AIMMS 4

Portable component

Linux Intel version

Release Notes for Linux

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Contents

Chapter 1

System Overview of the Intel Linux AIMMS Component

This chapter discusses the system requirements necessary to run the portable Intel Linux AIMMS component. The chapter also contains a feature comparison with the regular Windows version of AIMMS.

System overview

1.1 Hardware and operating system requirements

The following list of hardware and software requirements applies to the portable Intel x64 Linux AIMMS 4 component release.

Hardware requirements Linux x64

- Intel x64 compatible system
- Centos 6, Red Hat 6, or Ubuntu 12.04 Linux operating system
- 1 Gb RAM
- 1 Gb free disk space

Note, however, that performance depends on model size and type and can vary. It can also be affected by the number of other applications that are running concurrently with AIMMS. In cases of a (regular) performance drop of either AIMMS or other applications you are advised to install sufficiently additional RAM.

Performance

1.2 Feature comparison with the Win32/Win64 version

The portable component version of AIMMS is a component version, i.e.

Component version

- it does not have an end-user GUI, and
- it cannot be used for model development.

The main purpose of the portable component version is to provide a portable platform for the deployment of AIMMS-based optimization components created using the AIMMS IDE.

Supported platforms

For AIMMS 4 the portable component version is supported on the Intel Linux operating system. Please contact AIMMS if you would like to have the portable component available on a specific 64-bit Linux/Unix operating system.

Feature comparison

In principle, the execution engine of the portable component version of AIMMS is functionally equivalent to the execution engine of the Windows version, with the exception of the following features:

- Database linkage is through ODBC only, and only to databases for which a Linux ODBC driver is available. To use ODBC and install ODBC data sources on the Linux platform, UnixODBC should be installed on the computer.
- Currently the Intel Linux version supports all solvers offered by AIMMS, with the exception of BARON.
- No support for Proxy/Stub solver approach.
- No support for reading Excel data.

External DLLs

External DLLs called from within the model under the Windows version of AIMMS must be recompiled using the GCC compiler, using the `-fPIC` compiler flag, into a Linux shared library.

Deployment of AIMMS*-based components*

AIMMS-based components can only be deployed through

- the in-process AIMMS C/C++ API,
- the out-of-process AIMMS SDK for Java/C/C++/.Net, or
- the commandline tool provided with the portable component. The commandline tool is discussed in more detail in Section 2.5.

Linking against the AIMMS *API*

You can link your program against the AIMMS API by adding the following linker flags to the link command of your program:

```
-L/usr/local/Aimms/Lib -laimms
```

Chapter 2

Installation and Usage

Installation and usage

This chapter discusses all relevant issues related to the installation, licensing and usage of AIMMS portable component version, either through the AIMMS API, or using the commandline tool.

2.1 Installation instructions

Installing the component version - as .run file

The Linux Intel x64 portable component version is provided as a .run file (Aimms-4.x.y.<buildnr>installer.run), which can be downloaded from the download page. To install, you do not need administrator rights and simply have to execute the file:

./aimms-4.x.y.z-installer.run (for example)

Please make sure the file has the execution bit set, by using the following command:

```
chmod a+rx ./aimms-4.x.y.z-installer.run
```

By default, AIMMS will be installed to $HOME/.Aimms/<aimms-version>. If you have a $HOME/bin folder it wil also create a symbolic link there to point to the newly installed aimms version.
Alternatively, you can also just extract it at any location you like by issuing the following command:

```
./aimms-4.x.y.z-installer.run --noexec --target
/home/my_own_preferred_location/aimms/4.x.y.z
```

There are more options to use, see the commandline descriptions:

./aimms-4.x.y.z-installer.run --help and ./aimms-4.x.y.z-installer.run

Installing the component version - as RPM file

The Linux Intel x64 portable component version is also provided as an RPM file `Aimms-4.x.y-<buildnr>.x86_64.rpm`, which can be downloaded from the same download page. To install, use the `rpm` program, or any other system administration tool you use to install RPM files. All AIMMS components will be installed in the `/usr/local/Aimms` directory.

Advantages of .run over RPM

Using the .run distribution files offers two advantages over using a .rpm file:

- You do not need administrator rights, and
- You can have multiple versions of the AIMMS version installed simultaneously

2.2 Solver availability per platform

Solvers in installation

In Table 2.1 you can find an overview of the solvers that are installed during an AIMMS installation on the several platforms on which AIMMS is supported. Note that it depends on your license whether you can use these solvers.

SSE2

Please note that the following solvers require a computer with a CPU that supports the SSE2 instruction set: CPLEX, CPOptimizer, GUROBI and ODH-CPLEX.

Open Source Solvers

CBC and IPOPT are open source solvers made available in the AIMMS distributable as solver DLL and through COIN-OR (www.coin-or.org) as solver DLL and in source code format. Please check the 'OS Solvers' section in the License Agreement before using these open source solvers with AIMMS.

2.3 Licensing

License types

The AIMMS portable component currently supports nodelocked and network licenses. To activate a nodelocked AIMMS license, you need

- an AIMMS license number, and
- a corresponding activation code.

You will receive this information when purchasing a nodelocked AIMMS license.

The NodelockTool

The `NodelockTool` program located in `/usr/local/Aimms/Bin` offers you the functionality to activate and deactivate licenses both online and offline, and to get an overview of the current licenses installed on a server. Simply type

```
NodelockTool
```

to get an overview of the various arguments that the tool accepts.

Solver	Version	Win 64 VS2017	Win 64 VS2013	Linux 64	Win 32
AOA		√	√	√	√
BARON	15	√	√	-	√
CBC	2.9	√	√	√	√
CONOPT	3.14 V	√	√	√	√
	4.0	√	√	√	√
CPLEX	12.6	√	√	√	√
	12.6.3	√	√	√	√
	12.7	√	√	√	-
	12.7.1	√	√	√	-
	12.8	√	√	√	-
CPOptimizer	12.6	-	√	√	√
	12.6.3	-	√	√	√
	12.7	-	√	√	-
	12.8	√	-	√	-
GUROBI	7.0	√	√	√	√
	7.5	√	√	√	√
	8.0	√	√	√	-
	8.1	√	√	√	-
IPOPT	3.11	√	√	√	√
Knitro	9.1	√	√	√	√
	10.3	√	√	√	√
	11.0	√	√	√	√
MINOS		√	√	√	√
ODH-CPLEX	3.2	-	√	√	-
ODH-CPLEX	4.0	√	-	√	-
PATH	4.7	√	√	√	√
SNOPT	6.1	√	√	√	√
	7.2	√	√	√	√
XA	15	√	√	√	√
	16	√	√	√	√

Table 2.1: Solvers included in the several types of AIMMS installations

Root access

The folders `Config`, `Licenses` and `Nodelocks` are located in the default AIMMS directory `/usr/local/Aimms`. It requires root access to make changes to files in this folder. The option *--aimms-root-path* in combination with the NodelockTool allows you to install an AIMMS license in a different folder, that does not require root access. However, it requires that the directories `Config`, `Licenses` and `Nodelocks` are present in the directory that is given as argument. If this option is used when the license is activated, it must also be used when AIMMS is started via the AIMMS command line tool or API, otherwise AIMMS will fail to start.

Activating a license online

If the computer on which you want to activate a license has an internet connection, the most convenient way to activate it is via online activation.

- By running the command

  `NodelockTool --activate` *lic. number* `--activation-code` *activation-code*

the nodelock tool will contact the AIMMS internet license server and try to activate the license directly.

If successful, the license will be made the (single) active license that will be used when AIMMS is started. In case of failure, the tool will print the error message returned either by the tool itself (in case of a connection failure) or the server (in case of a licensing error). Through the `--proxy`, `--proxy-user` and `--proxy-passwd` options you can specify any proxy settings you may need to connect to the AIMMS internet license server.

Activating a license offline

If the computer on which you want to activate a license has no internet connection, offline activation allows you to activate the license by generating a request file, performing the actual activation on our website, and finishing the activation with the response file returned by the previous step.

- By running the command

  `NodelockTool --activate` *lic. number* `--type request --activation-code` *activation-code*

  an activation request file will be created in the directory from which you run the program.
- To obtain a nodelock corresponding to the license, go to the web page

  http://www.aimms.com/services/license-requests/.

  where you can have the activation request processed by uploading the request file. As a result you will receive a response file corresponding to the request file.
- To complete the activation sequence enter the command

  `NodelockTool --activate` *license-number* `--type response`

  in the directory where the response file is located.

Network licenses

It is also possible to use a network license under Linux. You can add a network license to your current licenses by running the command

`NodelockTool --network` *license-server[:port]*

This will write the network license to your `licenses.cfg` file. It is also possible to *add* licenses to your `licenses.cfg` file. To do so, you must add the argument `--add` to the command line above.

License and configuration files

As part of the activation sequence, the `NodelockTool` will also install all necessary license files and configuration files associated with your license. All license related files will be located in the `Nodelocks`, `Licenses` and `AnyUser` subdirectories under the `/usr/local/Aimms` directory (the `NodelockTool` will also display the directory after a successful activation action). As AIMMS keeps track of the exact location of a nodelock file, you are advised not to copy, move, or replace the nodelock file yourself, as this may invalidate your AIMMS license.

Transferring a license

AIMMS allows you to transfer your AIMMS license to another computer up to three times per 365 days. You can transfer a license by deactivating it on the old machine, and activating it on the new machine. The deactivation step will fail if you have transferred the license more than three times in the last year. In that case it is extremely important to complete the deactivation sequence, in order to restore your original nodelock.

Deactivating a license online

To deactivate an active nodelocked license via online deactivation

- Run the command

  `NodelockTool --deactivate` *license-number*

If successful, the license will be deactivated directly, and the current license configuration will be removed from the computer. In case of failure, the tool will print the error message returned either by the tool itself (in case of a connection failure) or the server (in case of a licensing error). You may have to specify `--proxy`, `--proxy-user` and `--proxy-passwd` options to configure the use of a proxy server needed to contact the AIMMS internet license server.

Deactivating a license offline

To deactivate an active nodelocked license

- Run the command

  `NodelockTool --deactivate` *license-number* `--type request`

  which will create a deactivation request file in the directory from which you run the program.
- To change the status in our internet license database, go to the web page

  http://aimms.com/english/developers/licensing/maintenance/processing-request-files/.

  where you can have the deactivation request processed by uploading the request file. As a result you will receive a response file corresponding to the request file.
- To complete the deactivation sequence (or to restore the nodelock file in case of an error) enter the command

  `NodelockTool --deactivate` *license-number* `--type response`

  in the directory where the response file is located.

2.4 Usage of the portable component

Usage

The portable component is designed to work directly with AIMMS projects that have been created with the Windows AIMMS IDE. This means that you can continue to use the same API calls to start and run an AIMMS project and that you can continue to work with cases and datasets created with the Windows version of AIMMS, as well as the Windows version of your project itself.

Running the project

You can copy the project folder from your Windows machine to the Linux machine. You should then be able to run the project using the AIMMS command line tool that comes with the portable component. The command line tool is explained in full detail in the next section.

Beware of case in file and directory names

You should be aware that, other than Microsoft Windows, the Linux/Unix platform is case sensitive with respect to the names of files and directories. If your model refers to explicit file names, or if your model uses external DLLs, you should take care the case of these files and the directories in which they are contained, precisely match the case of the names used in the model.

External DLLs

External functions should be implemented as functions in shared libraries on the Linux platform. For AIMMS to be able to load these shared libraries, you should make sure that the environment variable `LD_LIBRARY_PATH` contains the path where the shared library to be loaded is located, and that this environment variables is exported prior to starting AIMMS.

2.5 The AIMMS command line tool

AIMMS command line tool

Next to accessing AIMMS from within your own programs through the AIMMS API, the AIMMS portable component also supports a commandline tool through which you can control an AIMMS project externally. The `AimmsCmd` program is located in `/usr/local/Aimms/Bin`. You can start the AIMMS command line tool by running

`AimmsCmd` *project-path*

In case you have specified a non-default root path when you activated your license (as described at the NodelockTool, see section 2.3), you should also specify this location via the *--aimms-root-path* command line option when starting the AIMMS command line tool, otherwise AIMMS will fail to start.

Commands

The AIMMS command line tool offers commands to

- assign values to sets, and to scalar and multidimensional identifier slices,
- display the contents of sets, and the values of scalar and multidimensional identifier slices,
- empty sets or multidimensional identifier slices,
- retrieve the cardinality of sets or multidimensional identifier slices,
- run procedures,
- execute system commands, and
- close the AIMMS project and quit the program.

Each command is terminated by a semicolon.

Assignments

You can assign value to sets and multidimensional identifiers and slices thereof through one of the commands

```
Let reference := data-expression ;
Let reference += data-expression ;
```

where the := operator refers to completely replacing the contents of *reference* and the += operator refers to a merge operation.

References

A *reference* in an assignment is either

- an identifier name such as "Transport", or
- a reference to an identifier slice such as

  ```
  Transport('Amsterdam',j)
  ```

  where each sliced dimension must refer to a quoted set element.

Data expressions

The *data expressions* allowed in an assignment are

- a set expression preceded by the keyword Set as in

  ```
  Set {'Amsterdam', 'Rotterdam'}
  ```

  where all set elements must be quoted,
- a ranged integer set preceded by the keyword Set as in

  ```
  Set {1 .. 10}
  ```

- a scalar numeric, element or string value as in

  ```
  10
  11.7
  'an element'
  "a string"
  ```

- a tuple list of numeric, element or string values preceded by the keyword List as in

```
List {('Amsterdam','Paris') :  10, ('Paris','London') :  20}
```

- a dense multidimensional array of numeric, element or string values preceded by the keyword Array as in

```
Array [[1,2],[3,4],[5,6]]
```

Value display

You can request AIMMS to display the contents of sets and multidimensional identifier slices in your model through the command

```
Display reference [:precision] [as Array] ;
```

For multidimensional identifier data AIMMS will, by default, use the List format described above. Through the optional "as Array" clause you can instruct AIMMS to display the identifier data as a dense array.

Empty identifiers

To empty the data of sets and multidimensional identifier slices in your model you can use the command

```
Empty reference ;
```

Identifier cardinality

You can request AIMMS to retrieve the cardinality of sets and multidimensional identifier slices in your model through the command

```
Card reference ;
```

Run procedures

With the command

```
Run procedure-name ;
```

you can request AIMMS to run a procedure (without arguments). When finished, AIMMS will display the return value of the procedure.

Executing system commands

You can let AIMMS execute a system command through the command

```
System system-command ;
```

where *system-command* is a string to be executed by command shell.

Help

Through the Help command, a list with a brief description all available commands will be displayed.

Closing the project

You can close the AIMMS project and quit the command line tool through the command

```
Quit ;
```

Chapter 3

Getting Support

Getting support

This chapter discusses the procedures that apply when you encounter problems in AIMMS. Please refer to the list of known and reported issues at the end of this chapter to verify whether a problem which you wish to report has already been reported before.

3.1 Reporting a problem

Problem fixing

When you encounter a problem in AIMMS, AIMMS will investigate the problem, and if applicable provide a fix for it. AIMMS always provides this service if your AIMMS version is the latest functional AIMMS release. In all other cases, you are only eligible to obtain a fixed release if your AIMMS license is in maintenance. Any problem fix will always be performed on the latest functional AIMMS release only, and may require that you upgrade your AIMMS system to that version.

Reporting a problem

Whenever you encounter a problem, AIMMS needs the following information to process the problem.

- **Computer information**
  - Brand and model
  - Operating system and version number (including any installed Service Packs)
  - CPU type and speed
  - Amount of installed RAM
  - MDAC and ODBC/OLE DB driver versions if the problem is database-related
- **AIMMS information**
  - License number (**Tools-License-License Configuration** menu)
  - AIMMS build number (**Help-About AIMMS** menu)
- **Problem details**
  - A detailed description of the problem
  - The type of the problem
    - Crash
    - Incorrect functionality
    - Cosmetic

    - Feature request
  - The severity of the problem
    - Crash
    - No work around available
    - Work around available
    - Cosmetic
- **Reproducibility** (if applicable)
  - A description of the steps required to reproduce the problem
  - A copy of your project files along with any other files used by your project, if such is necessary to reproduce the problem

Problem processing

You should e-mail your problem report containing the above information to Support@aimms.com. Upon receipt, AIMMS will investigate your report and notify you of its status, as well as the actions that will be undertaken to fix the problem. You will be notified when an AIMMS version will be released, in which the problem is fixed.

Modeling support

Support requests other than bug reports will, in principle, only be dealt with at our regular consulting fee. This is especially true for when you request us to provide extensive modeling support. If you are new to AIMMS, and need some quick pointers to help you tackle a particular modeling problem, we may decide to honor such requests at our discretion. When you send support requests to our e-mail account Support@aimms.com, please always include your AIMMS license number.

Automatic Error Reporting

Reports collected via the AIMMS Error Report Service are actively used by AIMMS to continuously improve the quality and reliability of AIMMS. This service is automatically called when a severe/fatal error appears. You can read why you should report these errors at Why Report Errors. You can read what information is collected by the AIMMS Error Report Service and what we do with this information at Data Collection Policy.

3.2 Known and reported issues

Known issues

At this moment there are no known incompatibilities between the AIMMS software and documentation.

Chapter 4

Release Notes

From AIMMS 4.1 onwards, we only publish the release notes on our website. *Release notes*
You can find these at https://aimms.com/english/developers/downloads/download-aimms/release-notes.
The release notes contain the following for each release:

- the build number of the release,
- the release date, and
- a description of the changes and the issues resolved in the release.

What's new in AIMMS 4

From AIMMS 4.1 onwards, we will only publish this "What's New" section on our website. It can be found at the following location:

https://aimms.com/english/developers/downloads/product-information/new-features/