

DaphneLib (API)

DaphneDSL (Domain-specific Language)



**MLIR**

**MLIR-Based  
Compilation  
Chain**

**DaphneIR (MLIR Dialect)**

Optimization Passes

New Runtime Abstractions  
for Data, Devices, Operations

Hierarchical Scheduling

**Device Kernels**  
(CPU, GPU, FPGA,  
Storage)

**Vectorized  
Execution Engine**  
(Fused Op Pipelines)

**Sync/Async I/O  
Buffer/Memory  
Management**

**Local (embedded) and Distributed Environments**  
(standalone, HPC, data lake, cloud, DB)

**Extensible  
Infrastructure**

**Multi-level  
Compilation/  
Runtime**

**Fine-grained  
Fusion and  
Parallelism**

**Integration w/  
Resource Mgmt &  
Prog. Models**