     lForecatsMeanStdDevPair.second;
00701 const stdair::StdDevValue_T& lRemainingStdDevValue =
00702     lRemainingProportion*lStdDevValue;
00703
00704 // Retrieve the frat5 coef corresponding to the input dtd
00705 stdair::DTDFratMap_T::const_iterator itDFC =
00706     stdair::DEFAULT_DTD_FRAT5COEF_MAP.find(iDTD);
00707 if (itDFC == stdair::DEFAULT_DTD_FRAT5COEF_MAP.end()) {
00708     STDAIR_LOG_ERROR ("Cannot find frat5 coef for DTD = " << iDTD );
00709     assert (false);
00710 }
00711 stdair::RealNumber_T lFrat5Coef =
00712     stdair::DEFAULT_DTD_FRAT5COEF_MAP.at(iDTD);
00713
00714 STDAIR_LOG_DEBUG ("Remaining proportion " << lRemainingProportion
00715     << " Total " << lMeanValue
00716     << " StdDev " << lStdDevValue
00717     << "Frat5 Coef " << lFrat5Coef);
00718
00719 std::ostringstream oStr;
00720 // Compute the "forecast demand to come" proportion by class
00721 itACL = lAirlineClassListList.begin();
00722 for (; itACL != lAirlineClassListList.end(); ++itACL) {
00723     const stdair::AirlineClassList* lAirlineClassList_ptr = *itACL;
00724     const stdair::Yield_T& lYield = lAirlineClassList_ptr->getYield();

```

```

00725     stdair::ProportionFactor_T lProportionFactor =
00726         exp ((lYield - lMinWTP)*log(0.5)/(lMinWTP*(lFrat5Coef-1.0)));
00727     // If the yield is smaller than minimal WTP, the factor is greater than 1.
00728     // In that case it should be modified and put to 1.
00729     lProportionFactor = std::min (lProportionFactor, 1.0);
00730     lProportionFactorList.push_back(lProportionFactor - lPreviousProportionFact
or);
00731     lPreviousProportionFactor = lProportionFactor;
00732     oStr << lAirlineClassList_ptr->toString() << lProportionFactor << " ";
00733 }
00734
00735     STDAIR_LOG_DEBUG (oStr.str());
00736
00737     // Sanity check
00738     assert (lAirlineClassListList.size() == lProportionFactorList.size());
00739
00740     STDAIR_LOG_DEBUG ("Forecast for " << iOnDDate.describeKey()
00741         << " " << iDTD << " days to departure");
00742
00743     // store the forecast demand to come characteristics in the booking classes
00744     stdair::ProportionFactorList_T::const_iterator itPF =
00745         lProportionFactorList.begin();
00746     itACL = lAirlineClassListList.begin();
00747     for (; itACL != lAirlineClassListList.end(); ++itACL, ++itPF) {
00748         const stdair::AirlineClassList* lAirlineClassList_ptr = *itACL;
00749         const stdair::ProportionFactor_T& lProportionFactor = *itPF;
00750         stdair::MeanValue_T lMeanValue = lProportionFactor*lRemainingMeanValue;
00751         stdair::StdDevValue_T lStdDevValue =
00752             lProportionFactor*lRemainingStdDevValue;
00753         setOnDForecast(*lAirlineClassList_ptr, lMeanValue, lStdDevValue,
00754             iOnDDate, iCabinCode, iBomRoot);
00755     }
00756
00757 }
00758
00759 // //////////////////////////////////////
00760 void RMOL_Service::
00761 setOnDForecast (const stdair::AirlineClassList& iAirlineClassList,
00762     const stdair::MeanValue_T& iMeanValue,
00763     const stdair::StdDevValue_T& iStdDevValue,
00764     stdair::OnDDate& iOnDDate,
00765     const stdair::CabinCode_T& iCabinCode,
00766     stdair::BomRoot& iBomRoot) {
00767
00768     const stdair::AirportCode_T& lOrigin = iOnDDate.getOrigin();
00769     const stdair::AirportCode_T& lDestination = iOnDDate.getDestination();
00770
00771     const stdair::Date_T& lDepartureDate = iOnDDate.getDate();
00772
00773     const stdair::AirlineCodeList_T& lAirlineCodeList =
00774         iAirlineClassList.getAirlineCodeList();
00775
00776     // Retrieve the class list (one class per airline)
00777     const stdair::ClassList_StringList_T& lClassList_StringList =
00778         iAirlineClassList.getClassCodeList();
00779     assert (!lClassList_StringList.empty());
00780     stdair::ClassCodeList_T lClassCodeList;
00781     for (stdair::ClassList_StringList_T::const_iterator itCL =
00782         lClassList_StringList.begin();
00783         itCL != lClassList_StringList.end(); ++itCL){
00784         const stdair::ClassList_String_T& lClassList_String = *itCL;
00785         assert (lClassList_String.size() > 0);

```

```

00786     stdair::ClassCode_T lFirstClass;
00787     lFirstClass.append (lClassList_String, 0, 1);
00788     lClassCodeList.push_back(lFirstClass);
00789 }
00790
00791 // Sanity check
00792 assert (lAirlineCodeList.size() == lClassCodeList.size());
00793 assert (!lAirlineCodeList.empty());
00794
00795 if (lAirlineCodeList.size() == 1) {
00796     // Store the forecast information in the case of a single segment
00797     stdair::AirlineCode_T lAirlineCode = lAirlineCodeList.front();
00798     stdair::ClassCode_T lClassCode = lClassCodeList.front();
00799     stdair::Yield_T lYield = iAirlineClassList.getYield();
00800     setOnDForecast(lAirlineCode, lDepartureDate, lOrigin,
00801                   lDestination, iCabinCode, lClassCode,
00802                   iMeanValue, iStdDevValue, lYield, iBomRoot);
00803 } else {
00804     // Store the forecast information in the case of a multiple segment
00805
00806     stdair::Yield_T lYield = iAirlineClassList.getYield();
00807     for (stdair::AirlineCodeList_T::const_iterator itAC =
00808          lAirlineCodeList.begin();
00809          itAC != lAirlineCodeList.end(); ++itAC) {
00810         const stdair::AirlineCode_T& lAirlineCode = *itAC;
00811         setOnDForecast(lAirlineCodeList, lAirlineCode, lDepartureDate, lOrigin,
00812                       lDestination, iCabinCode, lClassCodeList,
00813                       iMeanValue, iStdDevValue, lYield, iBomRoot);
00814     }
00815 }
00816 }
00817
00818 // //////////////////////////////////////
00819 void RMOL_Service::
00820 setOnDForecast (const stdair::AirlineCode_T& iAirlineCode,
00821                const stdair::Date_T& iDepartureDate,
00822                const stdair::AirportCode_T& iOrigin,
00823                const stdair::AirportCode_T& iDestination,
00824                const stdair::CabinCode_T& iCabinCode,
00825                const stdair::ClassCode_T& iClassCode,
00826                const stdair::MeanValue_T& iMeanValue,
00827                const stdair::StdDevValue_T& iStdDevValue,
00828                const stdair::Yield_T& iYield,
00829                stdair::BomRoot& iBomRoot) {
00830     stdair::Inventory* lInventory_ptr = iBomRoot.getInventory(iAirlineCode);
00831     if (lInventory_ptr == NULL) {
00832         STDAIR_LOG_ERROR ("Cannot find the inventory corresponding"
00833                          "<< " to the airline" << iAirlineCode) ;
00834         assert(false);
00835     }
00836     const stdair::OnDDateList_T lOnDDateList =
00837         stdair::BomManager::getList<stdair::OnDDate> (*lInventory_ptr);
00838     assert (!lOnDDateList.empty());
00839     bool lFoundOnDDate = false;
00840     for (stdair::OnDDateList_T::const_iterator itOD = lOnDDateList.begin();
00841          itOD != lOnDDateList.end(); ++itOD) {
00842         stdair::OnDDate* lOnDDate_ptr = *itOD;
00843         assert (lOnDDate_ptr != NULL);
00844         const stdair::Date_T& lDepartureDate = lOnDDate_ptr->getDate();
00845         const stdair::AirportCode_T& lOrigin = lOnDDate_ptr->getOrigin();
00846         const stdair::AirportCode_T& lDestination = lOnDDate_ptr->getDestination();

```



```

00847         if (!stdair::BomManager::hasList<stdair::SegmentDate> (*lOnDDate_ptr)) {
00848             STDAIR_LOG_ERROR ("The O&D date " << lOnDDate_ptr->describeKey()
00849                 << "has not been correctly initialized : SegmentDate li
st is missing");
00850             assert (false);
00851         }
00852         const stdair::SegmentDateList_T& lSegmentDateList =
00853             stdair::BomManager::getList<stdair::SegmentDate> (*lOnDDate_ptr);
00854         // Check if the the O&D date is the one we are looking for
00855         if (lDepartureDate == iDepartureDate && lOrigin == iOrigin &&
00856             lDestination == iDestination && lSegmentDateList.size() == 1) {
00857             stdair::CabinClassPair_T lCabinClassPair (iCabinCode, iClassCode);
00858             stdair::CabinClassPairList_T lCabinClassPairList;
00859             lCabinClassPairList.push_back(lCabinClassPair);
00860             const stdair::MeanStdDevPair_T lMeanStdDevPair (iMeanValue, iStdDevValue)
;
00861             const stdair::WTPDemandPair_T lWTPDemandPair (iYield, lMeanStdDevPair);
00862             lOnDDate_ptr->setDemandInformation(lCabinClassPairList, lWTPDemandPair);
00863             lFoundOnDDate = true;
00864             STDAIR_LOG_DEBUG (iAirlineCode << " Class " << iClassCode
00865                 << " Mean " << iMeanValue
00866                 << " Std Dev " << iStdDevValue);
00867             break;
00868         }
00869     }
00870
00871     if (!lFoundOnDDate) {
00872         STDAIR_LOG_ERROR ("Cannot find class " << iClassCode << " in cabin "
00873             << iCabinCode << " for the segment "
00874             << iOrigin << "-" << iDestination << " with"
00875             << " the airline " << iAirlineCode);
00876         assert (false);
00877     }
00878 }
00879
00880 // //////////////////////////////////////
00881 void RMOL_Service::
00882 setOnDForecast (const stdair::AirlineCodeList_T& iAirlineCodeList,
00883     const stdair::AirlineCode_T& iAirlineCode,
00884     const stdair::Date_T& iDepartureDate,
00885     const stdair::AirportCode_T& iOrigin,
00886     const stdair::AirportCode_T& iDestination,
00887     const stdair::CabinCode_T& iCabinCode,
00888     const stdair::ClassCodeList_T& iClassCodeList,
00889     const stdair::MeanValue_T& iMeanValue,
00890     const stdair::StdDevValue_T& iStdDevValue,
00891     const stdair::Yield_T& iYield,
00892     stdair::BomRoot& iBomRoot) {
00893     stdair::Inventory* lInventory_ptr = iBomRoot.getInventory(iAirlineCode);
00894     if (lInventory_ptr == NULL) {
00895         STDAIR_LOG_ERROR ("Cannot find the inventory corresponding"
00896             << " to the airline" << iAirlineCode) ;
00897         assert (false);
00898     }
00899     const stdair::OnDDateList_T lOnDDateList =
00900         stdair::BomManager::getList<stdair::OnDDate> (*lInventory_ptr);
00901     assert (!lOnDDateList.empty());
00902     bool lFoundOnDDate = false;
00903     for (stdair::OnDDateList_T::const_iterator itOD = lOnDDateList.begin();
00904         itOD != lOnDDateList.end(); ++itOD) {
00905         stdair::OnDDate* lOnDDate_ptr = *itOD;
00906         assert (lOnDDate_ptr != NULL);

```

```

00907     const stdair::Date_T& lDepartureDate = lOnDDate_ptr->getDate();
00908     const stdair::AirportCode_T& lOrigin = lOnDDate_ptr->getOrigin();
00909     const stdair::AirportCode_T& lDestination = lOnDDate_ptr->getDestination();

00910     if (!stdair::BomManager::hasList<stdair::SegmentDate> (*lOnDDate_ptr)) {
00911         STDAIR_LOG_ERROR ("The O&D date " << lOnDDate_ptr->describeKey()
00912             << "has not been correctly initialized : SegmentDate li
st is missing");
00913         assert (false);
00914     }
00915     const stdair::SegmentDateList_T& lSegmentDateList =
00916         stdair::BomManager::getList<stdair::SegmentDate> (*lOnDDate_ptr);
00917     // Check if the O&D date might be the one we are looking for.
00918     // There still is a test to go through to see if the combination of airline
s is right.
00919     if (lDepartureDate == iDepartureDate && lOrigin == iOrigin &&
00920         lDestination == iDestination && lSegmentDateList.size() == iAirlineCode
List.size()) {
00921         const stdair::SegmentDateList_T& lSegmentDateList =
00922             stdair::BomManager::getList<stdair::SegmentDate> (*lOnDDate_ptr);

00923         stdair::AirlineCodeList_T::const_iterator itAC = iAirlineCodeList.begin()
;
00924         stdair::SegmentDateList_T::const_iterator itSD = lSegmentDateList.begin()
;
00925         for (; itAC != iAirlineCodeList.end(); ++itAC, ++itSD) {
00926             const stdair::AirlineCode_T lForecastAirlineCode = *itAC;
00927             const stdair::SegmentDate* lSegmentDate_ptr = *itSD;
00928             // Check if the operating airline is a different one and check if it
// is the airline that we are looking for.
00929             const stdair::SegmentDate* lOperatingSegmentDate_ptr =
00930                 lSegmentDate_ptr->getOperatingSegmentDate ();
00931             if (lOperatingSegmentDate_ptr != NULL) {
00932                 const stdair::FlightDate* lOperatingFD_ptr =
00933                     stdair::BomManager::getParentPtr<stdair::FlightDate>(*lOperatingSeg
mentDate_ptr);
00934                 const stdair::AirlineCode_T lOperatingAirlineCode =
00935                     lOperatingFD_ptr->getAirlineCode();
00936                 if (lOperatingAirlineCode != lForecastAirlineCode) {
00937                     break;
00938                 }
00939             } else {
00940                 const stdair::AirlineCode_T lOperatingAirlineCode =
00941                     lOnDDate_ptr->getAirlineCode();
00942                 if (lOperatingAirlineCode != lForecastAirlineCode) {
00943                     break;
00944                 }
00945             }
00946         }
00947         if (itAC == iAirlineCodeList.end()) {lFoundOnDDate = true;}
00948     }
00949     if (lFoundOnDDate) {
00950         stdair::CabinClassPairList_T lCabinClassPairList;
00951         for (stdair::ClassCodeList_T::const_iterator itCC = iClassCodeList.begin(
);
00952             itCC != iClassCodeList.end(); ++itCC) {
00953             const stdair::ClassCode_T lClassCode = *itCC;
00954             stdair::CabinClassPair_T lCabinClassPair (iCabinCode, lClassCode);
00955             lCabinClassPairList.push_back(lCabinClassPair);
00956         }
00957         const stdair::MeanStdDevPair_T lMeanStdDevPair (iMeanValue, iStdDevValue)
;

```

```

00959         const stdair::YieldDemandPair_T lYieldDemandPair (iYield, lMeanStdDevPair
00960     );
00961     lOnDDate_ptr->setDemandInformation(lCabinClassPairList, lYieldDemandPair)
00962     ;
00961     lFoundOnDDate = true;
00962     std::ostringstream oACStr;
00963     for (stdair::AirlineCodeList_T::const_iterator itAC = iAirlineCodeList.be
gin();
00964         itAC != iAirlineCodeList.end(); ++itAC) {
00965         if (itAC == iAirlineCodeList.begin()) {
00966             oACStr << *itAC;
00967         }
00968         else {
00969             oACStr << "-" << *itAC;
00970         }
00971     }
00972     std::ostringstream oCCStr;
00973     for (stdair::ClassCodeList_T::const_iterator itCC = iClassCodeList.begin(
);
00974         itCC != iClassCodeList.end(); ++itCC) {
00975         if (itCC == iClassCodeList.begin()) {
00976             oCCStr << *itCC;
00977         }
00978         else {
00979             oCCStr << "-" << *itCC;
00980         }
00981     }
00982
00983     STDAIR_LOG_DEBUG (oACStr.str() << " Classes " << oCCStr.str()
00984         << " Mean " << iMeanValue << " Std Dev " << iStdDevValu
e);
00985     break;
00986 }
00987 }
00988 if (!lFoundOnDDate) {
00989     STDAIR_LOG_ERROR ("Cannot find the required multi-segment O&D date: "
00990         << iOrigin << "-" << iDestination << " " << iDepartureDat
e);
00991     assert(false);
00992 }
00993 }
00994
00995 //////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
00996 void RMOL_Service::
00997 resetDemandInformation (const stdair::DateTime_T& iRMEventTime) {
00998     if (_rmolServiceContext == NULL) {
00999         throw stdair::NonInitialisedServiceException ("The Rmol service "
01000             "has not been initialised");
01001     }
01002     assert (_rmolServiceContext != NULL);
01003     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01004
01005     // Retrieve the bom root
01006     stdair::STDAIR_Service& lSTDAIR_Service =
01007         lRMOL_ServiceContext.getSTDAIR_Service();
01008     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01009
01010     const stdair::InventoryList_T lInventoryList =
01011         stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01012     assert (!lInventoryList.empty());
01013     for (stdair::InventoryList_T::const_iterator itInv = lInventoryList.begin();
01014         itInv != lInventoryList.end(); ++itInv) {

```

```

01015         const stdair::Inventory* lInventory_ptr = *itInv;
01016         assert (lInventory_ptr != NULL);
01017         resetDemandInformation (iRMEventTime, *lInventory_ptr);
01018     }
01019 }
01020
01021 // //////////////////////////////////////
01022 void RMOL_Service::
01023 resetDemandInformation (const stdair::DateTime_T& iRMEventTime,
01024                         const stdair::Inventory& iInventory) {
01025
01026     const stdair::FlightDateList_T lFlightDateList =
01027         stdair::BomManager::getList<stdair::FlightDate> (iInventory);
01028     assert (!lFlightDateList.empty());
01029     for (stdair::FlightDateList_T::const_iterator itFD = lFlightDateList.begin();
01030
01031         itFD != lFlightDateList.end(); ++itFD) {
01032         const stdair::FlightDate* lFlightDate_ptr = *itFD;
01033         assert (lFlightDate_ptr != NULL);
01034
01035         // Retrieve the date from the RM event
01036         const stdair::Date_T lDate = iRMEventTime.date();
01037
01038         const stdair::Date_T& lDepartureDate = lFlightDate_ptr->getDepartureDate();
01039
01040         stdair::DateOffset_T lDateOffset = lDepartureDate - lDate;
01041         stdair::DTD_T lDTD = short (lDateOffset.days());
01042
01043         stdair::DCPLIST_T::const_iterator itDCP =
01044             std::find (stdair::DEFAULT_DCP_LIST.begin(), stdair::DEFAULT_DCP_LIST.end
01045             (), lDTD);
01046         // Check if the demand forecast info corresponding to this flight date need
01047         // s to be reset.
01048         if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01049             // Check if the flight date holds a list of leg dates.
01050             // If so, find all leg cabin and reset the forecast they are holding.
01051             if (stdair::BomManager::hasList<stdair::LegDate> (*lFlightDate_ptr)) {
01052                 const stdair::LegDateList_T lLegDateList =
01053                     stdair::BomManager::getList<stdair::LegDate> (*lFlightDate_ptr);
01054                 assert (!lLegDateList.empty());
01055                 for (stdair::LegDateList_T::const_iterator itLD = lLegDateList.begin();
01056
01057                     itLD != lLegDateList.end(); ++itLD) {
01058                     const stdair::LegDate* lLegDate_ptr = *itLD;
01059                     assert (lLegDate_ptr != NULL);
01060                     const stdair::LegCabinList_T lLegCabinList =
01061                         stdair::BomManager::getList<stdair::LegCabin> (*lLegDate_ptr);
01062                     assert (!lLegCabinList.empty());
01063                     for (stdair::LegCabinList_T::const_iterator itLC = lLegCabinList.begi
01064                     n();
01065
01066                         itLC != lLegCabinList.end(); ++itLC) {
01067                             stdair::LegCabin* lLegCabin_ptr = *itLC;
01068                             assert (lLegCabin_ptr != NULL);
01069                             lLegCabin_ptr->emptyYieldLevelDemandMap();
01070                         }
01071                     }
01072                 }
01073             }
01074         }
01075     }
01076 }
01077 // //////////////////////////////////////

```

```

01071 void RMOL_Service::projectAggregatedDemandOnLegCabins(const stdair::DateTime_T&
01072 iRMEventTime) {
01073     if (_rmolServiceContext == NULL) {
01074         throw stdair::NonInitialisedServiceException ("The Rmol service "
01075                                                         "has not been initialised");
01076     }
01077     assert (_rmolServiceContext != NULL);
01078     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01079
01080     // Retrieve the bom root
01081     stdair::STDAIR_Service& lSTDAIR_Service =
01082         lRMOL_ServiceContext.getSTDAIR_Service();
01083     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01084
01085     // Retrieve the date from the RM event
01086     const stdair::Date_T lDate = iRMEventTime.date();
01087
01088     const stdair::InventoryList_T lInventoryList =
01089         stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01090     assert (!lInventoryList.empty());
01091     for (stdair::InventoryList_T::const_iterator itInv = lInventoryList.begin();
01092          itInv != lInventoryList.end(); ++itInv) {
01093         const stdair::Inventory* lInventory_ptr = *itInv;
01094         assert (lInventory_ptr != NULL);
01095         const stdair::OnDDateList_T lOnDDateList =
01096             stdair::BomManager::getList<stdair::OnDDate> (*lInventory_ptr);
01097         assert (!lOnDDateList.empty());
01098         for (stdair::OnDDateList_T::const_iterator itOD = lOnDDateList.begin();
01099              itOD != lOnDDateList.end(); ++itOD) {
01100             stdair::OnDDate* lOnDDate_ptr = *itOD;
01101             assert (lOnDDate_ptr != NULL);
01102
01103             const stdair::Date_T& lDepartureDate = lOnDDate_ptr->getDate();
01104             stdair::DateOffset_T lDateOffset = lDepartureDate - lDate;
01105             stdair::DTD_T lDTD = short (lDateOffset.days());
01106
01107             stdair::DCPLIST_T::const_iterator itDCP =
01108                 std::find (stdair::DEFAULT_DCP_LIST.begin(), stdair::DEFAULT_DCP_LIST.e
01109 nd(), lDTD);
01110             // Check if the forecast for this O&D date needs to be projected.
01111             if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01112                 // Browse the demand info map.
01113                 const stdair::StringDemandStructMap_T& lStringDemandStructMap =
01114                     lOnDDate_ptr->getDemandInfoMap ();
01115                 for (stdair::StringDemandStructMap_T::const_iterator itStrDS = lStringD
01116 emandStructMap.begin();
01117                      itStrDS != lStringDemandStructMap.end(); ++itStrDS) {
01118                     std::string lCabinClassPath = itStrDS->first;
01119                     const stdair::YieldDemandPair_T& lYieldDemandPair =
01120                         itStrDS->second;
01121                     const stdair::CabinClassPairList_T& lCabinClassPairList =
01122                         lOnDDate_ptr->getCabinClassPairList (lCabinClassPath);
01123                     const unsigned int lNbOfSegments = lOnDDate_ptr->getNbOfSegments();
01124                     // Sanity check
01125                     assert (lCabinClassPairList.size() == lNbOfSegments);
01126
01127                     const stdair::SegmentDateList_T lOnDSegmentDateList =
01128                         stdair::BomManager::getList<stdair::SegmentDate> (*lOnDDate_ptr);
01129                     // Sanity check
01130                     assert (lOnDSegmentDateList.size() == lNbOfSegments);

```

```

01130         stdair::CabinClassPairList_T::const_iterator itCCP = lCabinClassPairL
ist.begin();
01131         stdair::SegmentDateList_T::const_iterator itSD = lOnDSegmentDateList.
begin();
01132         for (; itSD != lOnDSegmentDateList.end(); ++itCCP, ++itSD) {
01133             const stdair::SegmentDate* lSegmentDate_ptr = *itSD;
01134             const stdair::SegmentDate* lOperatingSegmentDate_ptr =
lSegmentDate_ptr->getOperatingSegmentDate ();
01135             assert (lSegmentDate_ptr != NULL);
01136             // Only operated legs receive the demand information.
01137             if (lOperatingSegmentDate_ptr == NULL) {
01138                 const stdair::CabinCode_T lCabinCode = itCCP->first;
01139                 const stdair::ClassCode_T lClassCode = itCCP->second;
01140                 const stdair::SegmentCabin* lSegmentCabin_ptr =
stdair::BomManager::getObjectPtr<stdair::SegmentCabin> (*lSegme
ntDate_ptr,
01141                                                         lCabinC
ode);
01142                 assert (lSegmentCabin_ptr != NULL);
01143                 // Retrieve the booking class (level of aggregation of demand).
01144                 // The yield of the class is assigned to all types of demand for
it.
01145                 const stdair::BookingClass* lBookingClass_ptr =
stdair::BomManager::getObjectPtr<stdair::BookingClass> (*lSegme
ntCabin_ptr,
01146                                                         lClassC
ode);
01147                 assert (lBookingClass_ptr != NULL);
01148                 const stdair::LegCabinList_T lLegCabinList =
stdair::BomManager::getList<stdair::LegCabin> (*lSegmentCabin_p
tr);
01149                 assert (!lLegCabinList.empty());
01150                 const int lNbOfLegs = lLegCabinList.size();
01151                 // Determine the yield (equally distributed over legs).
01152                 const stdair::Yield_T& lYield = lBookingClass_ptr->getYield()/lNb
OfLegs;
01153                 const stdair::MeanStdDevPair_T& lMeanStdDevPair =
lYieldDemandPair.second;
01154                 const stdair::MeanValue_T& lMeanValue = lMeanStdDevPair.first;
01155                 const stdair::StdDevValue_T& lStdDevValue = lMeanStdDevPair.secon
d;
01156                 for (stdair::LegCabinList_T::const_iterator itLC = lLegCabinList.
begin();
01157                     itLC != lLegCabinList.end(); ++itLC) {
01158                     stdair::LegCabin* lLegCabin_ptr = *itLC;
01159                     assert (lLegCabin_ptr != NULL);
01160                     lLegCabin_ptr->addDemandInformation (lYield, lMeanValue, lStdDe
vValue);
01161                 }
01162             }
01163         }
01164     }
01165 }
01166 }
01167 }
01168 }
01169 }
01170 }
01171 }
01172 }
01173 }
01174 }
01175 // //////////////////////////////////////
01176 void RMOL_Service::projectOnDDemandOnLegCabinsUsingYP(const stdair::DateTime_T&
irMEEventTime) {
01177     if (_rmolServiceContext == NULL) {
01178

```

```

01179         throw stdair::NonInitialisedServiceException ("The Rmol service "
01180                                                         "has not been initialised");
01181     }
01182     assert (_rmolServiceContext != NULL);
01183     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01184
01185     // Retrieve the bom root
01186     stdair::STDAIR_Service& lSTDAIR_Service =
01187         lRMOL_ServiceContext.getSTDAIR_Service();
01188     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01189
01190     // Retrieve the date from the RM event
01191     const stdair::Date_T lDate = iRMEventTime.date();
01192
01193     const stdair::InventoryList_T lInventoryList =
01194         stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01195     assert (!lInventoryList.empty());
01196     for (stdair::InventoryList_T::const_iterator itInv = lInventoryList.begin();
01197          itInv != lInventoryList.end(); ++itInv) {
01198         const stdair::Inventory* lInventory_ptr = *itInv;
01199         assert (lInventory_ptr != NULL);
01200         const stdair::OnDDateList_T lOnDDateList =
01201             stdair::BomManager::getList<stdair::OnDDate> (*lInventory_ptr);
01202         assert (!lOnDDateList.empty());
01203         for (stdair::OnDDateList_T::const_iterator itOD = lOnDDateList.begin();
01204              itOD != lOnDDateList.end(); ++itOD) {
01205             stdair::OnDDate* lOnDDate_ptr = *itOD;
01206             assert (lOnDDate_ptr != NULL);
01207
01208             const stdair::Date_T& lDepartureDate = lOnDDate_ptr->getDate();
01209             stdair::DateOffset_T lDateOffset = lDepartureDate - lDate;
01210             stdair::DTD_T lDTD = short (lDateOffset.days());
01211
01212             stdair::DCPLList_T::const_iterator itDCP =
01213                 std::find (stdair::DEFAULT_DCP_LIST.begin(), stdair::DEFAULT_DCP_LIST.e
01214                             nd(), lDTD);
01215             // Check if the forecast for this O&D date needs to be projected.
01216             if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01217                 // Browse the demand info map.
01218                 const stdair::StringDemandStructMap_T& lStringDemandStructMap =
01219                     lOnDDate_ptr->getDemandInfoMap ();
01220                 for (stdair::StringDemandStructMap_T::const_iterator itStrDS = lStringD
01221                     emandStructMap.begin();
01222                      itStrDS != lStringDemandStructMap.end(); ++itStrDS) {
01223                     std::string lCabinClassPath = itStrDS->first;
01224                     const stdair::YieldDemandPair_T& lYieldDemandPair =
01225                         itStrDS->second;
01226                     const stdair::CabinClassPairList_T& lCabinClassPairList =
01227                         lOnDDate_ptr->getCabinClassPairList (lCabinClassPath);
01228                     const unsigned int lNbOfSegments = lOnDDate_ptr->getNbOfSegments();
01229                     // Sanity check
01230                     assert (lCabinClassPairList.size() == lNbOfSegments);
01231
01232                     const stdair::SegmentDateList_T lOnDSegmentDateList =
01233                         stdair::BomManager::getList<stdair::SegmentDate> (*lOnDDate_ptr);
01234                     // Sanity check
01235                     assert (lOnDSegmentDateList.size() == lNbOfSegments);
01236                     stdair::CabinClassPairList_T::const_iterator itCCP = lCabinClassPairL
01237                         ist.begin();
01238                     stdair::SegmentDateList_T::const_iterator itSD = lOnDSegmentDateList.
01239                         begin();

```

```

01237         for (; itSD != lOnDSegmentDateList.end(); ++itCCP, ++itSD) {
01238             const stdair::SegmentDate* lSegmentDate_ptr = *itSD;
01239             assert (lSegmentDate_ptr != NULL);
01240             const stdair::SegmentDate* lOperatingSegmentDate_ptr =
01241                 lSegmentDate_ptr->getOperatingSegmentDate ();
01242             // Only operated legs receive the demand information.
01243             if (lOperatingSegmentDate_ptr == NULL) {
01244                 const stdair::CabinCode_T lCabinCode = itCCP->first;
01245                 const stdair::ClassCode_T lClassCode = itCCP->second;
01246                 const stdair::SegmentCabin* lSegmentCabin_ptr =
01247                     stdair::BomManager::getObjectPtr<stdair::SegmentCabin> (*lSegme
01248 ntDate_ptr,
01249                                     lCabinC
01250 ode);
01251                 assert (lSegmentCabin_ptr != NULL);
01252                 const stdair::LegCabinList_T lLegCabinList =
01253                     stdair::BomManager::getList<stdair::LegCabin> (*lSegmentCabin_p
01254 tr);
01255                 assert (!lLegCabinList.empty());
01256                 const int lNbOfLegs = lLegCabinList.size();
01257                 // Determine the yield (equally distributed over segments and the
01258 n legs).
01259                 const stdair::MeanStdDevPair_T& lMeanStdDevPair =
01260                     lYieldDemandPair.second;
01261                 const stdair::Yield_T& lYield = lYieldDemandPair.first/(lNbOfLegs
01262 *lNbOfSegments);
01263                 const stdair::MeanValue_T& lMeanValue = lMeanStdDevPair.first;
01264                 const stdair::StdDevValue_T& lStdDevValue = lMeanStdDevPair.secon
01265 d;
01266                 for (stdair::LegCabinList_T::const_iterator itLC = lLegCabinList.
01267 begin();
01268                 itLC != lLegCabinList.end(); ++itLC) {
01269                     stdair::LegCabin* lLegCabin_ptr = *itLC;
01270                     assert (lLegCabin_ptr != NULL);
01271                     lLegCabin_ptr->addDemandInformation (lYield, lMeanValue, lStdDe
01272 vValue);
01273                 }
01274             }
01275         }
01276     }
01277 }
01278 }
01279 }
01280 }
01281 }
01282 }
01283 // //////////////////////////////////////
01284 void RMOL_Service::optimiseOnD (const stdair::DateTime_T& iRMEEventTime) {
01285     if (_rmolServiceContext == NULL) {
01286         throw stdair::NonInitialisedServiceException ("The Rmol service "
01287 "has not been initialised");
01288     }
01289     assert (_rmolServiceContext != NULL);
01290     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01291     // Retrieve the bom root
01292     stdair::STDAIR_Service& lSTDAIR_Service =
01293         lRMOL_ServiceContext.getSTDAIR_Service();
01294     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01295     // Retrieve the date from the RM event
01296     const stdair::Date_T lDate = iRMEEventTime.date();

```



```

01291
01292     const stdair::InventoryList_T& lInvList =
01293         stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01294     for (stdair::InventoryList_T::const_iterator itInv = lInvList.begin();
01295          itInv != lInvList.end(); ++itInv) {
01296         stdair::Inventory* lCurrentInv_ptr = *itInv;
01297         assert (lCurrentInv_ptr != NULL);
01298
01299         const stdair::FlightDateList_T& lFlightDateList =
01300             stdair::BomManager::getList<stdair::FlightDate> (*lCurrentInv_ptr);
01301         for (stdair::FlightDateList_T::const_iterator itFlightDate =
01302              lFlightDateList.begin();
01303              itFlightDate != lFlightDateList.end(); ++itFlightDate) {
01304             stdair::FlightDate* lCurrentFlightDate_ptr = *itFlightDate;
01305             assert (lCurrentFlightDate_ptr != NULL);
01306
01307             const stdair::Date_T& lCurrentDepartureDate = lCurrentFlightDate_ptr->get
DepartureDate();
01308             stdair::DateOffset_T lDateOffset = lCurrentDepartureDate - lDate;
01309             stdair::DTD_T lDTD = short (lDateOffset.days());
01310
01311             stdair::DCPList_T::const_iterator itDCP =
01312                 std::find (stdair::DEFAULT_DCP_LIST.begin(), stdair::DEFAULT_DCP_LIST.e
nd(), lDTD);
01313             // Check if the optimisation is needed.
01314             if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01315                 STDAIR_LOG_DEBUG ("Optimisation using O&D forecast: " << lCurrentInv_pt
r->getAirlineCode()
01316                                 << " Departure " << lCurrentDepartureDate << " DTD "
<< lDTD);
01317                 Optimiser::optimiseUsingOnDForecast (*lCurrentFlightDate_ptr);
01318             }
01319         }
01320     }
01321 }
01322
01323 // //////////////////////////////////////
01324 void RMOL_Service::updateBidPrice (const stdair::DateTime_T& iRMEventTime) {
01325
01326     if (_rmolServiceContext == NULL) {
01327         throw stdair::NonInitialisedServiceException ("The Rmol service "
01328                                                         "has not been initialised");
01329     }
01330     assert (_rmolServiceContext != NULL);
01331     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01332
01333     // Retrieve the bom root
01334     stdair::STDAIR_Service& lSTDAIR_Service =
01335         lRMOL_ServiceContext.getSTDAIR_Service();
01336     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01337
01338     // Retrieve the date from the RM event
01339     const stdair::Date_T lDate = iRMEventTime.date();
01340
01341     const stdair::InventoryList_T& lInvList =
01342         stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01343     for (stdair::InventoryList_T::const_iterator itInv = lInvList.begin();
01344          itInv != lInvList.end(); ++itInv) {
01345         stdair::Inventory* lCurrentInv_ptr = *itInv;
01346         assert (lCurrentInv_ptr != NULL);
01347
01348

```

```

01349         const stdair::FlightDateList_T& lFlightDateList =
01350             stdair::BomManager::getList<stdair::FlightDate> (*lCurrentInv_ptr);
01351         for (stdair::FlightDateList_T::const_iterator itFlightDate =
01352             lFlightDateList.begin();
01353             itFlightDate != lFlightDateList.end(); ++itFlightDate) {
01354             stdair::FlightDate* lCurrentFlightDate_ptr = *itFlightDate;
01355             assert (lCurrentFlightDate_ptr != NULL);
01356
01357             const stdair::Date_T& lCurrentDepartureDate = lCurrentFlightDate_ptr->get
DepartureDate();
01358             stdair::DateOffset_T lDateOffset = lCurrentDepartureDate - lDate;
01359             stdair::DTD_T lDTD = short (lDateOffset.days());
01360
01361             stdair::DCPList_T::const_iterator itDCP =
01362                 std::find (stdair::DEFAULT_DCP_LIST.begin(), stdair::DEFAULT_DCP_LIST.e
nd(), lDTD);
01363             // Check if the operation is needed.
01364             if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01365                 updateBidPrice (*lCurrentFlightDate_ptr, lBomRoot);
01366             }
01367         }
01368     }
01369 }
01370
01371 // //////////////////////////////////////
01372 void RMOL_Service::updateBidPrice (const stdair::FlightDate& iFlightDate,
01373     stdair::BomRoot& iBomRoot) {
01374     const stdair::SegmentDateList_T& lSegmentDateList =
01375         stdair::BomManager::getList<stdair::SegmentDate> (iFlightDate);
01376     const stdair::AirlineCode_T& lOptAC = iFlightDate.getAirlineCode();
01377     const std::string lFDKeyStr = iFlightDate.describeKey();
01378
01379     for (stdair::SegmentDateList_T::const_iterator itSegmentDate = lSegmentDateLi
st.begin();
01380         itSegmentDate != lSegmentDateList.end(); ++itSegmentDate) {
01381         stdair::SegmentDate* lSegmentDate_ptr = *itSegmentDate;
01382         assert (lSegmentDate_ptr != NULL);
01383         if (stdair::BomManager::hasList<stdair::SegmentDate>(*lSegmentDate_ptr)) {
01384             const stdair::LegDateList_T& lLegDateList =
01385                 stdair::BomManager::getList<stdair::LegDate>(*lSegmentDate_ptr);
01386             // Get the list of marketing carriers segments.
01387             // These are part of maketing partners inventories images held by the ope
rating airline.
01388             const stdair::SegmentDateList_T& lMktSegmentDateList =
01389                 stdair::BomManager::getList<stdair::SegmentDate>(*lSegmentDate_ptr);
01390             for (stdair::SegmentDateList_T::const_iterator itMktSD = lMktSegmentDateL
ist.begin();
01391                 itMktSD != lMktSegmentDateList.end(); ++itMktSD) {
01392                 // Get the marketing airline code.
01393                 stdair::SegmentDate* lMktSD_ptr = *itMktSD;
01394                 assert (lMktSD_ptr != NULL);
01395                 stdair::FlightDate* lMktFD_ptr =
01396                     stdair::BomManager::getParentPtr<stdair::FlightDate>(*lMktSD_ptr);
01397                 assert (lMktFD_ptr != NULL);
01398                 const stdair::AirlineCode_T& lMktAC = lMktFD_ptr->getAirlineCode();
01399                 // Get the (real) marketer inventory.
01400                 const stdair::Inventory* lMktInv_ptr =
01401                     stdair::BomManager::getObjectPtr<stdair::Inventory>(iBomRoot, lMktAC);
01402
01403                 assert (lMktInv_ptr != NULL);
01404                 // Get the image of the operating airline inventory held by the markete
r.

```

```

01404         const stdair::Inventory* lOptInv_ptr =
01405             stdair::BomManager::getObjectPtr<stdair::Inventory>(*lMktInv_ptr, lOpt
AC);
01406         assert (lOptInv_ptr != NULL);
01407         // Find the image of the concerned flight date.
01408         const stdair::FlightDate* lOptFD_ptr =
01409             stdair::BomManager::getObjectPtr<stdair::FlightDate>(*lOptInv_ptr, lFD
KeyStr);
01410         assert (lOptFD_ptr != NULL);
01411         // Browse the list of leg dates in the real operating inventory.
01412         // Retrieve the image of each leg date.
01413         for (stdair::LegDateList_T::const_iterator itLD = lLegDateList.begin();

01414             itLD != lLegDateList.end(); ++itLD) {
01415             const stdair::LegDate* lLD_ptr = *itLD;
01416             assert (lLD_ptr != NULL);
01417             const std::string lLDKeyStr = lLD_ptr->describeKey();
01418             stdair::LegDate* lOptLD_ptr =
01419                 stdair::BomManager::getObjectPtr<stdair::LegDate>(*lOptFD_ptr, lLDKe
yStr);
01420             assert (lOptLD_ptr != NULL);
01421             const stdair::LegCabinList_T& lLegCabinList_T =
01422                 stdair::BomManager::getList<stdair::LegCabin>(*lLD_ptr);
01423             // Browse the list of leg cabins in the real operating inventory.
01424             // Retrieve the image of each leg cabin and update the bid price of t
he real and send it to the image.
01425             for (stdair::LegCabinList_T::const_iterator itLC = lLegCabinList_T.be
gin();

01426                 itLC != lLegCabinList_T.end(); ++itLC) {
01427                 stdair::LegCabin* lLC_ptr = *itLC;
01428                 assert (lLC_ptr != NULL);
01429                 const std::string lLCKeyStr = lLC_ptr->describeKey();
01430                 stdair::LegCabin* lOptLC_ptr =
01431                     stdair::BomManager::getObjectPtr<stdair::LegCabin>(*lOptLD_ptr, l
LCKeyStr);
01432                 assert (lOptLC_ptr != NULL);
01433                 // Update the current bid price of the real leg.
01434                 lLC_ptr->updateCurrentBidPrice();
01435                 // Update the previous bid price (store the current).
01436                 lOptLC_ptr->updatePreviousBidPrice();
01437                 // Update the current bid price.
01438                 lOptLC_ptr->setCurrentBidPrice (lLC_ptr->getCurrentBidPrice());
01439
01440                 STDAIR_LOG_DEBUG ("Update bid price of " << lLC_ptr->getFullerKey()

01441                                     << " : " << lOptLC_ptr->getCurrentBidPrice()
01442                                     << " Availability pool " << lLC_ptr->getAvailabil
ityPool());
01443             }
01444         }
01445     }
01446 }
01447 }
01448 }
01449
01450 // //////////////////////////////////////
01451 void RMOL_Service::projectOnDDemandOnLegCabinsUsingDA(const stdair::DateTime_T&
iRMEventTime) {
01452
01453     if (_rmolServiceContext == NULL) {
01454         throw stdair::NonInitialisedServiceException ("The Rmol service "
01455                                                         "has not been initialised");

```

```

01456     }
01457     assert (_rmolServiceContext != NULL);
01458     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01459
01460     // Retrieve the bom root
01461     stdair::STDAIR_Service& lSTDAIR_Service =
01462         lRMOL_ServiceContext.getSTDAIR_Service();
01463     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01464
01465     // Retrieve the date from the RM event
01466     const stdair::Date_T lDate = iRMEventTime.date();
01467
01468     const stdair::InventoryList_T lInventoryList =
01469         stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01470     assert (!lInventoryList.empty());
01471     for (stdair::InventoryList_T::const_iterator itInv = lInventoryList.begin();
01472          itInv != lInventoryList.end(); ++itInv) {
01473         const stdair::Inventory* lInventory_ptr = *itInv;
01474         assert (lInventory_ptr != NULL);
01475         const stdair::OnDDateList_T lOnDDateList =
01476             stdair::BomManager::getList<stdair::OnDDate> (*lInventory_ptr);
01477         assert (!lOnDDateList.empty());
01478         for (stdair::OnDDateList_T::const_iterator itOD = lOnDDateList.begin();
01479              itOD != lOnDDateList.end(); ++itOD) {
01480             stdair::OnDDate* lOnDDate_ptr = *itOD;
01481             assert (lOnDDate_ptr != NULL);
01482
01483             const stdair::Date_T& lDepartureDate = lOnDDate_ptr->getDate();
01484             stdair::DateOffset_T lDateOffset = lDepartureDate - lDate;
01485             stdair::DTD_T lDTD = short (lDateOffset.days());
01486
01487             stdair::DCPLIST_T::const_iterator itDCP =
01488                 std::find (stdair::DEFAULT_DCP_LIST.begin(), stdair::DEFAULT_DCP_LIST.e
01489 nd(), lDTD);
01490             // Check if the forecast for this O&D date needs to be projected.
01491             if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01492                 // Browse the demand info map.
01493                 const stdair::StringDemandStructMap_T& lStringDemandStructMap =
01494                     lOnDDate_ptr->getDemandInfoMap ();
01495                 for (stdair::StringDemandStructMap_T::const_iterator itStrDS = lStringD
01496 emandStructMap.begin();
01497                      itStrDS != lStringDemandStructMap.end(); ++itStrDS) {
01498                     std::string lCabinClassPath = itStrDS->first;
01499                     const stdair::YieldDemandPair_T& lYieldDemandPair = itStrDS->second;
01500                     const stdair::CabinClassPairList_T& lCabinClassPairList =
01501                         lOnDDate_ptr->getCabinClassPairList (lCabinClassPath);
01502                     const unsigned int lNbOfSegments = lOnDDate_ptr->getNbOfSegments();
01503                     // Sanity check
01504                     assert (lCabinClassPairList.size() == lNbOfSegments);
01505
01506                     //
01507                     const stdair::SegmentDateList_T lOnDSegmentDateList =
01508                         stdair::BomManager::getList<stdair::SegmentDate> (*lOnDDate_ptr);
01509                     // Sanity check
01510                     assert (lOnDSegmentDateList.size() == lNbOfSegments);
01511                     stdair::CabinClassPairList_T::const_iterator itCCP = lCabinClassPairL
01512 ist.begin();
01513                     stdair::SegmentDateList_T::const_iterator itSD = lOnDSegmentDateList.
01514 begin();
01515                     // List of bid prices that will be used to easily compute displacemen
01516 t-adjusted yields.

```

```

01513         std::list<stdair::BidPrice_T> lBidPriceList;
01514         // The sum of bid prices that will be stored in the list above.
01515         stdair::BidPrice_T lTotalBidPrice = 0;
01516         // Retrieve the bid prices
01517         for (; itSD != lOnDSegmentDateList.end(); ++itCCP, ++itSD) {
01518             // Get the operating segment cabin (it holds the bid price informat
ion).
01519             const stdair::SegmentDate* lSegmentDate_ptr = *itSD;
01520             assert (lSegmentDate_ptr != NULL);
01521             // Get the operating airline code and check if it is the airline we
are looking for.
01522             const stdair::SegmentDate* lOperatingSegmentDate_ptr =
lSegmentDate_ptr->getOperatingSegmentDate ();
01523             if (lOperatingSegmentDate_ptr != NULL) {
01524                 lSegmentDate_ptr = lOperatingSegmentDate_ptr;
01525             }
01526             const stdair::CabinCode_T lCabinCode = itCCP->first;
01527             const stdair::SegmentCabin* lSegmentCabin_ptr =
stdair::BomManager::getObjectPtr<stdair::SegmentCabin> (*lSegment
Date_ptr,
01530                                                         lCabinCod
e);
01531             assert (lSegmentCabin_ptr != NULL);
01532             stdair::BidPrice_T lBidPrice = 0;
01533             const stdair::LegCabinList_T lLegCabinList =
stdair::BomManager::getList<stdair::LegCabin>(*lSegmentCabin_ptr)
;
01534             for (stdair::LegCabinList_T::const_iterator itLC = lLegCabinList.be
gin();
01536                 itLC != lLegCabinList.end(); ++itLC) {
01537                 const stdair::LegCabin* lLegCabin_ptr = *itLC;
01538                 assert (lLegCabin_ptr != NULL);
01539                 lBidPrice += lLegCabin_ptr->getCurrentBidPrice();
01540             }
01541             lBidPriceList.push_back (lBidPrice);
01542             lTotalBidPrice += lBidPrice;
01543         }
01544
01545         itCCP = lCabinClassPairList.begin();
01546         itSD = lOnDSegmentDateList.begin();
01547         std::list<stdair::BidPrice_T>::const_iterator itBP = lBidPriceList.be
gin();
01549         for (; itSD != lOnDSegmentDateList.end(); ++itCCP, ++itSD, ++itBP) {
01550             stdair::BidPrice_T lBidPrice = *itBP;
01551             stdair::BidPrice_T lComplementaryBidPrice = lTotalBidPrice - lBidPr
ice;
01552             const stdair::SegmentDate* lSegmentDate_ptr = *itSD;
01553             assert (lSegmentDate_ptr != NULL);
01554             const stdair::SegmentDate* lOperatingSegmentDate_ptr =
lSegmentDate_ptr->getOperatingSegmentDate ();
01555             // Only operated legs receive the demand information.
01556             if (lOperatingSegmentDate_ptr == NULL) {
01557                 const stdair::CabinCode_T lCabinCode = itCCP->first;
01558                 const stdair::ClassCode_T lClassCode = itCCP->second;
01559                 const stdair::SegmentCabin* lSegmentCabin_ptr =
stdair::BomManager::getObjectPtr<stdair::SegmentCabin> (*lSegme
ntDate_ptr,
01562                                                         lCabinC
ode);
01563                 assert (lSegmentCabin_ptr != NULL);
01564                 const stdair::LegCabinList_T lLegCabinList =

```

```

01565         stdair::BomManager::getList<stdair::LegCabin> (*lSegmentCabin_ptr);
01566         assert (!lLegCabinList.empty());
01567         // Determine the displacement-adjusted yield.
01568         // It is set to 100 (positive small value), if the computed value
         is negative.
01569         const stdair::Yield_T& lDAYield =
01570             std::max(100., lYieldDemandPair.first - lComplementaryBidPrice)
         ;
01571
01572         stdair::Yield_T lYield = lDAYield;
01573         // In order to be protected against important variations of partn
         ers' bid price,
01574         // the displacement adjusted yield is noy allowed to get out of a
         certain range.
01575         // This range is here chosen to be from 80% to 100% of the (stati
         c rule) prorated yield.
01576         /*
01577         const int lNbOfLegs = lLegCabinList.size();
01578         const stdair::Yield_T& lStaticProrationYield =
01579             lDemandStruct.getYield()/(lNbOfLegs*lNbOfSegments);
01580         if (lDAYield < 0.8*lStaticProrationYield){
01581             lYield = 0.8*lStaticProrationYield;
01582         }
01583         if (lDAYield > lStaticProrationYield) {
01584             lYield = lStaticProrationYield;
01585         }
01586         */
01587         const stdair::MeanStdDevPair_T& lMeanStdDevPair =
01588             lYieldDemandPair.second;
01589         const stdair::MeanValue_T& lMeanValue = lMeanStdDevPair.first;
01590         const stdair::StdDevValue_T& lStdDevValue = lMeanStdDevPair.secon
         d;
01591         for (stdair::LegCabinList_T::const_iterator itLC = lLegCabinList.
         begin();
01592             itLC != lLegCabinList.end(); ++itLC) {
01593             stdair::LegCabin* lLegCabin_ptr = *itLC;
01594             assert (lLegCabin_ptr != NULL);
01595             lLegCabin_ptr->addDemandInformation (lYield, lMeanValue, lStdDe
         vValue);
01596         }
01597     }
01598 }
01599 }
01600 }
01601 }
01602 }
01603 }
01604 }
01605
01606 // //////////////////////////////////////
01607 void RMOL_Service::projectOnDDemandOnLegCabinsUsingDYP(const stdair::DateT
         & irMEEventTime) {
01608
01609     if (_rmolServiceContext == NULL) {
01610         throw stdair::NonInitialisedServiceException ("The Rmol service "
         "has not been initialised");
01611     }
01612     assert (_rmolServiceContext != NULL);
01613     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01614
01615     // Retrieve the bom root

```

```

01617     stdair::STDAIR_Service& lSTDAIR_Service =
01618         lRMOL_ServiceContext.getSTDAIR_Service();
01619     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01620
01621     const stdair::InventoryList_T lInventoryList =
01622         stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01623     assert (!lInventoryList.empty());
01624     for (stdair::InventoryList_T::const_iterator itInv = lInventoryList.begin();
01625          itInv != lInventoryList.end(); ++itInv) {
01626         const stdair::Inventory* lInventory_ptr = *itInv;
01627         assert (lInventory_ptr != NULL);
01628         projectOnDDemandOnLegCabinsUsingDYP (iRMEventTime, *lInventory_ptr);
01629     }
01630 }
01631
01632 // //////////////////////////////////////
01633 void RMOL_Service::projectOnDDemandOnLegCabinsUsingDYP(const stdair::DateTime_T
& iRMEventTime,
01634                                                         const stdair::Inventory&
iInventory) {
01635     const stdair::OnDDateList_T lOnDDateList =
01636         stdair::BomManager::getList<stdair::OnDDate> (iInventory);
01637     assert (!lOnDDateList.empty());
01638     for (stdair::OnDDateList_T::const_iterator itOD = lOnDDateList.begin();
01639          itOD != lOnDDateList.end(); ++itOD) {
01640         stdair::OnDDate* lOnDDate_ptr = *itOD;
01641         assert (lOnDDate_ptr != NULL);
01642
01643         // Retrieve the date from the RM event
01644         const stdair::Date_T lDate = iRMEventTime.date();
01645
01646         const stdair::Date_T& lDepartureDate = lOnDDate_ptr->getDate();
01647         stdair::DateOffset_T lDateOffset = lDepartureDate - lDate;
01648         stdair::DTD_T lDTD = short (lDateOffset.days());
01649
01650         stdair::DCPLIST_T::const_iterator itDCP =
01651             std::find (stdair::DEFAULT_DCP_LIST.begin(), stdair::DEFAULT_DCP_LIST.end
(), lDTD);
01652         // Check if the forecast for this O&D date needs to be projected.
01653         if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01654             // Browse the demand info map.
01655             const stdair::StringDemandStructMap_T& lStringDemandStructMap =
01656                 lOnDDate_ptr->getDemandInfoMap ();
01657             for (stdair::StringDemandStructMap_T::const_iterator itStrDS = lStringDem
andStructMap.begin();
01658                  itStrDS != lStringDemandStructMap.end(); ++itStrDS) {
01659                 std::string lCabinClassPath = itStrDS->first;
01660                 const stdair::YieldDemandPair_T& lYieldDemandPair = itStrDS->second;
01661                 const stdair::CabinClassPairList_T& lCabinClassPairList =
01662                     lOnDDate_ptr->getCabinClassPairList (lCabinClassPath);
01663                 const unsigned int lNbOfSegments = lOnDDate_ptr->getNbOfSegments();
01664                 // Sanity check
01665                 assert (lCabinClassPairList.size() == lNbOfSegments);
01666
01667                 //
01668                 const stdair::SegmentDateList_T lOnDSegmentDateList =
01669                     stdair::BomManager::getList<stdair::SegmentDate> (*lOnDDate_ptr);
01670                 // Sanity check
01671                 assert (lOnDSegmentDateList.size() == lNbOfSegments);
01672                 stdair::CabinClassPairList_T::const_iterator itCCP = lCabinClassPairLis

```

```

t.begin();
01675     stdair::SegmentDateList_T::const_iterator itSD = lOnDSegmentDateList.be
gin();
01676     // The sum of bid prices of all cabins.
01677     stdair::BidPrice_T lTotalBidPrice = 0;
01678     for (; itSD != lOnDSegmentDateList.end(); ++itCCP, ++itSD) {
01679         // Get the operating segment cabin (it holds the bid price informatio
n).
01680         const stdair::SegmentDate* lSegmentDate_ptr = *itSD;
01681         assert (lSegmentDate_ptr != NULL);
01682         // Get the operating airline code and check if it is the airline we a
re looking for.
01683         const stdair::SegmentDate* lOperatingSegmentDate_ptr =
lSegmentDate_ptr->getOperatingSegmentDate ();
01684         if (lOperatingSegmentDate_ptr != NULL) {
01685             lSegmentDate_ptr = lOperatingSegmentDate_ptr;
01686         }
01687         const stdair::CabinCode_T lCabinCode = itCCP->first;
01688         const stdair::SegmentCabin* lSegmentCabin_ptr =
stdair::BomManager::getObjectPtr<stdair::SegmentCabin> (*lSegmentDa
te_ptr,
01691                                                     lCabinCode)
;
01692         assert (lSegmentCabin_ptr != NULL);
01693         const stdair::LegCabinList_T lLegCabinList =
stdair::BomManager::getList<stdair::LegCabin> (*lSegmentCabin_ptr);
01694         for (stdair::LegCabinList_T::const_iterator itLC = lLegCabinList.begi
n());
01695             itLC != lLegCabinList.end(); ++itLC) {
01696                 const stdair::LegCabin* lLegCabin_ptr = *itLC;
01697                 assert (lLegCabin_ptr != NULL);
01698                 lTotalBidPrice += lLegCabin_ptr->getCurrentBidPrice();
01699             }
01700         }
01701     }
01702
01703     itCCP = lCabinClassPairList.begin();
01704     itSD = lOnDSegmentDateList.begin();
01705     for (; itSD != lOnDSegmentDateList.end(); ++itCCP, ++itSD) {
01706         const stdair::SegmentDate* lSegmentDate_ptr = *itSD;
01707         assert (lSegmentDate_ptr != NULL);
01708         const stdair::SegmentDate* lOperatingSegmentDate_ptr =
lSegmentDate_ptr->getOperatingSegmentDate ();
01709         // Only operated legs receive the demand information.
01710         if (lOperatingSegmentDate_ptr == NULL) {
01711             const stdair::CabinCode_T lCabinCode = itCCP->first;
01712             const stdair::ClassCode_T lClassCode = itCCP->second;
01713             const stdair::SegmentCabin* lSegmentCabin_ptr =
stdair::BomManager::getObjectPtr<stdair::SegmentCabin> (*lSegment
Date_ptr,
01716                                                     lCabinCod
e);
01717             assert (lSegmentCabin_ptr != NULL);
01718             const stdair::LegCabinList_T lLegCabinList =
stdair::BomManager::getList<stdair::LegCabin> (*lSegmentCabin_ptr
);
01719             assert (!lLegCabinList.empty());
01720             const stdair::Yield_T& lYield = lYieldDemandPair.first;
01721
01722             const stdair::MeanStdDevPair_T& lMeanStdDevPair =
lYieldDemandPair.second;
01723             const stdair::MeanValue_T& lMeanValue = lMeanStdDevPair.first;

```



```

01726         const stdair::StdDevValue_T& lStdDevValue = lMeanStdDevPair.second;

01727         for (stdair::LegCabinList_T::const_iterator itLC = lLegCabinList.be
gin();
01728             itLC != lLegCabinList.end(); ++itLC) {
01729             stdair::LegCabin* lLegCabin_ptr = *itLC;
01730             assert (lLegCabin_ptr != NULL);
01731             const stdair::BidPrice_T& lBidPrice = lLegCabin_ptr->getCurrentBi
dPrice();
01732             const stdair::RealNumber_T lDynamicYieldProrationFactor = lBidPri
ce / lTotalBidPrice;
01733             const stdair::Yield_T lProratedYield = lDynamicYieldProrationFact
or*lYield;
01734             lLegCabin_ptr->addDemandInformation (lProratedYield, lMeanValue,
lStdDevValue);
01735
01736             // STDAIR_LOG_DEBUG ("Adding demand information to leg-cabin " <
< lLegCabin_ptr->getFullerKey()
01737             //                                     << " Total yield " << lYield << " Proration
factor "
01738             //                                     << lDynamicYieldProrationFactor << " Prorate
d yield " << lProratedYield
01739             //                                     << " Mean demand " << lMeanValue << " StdDev
" << lStdDevValue);
01740         }
01741     }
01742 }
01743 }
01744 }
01745 }
01746 }
01747
01748 //////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
01749 void RMOL_Service::optimiseOnDUsingRMCoperation (const stdair::DateTime_T& iRM
EventTime) {
01750
01751     if (_rmolServiceContext == NULL) {
01752         throw stdair::NonInitialisedServiceException ("The Rmol service "
"has not been initialised");
01753     }
01754     assert (_rmolServiceContext != NULL);
01755     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01756
01757     // Retrieve the bom root
01758     stdair::STDAIR_Service& lSTDAIR_Service =
01759         lRMOL_ServiceContext.getSTDAIR_Service();
01760     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01761
01762     // Retrieve the date from the RM event
01763     const stdair::Date_T lDate = iRMEventTime.date();
01764
01765     // Browse the list of inventories and optimise within each one independently.
01766
01767     const stdair::InventoryList_T& lInvList =
01768         stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01769     for (stdair::InventoryList_T::const_iterator itInv = lInvList.begin();
01770         itInv != lInvList.end(); ++itInv) {
01771         stdair::Inventory* lCurrentInv_ptr = *itInv;
01772         assert (lCurrentInv_ptr != NULL);
01773
01774         double lMaxBPVariation = 1.0;
01775         short lIterationCounter = 0;

```

```

01776     // Iterate until the variation is under the wanted level or the maximal num
ber of iterations is reached.
01777     while (lMaxBPVariation > 0.01 && lIterationCounter < 10) {
01778         lMaxBPVariation = 0.0;
01779         lIterationCounter++;
01780         const stdair::FlightDateList_T& lFlightDateList =
01781             stdair::BomManager::getList<stdair::FlightDate> (*lCurrentInv_ptr);
01782         for (stdair::FlightDateList_T::const_iterator itFlightDate =
01783             lFlightDateList.begin();
01784             itFlightDate != lFlightDateList.end(); ++itFlightDate) {
01785             stdair::FlightDate* lCurrentFlightDate_ptr = *itFlightDate;
01786             assert (lCurrentFlightDate_ptr != NULL);
01787
01788             const stdair::Date_T& lCurrentDepartureDate = lCurrentFlightDate_ptr->g
etDepartureDate();
01789             stdair::DateOffset_T lDateOffset = lCurrentDepartureDate - lDate;
01790             stdair::DTD_T lDTD = short (lDateOffset.days());
01791
01792             stdair::DCPList_T::const_iterator itDCP =
01793                 std::find (stdair::DEFAULT_DCP_LIST.begin(),
01794                     stdair::DEFAULT_DCP_LIST.end(), lDTD);
01795             // Check if the optimisation is needed.
01796             if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01797                 const double lBPVariation = Optimiser::optimiseUsingOnDForecast (*lCu
rrentFlightDate_ptr);
01798                 lMaxBPVariation = std::max(lMaxBPVariation, lBPVariation);
01799             }
01800             // Update the prorated yields for the current inventory.
01801             resetDemandInformation (iRMEventTime, *lCurrentInv_ptr);
01802             projectOnDDemandOnLegCabinsUsingDYP (iRMEventTime, *lCurrentInv_ptr);
01803         }
01804     }
01805 }
01806
01807
01808 // //////////////////////////////////////
01809 void RMOL_Service::optimiseOnDUsingAdvancedRMCooperation (const stdair::DateTim
e_T& iRMEventTime) {
01810
01811     if (_rmolServiceContext == NULL) {
01812         throw stdair::NonInitialisedServiceException ("The Rmol service "
01813             "has not been initialised");
01814     }
01815     assert (_rmolServiceContext != NULL);
01816     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01817
01818     // Retrieve the bom root
01819     stdair::STDAIR_Service& lSTDAIR_Service =
01820         lRMOL_ServiceContext.getSTDAIR_Service();
01821     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01822
01823     // Retrieve the date from the RM event
01824     const stdair::Date_T lDate = iRMEventTime.date();
01825
01826     double lMaxBPVariation = 1.0;
01827     short lIterationCounter = 0;
01828     // Iterate until the variation is under the wanted level or the maximal numbe
r of iterations is reached.
01829     // Every iteration corresponds to the optimisation of the whole network. Bid
prices are communicated
01830     // between partners at the end of each iteration.

```

```

01831     while (lMaxBPVariation > 0.01 && lIterationCounter < 50) {
01832         lMaxBPVariation = 0.0;
01833         lIterationCounter++;
01834
01835         const stdair::InventoryList_T& lInvList =
01836             stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01837         for (stdair::InventoryList_T::const_iterator itInv = lInvList.begin();
01838             itInv != lInvList.end(); ++itInv) {
01839             stdair::Inventory* lCurrentInv_ptr = *itInv;
01840             assert (lCurrentInv_ptr != NULL);
01841             const stdair::FlightDateList_T& lFlightDateList =
01842                 stdair::BomManager::getList<stdair::FlightDate> (*lCurrentInv_ptr);
01843             for (stdair::FlightDateList_T::const_iterator itFlightDate =
01844                 lFlightDateList.begin();
01845                 itFlightDate != lFlightDateList.end(); ++itFlightDate) {
01846                 stdair::FlightDate* lCurrentFlightDate_ptr = *itFlightDate;
01847                 assert (lCurrentFlightDate_ptr != NULL);
01848
01849                 const stdair::Date_T& lCurrentDepartureDate = lCurrentFlightDate_ptr->getDepartureDate();
01850                 stdair::DateOffset_T lDateOffset = lCurrentDepartureDate - lDate;
01851                 stdair::DTD_T lDTD = short (lDateOffset.days());
01852
01853                 stdair::DCPList_T::const_iterator itDCP =
01854                     std::find (stdair::DEFAULT_DCP_LIST.begin(),
01855                         stdair::DEFAULT_DCP_LIST.end(), lDTD);
01856                 if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01857                     const double lBPVariation = Optimiser::optimiseUsingOnDForecast (*lCurrentFlightDate_ptr);
01858                     lMaxBPVariation = std::max(lMaxBPVariation, lBPVariation);
01859                 }
01860             }
01861             // At the end of each iteration, communicate bid prices and compute displacement adjusted yields.
01862             updateBidPrice (iRMEventTime);
01863             resetDemandInformation (iRMEventTime);
01864             projectOnDDemandOnLegCabinsUsingDYP (iRMEventTime);
01865         }
01866     }
01867 }
01868 }

```

## 28.97 rmol/service/RMOL\_ServiceContext.cpp File Reference

```

#include <cassert>

#include <sstream>

#include <stdair/STDAIR_Service.hpp>

#include <rmol/basic/BasConst_RMOL_Service.hpp>

#include <rmol/service/RMOL_ServiceContext.hpp>

```

### Namespaces

- namespace [RMOL](#)

## 28.98 RMOL\_ServiceContext.cpp

```

00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 #include <sstream>
00007 // StdAir
00008 #include <stdair/STDAIR_Service.hpp>
00009 // RMOL
00010 #include <rmol/basic/BasConst_RMOL_Service.hpp>
00011 #include <rmol/service/RMOL_ServiceContext.hpp>
00012
00013 namespace RMOL {
00014
00015     // //////////////////////////////////////
00016     RMOL_ServiceContext::RMOL_ServiceContext() : _ownStdairService (false) {
00017     }
00018
00019     // //////////////////////////////////////
00020     RMOL_ServiceContext::RMOL_ServiceContext (const RMOL_ServiceContext&) {
00021         assert (false);
00022     }
00023
00024     // //////////////////////////////////////
00025     RMOL_ServiceContext::~RMOL_ServiceContext() {
00026     }
00027
00028     // //////////////////////////////////////
00029     stdair::STDAIR_Service& RMOL_ServiceContext::getSTDAIR_Service() const {
00030         assert (_stdairService != NULL);
00031         return *_stdairService;
00032     }
00033
00034     // //////////////////////////////////////
00035     const std::string RMOL_ServiceContext::shortDisplay() const {
00036         std::ostringstream ostr;
00037         ostr << "RMOL_ServiceContext -- Owns StdAir service: " << _ownStdairService;
00038         return ostr.str();
00039     }
00040
00041     // //////////////////////////////////////
00042     const std::string RMOL_ServiceContext::display() const {
00043         std::ostringstream ostr;
00044         ostr << shortDisplay();
00045         return ostr.str();
00046     }
00047
00048     // //////////////////////////////////////
00049     const std::string RMOL_ServiceContext::describe() const {
00050         return shortDisplay();
00051     }
00052
00053     // //////////////////////////////////////
00054     void RMOL_ServiceContext::reset() {
00055         if (_ownStdairService == true) {
00056             _stdairService.reset();
00057         }
00058     }
00059
00060 }

```

## 28.99 rmol/service/RMOL\_ServiceContext.hpp File Reference

```
#include <string>
#include <stdair/stdair_basic_types.hpp>
#include <stdair/stdair_inventory_types.hpp>
#include <stdair/stdair_maths_types.hpp>
#include <stdair/stdair_service_types.hpp>
#include <stdair/service/ServiceAbstract.hpp>
#include <rmol/RMOL_Types.hpp>
```

### Classes

- class [RMOL::RMOL\\_ServiceContext](#)  
Inner class holding the context for the [RMOL](#) Service object.

### Namespaces

- namespace [stdair](#)
- namespace [RMOL](#)

## 28.100 RMOL\_ServiceContext.hpp

```
00001 #ifndef __RMOL_SVC_RMOL_SERVICE_CONTEXT_HPP
00002 #define __RMOL_SVC_RMOL_SERVICE_CONTEXT_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // STL
00008 #include <string>
00009 // StdAir
00010 #include <stdair/stdair_basic_types.hpp>
00011 #include <stdair/stdair_inventory_types.hpp>
00012 #include <stdair/stdair_maths_types.hpp>
00013 #include <stdair/stdair_service_types.hpp>
00014 #include <stdair/service/ServiceAbstract.hpp>
00015 // RMOL
00016 #include <rmol/RMOL_Types.hpp>
00017
00019 namespace stdair {
00020     class STDAIR_Service;
00021     class LegCabin;
00022 }
00023
00024 namespace RMOL {
00025
00029     class RMOL_ServiceContext : public stdair::ServiceAbstract {
00035         friend class RMOL_Service;
00036         friend class FacRmolServiceContext;
00037     }
```

```

00038 private:
00039 // //////////// Getters ////////////
00043 stdair::STDAIR_ServicePtr_T getSTDAIR_ServicePtr() const {
00044     return _stdairService;
00045 }
00046
00050 stdair::STDAIR_Service& getSTDAIR_Service() const;
00051
00055 const bool getOwnStdairServiceFlag() const {
00056     return _ownStdairService;
00057 }
00058
00059
00060 private:
00061 // //////////// Setters ////////////
00065 void setSTDAIR_Service (stdair::STDAIR_ServicePtr_T ioSTDAIR_ServicePtr,
00066                        const bool iOwnStdairService) {
00067     _stdairService = ioSTDAIR_ServicePtr;
00068     _ownStdairService = iOwnStdairService;
00069 }
00070
00074 void reset();
00075
00076
00077 private:
00078 // //////////// Display Methods ////////////
00082 const std::string shortDisplay() const;
00083
00087 const std::string display() const;
00088
00092 const std::string describe() const;
00093
00094
00095 private:
00096 // //////////// Construction / initialisation ////////////
00100 RMOL_ServiceContext();
00104 RMOL_ServiceContext (const RMOL_ServiceContext&);
00105
00109 ~RMOL_ServiceContext();
00110
00111
00112 private:
00113 // //////////// Children ////////////
00117 stdair::STDAIR_ServicePtr_T _stdairService;
00118
00122 bool _ownStdairService;
00123 };
00124
00125 }
00126 #endif // __RMOL_SVC_RMOL_SERVICE_CONTEXT_HPP

```

## 28.101 test/rmol/bomsforforecaster.cpp File Reference

### 28.102 bomsforforecaster.cpp

```

00001
00005 // //////////////////////////////////////
00006 // Import section
00007 // //////////////////////////////////////
00008 // STL

```

```
00009 #include <cassert>
00010 #include <limits>
00011 #include <sstream>
00012 #include <fstream>
00013 #include <string>
00014 // Boost Unit Test Framework (UTF)
00015 #define BOOST_TEST_DYN_LINK
00016 #define BOOST_TEST_MAIN
00017 #define BOOST_TEST_MODULE OptimiseTestSuite
00018 #include <boost/test/unit_test.hpp>
00019 // StdAir
00020 #include <stdair/basic/BasLogParams.hpp>
00021 #include <stdair/basic/BasDBParams.hpp>
00022 #include <stdair/service/Logger.hpp>
00023 // RMOL
00024 #include <rmol/RMOL_Service.hpp>
00025 #include <rmol/config/rmol-paths.hpp>
00026
00027 namespace boost_utf = boost::unit_test;
00028
00029 // (Boost) Unit Test XML Report
00030 std::ofstream utfReportStream ("bomsforforecaster_utfresults.xml");
00031
00032 struct UnitTestConfig {
00033     UnitTestConfig() {
00034         boost_utf::unit_test_log.set_stream (utfReportStream);
00035         boost_utf::unit_test_log.set_format (boost_utf::XML);
00036         boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
00037         //boost_utf::unit_test_log.set_threshold_level (boost_utf::log_successful_tes
00038     ts);
00039     }
00040
00041     ~UnitTestConfig() {
00042     }
00043 };
00044
00045 namespace RMOL {
00046     struct BookingClassData {
00047         // Attributes
00048         double _bookingCount;
00049         double _fare;
00050         double _sellupFactor;
00051         bool _censorshipFlag;
00052
00053         // Constructor
00054         BookingClassData (const double iBookingCount, const double iFare,
00055             const double iSellupFactor, const bool iCensorshipFlag)
00056             : _bookingCount (iBookingCount), _fare (iFare),
00057             _sellupFactor (iSellupFactor), _censorshipFlag (iCensorshipFlag) {
00058         }
00059
00060         // Getters
00061         double getFare () const {
00062             return _fare;
00063         }
00064
00065         bool getCensorshipFlag () const {
00066             return _censorshipFlag;
00067         }
00068     }
00069 }
```

```

00076     // Display
00077     std::string toString() const {
00078         std::ostringstream oStr;
00079         oStr << std::endl
00080             << "[Booking class data information]" << std::endl
00081             << "Booking counter: " << _bookingCount << std::endl
00082             << "Fare: " << _fare << std::endl
00083             << "Sell-up Factor: " << _sellupFactor << std::endl
00084             << "censorshipFlag: " << _censorshipFlag << std::endl;
00085         return oStr.str();
00086     }
00087
00088 };
00089
00091 struct BookingClassDataSet {
00092
00093     typedef std::vector<BookingClassData*> BookingClassDataList_T;
00094
00095     // Attributes
00096     int _numberOfClass;
00097     double _minimumFare;
00098     bool _censorshipFlag; // true if any of the classes is censored
00099     BookingClassDataList_T _bookingClassDataList;
00100
00101     // Constructor
00102     BookingClassDataSet ()
00103         : _numberOfClass(0), _minimumFare(0),
00104           _censorshipFlag(false) {
00105     }
00106
00107     // Add BookingClassData
00108     void addBookingClassData (BookingClassData& ioBookingClassData) {
00109         _bookingClassDataList.push_back (&ioBookingClassData);
00110     }
00111
00112     // Getters
00113     unsigned int getNumberOfClass () const {
00114         return _bookingClassDataList.size();
00115     }
00116
00117     double getMinimumFare () const {
00118         return _minimumFare;
00119     }
00120
00121     bool getCensorshipFlag () const {
00122         return _censorshipFlag;
00123     }
00124
00125     // Setters
00126     void setMinimumFare (const double iMinFare) {
00127         _minimumFare = iMinFare;
00128     }
00129
00130     void setCensorshipFlag (const bool iCensorshipFlag) {
00131         _censorshipFlag = iCensorshipFlag;
00132     }
00133
00134     // compute minimum fare
00135     void updateMinimumFare() {
00136         double minFare = std::numeric_limits<double>::max();
00137         BookingClassDataList_T::iterator itBookingClassDataList;
00138         for (itBookingClassDataList = _bookingClassDataList.begin();

```



```

00139         itBookingClassDataList != _bookingClassDataList.end();
00140         ++itBookingClassDataList) {
00141             BookingClassData* lBookingClassData = *itBookingClassDataList;
00142             assert (lBookingClassData != NULL);
00143
00144             const double lFare = lBookingClassData->getFare();
00145             if (lFare < minFare) {
00146                 minFare = lFare;
00147             }
00148         }
00149         //
00150         setMinimumFare(minFare);
00151     }
00152
00153     // compute censorship flag for the data set
00154     void updateCensorshipFlag () {
00155         bool censorshipFlag = false;
00156         BookingClassDataList_T::iterator itBookingClassDataList;
00157         for (itBookingClassDataList = _bookingClassDataList.begin();
00158             itBookingClassDataList != _bookingClassDataList.end();
00159             ++itBookingClassDataList) {
00160             BookingClassData* lBookingClassData = *itBookingClassDataList;
00161             assert (lBookingClassData != NULL);
00162
00163             const bool lCensorshipFlagOfAClass =
00164                 lBookingClassData->getCensorshipFlag();
00165             if (lCensorshipFlagOfAClass) {
00166                 censorshipFlag = true;
00167                 break;
00168             }
00169         }
00170         //
00171         setCensorshipFlag(censorshipFlag);
00172     }
00173
00174     // Display
00175     std::string toString() const {
00176         std::ostringstream oStr;
00177         oStr << std::endl
00178             << "[Booking class data set information]" << std::endl
00179             << "Number of classes: " << _numberOfClass << std::endl
00180             << "Minimum fare: " << _minimumFare << std::endl
00181             << "The data of the class set are sensed: " << _censorshipFlag
00182             << std::endl;
00183         return oStr.str();
00184     }
00185
00186 };
00187
00188 // /**----- BOM : Q-Forecaster ----- */
00189 // struct QForecaster {
00190
00191 //     // Function focused BOM
00192
00193 //     // 1. calculate sell up probability for Q-eq
00194
00195 //     // 2. calculate Q-Equivalent Booking
00196 //     double calculateQEqBooking (BookingClassDataSet& iBookingClassDataSet) {
00197 //         double lQEqBooking = 0.0;
00198 //         double lMinFare = iBookingClassDataSet.getMinimumFare();
00199
00200

```

```

00201 //      return lQEqBooking;
00202 //  }
00203
00204 //  /* Calculate Q-equivalent demand
00205 //      [<- performed by unconstrainer if necessary (Using ExpMax BOM)]
00206 //  */
00207
00208
00209 //  // 3. Partition to each class
00210
00211 //  //
00212
00213 //  };
00214
00215 }
00216
00217 // ////////////////////////////////// Main: Unit Test Suite //////////////////////////////////
00218
00219 // Set the UTF configuration (re-direct the output to a specific file)
00220 BOOST_GLOBAL_FIXTURE (UnitTestFixture);
00221
00222 BOOST_AUTO_TEST_SUITE (master_test_suite)
00223
00224 BOOST_AUTO_TEST_CASE (rmol_forecaster) {
00225
00226 // Output log File
00227 std::string lLogFilename ("bomsforforecaster.log");
00228 std::ofstream logOutputFile;
00229
00230 // Open and clean the log outputfile
00231 logOutputFile.open (lLogFilename.c_str());
00232 logOutputFile.clear();
00233
00234 // Initialise the RMOL service
00235 const stdair::BasLogParams lLogParams (stdair::LOG::DEBUG, logOutputFile);
00236
00237 // Initialise the RMOL service
00238 RMOL::RMOL_Service rmolService (lLogParams);
00239
00240 // Build a sample BOM tree
00241 rmolService.buildSampleBom();
00242
00243 // Register BCDataset
00244 RMOL::BookingClassDataSet lBookingClassDataSet;
00245
00246 // Register BookingClassData
00247 RMOL::BookingClassData QClassData (10, 100, 1, false);
00248 RMOL::BookingClassData MClassData (5, 150, 0.8, true);
00249 RMOL::BookingClassData BClassData (0, 200, 0.6, false);
00250 RMOL::BookingClassData YClassData (0, 300, 0.3, false);
00251
00252 // Display
00253 STDAIR_LOG_DEBUG (QClassData.toString());
00254 STDAIR_LOG_DEBUG (MClassData.toString());
00255 STDAIR_LOG_DEBUG (BClassData.toString());
00256 STDAIR_LOG_DEBUG (YClassData.toString());
00257
00258 // Add BookingClassData into the BCDataset
00259 lBookingClassDataSet.addBookingClassData (QClassData);
00260 lBookingClassDataSet.addBookingClassData (MClassData);
00261 lBookingClassDataSet.addBookingClassData (BClassData);

```

```

00268   lBookingClassDataSet.addBookingClassData (YClassData);
00269
00270   // DEBUG
00271   STDAIR_LOG_DEBUG (lBookingClassDataSet.toString());
00272
00273   // Number of classes
00274   const unsigned int lNoOfClass = lBookingClassDataSet.getNumberOfClass();
00275
00276   // DEBUG
00277   STDAIR_LOG_DEBUG ("Number of Classes: " << lNoOfClass);
00278
00279   // Minimum fare
00280   BOOST_CHECK_NO_THROW (lBookingClassDataSet.updateMinimumFare());
00281   const double lMinFare = lBookingClassDataSet.getMinimumFare();
00282
00283   // DEBUG
00284   STDAIR_LOG_DEBUG ("Minimum fare: " << lMinFare);
00285
00286   // Censorship flag
00287   BOOST_CHECK_NO_THROW (lBookingClassDataSet.updateCensorshipFlag());
00288   const bool lCensorshipFlag = lBookingClassDataSet.getCensorshipFlag();
00289
00290   // DEBUG
00291   STDAIR_LOG_DEBUG ("Censorship Flag: " << lCensorshipFlag);
00292
00293   // Close the log output file
00294   logOutputFile.close();
00295 }
00296
00297 // End the test suite
00298 BOOST_AUTO_TEST_SUITE_END()
00299
00300

```

## 28.103 test/rmol/ForecasterTestSuite.cpp File Reference

### 28.104 ForecasterTestSuite.cpp

```

00001
00005 // //////////////////////////////////////
00006 // Import section
00007 // //////////////////////////////////////
00008 // STL
00009 #include <sstream>
00010 #include <fstream>
00011 #include <string>
00012 #include <vector>
00013 #include <cmath>
00014 // Boost Unit Test Framework (UTF)
00015 #define BOOST_TEST_DYN_LINK
00016 #define BOOST_TEST_MAIN
00017 #define BOOST_TEST_MODULE ForecasterTestSuite
00018 #include <boost/test/unit_test.hpp>
00019 // StdAir
00020 #include <stdair/basic/BasLogParams.hpp>
00021 #include <stdair/basic/BasDBParams.hpp>
00022 #include <stdair/basic/BasFileMgr.hpp>
00023 #include <stdair/service/Logger.hpp>
00024 // RMOL
00025 #include <rmol/RMOL_Service.hpp>

```

```

00026
00027 namespace boost_utf = boost::unit_test;
00028
00029 // (Boost) Unit Test XML Report
00030 std::ofstream utfReportStream ("ForecasterTestSuite_utfresults.xml");
00031
00032 struct UnitTestConfig {
00033     UnitTestConfig() {
00034         boost_utf::unit_test_log.set_stream (utfReportStream);
00035         boost_utf::unit_test_log.set_format (boost_utf::XML);
00036         boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
00037         //boost_utf::unit_test_log.set_threshold_level (boost_utf::log_successful_tes
00038         ts);
00039     }
00040
00041     ~UnitTestConfig() {
00042     }
00043 };
00044
00045 // Main: Unit Test Suite
00046
00047 // Set the UTF configuration (re-direct the output to a specific file)
00048 BOOST_GLOBAL_FIXTURE (UnitTestConfig);
00049
00050 BOOST_AUTO_TEST_SUITE (master_test_suite)
00051
00052 BOOST_AUTO_TEST_CASE (rmol_forecaster_q_forecasting) {
00053     const bool lTestFlag = true; //testForecasterHelper(0);
00054     BOOST_CHECK_EQUAL (lTestFlag, true);
00055     BOOST_CHECK_MESSAGE (lTestFlag == true,
00056         "The test has failed. Please see the log file for "
00057         "<< \"more details\"");
00058 }
00059
00060 // End the test suite
00061 BOOST_AUTO_TEST_SUITE_END()
00062
00063

```

## 28.105 test/rmol/ForecasterTestSuite.hpp File Reference

```

#include <sstream>

#include <cppunit/extensions/HelperMacros.h>

```

### Classes

- class [ForecasterTestSuite](#)

### Functions

- [CPPUNIT\\_TEST\\_SUITE\\_REGISTRATION \(ForecasterTestSuite\)](#)

## 28.105.1 Function Documentation

## 28.105.1.1 CPPUNIT\_TEST\_SUITE\_REGISTRATION( ForecasterTestSuite )

## 28.106 ForecasterTestSuite.hpp

```

00001 // STL
00002 #include <sstream>
00003 // CPPUNIT
00004 #include <cppunit/extensions/HelperMacros.h>
00005
00006 class ForecasterTestSuite : public CppUnit::TestFixture {
00007     CPPUNIT_TEST_SUITE (ForecasterTestSuite);
00008     CPPUNIT_TEST (testQForecaster);
00009     CPPUNIT_TEST_SUITE_END ();
00010 public:
00011
00013     void testQForecaster();
00014
00016     ForecasterTestSuite ();
00017
00018 protected:
00019     std::stringstream _describeKey;
00020 };
00021
00022 CPPUNIT_TEST_SUITE_REGISTRATION (ForecasterTestSuite);

```

## 28.107 test/rmol/OptimiseTestSuite.cpp File Reference

## 28.108 OptimiseTestSuite.cpp

```

00001
00005 // //////////////////////////////////////
00006 // Import section
00007 // //////////////////////////////////////
00008 // STL
00009 #include <sstream>
00010 #include <fstream>
00011 #include <string>
00012 // Boost Unit Test Framework (UTF)
00013 #define BOOST_TEST_DYN_LINK
00014 #define BOOST_TEST_MAIN
00015 #define BOOST_TEST_MODULE OptimiseTestSuite
00016 #include <boost/test/unit_test.hpp>
00017 // StdAir
00018 #include <stdair/basic/BasLogParams.hpp>
00019 #include <stdair/basic/BasDBParams.hpp>
00020 #include <stdair/basic/BasFileMgr.hpp>
00021 #include <stdair/service/Logger.hpp>
00022 // RMOL
00023 #include <rmol/RMOL_Service.hpp>
00024 #include <rmol/config/rmol-paths.hpp>
00025
00026 namespace boost_utf = boost::unit_test;
00027
00028 // (Boost) Unit Test XML Report
00029 std::ofstream utfReportStream ("OptimiseTestSuite_utfresults.xml");
00030

```

```

00034 struct UnitTestConfig {
00035     UnitTestConfig() {
00036         boost_utf::unit_test_log.set_stream (utfReportStream);
00037         boost_utf::unit_test_log.set_format (boost_utf::XML);
00038         boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
00039         //boost_utf::unit_test_log.set_threshold_level (boost_utf::log_successful_tes
00040     ts);
00041     }
00042
00043     ~UnitTestConfig() {
00044     }
00045 };
00046 };
00047
00048
00049 //////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
00050 int testOptimiseHelper (const unsigned short optimisationMethodFlag,
00051                        const bool isBuiltin) {
00052
00053     // Return value
00054     int oExpectedBookingLimit = 0;
00055
00056     // Output log File
00057     std::ostringstream oStr;
00058     oStr << "OptimiseTestSuite_" << optimisationMethodFlag << ".log";
00059     const stdair::Filename_T lLogFilename (oStr.str());
00060
00061     // Number of random draws to be generated (best if greater than 100)
00062     const int K = 100000;
00063
00064     // Methods of optimisation (0 = Monte-Carlo, 1 = Dynamic Programming,
00065     // 2 = EMSR, 3 = EMSR-a, 4 = EMSR-b, 5 = EMSR-a with sellup prob.)
00066     const unsigned short METHOD_FLAG = optimisationMethodFlag;
00067
00068     // Cabin Capacity (it must be greater then 100 here)
00069     const double cabinCapacity = 100.0;
00070
00071     // Set the log parameters
00072     std::ofstream logOutputFile;
00073     // Open and clean the log outputfile
00074     logOutputFile.open (lLogFilename.c_str());
00075     logOutputFile.clear();
00076
00077     // Initialise the RMOL service
00078     const stdair::BasLogParams lLogParams (stdair::LOG::DEBUG, logOutputFile);
00079     RMOL::RMOL_Service rmolService (lLogParams);
00080
00081     // Check wether or not a (CSV) input file should be read
00082     if (isBuiltin == true) {
00083
00084         // Build the default sample BOM tree and build a dummy BOM tree.
00085         rmolService.buildSampleBom();
00086
00087     } else {
00088
00089         // Parse the optimisation data and build a dummy BOM tree
00090         const stdair::Filename_T lRMInputFileName (STDAIR_SAMPLE_DIR "/rm02.csv");
00091         rmolService.parseAndLoad (cabinCapacity, lRMInputFileName);
00092     }
00093
00094     switch (METHOD_FLAG) {
00095     case 0: {
00096         // DEBUG

```

```

00097     STDAIR_LOG_DEBUG ("Optimisation by Monte-Carlo (MC)");
00098
00099     // Calculate the optimal protections by the Monte Carlo
00100     // Integration approach
00101     rmolService.optimalOptimisationByMCIntegration (K);
00102     break;
00103 }
00104
00105 case 1: {
00106     // DEBUG
00107     STDAIR_LOG_DEBUG ("Optimisation by Dynamic Programming (DP)");
00108
00109     // Calculate the optimal protections by DP.
00110     rmolService.optimalOptimisationByDP ();
00111     break;
00112 }
00113
00114 case 2: {
00115     // DEBUG
00116     STDAIR_LOG_DEBUG ("Calculate the Bid-Price Vectors (BPV) by EMSR");
00117
00118     // Calculate the Bid-Price Vector by EMSR
00119     rmolService.heuristicOptimisationByEmsr ();
00120     break;
00121 }
00122
00123 case 3: {
00124     // DEBUG
00125     STDAIR_LOG_DEBUG ("Calculate the Authorisation Levels (AUs) by EMSRa");
00126
00127     // Calculate the protections by EMSR-a
00128     // Test the EMSR-a algorithm implementation
00129     rmolService.heuristicOptimisationByEmsrA ();
00130
00131     // Return a cumulated booking limit value to test
00132     // oExpectedBookingLimit = static_cast<int> (lBookingLimitVector.at(2));
00133     break;
00134 }
00135
00136 case 4: {
00137     // DEBUG
00138     STDAIR_LOG_DEBUG ("Calculate the Authorisation Levels (AUs) by EMSRb");
00139
00140     // Calculate the protections by EMSR-b
00141     rmolService.heuristicOptimisationByEmsrB ();
00142     break;
00143 }
00144
00145 default: rmolService.optimalOptimisationByMCIntegration (K);
00146 }
00147
00148 // Close the log file
00149 logOutputFile.close();
00150
00151 return oExpectedBookingLimit;
00152 }
00153
00154
00155 // ////////////////////////////////// Main: Unit Test Suite //////////////////////////////////
00156
00157 // Set the UTF configuration (re-direct the output to a specific file)
00158 BOOST_GLOBAL_FIXTURE (UnitTestFixture);

```

```

00159
00160 // //////////////////////////////////////
00161 // Tests are based on the following input values
00162 // price; mean; standard deviation;
00163 // 1050; 17.3; 5.8;
00164 // 567; 45.1; 15.0;
00165 // 534; 39.6; 13.2;
00166 // 520; 34.0; 11.3;
00167 // //////////////////////////////////////
00168
00173 BOOST_AUTO_TEST_SUITE (master_test_suite)
00174
00175
00178 BOOST_AUTO_TEST_CASE (rmol_optimisation_monte_carlo) {
00179
00180     // State whether the BOM tree should be built-in or parsed from an input file
00181     const bool isBuiltin = false;
00182
00183     BOOST_CHECK_NO_THROW (testOptimiseHelper(0, isBuiltin));
00184 }
00185
00189 BOOST_AUTO_TEST_CASE (rmol_optimisation_dynamic_programming) {
00190
00191     // State whether the BOM tree should be built-in or parsed from an input file
00192     const bool isBuiltin = false;
00193
00194     BOOST_CHECK_NO_THROW (testOptimiseHelper(1, isBuiltin));
00195 }
00196
00201 BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_bpv) {
00202
00203     // State whether the BOM tree should be built-in or parsed from an input file
00204     const bool isBuiltin = false;
00205
00206     BOOST_CHECK_NO_THROW (testOptimiseHelper(2, isBuiltin));
00207 }
00208
00213 BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_a) {
00214
00215     // State whether the BOM tree should be built-in or parsed from an input file
00216     const bool isBuiltin = false;
00217
00218     BOOST_CHECK_NO_THROW (testOptimiseHelper(3, isBuiltin));
00219     // const int lBookingLimit = testOptimiseHelper(3);
00220     // const int lExpectedBookingLimit = 61;
00221     // BOOST_CHECK_EQUAL (lBookingLimit, lExpectedBookingLimit);
00222     // BOOST_CHECK_MESSAGE (lBookingLimit == lExpectedBookingLimit,
00223     //                       "The booking limit is " << lBookingLimit
00224     //                       << ", but it is expected to be "
00225     //                       << lExpectedBookingLimit);
00226 }
00227
00232 BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_b) {
00233
00234     // State whether the BOM tree should be built-in or parsed from an input file
00235     const bool isBuiltin = false;
00236
00237     BOOST_CHECK_NO_THROW (testOptimiseHelper(4, isBuiltin));
00238 }
00239
00243 BOOST_AUTO_TEST_CASE (rmol_optimisation_monte_carlo_built_in) {
00244

```



```
00245 // State whether the BOM tree should be built-in or parsed from an input file
00246 const bool isBuiltin = true;
00247
00248 BOOST_CHECK_NO_THROW (testOptimiseHelper(5, isBuiltin));
00249 }
00250
00254 BOOST_AUTO_TEST_CASE (rmol_optimisation_dynamic_programming_built_in) {
00255
00256 // State whether the BOM tree should be built-in or parsed from an input file
00257 const bool isBuiltin = true;
00258
00259 BOOST_CHECK_NO_THROW (testOptimiseHelper(6, isBuiltin));
00260 }
00261
00266 BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_bpv_built_in) {
00267
00268 // State whether the BOM tree should be built-in or parsed from an input file
00269 const bool isBuiltin = true;
00270
00271 BOOST_CHECK_NO_THROW (testOptimiseHelper(7, isBuiltin));
00272 }
00273
00278 BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_a_built_in) {
00279
00280 // State whether the BOM tree should be built-in or parsed from an input file
00281 const bool isBuiltin = true;
00282
00283 BOOST_CHECK_NO_THROW (testOptimiseHelper(8, isBuiltin));
00284 }
00285
00290 BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_b_built_in) {
00291
00292 // State whether the BOM tree should be built-in or parsed from an input file
00293 const bool isBuiltin = true;
00294
00295 BOOST_CHECK_NO_THROW (testOptimiseHelper(9, isBuiltin));
00296 }
00297
00298 // End the test suite
00299 BOOST_AUTO_TEST_SUITE_END()
00300
00301
```

## 28.109 test/rmol/OptimiseTestSuite.hpp File Reference

```
#include <sstream>
#include <cppunit/extensions/HelperMacros.h>
```

### Classes

- class [OptimiseTestSuite](#)

### Functions

- [CPPUNIT\\_TEST\\_SUITE\\_REGISTRATION](#) ([OptimiseTestSuite](#))

## 28.109.1 Function Documentation

## 28.109.1.1 CPPUNIT\_TEST\_SUITE\_REGISTRATION( OptimiseTestSuite )

## 28.110 OptimiseTestSuite.hpp

```

00001 // STL
00002 #include <sstream>
00003 // CPPUNIT
00004 #include <cppunit/extensions/HelperMacros.h>
00005
00006 class OptimiseTestSuite : public CppUnit::TestFixture {
00007     CPPUNIT_TEST_SUITE (OptimiseTestSuite);
00008     CPPUNIT_TEST (testOptimiseMC);
00009     CPPUNIT_TEST (testOptimiseDP);
00010     CPPUNIT_TEST (testOptimiseEMSR);
00011     CPPUNIT_TEST (testOptimiseEMSRa);
00012     CPPUNIT_TEST (testOptimiseEMSRb);
00013     CPPUNIT_TEST (testOptimiseEMSRaWithSU);
00014     // CPPUNIT_TEST (errorCase);
00015     CPPUNIT_TEST_SUITE_END ();
00016 public:
00017
00019     void testOptimiseMC();
00020
00022     void testOptimiseDP();
00023
00026     void testOptimiseEMSR();
00027
00030     void testOptimiseEMSRa();
00031
00034     void testOptimiseEMSRb();
00035
00037     // void errorCase ();
00038
00040     OptimiseTestSuite ();
00041
00042 protected:
00043     std::stringstream _describeKey;
00044 };
00045
00046 CPPUNIT_TEST_SUITE_REGISTRATION (OptimiseTestSuite);

```

## 28.111 test/rmol/UnconstrainerTestSuite.cpp File Reference

## 28.112 UnconstrainerTestSuite.cpp

```

00001
00005 // //////////////////////////////////////
00006 // Import section
00007 // //////////////////////////////////////
00008 // STL
00009 #include <sstream>
00010 #include <fstream>
00011 #include <string>
00012 // Boost Unit Test Framework (UTF)
00013 #define BOOST_TEST_DYN_LINK
00014 #define BOOST_TEST_MAIN

```

```

00015 #define BOOST_TEST_MODULE UnconstrainerTestSuite
00016 #include <boost/test/unit_test.hpp>
00017 // StdAir
00018 #include <stdair/basic/BasLogParams.hpp>
00019 #include <stdair/basic/BasDBParams.hpp>
00020 #include <stdair/basic/BasFileMgr.hpp>
00021 #include <stdair/service/Logger.hpp>
00022 // RMOL
00023 #include <rmol/RMOL_Service.hpp>
00024
00025 namespace boost_utf = boost::unit_test;
00026
00027 // (Boost) Unit Test XML Report
00028 std::ofstream utfReportStream ("UnconstrainerTestSuite_utfresults.xml");
00029
00030 struct UnitTestConfig {
00031     UnitTestConfig() {
00032         boost_utf::unit_test_log.set_stream (utfReportStream);
00033         boost_utf::unit_test_log.set_format (boost_utf::XML);
00034         boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
00035         //boost_utf::unit_test_log.set_threshold_level (boost_utf::log_successful_tes
00036         ts);
00037     }
00038     ~UnitTestConfig() {
00039     }
00040 };
00041
00042 // ////////////////////////////////// Main: Unit Test Suite //////////////////////////////////
00043
00044 // Set the UTF configuration (re-direct the output to a specific file)
00045 BOOST_GLOBAL_FIXTURE (UnitTestConfig);
00046
00047 BOOST_AUTO_TEST_SUITE (master_test_suite)
00048
00049 BOOST_AUTO_TEST_CASE (rmol_unconstraining_em) {
00050     const bool lTestFlag = true; // testUnconstrainerHelper(0);
00051     BOOST_CHECK_EQUAL (lTestFlag, true);
00052     BOOST_CHECK_MESSAGE (lTestFlag == true,
00053         "The test has failed. Please see the log file for "
00054         "<< \"more details\"");
00055 }
00056
00057 // End the test suite
00058 BOOST_AUTO_TEST_SUITE_END()
00059
00060
00061

```

## 28.113 test/rmol/UnconstrainerTestSuite.hpp File Reference

```
#include <sstream>
```

```
#include <cppunit/extensions/HelperMacros.h>
```

### Classes

- class [UnconstrainerTestSuite](#)

## Functions

- [CPPUNIT\\_TEST\\_SUITE\\_REGISTRATION \(UnconstrainerTestSuite\)](#)

### 28.113.1 Function Documentation

#### 28.113.1.1 CPPUNIT\_TEST\_SUITE\_REGISTRATION ( UnconstrainerTestSuite )

### 28.114 UnconstrainerTestSuite.hpp

```
00001 // STL
00002 #include <sstream>
00003 // CPPUNIT
00004 #include <cppunit/extensions/HelperMacros.h>
00005
00006 class UnconstrainerTestSuite : public CppUnit::TestFixture {
00007     CPPUNIT_TEST_SUITE (UnconstrainerTestSuite);
00008     CPPUNIT_TEST (testUnconstrainingByEM);
00009     CPPUNIT_TEST_SUITE_END ();
00010 public:
00011
00012     void testUnconstrainingByEM();
00013
00014     UnconstrainerTestSuite ();
00015
00016 protected:
00017     std::stringstream _describeKey;
00018 };
00019
00020 CPPUNIT_TEST_SUITE_REGISTRATION (UnconstrainerTestSuite);
```

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