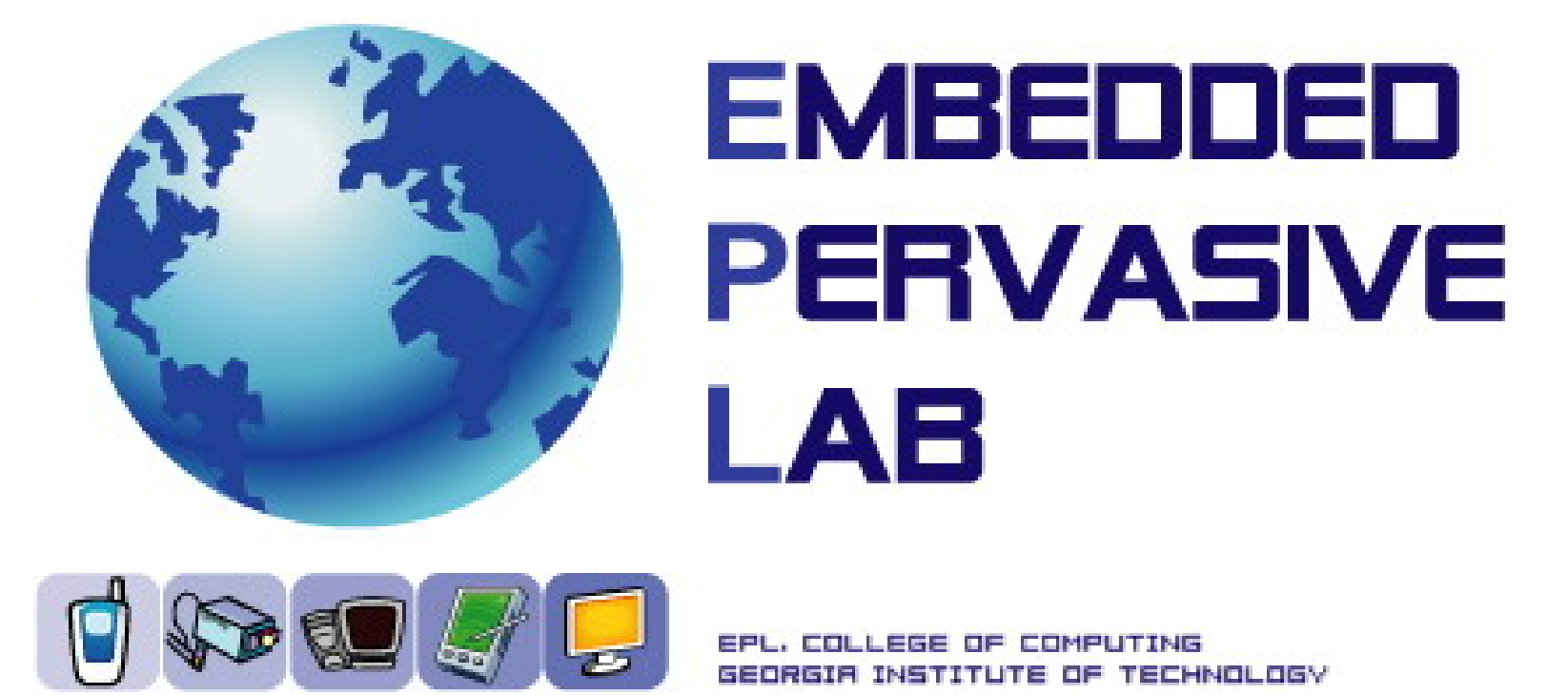


# Programming and Execution Environment for Geo-Distributed Latency-Sensitive Applications

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## Motivation

- Ubiquitous Computing becoming a Reality assisted by the Rise of Edge/Fog-Computing
- Omnipresence of Smartphones and Smart Cameras
- Current Approach: Run in the Cloud → High Latency!
- But: Latency-sensitive Applications (camera networks, etc.)

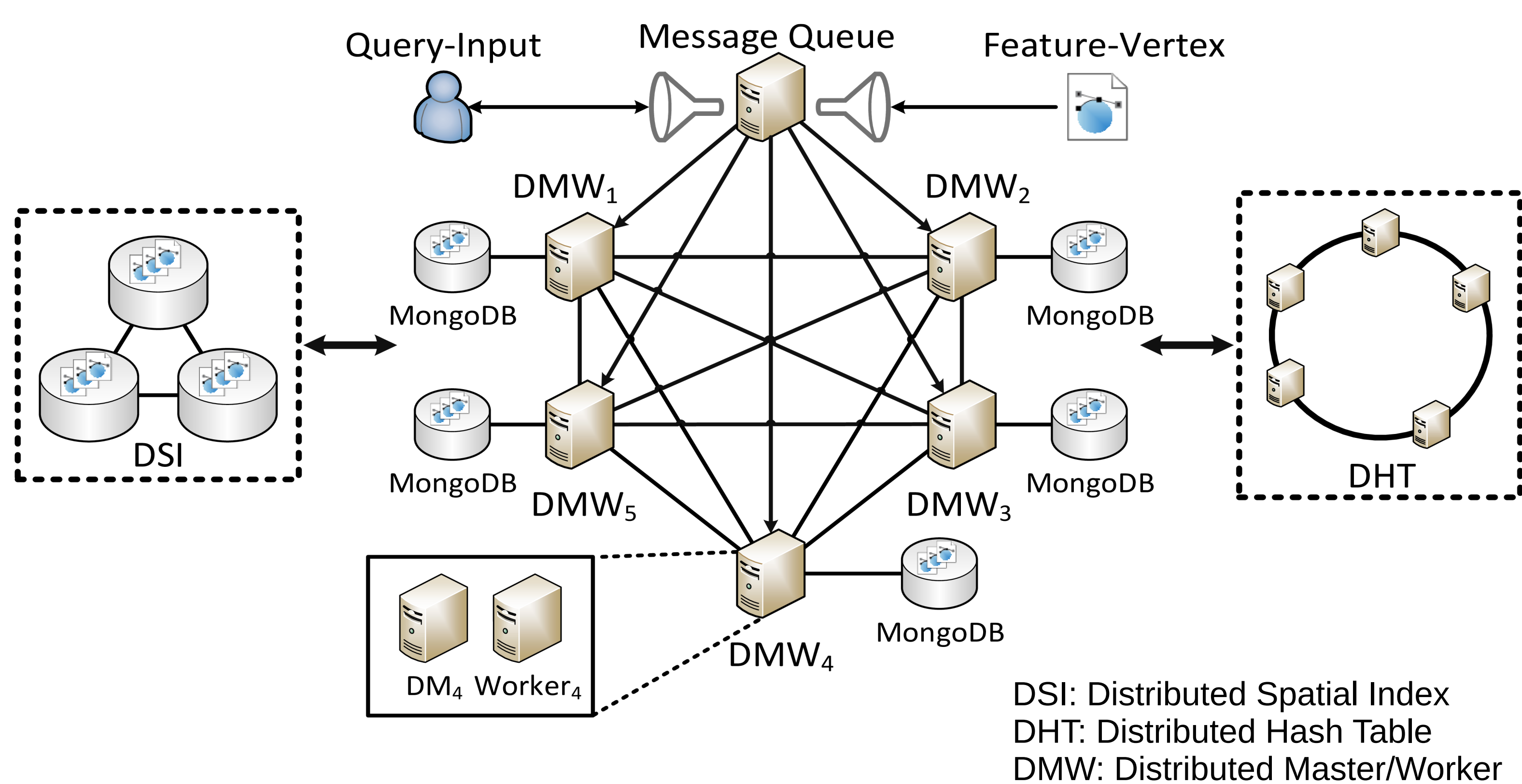


## Our Approach: Use nearby Computing Resources for interactive, latency-sensitive Computing

### CamGraph: Graph Processing for Camera Networks

- Efficient, Distributed archive/query-engine for Camera Network
- Key abstraction: 3D-Graph (vertices: detections, edges: similarity), dimensions:  $(x, y, t)$
- Key challenges: Load-Balancing (Partitioning)
- Our insight: Can do lightweight Partitioning on the fly → optimize locality, minimize access times

### Architecture



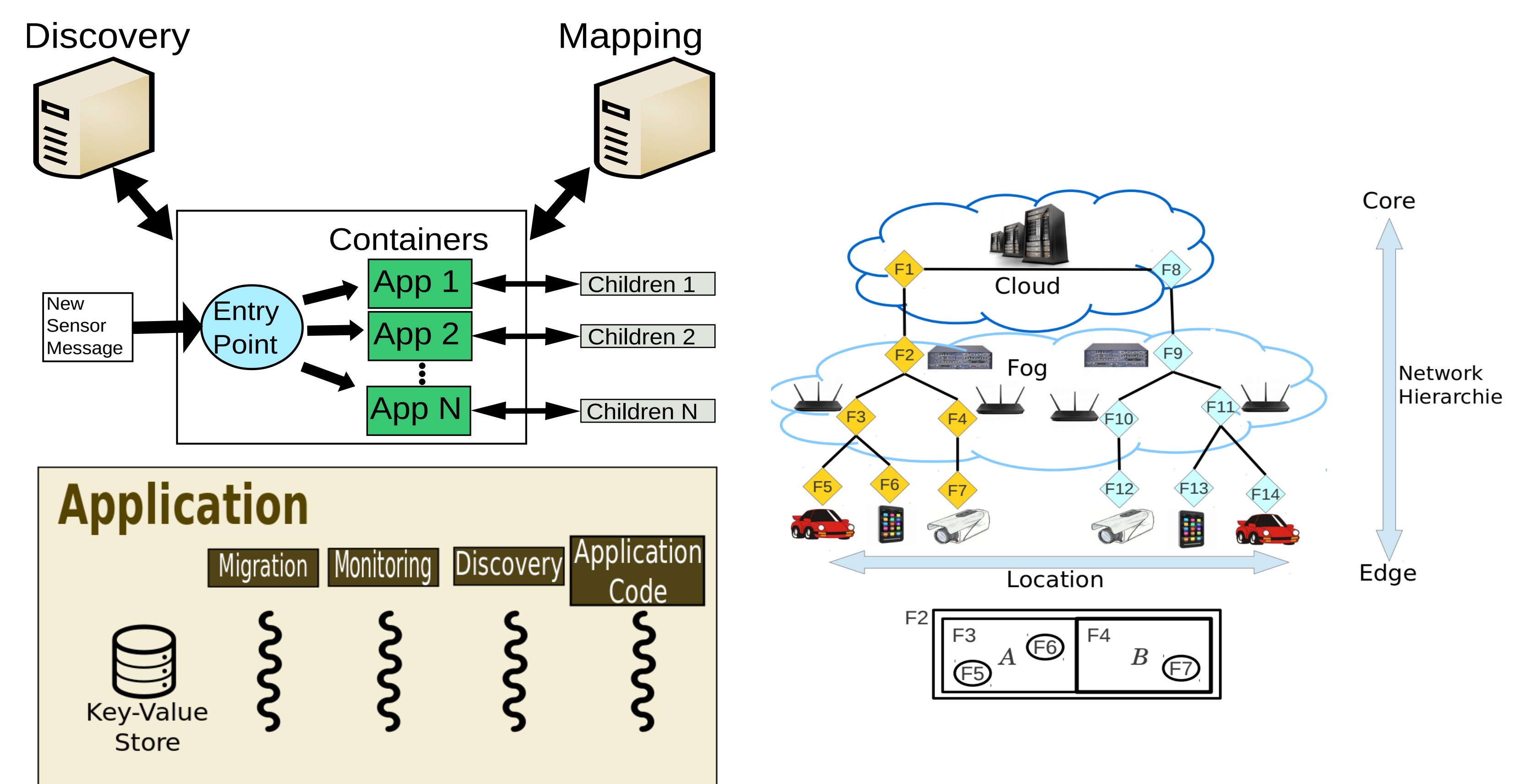
### Current State

- Single-Site Implementation evaluated on Microsoft Azure
- Scales well to more than 100 Compute-Nodes
- Finishes insertions in less than 100ms (single face-recognition: 60ms)
- Federated Version (spanning multiple sites) in progress
- Integration with MobileFog for federated version in progress
- Connectivity to small-scale Camera Network Testbed implemented

### MobileFog

- A novel Programming Model
- Key abstraction: Data Flow Graph optimized for Fog Computing
- Key challenges: Optimize Parent Selection and Migration to the Mobility Patterns
- Our insight: Developers should not worry about the Network Architecture. Optimize for Mobility

### Architecture



### Current State

- Minimal-set API
- Automatic and incremental Deployment of Applications
- Multiple Applications running concurrently
- Migrated Node can start communicating with a new Parent immediately, without the complete State being available (yet)
- Horizontal Migration in progress
- API was tested against applications in Camera Networks and Vehicular environments

**Take Away: There is no one-size fits all solution. Leverage the resources available.**