enTrans – A System for Flexible Consistency Maintenance in Directory Applications

Anandi Herlekar, Atul Deopujari, Krithi Ramamritham
Dept. of Computer Science and Engineering, IIT Bombay

Shyamsundar Gopale, Shridhar Shukla
Persistent Systems Private Limited, Pune

The work was completed as a part of the Master's thesis under the supervision of Prof. Krithi Ramamritham
WSP + ISP = ?
The Partnership Questions

- How do you **Unify** Customer Identity?
- How do you **Maintain Consistency** across Customer Identity?

Customer Service Administration

Customer Identity Consistency

Wireless Service Provider

Internet Service Provider
Scattered Identity Problem

- Service Profile:
  - Call Plan,
  - Call related Services, Email, Voice and Fax

- Customer and Billing Info:
  - Customer Name, Age, City, State, Annual Income, Phone-no, Total Bill

- User Profile:
  - Subscriber Name, Age, City, State, Phone-no, Preferences, Email, Voice and Fax
enTrans to perform consistent updates…

Update requests that need consistent updates to other directories

Integrity Constraint Manager executes transaction to maintain consistency, e.g., when customer Julie changes her place of living, the change in the identity components of Home City, Home State and Home Postal Code must get reflected in the data stores of both ABC Telecom and XYZ Post.com.

Steps for consistent updates:

1. Begin parent transaction at ABC Telecom.
2. Modify information at ABC Telecom.
5. End sub-transaction.
6. End parent transaction.

Transactions that have Group Commit dependency
PTAP (Predefined Trigger Action Protocol) Overview

- Standard LDAP APIs
- PTAP Transaction APIs

**LDAP Client Component**

**PTAP Client Component**

**Client Interface**

**IC Manager**

**PTAP Server Component**

**Transaction Manager**

**Logger**

**LDAP Server**

**ODBC DB**
Features of PTAP

• Generic
• Transparent
• Support for recovery from logical failures
• Multi-server support
• Assumption: Atomicity of single LDAP operation

Client Interface

Interface for transaction initiation and termination
• `ldap_begin_txn ( ld, type, parentTxnId, newTxnDetails )`
• `ldap_end ( ld, txnId, STATUS )`

Interface for basic primitives
• `ldap_permit ( ld, fromTxnId, toTxnId )`
• `ldap_delegate ( ld, fromTxnId, toTxnId )`
• `ldap_formDependency ( ld, fromTxnId, toTxnId, type )`

Interface for execution of operations in a transaction
• `ldap_add_t ( ld, dn, attrList, txnId )`
• `ldap_delete_t ( ld, dn, txnId )`
• `ldap_modify_t ( ld, dn, attrList, txnId )`
Related Work

§ No known support exists for executing Custom transactions in LDAP.

§ LTAP – (Light-weight Trigger Access Protocol)
   Adds active facilities in generic manner.
   http://ltap.bell-labs.com/
   Team: Robert Arlein, Narain Gehani, Daniel Lieuwen

Future Work

§ Support for crash recovery using logs provided by PTAP.

§ Design a formal method to specify integrity constraints in LDAP.

§ Design a formal method to map an integrity constraint to appropriate transaction model.