

POPULAR GPU-ACCELERATED APPLICATIONS

Application	Description	Supported Features	Expected Speed Up*	Multi-GPU Support	Release Status
CAD					
CATIA V6-Live Rendering	Photorealistic rendering	Interactive. Fully integrated in CATIA V6. Network rendering	3-6x	Yes	Available now
Bunxspeed Pro Suite 2012	Easy to use photorealistic rendering software	Iray-based ray-tracing. Animation support. Network rendering	3-6x	Yes	Available now
RTT DeltaGen 11.x	Photorealistic rendering used for design	Interactive ray tracing and global illumination. Integration with Siemens TeamCenter. Cluster support	16x	Yes	Available now
RTT DeltaPix	Photorealistic rendering with integration of TeamCenter and RTT formats	Iray based ray-tracing. Support for JT and csb formats	3-6x	Yes	Available now Version 1.1

Computational Finance

Hanweck Associates	Real-time options analytical engine (Volera)	Real-time options analytics engine	100x	Yes	Available now
MATLAB Mathworks	Data parallel mathematics (MATLAB PCT, MDCS)	MATLAB Operations	3-20x	Yes	Available now
Murex	Risk analytics (MACS)	MACS analytics library	60-400x	Yes	Available now
Numerical Algorithms Group (NAG)	Random number generators, Brownian bridges, and PDE solvers	Monte Carlo	50x	Single Only	Available now
Tanay ZX Lib (Fuzzy Logic)	Financial analytics and data mining library	Monte Carlo simulations, pricing of vanilla and exotic options, fixed income analytics, data mining	100 - 500x	Yes	Available now
SciComp, Inc	Derivative pricing (SciFinance)	Monte Carlo and PDE pricing models	30-50x (MC), 10-35x (PDE)	Single Only	Available now

Computational Structural Mechanics

Abaqus/Standard	Simulation and analysis tool for structural mechanics	Direct sparse solver	1.5-2.5x	Yes	Available now Version 6.12
ANSYS Mechanical	Simulation and analysis tool for structural mechanics	Direct & iterative solver	2-3x	Single Only	Available now Version 14
Impetus Afea	Predicts large deformations of structures and components exposed to extreme loading conditions	Linear equation solver	10x SPH, 2x Total	Yes	Available now
LS-DYNA Implicit	Multiphysics simulation package used	Linear equation solver	3x	Yes	Beta available for CentOS Linux
MSC Nastran	Simulation and analysis tool for structural mechanics	Linear equation solver	1.5x	Yes	Available now Version 12.1
Marc	Simulation and analysis tool for structural mechanics	Linear equation solver	1.5x	Yes	Available now Version 2012
RADIOSS Implicit	Used to maximize durability, NVH, crash,safety, manufactureability and fluid-structure interaction performance	Linear equation solver	2-4x	Yes	In Development

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Computational Fluid Dynamics					
Altair AcuSolve	General purpose CFD flow solver	Linear equation solver	2x	Yes	Available now Version 1.8a
ANSYS Fluent	General purpose CFD software based on FVM	Radiation heat transfer model	10x model	Single only	Available now Version 14.0
Autodesk Moldflow	Optimize design of plastic parts and injection molds	Linear equation solver	1.5x	Single Only	Available now Version 2013
FEFLO (GMU-Lohner)	General purpose CFD software based on FEM for compressible and incompressible flows	Implicit & explicit solver	2-10x	Yes	In Development
Fluidyna Culises for OpenFOAM	Solver library for general purpose CFD software based on FVM	Linear equation solvers	3x Solver	Yes	Available now Version 1.2
Fluidyna LBultra	General purpose CFD software	Lattice-Boltzmann solver	20x	Yes	Available now Version 2.0
Prometech Particleworks	Fluid simulation for free surface flow like Tsunami, material processing and liquids.	Particle CFD using MPS	4-9x	Yes	Available now Version 3.0
SD++(SU-Jameson)	General purpose CFD software based on FEM for compressible flows	Explicit compressible solver	15x	Yes	In Development
S3D (Sandia and Oak Ridge NL)	Direct numerical solver (DNS) for turbulent combustion	Chemistry kernel	5x	Yes	In Development
Vratis ARAEL	General purpose CFD software based on FVM with OpenFOAM compatibility	Linear equation solvers	3x Solver	Single Only	Available now Version 1.0
Turbostream Ltd.	CFD software based on FVM for turbomachinery internal flows	Explicit compressible solver	19x	Yes	Available now Version 2.0
Vratis SpeedIT extreme for OpenFOAM	Solver library for general purpose CFD software	Linear equation solvers	6x Solver	Yes	Available now Version 1.2
Defense & Intelligence					
DigitalGlobe Advanced Ortho Series	Geospatial Visualization	Image orthorectification	50x	Yes	Available now
Eternix Blaze Terra	Geospatial Visualization	3D visualization of geospatial data	50x	Yes	Available now
Exelis (ITT) ENVI	Geospatial Visualization	Image orthorectification (custom builds only)	70x	Yes	Available now
GeoEye Analytics Signature Analyst	Geospatial Visualization	Terrain analytics	12-15x	Yes	Available now
GeoWeb3d Desktop	Geospatial Visualization	3D visualization of geospatial data	Requires GPU	Yes	Available now
Incogna GIS	Geospatial Visualization	Image processing on Tesla cloud servers. Object recognition	50x	Yes	Available now
Intergraph Motion Video Analyst	Video filters and mosaic'ing — Geo-fuses FMV analytics with intelligence data	Full motion video ortho mosaic processing	5-7x	No	Available now
Intuvision Panoptes 3.0	Video Analytics	Object recognition and change detection	12x	Yes	Available now
MotionDSP Ikena 2.2	Video Enhancement	Video stabilization, filtering, ortho mosaic, and transcoding	5x	Yes	Available now
Nerve ViD SrX	Video Analytics	Object recognition and tracking	100x	Yes	Available now
PCI Geomatics GXL	Geospatial Visualization	Image orthorectification and additional image processing	20-60x	Yes	Available now
Savant (Delcross)	Simulation tool for installed antenna performance and antenna-to-antenna coupling	High-frequency solver	20-50x	Yes	Available now

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Electronic Design Automation and CEM					
Agilent Technologies ADS	Simulation tool for design of RF, microwave and high speed digital circuits	Signal integrity simulation	4-6x	Single Only	Available now
Agilent Technologies EMPro	Modeling and simulation environment for analyzing 3D EM effects of high speed and RF/Microwave components	FDTD solver	6x	Yes	Available now
ANSYS Nexxim	Circuit simulation engine for RF/analog/mixed-signal IC design; IBIS-AMI analysis speedup with GPU computing.	AMI analysis	7-15x	Single Only	Available now
CST Microwave Studio (MWS)	High frequency electromagnetic field simulation.	Transient solver	9-20x	Yes	Available now
Gauda OPC, OPV	Collection of several software tools for computational lithography running on Gauda hardware platform	Optical proximity correction & verification	20-100x	Single Only	Available now
Remcom XFDTD	3D EM modeling and simulation	FDTD solver	30-50x	Yes	Available now
Rocketick RocketSim	Verilog simulation	Verilog simulation	10x	Single Only	Available now
SPEAG SEMCAD-X	3D EM modeling and simulation	FDTD solver	100x	Yes	Available now
Materials Science					
LSMS	Materials code for investigating the effects of temperature on magnetism	Generalized Wang-Landau method	3x 2 GPUs vs 128 CPU cores	Yes	In development
Petot	First principles materials code that computes the behavior of the electron structures of materials	Density functional theory (DFT) plane wave pseudopotential calculations	6-10x	Yes	Available now
QMCPACK	Solves the many-body Schrodinger equation for electronic structures using a quantum Monte Carlo method	Main features	3-4x 512 GPUs vs. 512 CPUs	Yes	Available now
Quantum-Espresso/PWscf	An integrated suite of computer codes for electronic structure calculations and materials modeling at the nanoscale	PWscf package: linear algebra (matrix multiply), explicit computational kernels, 3D FFTs	7.8-8.9x	Yes	Available now Version 4.1.3
VASP	First principles materials code that computes the behavior of electronic structures based on quantum theory	Hybrid Hartree-Fock DFT functionals including exact exchange	2x 2 GPUs vs. 128 CPU cores	Yes	Available on request
Media & Entertainment - Animation					
Autodesk 3ds Max	3D modeling, animation, and rendering	iray interactive, photorealistic and physically correct rendering	6-10x	Yes	Available now
Autodesk Maya	3D modeling, animation, and rendering	Increased model complexity, larger scenes	10x	Single only	Available now

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Media & Entertainment-Editing and Effects					
Adobe After Effects CS6	Motion graphics and effects	3D ray tracing engine based on NVIDIA OptiX and Global Performance Cache	27x	Yes	Available now
Adobe Photoshop CS6	Image editing	Over 20 effects for smoother image manipulation in Mercury Graphics Engine	Real-Time	Single Only	Available now
Adobe Premiere Pro CS6	Video editing	Mercury Playback Engine for faster video effects and Mercury Transmit for Quadro SDI Output	7-8x	Single only	Available now
Adobe SpeedGrade CS6	Color grading	Real-time manipulation of color & light in Lumetri Deep Color Engine. For SDI. supports only NVIDIA Quadro SDI Output	Real-Time	Single Only	Available now
Assimilate Scratch	Color Grading and Finishing	Accelerated debayering for real-time digital finishing. Supports NVIDIA Quadro SDI Output	Real-Time	Single Only	Available now
Avid Media Composer	Video editing	Faster video effects, unique stereo 3D capabilities	2.5 - 7x	Single Only	Available now
Blackmagic Davinci Resolve	Color grading	Real-time color correction	Real-Time	Single Only	Available now
Cinefilm Dark Energy	Image texture management	Image de-noising and restoration. Simultaneous active and background rendering	Faster than real-time Requires GPU	Yes	Available now
GenArts Sapphire	Effects plug-in for video editing	Faster video effects	10x	Single only	Available now
Marquise Rain	Color grading	Real-time color correction and NVIDIA Quadro SDI Output	Real-Time	Single Only	Available now
Sony Vegas Pro	Video editing	Faster video effects and encoding	7x	Single only	Available now

Molecular Dynamics

Abalone	Models molecular dynamics of biopolymers for simulations of proteins, DNA and ligands	Simulations (on 1060 GPU)	4-29x	Single Only	Available now
ACEMD	Simulation of mechanics force fields, implicit & explicit solvent on CUDA	Written for use on GPUs	160ns/day	Yes	Available now
AMBER	Suite of programs to simulate molecular dynamics on biomolecules	PMEMD: explicit and implicit solvent	89.44 ns/day JAC NVE	Yes	Available now, Version 12
DL-POLY	Simulate macromolecules, polymers, ionic systems, etc on a distributed memory parallel computer	Two-body Forces, Link-cell Pairs, Ewald SPME forces, Shake VV	4x	Yes	Available now, Version 4.0 Source only
GROMACS	Simulation of biochemical molecules with complicated bond interactions	Implicit (5x), Explicit(2x) solvent	165 ns/Day DHFR	Single Only	Available now Version 4.5
HOOMD-Blue	Particle dynamics package written grounds up for GPUs	Written for GPUs	2x	Yes	Available now
LAMMPS	Classical molecular dynamics package	Lennard-Jones, Gay-Berne	3.5-15x	Yes	Available now
NAMD	Designed for high-performance simulation of large molecular systems	100M atom capable	6.44 ns/days STMV585x 2050s	Yes	Available now, Version 2.9
OpenMM	Library and application for molecular dynamics on high-performance	Implicit and explicit solvent, custom forces	Implicit: 127-213 ns/day; Explicit: 18-55 ns/day DHFR	Yes	Available now Version 4.0

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Numerical Analysis					
Jacket AccelerEyes	GPU acceleration for MATLAB (high-level technical computing language)	Support for several hundred of the most commonly used MATLAB functions	2-20x	Yes	Available now
Mathematica Wolfram	A symbolic technical computing language and development environment	Development environment for CUDA and OpenCL	2-20x	Yes	Available now
MATLAB Mathworks	GPU acceleration for MATLAB (high-level Technical Computing Language)	Support for over 200 of the most commonly used MATLAB functions	2-20x	Yes	Available now

Oil&Gas

Acceleware RTM	Seismic Processing	RTM algorithm	14x	Yes	Available now
CGG/Veritas RTM	Seismic Processing	RTM algorithm	Non-disclosed	Yes	Available now
ffA Geoteric	Seismic Interpretation	Attributes Calculations	11-13x	Yes	Available now
ffA SVI Pro	Seismic Interpretation	Attributes Calculations	5-20x	Yes	Available now
ffA SEA3D Pro	Seismic Interpretation	Attributes Calculations	5-20x	Yes	Available now
Geoteric	Seismic Processing/Interpretation	Attributes Calculations	11-13x	Yes	Available now
Headwave Suite	Seismic Interpretation	Attributes Calculations	10-50x	Yes	Available now
Insight Earth (Terraspark)	Seismic Interpretation	Horizon orientation attributes; automated fault extraction	10x or greater	Yes	In Development
Paradigm EarthStudy360	Reservoir Modeling	Attributes Calculations	10-40x	Yes	Available now
Paradigm Echos RTM	Seismic Processing	RTM algorithm	14x	Yes	Available now
Paradigm SKUA	Reservoir Modeling	Faults, Horizons and Flow Simulation Grid	5-40x	Yes	Available now
Paradigm VoxelGeo	Seismic Interpretation	Attributes Calculations	10-40x	Yes	Available now
Reservoir Simulation Solvers (Stoneridge)	Reservoir Simulation	Sparse Matrix solver	5-6x	Yes	Available now
Schlumberger WesterGeco Omega2 RTM	Seismic Processing	Multiple Algorithms (RTM, etc)	Non-disclosed	Yes	Available now
Seismic City Prestack Interpretation	Seismic Processing	Attributes Calculations	10-40x	Yes	Available now
SpectraSeis	Seismic Processing	Full elastic wave-equation imaging and analysis of microseismic fracture data	28x	Yes	Available now
Tsunami RTM	Seismic Processing	RTM algorithm	14x	Yes	Available now

Physics

Chroma	Lattice Quantum Chromodynamics (LQCD) codes simulate how elemental particles are formed and bound by the "strong force" to create larger particles like protons and neutrons	Wilson-clover fermions, Krylov solvers, Domain-decomposition	8-9x 768 GPUs vs. 768 (16-core) CPUs	Yes	Available now
GTC	Simulates microturbulence & transport in magnetically confined fusion plasma	Electron push and shift (accounting for >80% of run time)	2-3x 128 GPUs vs. 128 CPUs	Yes	Available now
MILC	Lattice Quantum Chromodynamics (LQCD) codes simulate how elemental particles are formed and bound by the "strong force" to create larger particles like protons and neutrons	Staggered fermions, Krylov solvers, Gauge-link fattening	5-6x	Yes	Available now

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Quantum Chemistry					
Abinit	Allows to find the total energy, charge density and electronic structure of systems made of electrons and nuclei within DFT	Local Hamiltonian, non-local Hamiltonian, LOBPCG algorithm, diagonalization/orthogonalization	1.3-2.7x	Yes	Available now Since Version 6.1
ACES III	Takes best features of parallel implementations of quantum chemistry methods for electronic structure	Integrating scheduling GPU into SIAL programming language and SIP runtime environment	10x kernels	Yes	In development
ADF	Density Functional Theory (DFT) software package that enables first-principles electronic structure calculations	Fock Matrix, Hessians	TBD	Yes	In development
BigDFT	Implements density functional theory by solving the Kohn-Sham equations describing the electrons in a material	DFT; Daubechies wavelets, part of Abinit	5-25x	Yes	Available now Version 6.1.x
Casino	Code for performing quantum Monte Carlo (QMC) electronic structure calculations for finite and periodic systems	TBD	TBD	Yes	In development
CP2K	Program to perform atomistic and molecular simulations of solid state, liquid, molecular and biological systems	DBCSR (space matrix multiply library)	2-7x	Yes	In development
GAMESS-UK	Is the general purpose ab initio molecular electronic structure program for performing SCF-, DFT- and MCSCF-gradient calculations	(ss/ss) type integrals within calculations using Hartree Fock ab initio methods and density functional theory. Supports organics & inorganics.	8x	Yes	In development
GAMESS-US	Computational chemistry suite used to simulate atomic and molecular electronic structure	Libqc with Rys Quadrature Algorithm, integral evaluation, closed shell Fock matrix construction	1.3-1.6x	Yes	Available now
Gaussian	Joint NVIDIA, PGI & Gaussian collaboration. Gaussian predicts the energies, molecular structures, and vibrational frequencies of molecular systems	TBD	TBD	Yes	In development
GPAW	Real-space grid DFT code written in C and Python	Electrostatic poisson equation, orthonormalizing of vectors, residual minimization method (rmm-diis)	8x	Yes	Available now
MOLCAS	Methods for calculating general electronic structures in molecular systems in both ground and excited states	CU_BLAS	1.1x	Yes	In development
MOLPRO	Used for accurate ab initio quantum chemistry calculations	Density-fitted MP2 (DF-MP2), density fitted local correlation methods (DF-RHF, DF-KS), DFT	1.7-2.3x	Yes	In development
NWChem	Computational chemistry package designed for HPC clusters	Triples part of Reg-CCSD(T), CCSD & EOMCCSD task schedulers	3-10x	Yes	In development
Q-CHEM	Computational chemistry package designed for HPC clusters	Various features including R1-MP2	8-14x	Yes	Available now Version 4.0
TeraChem	Quantum chemistry software designed to run on NVIDIA GPU	Full GPU-based solution. Performance compared to GAMESS CPU version.	44-650x	Yes	Available now, Version 1.5

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Visualization & Docking Software					
Amira 5	A multifaceted software platform for visualizing, manipulating, and understanding Life Science and bio-medical data.	3D visualization of volumetric data and surfaces	70x	Yes	Available now Version 5.5
Core Hopping	Rapid screening of novel cores to improve drug properties	GPU accelerated application	3.5-5000x	Yes	Available now
FastROCS	Molecule shape comparison application	All features are GPU-enabled	800-3000x	Yes	Available now
Molegro Virtual Docker 5	Method for performing high accuracy flexible molecular docking	Energy grid computation, pose evaluation and guided differential evolution	25-30x	Single only	Available now
VMD	Visualization and analyzing large bio-molecular systems in 3-D graphics	GPU acceleration for computationally demanding analysis and visualization tasks	100-125x Kernels	Yes	Available now Version 1.9.x

Weather & Climate Forecasting

ASUCA (JMA)	Regional atmospheric model	Entire model	12x	Yes	In Development
CAM / SE	Global atmosphere model for climate research	Entire model	2x Dynamics	Yes	In Development
COSMO	Regional atmospheric model	Entire model	3x Dynamics	Yes	In Development
GEOS-5	Global climate model	Entire model	10x Models, 3x Dynamics	Yes	In Development
HOMME	Dynamical core for numerical weather prediction model	Dynamical core	3x Kernels	Single Only	In Development
HYCOM	Ocean circulation model	Dynamical core	2x Kernels	Single Only	In Development
MITgcm	Ocean circulation model	Dynamical core	3x Dynamics	Single Only	In Development
NIM	Dynamical core for numerical weather prediction model using icosahedral horizontal grid	Dynamical core	7x Dynamics	Yes	In Development
WRF	Regional numerical weather prediction model	WSM5, WSM3, Ice Microphysics models	4-6x Models	Single Only	Available now Version 3.2

* Expected speedups are highly dependent on system configuration. Unless noted otherwise, speedup is for entire code. Speedup data based on NVIDIA in house testing or ISV's documentation. GPU performance compared against multi-core x86 CPU socket. GPU performance benchmarked on GPU supported features and may be a kernel to kernel performance comparison. For configuration details, please view the application website.

For more information on GPU-accelerated applications please visit, www.nvidia.com/teslaapps

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