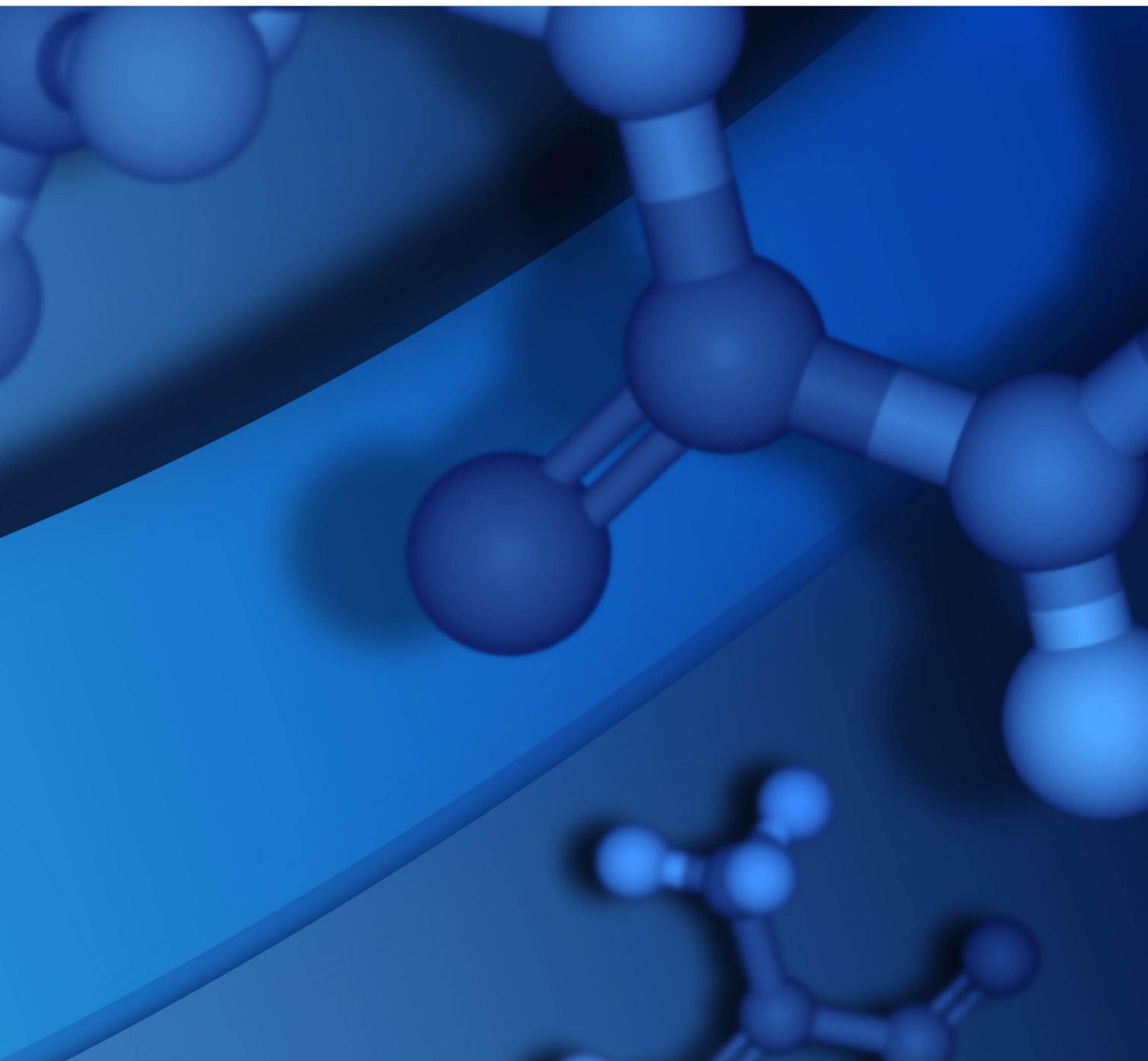


# SYSTEM REQUIREMENTS

MATERIALS STUDIO 2019



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## Acknowledgments and References

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## About This Document

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This documents the details of the system requirements for Materials Studio 2019 client and server. For installation instructions refer to the *Materials Studio 2019 Installation and Administration Guide*.

### Definitions

The following defines specific terms for BIOVIA Materials Studio 2019:

- **Supported:** The hardware or software was tested against BIOVIA Materials Studio, is expected to function as documented, and will be supported by BIOVIA. If issues are found that are specific to these versions of the hardware or software, they will be addressed in accordance with the BIOVIA software support policy.
- **Not Supported:** Any hardware and software not specifically listed in this document is not supported by BIOVIA. These are used at the customer's risk and BIOVIA makes no guarantee regarding the capability of unsupported hardware or software to function with BIOVIA Materials Studio.
- **Known to Be Incompatible:** Software, or versions of software, that will not function correctly in conjunction with BIOVIA Materials Studio 2019.
- **Regional Language Settings:** The ability to change the format that Microsoft® Windows uses to display dates, times, large numbers and decimal fractions. This document includes the regional language settings that BIOVIA supports for BIOVIA Materials Studio.

## Materials Visualizer Requirements

This section describes the requirements of the Materials Visualizer *only*. The Materials Visualizer is the core client module in Materials Studio; providing modeling, analysis, and visualization tools. It cannot set up or launch jobs *unless* installed in conjunction with [Materials Studio Server](#).

### Supported Operating Systems

| Operating System                            | Supported Versions                            | Notes |
|---|---|-------|
| Microsoft Windows Professional & Enterprise | 10 (64-bit only)<br>7 SP1 (32-bit and 64-bit) |       |

### Hardware Requirements

| Component                                  | Minimum Hardware  | Recommended                              |
|--|---|--|
| Processor                                  | Intel® Core™ i5 or equivalent   | Intel Core i7 or equivalent              |
| RAM  | 4 GB  | 16 GB                                    |
|  | 4 GB is the maximum possible RAM for Windows 7 SP1 32-bit   |  |
| Available hard disk space for installation | 1 GB  | 4 GB                                     |
|  | The hard disk space required for installation can vary between 1 GB for Materials Visualizer only and 4 GB if you install the complete Materials Studio server and client. The Materials Visualizer can only be installed on Windows. Additional space will be required if system updates are necessary, for example for .NET, runtimes, and libraries. |  |
| Display                                    | 1366 × 768 display resolution<br>24-bit   | 1920 × 1080 display resolution<br>32-bit |

To achieve a more satisfying experience with Materials Studio, particularly in terms of the client software, it is highly recommended that your system be substantially better than the minimum specification above. This is particularly important if running server software locally on the same computer as the client software.

Attention to the following areas can make a significant improvement to your overall user experience and enjoyment of the software:

- Memory - the more RAM your computer has, the better.
- A good OpenGL® graphics card can make a significant difference to the graphics performance.
- The higher the display resolution, the more flexibility you will have in displaying and managing document and dialog windows.
- Mouse - although not absolutely necessary, a two-button mouse with a wheel or a touch pad is strongly recommended. It will make the more complex structure manipulations easier and increase your efficiency and enjoyment of Materials Studio.

For example, a PC with 16 GB RAM, a screen resolution of 1920 × 1080, and a good OpenGL graphics card should perform well. PC hardware capabilities are currently advancing so rapidly that a new commodity desktop PC would have significantly higher specifications than these.

If you are installing the Materials Visualizer and Materials Studio server on the same machine, it should satisfy the [minimum server requirements](#).

## Browsers

The following browsers are supported on client operating systems:

| Browser  | Client Operating System |            |
|--|-------------------------|------------|
|  | Windows 7 SP1           | Windows 10 |
| Microsoft Edge   |                         | •          |
| Microsoft Internet Explorer 11                         | •                       | •          |
| Firefox ESR latest (at the time of release this is 60) | •                       | •          |
| Chrome latest (at the time of release this is 69)      | •                       | •          |

**IMPORTANT!** In order to view the PDF format documentation in the Materials Studio online help you must have a PDF viewer installed on your machine. If your browser does not have an in-built PDF viewer you must have Adobe Reader installed, visit <http://get.adobe.com/reader/>.

# Materials Studio Server Requirements

## Supported Operating Systems

| Operating System                            | Versions                                      | Notes                                   |
|---|---|---|
| Microsoft Windows Professional & Enterprise | 10 (64-bit only)<br>7 SP1 (32-bit and 64-bit) | ONETEP cannot be run on 32-bit servers. |
| Microsoft Windows Server                    | 2016<br>2012 R2                               |   |
| Red Hat Enterprise Linux                    | 7<br>6  |   |
| SuSE Linux Enterprise Server                | 11 SP4  |   |
| CentOS                                      | 7   |   |

**Note:** If you intend to run server applications in parallel on a Windows system that does not have a network connection, you should install the Microsoft Loopback Adapter by following instructions appropriate to your operating system.

## Hardware Requirements

| Component                                  | Minimum Hardware  | Recommended                                 |
|--|---|---|
| Processor                                  | Intel® Xeon® E5-1620 or equivalent  | Intel Xeon Silver 41XX series or equivalent |
| RAM per core (at least two cores)          | 2 GB  | 8 GB  |
| Available hard disk space for installation | 4 GB  | 4 GB  |
|  | The hard disk space required for installation can vary between 1 GB for Materials Visualizer only and 4 GB if you install the complete Materials Studio server and client. The Materials Visualizer can only be installed on Windows. Additional space will be required if system updates are necessary, for example for .NET, runtimes, and libraries. |   |

Greater processing power and memory are recommended for any heavy duty use.

As you use Materials Studio to create structures, run calculations, gather and analyze results, the disk space required will increase to allow storage of both results and interim job files on the server. You should ensure that the server you use for Materials Studio has enough disk space to accommodate your long term space requirements.

See the [Materials Visualizer Requirements](#) section for further recommendations to help you get the best out of Materials Studio visualization. There are no graphics-related requirements for running Materials Studio on Windows servers.

## Linux Server System Libraries

On Red Hat Enterprise Linux and SuSE Linux Enterprise Server systems, the standard C++ libraries for backward compatibility of the C++ compiler are required for proper operation of the Materials Studio server codes. These libraries should be installed prior to the installation of Materials Studio and BIOVIA License Pack.

The packages that contain the required libraries are listed below for the two most recent OS minor supported versions at the time of Materials Studio release:

| Operating System                       | 64-bit Package                              |
|--|---|
| Red Hat Enterprise Linux 6.9           | audit-libs-2.4.5-6.el6.x86_64               |
| * Required for a root RPM installation | fontconfig-2.8.0-5.el6.x86_64               |
|  | freetype-2.3.11-17.el6.x86_64               |
|  | glibc-2.12-1.209.el6.x86_64                 |
|  | keyutils-libs-1.4-5.el6.x86_64              |
|  | krb5-libs-1.10.3-65.el6.x86_64              |
|  | libcom_err-1.41.12-23.el6.x86_64            |
|  | libgcc-4.4.7-18.el6.x86_64                  |
|  | libselinux-2.0.94-7.el6.x86_64              |
|  | libstdc++-4.4.7-18.el6.x86_64               |
|  | libuuid-2.17.2-12.28.el6.x86_64             |
|  | libX11-1.6.4-3.el6.x86_64                   |
|  | libXau-1.0.6-4.el6.x86_64                   |
|  | libxcb-1.12-4.el6.x86_64                    |
|  | libXext-1.3.3-1.el6.x86_64                  |
|  | libXpm-3.5.10-2.el6.x86_64                  |
|  | libXrender-0.9.10-1.el6.x86_64              |
|  | nspr-4.19.0-1.el6.x86_64                    |
|  | nss-softokn-freebl-3.14.3-23.3.el6_8.x86_64 |
|  | pam-1.1.1-24.el6.x86_64                     |
|  | zlib-1.2.3-29.el6.x86_64                    |
|  | redhat-lsb-core-4.0-7.el6.x86_64 *          |
|  | shadow-utils-4.1.5.1-5.el6.x86_64 *         |

| Operating System                       | 64-bit Package                              |
|--|---|
| Red Hat Enterprise Linux 6.10          | audit-libs-2.4.5-6.el6.x86_64               |
| * Required for a root RPM installation | fontconfig-2.8.0-5.el6.x86_64               |
|  | freetype-2.3.11-17.el6.x86_64               |
|  | glibc-2.12-1.212.el6.x86_64                 |
|  | keyutils-libs-1.4-5.el6.x86_64              |
|  | krb5-libs-1.10.3-65.el6.x86_64              |
|  | libcom_err-1.41.12-24.el6.x86_64            |
|  | libgcc-4.4.7-23.el6.x86_64                  |
|  | libselinux-2.0.94-7.el6.x86_64              |
|  | libstdc++-4.4.7-23.el6.x86_64               |
|  | libuuid-2.17.2-12.28.el6_9.2.x86_64         |
|  | libX11-1.6.4-3.el6.x86_64                   |
|  | libXau-1.0.6-4.el6.x86_64                   |
|  | libxcb-1.12-4.el6.x86_64                    |
|  | libXext-1.3.3-1.el6.x86_64                  |
|  | libXpm-3.5.10-2.el6.x86_64                  |
|  | libXrender-0.9.10-1.el6.x86_64              |
|  | nspr-4.19.0-1.el6.x86_64                    |
|  | nss-softokn-freebl-3.14.3-23.3.el6_8.x86_64 |
|  | pam-1.1.1-24.el6.x86_64                     |
|  | zlib-1.2.3-29.el6.x86_64                    |
|  | redhat-lsb-core-4.0-7.el6.x86_64 *          |
|  | shadow-utils-4.1.5.1-5.el6.x86_64 *         |

| Operating System                       | 64-bit Package                           |
|--|--|
| Red Hat Enterprise Linux 7.4           | audit-libs-2.7.6-3.el7.x86_64            |
| * Required for a root RPM installation | fontconfig-2.10.95-11.el7.x86_64         |
|  | freetype-2.4.11-15.el7.x86_64            |
|  | glibc-2.17-196.el7_4.2.x86_64            |
|  | keyutils-libs-1.5.8-3.el7.x86_64         |
|  | krb5-libs-1.15.1-8.el7.x86_64            |
|  | libcap-ng-0.7.5-4.el7.x86_64             |
|  | libcom_err-1.42.9-10.el7.x86_64          |
|  | libgcc-4.8.5-16.el7_4.1.x86_64           |
|  | libselinux-2.5-11.el7.x86_64             |
|  | libstdc++-4.8.5-16.el7_4.1.x86_64        |
|  | libuuid-2.23.2-43.el7_4.2.x86_64         |
|  | libX11-1.6.5-1.el7.x86_64                |
|  | libXau-1.0.8-2.1.el7.x86_64              |
|  | libxcb-1.12-1.el7.x86_64                 |
|  | libXext-1.3.3-3.el7.x86_64               |
|  | libXpm-3.5.12-1.el7.x86_64               |
|  | libXrender-0.9.10-1.el7.x86_64           |
|  | nspr-4.19.0-1.el7_5.x86_64               |
|  | nss-softokn-freebl-3.36.0-5.el7_5.x86_64 |
|  | pam-1.1.8-18.el7.x86_64                  |
|  | zlib-1.2.7-17.el7.x86_64                 |
|  | redhat-lsb-core-4.1-27.el7.x86_64 *      |
|  | shadow-utils-4.1.5.1-24.el7.x86_64 *     |

| Operating System                       | 64-bit Package                           |
|--|--|
| Red Hat Enterprise Linux 7.5           | audit-libs-2.8.1-3.el7.x86_64            |
| * Required for a root RPM installation | fontconfig-2.10.95-11.el7.x86_64         |
|  | freetype-2.4.11-15.el7.x86_64            |
|  | glibc-2.17-222.el7.x86_64                |
|  | keyutils-libs-1.5.8-3.el7.x86_64         |
|  | krb5-libs-1.15.1-18.el7.x86_64           |
|  | libcap-ng-0.7.5-4.el7.x86_64             |
|  | libcom_err-1.42.9-11.el7.x86_64          |
|  | libgcc-4.8.5-28.el7.x86_64               |
|  | libselinux-2.5-12.el7.x86_64             |
|  | libstdc++-4.8.5-28.el7.x86_64            |
|  | libuuid-2.23.2-52.el7.x86_64             |
|  | libX11-1.6.5-1.el7.x86_64                |
|  | libXau-1.0.8-2.1.el7.x86_64              |
|  | libxcb-1.12-1.el7.x86_64                 |
|  | libXext-1.3.3-3.el7.x86_64               |
|  | libXpm-3.5.12-1.el7.x86_64               |
|  | libXrender-0.9.10-1.el7.x86_64           |
|  | nspr-4.19.0-1.el7_5.x86_64               |
|  | nss-softokn-freebl-3.36.0-5.el7_5.x86_64 |
|  | pam-1.1.8-22.el7.x86_64                  |
|  | zlib-1.2.7-17.el7.x86_64                 |
|  | redhat-lsb-core-4.1-27.el7.x86_64 *      |
|  | shadow-utils-4.1.5.1-24.el7.x86_64 *     |

| Operating System                       | 64-bit Package                               |
|--|--|
| CentOS Linux release 7.4.1708          | audit-libs-2.7.6-3.el7.x86_64                |
| * Required for a root RPM installation | fontconfig-2.10.95-11.el7.x86_64             |
|  | freetype-2.4.11-15.el7.x86_64                |
|  | glibc-2.17-196.el7_4.2.x86_64                |
|  | keyutils-libs-1.5.8-3.el7.x86_64             |
|  | krb5-libs-1.15.1-8.el7.x86_64                |
|  | libcap-ng-0.7.5-4.el7.x86_64                 |
|  | libcom_err-1.42.9-10.el7.x86_64              |
|  | libgcc-4.8.5-16.el7.x86_64                   |
|  | libselinux-2.5-11.el7.x86_64                 |
|  | libstdc++-4.8.5-16.el7.x86_64                |
|  | libuuid-2.23.2-43.el7.x86_64                 |
|  | libX11-1.6.5-1.el7.x86_64                    |
|  | libXau-1.0.8-2.1.el7.x86_64                  |
|  | libxcb-1.12-1.el7.x86_64                     |
|  | libXext-1.3.3-3.el7.x86_64                   |
|  | libXpm-3.5.12-1.el7.x86_64                   |
|  | libXrender-0.9.10-1.el7.x86_64               |
|  | nspr-4.19.0-1.el7_5.x86_64                   |
|  | nss-softokn-freebl-3.36.0-5.el7_5.x86_64     |
|  | pam-1.1.8-18.el7.x86_64                      |
|  | zlib-1.2.7-17.el7.x86_64                     |
|  | redhat-lsb-core-4.1-27.el7.centos.1.x86_64 * |
|  | shadow-utils-4.1.5.1-24.el7.x86_64 *         |

| Operating System                       | 64-bit Package                               |
|--|--|
| CentOS Linux release 7.5.1804          | audit-libs-2.8.1-3.el7.x86_64                |
| * Required for a root RPM installation | fontconfig-2.10.95-11.el7.x86_64             |
|  | freetype-2.4.11-15.el7.x86_64                |
|  | glibc-2.17-222.el7.x86_64                    |
|  | keyutils-libs-1.5.8-3.el7.x86_64             |
|  | krb5-libs-1.15.1-18.el7.x86_64               |
|  | libcap-ng-0.7.5-4.el7.x86_64                 |
|  | libcom_err-1.42.9-11.el7.x86_64              |
|  | libgcc-4.8.5-28.el7.x86_64                   |
|  | libselinux-2.5-12.el7.x86_64                 |
|  | libstdc++-4.8.5-28.el7.x86_64                |
|  | libuuid-2.23.2-52.el7.x86_64                 |
|  | libX11-1.6.5-1.el7.x86_64                    |
|  | libXau-1.0.8-2.1.el7.x86_64                  |
|  | libxcb-1.12-1.el7.x86_64                     |
|  | libXext-1.3.3-3.el7.x86_64                   |
|  | libXpm-3.5.12-1.el7.x86_64                   |
|  | libXrender-0.9.10-1.el7.x86_64               |
|  | nspr-4.19.0-1.el7_5.x86_64                   |
|  | nss-softokn-freebl-3.36.0-5.el7_5.x86_64     |
|  | pam-1.1.8-22.el7.x86_64                      |
|  | zlib-1.2.7-17.el7.x86_64                     |
|  | redhat-lsb-core-4.1-27.el7.centos.1.x86_64 * |
|  | shadow-utils-4.1.5.1-24.el7.x86_64 *         |

| Operating System                      | 64-bit Package                         |
|---------------------------------------|--|
| SuSE Linux Enterprise Server 11 (SP4) | audit-libs-1.8-0.34.26.x86_64          |
|                                       | fontconfig-2.6.0-10.20.5.2.x86_64      |
|                                       | freetype2-2.3.7-25.45.8.1.x86_64       |
|                                       | glibc-2.11.3-17.110.14.1.x86_64        |
|                                       | keyutils-libs-1.2-107.29.15.x86_64     |
|                                       | krb5-1.6.3-133.49.113.7.1.x86_64       |
|                                       | libcom_err2-1.41.9-2.14.3.x86_64       |
|                                       | libgcc_s1-5.3.1+r233831-14.1.x86_64    |
|                                       | libstdc++6-5.3.1+r233831-14.1.x86_64   |
|                                       | libuuid1-2.19.1-6.72.1.x86_64          |
|                                       | lsb-4.0-2.4.21.x86_64                  |
|                                       | mozilla-nspr-4.13.1-32.1.x86_64        |
|                                       | pam-1.1.5-0.17.2.x86_64                |
|                                       | pcre-7.8-2.18.x86_64                   |
|                                       | xorg-x11-libX11-7.4-5.11.72.6.1.x86_64 |
|                                       | xorg-x11-libXau-7.4-1.15.x86_64        |
|                                       | xorg-x11-libxcb-7.4-1.31.6.1.x86_64    |
|                                       | xorg-x11-libXext-7.4-1.18.16.x86_64    |
|                                       | xorg-x11-libXpm-7.4-3.1.x86_64         |
|                                       | xorg-x11-libXrender-7.4-1.23.1.x86_64  |
| zlib-1.2.7-0.14.1.x86_64              |  |

If you have a newer version of a package than those listed above, then no action should be required.

## CentOS and Red Hat Libraries

To check if the appropriate package is installed on CentOS or Red Hat, enter:

```
rpm -q <package name>
```

If a required package is missing, you can download and install it using the yum command:

```
yum install <package name>
```

## SuSE Libraries

To check if the appropriate package is installed on SuSE, enter:

```
rpm -q <package name>
```

If you are running SuSE Linux Enterprise Server and a required package is missing, ask your system administrator to download and install it using YaST (choose *Software | Software Management*).

## Linux Server Cluster Requirements

### Supported Operating Systems

**IMPORTANT!** Installation of Materials Studio on Windows clusters is not supported.

Only x86-64 server operating systems are supported.

| Operating System             | Versions | Notes |
|------------------------------|----------|-------|
| Red Hat Enterprise Linux     | 7<br>6   |       |
| SuSE Linux Enterprise Server | 11 SP4   |       |

Currently, only the Forcite, Mesocite, CASTEP, DMol<sup>3</sup>, DFTB+, GULP, MesoDyn, and ONETEP servers are supported for parallel execution on Linux clusters. All server codes are supported for serial operation on Linux clusters. It is recommended to use one of the supported queuing systems to utilize computational resources of a Linux cluster efficiently.

- We support the same homogeneous clusters as Intel MPI.
- We support heterogeneous clusters with queuing systems that are configured to submit jobs to homogeneous subsets of the cluster.
- Compute nodes must be set up to communicate with each other and the head node through rsh or ssh without a password (for MPI).
- A license file or license server must be installed on the head node, unless the compute nodes are configured so that they can access a license server elsewhere.

### Hardware Requirements

| Component                                     | Minimum Hardware  | Recommended                                 |
|---|---|---|
| Processor                                     | Intel Xeon E5-1620 or equivalent  | Intel Xeon Silver 41XX series or equivalent |
| RAM per core<br>(at least two cores)          | 2 GB  | 8 GB  |
| Available hard disk space<br>for installation | 4 GB<br>Additional space will be required if system updates are necessary.  | 4 GB  |
| File system                                   | Beowulf architecture, with a head node that holds the file system, Materials Studio installation, and user data. These files must be mounted and visible to the compute nodes at the same location as on the head node. |   |
| Interconnects                                 | Interconnect fabric supported by Intel MPI is required. See <a href="https://software.intel.com/en-us/mpi-library">https://software.intel.com/en-us/mpi-library</a> for more information.                               |   |

Greater processing power and memory are recommended for any heavy duty use.

As you use Materials Studio to create structures, run calculations, gather and analyze results, the disk space required will increase to allow storage of both results and interim job files on the server. You should ensure that the server you use for Materials Studio has enough disk space to accommodate your long term space requirements.

It is *strongly* recommended that you use a [supported queuing system](#) to ensure an even distribution of jobs between the different processors. There are no graphics-related requirements for running Materials Studio on Linux clusters.

For details of Intel MPI, refer to the Intel Cluster MPI Libraries documentation (<http://software.intel.com/en-us/articles/cluster-mpi-libraries/>).

## Linux System Libraries

On Red Hat Enterprise Linux and SuSE Linux Enterprise Server systems, the standard C++ libraries for backward compatibility of the C++ compiler are required for proper operation of the Materials Studio server codes. These libraries should be installed prior to the installation of Materials Studio and BIOVIA License Pack. The packages that contain the required libraries are listed in the [Linux Server System Libraries](#) table.

## Queuing Systems Requirements

The following queuing systems are officially supported with the current version of Materials Studio:

| Software                                 | Versions   | Operating Systems | Notes  |
|--|------------|-------------------|--|
| Altair Portable Batch System (PBS) Pro   | 13.1       | Windows           | <a href="http://www.pbsworks.com/Product.aspx?id=1">www.pbsworks.com/Product.aspx?id=1</a>   |
|  | 18.2       | Linux             |  |
| IBM Spectrum LSF (Load Sharing Facility) | 10.1       | Windows<br>Linux  | <a href="http://www-03.ibm.com/systems/spectrum-computing/products/lsf/index.html">www-03.ibm.com/systems/spectrum-computing/products/lsf/index.html</a> |
| Univa Grid Engine (UGE)                  | 8.5<br>8.6 | Linux             | <a href="http://www.univa.com/products/grid-engine">http://www.univa.com/products/grid-engine</a>  |
| Adaptive Computing TORQUE                | See Notes  | Linux             | Materials Studio supports TORQUE 6.1.2, which is the last open source version of this product. The commercial version of TORQUE is not supported.        |

## Finding Windows System Information

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Many system properties for computers running a Windows operating system are available from the System Properties page, which can be accessed from either the *Control Panel* or *Settings*.

More detailed information may be available from the following sources.

### Available Disk Space

In Windows Explorer select the drive you want to check, right-click and select *Properties*. A pie chart shows how much free and used space is on the disk.

### Operating System and Memory

Either:

- **Windows 7:** Open the *Control Panel* and choose *System and Security*, then select *System*.
- **Windows 10:** Open *Settings* and choose *System*, then select *About*.

The operating system revision, including the service pack number, will be displayed in the panel on the right along with the amount of installed memory (RAM).

### Internet Explorer Version

Start Internet Explorer and access the About dialog by clicking the cogwheel and selecting *About Internet Explorer*.

### Edge Version

Start Edge and access the Settings panel by clicking the ... and selecting *Settings*. The Edge version information is displayed under the *About this app* heading.

### Graphics Information

To access the Windows graphics information, either:

- **Windows 7:** Open the *Control Panel* and choose *Appearance and Personalization*, then select *Adjust screen resolution*.
- **Windows 10:** Open *Settings* and choose *System* then select *Display*. Click *Advanced display settings*.

The number of colors and desktop area are shown here.

### Drivers

To access the graphics driver information, either:

- **Windows 7:** In the Screen Resolution page of the Control Panel, click *Advanced settings* to open the monitor and graphics card properties dialog.
- **Windows 10:** Click *Advanced display settings* then *Display adapter properties*.

This shows details of the graphics board on the *Adapter* tab.

Click the *Properties* button next to the details of the adapter. The driver version numbers can be accessed on the *Driver* tab.

## Dassault Systèmes Support Resources

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For additional resources or to contact Dassault Systèmes Customer Support, visit the Support portal:

<https://www.3ds.com/support/>

From this portal, you can:

- Call or email Dassault Systèmes Customer Support
- Submit a request
- Download installers
- Access hardware and software requirements
- Access Knowledge Base
- Access Communities and Twitter feeds