Failure Detection and Recovery for Doubly Distributed Transactions
For Parallel and Distributed Computing
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Messaging Structure
Gather/Broadcast in a tree structure
- Sub-coordinators remove duplicates
- Singleton sub-transactions must be defined early
- Global sub-transactions defined at any time

Addressed Scenarios
Data Movement
- Simulation writes to staging
- Analysis reads, processes, writes to different staging area
- Visualization reads data, generates images, writes to disk, deletes intermediate data

System Reconfiguration
- Deploy resources, wait for proper setup, update registry
- Hide resources, quiesce service, start new successfully, update registry, advertise

Failure Detection/Recovery
Timeouts for message send/receive
- Account for multi-level
- Manage independent processing
- Maintain global state

Logical Protocol

Subordinate Failure

Sub-Coordinator Failure

Coordinator Failure

Example Architecture

Gather/Broadcast in a tree structure

Transactions Performance

Time spent executing
Transaction protocol is negligible