Running Mantevo Benchmark on a Bare-metal Server

Mohammad H. Mofrad
January 28, 2016
Contents

• Mantevo benchmark (CloverLeaf, CoMD, MiniFE)
• Running Mantevo on Baremetall
• Results
Mantevo Benchmark

• A collection of some application performance proxies known as mini applications (miniapps).

• Two advantages of mini apps
  • Encapsulating most important computational operations of a scientific application
  • Consolidating physics capabilities that belongs to a variety of scientific applications
Mantevo Benchmark – Selected Miniapps

**CloverLeaf**
- a mini-app that solves the *compressible Euler equations on a Cartesian grid*, using an explicit, second-order accurate method.

**CoMD**
- *a Classical molecular dynamics* algorithms and workloads as used in materials science.

**MiniFE**
- a proxy application for *unstructured implicit finite element codes*.
Mantevo Benchmark – Selected Libraries

OpenMP

- **Open Multi-Processing (OpenMP)** is an Application programming Interface (API) that supports multi-platform shared memory multiprocessing programming in C, C++, and Fortran.

MPI

- **Message Passing Interface (MPI)** is a standardized and portable message-passing system. Mpicc provides MPI libraries for C programmers.
Single Node Bare-metal Server Specification

**Linux kernel**
3.10.0-327.4.4.el7.x86_64

**Linux distribution**
Centos 7 @ 64 bit

**CPU**
Intel Core i5 4 Cores @3.1 GHz

**Network Interface**
Realtek Gigabit Ethernet Controller @ 1000 Mb/s

**RAM**
Samsung DDR3 4GB @ 1333 MHz

**HDD**
Seagate 1TB serial ATA
Results

• Each experiment performs 10 times
• OpenMP implementation of Mantevo runs with 1, 2, and 4 threads
• MPI implementation of Mantevo runs with 1, 2, and 4 CPUs
Results - OpenMP
Results - MPI

![Average runtime graph for CloverLeaf, CoMD, and MiniFE with 1, 2, and 4 CPUs.]
What’s done?

• Reading Yuyu’s Supercomputing conference poster
• Centos 7 configuration
• Mantevo installation
• Tweaking the Mantevo script
• Collecting results
What’s next?

• Extending the experiments
• Introducing Kernel-based Virtual Machine (KVM)
• Installing and configuring KVM (done)
• Installing Mantevo benchmark on a virtual machine (ongoing)
• Running Mantevo benchmark on KVM
• comparing kvm with bare-metal
References

• Yuyu’s poster in Supercomputing 2015 conference
• Yuyu’s scaletest Github repository  
  • https://github.com/yuyuzhou-pitt/scaletest/tree/master/baremetal
• Mantevo benchmark homepage:  
  • https://mantevo.org/download/tutorial/