Application Servers
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Session 4 - Main Theme
Distributed Object Computing Platforms

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Agenda

- CORBA
  - Inprise VisiBroker Environment
  - Orbacus
- RMI and RMI-IIOP
- DCOM
- DOC Platform Interoperability
- Web-Enabled DOC Applications
- Summary
- Readings
- Assignment #4
Summary of Previous Session

- Microsoft IIS with COM+/Net, and ASP Environment
- Servlet and Servlet Engines
- JSP and JSP Engines
- Apache TomCat / Macromedia JRun
- eXtensible Server Pages (XSP) Environment
  - Apache Cocoon2
- Summary
- Readings
- Assignment #3

Session 3 - Follow-up

- Application Servers for Enhanced HTML (traditional)
  - a.k.a., Page-Based Application Servers
  - Tag-Oriented (e.g., Macromedia ColdFusion 5.0 Server)
  - Script Oriented (e.g., Microsoft IIS with ASP, PHP)
  - Mostly Used to Support Standalone Web Applications
  - Typically less expensive than standalone and IDE-based servers
  - HTML-based development
- New Generation Page-Based Script-Oriented App. Servers
  - First Generation Extensions (e.g., Microsoft IIS with COM+/ASP)
  - Servlet/JSP Environments
  - XSP Environment
  - Can now be used as front-end to enterprise applications
  - Hybrid development environments
Session 3 – Homework Software

- VStudio .NET Pro 2003 Win32
  - http://shop.microsoft.com/Referral/Productinfo.asp?siteID=140
- SunOne Active Server Pages
- Future
  - .Net Framework SDK 1.1
    - http://msdn.microsoft.com/netframework/

Network and Socket Programming

- See Session 4 Sub-Topic 2 Presentation on Network Programming with Sockets and RMI
Distribution Mechanisms

- See Session 4 Presentations:
  - Sub-Topic 1 Presentation on Distributed Communications Enabling
  - Sub-Topic 3 Presentation on Introduction to CORBA, DCOM, and RMI

Part I

CORBA

Also See Session 4 Handout on:

- "The Object Request Broker (ORB) Architecture"
- "The OMG Object Model"
- "The Interface Definition Language (IDL)"
- "IDL to Java Mapping"
- "A Simple Java ORB Application"
- "Coding Examples for VisiBroker, OrbixWeb, and Java"
- "Objects by Value over CORBA"
- "IDL to C++ Language Mapping"
- "DII, IR, DSI, and IMR"
- "Using the Dynamic Invocation Interface (DII)"
CORBA DOC Platform
(Logical Architecture)

CORBA Architecture

Sample Java CORBA Application
CORBA Development Process
(pre-CORBA3)

Coding Server with BOA ImplBase
(pre-CORBA 2.3)
Coding Server with BOA TIE
(pre-CORBA 2.3)

Coding Server with POA Inheritance
(post-CORBA 2.3)
Coding Server with POA Delegation
(post-CORBA 2.3)

Object by Value
(post-CORBA 2.3)

- A valuetype can support an interface. The client can receive a local copy of the valuetype or a remote interface
Object by Value
(continued)

- Example:
  ```java
  module Test {
    valuetype OBV {
      private long amount;
      long getAmount();
      init(in long newAmount);
    };
    interface ByValue {
      OBV getOBV();
    };
  }
  ```

Object by Value
(continued)

- An abstract interface can be passed by value or by remote reference. The client can receive a local copy of a valuetype or a remote reference via the same operation call.

![Diagram of Client and Server interaction](image-url)
Part II

RMI and RMI-IIOP

Also See Session 4 Handout on:
“RMI Example”
“RMI-IIOP Example”

Java/RMI Interface Definition
(stockMarket.java)

- Example:

    package SimpleStocks;
    import java.rmi.*;
    import java.util.*;

    public interface StockMarket extends java.rmi.Remote {
        float get_price(String symbol) throws RemoteException;
    }
CORBA IDL
(stockMarket.idl)

- Example:

```IDL
module SimpleStocks {
    interface StockMarket {
        float get_price( in string symbol );
    }
};
```

Part III

**DCOM**

*See:*

- “http://www.execpc.com/~gopalan/misc/compare.html”
- “http://www.javacoffeetbreak.com/articles/rmi_corba/”
Example:
[
    uuid(7371a240-2e51-11d0-b4c1-444553540000),
    version(1.0)
]
library SimpleStocks
{
    importlib("stdole32.tlb");
    uuid(BC4C0AB0-5A45-11d2-99C5-00A02414C655),
    dual
}
interface IStockMarket : IDispatch
{
    HRESULT get_price([in] BSTR p1, [out, retval] float * rtn);
}

Example: (continued)
[
    uuid(BC4C0AB3-5A45-11d2-99C5-00A02414C655),
]
coclass StockMarket
{
    interface IStockMarket;
};
};
Part IV

DOC Platform Interoperability

Also See Session 4 Handout on:

“Interoperability and the CORBA Specification”
“Object Request Brokers Interoperability”

Implementation of an IIOP Bridge
ORB Interoperability

ORB Interoperability (continued)

CORBA Interoperability

CORBA Interoperability
Part V

Web-Enabled DOC Applications

Web Communications

- HTTP/1.1:
  - [http://www.w3.org/Protocols/rfc2616/rfc2616.html](http://www.w3.org/Protocols/rfc2616/rfc2616.html)
- IIOP tunneling
  - IIOP over HTTP
  - Sample Implementation
    - VisiBroker’s Gatekeeper
Part VI

Conclusion

Summary

- CORBA, RMI/JRMP, and DCOM were historically developed as separate Distributed Object Computing Platforms
- CORBA and RMI-IIOP were made compatible at the protocol layer
- JavaSoft implemented JavaIDL to provide compatibility between CORBA and RMI-IIOP at the application level
- Programming applications on top of the various platforms requires different knowledge and skills
- The various platforms can interoperate using protocol bridges
- All DOC platforms are web-enabled
Readings

- Handouts posted on the course web site
- Explore the VisiBroker, Orbacus, RMI, RMI-IIOP, and DCOM Environments
- Read white papers/documentation at:
  - Read VisiBroker, Orbacus, RMI, RMI-IIOP, and DCOM related whitepapers on the vendor sites

Project Frameworks

- Project Frameworks Setup (ongoing)
  - Apache Web Server (version 1.3.28/2.0.47, www.apache.org)
  - Perl (version 5.8.0, www.perl.com)
  - Microsoft IIS with COM+/Net and ASP
  - Sun One Active Server Pages 4.0
  - Apache Tomcat
  - Macromedia JRun4
  - Apache Cocoon 2/XSP
  - Visibroker, Orbacus
  - RMI-IIOP
Assignment

- Assignment:
  - Explore the textbooks’ references to Application Server technology (continued)
  - #4a: Investigate distributed object computing platforms’ development environments for the technologies covered in this session. Write a short report that documents your findings and recommendations with respect to selection criteria in support of development environments for application server technologies covered in this session
  - #4b: See homework #4 specification

Next Session:
Object Management Architectures

- Object Management Architectures
- Java-Based Application Servers
- Windows Services
- VMs and Component Technology
  - JVM and .Net CLR
  - Abstract Component Infrastructures
- .Net
- Introduction to Enterprise Component Development
- Introduction to Component-Based Architectures Design