



SC12

Salt Lake City, Utah

SC12 Call for Technical Papers

November 10–16, 2012

Salt Lake City, Utah

Abstracts due April 27, 2012; Full Papers due May 4, 2012

<http://sc12.supercomputing.org/content/papers>

SC12, the premier annual international conference on high performance computing, networking, and storage, will be held in **Salt Lake City, Utah, November 10-16, 2012**. The Technical Papers Program at SC is the leading venue for presenting the highest-quality original research, from the foundations of HPC to its emerging frontiers. The conference committee solicits submissions of excellent scientific merit that introduce new ideas to the field and stimulate future trends on topics such as applications, systems, parallel algorithms, and performance modeling. SC also welcomes submissions that make significant contributions to the “state of practice” by providing compelling insights on best practices for provisioning, using, and enhancing high performance computing systems, services, and facilities.

New in 2012

- Reorganized and new topic areas
- “State of Practice” track integrated with regular papers
- Later deadlines (end of April)
- Review rebuttal period

Technical Paper Topic Areas

Submissions will be considered on any topic related to high performance computing including, but not limited to, the nine topical areas below.

1. Algorithms
2. Applications
3. Architectures and Networks
4. Clouds and Grids
5. Performance, Energy, and Dependability
6. Programming Systems
7. Storage, Visualization, and Analytics
8. System Software
9. State of Practice

Algorithms

Concerns the development, evaluation and optimization of scalable, high performance algorithms for problems that are typically common to multiple disciplines. Topics include:

- Data assimilation, model refinement, and reduced-order models
- Discrete and combinatorial problems
- Grid and mesh-based methods
- Inverse problems
- Numerical methods, linear and non-linear systems
- Particle, N-body, and molecular/coarse-grained methods
- Uncertainty quantification

Applications

Concerns the development and enhancement of algorithms, models, software, and problem solving environments for domain-specific applications that require high performance computing, networking, and storage. Topics include:

- Bioinformatics and computational biology
- Computational earth and atmospheric sciences
- Computational materials science and engineering
- Computational astronomy, chemistry, fluid dynamics, physics, mechanics, etc.
- Computation and data enabled social science
- Computational design optimization for aerospace, energy, manufacturing, and industrial applications
- Computational medicine and bioengineering

Architecture and Networks

Concerns all aspects of high performance hardware including the optimization and evaluation of processors and networks. Topics include:

- Processor architecture, chip multiprocessors, GPUs, cache, and memory subsystems
- Interconnect technologies (InfiniBand, Myrinet, Quadrics, Ethernet, Routable PCI etc.), switch/router architecture, network topologies, on-chip or optical networks, and network fault tolerance
- Internet protocol (TCP, UDP, sockets), quality of service, congestion management, and collective communication
- Power-efficient architectures, high-availability architectures, stream or vector architectures, embedded and reconfigurable architectures, and emerging technologies
- Innovative hardware/software co-design
- Parallel and scalable system architectures
- Performance evaluation and measurement of real systems

Clouds and Grids

Concerns all aspects of grids and clouds. Topics include:

- Security and identity management
- Virtualization and overlays
- Scheduling, load balancing, workflows, and resource provisioning
- Data management and scientific applications
- Self-configuration, management, information services, and monitoring
- Compute and storage cloud architectures

- Programming models and tools for computing on clouds and grids
- Quality of service and service-level agreement management
- Problem solving environments and portals
- Service-oriented architectures and tools for integration of clouds, clusters, and grids

Performance, Energy, Dependability

Concerns the crosscutting subjects of performance, energy, and dependability (PED) that typically span multiple areas of expertise and are crucial factors in the design of scalable HPC systems. Topics include:

- Analysis, modeling, or simulation for PED
- Empirical measurement of PED on real-world systems
- Tools, code instrumentation, and instrumentation infrastructure for measurement and monitoring of PED
- New opportunities or challenges for PED made possible by emerging HPC technologies
- PED workload characterization and benchmarking
- PED studies of HPC subsystems, such as processor, network, memory, and I/O
- Impact of PED on applications and their design
- Impact of application design on PED
- Methodologies and formalisms for PED

Programming Systems

Concerns technologies that support parallel programming for large-scale systems as well as smaller-scale components that will plausibly serve as building blocks for next-generation HPC architectures. Topics include:

- Compiler analysis and optimization; program transformation
- Parallel programming languages and notations; programming models
- Runtime systems
- Libraries (in support of end users or other aspects of the programming environment)
- Parallel application frameworks
- Tools (e.g., debuggers, performance analysis, integrated development environments, data analysis, visualization)
- Software engineering for parallel programming
- Productivity-oriented programming environments and studies
- Solutions for parallel programming challenges: interoperability, memory consistency, determinism, race detection, work stealing, load balancing, etc.

Storage, Visualization, and Analytics

Concerns all aspects of storage, visualization, and analysis.

Topics include:

- Databases for HPC, scalable structured storage
- Data mining, analysis, and visualization for modeling and simulation
- Parallel file, storage, and archival systems
- Scalable storage, metadata, and data management
- I/O performance tuning, benchmarking, and middleware
- Next generation storage systems and media
- Storage systems for data intensive computing
- Storage networks
- Reliability and fault tolerance in HPC storage
- Visualization and image processing

System Software

Concerns the design and development of operating systems, runtime systems, and other low-level software that enables allocation and management of hardware resources for high performance computing applications and services. Topics include:

- Alternative and specialized operating systems and runtime systems for many-core processors
- Support for fault tolerance and resilience
- Management of complex memory hierarchies and transactional memory
- Enhancements for attached and integrated accelerators
- Distributed memory and shared memory systems
- Communication optimization
- Interactions between the OS, runtime, compiler, middleware, and tools
- Strategies for managing and reducing energy consumption
- Virtualization and virtual machines
- Approaches for enabling adaptive and introspective system software

State of Practice

Concerns all aspects related to the pragmatic practices of HPC, including infrastructure, services, facilities, large-scale application executions, etc. Submissions that develop best practices, optimized designs, or benchmarks are of particular interest. Although concrete case studies within a conceptual framework would likely serve as the basis for submitted papers, efforts to generalize the experience for wider applicability will be highly valued. Topics include:

- Deployment experiences of large-scale infrastructures and facilities
- Long-term infrastructural management experiences
- Comparative benchmarks of actual machines over a wide spectrum of workloads
- Pragmatic resource management strategies and experiences
- Facilitation of “big data” associated with supercomputing
- User support experiences with large-scale and novel machines
- Multi-center infrastructures and their management
- Pragmatic bridging of cloud data centers and supercomputing centers
- Education, training, and dissemination activities and their quantitative results
- Procurement, technology investment, and acquisition of best practices
- Infrastructural policy issues, especially international experiences

Review Process

The SC12 Technical Papers Committee will rigorously review all submissions with the goal of selecting the best technical contributions across both established and emerging areas of HPC. In an effort to enhance the review process and to create an exceptional program, SC12 will introduce a review rebuttal option for the authors.

The review process acceptance criteria will concentrate on originality, technical soundness, presentation quality, timeliness, impact, and relevance to SC. Some papers may present principles, results, and discussions in the context of a single node, core, thread, or GPU. To be accepted, these papers must measurably improve upon the state of the art along dimensions that are relevant for SC.

Awards will be presented for Best Paper and Best Student Paper. Extended versions of papers selected as finalists for the Best Paper and Best Student Paper Awards may be published in the journal Scientific Programming. With our focus on quality and the observed trend towards substantial increases in submissions from year to year, the committee expects a 20% acceptance rate for SC12 Technical Papers.

How to submit

Papers must be submitted electronically via the website

<https://submissions.supercomputing.org/>

A sample submission form is also available at that site (click on the tab “Sample Submission Forms” at the login page). SC follows a two-part submission process, with abstracts due by **April 27, 2012** and full papers by **May 4, 2012**.

Format. Submissions are limited to 10 pages in the IEEE format, see http://www.ieee.org/conferences_events/conferences/publishing/templates.html. The 10-page limit includes figures, tables, and appendices, but does not include references, for which there is no page limit. **Selecting areas of contribution.** All submissions *must indicate* one of the nine areas as the *primary area* of contribution. One of the remaining eight areas may be indicated as a secondary area of contribution.

Guidelines: Submission material cannot overlap substantially with any paper previously accepted for publication or under review by any conference or journal during the SC review process. Authors should follow IEEE publication policies, see:

http://www.ieee.org/publications_standards/publications/rights/Multi_Sub_Guidelines_Intro.html

SC12 Technical Papers Chairs

Padma Raghavan, The Pennsylvania State University

Jeffrey S. Vetter, Georgia Tech and Oak Ridge National Laboratory

SC12 Technical Papers Area Chairs

Algorithms: Edmond Chow, Georgia Institute of Technology

Applications: Martin Berzins, University of Utah

Architecture and Networks: Steve Keckler, NVIDIA and University of Texas at Austin

Clouds and Grids: Marty Humphrey, University of Virginia

Performance, Energy, and Dependability: David Lowenthal, University of Arizona

Programming Systems: Brad Chamberlain, Cray Inc.

Storage, Visualization, and Analytics: Hank Childs, Lawrence Berkeley National Laboratory

System Software: Ron Brightwell, Sandia National Laboratories

State of Practice: Satoshi Matsuoka, Tokyo Institute of Technology

The complete list of members of the technical papers committee is available online at:

<http://sc12.supercomputing.org/content/committees>

Important SC12 Information:
Utah Salt Palace Convention Center,
Salt Lake City, UT

<http://sc12.supercomputing.org/>

Web Submissions:
<https://submissions.supercomputing.org/>

Email Contact:
papers@info.supercomputing.org

Important Dates:
Submissions Open: February 15, 2012

Abstracts Due: April 27, 2012
(Abstracts are required to submit a full paper.)

Full Papers Due: May 4, 2012

Review Rebuttal: June 15-19, 2012

Notifications: July 15, 2012

Conference Dates: November 10-16, 2012