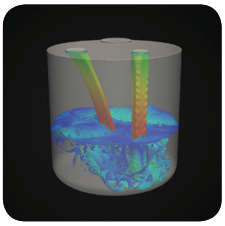
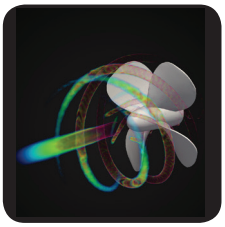
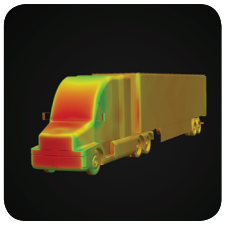
Ohio Supercomputer Center

An OH·TECH Consortium Member

www.osc.edu

Industrial Engagement

Modeling & Simulation: The Future of Manufacturing

Innovative Design • Improved Products • Increased Productivity

As industrial designers and engineers have become accustomed to computer-aided design and manufacturing tools, they seek more detail in the simulations and models to improve their designs, which in turn requires investments of more domain-specific knowledge, more specialized software and greater computational resources.

A number of prominent studies indicate that modeling and simulation (M&S) based on high-performance computing is critical to the competiveness of industry. In some estimates, M&S has saved as much as 98 percent when compared to physical testing and has accelerated design cycles by as much as 66 percent. With M&S, companies can take complex systems, simplify them and advance innovation by reducing time and cost for prototyping, while generating new and better products. The outcome is trimmed development expenses and more competitive products, resulting in increasing market share.

For more info, please visit:
tiny.cc/osc-compete

How AweSim can help!

AWESIM
Virtual Designs. Real Benefits.

Many large manufacturers have embraced simulation-driven design, but smaller manufacturers are largely missing out on this competitive advantage because they cannot afford to leverage such solutions.

Under the AweSim program, OSC and its industry partners are together pioneering the field of M&S as a Service – automating the manual prototyping process and creating reusable apps to support affordable and accessible HPC modeling, simulation and analysis for manufacturing. The platform provides the tools needed to rapidly develop customized M&S tools (known as apps), which in turn enable companies to more quickly address emerging customer requirements.

For more info, please visit: tiny.cc/osc-awesim.

How can industry access OSC resources?

1. Optional NDA/CDA agreement based on client needs
2. Completion of OSC Services Agreement
3. Watch-list screening of users and account creation
4. Monthly invoicing of actual usage

About OSC

The Ohio Supercomputer Center provides computation, software, storage and support services that empower Ohio's universities, industries and other clients to meet their research, educational and business goals.

When OSC was established through a state operating budget bill in 1987, policymakers "intended that the center be made accessible to private industry as appropriate." Later that year, the Ohio Board of Regents formed the Center "as a statewide resource designed to place Ohio's research universities and private industry in the forefront of computational research."

For more info: tiny.cc/osc-mission

Contact

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Basic packages start at only $500

OSC industry clients start with an initial startup package that costs just $500 and includes:

- **2,500 normal priority CPU hours** (parallel jobs are charged for whole nodes, regardless of number of CPUs utilized)
- **3 hours of advanced technical support**
- **Up to 1,024 cores at a time, with 95% availability**
- **Up to 500GB of home directory storage per user**
- **Up to 20 user accounts** associated with a single project
- **Outside network connectivity** via general Internet connection
- **Unlimited basic technical support** (such as user account issues, accessing the system and loading software)
- **Access to appropriate software** according to licensing restrictions*

*No fees are charged for already-installed, open-source software applications. Customers are responsible for obtaining licenses for any commercial software packages they decide to use, for which OSC does not have existing commercial-usage licenses.

Need Additional Hours & Services?

OSC also provides custom services including:

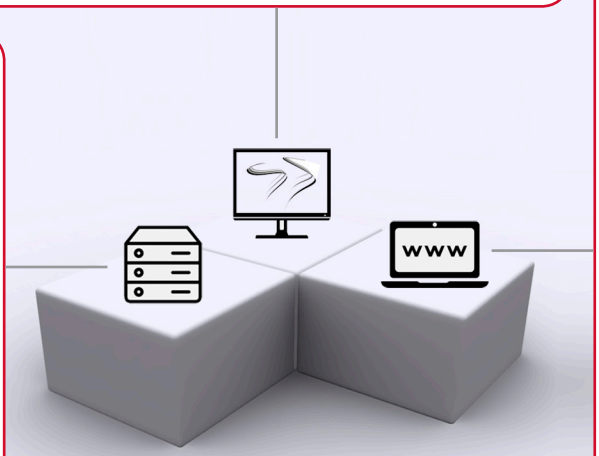
- Advanced technical support
- Engineering support in a wide variety of computational fields
- Hosting of export-controlled data and codes
- Long-term rental of dedicated compute nodes
- Large-scale data storage
- Priority queue access for computational jobs

Computational Software

OSC maintains more than 30 software applications and 70 different software packages. Industrial clients have the option of utilizing licensed open-source software, providing pointers to their own commercial licenses or working with OSC to obtain short-term commercial licenses. For more info, please visit: tiny.cc/osc-software

Data Storage

OSC offers more than two petabytes (PB) of disk-storage capacity distributed over several file systems, plus almost 2PB of backup tape storage. Storage types include home directories, project directories, local scratch disks and parallel file system. For more info, please visit: tiny.cc/osc-storage



Web Portals

OnDemand.osc.edu is our “one stop shop” for access to OSC resources. With OnDemand, you can transfer files, submit, and monitor jobs, run GUI applications and connect via SSH, all via a web browser. My.osc.edu is a comprehensive portal for managing user accounts, request services, track support issues and view utilization reports. For more info, please visit: tiny.cc/osc-portals

High Performance Computing System Specifications

For more info, please visit tiny.cc/osc-hardware

	Ruby System (2014)	Oakley System (2012)	Glenn System (Phase III, 2009)
Theoretical Peak Performance	96 TF +28.6 TF (GPU) +20 TF (Xeon Phi) ~144 TF	88.6 TF +65.5 TF (GPU) ~154 TF	34 TF +6 TF (GPU) ~40 TF
# of Nodes / Sockets / Cores	240 / 480 / 4800	692 / 1384 / 8304	426 / 856 / 3408
Cores per Node	20 cores/node	12 cores/node	8 cores/node
Local Disk Space per Node	~800 GB in /tmp	~800 GB in /tmp	~400 GB in /tmp
Compute CPU Specs	Intel Xeon E5-2670 v2 CPUs • 2.5 GHz • 10 cores per processor	Intel Xeon x5650 CPUs • 2.67 GHz • 6 cores per processor	AMD Opteron 2380 CPUs • 2.5 GHz • 4 cores per processor
Compute Server Specs	200 HP SL230 40 HP SL250 (for NVIDIA GPU/Intel Xeon Phi)	HP SL390 G7	IBM x3455
# / Kind of GPU/Accelerators	20 NVIDIA Tesla K40 • 1.43 TF Peak double-precision • 2880 CUDA cores • 12GB memory 20 Xeon Phi 5110p • 1.011 TF Peak • 60 cores • 1.053 GHz • 8 GB memory	128 NVIDIA M2070 • 515 GFlops Peak Double Precision • 6 GB memory • 448 CUDA cores	18 NVIDIA Quadro Plex 2200 S4 • Each with 4 Quadro FX 5800 GPUs • 240 CUDA Cores/GPU • 4 GB memory/GPU
# of GPU / Accelerator Nodes	40 total (20 of each type)	64 Nodes (2 GPUs/node)	36 Nodes (2 GPUs/Node)
Total Memory	~16 TB	~33 TB	~10 TB
Memory per Node / per Core	64 GB / 3.2 GB	48 GB / 4 GB	24 GB / 3 GB
Interconnect	FDR/EN IB (56 Gbps)	QDR IB (40 Gbps)	DDR IB (20 Gbps)

Standardized Policies & Procedures

OSC has established externally audited policies and procedures based upon industry standards covering aspects, such as acceptable use, data security, business continuity and risk management. For more info, please visit: tiny.cc/osc-policies

24x7 Support Desk

The OSC Support Desk provides technical support and consulting services for OSC's high performance computing resources. It is staffed 24x7 and reachable at:
Toll Free: (800) 686-6472
Local: (614) 292-1800
Email: oschelp@osc.edu

Tutorials & Training

OSC offers periodic training on a variety of topics at both our facility and universities across the state. Additionally, we make available online content designed for self-paced learning and step-by-step guides to accomplish certain tasks on our systems. For more info, please visit: tiny.cc/osc-training

A Record of Successful Industrial Engagements

Injection-Molded Lenses

Greenlight Optics modeled thermal properties involved in producing an injection-molded lens used for collimating LED light.
For more info: tiny.cc/osc-greenlight

Prototyping Fan Designs

TotalSim developed an online simulation portal for a provider of advanced airflow management solutions. For more info: tiny.cc/osc-totalsim

Optimizing Fuel Cell Efficiency

TMI developed thermal models of heat exchangers and steam reformers to optimize the efficiency of their AE fuel cell technology platform.
For more info: tiny.cc/osc-tmi

Welding Simulation

Engineering Mechanics Corporation of Columbus adapted their welding design software package to a more accessible manufacturing app.
For more info: tiny.cc/osc-emc2

Product Research

Procter & Gamble are actively applying various systems biology approaches to develop a more comprehensive understanding of how the company's products affect consumers. For more info: tiny.cc/osc-pg

Optimizing Plastic Containers

KLW Plastics and Kinetic Vision worked to improve algorithms used to optimize the amount of plastic used in the manufacture of their containers.
For more info: tiny.cc/osc-klw

Fuel Cell Modeling

LG Fuel Cell Systems refined software to simulate heat, chemical and flow traits in a fuel cell structure. For more info: tiny.cc/osc-lg

Dissipating Thermal Energy

AltaSim Technologies evaluted the thermal behavior of newly developed printed circuit boards designed for use in the process control industry.
For more info: tiny.cc/osc-altasim

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OH·TECH
Ohio Technology Consortium
A Division of the **Ohio Board of Regents**

Empower. Partner. Lead

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