Altair Simulation 2021.1

Hardware Recommendations and Certifications

Contents

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When contacting Altair support, specify the product and version number you are using along with a detailed description of the problem. It is beneficial for the support engineer to know what type of workstation, operating system, RAM, and graphics board you have, so please include that in your communication.

Location	Telephone	E-mail
Australia	+61 3 9866 5557	anzsupport@altair.com
Brazil	+55 113 884 0414	br_support@altair.com

Location	Telephone	E-mail
Canada	+1 416 447 6463	support@altairengineering.ca
China	+86 400 619 6186	support@altair.com.cn
France	+33 141 33 0992	francesupport@altair.com
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India	+91 806 629 4500 +1 800 425 0234 (toll free)	support@india.altair.com
Israel		israelsupport@altair.com
Italy	+39 800 905 595	support@altairengineering.it
Japan	+81 3 6225 5830	support@altairjp.co.jp
Malaysia	+60 32 742 7890	aseansupport@altair.com
Mexico	+52 55 5658 6808	mx-support@altair.com
New Zealand	+64 9 413 7981	anzsupport@altair.com
South Africa	+27 21 831 1500	support@altair.co.za
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Hardware Recommendations and Certifications

1

View the most recent recommended graphic boards, laptops and desktop hardware configurations.

This chapter covers the following:

Recommended Graphics Boards

Recommended CAE/CAD graphic boards to use with Altair Simulation applications.

The most recent vendor/manufacturer drivers should be used and all driver support for these cards should be addressed to the appropriate manufacturer of the graphic board.

> **Note:** AMD graphics cards will no longer be supported on Linux x86_64 operating systems in Altair Simulation 2021.1 and higher products.

AMD Graphics Cards

Products	GPU Model	Driver Version
Radeon™ Pro	VII WX 9100 W5700(*) WX 8200 W5500(*) WX 7100 WX 5100 WX 4100 WX 3200 WX 3100 WX 2100	*Windows 10 (64-bit)* 20.Q3 (20.Q4*) *Linux (64-bit)* Not Supported
Radeon™ Pro Mobility	WX 7130 WX 7100 WX 4170 WX 4150 WX 4130 WX 3100 WX 2100	*Windows 10 (64-bit)* 20.Q3 (20.Q4*) *Linux (64-bit)* Not Supported

NVIDIA Graphics Boards

Products	GPU Model					Driver Version
	M (Maxwell)	**P (Pascal)**	**V (Volta)**	**RTX (Turing)**	**A* (Ampere)**	
Quadro Series	M2000 M4000 M5000 M6000	P400 P420 P600 P620 P1000 P2000 P2200 P4000 P5000 P5200 P6000 GP100	GV100	RTX 3000 RTX 4000 RTX 5000 RTX 6000 RTX 8000	RTX A5000 RTX A6000	*Windows 10 (64-bit)* 451.77 *Linux (64-bit) ODE Long Live* 450.57 **Ampere GPUs* 462.32 or higher
Quadro Mobility	M500M M520M M600M M620M M1000M M2000M M2200M M3000M M4000M M5000M	P500 P520 P600 P620 P1000 P2000 P3000 P3200 P4000 P4200 P5000 P5200	N/A	T1000 T2000 RTX 3000 RTX 4000 RTX 5000		*Windows 10 (64-bit)* 451.77 *Linux (64-bit) ODE Long Live* 450.57

Note:

Minimum OpenGL 3.2 and OpenCL 2.1 Requirement
Virtual server/clients and VirtualGL setups may work, but are not officially tested or supported.

NVIDIA Optimus or AMD Switchable Graphics
In order to ensure best performance, these options should be set to use discrete NVIDIA or AMD GPU and not the Intel GPU.

Power Options and Mobility Center
In order to ensure best performance, these options should be maximum performance for both GPU and CPU.

Graphics Driver Corruption or Installation Issues
In order to ensure best driver compatibility, it is recommended to use "Custom" and "Clean" install options instead of the general "Express" driver installer options.

Recommended Workstation Desktop and Laptop/ Notebook Hardware

DELL Workstations - Desktops (1 of 2)

Product	**Workstation Model**			
Precision Workstation	**3420T / 3430T**	**3440 SFF**	**3460 (mini)**	**3620T / *3630T** ***3930 Rack**
NVIDIA Quadro GPU	P400 P600 P620 P1000	P400 P620 P1000	RTX 3000	P400 P600 P620 P1000 P2000 P4000 P5000 *RTX 4000 *RTX 5000
AMD Radeon™ Pro GPU	WX 2100 WX 3100 WX 4100	WX 3200	N/A	WX 2100 WX 3100 WX 4100 WX 5100 WX 7100

DELL Workstations - Desktops (2 of 2)

Product	**Workstation Model**		
Precision Workstation	**3640T / 3930 Rack***	**5810**	**5820 / 7820 / 7920**
NVIDIA Quadro GPU	P400 P620 P1000	P400 P600 P1000	P400 P620 P1000

Product	**Workstation Model**		
Precision Workstation	**3640T / 3930 Rack***	**5810**	**5820 / 7820 / 7920**
	RTX 4000 RTX 5000 RTX 6000*	P2000 P4000 P6000	P2200 RTX 4000 RTX 5000 RTX 6000 RTX 8000
AMD Radeon™ Pro GPU	W5500 W5700 WX 3200 WX 4100* WX 7100	W7100 W8100 W9100 WX 4100 WX 5100 WX 7100	W5500 W5700 WX 3200

DELL Workstations - Laptops (1 of 3)

Product	**Workstation Model**			
Precision Workstation	**3550**	**3551**	**5530**	**5540 / 5740**
NVIDIA Quadro GPU	P520	P620	P1000M P2000M	T1000 T2000 RTX 3000*
AMD Radeon™ Pro GPU	N/A	N/A	N/A	N/A

DELL Workstations - Laptops (2 of 3)

Product	**Workstation Model**				
Precision Workstation	**5520 AIO**	**5520**	**5550 / 5750***	**5720**	**7520**
NVIDIA Quadro GPU	N/A	M1200M	T1000 T2000	N/A	P3000M P5000M

Product	**Workstation Model**				
Precision Workstation	**5520 AIO**	**5520**	**5550 / 5750***	**5720**	**7520**
			RTX 3000*		
AMD Radeon™ Pro GPU	WX 4150	N/A	N/A	WX7100M	WX 7100

DELL Workstations - Laptops (3 of 3)

Product	**Workstation Model**				
Precision Workstation	**7530**	**7540 / 7740**	**7550 / 7750**	**7720**	**7730**
NVIDIA Quadro GPU	P2000M P3200M P4000M	T1000 T2000 RTX 3000 RTX 4000 RTX 5000	T1000 T2000 RTX 3000 RTX 4000 RTX 5000	M1200M P3000M P4000M P5000M	P3200M P4200M P5200M
AMD Radeon™ Pro GPU	WX 4150	WX 3200 WX 7130	N/A	WX 7100	WX 4150 WX 7100

Lenovo Workstations - Desktops (1 of 2)

Product	**Workstation Model**		
Lenovo ThinkStation	**P320 SFF / P320 TWR***	**P330 SFF / P330 TWR***	**P340 SFF / P340 TWR***
NVIDIA Quadro GPU (442.92 or higher)	P400 P600 P1000 P2000* P4000*	P400 P620 P1000 P2000* P2200* P4000*	P400 P620 P1000 P2200 RTX 4000* RTX 5000*

Product	**Workstation Model**		
Lenovo ThinkStation	**P320 SFF / P320 TWR***	**P330 SFF / P330 TWR***	**P340 SFF / P340 TWR***
AMD Radeon™ Pro GPU	N/A	N/A	N/A

Lenovo Workstations - Desktops (2 of 2)

Product	**Workstation Model**				
Lenovo ThinkStation	**P520**	**P520c**	**P620 (AMD Ryzen PRO 3975X)**	**P720 / P920**	**NEC (mini)**
NVIDIA Quadro GPU (442.92 or higher)	P400 P620 P1000 P2200 RTX 4000 RTX 5000 RTX 6000 RTX A5000 RTX A6000	P400 P620 P1000 P2200 RTX 4000 RTX 5000	P620 P1000 P2200 RTX 4000 RTX 5000 RTX 6000 RTX 8000 RTX A5000 RTX A6000 GP100	P400 P620 P1000 P2200 RTX 4000 RTX 5000 RTX 6000 RTX 8000 RTX A5000 RTX A6000	P1000
AMD Radeon™ Pro GPU	N/A	N/A	W5500 W5700	N/A	N/A

Lenovo Workstations - Laptops (*Windows 10 support only) (1 of 3)

Product	**Workstation Model**							
Lenovo ThinkPad	**P1 Gen1**	**P1 Gen2***	**P1 Gen3**	**P14s**	**P14s Gen1**	**P15 Gen1**	**P15s Gen1**	**P15v Gen1**
NVIDIA Quadro GPU	P1000M	T1000	T1000	P520	P520	T1000 T2000	P520	P620

Product	**Workstation Model**							
Lenovo ThinkPad	**P1 Gen1**	**P1 Gen2***	**P1 Gen3**	**P14s**	**P14s Gen1**	**P15 Gen1**	**P15s Gen1**	**P15v Gen1**
	P2000M	T2000	T2000			RTX 3000 RTX 4000		
AMD Radeon™ Pro GPU	N/A	N/A	N/A	N/A	AMD Ryzen 7 PRO 4750U with Radeon Graphics (2 GB)	N/A	N/A	N/A

Lenovo Workstations - Laptops (*Windows 10 support only) (2 of 3)

Product	**Workstation Model**						
Lenovo ThinkPad	**P17 Gen1**	**P40 Yoga**	**P43s***	**P50**	**P50s**	**P51**	**P51s**
NVIDIA Quadro GPU	T1000 T2000 RTX 3000 RTX 4000 RTX 5000	M500M	P520	M1000M M2000M	M500M	M1200M M2200M	M520M
AMD Radeon™ Pro GPU	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Lenovo Workstations - Laptops (*Windows 10 support only) (3 of 3)

Product	**Workstation Model**						
Lenovo ThinkPad	**P52**	**P52s**	**P53***	**P53s***	**P71**	**P72**	**P73***
NVIDIA Quadro GPU (442.92 or higher)	P1000 P2000 P3200	P500	T1000 T2000 RTX 3000 RTX 4000	P520	M620M P3000 P4000 P5000	P600 P2000 P3200 P4200 P5200	P620 T2000 RTX 3000 RTX 4000 RTX 5000
AMD Radeon™ Pro GPU	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Acer Workstations and Laptops (*Windows 10 support only)

Product	**Workstation Model**		
Acer	**ConceptD 500***	**ConceptD 700***	**Veriton K8**
NVIDIA Quadro GPU	RTX 4000	RTX 4000	RTX 4000
AMD Radeon™ Pro GPU	N/A	N/A	N/A

Product	**Mobile Workstation Model**				
Acer	**ConceptD 3 Pro***	**ConceptD 3 Ezel Pro***	**ConceptD 5 Pro***	**ConceptD 7 Pro***	**ConceptD 7 Ezel Pro***
NVIDIA Quadro GPU	T1000	T1000	RTX 3000	RTX 3000	RTX 5000
AMD Radeon™ Pro GPU	N/A	N/A	N/A	N/A	N/A

Altos Workstations and Laptops (*Windows 10 support only)

Product	Workstation Model	
Altos Computing	**BrainSphere™ P130 F5**	**BrainSphere™ P530 F4**
NVIDIA Quadro GPU	RTX 2000	K420 P400 K620 K1200 P1000 P2000 P4000 P5000 P6000 GP100 RTX 2000 RTX 4000 RTX 5000
AMD Radeon™ Pro GPU	N/A	N/A

Comments

For NVIDIA GPU based laptops/notebooks the Optimus power saving option in the BIOS should be disabled and the NVIDIA drivers properly installed for optimal performance in Altair Simulation products.

For AMD GPU based laptops/notebooks; the Enduro/Switchable Graphics power saving option should be disabled and the AMD drivers properly installed for optimal performance in Altair Simulation products.

Optimus (Intel/NVIDIA) enabled drivers may create performance issues with notebooks/laptops compared to a dedicated non-shared GPU driver. Disabling the Optimus feature in BIOS, if available, will help give the best overall graphics performance.

Disable nView Window manager under NVIDIA drivers if you experience random crashes and/or issues.

All power saving modes, settings and governors for CPU frequencies and GPU performance should be set to maximum settings in order to get the optimal performance out of Altair Simulation products. This includes smooth graphics and high frame rates (FPS) on Windows and Linux platforms.

Altair Simulation 2021.1 Solver Hardware Configuration Recommendations

Recommended hardware configurations for Altair Solvers.

AcuSolve Solver

Table 1:

Problem Size	Small	Medium	Large
Typical Workload Steady State or Transient	Steady state: Up to 1M nodes Transient: Up to 100K nodes	Steady state: Up to 10M nodes Transient: Up to 1M nodes	Steady state: Greater than 10M nodes Transient: Greater than 1M nodes
Throughput [1]	Single job	Single job	Single job
CPU [2]	Dual CPU socket For example, Intel Xeon Gold "Cascade Lake" or "Skylake" or AMD EPYC 7002 series	Dual CPU socket For example, Intel Xeon Gold "Cascade Lake" or "Skylake" or AMD EPYC 7002 series	Dual CPU socket For example, Intel Xeon Gold "Cascade Lake" or "Skylake" or AMD EPYC 7002 series
Number of CPU / node	1-4	1-4	1-4
Number of cores / node	32 – 128	32 – 128	32 – 128
Number of nodes	1-8	8 – 48	>48
Minimum Memory Configuration / node [3]	300MB to 3GB	3GB to 30GB	More than 30GB (3KB per CFD node)
Storage (minimum)	500 GB SATA or SSD	1.5 TB local storage	1.5 TB local storage
Network Interconnect	Gigabit Ethernet Or Infiniband	Infiniband or Intel Omni-path	Infiniband or Intel Omni-path
Operating System	Linux kernel 2.6.32 or higher Windows 7 or 10	Linux kernel 2.6.32 or higher	Linux kernel 2.6.32 or higher
GPU	Yes	Yes	Yes
MPI	Intel MPI 2018.4 or higher	Intel MPI 2018.4 or higher	Intel MPI 2018.4 or higher

Problem Size	Small	Medium	Large
Setup (2000-3000 computational nodes per core)	Pure OpenMP or Hybrid OpenMP/MPI	Hybrid OpenMP/MPI	Hybrid OpenMP/MPI
Hyper Threading	Not recommended	Not recommended	Not recommended

Feko Solver

Table 2:

Problem Size	Small	Medium	Large
General recommendations given for MoM and MLFMM dependent on problem size in terms of number of unknowns / mesh elements. For other solution methods (FEM, FDTD, RL-GO, PO, UTD) many factors to be considered.	Pure MoM: less than 50k unknowns. MLFMM: between 100k and 500k unknowns	Pure MoM: between 50k and 100k unknowns. MLFMM: between 500k and 5M unknowns	Pure MoM: >100k unknowns MLFMM: >5M unknowns
Throughput [1]	Single job	Single large job or few jobs in parallel	Single very large job or multiple jobs
CPU [2]	Dual CPU socket For example, Intel Xeon Gold "Cascade Lake" or "Skylake" or later	Dual CPU socket For example, Intel Xeon Gold "Cascade Lake" or "Skylake" or later	Dual CPU socket For example, Intel Xeon Gold "Cascade Lake" or "Skylake" or later
Number of CPU / node	2	2	2
Number of cores / node	32 – 56	32 – 56	32 – 56
Number of nodes	1	8 – 16	> 16
Minimum Memory Configuration / node [3]	64 GB	128 GB	256 GB
Storage (minimum)	500 GB SATA or SSD	500 GB SATA or SSD	500 GB SATA or SSD

Problem Size	Small	Medium	Large
Network Interconnect	Gigabit Ethernet	Infiniband or Intel Omni-path	Infiniband or Intel Omni-path
Operating System	Linux kernel 2.6.32 or higher Windows 7 or 10	Linux kernel 2.6.32 or higher	Linux kernel 2.6.32 or higher
GPU	Yes	No	No
MPI	Intel MPI 2018.4 or higher	Intel MPI 2018.4 or higher	Intel MPI 2018.4 or higher
Setup	Pure MPI	Pure MPI	Pure MPI
Hyper Threading	Not recommended	Not recommended	Not recommended

Flux Solver

Table 3:

Problem type	Small	Medium	Large
Typical Workload (depending on number of DOF, element type, and other factors)	< 300 000 DOF	Around 500 000 DOF	Around 5M DOF
Throughput [1]	Single	Single	Single
CPU [2]	Dual CPU socket For example, Intel Xeon Gold "Cascade Lake" or "Skylake"	Dual CPU socket For example, Intel Xeon Gold "Cascade Lake" or "Skylake"	Dual CPU socket For example, Intel Xeon Gold "Cascade Lake" or "Skylake"
Number of CPU / node	1	2	2
Number of cores / node	8	16	16+
Number of nodes	1	1	1-4
Minimum Memory Configuration / node [3]	8 GB	16-32 GB	300GB
Storage (minimum)	500 GB SATA or SSD	1 TB local storage SSD	1.5 TB local storage SSD

Problem type	Small	Medium	Large
Network Interconnect			Infiniband or Intel Omni-path
Operating System	Linux kernel 3.10.0-693 or higher Windows 7 or 10 with SSD	Linux kernel 3.10.0-693 or higher Windows 7 or 10 with SSD	Linux kernel 3.10.0-693 or higher Windows 7 or 10 with SSD
GPU	No	No	No
MPI	Intel MPI 2018.4 or higher	Intel MPI 2018.4 or higher	Intel MPI 2018.4 or higher
Setup	SMP	SMP or Hybrid 2MPI/node	SMP or Hybrid 2MPI/node
Hyper Threading	Not recommended	Not recommended	Not recommended

Radioss Solver

Table 4:

Problem Size	Small	Medium	Large
Typical Workload Crash & Impact	Component tests, sled test, drop test, … Less than 500K elements	Medium crash model, between 1 and 6 millions of elements model	Accurate car crash model (rupture), very large model with size > 6 million elements
Throughput [1]	Single job	Single large job or few jobs in parallel	Single very large job or multiple jobs
CPU [2]	Dual CPU socket For example, Intel Xeon Gold "Cascade Lake" or "Skylake" or AMD EPYC 7002 series	Dual CPU socket For example, Intel Xeon Gold "Cascade Lake" or "Skylake" or AMD EPYC 7002 series	Dual CPU socket For example, Intel Xeon Gold "Cascade Lake" or "Skylake" or AMD EPYC 7002 series
Number of CPU / node	2	2	2
Number of cores / node	32 – 64	32 – 128	32 – 128
Number of nodes	1	8 – 16	> 16

Problem Size	Small	Medium	Large
Minimum Memory Configuration / node [3]	64-128GB	64-128GB	64-128GB
Storage (minimum)	500 GB SATA or SSD	1,5 TB local storage	1,5 TB local storage
Network Interconnect	Gigabit Ethernet	Infiniband or Intel Omni-path	Infiniband or Intel Omni-path
Operating System	Linux kernel 2.6.32 or higher Windows 7 or 10	Linux kernel 2.6.32 or higher	Linux kernel 2.6.32 or higher
GPU	No	No	No
MPI	Intel MPI 2018.4 or higher	Intel MPI 2018.4 or higher	Intel MPI 2018.4 or higher
Setup	Pure MPI	Pure MPI or Hybrid with 2 or 4 OpenMP threads per MPI	Hybrid with 2 or 4 OpenMP threads per MPI
Hyper Threading [5]	Yes, Hybrid with 2 OpenMP per MPI	Not recommended	Not recommended

OptiStruct Solver

Table 5:

Problem type	Small or medium	Large static	Large dynamic
Typical Workload (depending on number of DOF, element type, and other factors)	Nonlinear - less than 2M DOF; linear static - less than 5M DOF; NVH - less than 5M DOF	Nonlinear - more than 2M DOF; linear static - more than 5M DOF	NVH - more than 5M DOF
Throughput [1]	Single	Single	Single or few jobs in parallel
CPU [2]	Dual CPU socket For example, Intel Xeon Gold "Cascade Lake" or "Skylake"	Dual CPU socket For example, Intel Xeon Gold "Cascade Lake" or "Skylake	Dual CPU socket For example, Intel Xeon Gold "Cascade Lake" or "Skylake
Number of CPU / node	2	2	2

Problem type	**Small or medium**	**Large static**	**Large dynamic**
Number of cores / node	8-24	24+	24+
Number of nodes	1	1-8	1-8
Minimum Memory Configuration / node [3]	16-64GB	128GB	256GB
Storage (minimum)	512GB local storage	1TB local storage	3 TB local storage, SSD and RAID0 recommended
Network Interconnect		InfiniBand or Intel Omni-path	InfiniBand or Intel Omni-path
Operating System	Linux kernel 2.6.32 or higher Windows 7 or 10 with SSD	Linux kernel 2.6.32 or higher Windows 7 or 10 with SSD	Linux kernel 2.6.32 or higher Windows 7 or 10 with SSD
GPU	Yes	No	No
MPI	Intel MPI 2018.4 or higher	Intel MPI 2018.4 or higher	Intel MPI 2018.4 or higher
Setup	SMP or DDM hybrid	DDM hybrid	SMP or DDM hybrid
Hyper Threading	Not recommended	Not recommended	Not recommended

1. Number of simultaneous jobs. Use of a workload management middleware like Altair PBS is highly recommended to insure optimal and dedicated usage of the CPU resource
2. Typical node configuration is based on dual CPU socket processors
3. It is extremely important to populate all the memory banks on the mother board.
4. In Hybrid mode, it is recommended to set a number of MPIs that is a multiple of the number of sockets and then set the number of OpenMP in a way that number of MPIs x number of OpenMP equal number of physical cores.
5. Hyper Threading (HT) may increase performance by around 10% on single node. In this case, recommended setup is to run 2 OpenMP per MPI, with a number of MPIs that matches the total number of physical cores on the node. On multi-node, it is better not using HT

Recommended GPU Computing Processor List for OptiStruct

Recommended graphic boards for use with the Altair Solver applications for high-powered GPU computing.

The following table lists the recommended graphic boards for use with the Altair Solver applications for high-powered GPU computing.

Manufacturer and Model	Graphics Card	Driver Version (Minimum or Higher)
NVIDIA (Tesla)	P100 V100	Linux (64-bit) 387.26 Windows (64-bit) 391.03
NVIDIA (Quadro)	GP100 GV100	Linux (64-bit) 387.26 Windows (64-bit) 391.03

Note: The most recent vendor/manufacturer drivers should be used and all driver support for these cards should be addressed to the appropriate manufacturer of the graphics board.

Additional Information on Driver Installations

The NVIDIA Driver Update recommendation is to use the **Custom installation** option and select the **Perform clean installation** option to validate that there are no conflicts in DLL/drivers.

The same should be done with AMD hardware and drivers as well using AMD's custom uninstall tools.

Figure 1: