Standards for Distributed Platforms

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INTRODUCTION

Consensus in the computer industry has traditionally been hard to come by. Despite a long tradition of standardization in the engineering disciplines, and decades of ISO, IEC and ITU work in computer and communication systems standards, systems integration remains a complex and difficult chore for software developers. The primary cause is heterogeneity:

- multiple network hardware standards
- multiple network protocols
- multiple instruction set architectures
- multiple operating systems
- multiple file formats
- multiple application API's
- multiple interface API's

As the saying goes in the standards business, that's the nice thing about standards, that there are so many to choose from. So where *did* they all come from? Users usually point at vendors, and vendors at users. Users complain that vendors attempt to ensure competitive advantage by shipping and supporting proprietary interfaces. And vendors make it clear that users'

differing product demands (price, performance, functionality) guarantee a wide spectrum of products. Of course, both complaints are correct.

So we as software users have to learn to live with heterogeneity. After all, we as engineers have done so for hundreds of years—there are different screw sizes, different electric mains voltages, and different automobile interfaces that we've learned to deal with. Can we somehow do the same with software systems, and reduce the fire of the twin dragons of long software application backlogs and heavy software maintenance costs?

The Object Management Group (OMG), was founded with exactly that purpose in mind. The vision of the OMG is to create enough consensus in the computer industry so that software integration costs fall even in the face of the existing and growing systems heterogeneity. Furthermore, the OMG solution should address the level of detail necessary to support the concept of the Global Information Appliance—that any computer (from toaster to supercomputer) running any application ought to be able to access the services of any other application that can be physically addressed.

THE OBJECT MANAGEMENT ARCHITECTURE

As a first step in this direction, the OMG proposed (and has been filling out) an overall architecture for software integration called the Object Management Architecture (OMA). The OMA takes as a starting point two key ideas:

- that object technology is an important way to achieve clearly-defined, modular interface specifications extensible to fit any real-world problem; and
- that standards with no implementation are worthless, and thus the OMG must concentrate on adopted technology specifications which already are (or are shortly to be) commercially available.

That in mind, the OMA was simply sketched as a software-bus style architecture.

In this model, the central double-headed arrow labelled *CORBA* (for Common Object Request Broker Architecture) performs with minimal overhead the central software integration role. It includes a language for describing interface (which OMG calls OMG IDL, for Interface Definition Language) and an API for

- discovering application services available (e.g., on the network);
- determining the interface of a service to be used;
- building a request to be sent, and invoking that request; and
- retrieving the results of the invocation (or failure information).

In the OMG model, every other possible function of systems integration is *layered*. This allows competition between vendors in the areas of functionality, price and performance, and allows buyers to choose a best-practices approach to building enterprise solutions.

All of the clients and services (which are really peers) in the heterogeneous computing environment are modelled as *objects*, communicating with other objects via the CORBA broker. Those objects are categorized by the level of functionality:

- CORBAServices are the lowest-level services, which all applications developers need. They include creation and deletion of services and servers; event and alarm notification; persistent storage of state; transaction processing interfaces; security and authentication control; etc.

- CORBA facilities represent critical but domain- or application-specific services. Such facilities include document management (for groupware and desktop markets); programmable controller interfaces (for manufacturing settings); financial instrument representations; patient record management; etc.
- CORBA applications cover the applications themselves, which (1) are the province of VAR's and ISV's, and (2) are specifically *not* in the standardization path of the OMG.

AN OPEN PROCESS

The OMG uses an open, consensus-based process to fill out this architecture with services that range from a common basis of control facilities (transaction management, event management, persistent storage, etc.) to specialized facilities for vertical industries (finance, health care, manufacturing, etc.). About 600 member companies, large and small and from around the world, participate in an open process to define requirements and services for access by users and developers. Participation is open to any and all companies, research institutions and universities.