

RMOL

0.25.3

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## 1 RMOL Documentation

### 1.1 Getting Started

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- [Installation](#)
- [Linking with RMOL](#)
- [Users Guide](#)
- [Tutorials](#)
- [Copyright and License](#)
- [Make a Difference](#)
- [Make a new release](#)
- [People](#)

## 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](#)
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## 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

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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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Most GNU software, including some libraries, is covered by the ordinary GNU General Public License. This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License. We use this license for certain libraries in order to permit linking those libraries into non-free programs.

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.

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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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These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this



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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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#### 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
Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA
```

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=${INSTALL_BASEDIR}/airsched-stable \
-DWITH_AIRAC_PREFIX=${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 `-aiv` 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``)
- [SOXI](#) - 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_TYPE:STRING
-- 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 functions
-- 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;Unconstrained
--
-- * 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;Unconstrained
--
-- 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;unit_test_f
--   - Boost required libraries ... : optimized;/usr/lib64/libboost_iostreams-mt.so;debug;/usr/lib64/libboost_
--
-- * 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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- [RMOL 0.23.x](#)
  - Linux Systems
    - \* [Fedora Core 4 with ATLAS](#)
    - \* [Gentoo Linux with ACML](#)
    - \* [Gentoo Linux with ATLAS](#)
    - \* [Gentoo Linux with MKL](#)
    - \* [Gentoo Linux with NetLib's BLAS and LAPACK](#)
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  - Unix Systems
    - \* [SunOS 5.9 with RMOL External](#)
- [RMOL 3.9.1](#)
- [RMOL 3.9.0](#)
- [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

- [Introduction](#)
  - [Preparing the StdAir Project for Development](#)
- [Build a Predefined BOM Tree](#)
  - [Instantiate the BOM Root Object](#)
  - [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::STD-AIR_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].../stdair/command/CmdBomManager.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,
Elapsed, 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,
CommSpace, 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,
Elapsed, 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,
CommSpace, 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, 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_tests);
    }

    ~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 BCDataSet
    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());
    STDAIR_LOG_DEBUG (BClassData.toString());
    STDAIR_LOG_DEBUG (YClassData.toString());

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

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

```

```

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

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

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

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

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

// DEBUG
STDAIR_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_FXTURE (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::ostream 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>54</b>
<b>basic</b>	<b>53</b>
<b>batches</b>	<b>53</b>
<b>bom</b>	<b>53</b>
<b>old</b>	<b>54</b>
<b>command</b>	<b>54</b>
<b>config</b>	<b>54</b>
<b>factory</b>	<b>54</b>
<b>service</b>	<b>55</b>
<b>test</b>	<b>55</b>
<b>rmol</b>	<b>54</b>

## 21 Namespace Index

### 21.1 Namespace List

Here is a list of all namespaces with brief descriptions:

<b>RMOL</b>	<b>55</b>
<b>stdair</b>	<b>59</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_ostringstream< char >
std::basic_ostringstream< wchar_t >
std::basic_string< char >
std::basic_string< wchar_t >
std::basic_stringstream< char >
std::basic_stringstream< wchar_t >

```

<b>CmdAbstract</b>	<b>59</b>
<b>RMOL::InventoryParser</b>	<b>76</b>
<b>RMOL::DefaultDCPList</b>	<b>59</b>
<b>RMOL::DefaultMap</b>	<b>59</b>
<b>RMOL::DemandGeneratorList</b>	<b>60</b>
<b>RMOL::Detruncator</b>	<b>61</b>
<b>RMOL::DPOptimiser</b>	<b>62</b>
<b>RMOL::EMDetruncator</b>	<b>63</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](#)
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- file [EMDetruncator.cpp](#)
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- file [Emsr.cpp](#)
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- 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](#) > [BookingClassUnconstrainedDemandVectorMap\\_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::BookingClassUnconstrained-DemandMap_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::projectOnDDemandOnLegCabinsUsingDA\(\)](#), [RMOL::RMOL\\_Service::projectOnDDemandOnLegCabinsUsingDYP\(\)](#), [RMOL::RMOL\\_Service::projectOnDDemandOnLegCabinsUsingYP\(\)](#), [RMOL::RMOL\\_Service::resetDemandInformation\(\)](#), and [RMOL::RMOL\\_Service::updateBidPrice\(\)](#).

## 26.2 stdair Namespace Reference

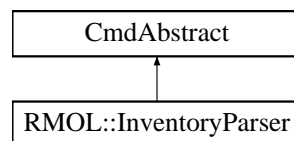
### 26.2.1 Detailed Description

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::getHistoricalBooking\(\)](#), [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 Expectation-Maximisation algorithm.

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

References [RMOL::HistoricalBookingHolder::getDemandMean\(\)](#), [RMOL::HistoricalBookingHolder::getListOfToBeUnconstrainedFlags\(\)](#), [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 limits 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:

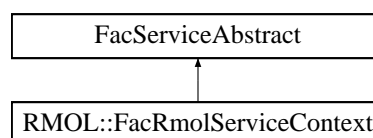
- [rmol/bom/EmsrUtils.hpp](#)
- [rmol/bom/EmsrUtils.cpp](#)

## 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 &amp; 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 `FacSimfqtServiceContext::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 &amp; 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 &amp; 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.

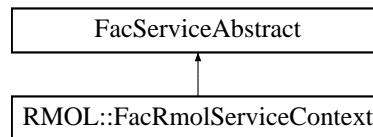
Definition at line 34 of file [FacRmolServiceContext.cpp](#).

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\(\)](#).

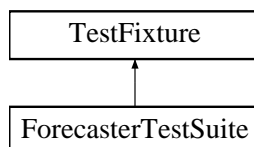
The documentation for this class was generated from the following files:

- [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:

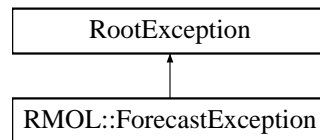
- test/rmol/[ForecasterTestSuite.hpp](#)

## 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:

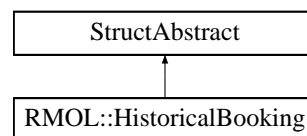
- [rmol/bom/GuillotineBlockHelper.hpp](#)
- [rmol/bom/GuillotineBlockHelper.cpp](#)

## 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 &amp; Destructor Documentation

27.16.2.1 RMOL::HistoricalBooking::HistoricalBooking ( const stdair::NbOfBookings\_T *nNbOfBookings*, 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::getUncensoredStandardDeviation\(\)](#), [toStream\(\)](#), and [RMOL::HistoricalBookingHolder::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\(\)](#), [toStream\(\)](#), and [RMOL::HistoricalBookingHolder::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::getListOfToBeUnconstrainedFlags\(\)](#), [RMOL::HistoricalBookingHolder::getNbOfUncensoredBookings\(\)](#), [toStream\(\)](#), and [RMOL::HistoricalBookingHolder::toStream\(\)](#).

27.16.3.4 void RMOL::HistoricalBooking::setUnconstrainedDemand ( const stdair::NbOfBookings\_T & *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\(\)](#).

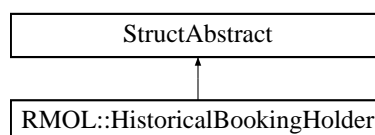
The documentation for this struct was generated from the following files:

- [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 std::vector< bool > [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 std::vector< bool > [getHistoricalBooking](#) (const short i) const
- const std::vector< bool > [getUnconstrainedDemand](#) (const short i) const
- const std::vector< bool > [getCensorshipFlag](#) (const short i) const
- const std::vector< bool > [getUnconstrainedDemandOnFirstElement](#) () const
- const std::vector< bool > [calculateExpectedDemand](#) (const double, const double, const short, const std::vector< bool >) const
- void [setUnconstrainedDemand](#) (const std::vector< bool > &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::unconstrainUsing-MultiplicativePickUp\(\)](#).

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::unconstrainUsingMultiplicativePickUp\(\)](#).

27.17.3.3 `const std::pair<NbOfBookings,T> 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 & 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 std::pair<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::unconstrainUsingEM-Method\(\)](#).

**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::getUnconstrainedDemandOnFirst-Element ( ) 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::unconstrainUsing-MultiplicativePickUp\(\)](#).

**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

<i>ostream&amp;</i>	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:

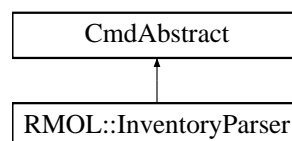
- [rmol/bom/HistoricalBookingHolder.hpp](#)
- [rmol/bom/HistoricalBookingHolder.cpp](#)

## 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 &inputFileName, 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 & *inputFileName*, stdair::BomRoot & *ioBomRoot* ) [static]**

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

## Parameters

<i>const</i>	std::string& <i>inputFileName</i> Inventory file to be parsed.
<i>stdair::Bom-Root&amp;</i>	The BOM tree.

## 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:

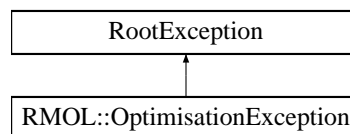
- [rmol/bom/MCOptimiser.hpp](#)
- [rmol/bom/MCOptimiser.cpp](#)

## 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 [optimalOptimisationByMCIntegration\(\)](#).

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::optimiseOnDUsingAdvancedRM-Cooperation\(\)](#), and [RMOL::RMOL\\_Service::optimiseOnDUsingRMCooperation\(\)](#).

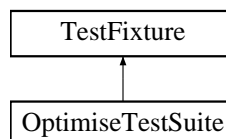
The documentation for this class was generated from the following files:

- [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 &amp; 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:

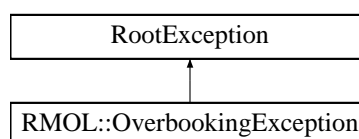
- [test/rmol/OptimiseTestSuite.hpp](#)

## 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 &amp; 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>	stdair::CabinCapacity& Capacity of the leg-cabin to be optimised.
<i>const</i>	stdair::Filename_T& (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::forecastUsingMultiplicativePickUp\(\)](#), [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 & *iInventory* )

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:

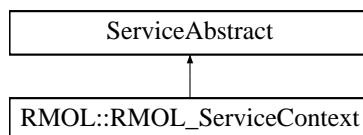
- [rmol/RMOL\\_Service.hpp](#)
- [rmol/service/RMOL\\_Service.cpp](#)

## 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]

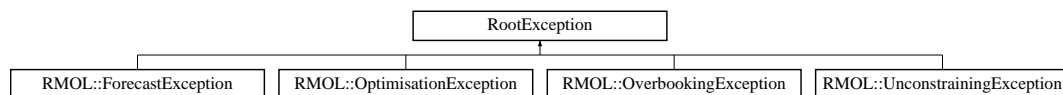
Definition at line 36 of file [RMOL\\_ServiceContext.hpp](#).

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:

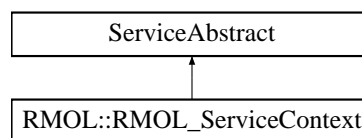


The documentation for this class was generated from the following file:

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

## 27.27 ServiceAbstract Class Reference

Inheritance diagram for ServiceAbstract:

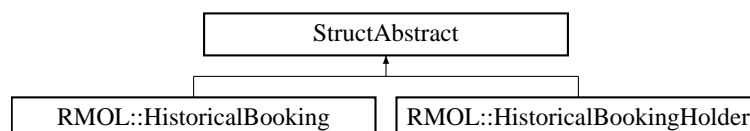


The documentation for this class was generated from the following file:

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

## 27.28 StructAbstract Class Reference

Inheritance diagram for StructAbstract:

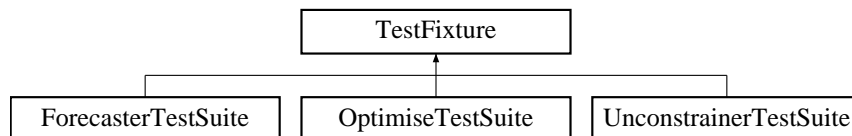


The documentation for this class was generated from the following file:

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

## 27.29 TestFixture Class Reference

Inheritance diagram for TestFixture:



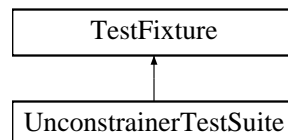
The documentation for this class was generated from the following file:

- [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:

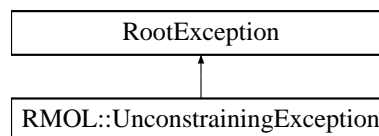
- [test/rmol/UnconstrainerTestSuite.hpp](#)

## 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 &amp; Destructor Documentation

## 27.31.2.1 RMOL::UnconstrainingException::UnconstrainingException ( const std::string &amp;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::heuristicOptimisationByEmsrA\(\)](#), [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
00088          Programming, 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.
00091          That latter must then be given with the -i/--input option")
00092         ("input,i",
00093          boost::program_options::value< std::string >(&ioInputFilename)->
00094          default_value(K_RMOL_DEFAULT_INPUT_FILENAME),
00095          "(CSV) input file for the demand distribution parameters and resource
00096          (leg-cabin) capacities")
00097         ("log,l",
00098          boost::program_options::value< std::string >(&ioLogFilename)->
00099          default_value(K_RMOL_DEFAULT_LOG_FILENAME),
00100          "Filename for the logs")
00101         ;
00102
00103     // Hidden options, will be allowed both on command line and
00104     // in config file, but will not be shown to the user.
00105     boost::program_options::options_description hidden ("Hidden options");
00106     hidden.add_options()
00107         ("copyright",
00108          boost::program_options::value< std::vector<std::string> >(),
00109          "Show the copyright (license)");
00110
00111     boost::program_options::options_description cmdline_options;
00112     cmdline_options.add(generic).add(config).add(hidden);
00113
00114     boost::program_options::options_description config_file_options;
00115     config_file_options.add(config).add(hidden);
00116
00117     boost::program_options::options_description visible ("Allowed options");
00118     visible.add(generic).add(config);
00119
00120     boost::program_options::positional_options_description p;
00121     p.add ("copyright", -1);
00122
00123     boost::program_options::variables_map vm;
00124     boost::program_options::
00125         store (boost::program_options::command_line_parser (argc, argv).
00126             options (cmdline_options).positional(p).run(), vm);
00127
00128     std::ifstream ifs ("rmol.cfg");
00129     boost::program_options::store (parse_config_file (ifs, config_file_options),
00130                                   vm);
00131     boost::program_options::notify (vm);
00132
00133     if (vm.count ("help")) {
00134         std::cout << visible << std::endl;
00135         return K_RMOL_EARLY_RETURN_STATUS;
00136     }
00137
00138     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 // //////////////////////////////////////
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 *
00028     //                                     DEFAULT_PRECISION);
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     // while (currentProtection < maxValue && currentBucketIndex < nbOfClasses)
00044     {
00045         // //while (currentBucketIndex == 1) {
00046         // bool protectionChanged = false;
00047         // double nextProtection = 0.0;
00048         // std::vector<double> currentMERVector;
00049         // // double testGradient = 10000;
00050
00051         // Bucket& currentBucket = ioBucketHolder.getCurrentBucket();
00052         // const double meanDemand = currentBucket.getMean();
00053         // const double SDDemand = currentBucket.getStandardDeviation();
00054         // const double currentYield = currentBucket.getAverageYield();
00055         // const double errorFactor = 1.0;
00056
00057         // Bucket& nextBucket = ioBucketHolder.getNextBucket();
00058         // const double nextYield = nextBucket.getAverageYield();
00059     }
00060 }

```

```

00059 // // For x <= currentProtection (y_(j-1)), V_j(x) = V_(j-1)(x).
00060 // for (int x = 0; x <= currentProtection; ++x) {
00061 //     const double MERValue =
MERVectorHolder.at(currentBucketIndex-1).at(x);
00062 //     currentMERVector.push_back (MERValue);
00063 // }
00064 // //
00065 // // boost::math::normal lNormalDistribution (meanDemand, SDDemand);
00066 // // Vector of gaussian pdf values.
00067 // std::vector<double> pdfVector;
00068 // for (int s = 0; s <= maxValue - currentProtection; ++s) {
00069 //     const double pdfValue =
00070 //         boost::math::pdf (lNormalDistribution, s/DEFAULT_PRECISION);
00071 //     pdfVector.push_back (pdfValue);
00072 // }
00073 // // Vector of gaussian cdf values.
00074 // std::vector<double> cdfVector;
00075 // for (int s = 0; s <= maxValue - currentProtection; ++s) {
00076 //     const double cdfValue =
00077 //         boost::math::cdf (boost::math::complement (lNormalDistribution,
00078 //             s/DEFAULT_PRECISION));
00079 //     cdfVector.push_back (cdfValue);
00080 // }
00081 // // Compute V_j(x) for x > currentProtection (y_(j-1)).
00082 // for (int x = currentProtection + 1; x <= maxValue; ++x) {
00083 //     const double lowerBound = static_cast<double> (x -
currentProtection);
00084 // // Compute the first integral in the V_j(x) formulation (see
00085 // // the memo of Jerome Contant).
00086 // const double power1 =
00087 //     - 0.5 * meanDemand * meanDemand / (SDDemand * SDDemand);
00088 // const double e1 = std::exp (power1);
00089 // const double power2 =
00090 //     - 0.5 * (lowerBound / DEFAULT_PRECISION - meanDemand)
00091 //     * (lowerBound / DEFAULT_PRECISION - meanDemand)
00092 //     / (SDDemand * SDDemand);
00093 // const double e2 = std::exp (power2);
00094 // const double cdfValue0 =
00095 //     boost::math::cdf (boost::math::complement (lNormalDistribution,
00096 //         0.0));
00097 // const double cdfValue1 =
00098 //     boost::math::cdf (boost::math::complement (lNormalDistribution,
00099 //         lowerBound/DEFAULT_PRECISION));
00100 // const double integralResult1 = currentYield
00101 //     * ((e1 - e2) * SDDemand / sqrt (2 * 3.14159265)
00102 //     + meanDemand * (cdfValue0 - cdfValue1));
00103 // double integralResult2 = 0.0;
00104 // for (int s = 0; s < lowerBound; ++s) {
00105 //     const double partialResult =
00106 //         2 * MERVectorHolder.at(currentBucketIndex-1).at(x-s)
00107 //         * pdfVector.at(s);
00108 //     integralResult2 += partialResult;
00109 // }
00110 // integralResult2 -= MERVectorHolder.at(currentBucketIndex-1).at(x) *
00111 //     pdfVector.at(0);
00112 // const int intLowerBound = static_cast<int>(lowerBound);
00113 // integralResult2 +=
00114 //     MERVectorHolder.at(currentBucketIndex-1).at(x - intLowerBound) *
00115 //     pdfVector.at(intLowerBound);
00116 // integralResult2 /= 2 * DEFAULT_PRECISION;
00117 // /*
00118 // for (int s = 0; s < lowerBound; ++s) {
00119 //     const double partialResult =
00120 //         (MERVectorHolder.at(currentBucketIndex-1).at(x-s) +
00121 //         MERVectorHolder.at(currentBucketIndex-1).at(x-s-1)) *
00122 //         (cdfVector.at(s+1) - cdfVector.at(s)) / 2;
00123 //     integralResult2 += partialResult;
00124 // }
00125 // */
00126 // const double firstElement = integralResult1 + integralResult2;
00127 // // Compute the second integral in the V_j(x) formulation (see
00128 // // the memo of Jerome Contant).
00129 // const double constCoefOfSecondElement =
00130 //     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_PRECISION));
00148
00149      //      const double MERValue = (firstElement + secondElement) /
00150      //      errorFactor;
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
00012     class EMDetruncator {
00013     public:
00016         static void unconstrainUsingEMMethod (HistoricalBookingHolder&);
00017     };
00018 }
00019 #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) {

```

```

00129     stdair::VirtualClassStruct& lCurrentVC = *itVC;
00130     for (int k = 1; k <= lCabinCapacity; ++k) {
00131         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
00011 namespace stdair {
00012     class LegCabin;

```



```

00013 }
00014
00015 namespace RMOL {
00016
00017     class Emsr {
00018     public:
00019         static void heuristicOptimisationByEmsr (stdair::LegCabin&);
00020
00021         static void heuristicOptimisationByEmsrA (stdair::LegCabin&);
00022
00023         static void heuristicOptimisationByEmsrB (stdair::LegCabin&);
00024
00025     };
00026 }
00027 #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 }

```

```

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     // Retrieve 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 ;
00062     const stdair::Yield_T lNextYield = ioNextVirtualClass.getYield();
00063     assert (lAggregatedYield != 0);
00064
00065     // Compute the yield ratio between the higher bucket and the current one
00066     const double lYieldRatio = lNextYield / lAggregatedYield;
00067
00068     boost::math::normal lNormalDistribution (lMean, lSD);
00069     const stdair::ProtectionLevel_T lProtection =
00070         boost::math::quantile (boost::math::complement (lNormalDistribution,
00071                                                         lYieldRatio));
00072
00073     return lProtection;
00074 }
00075
00076 // //////////////////////////////////////
00077 const double EmsrUtils::
00078 computeEmsrValue (double iCapacity,
00079                 stdair::VirtualClassStruct& ioVirtualClass){
00080     // Retrieve the average yield, mean and standard deviation of the
00081     // demand of the class/bucket.
00082     const stdair::MeanValue_T lMean = ioVirtualClass.getMean();
00083     const stdair::StdDevValue_T lSD = ioVirtualClass.getStdDev();
00084     const stdair::Yield_T lYield = ioVirtualClass.getYield();
00085
00086     // Compute the EMSR value = lYield * Pr (demand >= iCapacity).
00087     boost::math::normal lNormalDistribution (lMean, lSD);
00088     const double emsrValue =
00089         lYield * boost::math::cdf (boost::math::complement (lNormalDistribution,
00090                                                             iCapacity));
00091
00092     return emsrValue;
00093 }
00094
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 (
00028             stdair::VirtualClassStruct&, stdair::VirtualClassStruct&);
00030
00033         static const double computeEmsrValue (double, stdair::VirtualClassStruct&);
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&,
00036                                   const stdair::DTD_T&, const stdair::Date_T&);
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
00013     struct HistoricalBooking : public stdair::StructAbstract {
00014
00015     public:
00016         // ////////////////////////////////////// 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, dl, 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         {
00062             return getUnconstrainedDemand (0);
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
00100
00101

```

## 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
00106         const stdair::UnsignedIndex_T pjint = static_cast<const int> (pj);
00107         stdair::GeneratedDemandVector_T::iterator itLowerBound =
00108             lPartialSumHolder.begin();
00109         for (; idx <= pjint && idx <= lCapacityIndex; ++idx) {
00110             itLowerBound =
00111                 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
00133 stdair::VirtualClassStruct& lLastVC = *itCurrentVC;
00134 const stdair::Yield_T& yn = lLastVC.getYield();
00135 stdair::GeneratedDemandVector_T::iterator itLowerBound =
00136     lPartialSumHolder.begin();
00137 for (; idx <= lCapacityIndex; ++idx) {
00138     itLowerBound =
00139         std::lower_bound (itLowerBound, lPartialSumHolder.end(), idx);
00140     const stdair::UnsignedIndex_T pos =
00141         itLowerBound - lPartialSumHolder.begin();
00142     const stdair::UnsignedIndex_T K = lPartialSumHolder.size();
00143     const stdair::BidPrice_T lBP = yn * (K - pos) / K;
00144     lBPV.push_back (lBP);
00145 }
00146 }
00147
00148 // //////////////////////////////////////
00149 stdair::GeneratedDemandVector_T MCOptimiser::
00150 generateDemandVector (const stdair::MeanValue_T& iMean,
00151                     const stdair::StdDevValue_T& iStdDev,
00152                     const unsigned int& K) {
00153     stdair::GeneratedDemandVector_T oDemandVector;
00154     if (iStdDev > 0) {
00155         stdair::RandomGeneration lGenerator (stdair::DEFAULT_RANDOM_SEED);
00156         for (unsigned int i = 0; i < K; ++i) {
00157             stdair::RealNumber_T lDemandSample =
00158                 lGenerator.generateNormal (iMean, iStdDev);
00159             oDemandVector.push_back (lDemandSample);
00160         }
00161     } else {
00162         for (unsigned int i = 0; i < K; ++i) {
00163             oDemandVector.push_back (iMean);
00164         }
00165     }
00166     return oDemandVector;
00167 }
00168
00169 // //////////////////////////////////////
00170 void MCOptimiser::
00171 optimisationByMCIntegration (stdair::LegCabin& ioLegCabin) {
00172     // Number of MC samples
00173     unsigned int K = 100000;
00174
00175     const stdair::YieldLevelDemandMap_T& lYieldDemandMap =
00176         ioLegCabin.getYieldLevelDemandMap();
00177     assert (!lYieldDemandMap.empty());
00178
00179     std::ostringstream oStr;
00180     oStr << "Yield list ";
00181     for (stdair::YieldLevelDemandMap_T::const_iterator itYD =
00182         lYieldDemandMap.begin();
00183         itYD != lYieldDemandMap.end(); ++itYD) {
00184         const stdair::Yield_T& y = itYD->first;
00185         oStr << y << " ";
00186     }
00187
00188     STDAIR_LOG_DEBUG (oStr.str());
00189     ioLegCabin.emptyBidPriceVector();
00190     stdair::BidPriceVector_T& lBidPriceVector =
00191         ioLegCabin.getBidPriceVector();
00192     const stdair::Availability_T& lAvailabilityPool =
00193         ioLegCabin.getAvailabilityPool();
00194     // Initialise the minimal bid price to 1.0 (just to avoid problems
00195     // of division by zero).
00196     const stdair::BidPrice_T& lMinBP = 1.0;
00197
00198     stdair::YieldLevelDemandMap_T::const_reverse_iterator itCurrentYD =
00199         lYieldDemandMap.rbegin();
00200     stdair::YieldLevelDemandMap_T::const_reverse_iterator itNextYD =
00201         itCurrentYD;

```

```

00205     ++itNextYD;
00206
00207     // Initialise the partial sum holder
00208     stdair::MeanStdDevPair_T lMeanStdDevPair = itCurrentYD->second;
00209     stdair::GeneratedDemandVector_T lPartialSumHolder =
00210         generateDemandVector(lMeanStdDevPair.first, lMeanStdDevPair.second, K);
00211
00212     stdair::UnsignedIndex_T idx = 1;
00213     for (; itNextYD!=lYieldDemandMap.rend(); ++itCurrentYD, ++itNextYD) {
00214         const stdair::Yield_T& yj = itCurrentYD->first;
00215         const stdair::Yield_T& yj1 = itNextYD->first;
00216         // Consistency check: the yield/price of a higher class/bucket
00217         // (with the j index lower) must be higher.
00218         assert (yj > yj1);
00219         // Sort the partial sum holder.
00220         std::sort (lPartialSumHolder.begin(), lPartialSumHolder.end());
00221         // STDAIR_LOG_DEBUG ("Partial sums : max = " << lPartialSumHolder.back()
00222         //                  << " min = " << lPartialSumHolder.front());
00223         K = lPartialSumHolder.size ();
00224         // Compute the optimal index lj = floor {[y(j)-y(j+1)]/y(j) . K}
00225         const double ljdoube = std::floor (K * (yj - yj1) / yj);
00226         stdair::UnsignedIndex_T lj =
00227             static_cast<stdair::UnsignedIndex_T> (ljdoube);
00228         // Consistency check.
00229         assert (lj >= 1 && lj < K);
00230         // The optimal protection: p(j) = 1/2 [S(j,lj) + S(j, lj+1)]
00231         const double sjl = lPartialSumHolder.at (lj - 1);
00232         const double sjlp1 = lPartialSumHolder.at (lj + 1 - 1);
00233         const double pj = (sjl + sjlp1) / 2;
00234         const stdair::UnsignedIndex_T pjint = static_cast<const int> (pj);
00235         stdair::GeneratedDemandVector_T::iterator itLowerBound =
00236             lPartialSumHolder.begin();
00237         for (; idx <= pjint && idx <= lAvailabilityPool; ++idx) {
00238             itLowerBound =
00239                 std::lower_bound (itLowerBound, lPartialSumHolder.end(), idx);
00240             const stdair::UnsignedIndex_T pos =
00241                 itLowerBound - lPartialSumHolder.begin();
00242
00243             const stdair::BidPrice_T lBP = yj * (K - pos) / K;
00244             lBidPriceVector.push_back (lBP);
00245         }
00246         // Update the partial sum holder.
00247         lMeanStdDevPair = itNextYD->second;
00248         const stdair::GeneratedDemandVector_T& lNextDV =
00249             generateDemandVector (lMeanStdDevPair.first,
00250                                 lMeanStdDevPair.second, K - lj);
00251         for (stdair::UnsignedIndex_T i = 0; i < K - lj; ++i) {
00252             lPartialSumHolder.at(i) = lPartialSumHolder.at(i + lj) + lNextDV.at(i);
00253         }
00254         lPartialSumHolder.resize (K - lj);
00255     }
00256     // STDAIR_LOG_DEBUG ("Partial sums : max = " << lPartialSumHolder.back()
00257     //                  << " min = " << lPartialSumHolder.front());
00258
00259     std::sort (lPartialSumHolder.begin(), lPartialSumHolder.end());
00260     const stdair::Yield_T& yn = itCurrentYD->first;
00261     stdair::GeneratedDemandVector_T::iterator itLowerBound =
00262         lPartialSumHolder.begin();
00263     K = lPartialSumHolder.size();
00264
00265     bool lMinBPReached = false;
00266     for (; idx <= lAvailabilityPool; ++idx) {
00267         itLowerBound =
00268             std::lower_bound (itLowerBound, lPartialSumHolder.end(), idx);
00269
00270         if (!lMinBPReached) {
00271             const stdair::UnsignedIndex_T pos =
00272                 itLowerBound - lPartialSumHolder.begin();
00273             stdair::BidPrice_T lBP = yn * (K - pos) / K;
00274
00275             if (lBP < lMinBP) {
00276                 lBP = lMinBP; lMinBPReached = true;
00277             }
00278
00279             lBidPriceVector.push_back (lBP);
00280         } else {
00281             lBidPriceVector.push_back (lMinBP);
00282         }
00283     }
00284
00285     // Updating the bid price values
00286     ioLegCabin.updatePreviousBidPrice();
00287     ioLegCabin.setCurrentBidPrice (lBidPriceVector.back());
00288
00289     // 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 {
00019     class MCOptimiser {
00020     public:
00021
00022         static void optimalOptimisationByMCIntegration (stdair::LegCabin&);
00023
00024         static stdair::GeneratedDemandVector_T
00025         generateDemandVector (const stdair::MeanValue_T&,
00026                             const stdair::StdDevValue_T&, const unsigned int&);
00027
00028         static void optimisationByMCIntegration (stdair::LegCabin&);
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&
iDistributionParameterList) {
00026     init (iDistributionParameterList);
00027 }
00028
00029 // //////////////////////////////////////
00030 DemandGeneratorList::~DemandGeneratorList () {
00031 }
00032
00033 // //////////////////////////////////////
00034 void DemandGeneratorList::
00035 init (const DistributionParameterList_T& iDistributionParameterList) {
00036
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         _demandGeneratorList.push_back (gaussianGenerator);
00044     }
00045 }
00046
00047 // //////////////////////////////////////
00048 void DemandGeneratorList::
00049 generateVariateList (VariateList_T& ioVariateList) const {
00050
00051     // Iterate on the (number of) classes/buckets, n
00052     DemandGeneratorList_T::const_iterator itGenerator =
00053         _demandGeneratorList.begin();
00054     for ( ; itGenerator != _demandGeneratorList.end(); itGenerator++) {
00055         const Gaussian& gaussianGenerator = *itGenerator;
00056
00057         // Generate a random variate following the Gaussian distribution
00058         const double generatedVariate = gaussianGenerator.generateVariate ();
00059         ioVariateList.push_back (generatedVariate);
00060     }
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
00017     class DemandGeneratorList {
00018     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::DCPList_T Utilities::
00055 buildRemainingDCPList (const stdair::DTD_T& iDTD) {
00056     stdair::DCPList_T oDCPList;
00057
00058     const stdair::DCPList_T lWholeDCPList = stdair::DEFAULT_DCP_LIST;
00059     stdair::DCPList_T::const_iterator itDCP = lWholeDCPList.begin();
00060     while (itDCP != lWholeDCPList.end()) {
00061         const stdair::DCP_T& lDCP = *itDCP;
00062         if (iDTD >= lDCP) {
00063             break;
00064         }
00065         ++itDCP;
00066     }
00067     assert (itDCP != lWholeDCPList.end());
00068
00069     oDCPList.push_back (iDTD);
00070     ++itDCP;
00071     for (; itDCP != lWholeDCPList.end(); ++itDCP) {
00072         oDCPList.push_back (*itDCP);
00073     }
00074
00075     return oDCPList;

```

```

00076     }
00077
00078     // //////////////////////////////////////
00079     stdair::DCPList_T Utilities::
00080     buildRemainingDCPList2 (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
&, double&, double&);
00023
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::SegmentCabin&, const stdair::Date_T&);
00034
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::ConstSegmentCabinDTRangeSnapshotView_T lBookingView =
00087         iGuillotineBlock.
getConstSegmentCabinDTRangeProductAndPriceOrientedBookingSnapshotView (lSegBegin, iNbOfUsableSegments -1, iDCPEnd, iDCPBegin);
00088     stdair::ConstSegmentCabinDTRangeSnapshotView_T lAvlView =
00089         iGuillotineBlock.getConstSegmentCabinDTRangeAvailabilitySnapshotView (
lSegBegin, iNbOfUsableSegments -1, iDCPEnd, iDCPBegin);
00090
00091     // Browse the list of segments and build the historical booking holder.
00092     const stdair::ValueTypeIndexMap_T& lVTIdxMap =
00093         iGuillotineBlock.getValueTypeIndexMap();
00094     const unsigned int lNbOfValueTypes = lVTIdxMap.size();
00095     HistoricalBookingHolder lHBHolder;
00096     for (short i = 0; i < iNbOfUsableSegments-lSegBegin; ++i) {
00097         stdair::Flag_T lCensorshipFlag = false;
00098         stdair::NbOfBookings_T lNbOfHistoricalBkgs = 0.0;
00099         const short lNbOfEDTDs = iDCPBegin - iDCPEnd + 1;
00100
00101         // Parse the DTDs during the period
00102         for (short j = 0; j < lNbOfEDTDs; ++j) {
00103             // Check if the data has been censored during this day.
00104             // STDAIR_LOG_DEBUG ("i: " << i << " ", NbOfValues: " << lNbOfValueTypes
00105             // << " ", BlockIdx: " << iBlockIdx << " ", j: " << j);
00106             if (lCensorshipFlag == false) {
00107                 if (lAvlView[i*lNbOfValueTypes + iBlockIdx][j] < 1.0) {
00108                     lCensorshipFlag = true;
00109                 }
00110             }

```

```

00111
00112     // Get the bookings of the day.
00113     //STDAIR_LOG_DEBUG ("Bookings of the day: " <<
1BookingView[i*1NbOfValueTypes + iBlockIdx][j]);
00114     1NbOfHistoricalBkgs += 1BookingView[i*1NbOfValueTypes + iBlockIdx][j];
00115 }
00116
00117     HistoricalBooking lHistoricalBkg (1NbOfHistoricalBkgs, 1CensorshipFlag);
00118     lHBHolder.addHistoricalBooking (lHistoricalBkg);
00119
00120     // DEBUG
00121     STDAIR_LOG_DEBUG ("Historical bkgs: " << 1NbOfHistoricalBkgs
00122     << ", censored: " << 1CensorshipFlag);
00123     // STDAIR_LOG_NOTIFICATION (1NbOfHistoricalBkgs
00124     << "; " << 1CensorshipFlag);
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.
00158     getConstSegmentCabinDTDRangeProductAndPriceOrientedBookingSnapshotView (lSegBegin, iNbOfUsableSegments - 1, iDCPEnd, iDCPBegin);
00159     stdair::ConstSegmentCabinDTDRangeSnapshotView_T lAvlView =
00160     iGuillotineBlock.getConstSegmentCabinDTDRangeAvailabilitySnapshotView (
00161     lSegBegin, 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 1NbOfValueTypes = lVTIdxMap.size();
00167     HistoricalBookingHolder lHBHolder;
00168     for (short i = 0; i < iNbOfUsableSegments - lSegBegin; ++i) {
00169         stdair::Flag_T lCensorshipFlag = false;
00170         stdair::NbOfBookings_T 1NbOfHistoricalBkgs = 0.0;
00171         const short 1NbOfDTDs = iDCPBegin - iDCPEnd + 1;
00172
00173         // Parse the DTDs during the period
00174         for (short j = 0; j < 1NbOfDTDs; ++j) {
00175             // Check if the data has been censored during this day.
00176             // STDAIR_LOG_DEBUG ("i: " << i << ", NbOfValues: " << 1NbOfValueTypes
00177             // << ", BlockIdx: " << iBlockIdx << ", j: " << j);
00178             if (1CensorshipFlag == false) {
00179                 if (1AvlView[i*1NbOfValueTypes + iBlockIdx][j] < 1.0) {
00180                     1CensorshipFlag = true;
00181                 }
00182             }
00183
00184             // Get the bookings of the day.
00185             //STDAIR_LOG_DEBUG ("Bookings of the day: " <<
00186             1BookingView[i*1NbOfValueTypes + iBlockIdx][j]);
00187             1NbOfHistoricalBkgs += 1BookingView[i*1NbOfValueTypes + iBlockIdx][j];
00188         }
00189
00190         HistoricalBooking lHistoricalBkg (1NbOfHistoricalBkgs, 1CensorshipFlag);
00191         lHBHolder.addHistoricalBooking (lHistoricalBkg);
00192
00193         // DEBUG
00194         STDAIR_LOG_DEBUG ("Historical bkgs: " << 1NbOfHistoricalBkgs
00195         << ", censored: " << 1CensorshipFlag);
00196         // STDAIR_LOG_NOTIFICATION (1NbOfHistoricalBkgs

```

```

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
00262             << lBCKey);
00263         retrieveUnconstrainedDemandForFirstDCP (lGuillotineBlock, lUncDemVector,
00264             iFirstDCP, lBlockIdx,
00265             iNbOfSegments, iNbOfUsedSegments)
00266     ;
00267     }
00268
00269     // Unconstrain the Q-equivalent bookings.
00270     // Retrieve the block index of the segment-cabin.
00271     std::ostringstream lSCMapKey;
00272     lSCMapKey << stdair::DEFAULT_SEGMENT_CABIN_VALUE_TYPE
00273         << iSegmentCabin.describeKey();
00274     const stdair::BlockIndex_T& lCabinValueIdx =
00275         lGuillotineBlock.getBlockIndex (lSCMapKey.str());
00276
00277     STDAIR_LOG_DEBUG ("Retrieve the unconstrained price-oriented demand");
00278     retrieveUnconstrainedDemandForFirstDCP (lGuillotineBlock,
00279         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.
getConstSegmentCabinDTDRangeProductAndPriceOrientedBookingSnapshotView (lSegBegin, iNbOfSegments -1, iFirstDCP, stdair:
;
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::
getNbOfSegmentAlreadyPassedThisDTD (lGuillotineBlock, iDCPEnd,
00331                                     iCurrentDate);
00332
00333         // Parse the booking class list and unconstrain historical bookings.
00334         for (BookingClassUnconstrainedDemandVectorMap_T::iterator itBCUDV =
00335              ioBkgClassUncDemMap.begin(); itBCUDV != ioBkgClassUncDemMap.end();
00336              ++itBCUDV) {
00337             stdair::BookingClass* lBC_ptr = itBCUDV->first;
00338             assert (lBC_ptr != NULL);
00339             const stdair::MapKey_T& lBCKey = lBC_ptr->describeKey();
00340             const stdair::BlockIndex_T& lBlockIdx =
00341                 lGuillotineBlock.getBlockIndex (lBCKey);
00342             UnconstrainedDemandVector_T& lUncDemVector = itBCUDV->second;
00343
00344             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.
00386         getConstSegmentCabinDTDRangeProductAndPriceOrientedBookingSnapshotView (lSegBegin, iNbOfUsableSegments - 1, iDCPEnd, iDCPBegin);
00387     stdair::ConstSegmentCabinDTDRangeSnapshotView_T lAvlView =
00388         iGuillotineBlock.getConstSegmentCabinDTDRangeAvailabilitySnapshotView (
00389         lSegBegin, iNbOfUsableSegments - 1, iDCPEnd, iDCPBegin);
00390
00391     // Browse the list of segments and build the historical booking holder.
00392     const stdair::ValueTypeIndexMap_T& lVTIdxMap =
00393         iGuillotineBlock.getValueTypeIndexMap();
00394     const unsigned int lNbOfValueTypes = lVTIdxMap.size();
00395     HistoricalBookingHolder lHBHolder;
00396     std::vector<short> lDataIndexList;
00397     for (short i = 0; i < iNbOfUsableSegments - lSegBegin; ++i) {
00398         stdair::Flag_T lCensorshipFlag = false;
00399         stdair::NbOfBookings_T lNbOfHistoricalBkgs = 0.0;
00400         const short lNbOfDTDs = iDCPBegin - iDCPEnd + 1;
00401
00402         // Parse the DTDs during the period
00403         for (short j = 0; j < lNbOfDTDs; ++j) {
00404             // Check if the data has been censored during this day.
00405             // STDAIR_LOG_DEBUG ("i: " << i << ", NbOfValues: " << lNbOfValueTypes
00406             // << ", BlockIdx: " << iBlockIdx << ", j: " << j);
00407             if (lCensorshipFlag == false) {
00408                 if (lAvlView[i * lNbOfValueTypes + iBlockIdx][j] < 1.0) {
00409                     lCensorshipFlag = true;
00410                 }
00411             }
00412             // Get the bookings of the day.
00413             // STDAIR_LOG_DEBUG ("Bookings of the day: " <<
00414             lBookingView[i * lNbOfValueTypes + iBlockIdx][j]);
00415             lNbOfHistoricalBkgs += lBookingView[i * lNbOfValueTypes + iBlockIdx][j];
00416         }
00417
00418         // If there is no booking till now for this class and for this segment,
00419         // there will be no unconstraining process.
00420         stdair::NbOfRequests_T& lUncDemand = ioUncDemVector.at (i);
00421         if (lUncDemand < 1.0) {
00422             lUncDemand += lNbOfHistoricalBkgs;
00423         } else {
00424             double lBkgDemandFactor = lNbOfHistoricalBkgs / lUncDemand;
00425             HistoricalBooking lHistoricalBkg (lBkgDemandFactor, lCensorshipFlag);
00426             lHBHolder.addHistoricalBooking (lHistoricalBkg);
00427             lDataIndexList.push_back (i);
00428         }
00429
00430         // DEBUG
00431         STDAIR_LOG_DEBUG ("Historical bkgs: " << lNbOfHistoricalBkgs
00432             << ", censored: " << lCensorshipFlag);
00433     }
00434
00435     // DEBUG
00436     STDAIR_LOG_DEBUG ("Unconstrain by multiplicative pick-up using EM");
00437
00438     // Unconstrain the booking figures
00439     unconstrainUsingMultiplicativePickUp (lHBHolder);
00440
00441     // Update the unconstrained demand vector.
00442     short i = 0;
00443     for (std::vector<short>::iterator itIdx = lDataIndexList.begin();
00444         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.
getConstSegmentCabinDTDRangeProductAndPriceOrientedBookingSnapshotView (lSegBegin, iNbOfUsableSegments -1, iDCPEnd, iDCPBegin);
00470     stdair::ConstSegmentCabinDTDRangeSnapshotView_T lAvlView =
00471         iGuillotineBlock.getConstSegmentCabinDTDRangeAvailabilitySnapshotView (
lSegBegin, iNbOfUsableSegments -1, iDCPEnd, iDCPBegin);
00472
00473     // Browse the list of segments and build the historical booking holder.
00474     const stdair::ValueTypeIndexMap_T& lVTIdxMap =
00475         iGuillotineBlock.getValueTypeIndexMap();
00476     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*lNbOfValueTypes + iBlockIdx][j]);
00497             lNbOfHistoricalBkgs += lBookingView[i*lNbOfValueTypes + iBlockIdx][j];
00498         }
00499
00500         // If there is no booking till now for this class and for this segment,
00501         // there will be no unconstraining process.
00502         stdair::NbOfRequests_T& lUncDemand = ioUncDemVector.at (i);
00503         if (lUncDemand < 1.0) {
00504             lUncDemand += lNbOfHistoricalBkgs;
00505         } else {
00506             double lBkgDemandFactor = lNbOfHistoricalBkgs / lUncDemand;
00507             HistoricalBooking lHistoricalBkg (lBkgDemandFactor, lCensorshipFlag);
00508             lHBHolder.addHistoricalBooking (lHistoricalBkg);
00509             lDataIndexList.push_back (i);
00510         }
00511
00512         // DEBUG
00513         STDAIR_LOG_DEBUG ("Historical bkgs: " << lNbOfHistoricalBkgs
00514             << ", censored: " << lCensorshipFlag);
00515     }
00516
00517     // DEBUG
00518     STDAIR_LOG_DEBUG ("Unconstrain by multiplicative pick-up");
00519
00520     // Unconstrain the booking figures
00521     unconstrainUsingMultiplicativePickUp (lHBHolder);
00522
00523     // Update the unconstrained demand vector.
00524     // LOG
00525     const stdair::SegmentDate& lSegmentDate = stdair::BomManager::
00526         getParent<stdair::SegmentDate, stdair::SegmentCabin> (iSegmentCabin);

```

```

00527     const stdair::FlightDate& lFlightDate = stdair::BomManager::
00528         getParent<stdair::FlightDate, stdair::SegmentDate> (lSegmentDate);
00529     const stdair::Date_T& lDepDate = lFlightDate.getDepartureDate();
00530     const boost::gregorian::date_duration lDD = lDepDate - iCurrentDate;
00531     const long lDTD = lDD.days();
00532     stdair::Date_T lRefDate (2012, boost::gregorian::Jan, 01);
00533
00534     short i = 0;
00535     for (std::vector<short>::iterator itIdx = lDataIndexList.begin();
00536          itIdx != lDataIndexList.end(); ++itIdx, ++i) {
00537         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 for 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
00046         static void retrieveUnconstrainedDemandForFirstDCP
00047         (const stdair::SegmentCabin&,
00048          BookingClassUnconstrainedDemandVectorMap_T&,
00049          UnconstrainedDemandVector_T&, const stdair::DCP_T&,
00050          const stdair::NbOfSegments_T&, const stdair::NbOfSegments_T&);
00051
00055         static void unconstrainUsingMultiplicativePickUp (HistoricalBookingHolder&)
00056     ;
00057     private:
00061         static void unconstrainUsingAdditivePickUp (const stdair::GuillotineBlock&,
00062                                                     UnconstrainedDemandVector_T&,
00063                                                     const stdair::DCP_T&,
00064                                                     const stdair::DCP_T&,
00065                                                     const stdair::NbOfSegments_T&,
00066                                                     const stdair::BlockIndex_T&);
00070         static void unconstrainUsingAdditivePickUp (const stdair::GuillotineBlock&,
00071                                                     UnconstrainedDemandVector_T&,
00072                                                     const stdair::DCP_T&,
00073                                                     const stdair::DCP_T&,
00074                                                     const stdair::NbOfSegments_T&,
00075                                                     const stdair::BlockIndex_T&,
00076                                                     const stdair::SegmentCabin&,
00077                                                     const stdair::Date_T&);
00078
00082         static void unconstrainUsingMultiplicativePickUp
00083         (const stdair::GuillotineBlock&, UnconstrainedDemandVector_T&,
00084          const stdair::DCP_T&, const stdair::DCP_T&,
00085          const stdair::NbOfSegments_T&, const stdair::BlockIndex_T&,
00086          const stdair::NbOfSegments_T&);
00087
00091         static void unconstrainUsingMultiplicativePickUp
00092         (const stdair::GuillotineBlock&, UnconstrainedDemandVector_T&,
00093          const stdair::DCP_T&, const stdair::DCP_T&,
00094          const stdair::NbOfSegments_T&, const stdair::BlockIndex_T&,

```

```

00095     const stdair::NbOfSegments_T&,
00096     const stdair::SegmentCabin&, const stdair::Date_T&);
00097
00101     static void retrieveUnconstrainedDemandForFirstDCP
00102     (const stdair::GuillotineBlock&, UnconstrainedDemandVector_T&,
00103     const stdair::DCP_T&, const stdair::BlockIndex_T&,
00104     const stdair::NbOfSegments_T&, const stdair::NbOfSegments_T&);
00105     };
00106 }
00107 #endif // __RMOL_COMMAND_DETRUNCATOR_HPP
00108
00109

```

## 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
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, 0.0);
00115         BookingClassUnconstrainedDemandVectorMap_T lBkgClassUncDemMap;
00116         const stdair::BookingClassList_T& lBCList =
00117             stdair::BomManager::getList<stdair::BookingClass> (ioSegmentCabin);
00118         for (stdair::BookingClassList_T::const_iterator itBC = lBCList.begin();
00119             itBC != lBCList.end(); ++itBC) {
00120             stdair::BookingClass* lBC_ptr = *itBC;
00121             assert (lBC_ptr != NULL);
00122             std::vector<stdair::NbOfRequests_T> lUncDemandVector (
lNbOfDepartedSegments, 0.0);
00123             bool insertionSucceeded = lBkgClassUncDemMap.insert
00124                 (BookingClassUnconstrainedDemandVectorMap_T::
00125                     value_type (lBC_ptr, lUncDemandVector)).second;
00126             assert (insertionSucceeded == true);
00127         }
00128
00129         // Build the DCP intervals and unconstrain censored booking figures for
00130         // each interval.
00131         stdair::DCPList_T::const_iterator itNextDCP = itDCP; ++itNextDCP;
00132         for (; itNextDCP != iDCPList.end(); ++itDCP, ++itNextDCP) {
00133             const stdair::DCP_T& lCurrentDCP = *itDCP;
00134             const stdair::DCP_T& lNextDCP = *itNextDCP;
00135
00136             // DEBUG
00137             STDAIR_LOG_DEBUG ("Unconstrain demand for "
00138                 << ioSegmentCabin.describeKey()
00139                 << " and the DCP's " << lCurrentDCP << ", "
00140                 << lNextDCP);
00141             Detruncator::unconstrainUsingAdditivePickUp (ioSegmentCabin,
00142                 lBkgClassUncDemMap,
00143                 lQEquivalentDemandVector,
00144                 lCurrentDCP-l, lNextDCP,
00145                 iEventDate);
00146             STDAIR_LOG_DEBUG ("Detruncation 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
& iClassUncDemMap,
00166     const UnconstrainedDemandVector_T& iUncDemVector
,
00167     const double& iSellUpFactor) {
00168     double lPriceOriMean; double lPriceOriStdDev;
00169     Utilities::computeDistributionParameters (iUncDemVector, lPriceOriMean,
00170         lPriceOriStdDev);
00171
00172     // DEBUG
00173     //STDAIR_LOG_NOTIFICATION (lPriceOriMean << ", " << lPriceOriStdDev);
00174
00175     // Retrieve the classes from low to high and compute the distributions of
00176     // product-oriented and price-oriented demand.
00177     // Retrieve the lowest class.
00178     const stdair::BookingClassList_T& lBCList =
00179         stdair::BomManager::getList<stdair::BookingClass> (ioSegmentCabin);
00180     stdair::BookingClassList_T::const_reverse_iterator itCurrentClass =
00181         lBCList.rbegin();
00182     assert (itCurrentClass != lBCList.rend());
00183     stdair::BookingClassList_T::const_reverse_iterator itNextClass =
00184         itCurrentClass;
00185     ++itNextClass;
00186     // If there is only one class in the cabin, the demand distribution of this
00187     // class is equal to the price-oriented demand distribution of the cabin.
00188     if (itNextClass == lBCList.rend()) {
00189         stdair::BookingClass* lLowestBC_ptr = *itCurrentClass;
00190         lLowestBC_ptr->setMean (lPriceOriMean);

```



```

00191     lLowestBC_ptr->setStdDev (lPriceOriStdDev);
00192 } else {
00193     // Compute the demand for higher class using the formula
00194     //  $Pro\_sell\_up\_from\_Q\_to\_F = e^{((y_F/y_Q - 1) * \ln(0.5) / (FRAT5 - 1))}$ 
00195     for (; itNextClass != lBCList.rend(); ++itCurrentClass, ++itNextClass) {
00196         stdair::BookingClass* lCurrentBC_ptr = *itCurrentClass;
00197         assert (lCurrentBC_ptr != NULL);
00198         const stdair::Yield_T& lCurrentYield = lCurrentBC_ptr->getYield();
00199         stdair::BookingClass* lNextBC_ptr = *itNextClass;
00200         assert (lNextBC_ptr != NULL);
00201         const stdair::Yield_T& lNextYield = lNextBC_ptr->getYield();
00202
00203         // Compute the part of price-oriented demand distributed to the
00204         // current class.
00205         const double lSellUp =
00206             exp ((1.0 - lNextYield/lCurrentYield) * lSellUpFactor);
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 {
00264     // Set the demand forecast for all classes to zero.
00265     const stdair::BookingClassList_T& lBCList =
00266         stdair::BomManager::getList<stdair::BookingClass> (iSegmentCabin);
00267     for (stdair::BookingClassList_T::const_iterator itBC = lBCList.begin();
00268          itBC != lBCList.end(); ++itBC) {
00269         stdair::BookingClass* lBC_ptr = *itBC;
00270         assert (lBC_ptr != NULL);
00271         lBC_ptr->setMean (0.0);
00272     }
00273 }
00274 // //////////////////////////////////////

```

```

00275 bool Forecaster::
00276 forecastUsingMultiplicativePickUp (stdair::FlightDate& ioFlightDate,
00277                                   const stdair::Date_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             if (isForecasted == false) {
00307                 isSucceeded = false;
00308             }
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::getNbOfDepartedSegments (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
00353         assert (itDCP != stdair::DEFAULT_DCP_LIST.end());
00354         const stdair::DCP_T& lFirstDCP = *itDCP;
00355
00356         // Initialise the unconstrained demand for classes.
00357         stdair::NbOfSegments_T lNbOfUsableSegments =
00358             GuillotineBlockHelper::
00359                 getNbOfSegmentAlreadyPassedThisDTD (lGuillotineBlock, lFirstDCP,
00360                                                       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
00491     cabin
00492     const stdair::NbOfSegments_T lNbOfUsableSegments = GuillotineBlockHelper::
00493         getNbOfSegmentAlreadyPassedThisDTD (lGuillotineBlock, iDCPEnd,
00494         iCurrentDate);
00495
00496     STDAIR_LOG_DEBUG ("Nb of usable similar segments: "
00497         << lNbOfUsableSegments);
00498
00499     if (lNbOfUsableSegments > 0) {
00500
00501         // Parse the booking class list and unconstrain historical bookings.
00502         for (BookingClassUnconstrainedDemandVectorMap_T::iterator itBCUDV =
00503             ioBkgClassUncDemMap.begin(); itBCUDV != ioBkgClassUncDemMap.end();
00504             ++itBCUDV) {
00505             stdair::BookingClass* lBC_ptr = itBCUDV->first;
00506             assert (lBC_ptr != NULL);
00507             const stdair::MapKey_T& lBCKey = lBC_ptr->describeKey();
00508             const stdair::BlockIndex_T& lBlockIdx =
00509                 lGuillotineBlock.getBlockIndex (lBCKey);
00510             UnconstrainedDemandVector_T& lUncDemVector = itBCUDV->second;
00511
00512             STDAIR_LOG_DEBUG ("Unconstrain product-oriented bookings for "<lBCKey)
00513
00514             forecastUsingMultiplicativePickUp (lGuillotineBlock, lUncDemVector,
00515                 iDCPBegin, iDCPEnd,
00516                 lNbOfUsableSegments, lBlockIdx,
00517                 iNbOfAnteriorSimilarSegments,
00518                 iNbOfDepartedSegments);
00519         }
00520
00521         // Unconstrain the Q-equivalent bookings.
00522         // Retrieve the block index of the segment-cabin.
00523         std::ostringstream lSCMapKey;
00524         lSCMapKey << stdair::DEFAULT_SEGMENT_CABIN_VALUE_TYPE
00525             << iSegmentCabin.describeKey();
00526         const stdair::BlockIndex_T& lCabinIdx =
00527             lGuillotineBlock.getBlockIndex (lSCMapKey.str());
00528
00529         STDAIR_LOG_DEBUG ("Unconstrain price-oriented bookings");
00530         forecastUsingMultiplicativePickUp (lGuillotineBlock,
00531             ioQEquivalentDemandVector,
00532             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.
00555         getConstSegmentCabinDTDRangeProductAndPriceOrientedBookingSnapshotView (lSegBegin, iNbOfUsableSegments - 1, iDCPEnd, iDCPBegin);
00556     stdair::ConstSegmentCabinDTDRangeSnapshotView_T lAvlView =
00557         iGuillotineBlock.getConstSegmentCabinDTDRangeAvailabilitySnapshotView (
00558         lSegBegin, 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) {
00577                 if (lAvlView[i * lNbOfValueTypes + iBlockIdx][j] < 1.0) {
00578                     lCensorshipFlag = true;
00579                 }
00580             }
00581
00582             // Get the bookings of the day.
00583             // STDAIR_LOG_DEBUG ("Bookings of the day: " <<
00584             lBookingView[i * lNbOfValueTypes + iBlockIdx][j]);
00585             lNbOfHistoricalBkgs += lBookingView[i * lNbOfValueTypes + iBlockIdx][j];
00586         }
00587
00588         // If there is no booking till now for this class and for this segment,
00589         // there will be no unconstraining process.
00590         stdair::NbOfRequests_T& lUncDemand = ioUncDemVector.at (i);
00591         if (lUncDemand < 1.0) {
00592             lUncDemand += lNbOfHistoricalBkgs;
00593         } else {
00594             double lBkgDemandFactor = lNbOfHistoricalBkgs / lUncDemand;
00595             HistoricalBooking lHistoricalBkg (lBkgDemandFactor, lCensorshipFlag);
00596             lHBHolder.addHistoricalBooking (lHistoricalBkg);
00597             lDataIndexList.push_back (i);
00598         }
00599
00600         // DEBUG
00601         STDAIR_LOG_DEBUG ("Historical bkgs: " << lNbOfHistoricalBkgs
00602         << ", censored: " << lCensorshipFlag);
00603     }
00604
00605     // DEBUG
00606     STDAIR_LOG_DEBUG ("Unconstrain by multiplicative pick-up using EM");
00607
00608     // Unconstrain the booking figures
00609     Detruncator::unconstrainUsingMultiplicativePickUp (lHBHolder);
00610
00611     // Update the unconstrained demand vector.
00612     short i = 0;
00613     for (std::vector<short>::iterator itIdx = lDataIndexList.begin();
00614          itIdx != lDataIndexList.end(); ++itIdx, ++i) {
00615         short lIdx = *itIdx;
00616         stdair::NbOfRequests_T& lPastDemand = ioUncDemVector.at (lIdx);
00617         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,
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.
00648         getConstSegmentCabinDTDRangeProductAndPriceOrientedBookingSnapshotView (lSegBegin, iNbOfUsableSegments-1, iDCPEnd, iDCPBegin);
00649     stdair::ConstSegmentCabinDTDRangeSnapshotView_T lAvlView =
00650         iGuillotineBlock.getConstSegmentCabinDTDRangeAvailabilitySnapshotView (
00651         lSegBegin, iNbOfUsableSegments-1, iDCPEnd, iDCPBegin);
00652
00653     // Browse the list of segments and build the historical booking holder.
00654     const stdair::ValueTypeIndexMap_T& lVTIdxMap =
00655         iGuillotineBlock.getValueTypeIndexMap();
00656     const unsigned int lNbOfValueTypes = lVTIdxMap.size();
00657     HistoricalBookingHolder lHBHolder;
00658     std::vector<short> lDataIndexList;
00659     for (short i = 0; i < iNbOfUsableSegments-lSegBegin; ++i) {
00660         stdair::Flag_T lCensorshipFlag = false;
00661         stdair::NbOfBookings_T lNbOfHistoricalBkgs = 0.0;
00662         const short lNbOfDTDs = iDCPBegin - iDCPEnd + 1;
00663
00664         // Parse the DTDs during the period
00665         for (short j = 0; j < lNbOfDTDs; ++j) {
00666             // Check if the data has been censored during this day.
00667             // STDAIR_LOG_DEBUG ("i: " << i << ", NbOfValues: " << lNbOfValueTypes
00668             //                  << ", BlockIdx: " << iBlockIdx << ", j: " << j);
00669             if (lCensorshipFlag == false) {
00670                 if (lAvlView[i*lNbOfValueTypes + iBlockIdx][j] < 1.0) {
00671                     lCensorshipFlag = true;
00672                 }
00673             }
00674             // Get the bookings of the day.
00675             // STDAIR_LOG_DEBUG ("Bookings of the day: " <<
00676             lBookingView[i*lNbOfValueTypes + iBlockIdx][j]);
00677             lNbOfHistoricalBkgs += lBookingView[i*lNbOfValueTypes + iBlockIdx][j];
00678         }
00679
00680         // If there is no booking till now for this class and for this segment,
00681         // there will be no unconstraining process.
00682         stdair::NbOfRequests_T& lUncDemand = ioUncDemVector.at (i);
00683         if (lUncDemand < 1.0) {
00684             lUncDemand += lNbOfHistoricalBkgs;
00685         } else {
00686             double lBkgDemandFactor = lNbOfHistoricalBkgs / lUncDemand;
00687             HistoricalBooking lHistoricalBkg (lBkgDemandFactor, lCensorshipFlag);
00688             lHBHolder.addHistoricalBooking (lHistoricalBkg);
00689             lDataIndexList.push_back (i);
00690         }
00691     }
00692
00693     // DEBUG
00694     STDAIR_LOG_DEBUG ("Historical bkgs: " << lNbOfHistoricalBkgs
00695                       << ", censored: " << lCensorshipFlag);
00696 }
00697
00698 // DEBUG
00699 STDAIR_LOG_DEBUG ("Unconstrain by multiplicative pick-up using EM");
00700
00701 // Unconstrain the booking figures

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```

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;
00757     double lPriceOriStdDev = sqrt (iUncDem);
00758
00759     // DEBUG
00760     STDAIR_LOG_DEBUG ("Price-oriented demand: mean = " << lPriceOriMean
00761                      << ", stddev = " << lPriceOriStdDev);
00762
00763     // Retrieve the classes from low to high and compute the distributions of
00764     // product-oriented and price-oriented demand.
00765     // Retrieve the lowest class.
00766     const stdair::BookingClassList_T& lBCList =
00767         stdair::BomManager::getList<stdair::BookingClass> (ioSegmentCabin);
00768     stdair::BookingClassList_T::const_reverse_iterator itCurrentClass =
00769         lBCList.rbegin();
00770     assert (itCurrentClass != lBCList.rend());
00771     stdair::BookingClassList_T::const_reverse_iterator itNextClass =
00772         itCurrentClass;
00773     ++itNextClass;
00774     // If there is only one class in the cabin, the demand distribution of this
00775     // class is equal to the price-oriented demand distribution of the cabin.
00776     if (itNextClass == lBCList.rend()) {
00777         stdair::BookingClass* lLowestBC_ptr = *itCurrentClass;
00778         lLowestBC_ptr->setMean (lPriceOriMean);
00779         lLowestBC_ptr->setStdDev (lPriceOriStdDev);
00780         if (lPriceOriMean > 0) {
00781             return true;
00782         } else {
00783             return false;
00784         }
00785     } 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         ,
00052         const stdair::NbOfSegments_T&
00053         );
00054
00055         static void forecastUsingMultiplicativePickUp(const stdair::GuillotineBlock
00056         &,
00057         UnconstrainedDemandVector_T&,
00058         const stdair::DCP_T&,
00059         const stdair::DCP_T&,
00060         const stdair::NbOfSegments_T&
00061         ,
00062         const stdair::BlockIndex_T&,
00063         const stdair::NbOfSegments_T&
00064         ,

```

```

00081                                     const stdair::NbOfSegments_T&
00082     );
00086     static void forecastUsingMultiplicativePickUp(const stdair::GuillotineBlock
00087     &,
00087                                     UnconstrainedDemandVector_T&,
00088                                     const stdair::DCP_T&,
00089                                     const stdair::DCP_T&,
00090                                     const stdair::NbOfSegments_T&
00091     ,
00091                                     const stdair::BlockIndex_T&,
00092                                     const stdair::NbOfSegments_T&
00093     ,
00093                                     const stdair::NbOfSegments_T&
00094     ,
00094                                     const stdair::SegmentCabin&,
00095                                     const stdair::Date_T&);
00096
00101     static bool forecastUsingMultiplicativePickUp(stdair::SegmentCabin&,
00102     const
00102     BookingClassUnconstrainedDemandMap_T&,
00103     const stdair::NbOfRequests_T&
00104     ,
00104     const double&);
00105
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 hasAllParams = 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             hasAllParams = true;
00080         }
00081
00082         if (iStringStr >> dval) {
00083             if (i == 1) {
00084                 lYield = dval;
00085                 // std::cout << "Yield[" << i << "] = '" << dval << "'" << std::endl;
00086             } else if (i == 2) {
00087                 lMean = dval;
00088                 // std::cout << "Mean[" << i << "] = '" << dval << "'" << std::endl;
00089             }

```

```

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
00013 namespace stdair {

```

```

00014     class BomRoot;
00015     class LegCabin;
00016     class SegmentCabin;
00017 }
00018
00019 namespace RMOL {
00020
00025     class InventoryParser : public stdair::CmdAbstract {
00026     public:
00027
00035         static bool parseInputFileAndBuildBom (const std::string& iInputFileName,
00036                                                stdair::BomRoot&);
00037     };
00038 }
00039 #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
00036     assert (itSC != lSegmentCabinList.end());
00037     const stdair::SegmentCabin* lSegmentCabin_ptr = *itSC;
00038     assert (lSegmentCabin_ptr != NULL);
00039
00040     // Retrieve the class list.
00041     const stdair::BookingClassList_T lBookingClassList =
00042         stdair::BomManager::getList<stdair::BookingClass> (*lSegmentCabin_ptr);
00043     stdair::RandomGeneration lSeedGenerator (stdair::DEFAULT_RANDOM_SEED);
00044
00045     // Generate the demand samples for the booking classes.
00046     for (stdair::BookingClassList_T::const_iterator itBC =
00047         lBookingClassList.begin(); itBC != lBookingClassList.end(); ++itBC)
00048     {
00049         stdair::RandomSeed_T lRandomSeed =
00050             lSeedGenerator.generateUniform01 () * 1e9;
00051         stdair::BookingClass* lBookingClass_ptr = *itBC;
00052         assert (lBookingClass_ptr != NULL);
00053         lBookingClass_ptr->generateDemandSamples (K, lRandomSeed);
00054
00055         // DEBUG
00056         //STDAIR_LOG_DEBUG ("Generating " << K << " demand samples for the class
00057
00058         //
00059         << lBookingClass_ptr->describeKey());
00060     }
00061
00062     // Call the class performing the actual algorithm
00063     MCOptimiser::optimalOptimisationByMCIntegration (ioLegCabin);
00064
00065 // //////////////////////////////////////
00066 void Optimiser::optimalOptimisationByDP (stdair::LegCabin& ioLegCabin) {
00067     DPOptimiser::optimalOptimisationByDP (ioLegCabin);
00068 }
00069
00070 // //////////////////////////////////////
00071 void Optimiser::heuristicOptimisationByEmsr (stdair::LegCabin& ioLegCabin) {
00072     Emsr::heuristicOptimisationByEmsr (ioLegCabin);
00073 }
00074
00075 // //////////////////////////////////////
00076 void Optimiser::heuristicOptimisationByEmsrA (stdair::LegCabin& ioLegCabin) {
00077     Emsr::heuristicOptimisationByEmsrA (ioLegCabin);
00078 }
00079
00080 // //////////////////////////////////////
00081 void Optimiser::heuristicOptimisationByEmsrB (stdair::LegCabin& ioLegCabin) {
00082     Emsr::heuristicOptimisationByEmsrB (ioLegCabin);
00083 }
00084
00085 // //////////////////////////////////////
00086 void Optimiser::optimise (stdair::FlightDate& ioFlightDate) {
00087     // Browse the leg-cabin list and build the virtual class list for
00088     // each cabin.
00089     const stdair::LegDateList_T& lLDList =
00090         stdair::BomManager::getList<stdair::LegDate> (ioFlightDate);
00091     for (stdair::LegDateList_T::const_iterator itLD = lLDList.begin();
00092         itLD != lLDList.end(); ++itLD) {
00093         stdair::LegDate* lLD_ptr = *itLD;
00094         assert (lLD_ptr != NULL);
00095
00096         //
00097         const stdair::LegCabinList_T& lLCList =
00098             stdair::BomManager::getList<stdair::LegCabin> (*lLD_ptr);
00099         for (stdair::LegCabinList_T::const_iterator itLC = lLCList.begin();
00100             itLC != lLCList.end(); ++itLC) {
00101             stdair::LegCabin* lLC_ptr = *itLC;
00102             assert (lLC_ptr != NULL);
00103
00104             // Build the virtual class list.
00105             buildVirtualClassListForLegBasedOptimisation (*lLC_ptr);
00106
00107             // Optimise using Monte-Carlo Integration method.
00108             optimalOptimisationByMCIntegration (10000, *lLC_ptr);
00109         }
00110     }
00111 }
00112
00113 // //////////////////////////////////////

```

```

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
00121     assert (itSC != lSegmentCabinList.end());
00122     const stdair::SegmentCabin* lSegmentCabin_ptr = *itSC;
00123     assert (lSegmentCabin_ptr != NULL);
00124
00125     // Retrieve the class list.
00126     const stdair::BookingClassList_T lBookingClassList =
00127         stdair::BomManager::getList<stdair::BookingClass> (*lSegmentCabin_ptr);
00128
00129     // Generate the demand samples for the booking classes.
00130     for (stdair::BookingClassList_T::const_iterator itBC =
00131         lBookingClassList.begin(); itBC != lBookingClassList.end(); ++itBC)
00132     {
00133         stdair::BookingClass* lBookingClass_ptr = *itBC;
00134         assert (lBookingClass_ptr != NULL);
00135
00136         const stdair::Yield_T& lYield = lBookingClass_ptr->getYield();
00137         stdair::VirtualClassStruct lVirtualClass (*lBookingClass_ptr);
00138         lVirtualClass.setYield (lYield);
00139         lVirtualClass.setMean (lBookingClass_ptr->getMean());
00140         lVirtualClass.setStdDev (lBookingClass_ptr->getStdDev());
00141         lVirtualClassMap.insert (stdair::VirtualClassMap_T::
00142             value_type (lYield, lVirtualClass));
00143     }
00144
00145     // Browse the virtual class map from high to low yield.
00146     ioLegCabin.emptyVirtualClassList();
00147     for (stdair::VirtualClassMap_T::reverse_iterator itVC =
00148         lVirtualClassMap.rbegin(); itVC != lVirtualClassMap.rend(); ++itVC)
00149     {
00150         stdair::VirtualClassStruct& lVC = itVC->second;
00151         ioLegCabin.addVirtualClass (lVC);
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& lLCLList =
00173                     stdair::BomManager::getList<stdair::LegCabin> (*lLD_ptr);
00174                 for (stdair::LegCabinList_T::const_iterator itLC = lLCLList.begin();
00175                     itLC != lLCLList.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 {
00017     class Optimiser {
00018     public:
00019
00020
00021         static void optimalOptimisationByMCIntegration (const int K,
00022                                                         stdair::LegCabin&);
00023
00024         static void optimalOptimisationByDP (stdair::LegCabin&);
00025
00026         static void heuristicOptimisationByEmsr (stdair::LegCabin&);
00027
00028         static void heuristicOptimisationByEmsrA (stdair::LegCabin&);
00029
00030         static void heuristicOptimisationByEmsrB (stdair::LegCabin&);
00031
00032         static void optimise (stdair::FlightDate&);
00033
00034         static void buildVirtualClassListForLegBasedOptimisation (stdair::LegCabin&)
00035     ;
00036
00037         static double optimiseUsingOnDForecast (stdair::FlightDate&,
00038                                                 const bool& iReduceFluctuations =
00039             false);
00040     };
00041 }
00042 #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
00034     class RMOL_ServiceContext;
00035
00039     class RMOL_Service {
00040     public:
00041         // ////////////////////////////////// Constructors and destructors //////////////////////////////////
00057         RMOL_Service (const stdair::BasLogParams&, const stdair::BasDBParams&);
00058
00070         RMOL_Service (const stdair::BasLogParams&);
00071
00087         RMOL_Service (stdair::STDAIR_ServicePtr_T);
00088
00112         void parseAndLoad (const stdair::CabinCapacity_T& iCabinCapacity,
00113                          const stdair::Filename_T& iDemandAndClassDataFile);
00114
00118         void setUpStudyStatManager();
00119
00123         ~RMOL_Service();
00124
00125     public:
00127         // ////////////////////////////////// Business Methods //////////////////////////////////
00133         void buildSampleBom();
00134
00138         void optimalOptimisationByMCIntegration (const int K);
00139
00143         void optimalOptimisationByDP();
00144
00148         void heuristicOptimisationByEmsr();
00149
00153         void heuristicOptimisationByEmsrA();
00154
00158         void heuristicOptimisationByEmsrB();
00159
00163         bool optimise (stdair::FlightDate&, const stdair::DateTime_T&,
00164                      const stdair::ForecastingMethod&, const
stdair::PartnershipTechnique&);
00165
00170         // O&D based forecast
00171         void forecastOnD (const stdair::DateTime_T&);
00172
00173         stdair::YieldFeatures* getYieldFeatures(const stdair::OnDDate&, const
stdair::CabinCode_T&,
00174                                              stdair::BomRoot&);
00175
00176         void forecastOnD (const stdair::YieldFeatures&, stdair::OnDDate&,
00177                          const stdair::CabinCode_T&, const stdair::DTD_T&,
00178                          stdair::BomRoot&);
00179
00180         void setOnDForecast (const stdair::AirlineClassList&, const
stdair::MeanValue_T&,
00181                             const stdair::StdDevValue_T&, stdair::OnDDate&, const
stdair::CabinCode_T&,
00182                             stdair::BomRoot&);
00183

```

```

00184     // Single segment O&D
00185     void setOnDForecast (const stdair::AirlineCode_T&, const stdair::Date_T&,
00186         const stdair::AirportCode_T&,
00187         const stdair::AirportCode_T&, const
00188         stdair::CabinCode_T&, const stdair::ClassCode_T&,
00189         const stdair::MeanValue_T&, const
00190         stdair::StdDevValue_T&, const stdair::Yield_T&, stdair::BomRoot&);
00191
00192     // Multiple segment O&D
00193     void setOnDForecast (const stdair::AirlineCodeList_T&, const
00194         stdair::AirlineCode_T&,const stdair::Date_T&,
00195         const stdair::AirportCode_T&, const
00196         stdair::AirportCode_T&, const stdair::CabinCode_T&,
00197         const stdair::ClassCodeList_T&, const
00198         stdair::MeanValue_T&, const stdair::StdDevValue_T&,
00199         const stdair::Yield_T&, stdair::BomRoot&);
00200
00201     // Initialise (or re-initialise) the demand projections in all leg cabins
00202     void resetDemandInformation (const stdair::DateTime_T&);
00203
00204     void resetDemandInformation (const stdair::DateTime_T&, const
00205         stdair::Inventory&);
00206
00207     /* Projection of demand */
00208
00209     // Aggregated demand at booking class level.
00210     void projectAggregatedDemandOnLegCabins (const stdair::DateTime_T&);
00211
00212     // Static rule prorated yield
00213     void projectOnDDemandOnLegCabinsUsingYP (const stdair::DateTime_T&);
00214
00215     // Displacement-adjusted yield
00216     void projectOnDDemandOnLegCabinsUsingDA (const stdair::DateTime_T&);
00217
00218     // Dynamic yield proration (PF = BP_i/BP_{total}, where BP_{total} =
00219         sum(BP_i))
00220     void projectOnDDemandOnLegCabinsUsingDYP (const stdair::DateTime_T&);
00221
00222     void projectOnDDemandOnLegCabinsUsingDYP (const stdair::DateTime_T&, const
00223         stdair::Inventory&);
00224
00225     // O&D-based optimisation (using demand aggregation or demand aggregation).
00226     void optimiseOnD (const stdair::DateTime_T&);
00227
00228     // O&D-based optimisation using displacement-adjusted yield.
00229     void optimiseOnDUsingRMCooperation (const stdair::DateTime_T&);
00230
00231     // Advanced version of O&D-based optimisation using displacement-adjusted
00232     yield.
00233     // Network optimisation instead of separate inventory optimisation.
00234     void optimiseOnDUsingAdvancedRMCooperation (const stdair::DateTime_T&);
00235
00236     // Update bid price and send to partners
00237     void updateBidPrice (const stdair::DateTime_T&);
00238     void updateBidPrice (const stdair::FlightDate&, stdair::BomRoot&);
00239
00240 public:
00241     // //////////// Export support methods ////////////
00242     std::string jsonExport (const stdair::AirlineCode_T&,
00243         const stdair::FlightNumber_T&,
00244         const stdair::Date_T iDepartureDate) const;
00245
00246 public:
00247     // //////////// Display support methods ////////////
00248     std::string csvDisplay() const;
00249
00250 private:
00251     // ////////// Construction and Destruction helper methods //////////
00252     RMOL_Service();
00253
00254     RMOL_Service (const RMOL_Service&);
00255
00256     stdair::STDAIR_ServicePtr_T initStdAirService (const stdair::BasLogParams&,
00257         const stdair::BasDBParams&);
00258
00259     stdair::STDAIR_ServicePtr_T initStdAirService (const stdair::BasLogParams&)
00260     ;
00261
00262     void addStdAirService (stdair::STDAIR_ServicePtr_T,
00263         const bool iOwnStdairService);
00264
00265     void initServiceContext ();
00266
00267     void initRmolService();
00268

```

```

00322     void finalise();
00323
00324
00325 private:
00326     // ////////// Service Context //////////
00330     RMOL_ServiceContext* _rmolServiceContext;
00331
00333     stdair::Date_T _previousForecastDate;
00334 };
00335 }
00336 #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::BookingClassUnconstrainedDemandVectorMap\\_T](#)
- typedef std::map  
    < stdair::BookingClass  
    \*, stdair::NbOfRequests\_T > [RMOL::BookingClassUnconstrainedDemandMap\\_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     // Forward declarations
00023     class RMOL_Service;
00024
00025     // ////////////////////////////////// Exceptions //////////////////////////////////
00026     class OverbookingException : public stdair::RootException {
00027     public:
00028         OverbookingException (const std::string& iWhat)
00029             : stdair::RootException (iWhat) {}
00030     };
00031
00032     class UnconstrainingException : public stdair::RootException {
00033     public:
00034         UnconstrainingException (const std::string& iWhat)
00035             : stdair::RootException (iWhat) {}
00036     };
00037
00038     class ForecastException : public stdair::RootException {
00039     public:
00040         ForecastException (const std::string& iWhat)
00041             : stdair::RootException (iWhat) {}
00042     };
00043
00044     class OptimisationException : public stdair::RootException {
00045     public:
00046         OptimisationException (const std::string& iWhat)
00047             : stdair::RootException (iWhat) {}
00048     };
00049
00050     // ////////////////////////////////// Type definitions //////////////////////////////////
00051     typedef boost::shared_ptr<RMOL_Service> RMOL_ServicePtr_T;
00052
00053     typedef std::vector<stdair::NbOfRequests_T> UnconstrainedDemandVector_T;
00054
00055     typedef std::vector<stdair::NbOfBookings_T> BookingVector_T;
00056
00057     typedef std::vector<stdair::Flag_T> FlagVector_T;
00058
00059     typedef std::map<stdair::BookingClass*, UnconstrainedDemandVector_T>
00060     BookingClassUnconstrainedDemandVectorMap_T;
00061
00062     typedef std::map<stdair::BookingClass*, stdair::NbOfRequests_T>
00063     BookingClassUnconstrainedDemandMap_T;
00064
00065     typedef std::map<const stdair::DTD_T, double> FRAT5Curve_T;
00066 }
00067 #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 }

```

```

00207     }
00208     assert (_rmolServiceContext != NULL);
00209     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00210
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 "
00272         "<< lOptimisationMeasure);
00273     STDAIR_LOG_DEBUG ("Result: " << lLegCabin.displayVirtualClassList());
00274
00275     std::ostream logStream;
00276     stdair::BidPriceVector_T lBidPriceVector = lLegCabin.getBidPriceVector();
00277     logStream << "Bid-Price Vector (BPV): ";
00278     unsigned int size = lBidPriceVector.size();
00279
00280     for (unsigned int i = 0; i < size - 1; ++i) {
00281         const double bidPrice = lBidPriceVector.at(i);
00282         logStream << std::fixed << std::setprecision (2) << bidPrice << ", ";
00283     }
00284     const double bidPrice = lBidPriceVector.at(size - 1);
00285     logStream << std::fixed << std::setprecision (2) << bidPrice;
00286     STDAIR_LOG_DEBUG (logStream.str());
00287 }
00288
00289 // //////////////////////////////////////
00290 void RMOL_Service::optimalOptimisationByDP() {
00291 }
00292
00293
00294

```

```

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         itBP != lBidPriceVector.end(); ++itBP) {
00346         if (idx != 0) {
00347             logStream << ", ";
00348         }
00349         const stdair::BidPrice_T& lBidPrice = *itBP;
00350         logStream << std::fixed << std::setprecision (2) << lBidPrice;
00351     }
00352     // DEBUG
00353     STDAIR_LOG_DEBUG (logStream.str());
00354 }
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 void RMOL_Service::heuristicOptimisationByEmsrB() {
00378     assert (_rmolServiceContext != NULL);
00379     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00380
00381     // Retrieve the StdAir service
00382     stdair::STDAIR_Service& lSTDAIR_Service =
00383         lRMOL_ServiceContext.getSTDAIR_Service();
00384     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
00385
00386     //
00387     stdair::LegCabin& lLegCabin =
00388         stdair::BomRetriever::retrieveDummyLegCabin (lBomRoot);
00389
00390     Optimiser::heuristicOptimisationByEmsrB (lLegCabin);
00391
00392     // DEBUG
00393     STDAIR_LOG_DEBUG ("Result: " << lLegCabin.displayVirtualClassList());
00394 }
00395
00396 ///////////////////////////////////////////////////////////////////
00397 bool RMOL_Service::
00398 optimise (stdair::FlightDate& ioFlightDate,
00399     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&
lPartnershipTechnique =
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 (iRMEEventTime);
00417                     optimiseOnD (iRMEEventTime);
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 < iRMEEventTime.date()) {
00425                     forecastOnD (iRMEEventTime);
00426                     resetDemandInformation (iRMEEventTime);
00427                     projectOnDDemandOnLegCabinsUsingYP (iRMEEventTime);
00428                     optimiseOnD (iRMEEventTime);
00429                 }
00430                 break;
00431             }
00432             case stdair::PartnershipTechnique::RMC: {
00433                 if (_previousForecastDate < iRMEEventTime.date()) {
00434                     forecastOnD (iRMEEventTime);
00435                     resetDemandInformation (iRMEEventTime);
00436                     updateBidPrice (iRMEEventTime);
00437                     projectOnDDemandOnLegCabinsUsingDYP (iRMEEventTime);
00438                     optimiseOnDUsingRMCooperation (iRMEEventTime);
00439                 }
00440                 break;
00441             }
00442             case stdair::PartnershipTechnique::A_RMC: {
00443                 if (_previousForecastDate < iRMEEventTime.date()) {
00444                     forecastOnD (iRMEEventTime);
00445                     resetDemandInformation (iRMEEventTime);
00446                     updateBidPrice (iRMEEventTime);
00447                     projectOnDDemandOnLegCabinsUsingDYP (iRMEEventTime);
00448                     optimiseOnDUsingAdvancedRMCooperation (iRMEEventTime);
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::EN_ForecastingMethod& lForecastingMethod
=
00459                     iForecastingMethod.getMethod();
00460                 switch (lForecastingMethod) {
00461                     case stdair::ForecastingMethod::ADD_PK: {
00462                         isForecasted = Forecaster::forecastUsingAdditivePickUp (ioFlightDate,
00463                                                                                 iRMEEventTime);
00464                         break;
00465                     }
00466                     case stdair::ForecastingMethod::MUL_PK: {
00467                         isForecasted =
00468                             Forecaster::forecastUsingMultiplicativePickUp (ioFlightDate,
00469                                                                               iRMEEventTime);
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     }
00507     assert (_rmolServiceContext != NULL);
00508     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00509
00510     // Retrieve the bom root
00511     stdair::STDAIR_Service& lSTDAIR_Service =
00512         lRMOL_ServiceContext.getSTDAIR_Service();
00513     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
00514
00515     // Retrieve the date from the RM event
00516     const stdair::Date_T lDate = iRMEventTime.date();
00517
00518     _previousForecastDate = lDate;
00519
00520     const stdair::InventoryList_T& lInventoryList =
00521         stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
00522     assert (!lInventoryList.empty());
00523     for (stdair::InventoryList_T::const_iterator itInv = lInventoryList.begin()
00524 ;
00525         itInv != lInventoryList.end(); ++itInv) {
00526         const stdair::Inventory* lInventory_ptr = *itInv;
00527         assert (lInventory_ptr != NULL);
00528         if (stdair::BomManager::hasList<stdair::OnDDate> (*lInventory_ptr)) {
00529             const stdair::OnDDateList_T lOnDDateList =
00530                 stdair::BomManager::getList<stdair::OnDDate> (*lInventory_ptr);
00531
00532             for (stdair::OnDDateList_T::const_iterator itOD = lOnDDateList.begin();
00533                 itOD != lOnDDateList.end(); ++itOD) {
00534                 stdair::OnDDate* lOnDDate_ptr = *itOD;
00535                 assert (lOnDDate_ptr != NULL);
00536
00537                 const stdair::Date_T& lDepartureDate = lOnDDate_ptr->getDate();
00538                 stdair::DateOffset_T lDateOffset = lDepartureDate - lDate;
00539                 stdair::DTD_T lDTD = short (lDateOffset.days());
00540
00541                 stdair::DCPLList_T::const_iterator itDCP =
00542                     std::find (stdair::DEFAULT_DCP_LIST.begin(),
00543                         stdair::DEFAULT_DCP_LIST.end(), lDTD);
00544                 // Check if the forecast for this O&D date needs to be forecasted.
00545                 if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
00546                     // Retrieve the total forecast map.
00547                     const stdair::CabinForecastMap_T& lTotalForecastMap =
00548                         lOnDDate_ptr->getTotalForecastMap();
00549
00550                     // Browse the map and make a forecast for every cabin.
00551                     for (stdair::CabinForecastMap_T::const_iterator itCF =
00552                         lTotalForecastMap.begin();
00553                         itCF != lTotalForecastMap.end(); ++itCF) {
00554                         const stdair::CabinCode_T lCabinCode = itCF->first;
00555                         stdair::YieldFeatures* lYieldFeatures_ptr =
00556                             getYieldFeatures(*lOnDDate_ptr, lCabinCode, lBomRoot);
00557                         if (lYieldFeatures_ptr == NULL) {
00558                             STDAIR_LOG_ERROR ("Cannot find yield corresponding to "
00559                                 "<< "the O&D date"
00560                                 "<< lOnDDate_ptr->toString()
00561                                 "<< " Cabin " << lCabinCode);
00562                             assert (false);
00563                         }
00564                     }
00565                     forecastOnD (*lYieldFeatures_ptr, *lOnDDate_ptr, lCabinCode, lDTD
00566 ;
00567                         lBomRoot);
00568                 }
00569             }
00570         }
00571     }
00572 }

```

```

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 (
00629                     stdair::TRIP_TYPE_ONE_WAY,
00630                     iCabinCode);
00631                 stdair::YieldFeatures* oYieldFeatures_ptr = stdair::BomManager::
00632                     getObjectPtr<stdair::YieldFeatures> (*lTimePeriod_ptr,
00633                                                         lYieldFeaturesKey.toString());
00634                 if (oYieldFeatures_ptr != NULL) {
00635                     return oYieldFeatures_ptr;
00636                 }
00637             }
00638         }
00639         return NULL;
00640     }
00641 }
00642
00643 ///////////////////////////////////////////////////////////////////
00644 void RMOL_Service::
00645 forecastOnD (const stdair::YieldFeatures& iYieldFeatures,
00646             stdair::OnDDate& iOnDDate,
00647             const stdair::CabinCode_T& iCabinCode,
00648             const stdair::DTD_T& iDTD,
00649             stdair::BomRoot& iBomRoot) {
00650
00651     const stdair::AirlineClassListList_T lAirlineClassListList =
00652         stdair::BomManager::getList<stdair::AirlineClassList> (iYieldFeatures);
00653     assert (lAirlineClassListList.begin() != lAirlineClassListList.end());
00654
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
00728     1.
00729     // In that case it should be modified and put to 1.
00730     lProportionFactor = std::min (lProportionFactor, 1.0);
00731     lProportionFactorList.push_back (lProportionFactor -
00732         lPreviousProportionFactor);
00733     lPreviousProportionFactor = lProportionFactor;
00734     oStr << lAirlineClassList_ptr->toString() << lProportionFactor << " ";
00735 }
00736 STDAIR_LOG_DEBUG (oStr.str());
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
list 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 setOnDDForecast (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
list 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
    airlines is right.
00919     if (lDepartureDate == iDepartureDate && lOrigin == iOrigin &&
00920         lDestination == iDestination && lSegmentDateList.size() ==
iAirlineCodeList.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
00929             // is the airline that we are looking for.
00930             const stdair::SegmentDate* lOperatingSegmentDate_ptr =
00931                 lSegmentDate_ptr->getOperatingSegmentDate ();
00932             if (lOperatingSegmentDate_ptr != NULL) {
00933                 const stdair::FlightDate* lOperatingFD_ptr =
00934                     stdair::BomManager::getParentPtr<stdair::FlightDate>
(*lOperatingSegmentDate_ptr);
00935                 const stdair::AirlineCode_T lOperatingAirlineCode =
00936                     lOperatingFD_ptr->getAirlineCode();
00937                 if (lOperatingAirlineCode != lForecastAirlineCode) {
00938                     break;
00939                 }
00940             } else {
00941                 const stdair::AirlineCode_T lOperatingAirlineCode =
00942                     lOnDDate_ptr->getAirlineCode();
00943                 if (lOperatingAirlineCode != lForecastAirlineCode) {
00944                     break;
00945                 }
00946             }
00947         }
00948         if (itAC == iAirlineCodeList.end()) {lFoundOnDDate = true;}
00949     }
00950     if (lFoundOnDDate) {
00951         stdair::CabinClassPairList_T lCabinClassPairList;
00952         for (stdair::ClassCodeList_T::const_iterator itCC = iClassCodeList.
begin();
00953             itCC != iClassCodeList.end(); ++itCC) {
00954             const stdair::ClassCode_T lClassCode = *itCC;
00955             stdair::CabinClassPair_T lCabinClassPair (iCabinCode, lClassCode);
00956             lCabinClassPairList.push_back(lCabinClassPair);
00957         }
00958         const stdair::MeanStdDevPair_T lMeanStdDevPair (iMeanValue,
iStdDevValue);
00959         const stdair::YieldDemandPair_T lYieldDemandPair (iYield,
lMeanStdDevPair);
00960         lOnDDate_ptr->setDemandInformation(lCabinClassPairList,
lYieldDemandPair);
00961         lFoundOnDDate = true;
00962         std::ostringstream oACStr;
00963         for (stdair::AirlineCodeList_T::const_iterator itAC = iAirlineCodeList.
begin();
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

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00983         STDAIR_LOG_DEBUG (oACStr.str() << " Classes " << oCCStr.str()
00984                             << " Mean " << iMeanValue << " Std Dev " <<
iStdDevValue);
00985         break;
00986     }
00987 }
00988 if (!lFoundOnDDate) {
00989     STDAIR_LOG_ERROR ("Cannot find the required multi-segment O&D date: "
00990                     << iOrigin << "-" << iDestination << " " <<
iDepartureDate);
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         itFD != lFlightDateList.end(); ++itFD) {
01031         const stdair::FlightDate* lFlightDate_ptr = *itFD;
01032         assert (lFlightDate_ptr != NULL);
01033
01034         // Retrieve the date from the RM event
01035         const stdair::Date_T lDate = iRMEventTime.date();
01036
01037         const stdair::Date_T& lDepartureDate = lFlightDate_ptr->getDepartureDate()
);
01038         stdair::DateOffset_T lDateOffset = lDepartureDate - lDate;
01039         stdair::DTD_T lDTD = short (lDateOffset.days());
01040
01041         stdair::DCPLIST_T::const_iterator itDCP =
01042             std::find (stdair::DEFAULT_DCP_LIST.begin(), stdair::DEFAULT_DCP_LIST.
end(), lDTD);
01043         // Check if the demand forecast info corresponding to this flight date
needs to be reset.
01044         if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01045             // Check if the flight date holds a list of leg dates.
01046             // If so, find all leg cabin and reset the forecast they are holding.
01047             if (stdair::BomManager::hasList<stdair::LegDate> (*lFlightDate_ptr)) {
01048                 const stdair::LegDateList_T lLegDateList =
01049                     stdair::BomManager::getList<stdair::LegDate> (*lFlightDate_ptr);
01050                 assert (!lLegDateList.empty());
01051                 for (stdair::LegDateList_T::const_iterator itLD = lLegDateList.begin()
);
01052                     itLD != lLegDateList.end(); ++itLD) {
01053                     const stdair::LegDate* lLegDate_ptr = *itLD;
01054                     assert (lLegDate_ptr != NULL);
01055                     const stdair::LegCabinList_T lLegCabinList =
01056                         stdair::BomManager::getList<stdair::LegCabin> (*lLegDate_ptr);
01057                     assert (!lLegCabinList.empty());
01058                     for (stdair::LegCabinList_T::const_iterator itLC = lLegCabinList.
begin();
01059                         itLC != lLegCabinList.end(); ++itLC) {

```

```

01060         stdair::LegCabin* lLegCabin_ptr = *itLC;
01061         assert (lLegCabin_ptr != NULL);
01062         lLegCabin_ptr->emptyYieldLevelDemandMap();
01063     }
01064 }
01065 }
01066 }
01067 }
01068 }
01069
01070 //////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
01071 void RMOL_Service::projectAggregatedDemandOnLegCabins(const
stdair::DateTime_T& irMEventTime) {
01072
01073     if (_rmolServiceContext == NULL) {
01074         throw stdair::NonInitialisedServiceException ("The Rmol service "
01075             "has not been initialised")
01076     ;
01077     }
01078     assert (_rmolServiceContext != NULL);
01079     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01080
01081     // Retrieve the bom root
01082     stdair::STDAIR_Service& lSTDAIR_Service =
01083         lRMOL_ServiceContext.getSTDAIR_Service();
01084     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01085
01086     // Retrieve the date from the RM event
01087     const stdair::Date_T lDate = irMEventTime.date();
01088
01089     const stdair::InventoryList_T lInventoryList =
01090         stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01091     assert (!lInventoryList.empty());
01092     for (stdair::InventoryList_T::const_iterator itInv = lInventoryList.begin()
01093 ;
01094         itInv != lInventoryList.end(); ++itInv) {
01095         const stdair::Inventory* lInventory_ptr = *itInv;
01096         assert (lInventory_ptr != NULL);
01097         const stdair::OnDDateList_T lOnDDateList =
01098             stdair::BomManager::getList<stdair::OnDDate> (*lInventory_ptr);
01099         assert (!lOnDDateList.empty());
01100         for (stdair::OnDDateList_T::const_iterator itOD = lOnDDateList.begin();
01101             itOD != lOnDDateList.end(); ++itOD) {
01102             stdair::OnDDate* lOnDDate_ptr = *itOD;
01103             assert (lOnDDate_ptr != NULL);
01104
01105             const stdair::Date_T& lDepartureDate = lOnDDate_ptr->getDate();
01106             stdair::DateOffset_T lDateOffset = lDepartureDate - lDate;
01107             stdair::DTD_T lDTD = short (lDateOffset.days());
01108
01109             stdair::DCPList_T::const_iterator itDCP =
01110                 std::find (stdair::DEFAULT_DCP_LIST.begin(), stdair::DEFAULT_DCP_LIST
01111 .end(), lDTD);
01112             // Check if the forecast for this O&D date needs to be projected.
01113             if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01114                 // Browse the demand info map.
01115                 const stdair::StringDemandStructMap_T& lStringDemandStructMap =
01116                     lOnDDate_ptr->getDemandInfoMap ();
01117                 for (stdair::StringDemandStructMap_T::const_iterator itStrDS =
01118                     lStringDemandStructMap.begin();
01119                     itStrDS != lStringDemandStructMap.end(); ++itStrDS) {
01120                     std::string lCabinClassPath = itStrDS->first;
01121                     const stdair::YieldDemandPair_T& lYieldDemandPair =
01122                         itStrDS->second;
01123                     const stdair::CabinClassPairList_T& lCabinClassPairList =
01124                         lOnDDate_ptr->getCabinClassPairList (lCabinClassPath);
01125                     const unsigned int lNbOfSegments = lOnDDate_ptr->getNbOfSegments();
01126                     // Sanity check
01127                     assert (lCabinClassPairList.size() == lNbOfSegments);
01128
01129                     const stdair::SegmentDateList_T lOnDSegmentDateList =
01130                         stdair::BomManager::getList<stdair::SegmentDate> (*lOnDDate_ptr);
01131                     // Sanity check
01132                     assert (lOnDSegmentDateList.size() == lNbOfSegments);
01133                     stdair::CabinClassPairList_T::const_iterator itCCP =
01134                         lCabinClassPairList.begin();
01135                     stdair::SegmentDateList_T::const_iterator itSD =
01136                         lOnDSegmentDateList.begin();
01137                     for (; itSD != lOnDSegmentDateList.end(); ++itCCP, ++itSD) {
01138                         const stdair::SegmentDate* lSegmentDate_ptr = *itSD;
01139                         const stdair::SegmentDate* lOperatingSegmentDate_ptr =
01140                             lSegmentDate_ptr->getOperatingSegmentDate ();
01141                         assert (lSegmentDate_ptr != NULL);
01142                         // Only operated legs receive the demand information.
01143                         if (lOperatingSegmentDate_ptr == NULL) {
01144                             const stdair::CabinCode_T lCabinCode = itCCP->first;

```

```

01140         const stdair::ClassCode_T lClassCode = itCCP->second;
01141         const stdair::SegmentCabin* lSegmentCabin_ptr =
01142             stdair::BomManager::getObjectPtr<stdair::SegmentCabin> (*
lSegmentDate_ptr,
01143 lCabinCode);
01144         assert (lSegmentCabin_ptr != NULL);
01145         // Retrieve the booking class (level of aggregation of demand).
01146         // The yield of the class is assigned to all types of demand
for it.
01147         const stdair::BookingClass* lBookingClass_ptr =
01148             stdair::BomManager::getObjectPtr<stdair::BookingClass> (*
lSegmentCabin_ptr,
01149 lClassCode);
01150         assert (lBookingClass_ptr != NULL);
01151         const stdair::LegCabinList_T lLegCabinList =
01152             stdair::BomManager::getList<stdair::LegCabin>
(*lSegmentCabin_ptr);
01153         assert (!lLegCabinList.empty());
01154         const int lNbOfLegs = lLegCabinList.size();
01155         // Determine the yield (equally distributed over legs).
01156         const stdair::Yield_T& lYield = lBookingClass_ptr->getYield()/
lNbOfLegs;
01157         const stdair::MeanStdDevPair_T& lMeanStdDevPair =
lYieldDemandPair.second;
01158         const stdair::MeanValue_T& lMeanValue = lMeanStdDevPair.first;
01159         const stdair::StdDevValue_T& lStdDevValue = lMeanStdDevPair.
second;
01160         for (stdair::LegCabinList_T::const_iterator itLC =
lLegCabinList.begin();
01161 itLC != lLegCabinList.end(); ++itLC) {
01162             stdair::LegCabin* lLegCabin_ptr = *itLC;
01163             assert (lLegCabin_ptr != NULL);
01164             lLegCabin_ptr->addDemandInformation (lYield, lMeanValue,
lStdDevValue);
01165         }
01166     }
01167 }
01168 }
01169 }
01170 }
01171 }
01172 }
01173 }
01174
01175 // //////////////////////////////////////
01176 void RMOL_Service::projectOnDDemandOnLegCabinsUsingYP (const
stdair::DateTime_T& iRMEventTime) {
01177
01178     if (_rmolServiceContext == NULL) {
01179         throw stdair::NonInitialisedServiceException ("The Rmol service "
"has not been initialised")
01180     };
01181 }
01182 assert (_rmolServiceContext != NULL);
01183 RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01184
01185 // Retrieve the bom root
01186 stdair::STDAIR_Service& lSTDAIR_Service =
lRMOL_ServiceContext.getSTDAIR_Service();
01187 stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01188
01189 // Retrieve the date from the RM event
01190 const stdair::Date_T lDate = iRMEventTime.date();
01191
01192 const stdair::InventoryList_T lInventoryList =
stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01193 assert (!lInventoryList.empty());
01194 for (stdair::InventoryList_T::const_iterator itInv = lInventoryList.begin()
01195
01196     itInv != lInventoryList.end(); ++itInv) {
01197         const stdair::Inventory* lInventory_ptr = *itInv;
01198         assert (lInventory_ptr != NULL);
01199         const stdair::OnDDateList_T lOnDDateList =
stdair::BomManager::getList<stdair::OnDDate> (*lInventory_ptr);
01200         assert (!lOnDDateList.empty());
01201         for (stdair::OnDDateList_T::const_iterator itOD = lOnDDateList.begin();
01202 itOD != lOnDDateList.end(); ++itOD) {
01203             stdair::OnDDate* lOnDDate_ptr = *itOD;
01204             assert (lOnDDate_ptr != NULL);
01205
01206             const stdair::Date_T& lDepartureDate = lOnDDate_ptr->getDate();
01207             stdair::DateOffset_T lDateOffset = lDepartureDate - lDate;
01208             stdair::DTD_T lDTD = short (lDateOffset.days());
01209
01210             stdair::DCPLIST_T::const_iterator itDCP =
std::find (stdair::DEFAULT_DCP_LIST.begin(), stdair::DEFAULT_DCP_LIST

```

```

        .end(), lDTD);
01214 // Check if the forecast for this O&D date needs to be projected.
01215 if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01216
01217     // Browse the demand info map.
01218     const stdair::StringDemandStructMap_T& lStringDemandStructMap =
01219         lOnDDate_ptr->getDemandInfoMap ();
01220     for (stdair::StringDemandStructMap_T::const_iterator itStrDS =
01221         lStringDemandStructMap.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 =
01237             lCabinClassPairList.begin();
01238         stdair::SegmentDateList_T::const_iterator itSD =
01239             lOnDSegmentDateList.begin();
01240         for (; itSD != lOnDSegmentDateList.end(); ++itCCP, ++itSD) {
01241             const stdair::SegmentDate* lSegmentDate_ptr = *itSD;
01242             assert (lSegmentDate_ptr != NULL);
01243             const stdair::SegmentDate* lOperatingSegmentDate_ptr =
01244                 lSegmentDate_ptr->getOperatingSegmentDate ();
01245             // Only operated legs receive the demand information.
01246             if (lOperatingSegmentDate_ptr == NULL) {
01247                 const stdair::CabinCode_T lCabinCode = itCCP->first;
01248                 const stdair::ClassCode_T lClassCode = itCCP->second;
01249                 const stdair::SegmentCabin* lSegmentCabin_ptr =
01250                     stdair::BomManager::getObjectPtr<stdair::SegmentCabin> (*
01251                         lSegmentDate_ptr,
01252                         lCabinCode);
01253                 assert (lSegmentCabin_ptr != NULL);
01254                 const stdair::LegCabinList_T lLegCabinList =
01255                     stdair::BomManager::getList<stdair::LegCabin>
01256                         (*lSegmentCabin_ptr);
01257                 assert (!lLegCabinList.empty());
01258                 const int lNbOfLegs = lLegCabinList.size();
01259                 // Determine the yield (equally distributed over segments and
01260                 then legs).
01261                 const stdair::MeanStdDevPair_T& lMeanStdDevPair =
01262                     lYieldDemandPair.second;
01263                 const stdair::Yield_T& lYield = lYieldDemandPair.first/(
01264                     lNbOfLegs*lNbOfSegments);
01265                 const stdair::MeanValue_T& lMeanValue = lMeanStdDevPair.first;
01266                 const stdair::StdDevValue_T& lStdDevValue = lMeanStdDevPair.
01267                     second;
01268                 for (stdair::LegCabinList_T::const_iterator itLC =
01269                     lLegCabinList.begin();
01270                     itLC != lLegCabinList.end(); ++itLC) {
01271                     stdair::LegCabin* lLegCabin_ptr = *itLC;
01272                     assert (lLegCabin_ptr != NULL);
01273                     lLegCabin_ptr->addDemandInformation (lYield, lMeanValue,
01274                         lStdDevValue);
01275                 }
01276             }
01277         }
01278     }
01279 }
01280
01281 ///////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
01282 void RMOL_Service::optimiseOnD (const stdair::DateTime_T& iRMEventTime) {
01283
01284     if (_rmolServiceContext == NULL) {
01285         throw stdair::NonInitialisedServiceException ("The Rmol service "
01286             "has not been initialised")
01287     ;
01288     }
01289     assert (_rmolServiceContext != NULL);
01290     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01291
01292     // Retrieve the bom root
01293     stdair::STDAIR_Service& lSTDAIR_Service =
01294         lRMOL_ServiceContext.getSTDAIR_Service();
01295     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();

```



```

01288
01289 // Retrieve the date from the RM event
01290 const stdair::Date_T lDate = iRMEventTime.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->
getDepartureDate();
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
.end(), 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_ptr->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
01344     for (stdair::InventoryList_T::const_iterator itInv = lInvList.begin();
01345          itInv != lInvList.end(); ++itInv) {
01346         stdair::Inventory* lCurrentInv_ptr = *itInv;
01347         assert (lCurrentInv_ptr != NULL);
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->
getDepartureDate();
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
.end(), lDTD);
01363             // Check if the operation is needed.
01364             if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01365                 updateBidPrice (*lCurrentFlightDate_ptr, lBomRoot);
01366             }
01367         }
01368     }

```

```

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 =
01380 lSegmentDateList.begin();
01381          itSegmentDate != lSegmentDateList.end(); ++itSegmentDate) {
01382         stdair::SegmentDate* lSegmentDate_ptr = *itSegmentDate;
01383         assert (lSegmentDate_ptr != NULL);
01384         if (stdair::BomManager::hasList<stdair::SegmentDate>(*lSegmentDate_ptr))
01385         {
01386             const stdair::LegDateList_T& lLegDateList =
01387                 stdair::BomManager::getList<stdair::LegDate>(*lSegmentDate_ptr);
01388             // Get the list of marketing carriers segments.
01389             // These are part of maketing partners inventories images held by the
01390             // operating airline.
01391             const stdair::SegmentDateList_T& lMktSegmentDateList =
01392                 stdair::BomManager::getList<stdair::SegmentDate>(*lSegmentDate_ptr);
01393             for (stdair::SegmentDateList_T::const_iterator itMktSD =
01394 lMktSegmentDateList.begin();
01395                  itMktSD != lMktSegmentDateList.end(); ++itMktSD) {
01396                 // Get the marketing airline code.
01397                 stdair::SegmentDate* lMktSD_ptr = *itMktSD;
01398                 assert (lMktSD_ptr != NULL);
01399                 stdair::FlightDate* lMktFD_ptr =
01400                     stdair::BomManager::getParentPtr<stdair::FlightDate>(*lMktSD_ptr);
01401                 assert (lMktFD_ptr != NULL);
01402                 const stdair::AirlineCode_T& lMktAC = lMktFD_ptr->getAirlineCode();
01403                 // Get the (real) marketer inventory.
01404                 const stdair::Inventory* lMktInv_ptr =
01405                     stdair::BomManager::getObjectPtr<stdair::Inventory>(iBomRoot, lMktAC
01406 );
01407                 assert (lMktInv_ptr != NULL);
01408                 // Get the image of the operating airline inventory held by the
01409                 // marketer.
01410                 const stdair::Inventory* lOptInv_ptr =
01411                     stdair::BomManager::getObjectPtr<stdair::Inventory>(*lMktInv_ptr,
01412 lOptAC);
01413                 assert (lOptInv_ptr != NULL);
01414                 // Find the image of the concerned flight date.
01415                 const stdair::FlightDate* lOptFD_ptr =
01416                     stdair::BomManager::getObjectPtr<stdair::FlightDate>(*lOptInv_ptr,
01417 lFDKeyStr);
01418                 assert (lOptFD_ptr != NULL);
01419                 // Browse the list of leg dates in the real operating inventory.
01420                 // Retrieve the image of each leg date.
01421                 for (stdair::LegDateList_T::const_iterator itLD = lLegDateList.begin(
01422 );
01423                      itLD != lLegDateList.end(); ++itLD) {
01424                     const stdair::LegDate* lLD_ptr = *itLD;
01425                     assert (lLD_ptr != NULL);
01426                     const std::string lLDKeyStr = lLD_ptr->describeKey();
01427                     stdair::LegDate* lOptLD_ptr =
01428                         stdair::BomManager::getObjectPtr<stdair::LegDate>(*lOptFD_ptr,
01429 lLDKeyStr);
01430                     assert (lOptLD_ptr != NULL);
01431                     const stdair::LegCabinList_T& lLegCabinList_T =
01432                         stdair::BomManager::getList<stdair::LegCabin>(*lLD_ptr);
01433                     // Browse the list of leg cabins in the real operating inventory.
01434                     // Retrieve the image of each leg cabin and update the bid price of
01435                     // the real and send it to the image.
01436                     for (stdair::LegCabinList_T::const_iterator itLC = lLegCabinList_T.
01437 begin();
01438                          itLC != lLegCabinList_T.end(); ++itLC) {
01439                         stdair::LegCabin* lLC_ptr = *itLC;
01440                         assert (lLC_ptr != NULL);
01441                         const std::string lLCKeyStr = lLC_ptr->describeKey();
01442                         stdair::LegCabin* lOptLC_ptr =
01443                             stdair::BomManager::getObjectPtr<stdair::LegCabin>(*lOptLD_ptr,
01444 lLCKeyStr);
01445                         assert (lOptLC_ptr != NULL);
01446                         // Update the current bid price of the real leg.
01447                         lLC_ptr->updateCurrentBidPrice();
01448                         // Update the previous bid price (store the current).
01449                         lOptLC_ptr->updatePreviousBidPrice();
01450                         // Update the current bid price.
01451                         lOptLC_ptr->setCurrentBidPrice (lLC_ptr->getCurrentBidPrice());
01452
01453                         STDAIR_LOG_DEBUG ("Update bid price of " << lLC_ptr->getFullerKey
01454 )

```

```

01441                                     << " : " << lOptLC_ptr->getCurrentBidPrice()
01442                                     << " Availability pool " << lLC_ptr->
    getAvailabilityPool());
01443     }
01444     }
01445     }
01446     }
01447     }
01448     }
01449
01450     ///////////////////////////////////////////////////////////////////
01451 void RMOL_Service::projectOnDDemandOnLegCabinsUsingDA(const
stdair::Date_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
.end(), lDTD);
01489             // Check if the forecast for this O&D date needs to be projected.
01490             if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01491
01492                 // Browse the demand info map.
01493                 const stdair::StringDemandStructMap_T& lStringDemandStructMap =
01494                     lOnDDate_ptr->getDemandInfoMap ();
01495                 for (stdair::StringDemandStructMap_T::const_iterator itStrDS =
lStringDemandStructMap.begin();
01496                     itStrDS != lStringDemandStructMap.end(); ++itStrDS) {
01497                     std::string lCabinClassPath = itStrDS->first;
01498                     const stdair::YieldDemandPair_T& lYieldDemandPair = itStrDS->second
;
01499                     const stdair::CabinClassPairList_T& lCabinClassPairList =
01500                         lOnDDate_ptr->getCabinClassPairList (lCabinClassPath);
01501                     const unsigned int lNbOfSegments = lOnDDate_ptr->getNbOfSegments();
01502                     // Sanity check
01503                     assert (lCabinClassPairList.size() == lNbOfSegments);
01504
01505                     //
01506                     const stdair::SegmentDateList_T lOnDSegmentDateList =
01507                         stdair::BomManager::getList<stdair::SegmentDate> (*lOnDDate_ptr);
01508                     // Sanity check
01509                     assert (lOnDSegmentDateList.size() == lNbOfSegments);
01510                     stdair::CabinClassPairList_T::const_iterator itCCP =
lCabinClassPairList.begin();
01511                     stdair::SegmentDateList_T::const_iterator itSD =
lOnDSegmentDateList.begin();
01512                     // List of bid prices that will be used to easily compute
displacement-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
information).
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 =
01523         lSegmentDate_ptr->getOperatingSegmentDate ();
01524         if (lOperatingSegmentDate_ptr != NULL) {
01525             lSegmentDate_ptr = lOperatingSegmentDate_ptr;
01526         }
01527         const stdair::CabinCode_T lCabinCode = itCCP->first;
01528         const stdair::SegmentCabin* lSegmentCabin_ptr =
01529         stdair::BomManager::getObjectPtr<stdair::SegmentCabin> (*
lSegmentDate_ptr,
01530 lCabinCode);
01531         assert (lSegmentCabin_ptr != NULL);
01532         stdair::BidPrice_T lBidPrice = 0;
01533         const stdair::LegCabinList_T lLegCabinList =
01534         stdair::BomManager::getList<stdair::LegCabin>
(*lSegmentCabin_ptr);
01535         for (stdair::LegCabinList_T::const_iterator itLC = lLegCabinList.
begin();
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
01546     itCCP = lCabinClassPairList.begin();
01547     itSD = lOnDSegmentDateList.begin();
01548     std::list<stdair::BidPrice_T>::const_iterator itBP = lBidPriceList.
begin();
01549     for (; itSD != lOnDSegmentDateList.end(); ++itCCP, ++itSD, ++itBP)
{
01550         stdair::BidPrice_T lBidPrice = *itBP;
01551         stdair::BidPrice_T lComplementaryBidPrice = lTotalBidPrice -
lBidPrice;
01552         const stdair::SegmentDate* lSegmentDate_ptr = *itSD;
01553         assert (lSegmentDate_ptr != NULL);
01554         const stdair::SegmentDate* lOperatingSegmentDate_ptr =
01555         lSegmentDate_ptr->getOperatingSegmentDate ();
01556         // Only operated legs receive the demand information.
01557         if (lOperatingSegmentDate_ptr == NULL) {
01558             const stdair::CabinCode_T lCabinCode = itCCP->first;
01559             const stdair::ClassCode_T lClassCode = itCCP->second;
01560             const stdair::SegmentCabin* lSegmentCabin_ptr =
01561             stdair::BomManager::getObjectPtr<stdair::SegmentCabin> (*
lSegmentDate_ptr,
01562 lCabinCode);
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
01573             stdair::Yield_T lYield = lDAYield;
01574             // In order to be protected against important variations of
partners' bid price,
01575             // the displacement adjusted yield is noy allowed to get out of
a certain range.
01576             // This range is here chosen to be from 80% to 100% of the
(static rule) prorated yield.
01577             /*
01578             const int lNbOfLegs = lLegCabinList.size();
01579             const stdair::Yield_T& lStaticProrationYield =
01580             lDemandStruct.getYield() / (lNbOfLegs*lNbOfSegments);
01581             if (lDAYield < 0.8*lStaticProrationYield){
01582                 lYield = 0.8*lStaticProrationYield;
01583             }
01584             if (lDAYield > lStaticProrationYield) {
01585                 lYield = lStaticProrationYield;
01586             }
01587             */

```

```

01588         const stdair::MeanStdDevPair_T& lMeanStdDevPair =
01589             lYieldDemandPair.second;
01590         const stdair::MeanValue_T& lMeanValue = lMeanStdDevPair.first;
01591         const stdair::StdDevValue_T& lStdDevValue = lMeanStdDevPair.
second;
01592         for (stdair::LegCabinList_T::const_iterator itLC =
lLegCabinList.begin();
01593             itLC != lLegCabinList.end(); ++itLC) {
01594             stdair::LegCabin* lLegCabin_ptr = *itLC;
01595             assert (lLegCabin_ptr != NULL);
01596             lLegCabin_ptr->addDemandInformation (lYield, lMeanValue,
lStdDevValue);
01597         }
01598     }
01599 }
01600 }
01601 }
01602 }
01603 }
01604 }
01605
01606 // //////////////////////////////////////
01607 void RMOL_Service::projectOnDDemandOnLegCabinsUsingDYP (const
stdair::DateTime_T& iRMEventTime) {
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
01616     stdair::STDAIR_Service& lSTDAIR_Service =
lRMOL_ServiceContext.getSTDAIR_Service();
01617     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01618
01619     const stdair::InventoryList_T lInventoryList =
stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01620     assert (!lInventoryList.empty());
01621     for (stdair::InventoryList_T::const_iterator itInv = lInventoryList.begin()
;
01622         itInv != lInventoryList.end(); ++itInv) {
01623         const stdair::Inventory* lInventory_ptr = *itInv;
01624         assert (lInventory_ptr != NULL);
01625         projectOnDDemandOnLegCabinsUsingDYP (iRMEventTime, *lInventory_ptr);
01626     }
01627 }
01628
01629 // //////////////////////////////////////
01630 void RMOL_Service::projectOnDDemandOnLegCabinsUsingDYP (const
stdair::DateTime_T& iRMEventTime,
const
stdair::Inventory& iInventory) {
01631
01632     const stdair::OnDDateList_T lOnDDateList =
stdair::BomManager::getList<stdair::OnDDate> (iInventory);
01633     assert (!lOnDDateList.empty());
01634     for (stdair::OnDDateList_T::const_iterator itOD = lOnDDateList.begin();
01635         itOD != lOnDDateList.end(); ++itOD) {
01636         stdair::OnDDate* lOnDDate_ptr = *itOD;
01637         assert (lOnDDate_ptr != NULL);
01638
01639         // Retrieve the date from the RM event
01640         const stdair::Date_T lDate = iRMEventTime.date();
01641
01642         const stdair::Date_T& lDepartureDate = lOnDDate_ptr->getDate();
01643         stdair::DateOffset_T lDateOffset = lDepartureDate - lDate;
01644         stdair::DTD_T lDTD = short (lDateOffset.days());
01645
01646         stdair::DCPLIST_T::const_iterator itDCP =
std::find (stdair::DEFAULT_DCP_LIST.begin(), stdair::DEFAULT_DCP_LIST.
end(), lDTD);
01647         // Check if the forecast for this O&D date needs to be projected.
01648         if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01649
01650             // Browse the demand info map.
01651             const stdair::StringDemandStructMap_T& lStringDemandStructMap =
lOnDDate_ptr->getDemandInfoMap ();
01652             for (stdair::StringDemandStructMap_T::const_iterator itStrDS =
lStringDemandStructMap.begin();
01653                 itStrDS != lStringDemandStructMap.end(); ++itStrDS) {
01654                 std::string lCabinClassPath = itStrDS->first;
01655                 const stdair::YieldDemandPair_T& lYieldDemandPair = itStrDS->second;
01656                 const stdair::CabinClassPairList_T& lCabinClassPairList =
lOnDDate_ptr->getCabinClassPairList (lCabinClassPath);

```

```

01665         const unsigned int lNbOfSegments = lOnDDate_ptr->getNbOfSegments();
01666         // Sanity check
01667         assert (lCabinClassPairList.size() == lNbOfSegments);
01668         //
01669         const stdair::SegmentDateList_T lOnDSegmentDateList =
01670             stdair::BomManager::getList<stdair::SegmentDate> (*lOnDDate_ptr);
01671         // Sanity check
01672         assert (lOnDSegmentDateList.size() == lNbOfSegments);
01673         stdair::CabinClassPairList_T::const_iterator itCCP =
01674             lCabinClassPairList.begin();
01675         stdair::SegmentDateList_T::const_iterator itSD = lOnDSegmentDateList.
01676             begin();
01677         // The sum of bid prices of all cabins.
01678         stdair::BidPrice_T lTotalBidPrice = 0;
01679         for (; itSD != lOnDSegmentDateList.end(); ++itCCP, ++itSD) {
01680             // Get the operating segment cabin (it holds the bid price
01681             information).
01682             const stdair::SegmentDate* lSegmentDate_ptr = *itSD;
01683             assert (lSegmentDate_ptr != NULL);
01684             // Get the operating airline code and check if it is the airline we
01685             are looking for.
01686             const stdair::SegmentDate* lOperatingSegmentDate_ptr =
01687                 lSegmentDate_ptr->getOperatingSegmentDate ();
01688             if (lOperatingSegmentDate_ptr != NULL) {
01689                 lSegmentDate_ptr = lOperatingSegmentDate_ptr;
01690             }
01691             const stdair::CabinCode_T lCabinCode = itCCP->first;
01692             const stdair::SegmentCabin* lSegmentCabin_ptr =
01693                 stdair::BomManager::getObjectPtr<stdair::SegmentCabin> (*
01694                 lSegmentDate_ptr,
01695                 lCabinCode);
01696             assert (lSegmentCabin_ptr != NULL);
01697             const stdair::LegCabinList_T lLegCabinList =
01698                 stdair::BomManager::getList<stdair::LegCabin>(*lSegmentCabin_ptr)
01699             ;
01700             for (stdair::LegCabinList_T::const_iterator itLC = lLegCabinList.
01701                 begin();
01702                 itLC != lLegCabinList.end(); ++itLC) {
01703                 const stdair::LegCabin* lLegCabin_ptr = *itLC;
01704                 assert (lLegCabin_ptr != NULL);
01705                 lTotalBidPrice += lLegCabin_ptr->getCurrentBidPrice();
01706             }
01707         }
01708         itCCP = lCabinClassPairList.begin();
01709         itSD = lOnDSegmentDateList.begin();
01710         for (; itSD != lOnDSegmentDateList.end(); ++itCCP, ++itSD) {
01711             const stdair::SegmentDate* lSegmentDate_ptr = *itSD;
01712             assert (lSegmentDate_ptr != NULL);
01713             const stdair::SegmentDate* lOperatingSegmentDate_ptr =
01714                 lSegmentDate_ptr->getOperatingSegmentDate ();
01715             // Only operated legs receive the demand information.
01716             if (lOperatingSegmentDate_ptr == NULL) {
01717                 const stdair::CabinCode_T lCabinCode = itCCP->first;
01718                 const stdair::ClassCode_T lClassCode = itCCP->second;
01719                 const stdair::SegmentCabin* lSegmentCabin_ptr =
01720                     stdair::BomManager::getObjectPtr<stdair::SegmentCabin> (*
01721                     lSegmentDate_ptr,
01722                     lCabinCode);
01723                 assert (lSegmentCabin_ptr != NULL);
01724                 const stdair::LegCabinList_T lLegCabinList =
01725                     stdair::BomManager::getList<stdair::LegCabin>
01726                     (*lSegmentCabin_ptr);
01727                 assert (!lLegCabinList.empty());
01728                 const stdair::Yield_T& lYield = lYieldDemandPair.first;
01729                 const stdair::MeanStdDevPair_T& lMeanStdDevPair =
01730                     lYieldDemandPair.second;
01731                 const stdair::MeanValue_T& lMeanValue = lMeanStdDevPair.first;
01732                 const stdair::StdDevValue_T& lStdDevValue = lMeanStdDevPair.
01733                 second;
01734                 for (stdair::LegCabinList_T::const_iterator itLC = lLegCabinList.
01735                     begin();
01736                     itLC != lLegCabinList.end(); ++itLC) {
01737                     stdair::LegCabin* lLegCabin_ptr = *itLC;
01738                     assert (lLegCabin_ptr != NULL);
01739                     const stdair::BidPrice_T& lBidPrice = lLegCabin_ptr->
01740                     getCurrentBidPrice();
01741                     const stdair::RealNumber_T lDynamicYieldProrationFactor =
01742                     lBidPrice / lTotalBidPrice;
01743                     const stdair::Yield_T lProratedYield =
01744                     lDynamicYieldProrationFactor*lYield;
01745                     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 << "
Prorated yield " << lProratedYield
01739         //                                     << " Mean demand " << lMeanValue << "
StdDev " << lStdDevValue);
01740     }
01741 }
01742 }
01743 }
01744 }
01745 }
01746 }
01747
01748 // //////////////////////////////////////
01749 void RMOL_Service::optimiseOnDUsingRMCooperation (const stdair::DateTime_T&
iRMEventTime) {
01750
01751     if (_rmolServiceContext == NULL) {
01752         throw stdair::NonInitialisedServiceException ("The Rmol service "
01753             "has not been initialised")
;
01754     }
01755     assert (_rmolServiceContext != NULL);
01756     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01757
01758     // Retrieve the bom root
01759     stdair::STDAIR_Service& lSTDAIR_Service =
01760         lRMOL_ServiceContext.getSTDAIR_Service();
01761     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01762
01763     // Retrieve the date from the RM event
01764     const stdair::Date_T lDate = iRMEventTime.date();
01765
01766     // Browse the list of inventories and optimise within each one
independently.
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
number 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
->getDepartureDate();
01789                 stdair::DateOffset_T lDateOffset = lCurrentDepartureDate - lDate;
01790                 stdair::DTD_T lDTD = short (lDateOffset.days());
01791
01792                 stdair::DCPLList_T::const_iterator itDCP =
01793                     std::find (stdair::DEFAULT_DCP_LIST.begin(),
stdair::DEFAULT_DCP_LIST.end(), lDTD);
01794                 // Check if the optimisation is needed.
01795                 if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01796                     const double lBPVariation = Optimiser::optimiseUsingOnDForecast (*
lCurrentFlightDate_ptr);
01797                     lMaxBPVariation = std::max(lMaxBPVariation, lBPVariation);
01798                 }
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 void RMOL_Service::optimiseOnDUsingAdvancedRMCooperation (const

```

```

stdair::DateTime_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
    number of iterations is reached.
01829     // Every iteration corresponds to the optimisation of the whole network.
    Bid prices are communicated
    // 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(),
stdair::DEFAULT_DCP_LIST.end(), lDTD);
01855                 if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01856                     const double lBPVariation = Optimiser::optimiseUsingOnDForecast (*
lCurrentFlightDate_ptr);
01857                     lMaxBPVariation = std::max(lMaxBPVariation, lBPVariation);
01858                 }
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
00018 namespace stdair {
00019     class STDAIR_Service;
00020     class LegCabin;
00021 }
00022
00023 namespace RMOL {
00024
00025     class RMOL_ServiceContext : public stdair::ServiceAbstract {
00026     public:
00027         friend class RMOL_Service;
00028         friend class FacRmolServiceContext;
00029
00030     private:
00031         // ////////////////////////////////// Getters //////////////////////////////////
00032         stdair::STDAIR_ServicePtr_T getSTDAIR_ServicePtr() const {
00033             return _stdairService;
00034         }
00035
00036         stdair::STDAIR_Service& getSTDAIR_Service() const;
00037
00038         const bool getOwnStdairServiceFlag() const {
00039             return _ownStdairService;
00040         }
00041
00042     private:
00043         // ////////////////////////////////// Setters //////////////////////////////////
00044         void setSTDAIR_Service (stdair::STDAIR_ServicePtr_T ioSTDAIR_ServicePtr,
00045                                 const bool iOwnStdairService) {
00046             _stdairService = ioSTDAIR_ServicePtr;
00047             _ownStdairService = iOwnStdairService;
00048         }
00049
00050         void reset();
00051
00052     private:
00053         // ////////////////////////////////// Display Methods //////////////////////////////////
00054         const std::string shortDisplay() const;
00055
00056         const std::string display() const;
00057
00058         const std::string describe() const;
00059
00060     private:
00061         // ////////////////////////////////// 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
00035 struct UnitTestConfig {
00037     UnitTestConfig() {
00038         boost_utf::unit_test_log.set_stream (utfReportStream);
00039         boost_utf::unit_test_log.set_format (boost_utf::XML);
00040         boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
00041         //boost_utf::unit_test_log.set_threshold_level
00042         (boost_utf::log_successful_tests);
00043     }
00044
00045     ~UnitTestConfig() {
00046     }
00047 };
00048
00049 namespace RMOL {
00050
00052     struct BookingClassData {
00053
00054         // Attributes
00055         double _bookingCount;
00056         double _fare;
00057         double _sellupFactor;
00058         bool _censorshipFlag;
00059
00060         // Constructor
00061         BookingClassData (const double iBookingCount, const double iFare,
00062             const double iSellupFactor, const bool iCensorshipFlag)
00063             : _bookingCount (iBookingCount), _fare (iFare),
00064             _sellupFactor (iSellupFactor), _censorshipFlag (iCensorshipFlag) {
00065         }
00066
00067         // Getters
00068         double getFare () const {
00069             return _fare;
00070         }
00071
00071

```

```

00072     bool getCensorshipFlag () const {
00073         return _censorshipFlag;
00074     }
00075
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 //         return lQEqBooking;
00201 //     }
00202 //
00203 //     /* Calculate Q-equivalent demand
00204 //         [<- performed by unconstrainer if necessary (Using ExpMax BOM)]
00205 //     */
00206 //
00207 //
00208 //     // 3. Partition to each class
00209 //
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 BCDDataSet
00244     RMOL::BookingClassDataSet lBookingClassDataSet;
00245
00246

```

```

00252 // Register BookingClassData
00253 RMOL::BookingClassData QClassData (10, 100, 1, false);
00254 RMOL::BookingClassData MClassData (5, 150, 0.8, true);
00255 RMOL::BookingClassData BClassData (0, 200, 0.6, false);
00256 RMOL::BookingClassData YClassData (0, 300, 0.3, false);
00257
00258 // Display
00259 STDAIR_LOG_DEBUG (QClassData.toString());
00260 STDAIR_LOG_DEBUG (MClassData.toString());
00261 STDAIR_LOG_DEBUG (BClassData.toString());
00262 STDAIR_LOG_DEBUG (YClassData.toString());
00263
00264 // Add BookingClassData into the BCDataSet
00265 lBookingClassDataSet.addBookingClassData (QClassData);
00266 lBookingClassDataSet.addBookingClassData (MClassData);
00267 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
00035 struct UnitTestConfig {

```

```

00037  UnitTestConfig() {
00038      boost_utf::unit_test_log.set_stream (utfReportStream);
00039      boost_utf::unit_test_log.set_format (boost_utf::XML);
00040      boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
00041      //boost_utf::unit_test_log.set_threshold_level
00042      (boost_utf::log_successful_tests);
00043  }
00044  ~UnitTestConfig() {
00045  }
00046  };
00047
00048
00049
00050 // ////////////////////////////////// Main: Unit Test Suite //////////////////////////////////
00051
00052 // Set the UTF configuration (re-direct the output to a specific file)
00053 BOOST_GLOBAL_FIXTURE (UnitTestConfig);
00054
00055 BOOST_AUTO_TEST_SUITE (master_test_suite)
00056
00057
00058 BOOST_AUTO_TEST_CASE (rmol_forecaster_q_forecasting) {
00059     const bool lTestFlag = true; //testForecasterHelper(0);
00060     BOOST_CHECK_EQUAL (lTestFlag, true);
00061     BOOST_CHECK_MESSAGE (lTestFlag == true,
00062         "The test has failed. Please see the log file for "
00063         "<< \"more details\"");
00064 }
00065
00066 // End the test suite
00067 BOOST_AUTO_TEST_SUITE_END ()
00068
00069
00070

```

## 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
00012     void testQForecaster();
00013
00014     ForecasterTestSuite ();
00015
00016 protected:
00017     std::stringstream _describeKey;
00018 };

```

```

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 {
00036     UnitTestConfig() {
00037         boost_utf::unit_test_log.set_stream (utfReportStream);
00038         boost_utf::unit_test_log.set_format (boost_utf::XML);
00039         boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
00040         //boost_utf::unit_test_log.set_threshold_level
00041         (boost_utf::log_successful_tests);
00042     }
00044     ~UnitTestConfig() {
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 whether 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
00036         (boost_utf::log_successful_tests);
00037     }
00038
00039     ~UnitTestConfig() {
00040     }
00041 };
00042
00043 // ////////////////////////////////// Main: Unit Test Suite //////////////////////////////////
00044 // Set the UTF configuration (re-direct the output to a specific file)
00045 BOOST_GLOBAL_FIXTURE (UnitTestConfig);
00046 BOOST_AUTO_TEST_SUITE (master_test_suite)
00047
00048 BOOST_AUTO_TEST_CASE (rmol_unconstraining_em) {
00049     const bool lTestFlag = true; // testUnconstrainerHelper(0);
00050     BOOST_CHECK_EQUAL (lTestFlag, true);
00051     BOOST_CHECK_MESSAGE (lTestFlag == true,
00052         "The test has failed. Please see the log file for "
00053         "<< \"more details\"");
00054 }
00055
00056 // End the test suite
00057 BOOST_AUTO_TEST_SUITE_END()
00058
00059
00060

```

## 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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