

OVERVIEW

The project develops a scalable, strongly consistent shared memory service. It combines multiple Distributed Shared Memory (DSM) instances into a single **Unified DSM (uDSM)** that grows, shrinks and reorganises automatically, while applications keep a simple read/write interface.

MOTIVATION

Distributed applications are more important than ever, but building them across devices with different hardware, operating systems and networks is still difficult. A DSM hides this complexity by giving all nodes one consistent memory. Atomic DSM also guarantees that every read returns the most recent value.

Existing DSM solutions, however, rely on a single monolithic instance. Its capacity is limited by the smallest node, and its performance drops as more nodes and users join. **ATLAS addresses this by turning DSM into a modular, self-organising service that can scale up and down on demand.**

OUR FOCUS

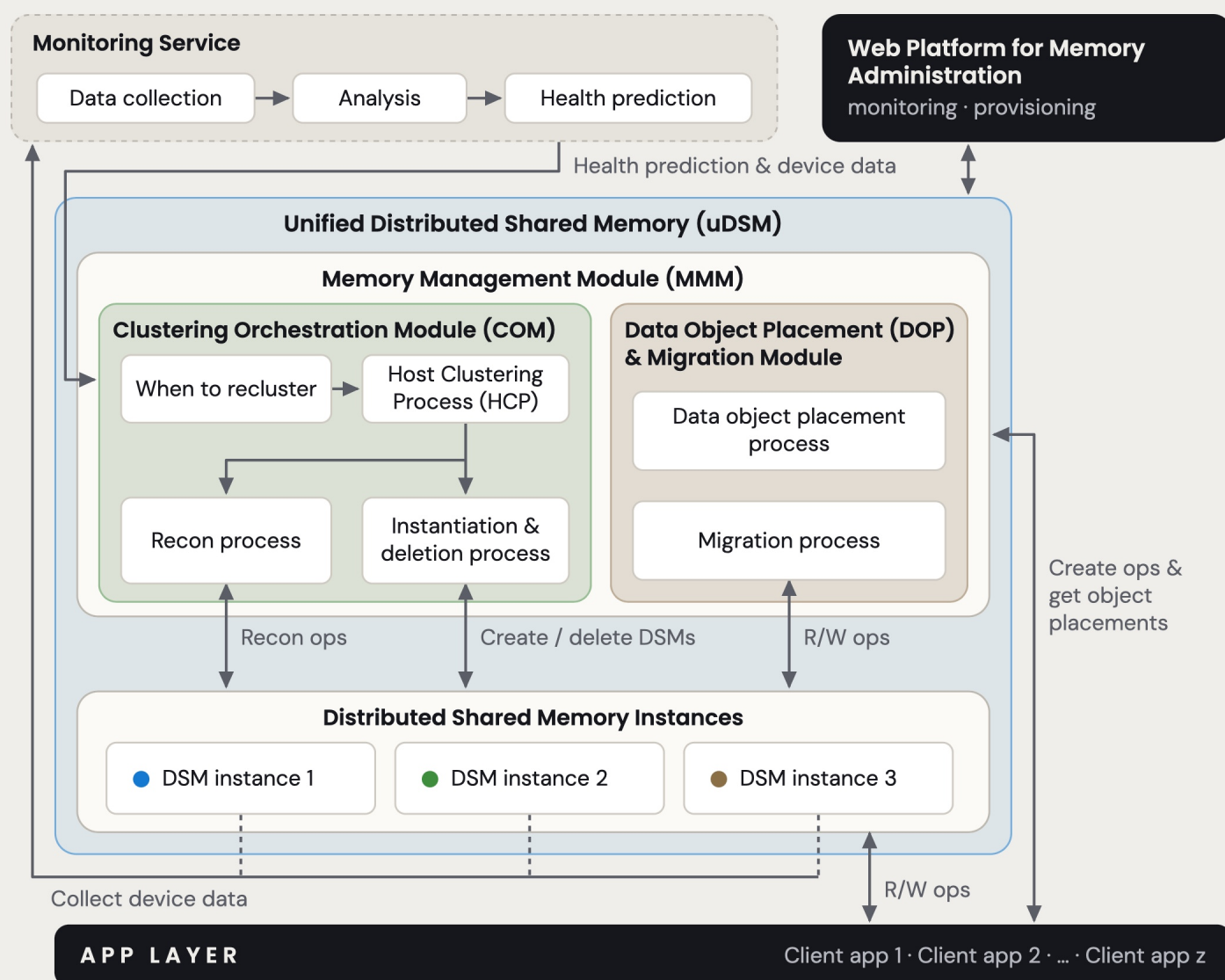
THEORY

New decentralised algorithms for clustering nodes, placing and migrating data objects, and reconfiguring the service, all with formal guarantees of atomicity, consistency and liveness.

PRACTICE

A working multi-instance DSM service, evaluated on a real testbed and integrated into an existing web platform for real-time monitoring and management.

SYSTEM ARCHITECTURE



MAIN OUTCOMES

01

Scalable Unified DSM

A strongly consistent shared memory that combines multiple DSM instances into a single, unified memory service.

02

Clustering, Placement & Migration

Decentralised algorithms specifying how nodes are grouped into DSM instances, where each data object is stored, and when and how to reorganise and migrate data without interrupting the service.

03

Web Platform for Memory Administration

A web platform for monitoring DSM instances, nodes and data objects in real time, and for automatically adding new nodes to the service.

PROJECT OBJECTIVES

O1

Design Decentralised Clustering and Data Placement Algorithms

O2

Design Dynamic Clustering and Data Migration Algorithms

O3

Implement, Integrate and Evaluate

O4

Develop and Integrate the ATLAS Web Platform