

## Bachelor's / Master's / Semester Project

### OS I/O Stack Design for Storage-Centric Computing on Mobile Devices

#### Design of a New Workflow for Data Stack Specialization:

**Objective:** The goal is to simplify and tailor the data stack specifically for target mobile applications, enabling efficient offloading of computation and workloads to storage-centric computing systems.

#### Challenges:

- What are the guiding principles for redesigning the data stack?
- How can we quantitatively evaluate the benefits of this optimization?
- Are there any widely-recognized benchmarks available for reference?

#### Development of a Communication Interface and Protocol:

**Objective:** The aim is to facilitate computation offloading and synchronization between the host CPU and storage-centric computing.

#### Challenges:

- How should the memory-semantic interface be defined?
- Should the approach focus on synchronized or asynchronous access? Should it be based on a stream model or a message model?
- What considerations are involved in designing a communication protocol and extended command set to support in-storage data processing, based on the memory-semantic interface?

We are looking for enthusiastic students who want to work hands-on on different software, hardware, and architecture projects for heterogeneous systems.

#### Requirements

- Outstanding programming skills (C/C++)
- Operating system & computer architecture background
- Interest in discovering why things do or do not work and solving problems
- Interest in making systems efficient and usable
- Strong work ethic

For background and example past studies please see:

- Z. Yang, Y. Lu, X. Liao, Y. Chen, J. Li, S. He, and J. Shu, "[λ-IO: A Unified IO Stack for Computational Storage](#)," FAST, 2023.

For the introduction of PIM or storage-centric (summary papers) please see:

- [https://people.inf.ethz.ch/omutlu/pub/processing-in-memory\\_workload-driven-perspective\\_IBMjrd19.pdf](https://people.inf.ethz.ch/omutlu/pub/processing-in-memory_workload-driven-perspective_IBMjrd19.pdf)

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