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MAIN CONFERENCE PROGRAMME Day 1 | Tuesday, 17 March 2015 Breakthrough Theatrette, Level 4, Matrix Building, Biopolis	
08:00 - 08:40	Registration & Welcome Coffee
08:40 - 08:45	Opening Remarks *Marek Michalewicz, A*STAR Computational Resource Centre, Singapore* *Yuefan Deng, Stony Brook University, USA & A*STAR Computational Resource Centre, Singapore*
08:45 - 08:55	Welcome Address *Tin Wee Tan, Chairman, A*STAR Computational Resource Centre, Singapore*
EXASCALE & APPLICATIONS I Chair: Marek Michalewicz	
09:00 - 09:45	Exascale Arithmetic *John Gustafson, Ceranovo Inc., USA*
09:45 - 10:30	Current Trends in Parallel Numerical Computing and Challenges for the Future *Jack Dongarra, University of Tennessee Knoxville & Oak Ridge National Laboratory USA*
10:30 - 10:45	Break
10:45 - 11:30	Exascale Challenges in Computational Genomics *Rick Stevens, University of Chicago & Argonne National Laboratory, USA*
11:30 - 12:15	Toward Exascale Seismic Imaging: Taming Workflow and I/O Issues *Jeroen Tromp, Princeton University, USA*
12:15 - 13:15	Lunch
EXASCALE & APPLICATIONS II Chair: Yuefan Deng	
13:15 - 13:55	Exascale Dream in Fusion Energy Dream *Choong-Seock Chang, Korea Advanced Institute of Science and Technology, South Korea & Princeton University, USA*

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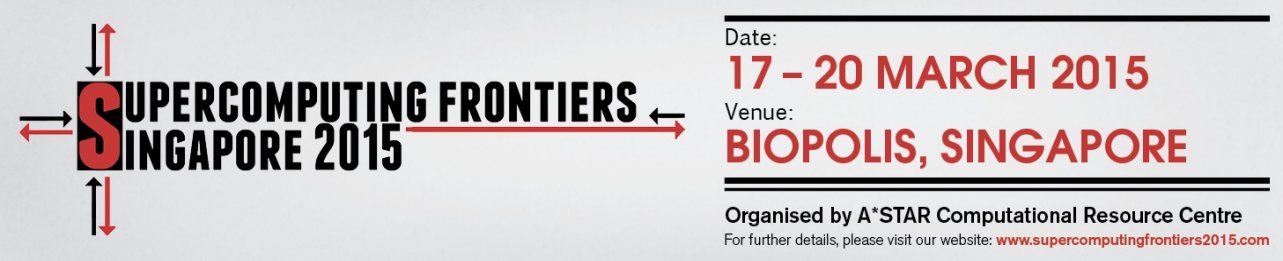
MAIN CONFERENCE PROGRAMME Day 1 | Tuesday, 17 March 2015 Breakthrough Theatrette, Level 4, Matrix Building, Biopolis	
13:55 - 14:15	**Breaking the Simulation/Analysis Chain** *Michael Bussmann, Axel Huebl and René Widera, Helmholtz-Zentrum Dresden-Rossendorf, Germany* *Felix Schmitt, NVIDIA, USA* *Sebastian Grottel, Technische Universität Dresden, Germany* *Norbert Podhorszki and Dave Pugmire, Oak Ridge National Laboratory, USA* *Scott Klasky, Georgia Tech University & University of Tennessee Knoxville, USA*
14:15 - 14:35	**Creating Skeletons for Task-Based Scientific Workflows** *Jeremy Logan, University of Tennessee Knoxville, USA* *Scott Klasky, Georgia Tech University & University of Tennessee Knoxville, USA* *Norbert Podhorszki, Oak Ridge National Laboratory, USA* *Lizhe Wang, Chinese Academy of Sciences, China* *Wei Xue, Tsinghua University, China*
14:35 - 14:55	**Multi-Component Modeling with Swift at Extreme Scale** *Daniel S. Katz, Justin Wozniak, Michael Wilde and Ian Foster,* *University of Chicago & Argonne National Laboratory, USA*
14:55 - 15:10	**Break**
EXASCALE & APPLICATIONS III Chair: Thomas Sterling	
15:10 - 15:50	**A Sustainable Model for Scientific Simulation Beyond the Exascale** *Robert Harrison, Stony Brook University & Brookhaven National Laboratory, USA*
15:50 - 16:20	**InfiniBand at the Extreme Scale** *Richard Graham, Mellanox Technologies, USA*
16:20 - 16:40	**A Data-Driven Approach to Data-Intensive Astronomy on HPC Clusters** *Chen Wu, Andreas Wicenec and Kevin Vinsen, The University of Western Australia, Australia* *Ruonan Wang, International Centre for Radio Astronomy Research & The University of Western Australia, Australia*
16:40 - 17:00	**Multigrid at Scale** *Mark Ainsworth, Brown University, USA*



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MAIN CONFERENCE PROGRAMME Day 1 | Tuesday, 17 March 2015 Breakthrough Theatrette, Level 4, Matrix Building, Biopolis	
17:00 - 17:20	Scalable Multilevel Stokes Solver for Mantle Convection Problems *Björn Gmeiner and Ulrich Ruede, University Erlangen-Nuremberg, Germany*
17:20 - 17:40	Multi-scale Supercomputing for Virtual Process Engineering *Wei Ge, Chinese Academy of Sciences, China*
17:40 - 18:00	Multi-Paradigm Simulation at Nanoscale: Methodology and Application to Functional Carbon Material *Haibin Su, Nanyang Technological University, Singapore*
END OF DAY 1	

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MAIN CONFERENCE PROGRAMME Day 2 | Wednesday, 18 March 2015 Breakthrough Theatrette, Level 4, Matrix Building, Biopolis	
08:00 - 08:30	Registration & Welcome Coffee
SOFTWARE ECOSYSTEMS Chair: Chee Yeow Meng	
08:30 - 09:15	Pioneering at the Frontiers of Exascale Computing and Beyond *Thomas Sterling, CREST, Indiana University, USA*
09:15 - 10:00	Creating a Software Ecosystem for Data Intensive Science *Scott Klasky, Georgia Tech University & University of Tennessee Knoxville, USA*
10:00 - 10:30	An Autonomic Performance Environment for Exascale *Kevin Huck, Nicholas Chaimov and Allen Malony, University of Oregon, USA* *Allan Porterfield and Robert Fowler, Renaissance Computing Institute, USA* *Harmut Kaiser, Louisiana State University, USA* *Thomas Sterling, Indiana University, USA*
10:30 - 10:45	Break
10:45 - 11:15	Big Data Challenges in Simulation-Based Science *Manish Parashar, Rutgers University, USA*
WORKFLOWS & I/O Chair: Manish Parashar	
11:20 - 11:50	Challenges of Managing Scientific Workflows in High-Throughput and High-Performance Computing Environments *Ewa Deelman, University of Southern California Information Sciences Institute, USA*
11:50 - 12:20	A Maturing Role of Workflows in the Presence of Heterogenous Computing Architectures *Ilkay Altintas, University of California, San Diego, USA*
12:20 - 13:20	Lunch

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MAIN CONFERENCE PROGRAMME Day 2 | Wednesday, 18 March 2015 Breakthrough Theatrette, Level 4, Matrix Building, Biopolis	
13:20 - 13:50	**ADIOS Query Interface Design** *Drew A. Boyuka, Xiaocheng Zou and Nagiza Samatova, North Carolina State University, USA* *Junmin Gu and Kesheng Wu, Lawrence Berkeley National Laboratory, USA* *Norbert Podhorszki, Oak Ridge National Laboratory, USA* *Scott Klasky, Georgia Tech University & University of Tennessee Knoxville, USA*
13:50 - 14:10	**SideIO: A Side I/O Framework System for Eliminating Analysis Data Migration** *Dan Huang, Jiangling Yin, Jun Wang, Xuhong Zhang and Jian Zhou, University of Central Florida, USA* *Qing Liu, Oak Ridge National Laboratory, USA*
14:10 - 14:30	**Sebo: Selective Bulk Analysis Optimization in Big Data Processing** *Jiangling Yin and Jun Wang, University of Central Florida, USA*
14:30 - 15:00	**ICEE: Enabling Data Stream Processing For Remote Data Analysis Over Wide Area Networks** *Jong Choi, Yuan Tian, Gary Liu, Norbert Podhorszki and David Pugmire, Oak Ridge National Laboratory, USA* *Scott Klasky, Georgia Tech University & University of Tennessee Knoxville, USA* *Eun-Kyu Byun and Soonwook Hwang, Korea Institute of Science & Technology (KISTI), South Korea* *Alex Sim, Lingfei Wu, and John Wu, Lawrence Berkeley National Laboratory, USA* *Mehmet Aktas and Manish Parashar, Rutgers University, USA* *Michael Churchill and C.S. Chang, Princeton Plasma Physics Laboratory, USA* *Tahsin Kurc, Stony Brook University, USA* *Xinyan Yan and Matthew Wolf, Georgia Tech, USA*
15:00 - 15:15	**Break**
INTERCONNECTS Chair: Ewa Deelman	
15:15 - 15:45	**An HPC Interconnect with Functions, Features and Opportunities** *Ulrich Bruening, University of Heidelberg, Germany*
15:45 - 16:10	**Creating Interconnect Topologies for Big Data and Exascale Era: MDO and SMOD Algorithms** *Marek Michalewicz and Lukasz Orlowski, A*STAR Computational Resource Centre, Singapore* *Yuefan Deng, Stony Brook University, USA & A*STAR Computational Resource Centre, Singapore*
16:10 - 16:35	**Group Theory for Design of Network Topologies for Supercomputers** *Alexandre Ferreira Ramos, University of São Paolo, Brazil*

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MAIN CONFERENCE PROGRAMME Day 2 | Wednesday, 18 March 2015 Breakthrough Theatrette, Level 4, Matrix Building, Biopolis	
ACCELERATED COMPUTING Chair: Rick Goh Siow Mong	
16:40 - 16:55	A Case for Embedded FPGA-based SoCs for Energy-Efficient Acceleration of Graph Problems *Pradeep Moorthy, Siddhartha and Nachiket Kapre, Nanyang Technological University, Singapore*
16:55 - 17:10	Scale-Free Sparse Matrix-Vector Multiplication on Accelerators *Wai Teng Tang, Mian Lu, Huynh Phung Huynh and Rick Siow Mong Goh, Institute of High Performance Computing, A*STAR, Singapore*
17:10- 17:25	CUDA Capable GPU Based Near Real-time Processing for an Underwater Acoustic Video Camera *Mandar Chitre, Anshu Singh and Venugopal Pallayil,* *Acoustic Research Laboratory, Tropical Marine Science Institute, National University of Singapore* *Manu Ignatius, Subnero Pte. Ltd., Singapore*
Conference Dinner at The Ballroom of Faber Peak Singapore 6:30pm - 9:30pm	
END OF DAY 2	

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MAIN CONFERENCE PROGRAMME Day 3	Thursday, 19 March 2015 Breakthrough Theatrette, Level 4, Matrix Building, Biopolis
08:00 - 08:30	Registration & Welcome Coffee
	EXASCALE SYSTEMS Chair: Jack Dongarra
08:30 - 09:10	Architecture for Exascale and Beyond *Alan Gara and Amrita Lokre, Intel, USA*
09:10 - 09:50	TSUBAME3.0 Towards 4.0 and Issues Toward Convergence of Extreme Computing and Big Data Centers *Satoshi Matsuoka, Tokyo Institute of Technology, Japan*
09:50 - 10:30	High-Performance or High-Productivity, Can We Have Both? *Thomas Schulthess, ETH Zürich, Switzerland*
10:30 - 10:45	Break
	ENERGY & EFFICIENCY OF OPERATIONS Chair: Ulrich Brüning
10:45 - 11:05	Ensuring Efficiency of Exascale Supercomputer Centers *Vladimir Voevodin and Vadim Voevodin, Research Computing Center, Moscow State University, Russia*
11:05 - 11:25	Driving Energy Efficient Supercomputing *Natalie Bates, Chair, Energy Efficient HPC Working Group, USA*
11:25 - 11:45	The L-CSC Cluster: Greenest Supercomputer in the World in Green500 List of November 2014 *David Rohr, Gvozden Neskovic, Mathias Radtke and Volker Lindenstruth,* *Frankfurt Institute for Advanced Studies, Germany*
11:45 - 12:05	Roadmap Towards Ultimately-Efficient Zeta-Scale Data Centers *Bruno Michel, Matteo Cossale, Ronald Luijten, Stefan Paredes and Ingmar Meijer,* *IBM Research Zurich, Switzerland*
12:05 - 12:25	Next-Generation Data Center Design and Management: Green and Efficient Data Centers *Bob Shatten and Eric Grunebaum, TeraCool LLC, USA*

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MAIN CONFERENCE PROGRAMME Day 3	Thursday, 19 March 2015 Breakthrough Theatrette, Level 4, Matrix Building, Biopolis
12:25 - 12:45	**Energy Aware Scheduling on BlueWonder** *Luigi Brochard, Lenovo, France* *Vadim Elisseev, IBM, Canada* *Neil Morgan, Science & Technology Facilities Council, United Kingdom*
12:45 - 13:45	**Lunch**
VISUALISATION Chair: Robert Harrison	
13:45 - 14:05	**Data-driven Computational Modelling of Large Multi-scale Populations with Intrinsic Structures** *Marek Niezgódka, University of Warsaw, Poland*
14:05 - 14:25	**Large-Scale Scientific Visualization for Today and Tomorrow** *Kenneth Moreland, Sandia National Laboratories, USA* *Presented on behalf of Kenneth Moreland by Hank Childs*
14:25 - 14:45	**Data Exploration at the Exascale** *Hank Childs, University of Oregon, USA*
14:45 - 15:05	**PIC Live: Real-time Interactive Programming in Scientific Simulation** *Ben Swift and Henry Gardner, Australian National University, Australia* *Andrew Sorensen, Queensland University of Technology, Australia* *Viktor Decyk, University of California, Los Angeles, USA*
15:05 – 15:25	**Towards Programming for Multi-level Locality Using a Data-oriented PGAS Approach** *Karl Fuerlinger, Ludwig Maximilian University of Munich, Germany*
15:25 - 15:40	**Break**

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MAIN CONFERENCE PROGRAMME Day 3	Thursday, 19 March 2015 Breakthrough Theatrette, Level 4, Matrix Building, Biopolis
INFINICORTEX Chair: Satoshi Matsuoka	
15:40 - 16:00	**InfiniCortex: A Path to Reach Exascale Concurrent Supercomputing Across the Globe Utilising Trans-continental InfiniBand and Galaxy of Supercomputers** *Tin Wee Tan, Dominic Siu Hung Chien, Seng Lim, Sing-Wu Liou, Jonathan Low, Marek Michalewicz, Gabriel Noaje, Yves Poppe and Geok Lian Tan, A*STAR Computational Resource Centre, Singapore* *Yuefan Deng, Stony Brook University, USA & A*STAR Computational Resource Centre, Singapore*
16:00 - 16:15	**InfiniCloud: Leveraging Global InfiniCortex Fabric and OpenStack Cloud for Borderless High Performance Computing of Genomic Data and Beyond** *Jakub Chrzeszczyk, Andrew Howard and Dongyang Li, National Computational Infrastructure, Australia* *Kenneth Ban and Tin Wee Tan, A*STAR Computational Resource Centre, Singapore*
16:15 - 16:30	**Leveraging RDMA to Enable Big Data Performance on Cloud** *Tong Liu, HPC Advisory Council, China*
16:30 - 16:45	**Performance Assessment of InfiniBand HPC Cloud Instances on Intel Haswell and Intel Sandy Bridge Architectures** *Jonathan Low, A*STAR Computational Resource Centre, Singapore* *Jakub Chrzeszczyk and Andrew Howard, National Computational Infrastructure, Australia* *Andrzej Chrzeszczyk, Jan Kochanowski University, Poland*
16:45 - 17:05	**TCP Based Data Staging on Supercomputers** *Yaxiong Liang, Xu Ji and Wei Xue, Tsinghua University, China* *Hoang Bui and Manish Parashar, Rutgers University, USA* *Jeremy Logan, Oak Ridge National Laboratory, USA* *Lizhe Wang, Chinese Academy of Sciences, China* *Scott Klasky, Georgia Tech University & University of Tennessee Knoxville, USA*
17:05 - 17:20	**Reverse Engineering Password Hashes using ACRC's Aurora SMP System** *Aditi Agarwal, National University of Singapore* *Murali Srirangam Ramanujam and Krishnan S. P. T,, Institute for Infocomm Research, A*STAR, Singapore*
17:20 - 17:35	**Panel Session** *Chaired by Marek Michalewicz*

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MAIN CONFERENCE PROGRAMME Day 3	Thursday, 19 March 2015 Breakthrough Theatrette, Level 4, Matrix Building, Biopolis
17:35 - 17:45	Closing Remarks *Tin Wee Tan, Chairman, A*STAR Computational Resource Centre, Singapore*
END OF DAY 3	

WORKSHOPS PROGRAMME

Day 4 | Friday, 20 March 2015

Level 4, Matrix Building, Biopolis

SCF2015 Workshops offer attendees a variety of short courses on key topics and technologies relevant to high performance computing, programming, debugging & novel architectures. These workshops also provide the opportunity to interact with recognised leaders in the field and to learn about the latest technology trends, theory, and practical techniques.

Our workshops are open to all registered conference attendees except those who are on 1-Day passes but registrations for the workshops are required via our online registration platform. For those of you who are only interested in attending the workshops but not the main conference from 17 – 19 March 2015, we have introduced a special workshop-only fee of SG$100. Please check out the details on our registration page.

Please proceed to Level 4 of the Matrix Building at Biopolis. Welcome morning coffee at the venue will be available from 8:30am on Friday, 20 March 2015.

Monte Carlo Methods and High-Performance Computing

Time:	9:00am - 5:00pm
Venue:	Creation Theatrette, Level 4, Matrix Building, Biopolis
Breaks:	Morning & afternoon tea breaks & lunch
Presenter:	Michael Mascagni *Florida State University & National Institute of Standards and Technology, USA*
Abstract:	The modern development of Monte Carlo methods (MCMs) coincides with the modern development of digital computation and high-performance computing (HPC). This was due to the intrinsic ease of implementation and execution of MCMs on HPC platforms. This close relationship persisted through the introduction of multiple processing elements, vectorizing hardware, Single Instruction Multiple Data (SIMD) hardware, Multiple Instruction Multiple Data (MIMD) and into the modern architectural era with multicore hardware and hybrid architectures that include GPGPUs. This course introduces the students to modern MCMs, which are now essential in many fields, including nanomaterials, financial engineering, computational physics, structural biology, and scientific computing. The algorithmic presentation stresses ways of identifying and exploiting the ample parallelism in these naturally parallel numerical techniques. In addition, an overview of modern HPC hardware and future trends in HPC is presented, and this material is likewise filtered through MCM implementation.

Application Programming for Efficiency on Parallel Supercomputers

Time:	9:00am - 5:00pm
Venue:	Level 4, Matrix Building, Biopolis
Breaks:	Morning & afternoon tea breaks & lunch
Presenter:	Zaphiris Christidis *Senior IT Architect, Lenovo Inc.*
Abstract:	This workshop includes a tutorial in efficient FORTRAN programming on XEON processors. Various single core optimization techniques in programming are examined and several examples are presented. In turn, principles of shared memory programming using OpenMP, and distributed memory programming using MPI are described and several examples from real application programs are given.

WORKSHOPS PROGRAMME
Day 4 | Friday, 20 March 2015
Level 4, Matrix Building, Biopolis

Micron's Automata Processor: A Massively Parallel Computing Solution

Time:	9:00am - 3:00pm
Venue:	Level 4, Matrix Building, Biopolis
Breaks:	Morning tea break and lunch
Presenters:	Terry Leslie *Director of Business Development, Automata Processing Team, Micron Technology* Matt Tanner *Senior Applications Engineer, Advanced Computing Solutions Group, Micron Technology*
Abstract:	Many of today's most challenging computer science problems – such as those involving very large data structures, unstructured data, random access or real-time performance requirements – require highly parallel solutions. The current implementation of parallelism can be cumbersome and complex, challenging the capabilities of traditional CPU and memory system architectures and often requiring significant effort on the part of programmers and system designers. For the past seven years, Micron Technology has been developing a hardware co-processor technology that can directly implement large-scale Non-deterministic Finite Automata (NFA) for efficient parallel execution. This new non-Von Neumann processor, currently in fabrication, borrows from the architecture of memory systems to achieve massive data parallelism, addressing complex problems in an efficient, manageable method. This workshop will provide an overview on this revolutionary new technology, the growing ecosystem, as well as potential applications such as bioinformatics, video and image analysis and cyber security.

An Introduction to Xeon Phi Programming and Sharing a Numerical Library Developer's Experience Using the Xeon and Xeon Phi.

Time:	9:00am - 1:00pm
Venue:	Level 4, Matrix Building, Biopolis
Breaks:	Morning tea break and lunch
Presenter:	Brian Spector *Technical Consultant, The Numerical Algorithms Group (NAG)*
Abstract:	This half-day workshop introduces parallel program development for the Intel Xeon Phi coprocessor using basic OpenMP. It will discuss the architecture of the system and teach an introduction to developing parallel applications (with OpenMP) targeting the Xeon Phi using both its native and offload modes of execution. We start by introducing the basics of x86 architecture and extending this description into more specific details of the Intel Xeon Phi architecture. We then present some of the basics of OpenMP and Intel's Language Extensions for Offload (LEO) — Intel's compiler directives for using the Xeon Phi alongside the host system. Important topics discussed include data offloading, code profilers, and vectorization. Finally, we demonstrate using the NAG SMP Library for Xeon Phi and show examples of performance gains and pitfalls while coding on the Phi.

WORKSHOPS PROGRAMME
Day 4 | Friday, 20 March 2015
Level 4, Matrix Building, Biopolis

From High Performance Computing to High Efficiency Computing with Allinea

Time:	9:00am - 1:00pm
Venue:	Level 4, Matrix Building, Biopolis
Breaks:	Morning tea break and lunch
Presenter:	Patrick Wohlschlegel *Technical Services Manager, Allinea*
Abstract:	Allinea is an HPC software tools company whose tools are widely used in the biggest supercomputing centers worldwide, including A*STAR. Allinea endeavors to help scientists resolve challenging issues at all stages in their applications life-cycle. In the development stage, Allinea Forge – the well established development environment that includes Allinea DDT and Allinea MAP – provides unique capabilities to help debug and optimize HPC applications. Later during production, Allinea Performance Reports has proved to be invaluable to understand complex workloads and increase the efficiency of Supercomputers. During this hands-on workshop, Allinea will provide you with an introduction to Allinea Forge and Allinea Performance Reports. Through various exercises, we will see how to develop and run high quality and efficient codes.

GPU Programming Workshop with Use Cases in Deep Learning, IVA and Autonomous Driving

Time:	9:00am - 5:00pm
Venue:	Level 4, Matrix Building, Biopolis
Breaks:	Morning & afternoon tea breaks & lunch
Presenter:	Sanjiv Satoor, *CUDA Performance Analysis Tools Manager, NVIDIA*
Abstract:	The GPU has propelled computer graphics from a feature into an ever-expanding industry — encompassing scientific research, supercomputing, and product design among many other categories. GPUs are now driving new fields like deep learning (the use of sophisticated, multi-level "deep" neural networks to create systems that can perform feature detection from massive amounts of unlabeled training data), computer vision, image processing and augmented reality. This workshop will show how other scientists and industry professionals are advancing their work in the field of machine learning, Intelligent Video Analytics (IVA), autonomous driving, and provide information about GPU programming tools, software frameworks, and computing configurations that will help you get started. Sanjiv will discuss where GPU acceleration fits in the context of deep learning, IVA and autonomous driving use cases. He will cover what's latest in hardware and software, GPU and CUDA roadmap, and how to get started with GPU programming. Workshop will feature hands-on GPU programming session (laptop is required).

END OF CONFERENCE