



**Martin is getting the
projector
to work
with his
laptop.**

Replicated Service Objects

A Strategy for
Distributed
Applications

Martin McClure



GEMTALK[™]
SYSTEMS




Background: GemStone/S



30 Years!

Service Logic Development Corporation

Gemstone - a new object oriented database system



GemStone™

Multi-User

- Connect across to object databases
- Network to multiple workstations
- Consistency control
- Transaction control
- Database authorization

Object-oriented

- Streamline the data model and language
- Improve programmer productivity
- Enhanced modeling capabilities
- Support aggregation collections
- Freedom from relational restrictions

Database

- Performance object oriented
- Efficient in hardware fabric
- Large capacity - 2 billion objects
- Large objects - 1 billion elements
- High retention time large collections

GemStone/S

- **Server-side Smalltalk**
- **Object Database**

Server-side Smalltalk



- Headless
- Multi-User
- Scalable

Object Database

- One persistent “image”
- Shared transactionally
 - Merged at commit
 - Conflicts are detected


GemBuilder for Smalltalk (GBS)

- **Interfaces VW or VA
Smalltalk to GemStone**

Service Logic Development Corporation

Gemstone - a new object oriented database system

Service Logic Development Corporation
Gemstone - a new object oriented database system



GemStone™

Multi-User

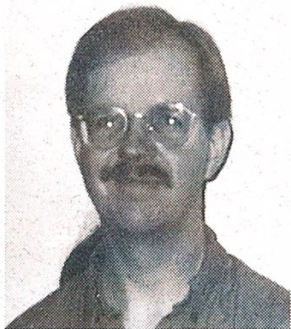
- Connect across to object databases
- Network to multiple workstations
- Concurrent control
- Transaction control
- Database authorization

Object-oriented

- Streamline the data model and language
- Improve programmer productivity
- Enhanced modeling capabilities
- Support aggregation collections
- Freedom from relational restrictions

Database

- Performance object oriented
- Efficient in hardware fabric
- Large capacity - 2 billion objects
- Large objects - 1 billion elements
- High retention time large collections



Martin McClure

Originally from St. Paul, Minnesota, Martin has worked with Smalltalk for over 10 years. He is glad to be here where he will work on GemBuilder for Smalltalk projects. In addition to reading science fiction, Martin is a glassblower and has plans to build a studio in his back yard. Some of his glass work is in his cube.

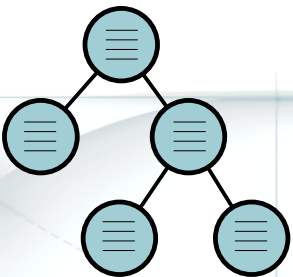
GemBuilder for Smalltalk (GBS)

- **Interfaces VW or VA
Smalltalk to GemStone**

GBS Main Features

- **Forwarders**
 - **Remote messaging**
- **Replicates**
 - **Synchronized copy**
 - **(new) Remote messaging**

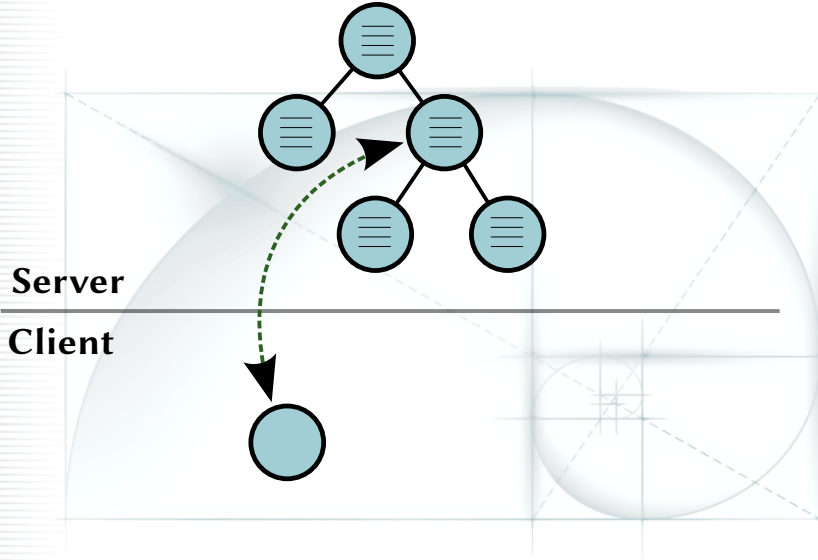
Forwarder



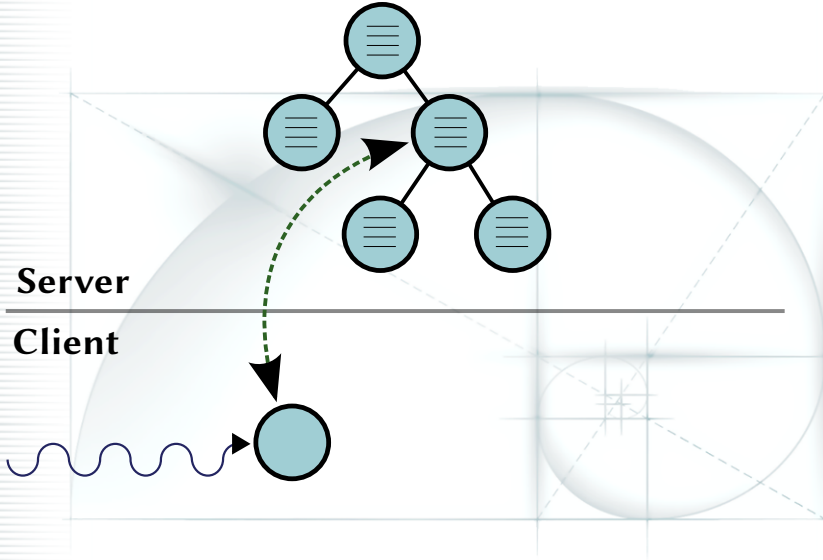
Server

Client

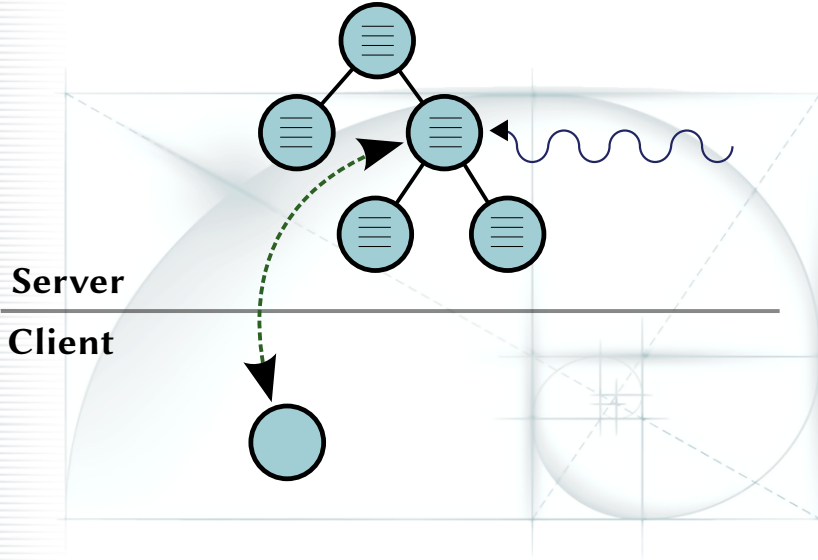
Forwarder



Forwarder



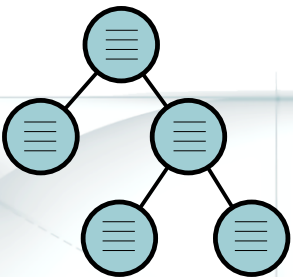
Forwarder



Server

Client

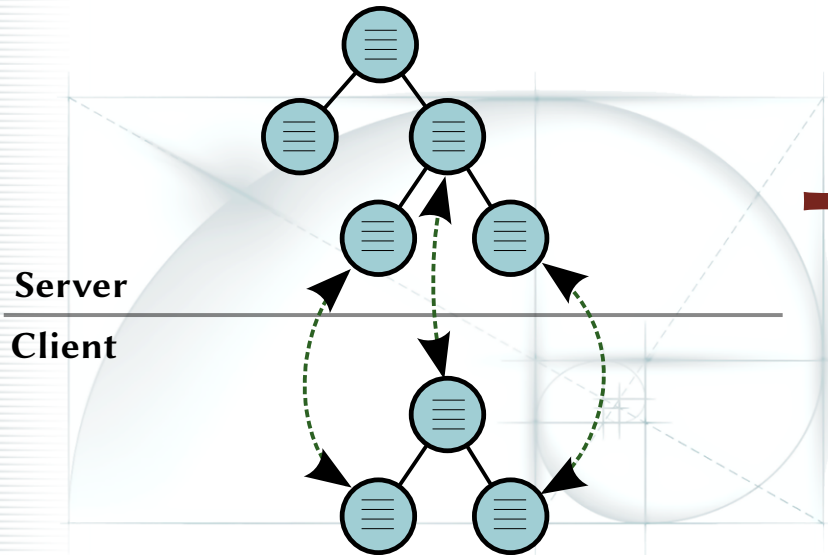
Replicate



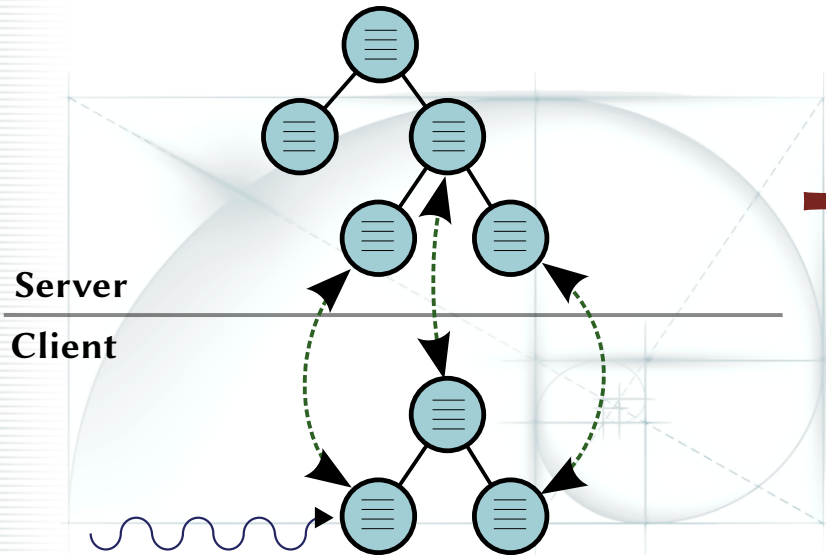
Server

Client

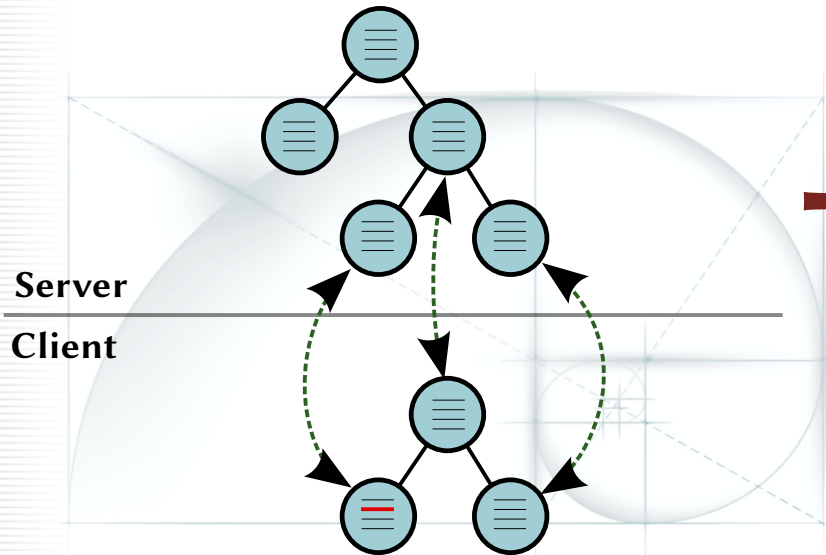
Replicate



Replicate



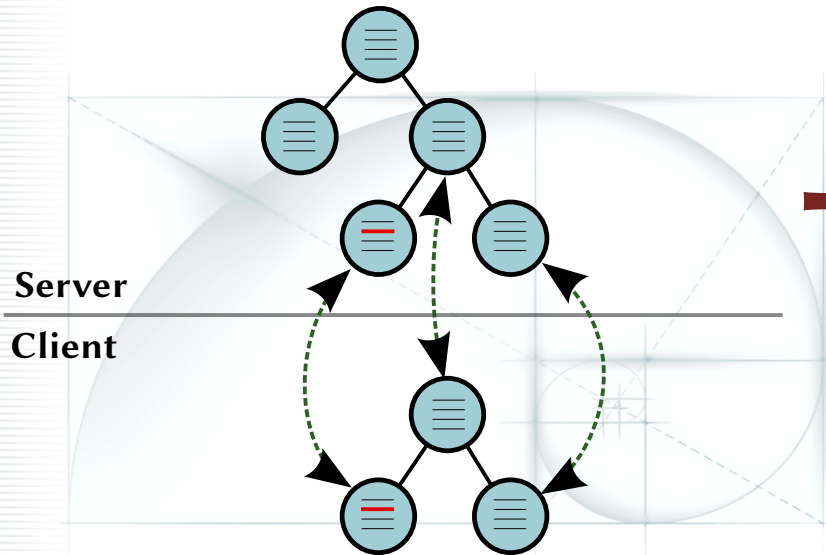
Replicate



Server

Client

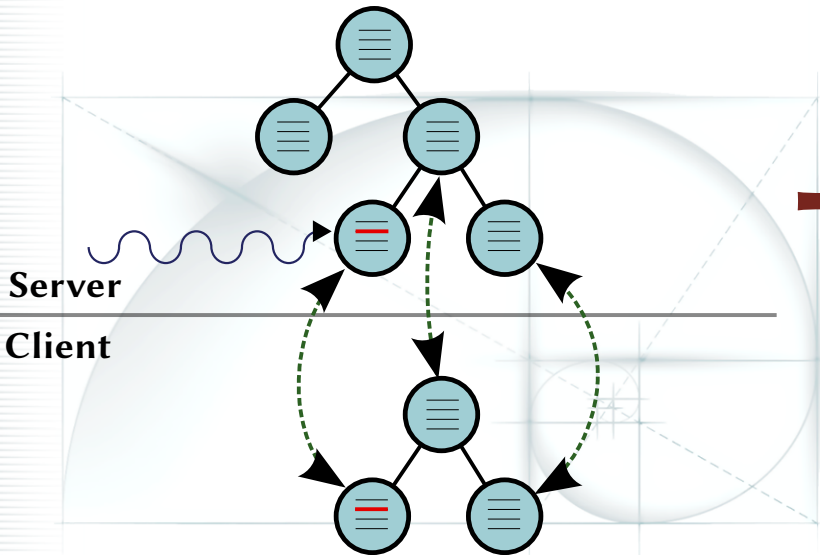
Replicate



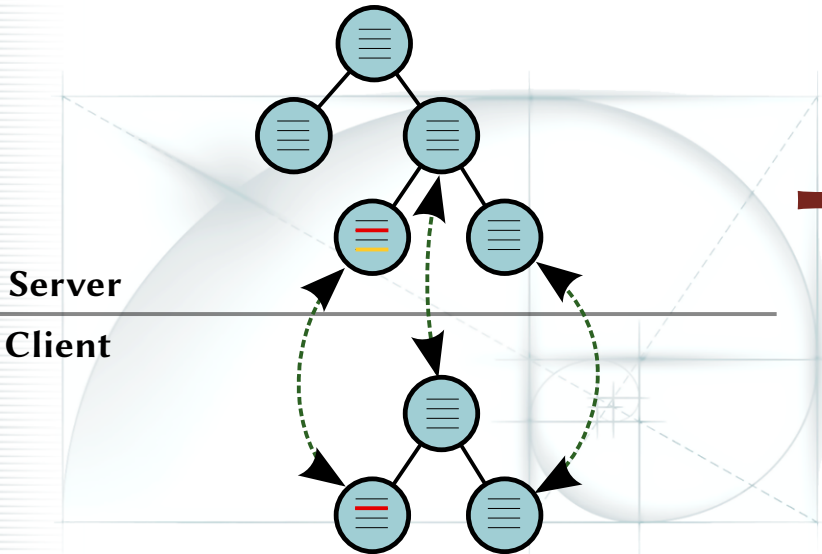
Server

Client

Replicate



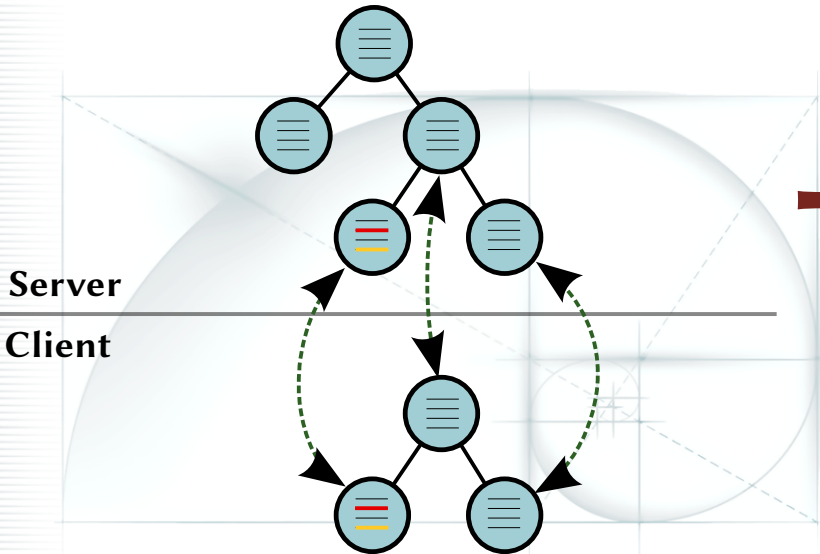
Replicate



Server

Client

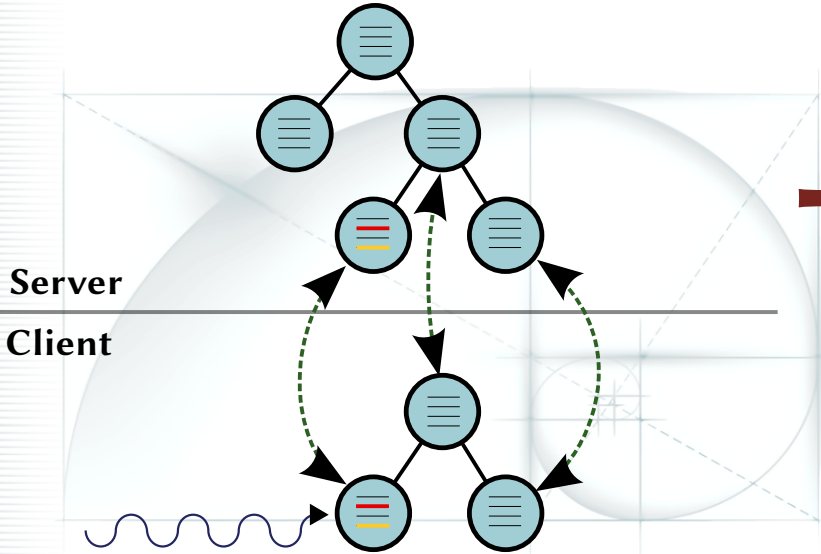
Replicate



Server

Client

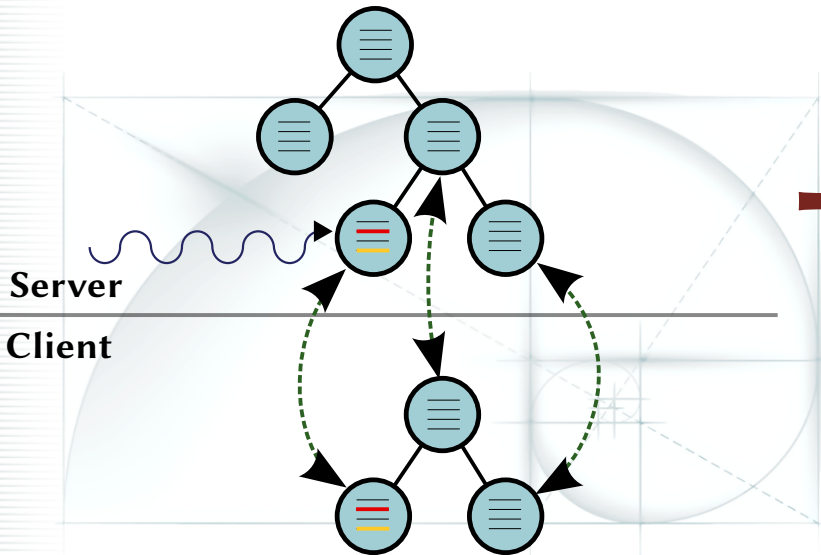
Replicate



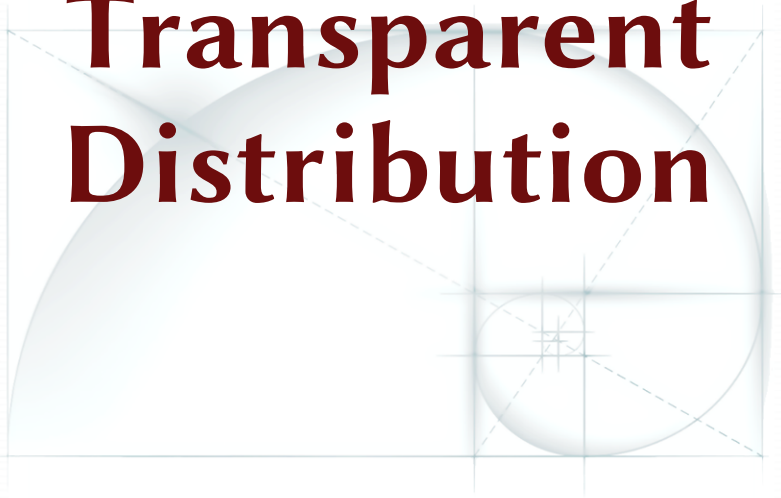
Server

Client

Replicate



Transparent Distribution



Transparent Distribution

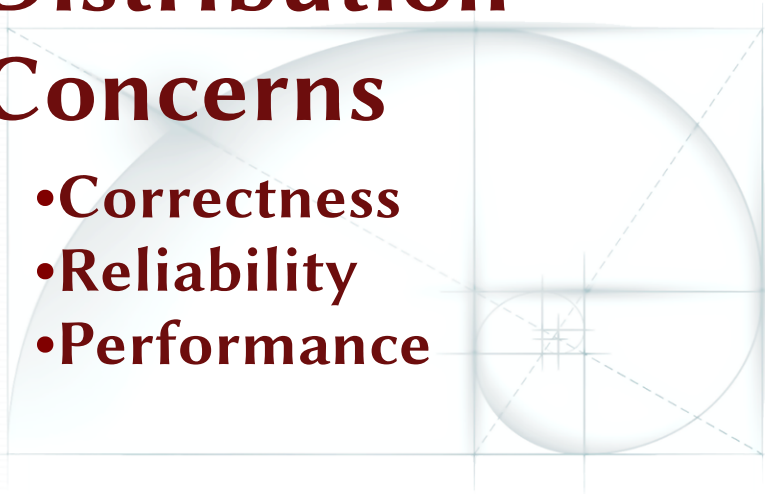
Good Idea

Transparent Distribution

~~Good~~ Idea

Distribution Concerns

- Correctness
- Reliability
- Performance



Distribution Concerns

- ✓ • Correctness
- Reliability
- Performance



Distribution Concerns



- ✓ • Correctness
- ✗ • Reliability
- Performance

Distribution Concerns



- ✓ • Correctness
- ✗ • Reliability
- ✗ • Performance



**An
Embarrassing
Story**

n^2

The image shows a geometric composition within a rectangular frame. On the left, a large semi-circle is drawn with a light blue gradient. On the right, a golden spiral is drawn, also with a light blue gradient, starting from a central point and expanding outwards. The entire scene is overlaid with a grid of thin, light blue lines. Two dashed lines represent the diagonals of the rectangle. In the center of the composition, the text 'n^2' is written in a bold, dark red serif font.

A light blue semi-circle is centered on a white background. A light blue grid is overlaid on the semi-circle, consisting of a vertical line through the center and a horizontal line at the base. Dashed light blue lines form a square that circumscribes the semi-circle, with diagonal lines connecting the corners of the square. The text "One Month" is written in a dark red, serif font, centered within the semi-circle.

**One
Month**



Tools used

Forwarders

Lessons



- Test scaling
- Test with latency
- Need better design pattern



Replicated Service Objects

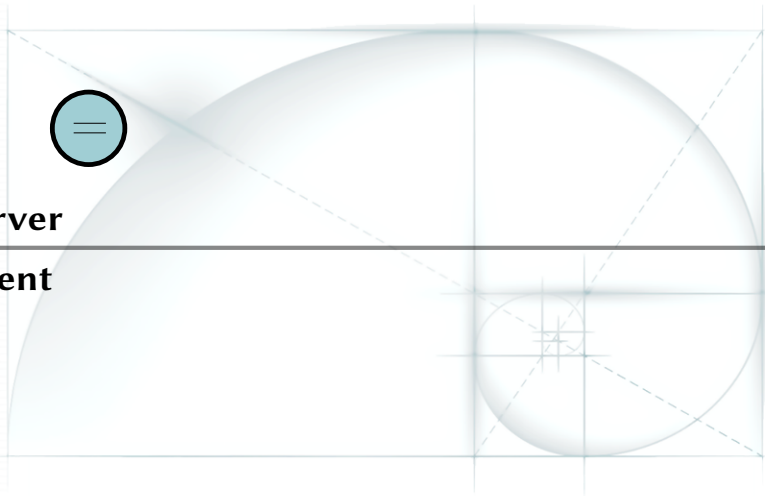
The background features a light blue globe with a grid of latitude and longitude lines. Overlaid on the globe is a technical drawing consisting of a rectangle with dashed diagonal lines and a smaller circle with a crosshair inside it.

Example: Inspector Service



Server

Client





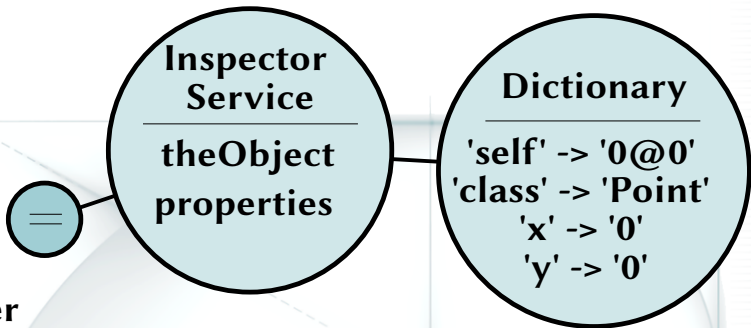
The diagram features a large light blue circle with a black border, containing the text "Inspector Service" and "theObject properties" separated by a horizontal line. A smaller light blue circle with a black border, containing two horizontal lines, is connected to the larger circle by a thin black line. A horizontal line separates the "Server" region (top) from the "Client" region (bottom). The background includes a faint golden spiral and a grid of dashed lines.

**Inspector
Service**

**theObject
properties**

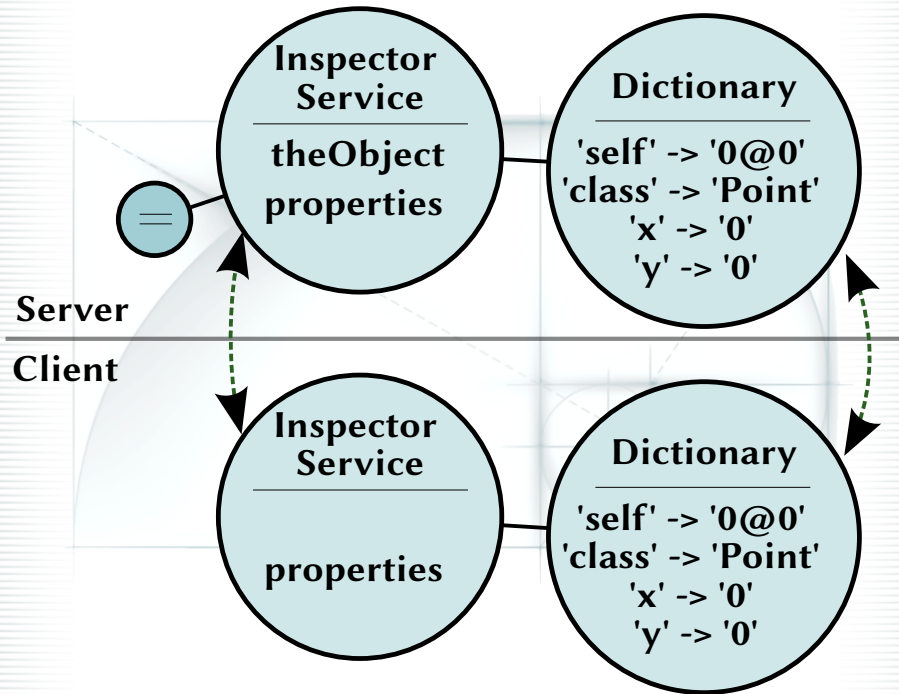
Server

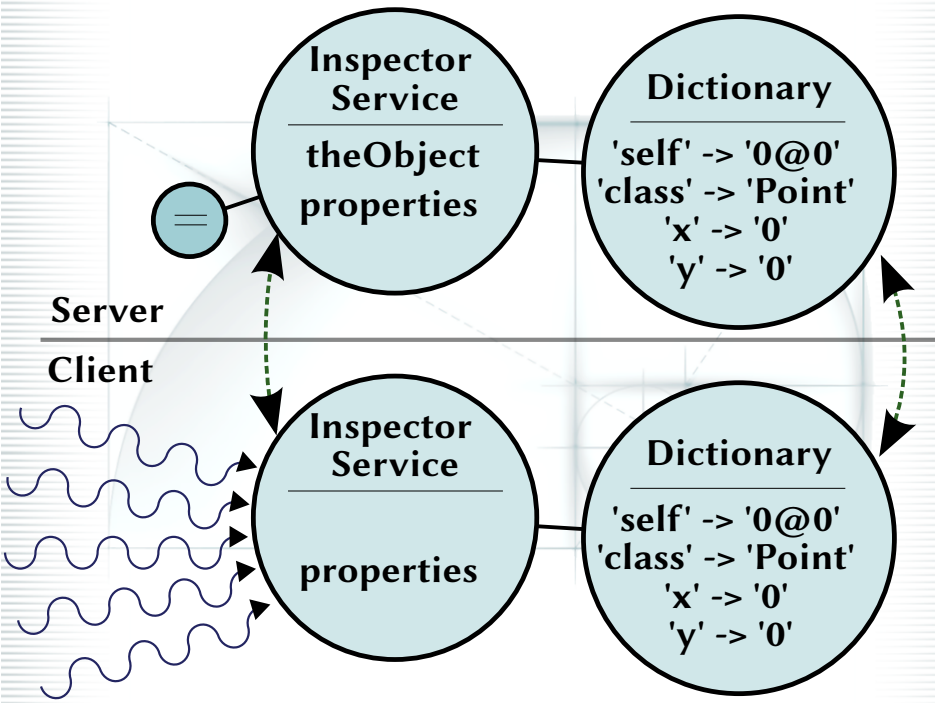
Client

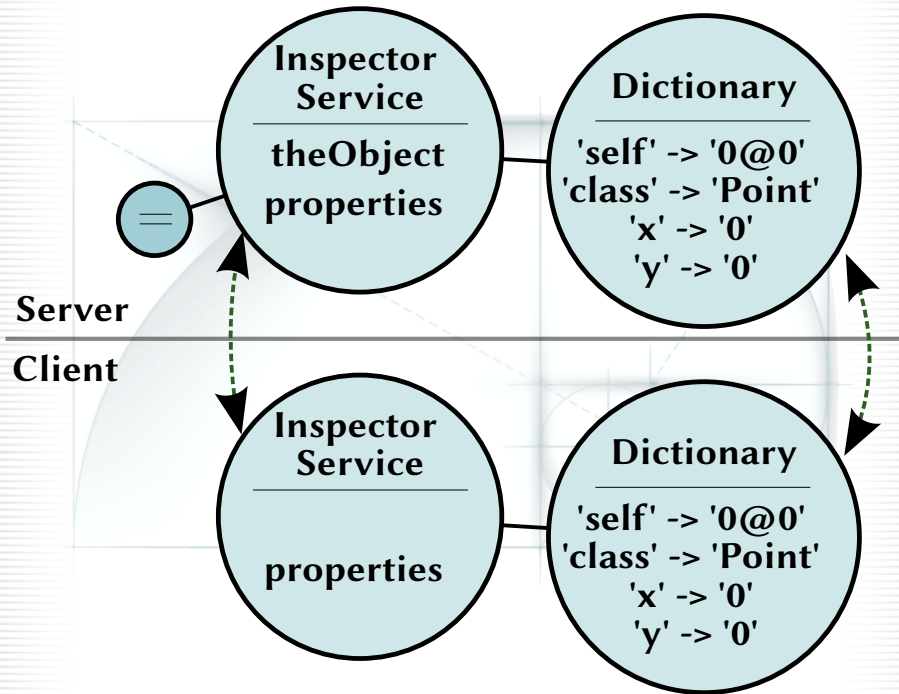


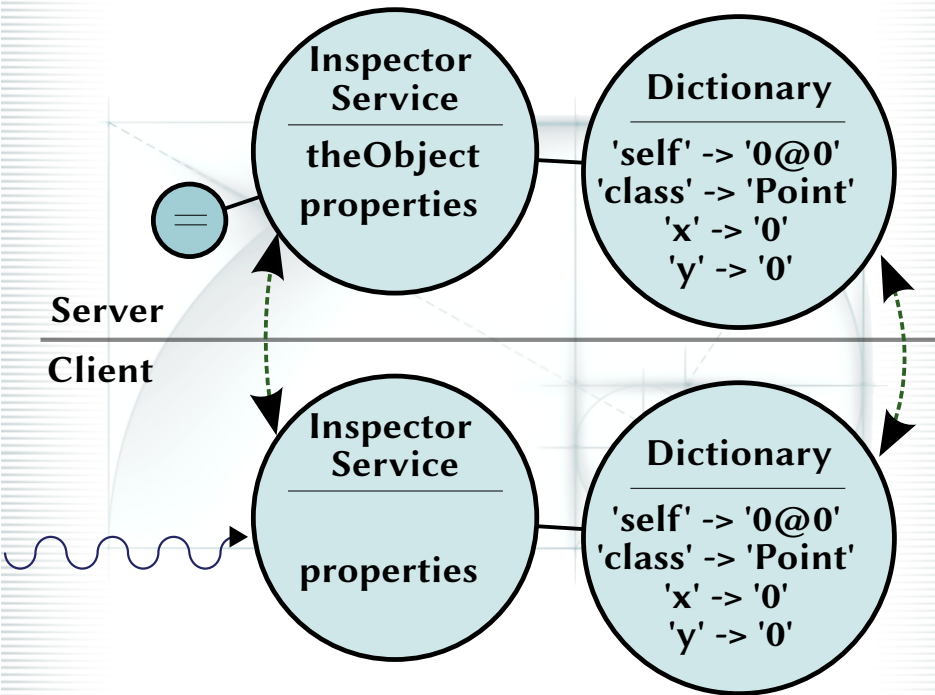
Server

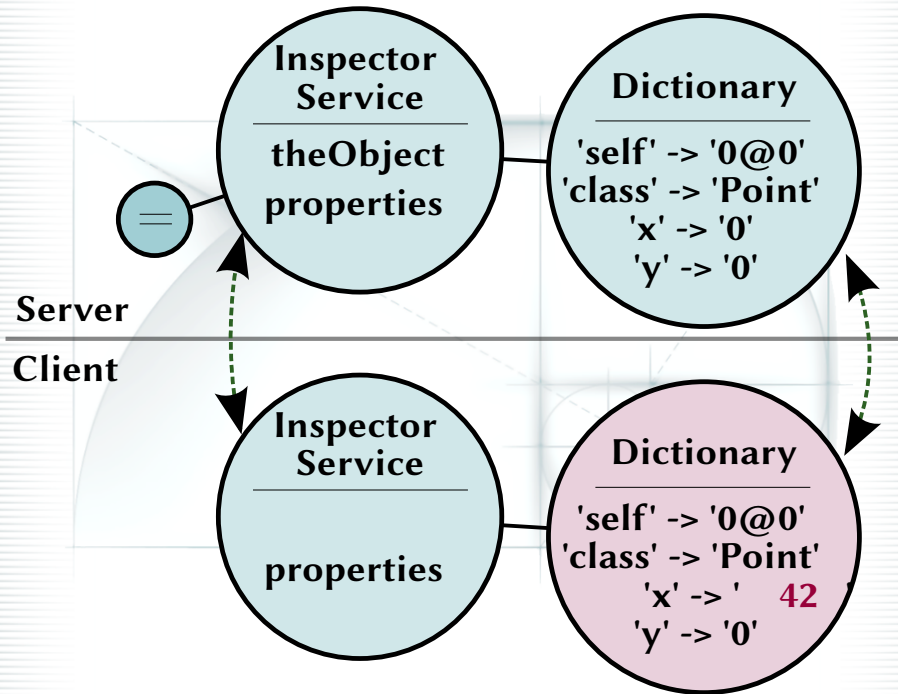
Client

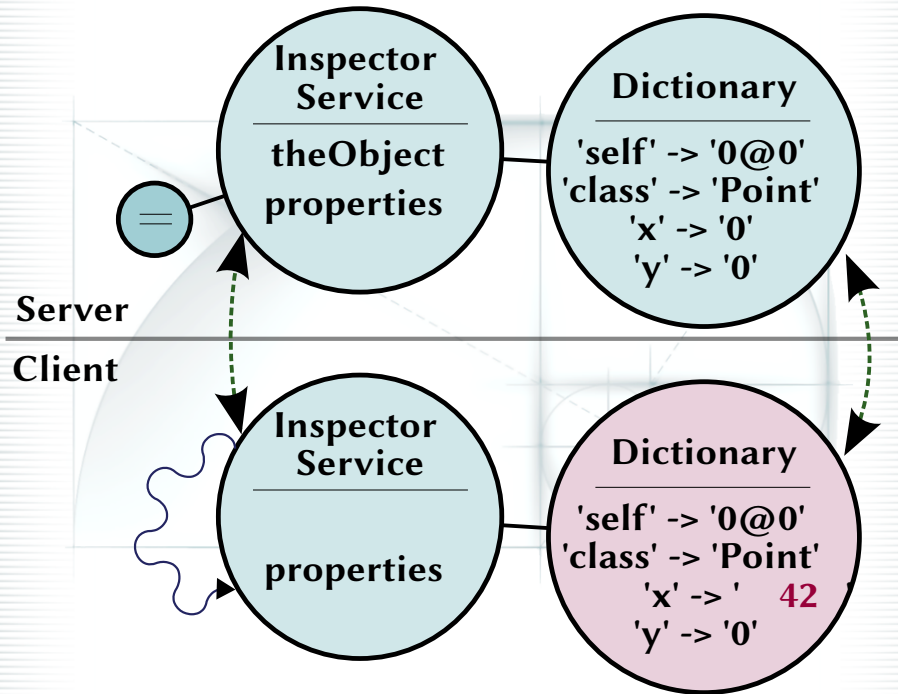


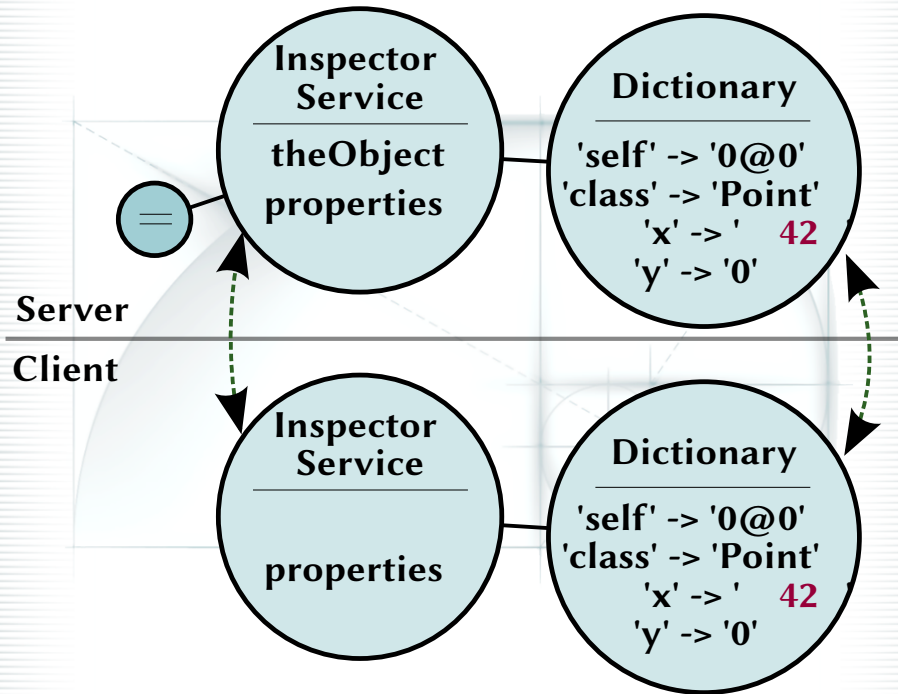


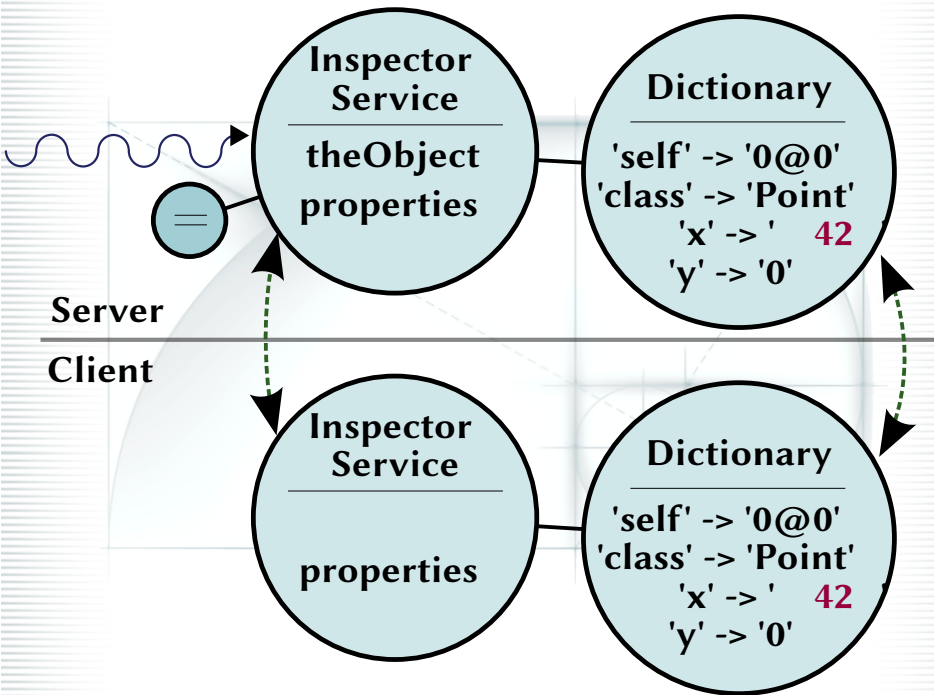












Inspector Service

theObject
properties

Dictionary

'self' -> '0@0'
'class' -> 'Point'
'x' -> ' 42'
'y' -> '0'



Server

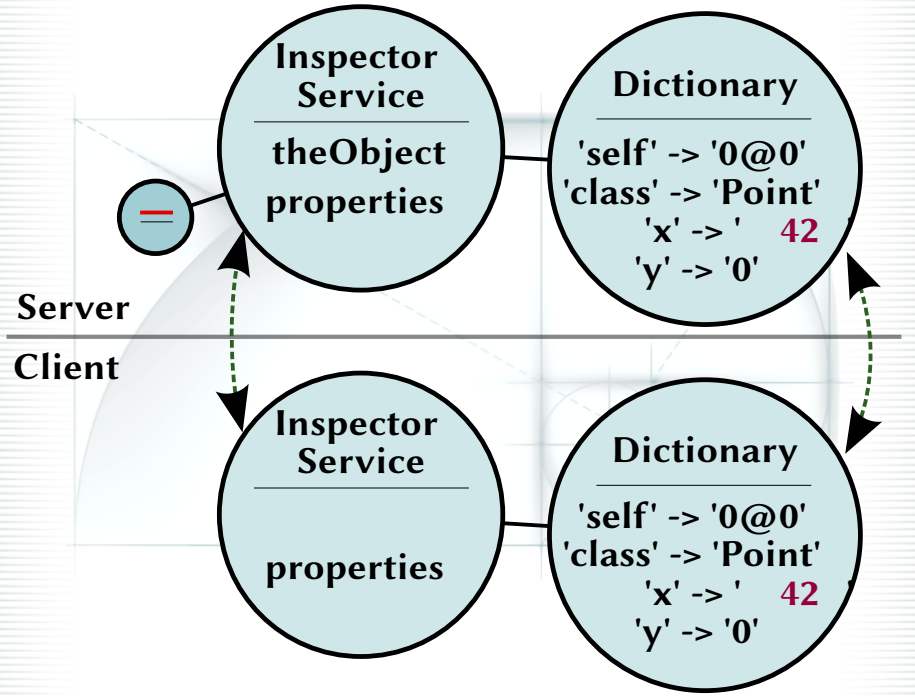
Client

Inspector Service

properties

Dictionary

'self' -> '0@0'
'class' -> 'Point'
'x' -> ' 42'
'y' -> '0'



Principles

- **Replicate everything you'll need frequently**

Principles



- **Represent information as basic objects when necessary.**

Principles



- **Do everything you can predict in a single round trip.**

Replicated Service Objects

A Strategy for
Distributed
Applications

Martin McClure



GEMTALK[™]
SYSTEMS