Fabric

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http://www.cs.cornell.edu/projects/fabric/

CT-ISG: Diaspora:

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A Secure, Reliable, Federated Execution Platform and Information Store

Overview

Internet has tremendous untapped potential for cooperation

Now: limited, ad hoc sharing, with uncertain security

Goal: secure, reliable computation and storage on a highly available decentralized infrastructure

Example Applications

Unified Medical Database: Hospitals share a single, consistently updated medical record for each patient

Wikipedia++: A universal knowledge repository. Each user has a distinct view according to security privileges

Decentralized Social Networking: Data can be used by any application while enforcing user privacy

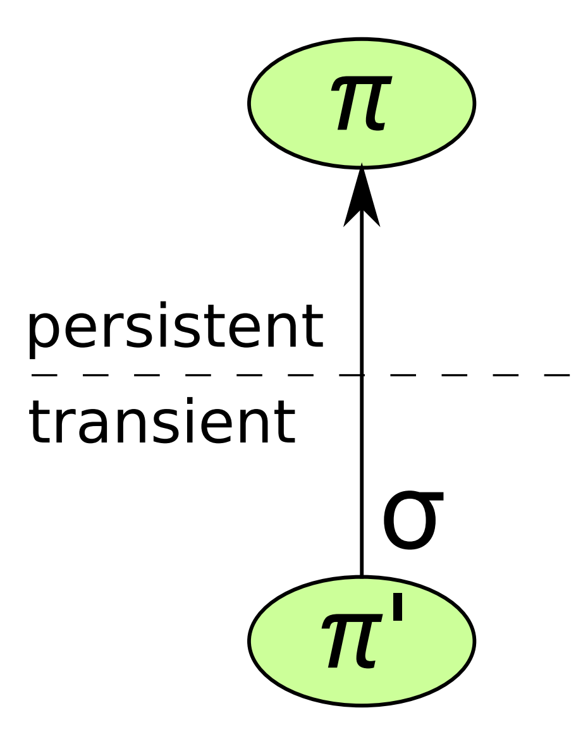
Language Features

Information-flow annotations provide explicit per-object confidentiality and integrity policies

```
Confidentiality policy:
  {Patient -> Doctor, Insurance}
Integrity policy:
  {Patient <- Doctor}
```

Transactions provide a simple conceptual framework for managing concurrency

Persistence annotations prevent unexpected dangling references while avoiding the "persist-the-world" phenomenon.

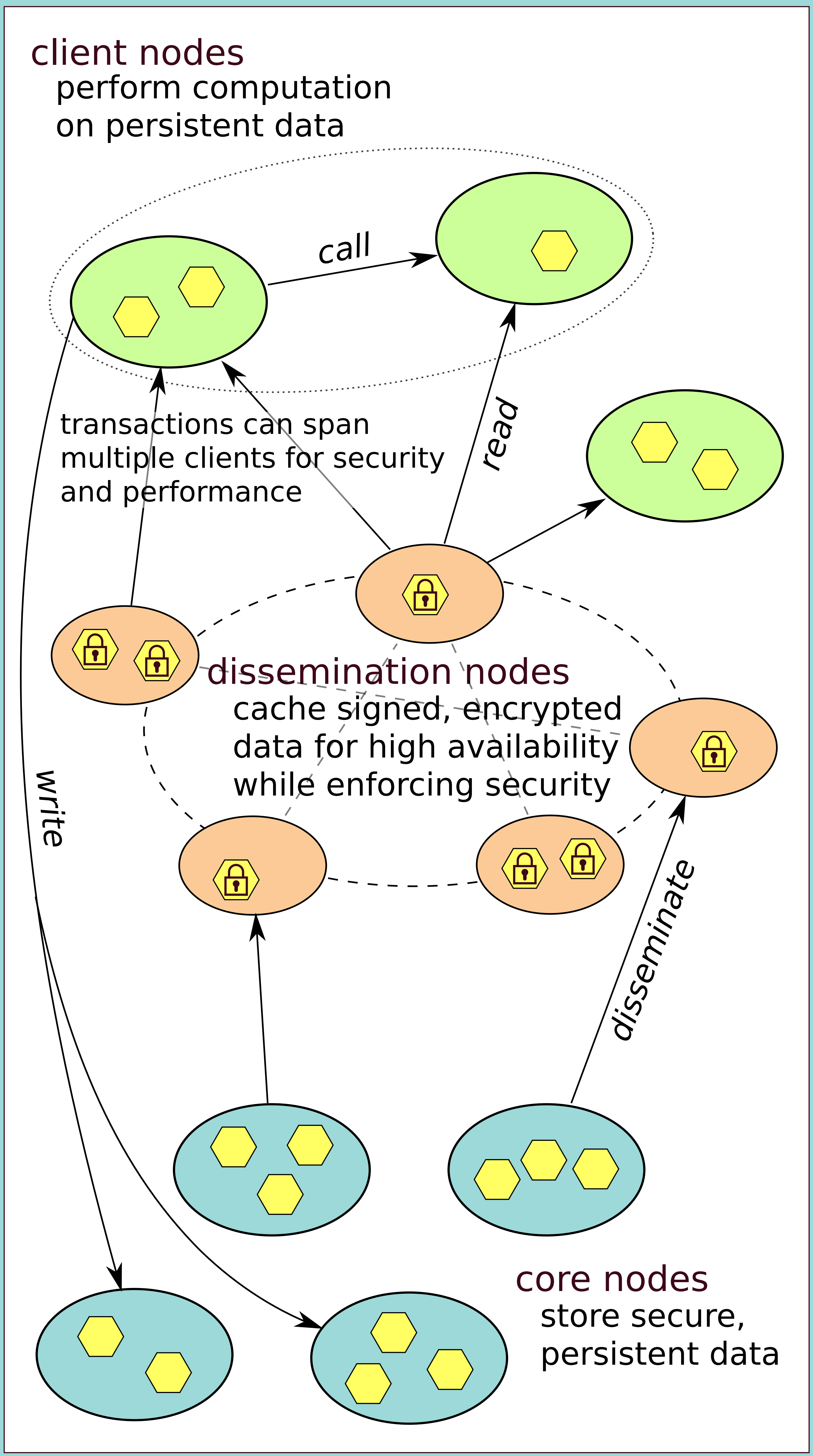


Objects created with explicit persistence π

References labeled with static approximation σ

Objects cannot be created more persistent than non-transient fields

Multi-Tiered Architecture



client nodes
perform computation on persistent data

transactions can span multiple clients for security and performance

dissemination nodes
cache signed, encrypted data for high availability while enforcing security

core nodes
store secure, persistent data

Challenges

Automatic partitioning of data and code based on security policy

Dissemination of popular objects while enforcing consistency and security

Transactions spanning multiple clients and trust domains

Function-shipping moves computation closer to data

National Science Foundation
WHERE DISCOVERIES BEGIN

NSF CyberTrust PI Meeting
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Cornell University
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