# Supported Platforms and Hardware Requirements & Recommendations

# GT-SUITE V7.4

This document is intended to inform potential customers and current users about what software and hardware is needed to run GT-SUITE. The first section on Supported Platforms covers what platform the GT-SUITE GUI and solver will run on, as well as what platforms may be used as a license server for GT-SUITE. The second section on Hardware Recommendations gives typical recommendations for what to consider when buying a new computer for a GT-SUITE workstation. The third section on Minimum System Requirements presents general information about what hardware is required to run the software on each operating system. Finally the fourth section on Video Card Support explains recommended and required video card hardware and drivers, and a troubleshooting guide for diagnosing and fixing video card problems.

## 1.1  Supported Platforms for GT-SUITE v7.4 and the License Server

Below is the most recent list of supported platforms for GT-SUITE and the License Server at the time that this build was released.  If a platform is listed as "Yes" for GT-SUITE, but "No" for the License Server, then it cannot be the license server, and must checkout a license from a supported License Server platform.  We do not support GT-SUITE or the license server on a virtual machine.

Please see the minimum system requirements section for more information on the minimum requirements to run GT-SUITE software.  Please refer to the hardware recommendations section for recommendations when purchasing new hardware.

| Platform | Operating System | Version | Architecture | GT-SUITE V7.4 | License Server (See specific notes below table for details) |
|---|---|---|---|---|---|
| Windows | Windows | **XP\***, 2003 & 2008 Server, Vista, 7, 8 | Any x86 32 or 64 bit which has SSE2 **See below for the future of 32 bit Linux** | Yes (See "Services on Vista/Windows 7/8" below) | Yes\* |
| Linux **See below for required patches** | RedHat Enterprise Server | 5.8-6.4 | | Yes – See below for future version support | Yes - See below for known platform specific issues |
| | SuSE **\* See Below** | 10.3 -12.1 | | Yes – See below for future version support | Yes - See below for known platform specific issues |
| | SuSE Enterprise Server | 11 | | Yes – See below for future version support | Yes - See below for known platform specific issues |
| License Server Only | Any above | - | | N/A | Yes - See below for known platform specific issues |
| | UNIX | - | - | **NOT SUPPORTED** | **NOT SUPPORTED** |
| | | | | | |
| **Virtual Machines** | Any | - | - | Unsupported, but might work | **NOT SUPPORTED** |

**Specific Notes**: (please read to the end, as they are listed in order of importance / expected frequency)

**32 bit Linux** - **GT-SUITE will not be supported on a 32 bit Linux operating system starting with the next version, which is expected to be released Q4 2014.** Older versions will still continue to be supported on 32 bit operating systems.

**OpenSuse Support** - **Support for the Open SuSE operating system is scheduled to be discontinued for the v7.6 release of GT-SUITE, which will be in Q4 2015.** Support for SuSE Enterprise server (SLES) will continue as normal. Our intent is to continue to support Open SuSE throughout the life cycle of v7.4 and v7.5. If your organization will continue to use this OS into Q4 2015 and will need the latest GT-SUITE, please have your main GT-SUITE contact email support@gtisoft.com, so that we may consider your needs in this decision.

**Discontinued Linux Operating Systems**– In v7.4 we have discontinued support for RHEL 4, SLES 10, OpenSuse 10.0, 10.1, and 10.2. Please install and run on a supported platform as indicated in the table above.

**Windows XP** - **GT-SUITE will not be supported on Windows XP starting with the next version, which is expected to be released Q4 2014.** GT-SUITE will still be allowed to be installed in v7.5, but it will not be tested nor fully supported by GTI. Older versions will still continue to be supported on XP
.
**Windows 8** – Older USB dongles which are 52mm in length will not work with Windows 8. Please contact support@gtisoft.com for a replacement dongle.

**GT-SPACECLAIM -** GT-SPACECLAIM is a Windows only application, supported for Windows XP (service pack 3), Windows Vista, and Windows 7/8.  Both 32 and 64 bit versions of these operating systems are supported, but a Linux version is not available.  It also requires the Microsoft .NET Framework version 4.0 for all platforms, and version 3.5 for Windows XP.  These updates will be installed during the GT-SPACECLAIM installation if they are not already in place.

**3D Applications -** All 3D applications (GEM3D, COOL3D, GT-ISE 3D viewer, GT-POST 3D viewer, etc) require glibc 2.5 or higher on Linux operating systems.  Parasolid (used by GEM3D and COOL3D) is supported on SUSE Linux Enterprise Desktop/Server versions 10 and 11, on Red Hat Enterprise Linux 5 and 6.

**CONVERGE-LITE** – There is no CONVERGE-LITE support for 32 bit Linux.

**Services** on **Vista/Windows 7/8** - An account with administrator rights must be used to install either of the following optional services on Vista and Windows 7/8:  FLEXnet license services & distributed computing services. Additionally, if the distributed computing services will be used to run models with version 7.1 or earlier solvers, they must be set to run as a specified user.  Please see the DistributedComputing.pdf document in the %GTIHOME%\<version>\documents\DistributedComputing directory for more information.

**Linux -** All Linux platforms must have /usr/lib/libstdc++.so.6 installed to run v7.3 and later.  Additionally, libstdc++.so.5 might be required to run version v72 or older.  Please see the older documentation for details if necessary.

**General Linux License Servers:** To run the license server on a Linux machine it must conform to LSB 3.0+ (Linux standard base)

**Red Hat Enterprise Server 6 64-Bit** - The 64-bit version of RHEL 6 does not install the necessary 32-bit libraries to run our applications.  The following 32-bit (i686) libraries will need to be installed.  These can be installed using the yum utility.

- libstdc++-4.4*.i686 (This will install the libstdc++.so.6 for i686).
- libXext - This will also install the dependencies libX11, libXau, and libxcb for i686.
- libXtst - This will also install the dependency libXi for i686.
- libXxf86vm
- libXinerama
- libXrender

**OpenSUSE 12.3** - There are problem with JAVA on this OS and it is not recommended.  Run Time monitors are disabled on this platform due to a bug in this version of SuSE which would cause the solver to crash when using run time monitors.  Also the machine has been known to become unresponsive while using the GUI.  This is not reproducible enough to have been corrected.

**OpenSUSE 11.3** - Linking in GT-ISE may not work on this platform due to a problem in the JAVA implementation. A work around for this is to disable the automatic panning when a link is pulled outside the map.  This can be disabled by adding the entry "gti.disableDragLink=true" under the heading [GUI-gtise default] in the file */v*/GTsuite/bin/product.cfg.

**OpenSUSE 11.2 64 bit** - The 32 bit hardlock driver does not work correctly on OpenSUSE 11.2 64 bit.

**SUSE License Server** - The drivers depend on a USB setting that is not enabled by default on SuSE 10.3 (and some later builds of 10.2).  There is a work-around, but there is a security risk, please see below.

To mount the /proc/bus/usb for the Aladdin drivers, change the mount line in /etc/fstab similar to that shown below.  Then run `mount –a`.  Doing this may be a security risk, and as such we cannot officially recommend it.

```
#The original line might look like the following:
#usbfs            /proc/bus/usb     usbfs    noauto            0 0
#
#Newer systems use "devmode" while older ones still use "mode".  Please try one of the
# following lines.  If it gives a warning when mounting, unmount it and then use the other option.
#usbfs            /proc/bus/usb     usbfs    mode=0666            0 0
usbfs            /proc/bus/usb     usbfs    devmode=0666            0 0
```

**If the above mount was not present when the drivers were installed, remove and reinstall the drivers**.  This can be done by running `rpm –e aksusbd-*` and `rpm –i aksusbd-*` from the flexlm folder.

The mount above requires that the kernel has the option CONFIG_USB_DEVICEFS enabled.  If your kernel does not have this enabled, you must either update to the latest kernel, or re-compile with this option enabled.  (It was completely disabled due to security concerns in a few builds of 10.2 & 10.3) See the link below for full details:

https://bugzilla.novell.com/show_bug.cgi?id=210899#c47

## 1.2  Hardware Recommendations (Which computer should I buy?)

There are several factors that can affect the performance of GT-SUITE, which are addressed below.

**CPU:** The most important factor is the CPU.  CPUs have evolved to such a state that the clock speed is no-longer the only important factor in determining its processing power.  However, when comparing within a processor family, the simulation times will roughly scale inversely with the clock speed.  The speed of our simulations can roughly be correlated to the floating point math operations of the system.  As a reference to help in deciding on new hardware, the following will describe the hardware that Gamma Technologies is using internally as of September 2013.  We are not endorsing these products, but rather they are provided as a reference.  Our desktops and cluster machines are running Intel Core i7 4770 @ 3.40 GHz (Quad-Core) with 8GB of RAM, and our laptops are running Intel Core i7 4800MQ @ 2.7 GHz (Quad-Core).  For other types of CPU, a comparative listing of computation speed can be found by viewing the latest benchmarks from http://www.cpubenchmark.net.  Please see our webpage http://www.gtisoft.com/products/p_Supported_Platforms.php for our currently supported platforms.

**32/64 bit:** Starting in v7.4, GT-SUITE provides both 32 and 64 bit executables.  Older versions of GT-SUITE only had a 32 bit executable which would run on both 32 and 64 bit systems.  When purchasing a new system 64 bit is the preferred choice for both the hardware and the OS, as this allows for more system memory.

**Multiple Processors or Cores:**  There are two ways in which GT-SUITE simulations can take advantage of multi-processor/core systems, distributed computing or parallel processing.

In distributed computing, each case of a simulation may be run on a single processor/core.  As a result, multiple processors will not decrease computation time for a single case.  A multiple-case model will be divided into single cases or packets of cases, and sent to multiple processors for solving by using the distributed computing feature.  Additionally, with a multiple processor system other software applications will have improved responsiveness while a simulation is running.

A solver license will be required for each core which is simultaneously processing a simulation.  A multi core machine will function with a single solver license, but it will be limited to only solve one model/packet at a time.

In parallel processing, selected parts of the code can be branched into multiple threads that can be run on different processors or cores at the same time.  A single case of a simulation can be run in this manner to reduce the run-time of a simulation.  Parallel processing is supported on the same hardware that is supported for serial (single processor) calculations.  GT-SUITE will use only one solver license for a parallel calculation, no matter how many processors are used.  More information on realistic expectations of speedup can be found in the GT-ISE help for the Run Simulation Wizard.

**RAM  (Memory):**  The amount of RAM may limit the responsiveness of the GUI, but has not been found to limit the computational speed. 3 GB of RAM is the minimum requirement for a 32-bit system and 8 GB is the minimum requirement for a 64-bit system.  More may be desirable if other applications concurrently used with GT-SUITE.  The RAM should be increased if significant memory paging is found to occur.  Please note that a 32-bit operating system is limited to 4 GB of RAM, but more can be installed for 64 bit systems.

**Hard Disk:** GT-SUITE does not rely heavily on I/O, so the disk choice has a minimal effect.

**Video Card:** The video card performance is only important for the 3D parts of GT-SUITE, such as: GEM3D, COOL3D, 3D Flowsplit Viewer in GT-ISE, and 3D Plots in GT-POST. We recommend that you use a stand-alone video card rather than one that is built into the computer's motherboard. Please see the section below for full requirements.

**Monitor:** The absolute minimum is 1280x768. This is true for projectors as well because a widescreen projector is recommended. Monitors are cheap, larger is better, and dual monitors are recommended for maximum productivity.

## 1.3  Minimum System Requirements (PC and UNIX)

All systems must have 1280x768 or more screen resolution, an x86 processor with the SSE2 instruction set (P4+ / Athalon64+), 2GB Free Disk Space, DVD-ROM Drive, and 2 GB RAM.  The computation time is highly dependent on the CPU and the above is simply a minimum which has the necessary instruction sect to run.  It is highly recommended that a better CPU is used.  Please see the section Hardware Recommendations (Which computer should I buy?) for recommendations.  Additionally, to use the 3D graphical features, the system must have a modestly powerful video card.  Platform and OS requirements for coupling GT-SUITE with CFD codes are shown later in this manual.

**NOTE:**  If installing GT-Spaceclaim, you will need an additional 1.1 GB of free disk space.  The installation will also require an additional 4.4 GB of hard drive space.  This 4.4 GB is temporary and will be released back to the system after the installation completes.

Additionally, to compile the user subroutines, the machine must have Intel FORTRAN 12 & Visual Studio 2010 on PC; or Intel FORTRAN complier 12 (ifort/icpc/icc) on Linux.

## 1.4  Virtual Machines

Virtual machines of any sort are officially unsupported.  We do not plan to support virtualization as there are too many possibilities.  Furthermore, if the visualization product is working correctly, there should not be any issues over those from the base operating system.  GT-SUITE clients (GT-ISE, solver, GT-POST, etc…) might run on virtual machines, but Gamma Technologies will not be able to assist with issues specific to a virtual machine.

A license server will require the use of a USB hardlock and as such a license server should be run on physical hardware, not on a virtual machine.

## 1.5 Video Card Support

GT-SUITE has many features (GEM3D, GT-ISE 3D viewer, GT-POST 3D viewer, etc.) related to 3D graphics. In order to make these new features function properly, the video card hardware AND the driver for the system must meet specific requirements described below. If the requirements are not met, the graphically intensive parts of GT-SUITE may not work, but the remainder of the product will function. In summary, a stand-alone video card should be used and not motherboard integrated graphics, the card must generally have a minimum of 64 MB of dedicated video memory, and the driver must support GLX 1.3+ and OpenGL 1.2+. For GT-SPACECLAIM, the driver must also support DirectX 9c, and Shader Model 3.0. 256 MB of graphics memory is also recommended. Please see below for details.

### 1.5.1 Video Card Hardware

A modestly powerful video card is required which is supported by JOGL. In general, stand-alone video cards have adequate support for 3D graphics. We do not recommend using graphic cards that are integrated to the computer's motherboard. Below are the hardware requirements for the video card:

1. Stand-alone video cards should be used and video cards integrated on the computer's motherboard are not recommended. *Note on laptops: Some laptops that include NVIDIA graphics cards may try to maximize battery life by automatically selecting the integrated video processor instead of the NVIDIA card for applications that it does not think are graphics intensive. Please make sure that all GT-SUITE applications are forced to use the NVIDIA card, rather than use the "automatic detection" algorithm (the automatic detection will use the weaker integrated processor and may result in graphical issues).*

2. The video card should have at least 64M (128M is suggested, 256M recommended for GT-SPACECLAIM) of dedicated video card memory.

3. The latest video card driver from the video card vendors should be used and the video card's hardware acceleration should be fully enabled. See the section below for specific requirements for the driver.

Below is a list of video cards known to be compatible with GT-SUITE, but only a limited number of cards have been tested and so this list is not complete. If your video card is not on this list, we recommend trying it before investing in a new video card. Based on our testing of GT-SUITE, NVIDIA cards work well more often than other brands.

| NVIDIA Graphic Cards: | AMD Graphic Cards: |
|---|---|
| - GeForce 9500 Series | - Radeon HD 6300 Series |
| - GeForce 9300 Series | - Radeon HD 3400 Series |
| - GeForce 8400 Series | - Radeon HD 2400 Series |
| - GeForce 7300 Series | - Mobility Radeon X1400 |
| - Quadro NVS 140M | - |
| - Quadro NVS 4200M | |

Recent generations of Intel integrated graphics cards have been tested with GT-SUITE. The Intel HD 3000 and higher provide basic 3D graphics support for GT-SUITE, but performance is reduced when

compared to a dedicated graphics card.  Therefore, these cards are not recommend for regular use with GT-SUITE 3D applications.

**Known Issues**

- It is not recommended to use AMD video cards on Linux 64-bit platforms.  There are known driver and compatibility issues with AMD video card drivers and Linux operating systems that can cause 3D application to fail.  Depending on the exact configuration, this may work, but no guarantees can be made.
- We have received reports of problems with the NVIDIA Quadro series of graphics cards on the Windows XP operating system.  The use of program-specific video card settings may reduce these problems.  These settings are available in the NVIDIA Control Panel, which is usually accessed through the NVIDIA system tray icon or by right-clicking on the Windows desktop.  In the Manage 3D Settings window the Program Settings folder can be used to specify graphics card settings for specific applications.    Add cool3d.exe, gem.exe, and gtise.exe from %GTIHOME%\<version>\GTsuite\bin\win32 to the program list with the following overrides:

| | |
|---|---|
| Antialiasing – Mode: | Override any application setting |
| Antialiasing – Setting: | 2x (2xMS) |
| Antialiasing – Transparency: | Off |
| Threaded optimization: | Off |

## 1.5.2   Video Card Drivers

For the graphically intensive features, the video driver must have a GLX version of at least 1.3 and OpenGL version as shown below.  For GT-SPACECLAIM, the additional driver requirements are DirectX 9c and Shader Model 3.0 support.  A driver from the video card manufacturer is more likely to meet the requirements than a generic one from the operating system, especially on Windows.  Linux may not come with GLX 1.3 and an updated version is only known to be available through video card manufacturers.

| Platforms requiring OpenGL 1.2 or higher |
|---|
| -    Win32/x86,x86_64 |
| -    Linux/x86,x86_64 |

## 1.5.3   Remote X-Windows

When using X-Windows to display the graphics on another machine's display, both the client and server's GLX version must be at least 1.3 and have the required OpenGL version shown above.  The hardware on the machine displaying the graphical image is the one that is important for the speed of updating the image.  Network traffic or speed limitations may also affect the frame rate.

We do not officially support any third-party X-Windowing software.  However, as a service to our users we have tested the following: Cygwin, Exceed, and Exceed Power Suite 2006. We have found that the base Exceed package does not support GLX 1.3 and does not work with the advanced 3D features.  The Exceed 3D add-on which was tested as found in "Exceed Power Suite 2006" does meet the minimum requirements, however it gives ~20% slower frame rates compared to displaying graphics generated locally on the same machine.  The option "GLX 1.3 Support" must be enabled from Start> Exceed Tools>

XConfig> Exceed 3D and GLX.  Cygwin only has a GLX version of 1.2, so it does not work with most machines.  It was found to work with a remote machine with a GLX version of 1.4 (RHEL4.0), but its frame rate is 50% slower than compared to the local machine.  Again, the above products are not supported or endorsed.

### 1.5.4   Testing the video card

The script **gttestj3d,** located in the $GTIHOME/bin directory, may be used to test whether OpenGL and GLX is installed and working properly on your machine.  If the required versions are not installed, it can typically be upgraded by installing the latest graphics driver for the video card from the graphics card manufacturer, <u>not Microsoft</u> (in the case of Windows operating system).

### 1.5.5   Troubleshooting 3D Issues

If you are experiencing problems with our 3D applications, please read through the "Video Card Support" section first.  There are many details above that will more than likely resolve your problem.  If the above information does not help, please follow the steps below.

    I.  Check that your video card meets the minimum requires as stated above.
        a.  If you do not meet these requirements, please update your card.  Refer to our list of recommended cards that are known to work well with our 3D applications.
    II.  Update the video card driver from the video card vendor.
        a.  The driver must be provided by the vendor and not the OS default driver.
        b.  This is necessary to ensure that you are using the proper version of OpenGL and GLX (refer to the information above).  Using an outdated video driver with an older version of OpenGL or GLX will prevent our 3D applications from running.
    III.  Run the test program gttestj3d script, located in the $GTIHOME/bin directory and read the on screen instructions.  This will report the relative performance of the graphical system.
    IV.  Another option is to test with upgraded video card.  Install and test 3D on your machine, but with an upgraded video card. Make sure that this new card meets the minimum requirements we specify.  Run the gttestj3d script as mentioned in Step 3.

# 1.6 Coupling GT-SUITE with 3<sup>rd</sup> Party Software (CFD/Simulink)

The follow sections contain information regarding coupling of GTI software with other software code. Please note the versions which are supported as well as licensing considerations.

## 1.6.1 Coupling GT-SUITE with CFD Codes

The following table provides a summary of the supported versions of CFD codes that are confirmed compatible with released versions of GT-SUITE.

Confirmed incompatibilities are indicated. <u>Absence from the below table does not imply incompatibility</u>, but rather lack of compatibility testing. Please contact support@gtisoft.com (or the CFD software support if the CFD version is new) if it is desired to use a combination not that is listed.

*Italicized* version numbers in the below table indicate a version with no planned support for the next major release of GT-SUITE to be released. Please contact support@gtisoft.com if any of the planned removals are problematic.

**Verified Compatibility: General flow coupling using 'CFDComponent'**

|  | GT-SUITE v7.4 | GT-SUITE v7.3 | GT-SUITE v7.2 |
|---|---|---|---|
| **STAR-CCM+** | v8.06<br>v8.04<br>v8.02<br>*v7.06* | v8.04<br>v8.02<br>*v7.06*<br>*v7.04\*\*\**<br>*v7.02\*\*\** | v8.02<br>*v7.06*<br>*v7.04\*\*\**<br>*v7.02\*\*\**<br>*v6.06* |
| **STAR-CD** | v4.20<sup>L</sup><br>v4.18<sup>L</sup><br>v4.16<sup>L</sup><br>v4.14 | *v4.08, v4.10, v4.12,*<br>v4.14, v4.16<sup>L</sup>, v4.18<sup>L</sup> | *v3.26, v4.08, v4.10,*<br>*v4.12,* v4.14, v4.16<sup>L</sup> |
| **CONVERGE** | v2.0<br>(Linux 112112)<br>(Windows 120412) | v2.0<br>(Linux 112112,<br>*101012†*<br>Windows 120412,<br>*101912†*) | v2.0<br>(Linux 112112,<br>*101012†*,<br>Windows *101912†*)<br>*v1.4.1* |
| **FLUENT** | R15.0<br>R14.5<br>R14.0<br><span style="color:red">(R13.0 SP2 only)\*</span><br>R12.1<br>*R12.0* | R14.5<br>R14.0<br><span style="color:red">(R13.0 SP2 only)\*</span><br>R12.1<br>*R12.0* | R14.5<br>R14.0<br><span style="color:red">(R13.0 SP2 only)\*</span><br>R12.1<br>*R12.0*<br>*v6.3* |
| **OpenFOAM** | v1.4.1-dev‡ | v1.4.1-dev‡ | v1.4.1-dev |
| **FIRE\*\*** | v2013<br>v2010.1 | v2013<br>v2010.1 | v2010.1<br>*v2009.0* |

**Verified Compatibility: CFD Cylinder coupling using 'EngCylinderCFD'**

|  | GT-SUITE v7.4 | GT-SUITE v7.3 | GT-SUITE v7.2 |
|---|---|---|---|
| **CONVERGE** | v2.0 (Linux 112112<br>*Windows 101912†*) | v2.0 (Linux 112112,<br>*101012†* | Not supported |

| | *Windows 101912†)* | |
|---|---|---|

\* - Due to a critical bug in the first release of FLUENT R13.0 and R13.0 SP1, GT-SUITE coupling was not supported (for all GT-SUITE versions). This is fixed for R13.0 SP2 and higher.

\*\* - Other FIRE versions are likely supported, but only compatibility with the listed versions have been verified at GTI.

\*\*\* - STAR-CCM+ v7.02.008 and v7.04.006 are supported for 64-bit Windows, 64-bit Linux, and 32-bit Linux platforms only. The 32-bit Windows version of STAR-CCM+ v7.02.008 and v7.04.006 is not supported due to a bug in these builds of STAR-CCM+.

‡ - OpenFOAM coupling is supported on Linux only for GT-SUITE v7.3 and higher.

† - If using a v2.0 CONVERGE version 101012-110712, a particular and rarely occurring CONVERGE timestep reduction method that reduces its timestep by a factor of 10 does not report to GT-SUITE the correct time to advance its solution. Consequently, GT-POST results may not be generated appropriately despite proper model setup using these versions. This is fixed in CONVERGE v2.0 112112+. This bug may require that the simulation is extended a bit further in a restart to obtain GT-POST data, but the impact on results will be negligible unless this 10x timestep reduction happens regularly in the simulation (which would be very atypical).

$^{L}$ – Errors in the default installed STAR-CD STARGTPOWER plugin scripts prevent STAR-CD solvers from coupling to major release versions of GT-SUITE that are different than the default GT-SUITE version specified in %GTIHOME%\VERSIONS.TXT when using automatic port setup. The default GT-SUITE version in this file is typically the newest version of GT-SUITE installed to the specified %GTIHOME% installation. To correct, either STARGTPOWER plugin scripts need to be adapted to use a changeable GT major release flag, or the %GTIHOME%\VERSIONS.TXT file needs to be changed. It is understood that these requirements are undesirable and Gamma Technologies has reported this problem to CD-Adapco.

When coupling GT-SUITE with CFD codes, the applied CFD software does NOT necessarily need to be run on the same machine that runs the GTI software. The user has the option to run both codes on separate machines OR on the same machine. If using different machines, the CFD software only needs to be installed on one machine.

Although the GT-SUITE solver does not have any dependence on MPI libraries, when GT-SUITE is used to couple with a separately licensed parallel version of CONVERGE-Lite the MPI CONVERGE-Lite solvers installed with GT-SUITE do require MPI library installation.

While MPI CONVERGE-Lite solver MPI library compatibility is not expected to be limited to particular versions of MPI libraries, a table of MPI library versions used to verify MPI CONVERGE-Lite solvers is shown below.

<div align="center">

**Verified Compatibility: General flow coupling using 'CFDCONVERGELite'**

</div>

| MPI Library Platform | GT-SUITE v7.4 build 2+ |
|---|---|
| 64-bit Linux | HP-MPI 02.03.00.00<br>MPICH2 1.2.1 2.3e16<br>OpenMPI 1.4.3 |
| 64-bit Windows | MS-MPI Microsoft HPC Pack 2012 |

|  | MPICH2 1.4.1p1 |
|---|---|
| 32-bit Windows (a 32-bit Windows MPI library can be used for 64-bit Windows CONVERGE-Lite solvers) | MS-MPI Microsoft HPC Pack 2008 R2 MPICH2 1.4.1† HP-MPI 2.0.06049*† |

* - Only single-node HP-MPI has been verified by Gamma Technologies.
† - Configuration-specific Windows 32-bit HP-MPI 2.0.06049 and MPICH2 1.4.1 MPI library limitations exist that do not allow environment variables to be set on nodes and therefore can cause a CONVERGE-Lite solver from starting successfully. If this is encountered, it is recommended to use alternative MPI library. 64-bit Windows MPICH2 1.4.1p1 and listed Microsoft HPC Pack MPI libraries have not exhibited any environment variable relay problems on 32-bit, 64-bit, Windows XP, and Windows 7 systems tested.

If a GT-SUITE installation is used for parallel CONVERGE-Lite coupling, all MPI libraries must be obtained and installed separately. HP-MPI libraries can be downloaded from one's local CONVERGE office. MS-MPI HPC Pack 2012 is a free redistributable available from Microsoft (as is MS-MPI HPC Pack 2008 R2, which would be needed if using Windows XP). Both MPICH2 and OpenMPI are also freely available under BSD-like licenses.


### 1.6.2   Coupling GT-SUITE with Simulink

Coupling of GT-SUITE with Simulink is currently supported for Matlab/Simulink versions 2006b to R2013a.  Coupling is performed via a GTI supplied S-Function Block in the Simulink model and through the use of either a 'SimulinkHarness' or 'CoSimInterface' object in the GT-SUITE model.  For additional information regarding coupling with Simulink, please refer to the Controls Coupling Manual, which is accessible from GT-ISE under Help -> Manuals -> Co-Simulation And User Routines.


### 1.6.3   Other coupling to GT-SUITE using the GTLINK coupling library

Support of CAE client software using the gtlink library provided by Gamma Technologies is required to be built with glibc version 2.5 or higher.