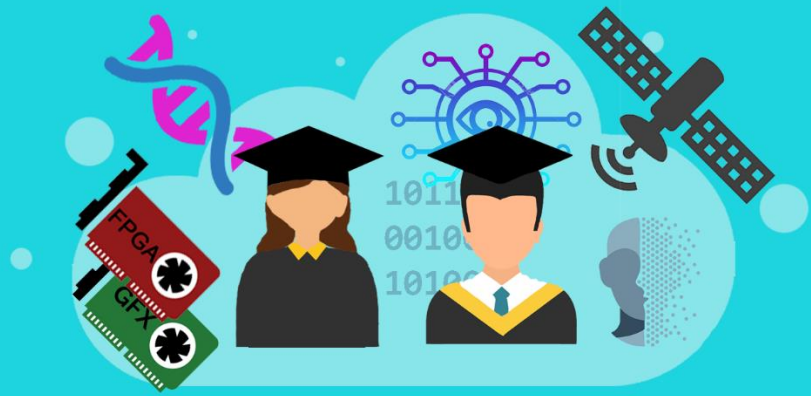


Diploma Thesis

Microprocessors and
Digital Systems
Laboratory



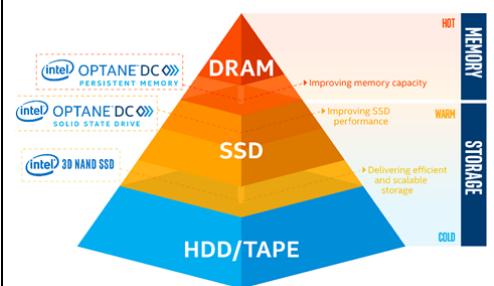
High performance and sustainable computing with Intel Optane DC persistent memory

Intel Optane DC Persistent memory is the first commercially available non-volatile DIMM. It provides higher capacity and lower power than DRAM. It is an attractive State of the Art scalable memory technology for a wide variety of applications, including databases and scientific workloads. Intel Optane DC is an intermediate memory layer between DRAM and SSD and can operate in different modes to fulfill different application requirements and constraints.

This diploma thesis will investigate efficient ways by which HPC workloads can exploit memory hierarchies that integrate Intel Optane DCPM. Challenges to be addressed in this thesis are the following:

- How can we use Optane DCPM to obtain high throughput and scalable performance for modern applications?
- What energy gains can be obtained compared to DRAM-only?
- How can we correctly tune Optane DCPM to maximize gains?

The diploma thesis will deliver a sophisticated methodology, supported by tools, for the efficient deployment of complex workloads on systems relying on DRAM/Optane DCPM hierarchies.



TOOLS, LIBRARIES AND INFRASTRUCTURE:

- Server(s) with Intel Optane DCPM modules integrated in the memory hierarchy
- Intel Persistent Memory Development Kit (PMDK)
- Intel VTune Amplifier and/or other profiling tools for performance and energy
- HPC workloads, including databases, indexes tuned for NVMs, HPC applications

RELATED MATERIAL:

- Intel Optane DCPM overview: <https://www.youtube.com/watch?v=BShO6h8Lc1s>
- Benchmarking Intel Optane DCPM: <https://lenovopress.lenovo.com/lp1085.pdf>

PREREQUISITES:

- Understanding the memory hierarchy of modern computing systems
- C/C++, Python programming
- Basic knowledge of database systems is an advantage

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