**FINISH LINE**

A system that is aware of the different storage’s
- Performance characteristics
- Interfaces
- Durability characteristics
- Cost model

Also knows the application’s
- QoS requirements
- Workload characteristics

Generates and executes an optimal storage policy that hits the sweet spot in the tradeoff space!

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**MAJOR CHALLENGES**

- Scalability
  - Store millions of objects
  - Millions of requests per second

- Metadata Management and System Monitoring
  - Ensuring durability
  - Efficient metadata lookup
  - Minimizing impact on workload
  - Characterize application workload

- Detecting and Avoiding Conflicting Policy Actions
  - Backing up data while serving requests
  - Dynamic re-configuration without affecting performance

- Achieving Required Quality of Service
  - Multi-tenancy poses a big challenge here
  - Characterizing cloud storage

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**PRELIMINARY EVALUATION**

Evaluating Performance-Cost-Durability Tradeoff

![Chart showing performance-cost-durability tradeoff]

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**TIERA**

A system that provides first-class support for encapsulated tiered storage, event-driven control, and support for runtime replacement/addition of policies and tiers.

**USING TIERA**

```java
// Tiera PersistenceInstance()
Tiera PersistenceInstance() {
    tier1: { name: Memcache, size: 100M };
    tier2: { name: S3, size: 10G };
    tier3: { name: EBS, size: 1G };

    event(insert) : response {
        store(what: insert.object, to: tier1);
    }

    event(tier1.filled == 50M) : response {
        move(what: object.loc = tier1, to: tier2);
    }

    % A simple persistence policy, % write-back once a timer fires
    event(time == t) : response {
        copy(what: object.loc = tier1, to: tier2);
    }
}
```

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**MOTIVATION**

- Many Storage Options
  - Memory (Memcache)
  - Block Devices (Cinder, EBS)
  - Object Store (Swift, S3)
  - ...

- Multiple Desirable Combinations
  - Memcache + S3
  - EBS + S3
  - ...

Each offers different performance, cost, reliability guarantees, and interfaces.

Which configuration works best for my needs?