Cheddar

Matthieu Weber (mweber@mit.jyu.fi)

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Introduction
Origins

- CheDAr: a CHEap Distributed ARchitecture
  - Completely distributed computing platform
- Globus: grid computing system, with centralized resource discovery
- Chedar refocused to be a fully distributed resource discovery system
Centralized Vs. Distributed Systems

Centralized Resource Discovery

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Resource

Resource

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Centralized Vs. Distributed Systems

Distributed Resource Discovery

Centralized Resource Discovery
Resources

• Resource discovery, based on specific attributes

• Various types of resources:
  – Computing resource (available computing time)
  – File resource (a given file, free storage space)
  – Display resource (a screen)
  – Printing resource (a printer)

• Query/reply messages
Architecture
Chedar’s Components

- ChedarClient
- Connection
- Connection Manager
- Topology Manager
- Propagation Engine
ChedarClient

- Control interface of a Chedar node
- Applications and user interfaces communicate with Chedar through the ChedarClient component

- Used by:
  - P2PStudio
  - Data fusion application
Connection

- Represents a connection with another node
- Based on JXTA’s pipes
- Monitors the “health” of the connection
Connection Manager

- Keeps a track of former neighbors (connections)
- Establishes/drops connections based on:
  - the connection’s health
  - the topology manager’s decisions
Topology Manager

- Optimizes the network’s topology locally
- Decides where to establish new connections (overtaking)
- Based on the quality of the relations with the neighbors (node rating)
Propagation Engine

- Handles the resource queries and replies
- Answers queries when they match the local resources
- Forwards queries to other nodes when it cannot answer it
Algorithms
Basic Search

- Generates a lot of traffic
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Node Rating

• Ratings are given to the neighbors:
  – amount of replies
  – number of neighbors
  – reply speed

• Node selection based on those ratings

• Improves the search’s efficiency
Overload Limitation

- Limits the propagation of messages
- More adaptive than time-to-live
  - Each message contains a hop count
  - Each node accepts messages whose hop count is below a given limit
  - That limit is broadcast to the neighbors, which must respect it
Return Path

- 3 ways to reply to a query:
  - reverse the query’s path
  - reverse path with “jumping” over unavailable nodes
  - direct connection to the requester

- Increases the fault-tolerance
Overtaking Algorithm

- The nodes that are not valuable are overtaken

A -- B -- C

D -- C

E

F
Overtaking Algorithm

- The nodes that are not valuable are overtaken

Diagram:
- A
- B
- C
- D
- E
- F

Connections:
- A to B
- B to C