ECE574: Embedded Systems – Homework #2

Supercomputer Paper Reading

Due: 26 January 2017, 3:30pm

Read the following three papers and answer the questions.

1. **How the World's Most Powerful Supercomputer Inched Toward the Exascale**, IEEE Spectrum, 20 Jul 2016.

   http://spectrum.ieee.org/computing/hardware/how-the-worlds-most-powerful-supercomputer-inched-toward-the-exascale

   (a) Name one way the computer's design saved on power.

   (b) What percentage of theoretical peak does it reach on Linpack? On HPCG?

   (c) When does the US plan on having an Exaflop machine?

2. **Next-Generation Supercomputers**, IEEE Spectrum, 26 Jan 2011

   http://spectrum.ieee.org/computing/hardware/nextgeneration-supercomputers

   (a) Is the limiting power factor (in pico-Joules per operation) the actual floating point instruction, or something else?

   (b) Typically, around what percentage of a supercomputer's theoretical peak performance is actually achieved?

   (c) Did we make DARPAs goal of an Exaflop by 2015?

3. **How To Kill A Supercomputer: Dirty Power, Cosmic Rays, and Bad Solder**, IEEE Spectrum, 23 Feb 2016

   http://spectrum.ieee.org/computing/hardware/how-to-kill-a-supercomputer-dirty-power-cosmic-rays-and-bad-solder

   (a) What year does this article predict an exascale computer will be ready?

   (b) How often were ECC memory errors happening on the Jaguar super computer?

   (c) What was causing the LLNL Bluegene computer to crash?

   (d) Why might powering off unused chips or parts of chips be bad?

4. **Submitting the Results**

   E-mail me the answers to the questions. Just plain text in the e-mail is fine, or you can attach a PDF or TXT file.