

SAUDI ARABIAN HIGH PERFORMANCE COMPUTING

PAST, PRESENT AND FUTURE

SYMPOSIUM AGENDA

DECEMBER 6-7, 2011

MÖVENPICK HOTEL, AL-KHOBAR, SAUDI ARABIA

INTRODUCTION

Welcome to the Saudi Arabian HPC Symposium

The Saudi Arabian High Performance Computing (SAHPC) Symposium offers a premier regional event where participants will have the opportunity to interact with HPC industry leaders on the challenges facing the supercomputing industry today. SAHPC emphasizes nurturing local HPC communities in Saudi Arabia to facilitate information exchange discussions and new collaborations for business, research, education and advancing related applications and scholarships. The Symposium welcomes you to participate under the following theme: “HPC Past, Present & Future”

SYMPOSIUM AGENDA

DAY ONE TUESDAY, DECEMBER 6, 2011

07:15 am Check-in & Registration

Welcome
08:15 am

Welcome and Opening Statement

Keynote Speaker: Introduction to the Challenges of the Exascale
Dr. Bill D. Gropp, Paul and Cynthia Saylor Professor of Computer Science

09:45 am Coffee Break

Session One
10:00 am

HPC at Saudi Aramco, EXPEC Computer Center
Saeed Al-Zahrani, Senior Systems Analyst at Saudi Aramco, EXPEC Computer Center

Transforming HPC Solving Real World Problems at any Scale
Jeffrey Watters, Intel Planning Manager for High End HPC & Supercomputing Division at

Trends in HPC I/O Systems: Past, Present, and Future
Dr. Brent Welch, Director of Software Architecture at Panasas

12:00 pm Prayer & Lunch Break

Session Two
01:15 pm

Keynote Speaker: Developing a National Research and Educational Network in Saudi Arabia

Dr. Hesham Bin-Abbas, Director of Internet Services Unit at KACST

HPC Vision for Cloud & Exascale
Patrick Demichel, HPC Senior Solution Architect & Labs Researcher at HP

02:35 pm Coffee and Prayer Break

Session Three
02:55 pm

K System
Dr. Motoi Okuda, Executive Architect, Technical Computing Solutions Unit at Fujitsu Ltd.

Computer Simulation on the HPC
Dr. Abdullah Sunaidi, Assistant Professor, Physics Department at KFUPM

04:15 pm Closing Remarks

DAY TWO WEDNESDAY, DECEMBER 7, 2011

07:15 am Check-in & Registration

Session One 08:15 am

Keynote Speaker: Algorithms for Extreme Simulation in Science and Engineering
Dr. David Keyes, Dean, Division of Mathematical and Computer Sciences and Engineering at KAUST

ECC & KFUPM: The High Performance Collaboration
Raed Al-Shaikh, Senior Systems Analyst at Saudi Aramco, EXPEC Computer Center

R&D hands on work on pre-exascale HPC systems
Dr. Joshua Mora, Senior Member Technical Staff, Performance Center of Excellence at AMD

10:20 am Coffee Break

Session Two 10:35 am

Practical Considerations for Building Modular HPC Configurations
Dr. Reza Rooholamini, Executive Director at Dell

High Performance Computing for GigaCell Reservoir Simulation
Dr. Werner Hahn, Petroleum Engineering Specialist at Saudi Aramco, EXPEC Advanced Research Center

KACST findings and experience in building a HPC RFP
Eng. Hani Al-Thubaiti, IT Manager at KACST

12:15 pm Prayer & Lunch Break

Session Three 01:30 pm

Scale-Out Storage Clusters for HPC
Rob Anderson, Chief Technology Officer EMEA at Isilon Products Group

Getting to Exascale: HPC challenges in the Next Decade
Dr. Michael P. Perrone, IBM Master Inventor at IBM

02:35 pm Coffee and Prayer Break

Session Four 03:05 pm

The Applicability of InfiniBand on the Path to Exascale Computing
Philip Murphy, Vice President of HPC Technology at QLogic Corporation

National Supercomputer and Pre-stack Migration and Inversion
Zhang Xuan min, Jing Wei ping, Huang Jian ping, at Tianhe Petroleum Geophysical Data Processing Center

04:25 pm Closing Remarks

SPEAKERS



Bill D. Gropp, Paul and Cynthia Saylor Professor of Computer Science at University of Illinois Urbana Champaign

Bill D. Gropp is Paul and Cynthia Saylor Professor of Computer Science at the University of Illinois Urbana-Champaign. Gropp helped to create the Message Passing Interface, also known as MPI, and the Portable, Extensible Toolkit for Scientific Computation, also known as PETSc. He is also the Deputy Director for Research Institute for Advanced Computing Applications and Technologies. Gropp was awarded the Sidney Fernbach Award in 2008, "for outstanding contributions to the development of domain decomposition algorithms, scalable tools for the parallel numerical solution of PDEs, and the dominant HPC communications interface." In 2009, Gropp received an R&D 100 Award for PETSc. In February 2010, he was elected to the National Academy of Engineering, "For contributions to numerical software in the area of linear algebra and high-performance parallel and distributed computation." In March 2010, he was honored with the IEEE TCSC Medal for Excellence in Scalable Computing.



David E. Keyes, Dean, Division of Mathematical and Computer Sciences and Engineering at KAUST

Dr. David E. Keyes is the founding Dean of the Division of Mathematical and Computer Sciences and Engineering at the King Abdullah University of Science and Technology, having come to KAUST from the Fu Foundation Chair of Applied Mathematics at Columbia University. A pioneer in the application of high performance computing to problems in engineering and applied physics, Keyes has been awarded the Gordon Bell Prize of the Association for Computing Machinery (ACM) and the Sidney Fernbach Award of the IEEE Computer Society. The Society for Industrial and Applied Mathematics (SIAM) recently awarded Keyes its Prize for Distinguished Service to the Profession for his leadership and long-term advocacy of high performance computing in computational science and engineering, embodied in many reports to federal agencies of the USA. He has directed several multi-institutional projects in scientific software infrastructure for the US National Science Foundation and Department of Energy and is the Director of KAUST's strategic initiative in Extreme Computing With a BSE from Princeton and PhD from Harvard, Keyes taught for eight years at Yale, prior to joining Old Dominion University and the Institute for Computer Applications in Science & Engineering (ICASE) at the NASA Langley Research Center in 1993. He has consulted at the national laboratories of the US for 25 years and directed the Institute for Scientific Computing Research (ISCR) at Lawrence Livermore National Laboratory for nine years.



Hesham Bin-Abbas, Assistant Professor, Director of Internet Services Unit at KACST

Dr. Hesham Bin-Abbas is an assistant research professor at King Abdulaziz City for Science and Technology (KACST) and also he has been the director of internet services unit since 2006. Dr. Bin-Abbas graduated from the department of electrical engineering of King Saud University with first class honor, and received his Master's and Ph.D. from the department of Electrical and Computer Engineering from University of Washington, Seattle, and University of Pittsburgh in 1996 and 2004, respectively. He has been a research faculty member at KACST where he participated in many scientific and applied researches in the areas of digital communications, network security, steganography, and Internet content filtration. Recently, Dr. Bin-Abbas has been appointed to lead two national projects that belong to the national plan for Science and Technology, and they are the development of NREN and constructing a consortium for electronic resources access and group subscription. Dr. Bin-Abbas is a PRINCE2 and ITIL v3 certified.



Saeed Al-Zahrani, Senior Systems Analyst at Saudi Aramco EXPEC Computer Center

Saeed Al-Zahrani is a Senior Systems Analyst at Saudi Aramco, leading the EXPEC Computer Center Data Storage Management Group. Saeed has more than 10 years of experience in IT industry mainly in High Performance Computing support at Saudi Aramco. He led multiple projects in the EXPEC Computer Center to enhance the compute and storage infrastructure, and was part of the first team in Saudi Aramco to deploy Linux HPC for seismic processing. Saeed holds a Bachelor of Science degree in Computer Engineering from Oregon State University and a Masters in Computer Science from Sheffield University. Saeed's main focus, for the past four years, is distributed parallel file systems and data growth manageability and protection in HPC systems.



Jeffrey Watters, Product Planning Manager, Data Center & Storage Group at Intel

Jeff Watters is currently responsible for defining future Intel Many Integrated Core (MIC) products targeted at the HPC market. He has been responsible for the creation of multiple server organization strategies including Intel's approach to exascale computing, and separately for high-end scale-up server products. During his 18 year career at Intel, he has held roles as Applications Engineering director for the Enterprise server group, Taiwan-based field applications director for the Asia Pacific Region, and other technical and management positions. Jeff received his bachelor's degree in Electrical and Computer Engineering from the University of Illinois at Urbana-Champaign in 1986, and spent his early years as a design engineer for Compaq Computer Corporation, where he produced two patents.



Brent Welch, Director of Software Architecture at Panasas

Dr. Brent Welch is Director of Software Architecture at Panasas. Panasas has developed a scalable, high-performance, object-based parallel file system that is used in a variety of HPC environments, including many of the Top500 super computers. He has worked at Xerox-PARC and Sun Microsystems Laboratories. Brent has experience building software systems from the device driver level up through network servers, user applications, and graphical user interfaces. While getting his Ph.D. at UC Berkeley, he designed and built the Sprite distributed file system. Brent is the creator of the TclHttpd web server, the exmh email user interface, and the author of Practical Programming in Tcl and Tk. Brent participates in the NFSv4 working group, and is co author of the pNFS internet drafts that specify parallel I/O extensions for NFSv4.



**Patrick Demichel, HPC Senior Solution Architect & Labs
Researcher at HP**

Patrick Demichel is a HP HPC Senior Solution Architect & Labs Researcher. Graduated in 1980 in Computer Technologies by Control Data Institute Paris Work for HP since. Started to work on real time environments, then moved on Unix and Linux for technical environments with a focus on compilers technologies and performance tuning code and systems. Worked 5 years in HP Technical Consulting Lab in Fort Collins, USA on the IA64 project. Back in Grenoble since 2003, work on HPC for EMA as senior architect with a focus on the large scale projects. Patrick has major contribution in HPC business world-wide, with very recognized name in scalable computing, codes efficiency and several key technical reviews and articles.



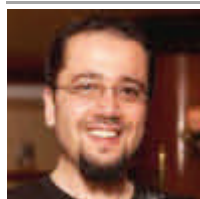
**Motoi Okuda, Executive Architect, Technical Computing
Solutions Unit at Fujitsu**

Dr. Motoi Okuda, his professional experience at Fujitsu Ltd. from (April 1977- present) in Product and Business Planning Management: High performance computing solutions, is Project management: Development of "Next generation supercomputer of Japan (K computer project)." Development of "National Grid projects of Japan (NAREGI and ITBL)," Development of "System for Prediction of Environment Emergency Dose Information (SPEEDI)", Parallel Computing Center in Fujitsu Lab. Also, in Application software development: Computational science and engineering application software: Fluid dynamics, Nuclear code, Crashworthiness, Molecular dynamics and in Computer graphics system. His education: Ph.D., Information Science: Japan Advanced Institute of Science and Technology, Ishikawa. Master of Nuclear Engineering: Nagoya University. Professional Society. The Japan Society for Computational Engineering and Science (JSCES), Vice Chairman. IEEE. Information Processing Society of Japan.



Abdullah Al-Sunaidi, Assistant Professor, Physics Department
at KFUPM

Dr. Abdullah SULTAN is an assistant professor in the department of Petroleum Engineering. He holds B.S. (2002) and M.Sc. (2005) in Chemical Engineering from KFUPM and Ph.D. from Texas A&M University (2009). His areas of interest include "complex fluids", and polymer characterization. His recent work and publications are focus on the development of "smart fluids" to address problems in petroleum industry such as Enhanced Oil Recovery, drilling fluids, stimulation fluids and scale prevention. He is working on quantum mechanics and molecular dynamic simulation to design new fluids from first-principle and understand their behavior. He has good record of publications in the fields of polymeric membranes and smart fluids related to oilfield and fuel cell applications. In September 2010, he has appointed as Director for center of Petroleum and Minerals in Research Institute at KFUPM.



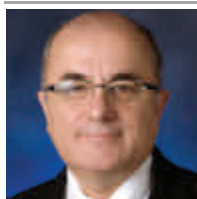
Raed A. Al-Shaikh, Senior Systems Analyst at Saudi Aramco

Raed A. Al-Shaikh is a Senior Systems Analyst at Saudi Aramco, leading the High Performance Computing and Systems Group at the EXPEC Computer Center (ECC). The ECC center is the home of 60+ multi-size HPC clusters, mainly serving E&P business line in Saudi Aramco. Al-Shaikh obtained his B.Sc. degree in computer engineering from King Fahd University of Petroleum and Minerals (KFUPM). He holds a M.Sc. degree in Computer Science from Ottawa University, Canada, and an Executive MBA from the University of Bahrain. He is currently pursuing his Ph.D. degree in Computer Engineering at KFUPM. Al-Shaikh has authored several IEEE and ACM publications in the fields of HPC and distributed file systems. He is a co-designer of Paradise distributed file system test bed, and a co author of the Data Distribution Service (DDS) modeling into HPC. His primary areas of expertise include peer-to-peer computing, high performance computing, and distributed mobile file systems.



Joshua Mora, Senior Member Technical Staff, Performance
Center of Excellence at AMD

Joshua Mora, is a Technical advisor in HPC for manufacturing, F1 car design, and oil and gas markets. Design/validation of HPC (HAWS) solutions for academia and enterprise. HOW: multi socket, multi core, multi chipset, multi rail networking, NAS, I, GU SW: Linux/Windows Server for HPC, compilers, debuggers, profilers, libraries, scripting, schedulers. Large scale scientific applications development and tuning on state of the art of clusters and supercomputers. Joshua's Specialties: State-of-the-art in software and hardware for high performance computing. development/tuning of distributed memory large scale solvers: factorizations, Kriol, multigrain, preconditions - Applications/benchmarks: HOCK, HAL, STREAM, IAMB, I, IOZONE, SPEC, FLUENT, STAR[CD,CCM], ACUSOLVE, LSDYNA, POP, WRF, NWCHEM, GROMACS, PAMCRASH, ESI-CFD, ECLIPSE, LAMPS, CPMD, MPIBLAST, HOMME, HIRLAM.



Reza Rooholamini, Executive Director of Enterprise Solutions at DELL

Dr. Rooholamini has been responsible for the product development of Dell's PowerEdge SMP servers, cluster offerings, database, Virtualization, Messaging, and custom solutions. With more than 17 years of experience in the computer and communications industries, he has worked extensively in product development and has served as a technology consultant to many companies. Dr. Rooholamini has also served as a Professor of Computer Systems at the University of Wisconsin. Prior to Dell he worked at NCR, AT&T, and Memorex. His current research interests are scale out solutions including clustering, cloud computing, virtualization, and scalable datacenter designs. He has more than two-dozen publications in conferences and journals. Rooholamini obtained a B.S. in electrical engineering from the University of Illinois at Urbana, and an M.S. in electrical engineering and an M.S. in computer science from the University of Wisconsin. He also holds a Ph.D. in computer science/engineering from the University of Minnesota.



Dr. Werner Hahn, Petroleum Engineering Specialist at Saudi Aramco EXPEC ARC

Dr. Werner Hahn is a Petroleum Engineering Specialist in Saudi Aramco's EXPEC Advanced Research Center. He specializes in the application of HPC in the development of GigaPowers, the world leading Reservoir Simulator in terms of the size of problems solved. Prior to joining Saudi Aramco, Dr. Hahn worked for Hewlett Packard where he was a Senior System Architect designing and delivering HPC clusters to customers. In particular he was co-leader of the installation team of a 1000 node cluster at the Pacific Northwest National Laboratory in Seattle WA. Prior to his engagement with HP he worked at Exxon Production Research Center where he was a team member in Exxon's Reservoir Simulator development team, focusing primarily on the needs of simulation of Aramco's giant oil fields. Dr. Hahn holds a MS and PhD in Chemical Engineering from the University of Arizona in Tucson AZ.



Hani Al-Thubaiti, IT Manager at KACST

Computer engineer at King Abdulaziz City for Science and Technology (KACST) and also he has been the Network Operation Manager (NOC) of the internet services unit (ISU) since 2006. Hani Al-Thubaiti graduated from department of Computer Engineering at King Fahd University of Petroleum and Minerals (KFUPM) in 2000. He has been working as a Computer Engineer in KACST since 2000 and was promoted to security manager in 2004 and to the NOC manager in 2006. Recently, Hani Al-Thubaiti has been appointed to lead the HPC project and also to be as a team member of the development of Saudi NREN project. Hani Al-Thubaiti is a CISSP, ITIL v3 and EC-CEH certified.



Rob Anderson, Chief Technology Officer at EMC

Rob Anderson serves as Chief Technology Officer EMEA for the Isilon Products Group of EMC Corporation, in which role he engages with users in media and entertainment, life sciences, telecoms, finance, energy and other market sectors to discuss how Isilon's breakthrough technologies can help accelerate results, manage growth and reduce management costs. Mr. Anderson has led engineering teams in the development of Isilon's industry-leading OneFS clustered filesystem, filing numerous patents including eight for which he is named as an author. Mr. Anderson formerly held senior technical roles with Amazon.com and Equator Technologies. He holds an M.Sc. in Computer Science from the University of Washington and a B.Eng. in Computer Engineering from McGill University.



Michael P. Perrone, IBM Master Inventor at IBM

Dr. Perrone is an IBM Master Inventor with over 20 years of experience in computer science, including 7 years in high performance computing and 5 years in seismic imaging. He is the manager of the IBM Research Multicore Computing Department, which has the mission of exploring the strengths and weaknesses of multicore processors to help guide supercomputing architectural design and to aid customers in designing novel supercomputing algorithms. His recent projects cover a variety of HPC workloads, including seismic imaging, reservoir modeling, computational fluid dynamics, business analytics, graph algorithms, network intrusion detection, financial data stream processing, high-speed text indexing, image processing, carbon sequestration and bioinformatics. His research includes algorithmic optimization for a variety of multicore processors, parallel computing and statistical machine learning. He received his Ph.D. in Physics from Brown University.



Philip Murphy, Vice President of HPC Technology at QLogic

Philip Murphy, vice president of HPC technology at QLogic Corporation, is responsible for ensuring that the company's high performance computing interconnect products remain on the forefront of the industry. Prior to his current role, Mr. Murphy was vice president of engineering within QLogic's Network Solutions Group, responsible for the design and development of all high performance computing products, as well as all storage area network switching products. Before joining QLogic, Mr. Murphy was vice president of engineering at SilverStorm Technologies, which he co-founded in 2000 and was acquired by QLogic in 2006. SilverStorm's core focus was on providing complete network solutions for high performance computing clusters. Prior to co-founding SilverStorm, Mr. Murphy was director of engineering at Unisys Corporation and responsible for all I/O development across the company's diverse product lines. Mr. Murphy holds an MS degree in Computer and Information Science from the University of Pennsylvania.



Zhang Xuan min, Jing Wei ping, Huang Jian ping, at Tianhe Petroleum Geophysical Data Processing Center

Tianhe Petroleum Geophysical Data Processing Center was founded by National Supercomputer Center (NSCC) in Tianjin was established in May 2009 approved by the Ministry of Science and collaboratively built by the Tianjin Binhai New Area and National University of Defense Technology, Tianhe Geocomputer is one of the fastest computers in the world. "Tianhe-1" adopts international leading GPU/CPU isomate co-processing Parallel computation structure , Processing system includes 7168 node,14336 Intel XeonEP, 7168 Nvidia050 GPU, Theoretical peak speed of double-precision floating point operations(TFlops) up to 4700 trillion times per second, the test performance of LINPACK is 2566 Tflops. It ranked first in November 2010 the world's TOP 500 supercomputer rankings. NSCC Tianhe Geocomputer can process several large seismic areas "thousands of KM2" 3D RTM programs, as well as time, and depth migration of small areas is expected to produce results instantaneously, Since Establishment the center have provided its customers with best available seismic image processing and results.