

Hardware, Software and Training Requirements for DMFAS 6



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This is not an official UNCTAD document. This document is for internal use and has an internal reference.

About this document

This document contains information about:

- The recommended hardware for workstations and servers running DMFAS 6 in an intranet/internet environment.
- The recommended software requirements to run DMFAS 6.
- The recommended technical training for DMFAS 6 users and the database administrator (DBA).

This document will be updated whenever necessary to take into account changes and developments in information technology. Considering that DMFAS 6 is continuously evolving, some hardware or software requirements may change over time. Nevertheless, the DMFAS Programme will do as much as possible to maintain the foreseen hardware and software platform.

The precise requirements for each institution to run DMFAS 6 will depend on the individual situation of the institution (number of users, number of debt instruments, available connections etc.). Therefore, it is important to contact the DMFAS Programme before ordering equipment, software or training to ensure that the latest and most appropriate specifications are met.

Hardware requirements

DMFAS 6 ARCHITECTURE

The DMFAS 6 system has been designed using the three-tier architecture. This type of architecture is made up of three separate processes. The back-end tier stores the data in a database server, the middle tier runs an application server that handles most of the processing, and the user-facing tier runs on **users' computers**. Even though this is the most recommended configuration it would be possible to install the database and the application server on the same server. In an intranet/internet environment the final decision should consider the needs of the institution, for example, the number of debt instruments, the type of instruments, the number of users, the workload of the machine, the projected use of the system, etc.

The present recommendations are based on a configuration where one server hosts the database and a separate one hosts the application server software and components of DMFAS 6.

DATABASE SERVER

In general, the DMFAS system runs on every platform compatible with the latest Oracle releases:

| Oracle Release | | Operating System | | |
|----------------|-------|------------------|------------|------------------------|
| 11gRx | 12cRx | MS WS 2012 SP2 | MS WS 2016 | Linux/Unix/Solaris/AIX |

x stands for Release 1 or 2

Additional memory, processor speed and disk space might be needed if other software is installed. Hardware specifications for servers running another network operating system should have equal performance and capacity and must be compatible with Oracle RDBMS. It is recommended to have an automatic detection software for monitoring updates and proactive support notifications.

| Component | Specifications |
|--------------------------|--|
| CPU ¹ | Intel® / Core i(7/9) 8 th to 10 th Gen, 4 or more GHz Series Processor |
| Hard disk | 3 x 480 GB or more SATA, NVMe, SSD or SAS 15K rpm with data striping through RAID X (Mixed drive types allowed matching type/speed/capacity) |
| DVD-ROM | DVD+/-RW |
| RAID/Internal Controller | PERC H(x) |
| Memory | From 32 GB up to 128 GB DIMM/LRDIMM/RDIMM |
| Screen/Video adapter | 17" Flat Panel with integrated video card with 1GB or more |
| Backup streamer | Digital tape streamer with the same capacity as the total disk space |
| NIC | 1 or more network card(s) supported by the network installed with capacity of 100/1000 Mbps for best performance |
| Computer in general | If the server is a stand-alone computer, it could be a tower model or suitable for placement in a rack. Both, with a scalable internal capacity and flexibility to adapt to changing workload conditions. Local technical support is strongly recommended. |

¹ Any 100% Intel compatible processor, such as AMD can be used as well, given that they deliver equal or better performance.

APPLICATION SERVER

DMFAS 6 is written entirely in Java™ and makes use of the services of JSP compliant Web application servers. As such, there are no specific requirements on the hardware platform other than those of the Web application server software itself. The following server configuration is based on a Windows 2012/2016 or Unix/Linux servers functioning as an application server only. Additional memory and disk space might be needed if other software is installed (e.g. database or other applications running on the same application server).

It is recommended to have an automatic detection software for monitoring updates and proactive support notifications.

Hardware specifications for servers running another network operating system should have equal performance and capacity.

| Component | Specifications |
|--------------------------|--|
| CPU ² | Intel® / Core i(7/9) 8 th to 10 th Gen, 4 or more GHz Series Processor |
| Hard disk | 3 x 480 GB or more SATA, NVMe, SSD or SAS 15K rpm with data striping through RAID X (Mixed drive types allowed matching type/speed/capacity) |
| DVD-ROM | DVD+/-RW |
| RAID/Internal Controller | PERC H(x) |
| Memory | From 32 GB up to 128 GB DIMM/LRDIMM/RDIMM |
| Screen/Video adapter | 17" Flat Panel with integrated video card with 1GB or more |
| Backup streamer | Digital tape streamer with the same capacity as the total disk space |
| NIC | 1 or more network card(s) supported by the network installed with capacity of 100/1000 Mbps for best performance |
| Computer in general | If the server is a stand-alone computer, it could be a tower model or suitable for placement in a rack. Both, with a scalable internal capacity and flexibility to adapt to changing workload conditions. Local technical support is strongly recommended. |

² Any 100% Intel compatible processor, such as AMD can be used as well, given that they deliver equal or better performance.

WORKSTATIONS (DESKTOPS/LAPTOPS)

The following table indicates the workstation requirements. The “Specifications” column specifies the components for running DMFAS effectively.

| Component | Specifications |
|----------------------|--|
| CPU ³ | Intel® / Core i(7/9) 4-10 Core, 8 th to 10 th Gen, 4 GHz or more |
| Hard disk | 500 GB or more SATA/SSD 7.2 rpm |
| DVD+/-RW | 16 speed or faster |
| Memory | 8 GB or more DDR4 DIMM or UDIMM |
| Screen/Video adapter | 1GB RAM or more, 17/19" Flat Panel 1280*1024 or more VGA/DVI |
| NIC | Network card supported by the network installed 1/10GB bps or more for best performance |
| PC in general | Plug and Play ready (Windows 10 or Mac not using Safari), Flash BIOS, local service available |

³ Any 100% Intel compatible processor, such as AMD can be used as well, given that they deliver equal or better performance.

PRINTER

| Component | Specifications |
|---------------------|--|
| Type | OS compatible laser printer |
| Format ⁴ | A4 (210 mm x 297 mm), duplex printing and A3 |
| Language | PCL6e or newer and Postscript |
| Capacity | 12 – 16 ppm |
| Resolution | 600 dpi |

ACCESSORIES

| Component | Description |
|-------------------------------|---|
| UPS | For the servers (and, if necessary, for the workstations) |
| Hub or, even better, a switch | For connecting the server, workstations and printer If 1/10GB network cards are used, check that the hub also supports 10GB. |
| Backup Media | For the streamer(s) The number of digital disks is dependent on the back-up strategy. |
| Cartridges | For the printers |
| Paper | For the printers |

⁴ All **standard** DMFAS 6 reports fit on A4 paper (210 mm x 297 mm) in portrait or landscape orientation. For country-specific or customized reports, a printer with a capacity for larger paper sizes provides more flexibility.

Software requirements

SERVER SOFTWARE

Network operating system

For the database server, any network operating system that supports the Oracle RDBMS (relational database management system) version is accepted. The expertise for administering and maintaining the network should already exist at the installation site. Up to now, the Oracle DMFAS 6 database has been installed and tested under Windows 2012 and 2016 (64 bits), Linux and UNIX. The DMFAS Programme in Geneva uses Windows 2012/2016 server as reference platform.

| Oracle Release | | Operating System | | |
|----------------|-------|------------------|------------|------------------------|
| 11gRx | 12cRx | MS WS 2012 SP2 | MS WS 2016 | Linux/Unix/Solaris/AIX |

x stands for Release 1 or 2

The DMFAS programme certifies the platforms MS WS 2012, 2016 and Linux Centos 7 as operating systems. For any other operating system, you must contact the DMFAS Programme for more information.

It's strongly recommended to install an antivirus and malware protection software.

Oracle database software

DMFAS 6 is targeted for platforms using the Oracle RDBMS version 11gR2 or 12cRx. In line with this, two RDBMS products are available: Standard Edition 2 or Enterprise Edition. So far, the product that we recommend buying for a new installation or for an upgrade from a previous DMFAS installation is Oracle 12cRx Standard Edition 2 because of its favourable price. The Enterprise Edition would be suitable for installations supporting 25 users or more and/or when specific features of the product are needed to comply with specific requirements.

Application server software

DMFAS 6 is targeted for platforms using any of the following application servers:

- Apache Tomcat V7 (open source, free to use)
- JDK 6 or 7

SOFTWARE FOR WORKSTATIONS

Operating system

DMFAS 6 runs as any standard Internet application, making use of current market standard web browser software, supporting the actual Java programming standards (CSS2, AJAX, Java & JavaScript); and including the support for multilanguage character sets (considering that the system needs to support English, French, Spanish, Russian and Arabic⁵ character sets) as Internet Explorer 11, Mozilla Firefox or Chrome. In line with this, there should not be restrictions in terms of operating system (MS Windows 10/Mac/Linux) as long as it provides support for the above-mentioned features.

It's strongly recommended to install an antivirus and malware protection software.

⁵ For the Arabic interface the system must also consider the data entry from right to left and the inversion of data entry forms.

Reporting software for DMFAS clients

Considering the change of technology, the DMFAS 6 software makes use (internally) of the open source Business Intelligence and Reporting Tool named Eclipse BIRT, which provides a more professional set of reporting features (e.g. the possibility to produce graphs, exporting to Portable Document Format, etc.). This open source software can be additionally installed with DMFAS version 6.

Under the terms and conditions of any open source tool, Eclipse BIRT installation is allowed on any DMFAS client to create reports. However, it is advisable to install it on the computer of a technical or advanced functional user in order to prepare the set of reports required by the debt office. These reports can be later centralized on the application server and executed from any DMFAS client.

Note that to continue using any Oracle reporting tool, a license fee is required whereas for the use of BIRT no license fee is required.

Additional software for workstations

The following additional products are needed to integrate the DMFAS 6 software with reporting tools:

- Adobe Acrobat Reader ^(TM) (may be required for viewing/printing reports)
- Office tools (spreadsheets, word processors, etc.)
- Java SE (JDK or JRE) 6 or 7

PRICES AND LICENSING

The following table details the Oracle products needed to run DMFAS 6 and their respective prices as indicated on the Oracle web site. Prices are based on the latest price list of Oracle products for the Oracle 12cRx database.

Price of Oracle products

The prices below may vary subject to changes in the marketing policy of Oracle Corporation.

| Product | Price (for a perpetual licence) | Maintenance per year |
|---|------------------------------------|---------------------------|
| Oracle12cR2 Standard Edition 2 (servers up to 2 sockets and 4 core processors) ⁶ | 5 users minimum: 1,750 USD | 5 users minimum: 385 USD |
| | (Named User Plus: 350 USD) OR | (Named User Plus: 77 USD) |
| | Per processor: 17,500 USD | Per processor: 3,850 USD |

⁶ Institutions having servers with more than 4 processors will have to acquire Oracle Standard Edition 2 and the price may vary according to the number of processors. Please contact the DMFAS Programme or your local Oracle dealers.

Example

The following example is for 1 server at the Ministry of Finance or Central Bank with 1 processor and 5 DMFAS users (with perpetual licenses).

| Product | Price |
|--|------------------------------|
| 1 Oracle Database 12cR2 Standard Edition 2 | (350 USD x 5 NU) = 1,750 USD |
| 1 year of maintenance | (77 USD x 5 NU) = 385 USD |
| Total Licenses | 2,135 USD |

The choice of Oracle products depends on the institution's needs. As an example, one institution with 25 users or more accessing one Oracle database should acquire one Oracle license "per processor". One institution with only five users accessing one Oracle database should acquire one Oracle license "per Named User Plus".

Hardware warranty and Oracle maintenance agreements

All critical hardware and software should be covered by a warranty or maintenance agreement (also known as a service agreement).

All hardware components and software are acquired under a warranty for a period during which their repair or replacement is the responsibility of the supplier, so long as defects occur during normal use. You usually have the option of extending the warranty when you buy a product, especially with larger hardware items.

For every Oracle product license bought, it is recommended to obtain an annual maintenance agreement. Depending on the type of maintenance support purchased, this agreement may cover hotline telephone support or web support (Metalink). In addition, a maintenance agreement automatically gives the right to a free upgrade of the Oracle product.

Training requirements

It is the policy of the DMFAS Programme that the DMFAS software should be installed on an intranet/internet. Consequently, the following information focuses on other recommended training activities that should be carried out before DMFAS 6 software is installed. Normally, training activities of this type are conducted locally by a software vendor, technical institute, etc. The suggested training modules are:

1. Training in Oracle database administration – The training component would concern only one or two selected staff members who would be responsible for the database administration part of the DMFAS 6 installation. This training should at least include i) Oracle database installation and upgrade ii) the physical structure of an Oracle RDBMS and iii) the administration and tuning of an Oracle database.
2. Training in application server administration – The training component would concern only one or two selected staff members who would be responsible for the maintenance and administration of the application server selected for the DMFAS 6 installation. This training, building on the above-mentioned training, should at least include i) the physical structure of the application server components, and ii) the administration and maintenance of the application server itself.

Finally, it is worth mentioning that, normally, during DMFAS 6 technical training, many relevant database administration tasks will also be carried out by UNCTAD after the system installation.