



Distributed Applications Middleware

BS Doherty

`b.s.doherty@aston.ac.uk`

Aston University

Enabling Technologies

- Remote Procedure Call (RPC)
- Remote Evaluation (REV)
- Agent technology

with the later one building on top of the previous one.

Distributed objects

Objects should be able to reside on any computer within a distributed system, and programs contain code that allows code on other computers to send messages to them.

In distributed object models, objects are named globally and can be invoked remotely.

Object-oriented middleware

Requirements for middleware software [Ince, 2004]:

- recognise when a distributed object is to be sent a message
- locate the server on which the distributed object resides
- resolve differences in data format between client and server
- package the data into a form that can be used by the server - method name and arguments
- package any returned data to suit client
- communicate with network layer

Technologies

- DCOM
- CORBA Common Object Request Broker Architecture (CORBA)
- RMI Java Remote Method Invocation
- JavaBean
- Jini (Java Intelligent Network Infrastructure)

CORBA

Object Request Broker (ORB)

- Location transparency
- Implementation transparency
- Object execution state transparency
- Communication mechanism transparency

CORBA services

- The Life Cycle Service
- The Persistence Service
- The Event Service
- The Naming Service
- The Concurrency Control Service
- The Relationship Service
- The Externalisation Service

...

More CORBA services

- The Query Service
- The Licensing Service
- The Properties Service
- The Time Service
- The Security Service
- The Trader Service
- The Collection Service

CORBA architecture

- Client IDL stubs
- Interface Definition Language
- Dynamic Invocation Interface
- Static IDL Skeletons
- Dynamic skeletons
- Interface Repository
- Object Request Broker
- Object Adapter

RMI Architecture

- The stub/skeleton layer
- The remote reference layer
- The transport layer

More on RMI

- Garbage collection
- Security

References

[Ince, 2004] Ince, D. (2004). *Developing Distributed and E-commerce Applications*. Addison-Wesley, second edition.