

## 1. Answer the following questions:

### a. How was actual DRAM power measured for the test setup?

In order to exercise the DRAM we look at the STREAM benchmark which tests a machine's memory performance. STREAM performs operations such as copying bytes in memory, adding values together, and scaling values by another number.

### b. How were the RAPL results gathered?

Using the perf tool to measure RAPL package and DRAM results on a number of benchmarks.

### c. Did the actual results match the DRAM results?

In general the RAPL DRAM power follows the LLC rate. It can be seen that for both CPU and DRAM the RAPL results are consistently below actual measurement, both for total energy as well as average power.

### d. The paper looks at measuring DDR3 DRAM power. What challenges exist with measuring DDR4 power?

It will require obtaining different DIMM measurement risers which are proving difficult to source. DDR4 DIMMs also have multiple voltages, which will make power measurement more complicated.

### e. What additional experiments do you think could be run that would make this paper better?

Testing when disable prefetching or branch prediction, what would happen to the system performance and power consumption.