WWW and OOP

- JUNE 24-25, 1996 JOINT W3C/OMG WORKSHOP ON DISTRIBUTED OBJECTS AND MOBILE CODE
- Dec 11, 1995 CONSORTIUM ANNOUNCES ACTIVE OBJECT AGREEMENT

Modern information systems tend toward distributed hypermedia applications. The web is no exception. Distributed applications have a few more wrinkles than conventional applications: they span address spaces, hardware architectures, and even administrative domains.

Techniques for distributing applications across address spaces include simple RPC systems, distributed object systems such as CORBA, and hybrid systems such as DCE (not to mention session-oriented protocols like NNTP, SMTP, and even HTTP to some extent).

Here we investigate the integration of distributed object technologies with the web, and the duality between application programmers' interfaces (APIs) and network protocols.

Contents

W3C Activity Area: WWW and OOP
: Statement of direction: Requirements, Plans, ...

Schools of Thought
: Architectural viewpoints: CORBA/OMG, DCE, ...

Web Object Terminology
: In a space of overloaded terms like object and document, we have to pick some definitions.

Interoperability Mechanisms
: Examples of integrating the web with CORBA, ILU, databases, ...

Mobile Code
: Java, Safe-Tcl, Logicware, Omniware, Jul 95 WorkShop

Issues in the Development of Distributed Hypermedia Applications
: Concurrency, Safety, Naming, Type Systems...

Technologies for Development of Distributed Applications
: Modula-3, ILU, python, ...

Compund Doucment Architecture
: OLE, OpenDoc, Fresco, ...

Other Hypermedia APIs/Protocols

See also:

- from the www-talk archives: re: objects, agents, and mobile code
- HTTP-NG using ILU? ala Object Interchange Service from Stanford Digital Library Testbed
- TimBL's original note on WWW/OOP

Schools of Thought

The various players in the distributed objects are separated into camps based on architectural interoperability, and listed in chronological order (roughly). See also:

- Design Issues: The Web Object Model and Type System

DCE
: OSF is the controlling body. The distributed object model inherits from something called TI-RPC, which is C++ish. The RPC system came from Apollo, I think.

CORBA
: Common Object Request Broker Architecture. OMG, The Object Management Group, is the controlling organization. The Java/Sun camp is CORBA-happy. So is OpenDoc (by CILabs).
  - The Electra Object Request Broker
  - SunSoft's NEO product family including JOE, sun's integration of Java with distributed objects.

SOM/DSOM
: @@need to study this to see if it fits in one of the above camps.

COM
: Microsoft's Component Object Model -- the underpinnings of OLE.

ILU
: Inter-Language Unification. A project from Xerox PARC. The architecture has a single interface specification language, plus an extensible set of message formats (called protocols, of all things, in ILU-terminology), and transports. For example, an XDR/UDP combo allows interoperability with SunRPC clients and servers. The CORBA IIOP is supported in version2.0. Xerox courier is supported via another combination. Calls within the same address space are also supported. All these combinations can be mixed in the same process, so that gateways are trivial.

  Language support includes C, C++, Modula-3, python, Common Lisp and tcl. Java is in the works. See: Why ILU?

Web Object Terminology

These terms are used in many ways in many places. Here are the terms and definitions I've settled on. See also: Web Architecture: Terminology

Object
: Some data/state with associated behaviour; typically, some bits of state and some set of methods. We won't use this one formally much.

Object Type
: A set of method signatures. I think the Smalltalk community originally coined ther term "protocol" for this use (somewhat ironic, given the current duality between network protocols and APIs). This is akin to an class in Smalltalk, C++ and other multiple-inheritance systems. It's similar to a class in Java Objective C, but it's more like an interface in Java, sine we're only talking about the interface, and not the implementation. Modula-3 has a crisp notion of object types, but it's single-inheritance. ILU's object types are similar, but without the single-inheritance restriction.

Namespace

A set of names and their (static) bindings. Has its roots in C's .h files. In Modula-3 and ILU, this is called an inteface, as in "a module exports an interface". In OMG IDL and python, a module (same for scheme48 and guile, I think). In Java, a package. (I was calling this an "Interface" until recently -- Jan 96).

Code Artifact

Some executable code. In C, a .c or .o file. In Modula-3 and python, a module. In Java, a class. Note that in Java and python, code artifacts and namespaces have a 1-1 relationship, wheras in C and Modula-3 (and most languages with a notion of separate compilation), they can have a many-many relationship.

Resource

Anything that can be named with a URI. Also, the object type with no methods (hmmm... perhaps a GET method? QueryInterface?). Hence resources are not directly observable. There is some inclination to use the term *object* here, but I'm resisting it. This is much like the concept of ANY in OMG IDL, which is not expressible in ILU's ISL.

Document

The object type with methods GET, PUT, POST, and DELETE. A document is also a resource; that is, it has an address or identifier. Not to be confused with artifact.

Digital Artifact

A sequence of bytes with an associated media type. Known in the HTTP spec as an entity. The HTML spec term "document" fits here too. Also: representation

Interoperability Mechanisms

ILU/HTTP

Digital Creations is releasing their freely-available integration of ILU and various http servers. Contact `info@digicool.com` for more information.

ANSA Information Services Framework Distributed Objects and the World Wide Web

> ANSA is building a set of tools to integrate a distributed object model into WWW. The objective is to provide a CORBA based environment from which the web appears to consist of a world of distributed CORBA objects.

Web Objects -- Arjuna Group, Dept. of Computing Science, Newcastle University

TCL/CORBA

an integration of TCL with Orbix (IONA's ORB)

```
Newsgroups: comp.lang.tcl,comp.object
Subject: Re: Q: Tcl CORBA extension
Date: 17 Jul 1995 19:08:56 GMT
Organization: Customer of EUnet Germany; Info: info@Germany.EU.net
```

GROW -- The GNU Remote Operations Web

@@need to study this

Compund Doucment Architecture

OLE2

Microsoft's Object Linking and Embedding. Big, thick books. Lots of support. @@I need to study it further. It's based on COM, but I don't know whether distributed OLE will be compatible with anything or not. COM (non-distributed) fits in the ILU architecture -- I think there are implementations.

OpenDoc
: - CILabs/OpenDoc
  - OpenDoc: The Future of Computer Applications!

Fresco
: Fresco - A Fresh Approach to User Interface Systems interfaces specified in OMG/IDL. Derives from Linton's work on Interviews.

Application Builders

These systems are generally used to build LAN or enterprise distributed database applications.

WebObjects
: by NeXT. Includes web interoperability. Lots of O/S's supported.

Lotus Notes
: @@need to investigate further

PowerBuilder
: @@need more info

Visual Basic
: Combined with MS/Access (and lots of other components known variously as VBXs, OLE controls, etc) VB is a booming applications development platform.

Misc Resources

This is some stuff that seemed relevant for one reason or another, but I haven't had time to annotate it and integrate it with the rest of this information.

- Distributed Applications in a Hypermedia Setting
- Embedded Objects and Client-Side State
- Safe Helper Applications
- Programming Active Objects in Java
- Standards for an Interactive Web
- OMG, OOA/D, and IDL

Connolly
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