

ECE571: Advanced Microprocessor Design – Homework 4
Spring 2017

Due: Thursday 16 February 2017, 11:00am

Create a document that contains the data and answers described in the sections below. A .pdf or .txt file is preferred but I can accept MS Office or Libreoffice format if necessary.

1. Read the paper *Power Measurement Techniques on Standard Compute Nodes: A Quantitative Comparison* by Hackenberg, Ilsche, Schöne, Molka, Schmidt and Nagel (ISPASS 2013).

http://web.eece.maine.edu/~vweaver/classes/ece571_2014f/papers/ispass2013-power_measurement2.pdf

and answer the following questions:

- (a) What kind of power meter do they use to measure the DC power?
- (b) Is it possible to get exact power measurements from RAPL? Why or why not?
- (c) How long does it take to read a RAPL MSR?
- (d) Why were the 2P Sandybridge RAPL results better than the 1P Sandybridge RAPL results?
- (e) Why might high-resolution sampling not work when measuring the AC load? Were they able to find high-resolution results in the AC data anyway?
- (f) How did the AMD APM results compare to the RAPL results?

2. Read the article *Leading Chipmakers Eye EUV Lithography to Save Moore's Law* in IEEE Spectrum

<http://spectrum.ieee.org/semiconductors/devices/leading-chipmakers-eye-euv-lithography-to-save-moores-law>

and answer the following questions:

- (a) How long does it take to change a wafer into a chip?
- (b) How do they make 13.5nm light?

3. Submitting your work.

- Create the document containing the answers to the questions asked.
- Please make sure your name appears in the document.
- e-mail the file to me by the homework deadline.