25th IEEE International Conference on High Performance Computing, Data, and Analytics

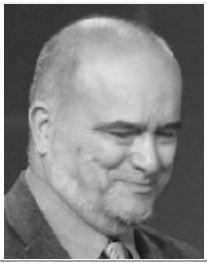
Bengaluru, India • December 17-20, 2018 • hipc.org

PROGRAM OVERVIEW

HiPC 2018 is the 25th edition of the IEEE Conference on High Performance Computing, Data, and Analytics. It serves as a forum to present current work by top researchers in the field and to highlight the activities in Asia in the area of high performance computing and related scientific, engineering, and commercial applications. To observe this Silver Anniversary, HiPC has broadened the technical program, held on Days 2, 3, and 4, to specifically include topics related to data science, and paper submissions were invited to either the HPC tracks of Algorithms, Applications, Architecture and Software or Data Science tracks of Big Data Algorithms and Analytics and Big Data Systems and Software. Papers and speakers presented in the conference reflect this updated mission for the conference, and we will have a special plenary event to highlight the international role of the conference in HPC and Data Science as well as its contributions to research in India.

Starting on Monday, December 17th, the first day of HiPC 2018 features five workshops and an Industry, Research and Users Symposium (IRUS) session on Convergence of HPC with AI. On Days 2 and 3, there will be a full program of industry exhibits and related events including another IRUS session on The Interplay of Compute / Data Technologies Unleashing a Digital Economy. There will also be five industry sponsor hosted technical sessions to present technology of interest to the conference community. Also on Days 2 and 3, posters of work selected for the Student Research Symposium will be on display. Day 4 will include two academic tutorials open to all attendees.

KEYNOTE SPEAKERS

	**Tuesday, December 18th – Day 2 Keynote** *Looking Under the Hood of Deep Neural Networks* **Balaraman Ravindran** Indian Institute of Technology, Madras
	**Wednesday, December 19th – Day 3 Keynote** *The Future of Supercomputing* **Marc Snir** University of Illinois at Urbana-Champaign
	**Thursday, December 20th – Day 4 Keynote** *Secure High-Performance Computer Architectures: Challenges and Opportunities* **Srini Devadas** Massachusetts Institute of Technology

WORKSHOPS

The detailed program for each workshop, including the papers and talks to be presented is available on the website, and the schedule of speakers and papers for each is included in this program book. Peer reviewed papers to be presented in workshops 1, 2, 3, and 4 will appear in the workshops volume of the proceedings – HiPCW 2018 - to be distributed online and linked to the conference mobile app.

1 - Parallel Fast Fourier Transforms (PFFT)
2 - Fourth Workshop on Computational Fluid Dynamics (CFD)
3 - Workshop on Artificial Intelligence Meets Blockchain (AIMB)
4 - Women in Data Science and High Performance Computing (WDSHPC)
Special Workshop on Education for High-Performance Computing (EduHiPC)

Abstracts for keynote speakers and invited speakers are included in the Workshop Introduction file in the proceedings as well as the individual webpages for the workshops.

STUDENT RESEARCH SYMPOSIUM

The 11th HiPC Student Research Symposium is aimed at stimulating and fostering student research, and providing an international forum to highlight student research accomplishments in HPC. The symposium also gives students exposure to the best practices of senior HPC researchers in academia and industry. As a program feature, started last year, the 2018 symposium will feature only student posters - there will be no talks by students – and the posters will be on display on both Day 2 and Day 3 of the conference, next to industry exhibits. This will allow students attending to more fully participate in all events of the conference.

TUTORIALS

HiPC introduced this format in 2014 with the purpose of fostering greater participation by the academic community at HiPC, including both domestic and international representation. With a focus on emerging areas of interest, the goal is to stimulate new research ideas, address specific problems, and build a research community. Tutorials offer attendees the chance to learn from and to interact with leading experts in popular areas of high performance computing, data, and analytics. This year, pre-conference satellite tutorials, open to all attendees, were conducted by Xilinx and Microsoft. Details are available at hipc.org. On Day 4, there will be two academic tutorials covering HClib: A Task-based Parallel Programming Model and A Language and Framework for Prototyping and Experimenting with Edge Oriented IoT. See the web and this program schedule for details.

INDUSTRY EVENTS

The conference welcomes (and strongly encourages) industry participation on all days at all levels including in the technical program and student symposium. We are especially grateful to those industry sponsors & partners whose support enables us to have lower fees for faculty and students in India. They include: Microsoft (Titanium); AMD, Intel, Mellanox, and Shell (Platinum); and Boston, Google, Infosys, NetApp, TATA, Western Digital and Xilinx (Gold). Visit the HiPC website to see full listing of all industry partners and exhibitors.

The industry/research exhibition, to be held on December 18th and 19th, will include booths and demonstrations and will showcase products, services and current work from vendor companies and R&D laboratories. Two Industry, Research and Users Symposium (IRUS) sessions will be held on Days 1 and 2 and will bring together solution providers and users of HPC in a forum to discuss platforms and technologies and best practices. Leading industry sponsors will conduct technical sessions: AMD, Intel, Microsoft, Mixed (Boston, Xilinx, ARM) and Mellanox.

HiPC 2018 PROGRAM DAILY SCHEDULE

Check the Mobile App and postings at the venue for up-to-date information on locations and schedules for each event. The following shows time and location for all events. Events are linked to their respective web pages.

Day	Start Time	End Time	Event	Radisson Blu Room
			Monday - December 17, 2018 - Day 1	
Mon			*Breakfast @ 7:30 am – Lunch @ 1:00 – Dinner @ 7:00 pm*	Refreshment Lounge
Mon			*Breaks: Morning Break@ 10:30 – Afternoon @ 4:00*	Lobby Area
Mon	8:30 AM	6:30 PM	Industry Exhibit Booth Set-up	Central Lobby Area
Mon	8:30 AM	1:00 PM	**Workshop 1: PFFT**	Arabica
Mon	8:30 AM	4:00 PM	**Workshop 2: CFD**	Grand Victoria B
Mon	8:30 AM	6:30 PM	**EduHiPC Workshop**	Robusta
Mon	2:00 PM	6:30 PM	**IRUS Session: Convergence of HPC with AI**	Brain Box
Mon	2:00 PM	6:30 PM	**Workshop 3: AIMB**	Arabica
Mon	2:00 PM	6:30 PM	**Workshop 4: WDSHPC**	Grand Victoria A
Mon	2:00 PM	6:30 PM	Student Research Symposium Posters Set-up	Lobby Grand Victoria
Mon	6:30 PM	8:00 PM	**Plenary Industry Gala Opening**	Grand Victoria
			Tuesday – December 18, 2018 – Day 2	
Tue			*Breakfast @ 7:00 – Lunch @ 12:00*	Refreshment Lounge
Tue			*Breaks: Morning @ 9:30 – Afternoon @ 3:00*	Lobby Area
Tue	8:00 AM	8:30 AM	**HiPC 2018 - Inauguration**	Grand Victoria
Tue	8:30 AM	9:30 AM	**Keynote Talk 1: Balaraman Ravindran**	Grand Victoria
Tue	10:00 AM	12:00 PM	**Tech Session 1: Learning**	Grand Victoria
Tue	10:00 AM	12:00 PM	**Sponsored Tech Session: AMD**	Brain Box
Tue	10:00 AM	5:15 PM	Industry Demos & Exhibits	Central Lobby Area
Tue	10:00 AM	5:15 PM	SRS Posters on display	Lobby Grand Victoria
Tue	1:00 PM	3:00 PM	**Tech Session 2: Graph Algorithms**	Grand Victoria
Tue	1:00 PM	3:00 PM	**Sponsored Tech Session: Intel**	Brain Box
Tue	3:15 PM	5:15 PM	**Tech Session 3: GPUs**	Grand Victoria
Tue	3:15 PM	5:15 PM	**Sponsored Tech Session: Microsoft**	Brain Box
			Wednesday – December 19, 2019	
Wed			*Breakfast @ 7:00 – Lunch @ 12:00*	Refreshment Lounge
Wed			*Breaks: Morning Break@ 9:30 – Afternoon @ 3:00*	Lobby Area
Wed	8:00 AM	8:30 AM	**Volunteer Award Ceremony**	Grand Victoria
Wed	8:30 AM	9:30 AM	**Keynote Talk 2: Marc Snir**	Grand Victoria
Wed	10:00 AM	12:00 PM	**Tech Session 4: Linear Algebra and Fault Tolerance**	Grand Victoria
Wed	10:00 AM	12:00 PM	**IRUS Session 2**	Brain Box
Wed	10:00 AM	12:00 PM	**Sponsored Tech Session: Mixed**	Robusta
Wed	10:00 AM	3:00 PM	Industry Demos & Exhibits	Central Lobby Area
Wed	10:00 AM	3:00 PM	SRS Posters on display	Lobby Grand Victoria
Wed	1:00 PM	3:00 PM	**Tech Session 5: Algorithms and Data Analysis**	Grand Victoria
Wed	1:00 PM	3:00 PM	**Sponsored Tech Session: Mellanox**	Brain Box
Wed	1:00 PM	3:00 PM	**Faculty Summit**	Robusta
Wed	3:15 PM	5:15 PM	**25th Year Celebration: Special Panel Discussion**	Grand Victoria
Wed	5:15 PM	6:30 PM	**Social Mixer**	Central Lobby Area
Wed	6:30 PM	9:30 PM	**Banquet & Awards**	Grand Victoria
			Thursday – December 20, 2018 – Day 4	
Thu			*Breakfast @ 7:30 – Break @ 9:30 – Lunch @ 12:00*	Refreshment Lounge
Thu	8:30 AM	9:30 AM	**Keynote Talk 3: Srini Devadas**	Grand Victoria
Thu	10:00 AM	12:00 PM	**Tech Session 6: Applications and System Tools**	Grand Victoria
Thu	10:00 AM	12:00 PM	**Tutorial 3: HCLib**	Arabica
Thu	1:00 PM	3:00 PM	**Tutorial 4: Edge oriented IoT**	Arabica
Thu	1:00 PM	3:00 PM	**Programming Challenge BOF**	Grand Victoria

Day 1 - Monday, December 17

Breakfast @ 7:30, Breaks @ 10:30 and 4:00, Lunch @ 1:00, Dinner @ 7:00

HiPC 2018 Workshop 1:
Parallel Fast Fourier Transforms (PFFT)
8:30 AM – 1:00 PM

Organizers:
Samar Aseeri, Hari Sundar, Daisuke Takahashi, Mahendra K. Verma

08:50-09:00
Opening Remarks by Workshop Chairs

09:00-09:30
Keynote Address: Challenges of efficient Fast Fourier Transform by Aniruddha Mukhopadhyay, Mahendra K. Verma, Dept of Physics, IIT Kanpur

09:30-10:00
Invited Talk: Automatic Tuning for Parallel FFTs on Cluster of Intel Xeon Phi Processors
Daisuke Takahashi, University of Tsukuba, Japan

10:00-10:30
Contributed Talk: Optimizing the Fast Fourier Transform using Mixed Precision on Tensor Core Hardware
Anumeena Sorna, Xiaohe Cheng, Eduardo D'azevedo, Kwai Wong and Stanimire Tomov

10:30-11:00 - **Coffee Break**

11:00-11:30
Contributed Talk: FFTX and SpectralPack: A First Look
Franz Franchetti, Daniele Giuseppe Spampinato, Anuva Kulkarni, Doru Thom Popovici, Tze Meng Low, Michael Franusich, Andrew Canning, Peter McCorquodale, Brian Van Straalen and Phillip Colella

12:00-12:30
Invited Talk: Development of an efficient FFT library and its scaling up to 65,536 cores of BlueGene/P and 196,608 cores of Cray XC40
Speaker: Anando G. Chatterjee, Dept of Physics, IIT Kanpur

12:30-13:00
Closing Remarks by Workshop Chairs

13:00-14:00 - **Lunch Break**

HiPC 2018 WORKSHOP 2:
Computational Fluid Dynamics (CFD)
8:30 AM – 4:00 PM

Organizers
Vinay R Gopala and Shauvik De, Shell

08:45-09:00 - **Introduction**

09:00-10:00
Keynote Address: The Growing Role of HiPC (and AI) in Understanding Complex Fluid Flows by Prof. Roddam Narasimha, PhD, Jawaharlal Nehru Centre for Advanced Scientific Research

10:00-10:25
Technical Paper 1 Presentation: Perforated bluff-body wake simulations: influence of aspect ratio
Abhinav Singh and Vagesh D. Narasimhamurthy

10:25-10:50
Technical Paper 2 Presentation: A Comparative Study of Turbulence Models for Two-Phase Coaxial Swirling Jet Flows
Aniruddha Choudhary and Vagesh D. Narasimhamurthy

10:50-11:15
Technical Paper 3 Presentation: Effective Mapping of an SPH Algorithm on Massively Parallel GPU Architecture

11:15-11:45
Technical Paper 4 Presentation: Three Dimensional Pseudo-Spectral Compressible Magnetohydrodynamic GPU Code for Astrophysical Plasma Simulation
Rupak Mukherjee, Rajaraman Ganesh, Vinod Saini, Nagavijayalakshmi Vydyanathan, Bharatkumar Sharma and Udaya Maurya

11:45-12:30
Invited Talk: Multiphase Microfluidics
Speaker: Prof. Suman Chakraborty, Department of Mechanical Engineering, IIT Kharagpur, India

12:30-14:00 - **Lunch Break**

14:00-14:25
Technical Paper 5 Presentation: Computational fluid modeling to understand the role of anatomy in bifurcation lesion disease
Madhurima Vardhan, Arpita Das, John Gounley and Amanda Randles

14:25-14:50
Technical Paper 6 Presentation: Acceleration of a 3D Immersed Boundary Solver Using OpenACC
Apurva Raj, Somnath Roy, Nagavijayalakshmi Vydyanathan and Bharatkumar Sharma

14:50-15:35
Invited Talk: Legacy CFD solvers on GPUs
Speaker: Prof. N. Balakrishnan, Professor and Head, Computational Aerodynamics Lab, IISc, Bangalore, India

15:35-16:00 -**Panel & Closing Remarks**

HiPC 2018 EduHiPC WORKSHOP
Special Workshop on Education for High-Performance Computing (EduHiPC)
8:30 AM – 6:30 PM

Organizers: Sushil K. Prasad and R. Govindranjana

08:30-08:40 - **Welcome**

08:40-10:30
Invited Talks and Poster Lightning Talks
Development of HPC aware manpower under National Supercomputing Mission
Ashish P. Kuvellkar

Developing IEEE-TCPP Parallel and Distrbuted Computing Curriculum and NSF CyberTraining Program
Sushil K. Prasad

Convergence of computing, enabling next gen developers to handle the upcoming challenges
Seetha Rama Krishna Nookala

Teaching Parallel Programming Using an Interactive Parallelization Tool
Ritu Arora and Lars Koesterke

Challenges of integrating parallel and distributed computing topics into Undergraduate CSE curriculum of AUST: Bangladesh Perspective
Kazi A Kalpoma and Md. Shahriar Mahbub

HPC for novices through a course in parallel programming
Vaishali Shah, Venkatesh Shenoi and Sandeep Joshi

Parallel & High Performance Computing Education – A Botswana Perspective
Lakshmi Narasimhan and Tshiamo Motshegwa

10:30-11:00 - **Morning Break**

11:00-12:05
Invited Talk and Poster Lightning Talks
The Structure of a Project-Based Course on the Fundamentals of Distributed Computing
Prasun Dewan

SimuLock – Simulator for lock based synchronization primitives on many-core processors
Ajit Singh and Dr. Pavan Chakraborty

Early Introduction to Parallel Computing via Applications in Data Analytics
Sukhamay Kundu

Reproducibility Framework for Scientific Application in HPC
Amarjeet Sharma, Anil Kumar Gupta and Sharda Dixit

Novel approach for teaching a course on Parallel Computing Systems
Chitra Pandian

Parallel & Distributed Computing (PDC) Using Low Cost, Compact and Portable Raspberry Pi Mini Cluster: Pradyut
Deepak Aggarwal, Prashant Kumar, Harish Charan and Hemant Joshi

Augmenting Massive Hands on Labs (MHOL) in Parallel Computing Course
Prathamesh Tugaonkar

12:05-13:00
Poster Session

13:00-14:00
Lunch Break

11:00-11:30
Invited Talks – Curricular Innovations and Adoption

Title: TBA
Andrew Lumsdaine

A Roadmap to Integrate PDC Topics in Introductory Programming Classes: An US Experience
Sheik Ghafoor

Role of Concurrency and Distributed Programming in the Era of Blockchains, PGAS, GPUs
R.K. Shyamasundar

Experiences of Teaching Parallel Programming to Early Undergraduates
Kishore Kothapalli

16:00-16:30
Afternoon Break

16:30-17:15
Town Hall – EduHiPC Future Planning

HiPC 2018 WORKSHOP 3:
Workshop on Artificial Intelligence Meets Blockchain (AIMB)
2:00 PM – 6:30 PM

Organizers: Archana Ramakrishnan and Sandya Mannarswamy

14:00-14:05
Workshop Opening Remarks

14:05-15:00
Keynote Address: TAI meets Blockchain – Opportunities and Challenges by Dr. Manish Gupta, VideoKen and the Infosys Foundation Chair Professor at IIIT Bangalore.

15:00-15:30
Research Paper Presentation 1: Blended Learning – Assimilating Authentic Data into Deep Learning Models
Saichand Akella

15:30-16:00
Research Paper Presentation 2: Privacy Preserving in Blockchain through Partial Homomorphic Encryption System
Sharath Yaji and Kajal Bangera

16:00-16:30
Technical Paper 3 Presentation: Smart Contracts for Multiagent Plan Execution in Untrusted Cyber-physical Systems
Anshu Shukla

17:00-17:30
Technical Paper 4 Presentation: DInEMMo: Decentralized Incentivization for Enterprise Marketplace Models
Avantika Gupta

17:30-18:00 - **Closing Remarks**

HiPC 2018 WORKSHOP 4:
Women in Data Science and High Performance Computing (WDSHPC)
2:00 PM – 6:30 PM

Organizers: Vandana Janeja, Nitya Hariharan, P. Chitra

14:00-14:10
Opening Remarks and Welcome

14:10-14:35
Keynote Address: It's a marathon, not a sprint by Rohini Srivathsa, Ph.D, NATIONAL TECHNOLOGY OFFICER – Microsoft India

14:40-15:00
Long Paper: Health Management of a Typical Small Aircraft Fuel System Using an Adaptive Technique
Vijaylakshmi Jigajinni and Upendranath Vanam

15:30-16:00
Long Paper: Performance Analysis of Deep learning architectures for Recommendation Systems
Devika Anil, Anagha Vembar, Srinidhi Hiriyannaiah, Siddesh G M and K G Srinivasa

15:20-15:40
Invited Technical Talk: High Bandwidth Journey on HPC (roadmap)
by Akshara Kaginalkar, Senior Director, HoD HPC-SEA group C-DAC Bangalore & Pune

16:00-16:30
Long Paper: Experimental Survey of Geospatial Big Data Platforms
Nilkamal More, V. B. Nikam and S Sen

16:00-16:30 - **Break**

16:30-16:50
Invited Technical Talk: Advancement in Automated Driving
by Krishna Paul – Principal Engineer – Intel Corporation

16:50-17:10
Invited Technical Talk: Visual Analytics is Komorebi: for Exploring Spatial Relationships in Data and for Leveling the Playing Field in STEM Careers
by Jaya Sreevalsan Nair, Ph.D. Research Affiliations: Graphics-Visualization-Computing Lab | Center for Data Sciences | E-Health Research Center

17:10-17:20
Lightning Talk: Data science techniques to improve accuracy of Provider Network Directory
Shanmugapriya Kandasamy, Divya Raji

17:20-17:40
Short Paper: Framework for Automatic Parallelization
Anala M R and Deepika Dash

17:40-18:00 - **Roundtable: Next Steps**

IRUS Session 1: Convergence of HPC with AI
2:00 PM – 4:00 PM

Speaker: Raj Kumar Kettimuthu, Argonne National Laboratory
Title: Accelerating Experimental Science HPC Workflows using Machine Learning

Speaker: Jeff Adie, Nvidia
Title : Applications of AI in Earth Sciences

Speaker: Aditya Nagori, CSIR-Institute of Genomics and Integrative Biology
Title : Critical Event Predictions in Intensive Care Unit Patients: Leveraging Artificial Intelligence and Domain Expertise

Speaker: Yang Juntao, Nvidia
Title : Deep Learning for C

Student Research Symposium (SRS)

Starts at 2:00 PM – Monday, December 17th

The following papers have been accepted for poster presentation on both Day 2 and Day 3 of the conference. They will be on display near the conference industry exhibits, and available for viewing throughout both days. Student authors will be available during breaks to answer questions.

Accelerating Bi-Quintic B-Spline Image Interpolation on a GPU
Mullai Thiagu, Sankara Subramanian and Rupesh Nasre.

Adaptive Stock Forecasting Model using Modified Backpropogation Neural Network
Uma Gurav and Nandini Sidnal

An approach of Feature Extraction for Face Detection in Thermal Imaging using MPI Model
Harsh Poddar, Chirag Kumar Kyal and Motahar Reza

An Experimental Analysis of Federated Learning Performance
Sahana Mohandoss, Priya Bagaria, Rahul Mayuranath, Subramaniam Kalambur and Dinkar Sitaram

Analysis of Cache Replacement Algorithms Using ChampSim
Aditya Kamath and Leslie Monis

Blockchain Solution for Claim Management in BigData of Health Insurance
Nukala.Poorna Viswanadha Sravan, Pallav Kumar Baurah, Satya Sai M and Phani Krishna K

Caching Strategy for Prefetch Blocks in TCMPs
Dipika Deb and Kashyap Mattoo

Classification and Unsupervised Clustering of Anomalies with Deep Transfer Learning
Daniel George, Hongyu Shen and Eliu Huerta

Communication Cost Efficient Multi-Way Spatial Join
Nagesh Bhattu, Avinash Potluri, Kadari Prashanth and R.B.V Subramanyam

Convolutional Neural Networks for Predicting Highest Priority Functional Group in Organic Molecules
Kunal Khatri, Vineet Mehta, Manish Narwaria and Bhaskar Chaudhury

Finding linear structures on a quantum computer
Sapv Tharrmashastha, Mayank Aneja and Debajyoti Bera

GPU Accelerated Parallel Algorithm For Efficient Tabular Data Extraction From Images
Varun Nagesh Jolly Behera, Ashish Ranjan, Motahar Reza and Kewal Krishna

Implementation and Performance Comparison of Partitioning Techniques in Apache Spark
Harshit N G and Geetha J

Multi-Scale Spectral Decomposition of Massive Graphs on GPU
Sneh Vyas and Kishore Kothapalli

Novel Architecture for Efficient Distributed Consensus
Saichand Akella and Pallav Kumar Baruah

Performance Enhancement of Bufferless Routers for 2D Mesh NoCs
Rose George Kunthara, Rekha K James, Simi Zerine Sleeba and John Jose

Personal Data Classification Using Natural Language Processing In Object Storage For Security Compliance
Neha Sontakke and Smita Raut

Real-time Vehicle detection and dynamic traffic light prediction
Parinith R Iyer, Shrutheesh Raman Iyer, Raghavendran Ramesh and Anala R

Risk Based Approach to Calculate General Motor Insurance Reserve using High Performance Computing
Nikhil Rai, Akhilesh Pandey and Karam Kulung Rai

State Preserving Dynamic DRAM Bank Re-Configurations for Enhanced Power Efficiency
Kaustav Goswami and Dip Sankar Banerjee

SymGR : Automatic Code Generation Framework for Computational General Relativity
Akila D. Perera, Eminda Ishan, Eranga Dulshan, Ruwan Karunanayake, Milinda Fernando, Sanath Jayasena and Hari Sundar

6:30 PM – 8:00 PM Monday, December 17

Plenary Industry Gala Opening: Exhibits & SRS Posters

10:00 AM – 5:30 PM Tuesday, December 18 and Wednesday, December 19

Industry/Research Exhibition

Attendees are invited to visit booths and check posted schedules for demonstrations and talks and collect materials these exhibitors have prepared for the conference.

Day 2 - Tuesday, December 18

Breakfast @ 7:00, Breaks @ 9:30 and 3:00, Lunch @ 12:00 (1 hour)

8:00 AM – 8:30 AM Tuesday, December 18th

Plenary Session: Conference Inauguration and Opening Remarks

8:30 AM – 9:30 AM

HiPC 2018 Keynote Presentation 1

Looking Under the Hood of Deep Neural Networks

Balaraman Ravindran, Indian Institute of Technology, Madras

10:00 AM – 12:00 PM Tuesday, December 18

Technical Session 1: Learning

Accelerating TensorFlow with Adaptive RDMA-based gRPC
Rajarshi Biswas, Xiaoyi Lu, and Dhabaleswar K. Panda (The Ohio State University, USA)

Balancing Stragglers Against Staleness in Distributed Deep Learning
Saurav Basu and Vaibhav Saxena (IBM Research, New Delhi, India), Rintu Panja (Indian Institute of Science, Bangalore, India) and Ashish Verma (IBM Research, USA)

Parallel Nonnegative CP Decomposition of Dense Tensors
Grey Ballard and Koby Hayashi (Wake Forest University, USA) and Ramakrishnan Kannan (Oak Ridge National Laboratory, USA)

Sampled Dense Matrix Multiplication for High-Performance Machine Learning
Israt Nisa, Aravind Sukumaran Rajam, Süreyya Emre Kurt, Changwan Hong and P Sadayappan (The Ohio State University, USA)

DeepHyper: Asynchronous Hyperparameter Search for Deep Neural Networks
Prasanna Balaprakash, Michael Salim, Thomas D. Uram, Venkat Vishwanath, and Stefan M. Wild (Argonne National Laboratory, USA)

10:00 AM – 12:00 PM Tuesday, December 18

Sponsored Tech Session: AMD

Title: Powering the Modern Data Center with High-Performance Hardware and Software

Abstract: This session will provide an overview of the various technologies that AMD has developed to meet the performance challenges posed by modern and emerging data center workloads. We will describe the features and design choices made in AMD's high performance modern server CPUs, advanced compilation techniques employed in the AOCC compiler, and an overview of ROCm, the open source platform for accelerating workloads such as machine learning and HPC workloads on AMD GPUs.

1:00 PM – 3:00 PM Tuesday, December 18

Technical Session 2: Graph Algorithms

Synchronization-Avoiding Graph Algorithms
Jesun Sahariar Firoz (Indiana University, USA), Marcin Zalewski (Pacific Northwest National Laboratory, USA), Thejaka Kanewala (Indiana University, USA) and Andrew Lumsdaine (Pacific Northwest National Laboratory and University of Washington, USA)

Shared-Memory Parallel Maximal Clique Enumeration
Apurba Das, Seyed-Vahid Sanei-Mehri and Srikanta Tirthapura (Iowa State University, USA)

Expediting Parallel Graph Connectivity Algorithms
Mihir Wadwekar and Kishore Kothapalli (International Institute of Information Technology, Hyderabad, India)

Adaptive Runtime Features For Distributed Graph Algorithms
Jesun Sahariar Firoz (Indiana University, USA), Marcin Zalewski and Joshua Suetterlein (Pacific Northwest National Laboratory, USA) and Andrew Lumsdaine (Pacific Northwest National Laboratory and University of Washington, USA)

Adaptive Pattern Matching with Reinforcement Learning for Dynamic Graphs
Hiroki Kanezashi (Tokyo Institute of Technology, Japan and IBM T.J. Watson Research Center, USA), Toyotaro Suzumura (IBM T.J. Watson Research Center, USA and Barcelona Supercomputing Center, Spain), Dario Garcia-Gasulla (Barcelona Supercomputing Center, Spain), Min-Hwan (Columbia University and IBM T.J. Watson Research Center, USA) and Satoshi Matsuoka (RIKEN Center for Computational Science and Tokyo Institute of Technology, Japan)

Probabilistic Sequential Consistency in Social Networks
Priyanka Singla (IISc Bangalore, India), Shubhankar Suman Singh (IIT Delhi, India), K. Gopinath (IISc Bangalore, India) and Smruti Sarangi (IIT Delhi, India)

1:00 PM – 3:00 PM Tuesday, December 18

Sponsored Tech Session: Intel

Title: Convergence of HPC and AI with Intel

Abstract: In this day and age where Deep Learning (DL) models are getting bigger and consuming tremendous amount of data, scalability of systems processing DL models has become a very important topic. The demand to reduce the turnaround time for training and latency for inference is putting further demands on these systems. HPC concepts will help build scalable, efficient and deterministic systems to run these ML/DL systems. In this BoF, we will look at some of the challenges and how we can help solve these challenges.

3:15 PM – 5:15 PM Tuesday, December 18

Technical Session 3: GPUs

Improving Provisioned Power Efficiency in HPC Systems with GPU-CAPP
Kramer Straube, Jason Lowe-Power, Christopher Nitta, Matthew Farrens and Venkatesh Akella (University of California, Davis, USA)

Compiling SIMT Programs on Multi- and Many-core Processors with Wide Vector Units: A Case Study with CUDA
Hancheng Wu, John Ravi and Michela Becchi (North Carolina State University, USA)

Lossless parallel implementation of a Turbo Decoder on GPU
Karthikeyan Natarajan and Nitin Chandrachoodan (Indian Institute of Technology, Madras, India)

OC-DNN: Exploiting Advanced Unified Memory Capabilities in CUDA 9 and Volta GPUs for Out-of-Core DNN Training
Ammar Ahmad Awan, Ching-Hsiang Chu, Hari Subramoni, Xiaoyi Lu and Dhabaleswar K. Panda (The Ohio State University, USA)

Acceleration of an Adaptive Cartesian Mesh CFD Solver in the Current Generation Processor Architectures
Harichand M V (Vikram Sarabhai Space Centre, India), Bharatkumar Sharma (Nvidia Graphics Pvt Ltd, India), G Sudhakaran and V Ashok (Vikram Sarabhai Space Centre, India)

Data-parallel Training of Generative Adversarial Networks on HPC Systems for HEP Simulations
Sofia Vallecorsa (CERN, Switzerland), Diana Moise (Cray Inc., Switzerland), Federico Carminati and Gul Rukh Khattak (CERN, Switzerland)

3:15 PM – 5:15 PM Tuesday, December 18

Sponsored Tech Session: Microsoft

Details to be announced.

Day 3 – Wednesday, December 19

Breakfast @ 7:00, Breaks @ 9:30 and 3:00, Lunch @ 12:00 (1 hour)

8:30 AM – 9:30 AM Wednesday, December 19

HiPC 2018 Keynote Presentation 2

The Future of Supercomputing

Marc Snir, University of Illinois at Urbana-Champaign

10:00 AM – 12:00 PM Wednesday, December 19

Technical Session 4: Linear Algebra and Fault Tolerance

Making Strassen Matrix Multiplication Safe
Himeshi De Silva, John L. Gustafson and Weng-Fai Wong (National University of Singapore, Singapore)

Quantification, Trade-off Analysis, and Optimal Checkpoint Placement for Reliability and Availability
Omer Subasi, Ramakrishna Tipireddy and Sriram Krishnamoorthy (Pacific Northwest National Laboratory, USA)

A Novel Approach for Handling Soft Error in Conjugate Gradients
Marissa Renardy, Muhammed Emin Ozturk, Yukun Li, Gagan Agrawal and Ching-Shan Chou (The Ohio State University, USA)

Characterization of the Impact of Soft Errors on Iterative Methods
Burcu Ozcelik Mutlu (Pacific Northwest National Laboratory, USA and Polytechnic University of Catalonia, Spain), Gokcen Kestor and Joseph Manzano (Pacific Northwest National Laboratory, USA), Osman Unsal (Barcelona Supercomputing Center, Spain), Samrat Chatterjee and Sriram Krishnamoorthy (Pacific Northwest National Laboratory, USA)

10:00 AM – 12:00 PM Wednesday, December 19

IRUS Session 2: The Interplay of Compute / Data Technologies Unleashing A Digital Economy

The theme for this year's IRUS is the impact of Computational and Data Science technologies on emerging Digital Economy. The session will contain 3 speakers who will talk about their venture, their technology platform and approach from a business idea to a product/platform. The speakers will come from established as well as emerging players who are playing a key role in transforming the society such as democratizing financial sector using large scale citizen database, bringing affordable healthcare from remote diagnosis as well as insights from a technology vendor whose rapid advances often underpin such path-breaking applications.

Symposium Organizer
Laks Raghupathi

Title: Financial Inclusion: Data Driven Delivery of Financial Services
Speaker: Srikanth Nadhamuni, Co-Founder & CEO at Khosla Labs

Title: Eradicating Preventable Blindness – A Digital Health Platform Approach
Speaker: Chandrasekhar K, Founder & CEO at Forus Health Pvt. Ltd

Title: Architectural considerations in building CHaiDNN (a state-of-the-art Deep-Learning inference accelerator for Zynq and MPSoC FPGAs)
Speaker: Kumar Vemuri, Director of Engineering, Embedded-Vision and Machine-Learning Libraries at Xilinx India Pvt Ltd

10:00 AM – 12:00 PM Wednesday, December 19

Sponsored Tech Session: Mixed (Boston Limited, Xilinx, ARM)

Title: Technology Trends in the HPC Ecosystems: Commercial Perspective

1:00 PM – 3:00 PM Wednesday, December 19

Sponsored Tech Session: Mellanox

Title: Deep Learning – Past, Present, and Future of AI

1:00 PM – 3:00 PM Wednesday, December 19

Technical Session 5: Algorithms and Data Analysis

Workflow Simulation Aware and Multi-Threading Effective Task Scheduling for Heterogeneous Computing
Vasilios Kelefouras (University of Plymouth, UK) and Karim Djemame (University of Leeds, West Yorkshire, UK)

Dynamic Count-Min Sketch for Analytical Queries over Continuous Data Streams
Xiaobo Zhu (Institute of Information Engineering, Chinese Academy of Sciences, Beijing and School of Cyber Security, University of Chinese Academy of Sciences, Beijing, China), Guangjun Wu (Institute of Information Engineering, Chinese Academy of Sciences, Beijing, China), Hong Zhang (National Computer Network Emergency Response technical Team/Coordination Center of China, Beijing, China), Shupeng Wang (Institute of Information Engineering, Chinese Academy of Sciences, Beijing, China) and Bingnan Ma (National Computer Network Emergency Response technical Team/Coordination Center of China, Beijing, China)

Scalable Proximity-Based Methods for Large-Scale Analysis of Atom Probe Data
Hao Lu, Sudip K. Seal and Jonathan D. Poplawsky (Oak Ridge National Laboratory, USA)

A Shared-Memory Algorithm for Updating Single-Source Shortest Paths in Large Weighted Dynamic Networks
Sriram Srinivasan (University of Nebraska Omaha, USA), Sara Riazi (University of Oregon, USA), Sajal K. Das (Missouri University of Science and Technology, USA), Boyana Norris (University of Oregon, USA) and Sanjukta Bhowmick (University of North Texas, USA)

Vidya: Performing Code-Block I/O Characterization for Data Access Optimization
Hariharan Devarajan, Anthony Kougkas, Prajwal Challa and Xian-He Sun (Illinois Institute of Technology, USA)

Decentralized Privacy-preserving Timed Execution in Blockchain-based Smart Contract Platforms
Chao Li and Balaji Palanisamy (University of Pittsburgh, USA)

3:30 PM – 5:30 PM Wednesday, December 19

25th Year Celebration: Special Panel Discussion

This session will help us to observe the silver jubilee of HiPC. We plan to include presentations and talks that summarize the start, the growth, and the future vision of HiPC. This will be followed by a special panel on the theme of "HiPC and Indian Academia." The panel will focus on topics such as how HiPC has helped Indian academia, what can be done going forward for mutual benefit, what is important to improve systems research in India, and other related topics. We have invited leading researchers with recognized standing who are also "friends" of the HiPC community who have helped us build this conference and attract leading international researchers. We will structure the panel to let the panelists make their short opening remarks and then open the session for the audience to ask specific questions of the panelists. The outcome of this panel will help the organizing team of future HiPC editions to focus the event appropriately and serve the broader community in India.

Starting at 6:30 PM Wednesday, December 19
Banquet & Awards
Details to be announced

Day 4 – Thursday, December 20

Breakfast @ 7:30, Break@ 9:30, Lunch @ 12:00

8:30 AM – 9:30 AM Thursday, December 20

HiPC 2018 Keynote Presentation 3

Secure High-Performance Computer Architectures: Challenges and Opportunities

Srini Devadas, Massachusetts Institute of Technology

10:00 AM – 12:00 PM Thursday, December 20

Technical Session 6: Applications and System Tools

Why do Users Kill HPC Jobs?
Venkatesh-Prasad Ranganath and Daniel Andresen (Kansas State University, USA)

Code and Data Transformations to Address Garbage Collector Performance in Big Data Processing
Damon Fenacci, Hans Vandierendonck and Dimitrios S. Nikolopoulos (Queen's University Belfast, Ireland)

Share-a-GPU: Providing Simple and Effective Time-Sharing on GPUs
Shaleen Garg, Kishore Kothapalli and Suresh Purini (International Institute of Information Technology, Hyderabad, India)

A Performance Prediction Framework for Irregular Applications
Gangyi Zhu and Gagan Agrawal (The Ohio State University, USA)

Achieving Performance and Programmability for MapReduce(-like) Frameworks
Jia Guo and Gagan Agrawal (The Ohio State University, USA)

Parallel Read Partitioning for Concurrent Assembly of Metagenomic Data
Vasudevan Rengasamy, Mahmut Kandemir, Paul Medvedev and Kamesh Madduri (The Pennsylvania State University, USA)

Conference Tutorial 3: HClib: A Task-based Parallel Programming Model
10:00 AM – 12:00 PM

Presenters:
Vivek Kumar, IIIT-Delhi, India
Vivek Sarkar, Georgia Tech., USA

Conference Tutorial 4: A Language and Framework for Prototyping and Experimenting with Edge Oriented IoT
1:00 PM – 3:00 PM

Presenter:
Muthucumaru Maheswaran, McGill University, Canada

2019

December 17-20, 2019

India