REXX, Distributed Systems and Objects

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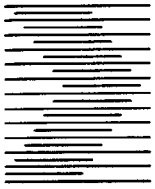

Rexx, Distributed Systems and Objects

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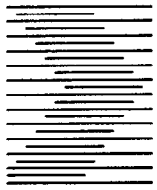
Rexx Symposium
May 2, 1995



Rexx, Distributed Systems and Objects

- **Rexx + Client/Server Database**
  - Simple architecture for simple C/S apps
- **ORexx + SOM**
  - Beginning of strong client/server platform
- **Current technology (ORexx)**
  - Functions as SOM requester
  - Adequate for client-side activity
- **Coming technology**
  - Exporting OREXX classes as SOM classes
  - Scripting language for OpenDoc
  - Suitable as server platform

Our approach...

- **Discuss paradigm issues**
  - Evolution of distributed architectures in Four Phases
- **Discuss transaction issues**
  - Agenda of TP
- **Examine Rexx C/S implementation strategies**

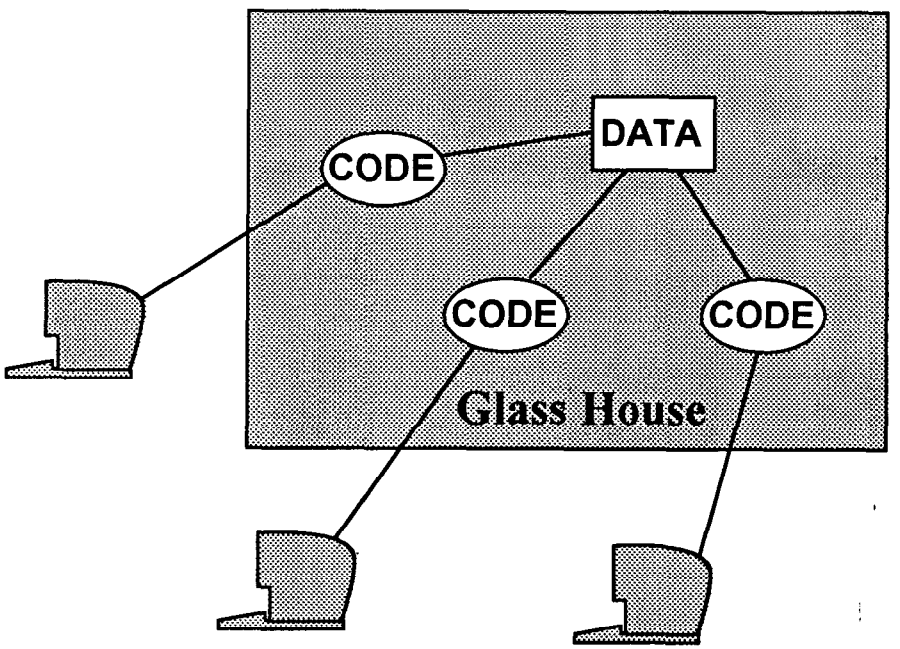
Computing Architecture Phases

1. Centralized
2. Clients to Database Server
3. Clients to Function Server
4. Objects

***Code* and *Data* in varying combinations**

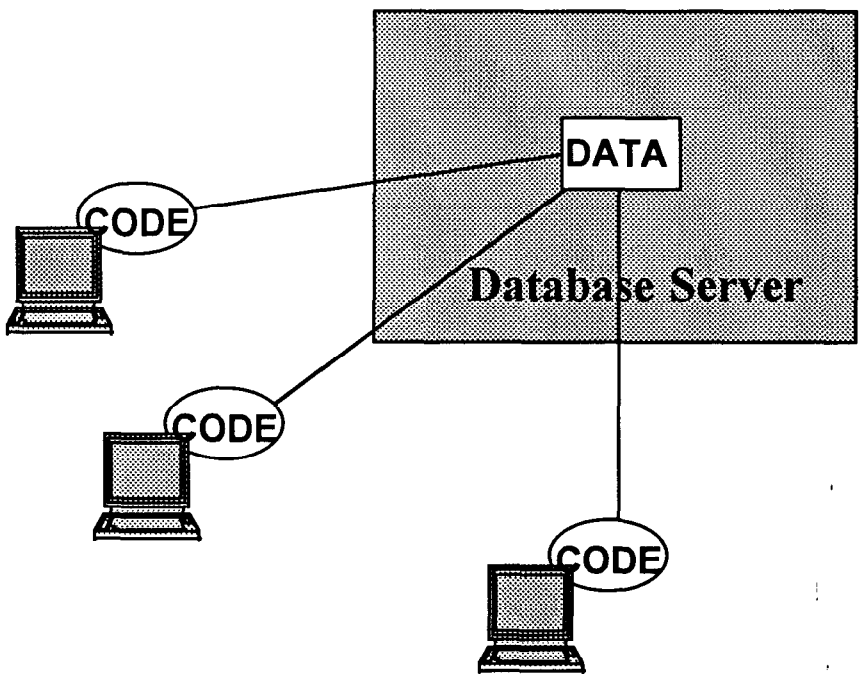
Phase 1. Centralized Computing

- Strong control & manageability
- Good security
- Weak user empowerment
- Weak on distributed computing
- Limits business "reach"



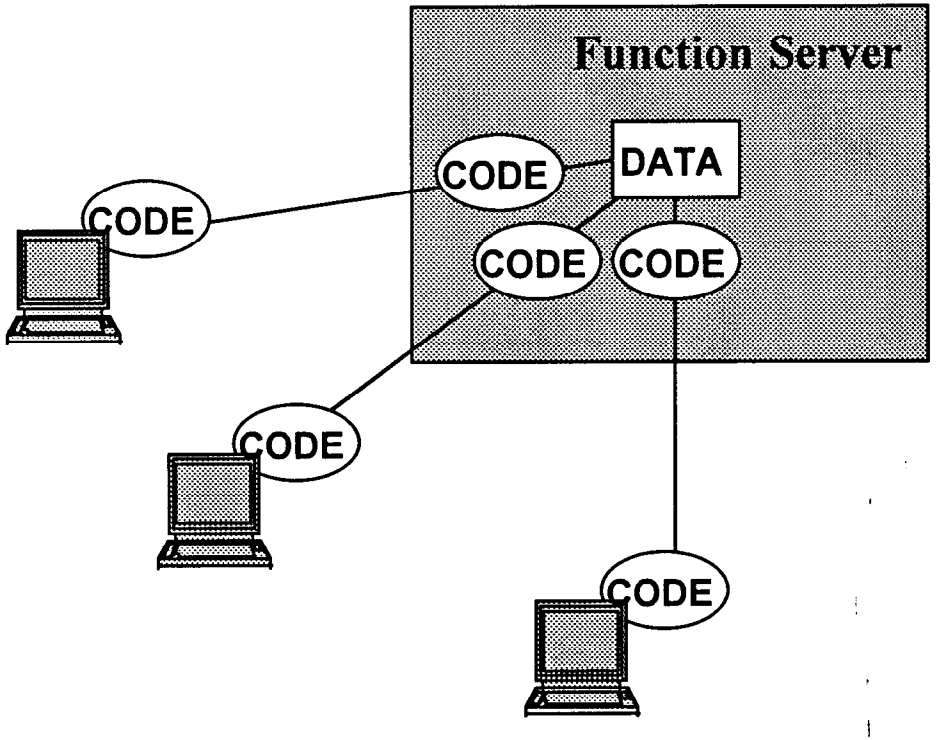
Phase 2. Clients to Database Server

- Power to the user
- Power to the user interface
- Uneven performance and integrity
- Weak 3-tier architecture
- Trust problems



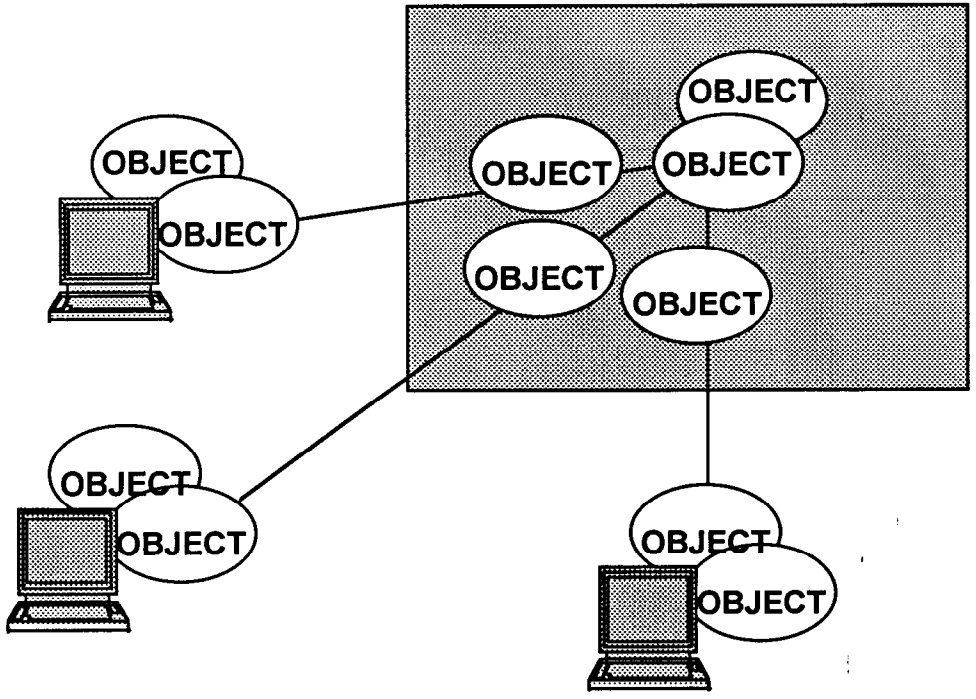
Phase 3. Clients to Function Server

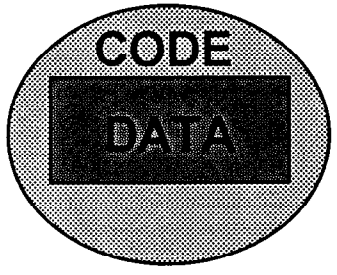
- Improved performance and integrity
- Stronger 3-tier architecture
- Trust tuning
- *But* significant software complexity



Phase 4. And Then There Are Objects...

- Inately partitioned
- Semantic continuity
- Limited transactional awareness





An Object is *Data*
surrounded by a protective layer of *Code*

Transaction = "The Deal"

- **In clay**
  - Baked invoices at Ebla (3rd millenium BC)
- **On paper**
  - Sales orders and invoices
  - Double-entry ledgers
  - Contracts and deeds
- **Online**
  - Reservations for travel, hotels, cars, etc
  - Banking & stock trading documents
  - Order entry, inventory planning, accounting
  - Telephone call setup and billing, email

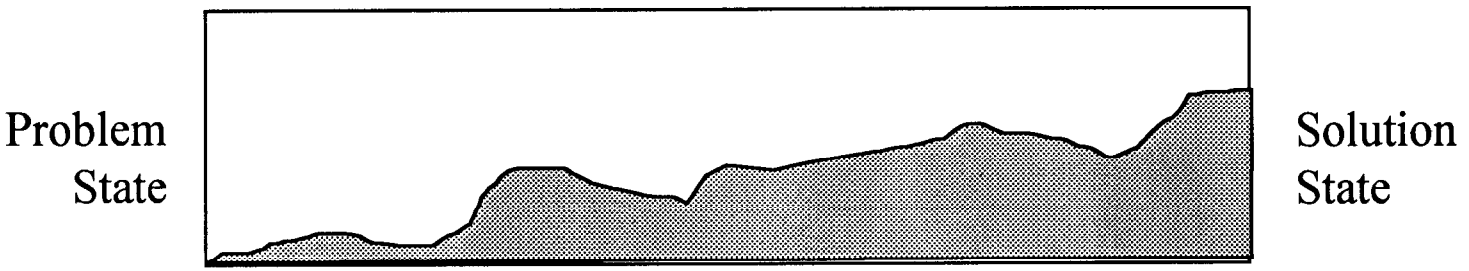
ACID Test for Transactions (And All Deals)

- **Atomicity**
  - Transactions are "all or nothing" (integrity principle)
  - Wedding vows (two-phase commit)
- **Consistency**
  - Transactions are a correct transformation of state
  - Debits = credits
- **Isolation**
  - Concurrent transactions behave as if executed serially
  - Transactions don't see other transactions partial results
- **Durability**
  - Once committed, transactions are not forgotten
  - Bound to honor COMMITments

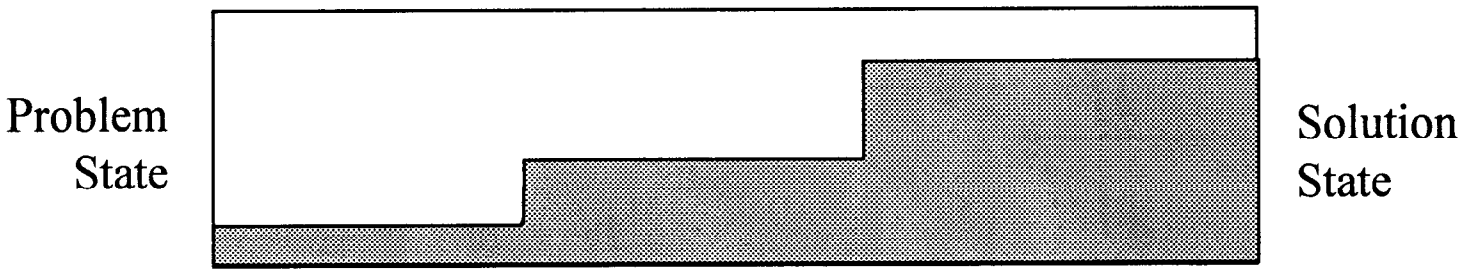
Transactions are the computer equivalent of contract law

The Transactional Discipline

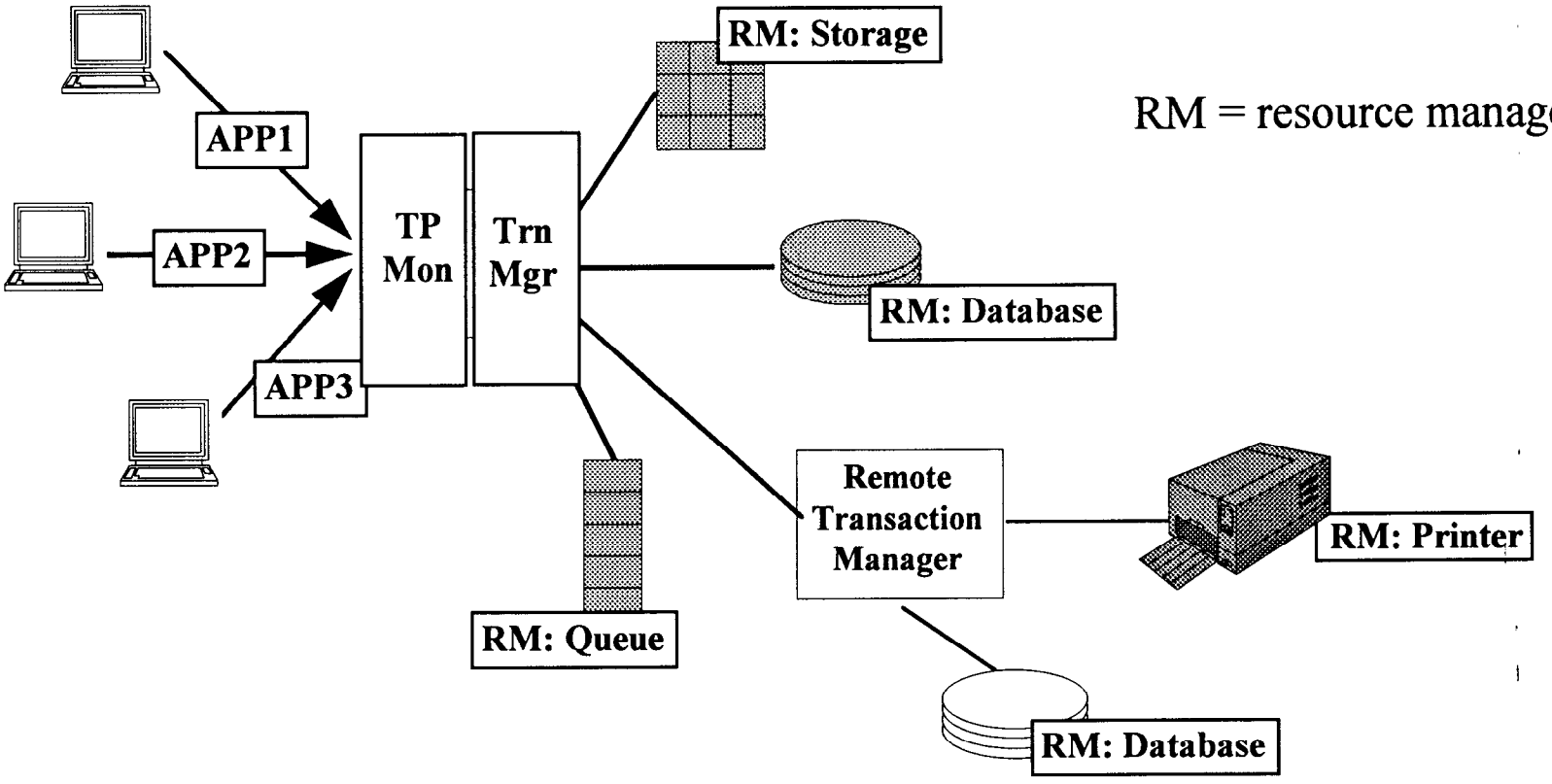
Non-transactional: state changes continuously



Transactional: orderly, coordinated, audited state change

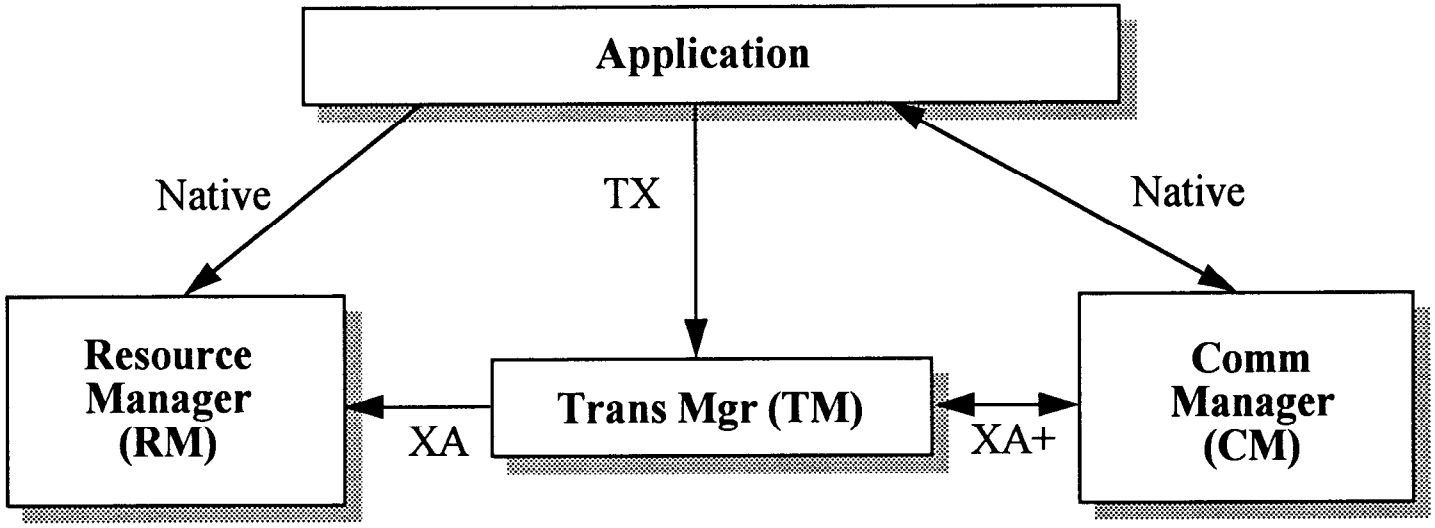


How TP Monitors are organized



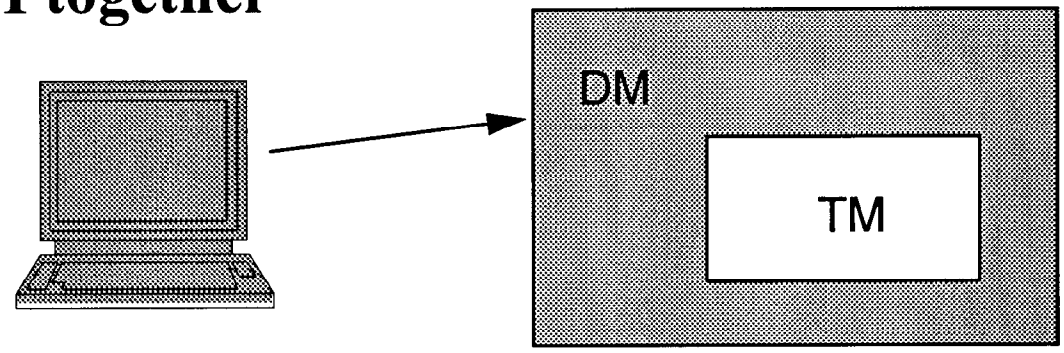
RM = resource manager

Full-Fledged TP: X/Open DTP Model



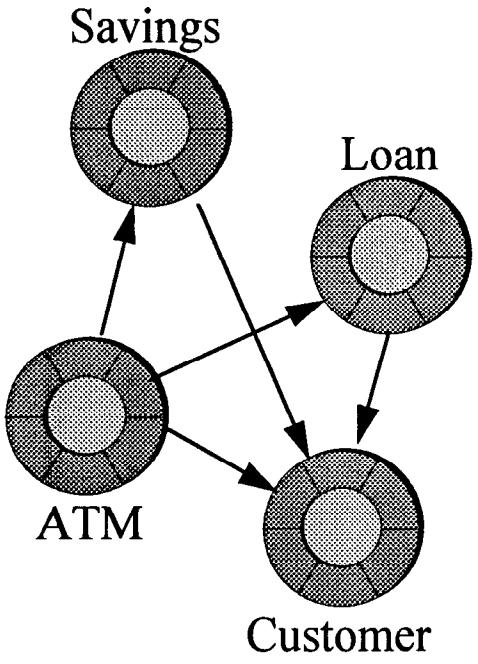
TP-Lite: Transactions Inside Database

- **Today's client/server databases bundle TM and DM together**



- **TM should be *unbundled* for open systems**
  - Coordinate multi-vendor DBMS
  - Coordinate user-written function
  - Coordinate other resources

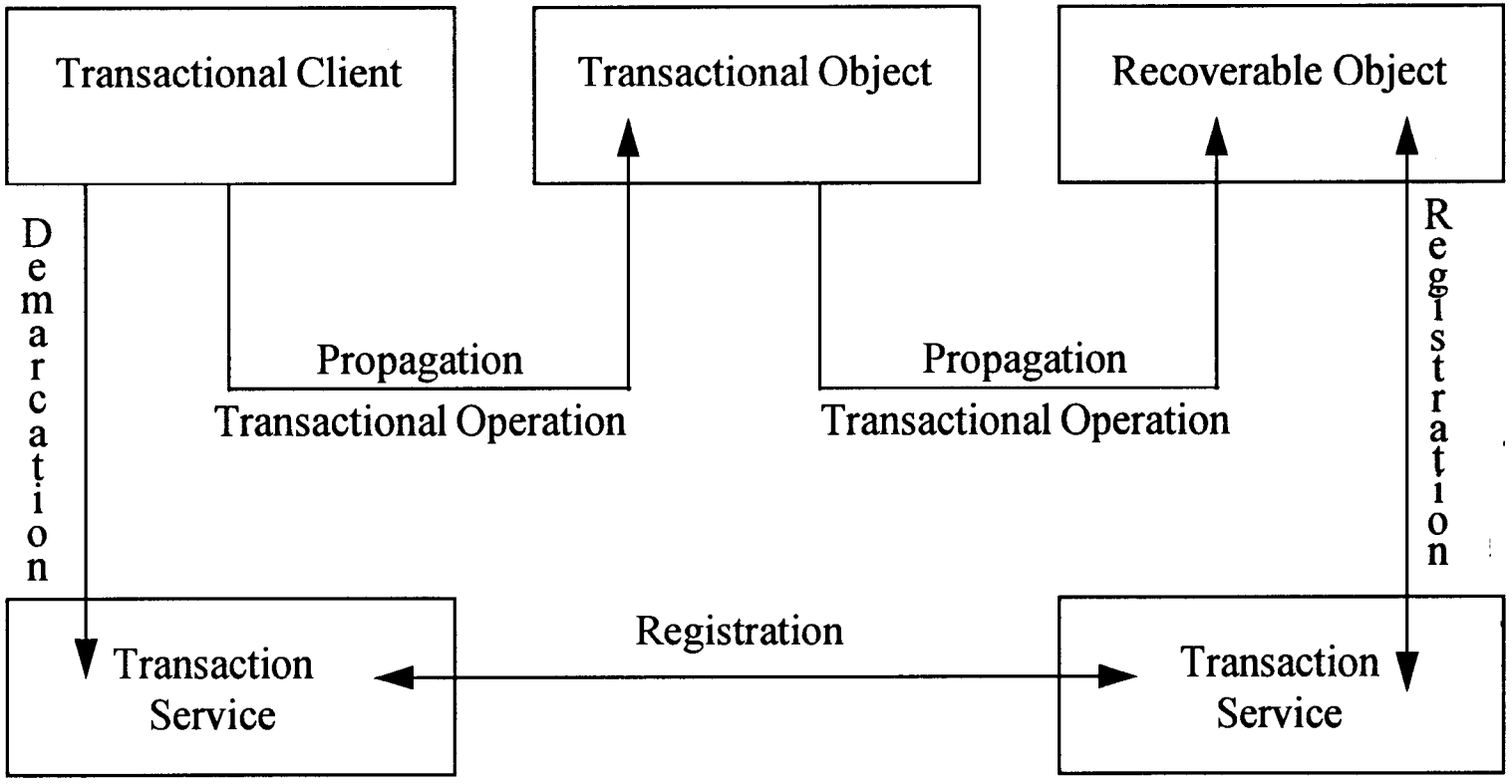
Imagine Transactional Objects



- Objects distributed about network
- Send messages to
  Debit savings acct object
  Credit load account
- Commit changes all object states
- Simultaneous to multiple consumers

Objects are microscopic Resource Managers:
Subsystem driven by a formal API that has state.

OMG Transactional Object



Mapping Paradigm & Transactionality

	Phase 1	Phase 2	Phase 3	Phase 4
Non-TP	Monolithic program	Any client/server DBMS	RPC Msg Queue Sockets	CORBA, DSOM, COM, DOE
TP	Monolithic program under TP: CICS, IMS, Guardian, ACMS	Any client/server DBMS with RUOW or DUOW	Dist TP: TRPC, TMQ, LU6.2	CORBA (w/OTS), DSOM, (COM)

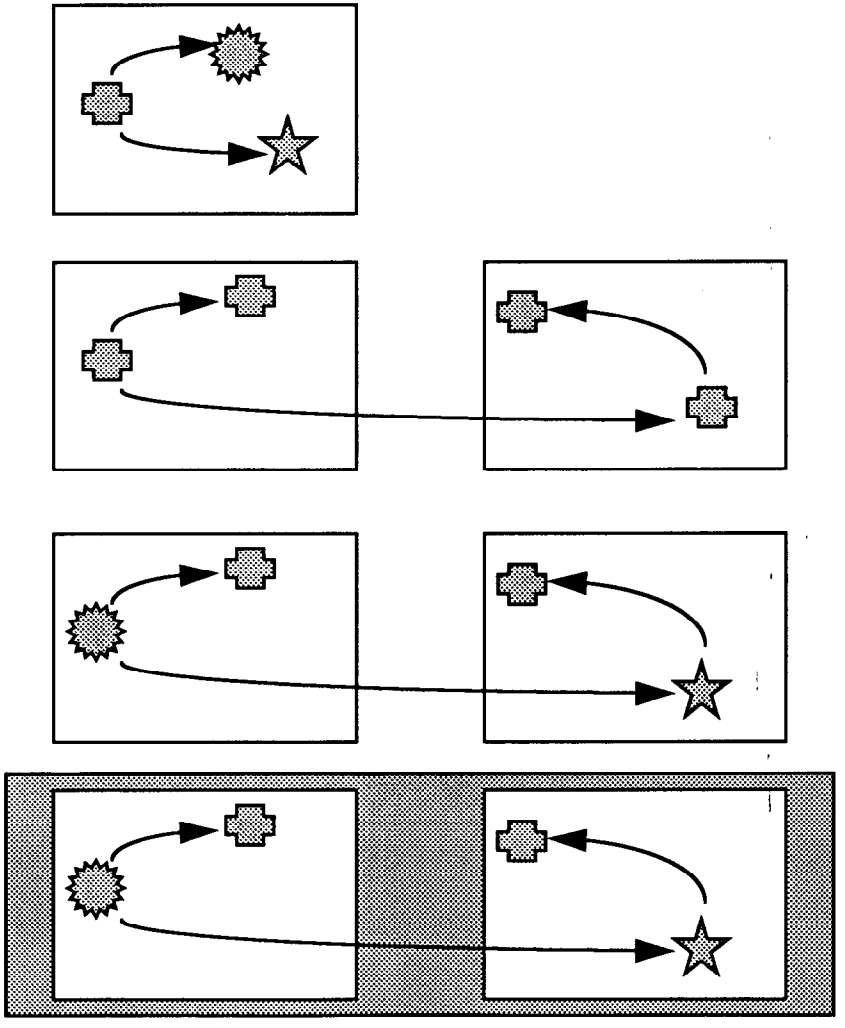
Steps to Distributed, then Transactional, Objects

1. ***Compatibility*** **among differing object models in same machine**
   - CORBA (coarse-grain)
   - SOM (fine-grain)

2. **Distributed homogeneous objects**
   - CORBA
   - DSOM

3. **Distributed heterogeneous objects**
   - CORBA 2.0
   - DSOM

4. **Distributed transactional objects**
   - CORBA w/OTS



Rexx implementation strategies

- **Rexx or ORexx Client to Client/Server database**
  - Phase 2 or Phase 4/2 hybrid
- **Rexx or ORexx Client to Function server**
  - Phase 3 or Phase 4/3 hybrid (non-transactional)
- **Rexx or ORexx Client to TP Monitor (eg. CICS ECI)**
  - Phase 3 or Phase 4/3 hybird (transactional)
- **ORexx Client to DSOM**
  - Phase 4 (non-transactional)
- **ORexx modifying Server behavior**
  - Phase 4 (non-transactional)
- **ORexx Client or Server with ORB transaction services**
  - Phase 4 (transactional)