Energy-Efficient Hybrid DRAM/NVM Main Memory

Summary:

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The motivation of the paper is because of certain observations related to power saving when a 4KB page is stored on a DRAM vs. RRAM. The authors observe that instead of page level granularity, the application level objects must be looked into in order to have a memory efficient placement of data between the DRAM and NVM. It also discusses the current domain of approaches which are OS-level, hardware-level and the application-level. Each having their own trade-offs and advantages.

The contributions are:
- Data placement policies for energy-efficient hybrid DRAM / NVM memory.
- Performance and energy models to derive data placement.
- Programming interface and API to allocate memory on hybrid main memory from an application.

The authors have come up with a software management policy for placement of data in the hybrid main memory. Data is stored at an application level granularity instead of page level granularity. It was observed that 91% of objects incur no added energy whereas only 61% of pages incur no extra energy. The authors developed an API to allocate application data onto the hybrid main memory along with this, they also developed tools for analysing source code and deriving placement policies for application objects.

Questions:

1. What is the overhead of using a separate tool for profiling?
2. Will there be any implications resulting from changing the storage granularity?