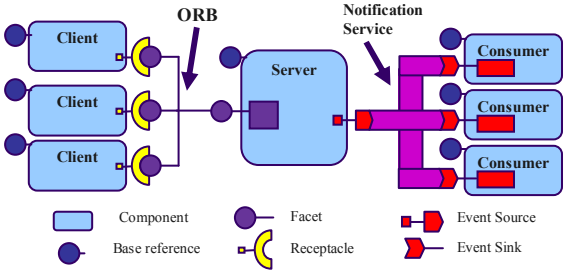
OpenCCM
The Open CORBA Component Model Platform

OpenCCM is the first public available implementation of the CORBA Component Model (CCM) specification defined by the Object Management Group (OMG). OpenCCM is an Open Source project started since 2000 and driven by the Laboratoire d'Informatique Fondamentale de Lille (LIFL). Its main goal is to provide an advanced CCM platform dedicated to research and experimental activities around next Distributed Component Computing and Middleware technologies.

The CORBA Component Model is the first vendor neutral open standard for Distributed Component Computing supporting various programming languages, operating systems, Object Request Broker (ORB) products and vendors seamlessly. The CCM is strongly inspired by the Entreprise Java Beans (EJB) specification. Components are created and managed by homes. They run inside containers which manage system services - like security, transactions, and persistence – transparently. They are hosted by application component servers.



A Distributed OpenCCM application

However, one CCM component could have several input and output interfaces, both synchronous operation or asynchronous event oriented. These interfaces are described via the extended OMG Interface Definition Language (OMG IDL3) and could be implemented by several classes via the Component Implementation Definition Language (CIDL). Moreover, one CCM application could be deployed and run on several distributed servers simultaneously. These various CCM specific features are illustrated in the following figures, one of the OpenCCM demonstrations.

```
interface Service {...operations...};
eventtype Event {...data...};
component Client {
  uses Service to_server;
};
component Server {
  provides Service the_service;
  publishes Event to_consumers;
};
component Consumer {
  consumes Event from_servers;
};
home ServerHome manages Server {
  factory create_server(...);
  ...other business home operations...
};
```

An OpenCCM IDL3 Example

OpenCCM is fully written with the Java language for portability, maintenance, and support reasons. Linux, Solaris, Windows operating systems and ORBacus 4, OpenORB, VisiBroker 4 products are already supported.

OpenCCM provides an open compilation and generation tool chain composed of an OMG IDL3 compiler, an OMG IDL3 repository, a generator for equivalent OMG IDL2, and a generator for extended Java skeleton classes (equivalent to EJB interposition classes). Then this provides an extensible component oriented framework for OMG IDL3 compilation and code generation.

OpenCCM provides a flexible distributed deployment and execution middleware infrastructure composed of a generic Java server to host Java components, an Application

Programming Interface (API) to start component servers and download component archives. Then, distributed deployment with OpenCCM is driven by OMG IDLscript scripts executed at any time. This implies no code generation at deployment time allowing a dynamic control of distributed deployment and component interconnections.

OpenCCM has been downloaded 500 times ago, and it is used for instance by :

- The French RNRT CESURE project (www.gemplus.fr/cesure) is aiming at distributed component-based application deployment driven by smart cards (with Gemplus Java Card), component replication and load balancing, and component oriented trading. Here, components are also running inside Compact iPAQ and Gemplus SmartLife PDA. In this context, the various IBM J9, ORBacus 4, OpenCCM runtimes consume less than 5 Mo.
- Thales ATM has built an XMI generator based on the OpenCCM compilation and generation framework. This generates XMI files from OMG IDL files allowing one to import them into the Softeam's Objecteering UML tool.
- The PARIS team of the IRISA research center at Rennes uses OpenCCM to build parallel components for GRID metacomputing.

Next OpenCCM releases will support:

- The Component Implementation Definition Language (CIDL) and the Persistent State Definition Language (PSDL);
- The Component Implementation Framework (CIF) and containers for security, persistence, transactions, notification system services;
- An open, adaptive, and extensible container framework applied to fault-tolerance, load balancing, real-time services in cooperation with Thales;
- The composite design and execution framework named CODeX;
- ZIP archives and XML DTDs associated to component packaging and deployment;
- The trading-based deployment and supervision infrastructure named TOSCA;
- An OMG IDLscript component scripting engine;
- Various graphical user interfaces for designing, assembling, deploying, and managing distributed OpenCCM applications;
- JacORB 1.4 and Orbix 2000 products; and
- A generator and runtime for C++ components.

Moreover, OpenCCM will be integrated with other ObjectWeb projects:

- Jonathan for its CORBA personality,
- JOnAS for its distributed transaction service,
- JORM for its persistence service, and
- JORAM for its reliable asynchronous messaging middleware.

About ObjectWeb

The ObjectWeb initiative is aiming at the creation of an Open Source Community around middleware software and the creation of a free middleware software database. Its software basis is the creation of a distributed platform which serves as an experimental infrastructure for new services experimentation and for advanced distributed applications for the academic community and the industry. More information on ObjectWeb is available via www.objectweb.org

About LIFL

The Laboratoire d'Informatique Fondamentale de Lille (LIFL) is the computer science research center of the french Université des Sciences et Technologies de Lille (USTL). More information on LIFL is available via www.lifl.fr

DOWNLOAD OpenCCM at corbaweb.lifl.fr/OpenCCM or www.objectweb.org/OpenCCM

ObjectWeb
Open Source Middleware

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