C-DAC's Three-days Internal Workshop

on

OpenPOWER for High Perf. Comp & Big Data Analytics-*Applications"*

(Initiatives on HPC RISC based IBM POWER8 Systems with NVIDIA GPUs)

(OPHPBD-2016)

(Jointly organized by C-DAC Pune and IBM, India)

Venue : C-DAC ACTS Office, Westend Centre III, Aundh, Pune 411007
Date : August 03-05, 2016

OPHPBD-2016 Registration is open. **For more details contact hpcfte@cdac.in**

Dead-line for EARLY BIRD REGISTRATION is August 01, 2016

OPHPBD-2016 is part of OPENPOWER Consortium Efforts. Visit www.openpowerfoundation.org/

Objective: The **OPHPBD-2016** workshop objective is to understand Performance and Scalability Analysis of High Performance Computing (**HPC**) Application Kernels and Big Data Processing Data Science applications on RISC based IBM POWER8 Systems with GPUs as a part of **OpenPOWER** foundation.

About OpenPOWER Consortium: IBM created the OpenPOWER Consortium and IBM is working with the participating vendors to deliver innovative solutions across all layers of the hardware and software stack.

Organizers: HPC Technology Group and ACTS group of C-DAC, Pune and IBM, India are jointly organizing **THREE** days internal technology workshop on OpenPOWER.

Why OPHPBD-2016 ? : IBM's Power8 **RISC** based System's solutions offer a compelling alternative for Linux-based x86 platform deployments to large scale data processing products in Distributed Computing Cluster to meet the HPC and Big Data Challenges. A comprehensive coverage of hardware and software topics on OpenPOWER (**IBM POWER8**) with NVIDIA GPUs focusing on HPC-GPU programming environment based on MPI, OpenMP, CUDA are required. Also, analytics for Big Data applications based on Hadoop Implementation of MapReduce and Spark programming environment are required. It gives an opportunity to explore new solution domain with scalable performance on **POWER8** Systems with GPUs. Numerous technical reasons exist to implement solutions on **POWER8** systems with NVIDIA GPUs. The POWER8 chip incorporates a Coherent Acceleration Processor Interface (**CAPI**). The **CAPI** port interfaces with the **PCIe** slot and enable external components such as accelerators and flash memory to directly communicate with the server's memory, thereby reducing the overheads in memory

access. **POWE**R8 System servers are optimized for Cent OS and Comprehensive Compiler toolkit may enhance the performance.

About Workshop: An opportunity for working on the new generation of IBM POWER8 Systems built upon the POWER8 microprocessors with NVIDIA GPUs exist in this workshop will be provided. The aim is to understand performance characteristics of IBM POWER8 Systems with NVIDIA GPUs to solve a problem of given size for High Performance Computing (HPC) application kernels and BIG Data Processing. The focus is to understand POWER8 Architecture, POWER8 with NVIDIA GPUs, Complier Tool Chain, ESSL Libraries, Tools, NVLINK-CAPI Interface for CPU-GPUs, Advances in MPI 3.0, Hadoop implementation of MapReduce and Spark. The workshop gives an opportunity to write, execute and demonstrate computational mathematics and application kernels using different programming paradigms as a part of OpenPOWER foundation. The workshop is aimed to cover classroom lectures in morning/forenoon session and two hours hands-on in afternoon session on every day. Participants will get an opportunity to walk-through an execute some of the programs in hands-on session laboratories.

Speakers: Speakers from IBM, Mellanox, NVIDIA and C-DAC will deliver lectures and C-DAC and IBM will conduct laboratory sessions on HPC and Big Data Analytics.

OPHPBD-2016 TOPICS AT GLANCE Topics of interest include but are not limited to:

Part I : First Two Days : High Performance Computing (HPC)

- An Overview of OpenPOWER (IBM POWER8 Architecture with NVIDIA GPUs)
- An Overview of IBM POWER8 - Compilers, Tools, Lib.; Prog. Env
- An Overview of NVIDIA GPUs - OpenPOWER
- An Overview of InterConnect - Mellanoax – OpenPOWER
- An Overview of OpenPower (IBM POWER8-GPU) NVLINK- CAPI- FPGAs
- An Overview of OpenPower Elastic Storage Server (ESS) - Software RAID
- An Overview of HPC- App. & Benchmarks
- An Overview of Third Party Applications on OpenPOWER
- An Overview of Tuning & Performance on POWER8 with GPUs using MPI, CUDA
- An Overview of Applications & Benchmarks Demonstration

Part II : Third day : Big Data Processing (Third Day)

- An Overview of Programming Environment
- Hadoop MapReduce vesion 2.7.2; Spark 1.6.1,; R-Lang 3.3.0
- Overview Application Kernels (MapReduce-MPI)

An Overview of Hands-on:

POWER8 Compiler Tool Kit, Use of ESSL Libraries,CUDA enabled NVIDIA GPUs Shared /Non-Shared Memory Programming (OpenMP, POSIX Threads,MPI) for Numerical (Dense/Sparse Matrix Comps.); & Non-Numerical Computations; Application and System Benchmarks - Top-500 & HPC Challenge Benchmarks; Programming based on MPI, OpenMP, CUDA, IBM

POWER8; Compilers and Profiling & Tuning Tools; Prog, Environment on POWER8 GPU Cluster; Performance issues of Benchmarks & Application Kernels on POWER8 GPU Cluster; Programming on POWER8 Systems based on Hadoop Implementation of MapReduce, Spark, R-language & Hadoop implementation of MapReduce.

OPHPBD-2016 Who can attend & Target Audience : Exclusively for C-DAC Staff who are working on HPC, Big Data Processing and large scale Applications.

Early Bird Registration: The dead-line is **August 01, 2016** The Early Bird registration is based on **FIRST CUM-FIRST SERVICE** basis. Maximum number of participants allowed is **25**. No registration fee is charged for C-DAC Staff. The **OPHPBD-2016** free registration does not include Food services and accommodation. The respective Group-In-Charge can nominate you by sending an email to hpcfte@cdac.in. The workshop is exclusively for C-DAC Staff Members

OPHPBD-2016 Guest House Accommodation: The guest house accommodation for Out-Station C-DAC Participants will be provided in Govt. aided Universities and academic institutes as per their Charges, subject to availability. Participants are required to pay the tariff charges as per the guest house. Organizers will arrange pick-up & drop from the C-DAC arranged accommodation locations for all C-DAC Participants during the workshop time. The interested participants can write to hpcfte@cdac.in

OPHPBD-2016 Travel Grants : No Travel Grants are available for participants. Participants are requested to make their own travel arrangements.

OPHPBD-2016 Benefits

- Understand OpenPOWER Consortium and explore various workloads of application to get performance on IBM POWER8 system.
- Address Programming challenges on RISC based POWER8 Systems with NVIDIA GPUs in compare with X8 based servers –
- Provides an opportunity for the new generation of IBM POWER8 Systems built upon the POWER8 Architecture and Data Processing Offers advanced concepts on Compilers and System software stack of IBM POWER8 systems
- Exposure to IBM POWER8 Architecture with Mellanox InfiniBand interconnect
- Exposure to IBM POWER8 Architecture with NVIDIA GPUs.
- Scaling Applications Algorithms of BIG Data on POWER8 System

OPHPBD-2016 Information & Accommodation Contact :

Dr.VCV.Rao
OPHPBD-2016 Workshop Co-ordinator
Associate Director
HPC- Tech. HPC Tech. Group, C-DAC
Pune University Campus, Ganeshkhind,
Pune 411 007, Cell No. : 99700 92817
Email : vcvrao@cdac.in

Mrs.Kamal Woman
Facilitation Executive Staff, (C-DAC),
Pune University Campus,
Ganeshkhind,Pune
Pune 411 007, Ph : 25704 100
Email kjw@cdac.in