

# The Livespace Bus

Part 3 – Network Enabling DataBeans

# Networking DataBeans

Or: how we turn DataBeans into distributed entities

# Network-Enabling Databeans

- An Entity is a DataBean with three guaranteed properties
  - A *globally-unique ID* string
  - A *name* – an ID that makes sense to humans (not necessarily unique)
  - A *type* e.g. “clipboard”, “computer”, etc

# Containers – Server

- To publish an entity, put it in a server container
- A server
  - Supplies entities to clients in response to queries
  - Monitors changes to its entities and emits deltas for clients to receive
  - Processes requests from clients to change the entity

# Containers – Client

- Clients
  - Query for remote entities and maintain a local replica
  - Monitor local changes to the replica and emit requests to server to update
  - Monitor changes to the replicated entities sent by servers and update their replicas

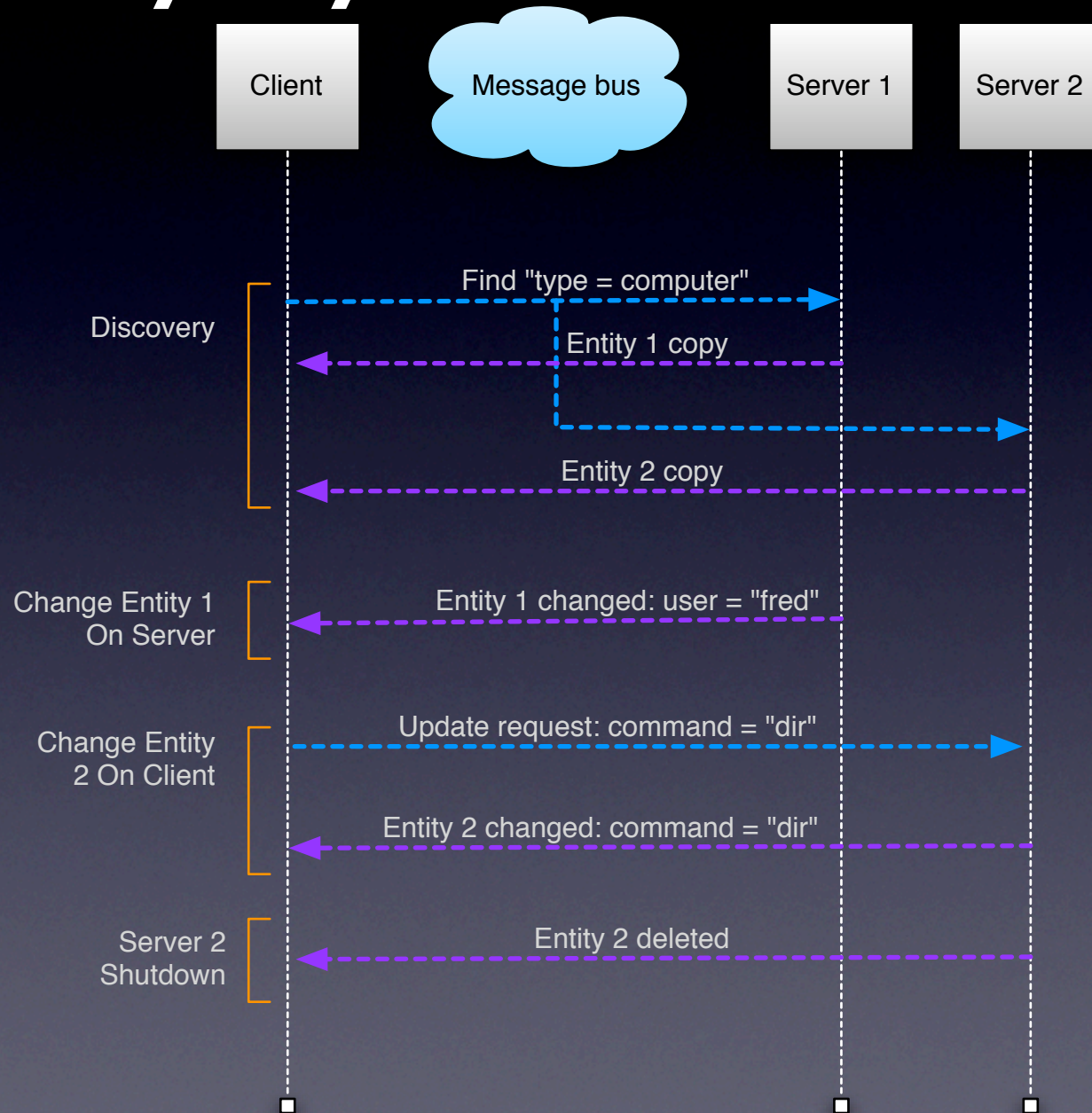
# Transparency

- Users of shared DataBeans/Entities do not need to be aware they're distributed
- Everything is asynchronous
- Optimistic lock/update, no blocking

# Under The Hood

Entity synchronisation is done by  
broadcasting messages over the Elvin event  
bus

# Entity Synchronisation





# Concurrency Issues

- Containers have a shared thread that executes updates
- When changing a shared entity
  - The developer must synchronise with the update thread
  - Or run the risk of race conditions with the update thread

# Elvin

- The Elvin message bus is used to synchronise entities
- Elvin supports broadcasting messages between producers and consumers
- Many uses: Livespaces, Sticker, AuTM, ...
- Usually invisible to Livespace developers
- You may can choose to use Elvin messaging directly if the Livespace entity model is not appropriate

# Elvin

- Elvin is a publish/subscribe message bus
- Messages are name-value pairs:

```
Name: "Fred"
```

```
Age: 20
```

```
Favourite number: 3.14159
```

# Elvin Subscriptions

- Clients select messages using subscription expressions

```
Name != "Frodo" && Age < 30
```

matches

```
Name: "Fred"
```

```
Age: 20
```

```
Favourite number: 3.14159
```

# Elvin In A Livespace

## Announcing the clipboard entity

```
Livespace-Protocol: 1000  
Room: "Intense Collaboration Space"  
Entity-Type: "clipboard"  
Entity-Id: "Intense Collaboration Space.clipboard"  
Livespace: "info"  
To: "*"   
Action: "init"  
\$Name: "Default"  
\$Text: "Some text"
```

# Elvin In A Livespace

Requesting a change to the clipboard entity

```
Livespace-Protocol: 1000  
Room: "Intense Collaboration Space"  
Entity-Type: "clipboard"  
Entity-Id: "Intense Collaboration Space.clipboard"  
Request-Id: "4f730dc:110a3cada56:f7fc4"  
From: "4f730dc:110a3cada56:f7fc4"  
Livespace: "update"  
\$Text: "Hello!"
```

# Avis

- Elvin has a long history
  - Started at DSTC in 1992
  - Commercialised by Mantara in 2003
  - Will be withdrawn from sale end 2007
- Avis is an open source implementation of the Elvin service
- Livespaces switching to Avis by end 2007

**End Of Part 3**



# Exercise – The Sound Player