ANJUMAN-I-ISLAM'S KALSEKAR TECHNICAL CAMPUS

School of Engineering & Technology

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Course Code : Course Name : DC LAB

Class : BECO Batch : 1

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History

The CORBA (Common Object Request Broker Architecture) specification was developed in 1991 by the Object Management Group (OMG). The OMG was founded by eleven corporations to develop CORBA. CORBA 2.0 specification (introduced in 1996) permits communications between implementations made by different developers.

Goal

The OMG's goal was to adopt distributed object systems that utilize object-oriented programming for distributed systems. Systems to be built on heterogeneous hardware, networks, operating systems and programming languages. The distributed objects would be implemented in various programming languages and still be able to communicate with each other.

Definitions

CDR – Common Data Representation: An external data representation of all data types that can be used as arguments or return values in remote invocations.

CORBA – Common Object Request Broker Architecture: An Object Request Broker (ORB) architecture specification for distributed object systems.

GIOP – General Inter-ORB Protocol: CORBA 2.0 standard that enables different developer implementations to communicate with each other.

IDL – Interface Definition Language: An interfacing programming language that allows communication across a heterogeneous distributed system.

IIOP – Internet Inter-ORB Protocol: Internet version of GIOP that uses the TCP/IP protocol.

Marshaling: The process of taking a collection of data items and assembling them into a form suitable for transmission in a message.

Middleware: A software layer that provides a programming abstraction as well as masking the heterogeneity of the underlying networks, hardware, operating systems, and programming languages.

OMG – Object Management Group: The organization that developed and maintains CORBA

POS – Persistent Object Service: A persistent object store for CORBA where objects that live between processes can be stored.

Features

CORBA consists of a language independent RMI consisting of a set of generic services useful for distributed applications. The CORBA RMI acts as a “universal translator” that permits client processes to invoke a method or process that may reside on a different operating system or hardware, or implemented via a different programming language.

CORBA RMI Features

The CORBA RMI consists of the following main components: –An interface definition language (IDL)

–An architecture (discussed in Structure)

–The General Inter-ORB Protocol (GIOP)

–The Internet Inter-ORB Protocol (IIOP)

CORBA IDL Features

Provides an interface consisting of a name and a set of methods that a client can request.

IDL supports fifteen primitive types, constructed types and a special type called Object.

–Primitive types: short, long, unsigned short, unsigned long, float, double, char, boolean, octet, and any.
–Constructed types such as arrays and sequences must be defined using typedefs and passed by value.
Interfaces and other IDL type definitions can be grouped into logical units called modules.

GIOP and IIOP Features

GIOP: General Inter-ORB Protocol are the standards (included in CORBA 2.0), which enable implementations to communicate with each other regardless of who developed it.

IIOP: Internet Inter-ORB Protocol is an implementation of GIOP that uses the TCP/IP protocol for the Internet.

CORBA Services

Set of generic service specifications useful for distributed applications. Each discussed in Chapter 17.3 and documentation provided @ OMG site.

–CORBA Naming Service - essential to any ORB

–CORBA Event Service - define interfaces

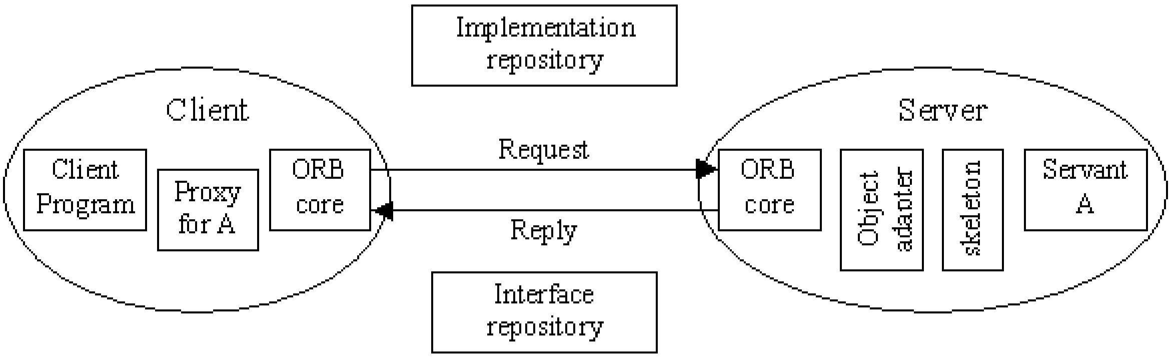
–CORBA Notification Service - extension of event service

–CORBA Security Service - controls access

–CORBA Trading Service - allows location by attribute

–CORBA Transaction and Concurrency Control Service

–CORBA Persistent Object Service



CORBA RMI Structure

Structure - ORB Core

ORB core –Carries out the request-reply protocol between client and server. –Provide operations that enable processes to be started and stopped. –Provide operations to convert between remote object references and strings.

Structure - Object Adapter

Object Adapter (server)

–Bridge the gap between CORBA objects and the programming language interfaces of the servant classes.
–Creates remoter object references for the CORBA objects

–Dispatches each RMI to the appropriate servant class via a skeleton, and activates objects.

–Assigns a unique name to itself and each object

–Called the Portable Object Adapter in CORBA 2.0

processes can run on ORB’s produced by different developers.

Structure - Skeletons and Proxies

Skeletons (server)

–An IDL compiler generates skeleton classes in the server’s language.

–Dispatch RMI’s to the appropriate servant class. Client Proxies / Stubs

–Generated by an IDL compiler in the client language.

–A proxy class is created for object oriented languages

–Stub procedures are created for procedural languages. Both are responsible for marshaling and unmarshalling arguments, results and exceptions.

Structure - Repositories

Implementation Repository

–Activates registered servers on demand and locates servers that are currently running.

Interface Repository

–Provides information about registered IDL interfaces to the clients and servers that require it. Optional for static invocation; required for dynamic invocation.

How to use CORBA

Server must include IDL interfaces in the form of servant classes. An interface compiler generates:

–the program(Java or C++) interfaces

–server skeletons for each IDL interface

–proxy classes (or client stubs) for each IDL interface

–A Java / C++ class for IDL defined struct

–helper classes for each IDL defined type

Server

–Creates and initializes the ORB

–Creates an instance of servant class, which is registered with the ORB. Servant class extends the corresponding skeleton class and implementation methods of an IDL interface.

–Makes a CORBA object Client

–Creates and initializes the ORB

–Contacts Naming service to get reference to the server

–Invokes methods on the server

Applications of CORBA

Used primarily as a remote method invocation of a distributed client – server system.

Can communicate between clients and servers on different operating systems and implemented by different programming languages (Java cannot do this).

Has many standards and services useful in implementing distributed applications.

Process can be both server and client to another server

Ideal for a heterogeneous distributed system like the Internet.

Significant Points

Harder to use than a single language RMI such as JAVA.

Compatible with various languages and operating systems.

CORBA’s IDL is the crucial part because it permits communication on a heterogeneous distributed system.

The OMG consists of several companies that maintain compatibility and standardization of the CORBA system.

Summary

The OMG developed CORBA for distributed object systems that will work on a heterogeneous distributed system.

CORBA consists of many parts and services that are useful for distributed applications.

The IDL portion is the crucial part that makes CORBA a language independent middleware.

CORBA includes generic service specifications useful in implementing distributed applications.