Tapestry: Wide-area Location and Routing

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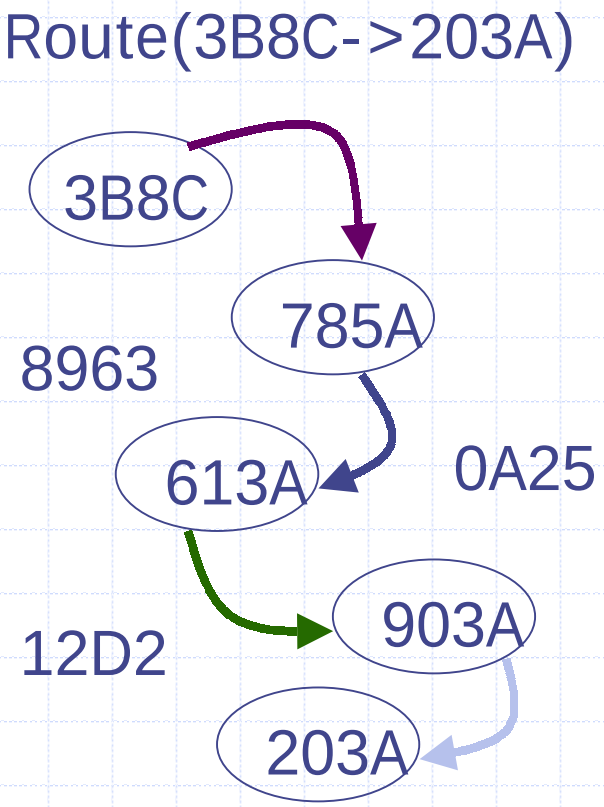
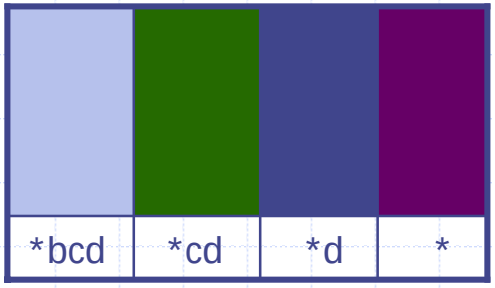
Why Tapestry?

- Distributed systems scaling to WAN
  - Larger scale ➔ frequent component faults
  - More data + centralization ➔ performance bottleneck
  - Dynamic environment ➔ manageability complexity
  - More principals ➔ attacks on system (e.g. DoS) more likely
- Tapestry:
  - Decentralized approach to location and routing focusing on fault-resilience and adaptability
  - Builds on previous work: Plaxton trees

Plaxton Trees

- Wide-area naming
  - Nodes/Objs named by hashed bit-sequence IDs
- Incremental routing
  - Route to root via local neighbor maps
  - Incremental progress towards destination
- Properties
  - Exploits search locality
  - Route around failures
  - Decentralized scaling
  - Log_bN hops to destination





RoutingMap(abcd)

Tapestry Improvements

- Root nodes => single point of failure
  - Soln: Root redundancy via hash salts
- Topology changes => high cost
  - Soln: Local heartbeats, alternate pointers, second chance invalidation
- Dynamic system => error persistence
  - Soln: Proactive node-integration, fault-detection, Self-optimization via query state
- Vulnerable to DoS attack
  - Soln: Approx. nodes for load diversion, online data verification, compromised node isolation

Project Status

- Providing location/routing support for the Oceanstore global storage project
  - *http://oceanstore.cs.berkeley.edu*
- Java-based prototype
- C-based simulation / measurements
- For more details, see Poster Session
- Contact
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