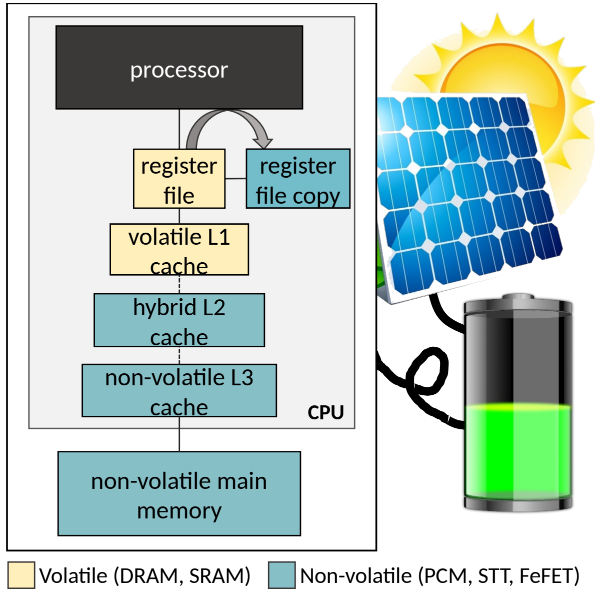
Improving Interaction between Applications and Hybrid Volatile/Non-Volatile Memory Hierarchies

Powering IoT devices via energy harvesting modules such as solar panels can provide great potential for realising efficient systems. Naturally, this can lead to unstable power supplies, thus losing all volatile memory contents during a power outage, requiring costly backups. While non-volatile memory technologies do exist, their increased write overhead also provides drawbacks. A trade-off is thus realised by a memory hybridisation combining both volatile and non-volatile technologies. However, this requires cache policies to be aware of the different underlying technologies, with decisions suitable to the design objectives depending on the characteristics of the architecture as well as the application.



This thesis therefore aims for a closer interaction between applications and hybrid memory hierarchies in energy harvesting systems. This can be realised by, e.g., denoting hints for the caches in the application code, thus realising transactions or efficiency gains not achievable by pure heuristics. The system simulator gem5 (`gem5.org`) shall be used, and if necessary extended, with the modular OS Unikraft (`unikraft.org`) compiling applications into unikernels.

Prerequisites:	Knowledge in C/C++ and Python, basic knowledge about caches
Type of Work:	Theory (20%), concept (30%), implementation (50%)
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