

Business Objects on the WWWeb

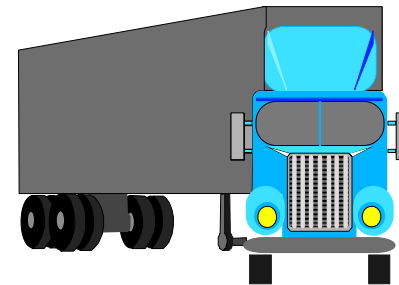
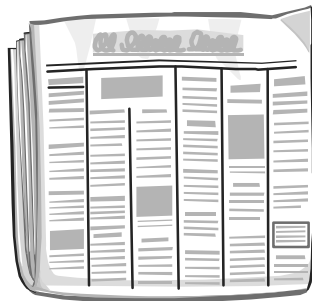
A marriage of CORBA and the Internet



Widgets and Business Objects

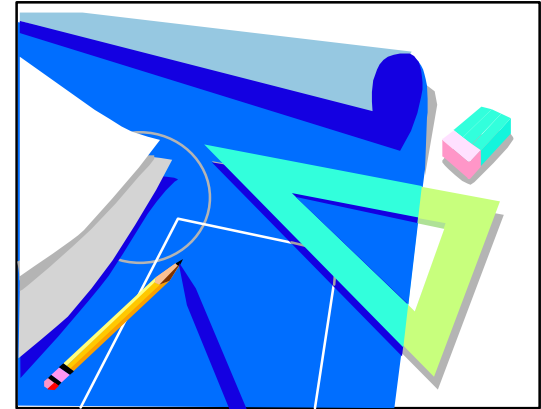
- **Widgets** are fine grained, technical objects
 - ▶ Usually unique to a particular technology or type of platform (e.g. relational database, Windows)
 - ▶ Examples: Window, Menu, Button, Scroll Bar, Slider, File Dialogue
 - ▶ Normally transient and visible to one application image
- **Business (Domain) objects** are usually coarse grained
 - ▶ Represent real world entities, concepts or business processes
 - ▶ Examples: Customer, Sales Category, Quotation
 - ▶ Usually persistent (stored between invocations) and shared across applications

Open

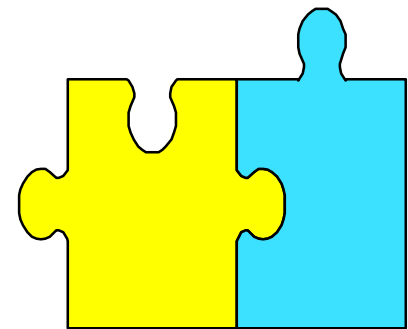


Components

- Classes are reusable or "starting point" designs
 - ▶ Issued at source level
 - ▶ Use as is by instantiation
 - ▶ Reuse by specialisation
 - ▶ or by modification

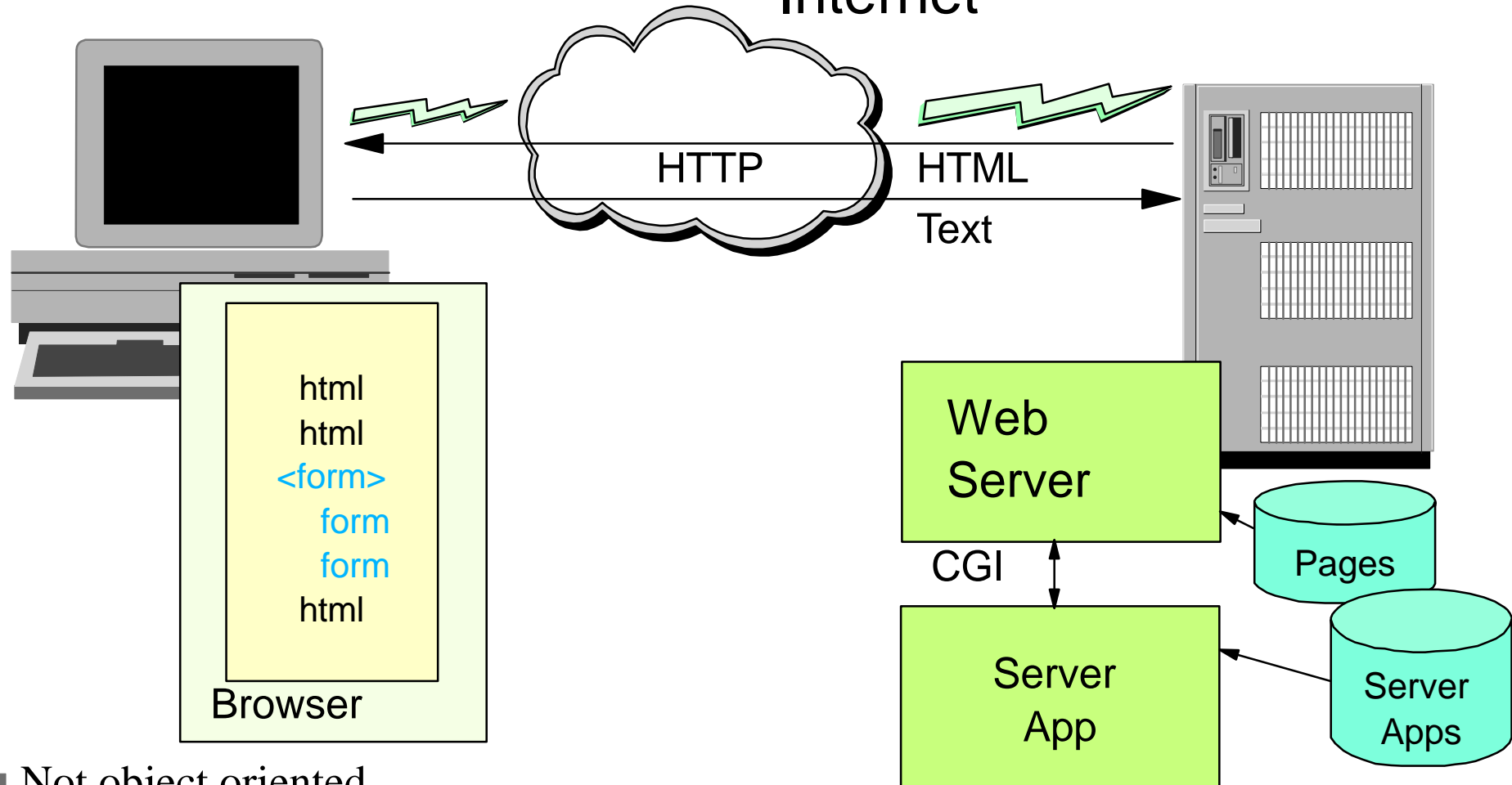


- Components are kit form objects which already have the correct structure
 - ▶ Issued at object level
 - ▶ Reuse by cloning and customizing attributes
 - ▶ May be "aggregated" into larger reusable assemblies



Internet as Client Server Platform -

1995
Internet



- Not object oriented
- No intelligence at workstation
- No session/transaction/event services
- Optimized for content display, not processing

Web Browsers and Plug-ins

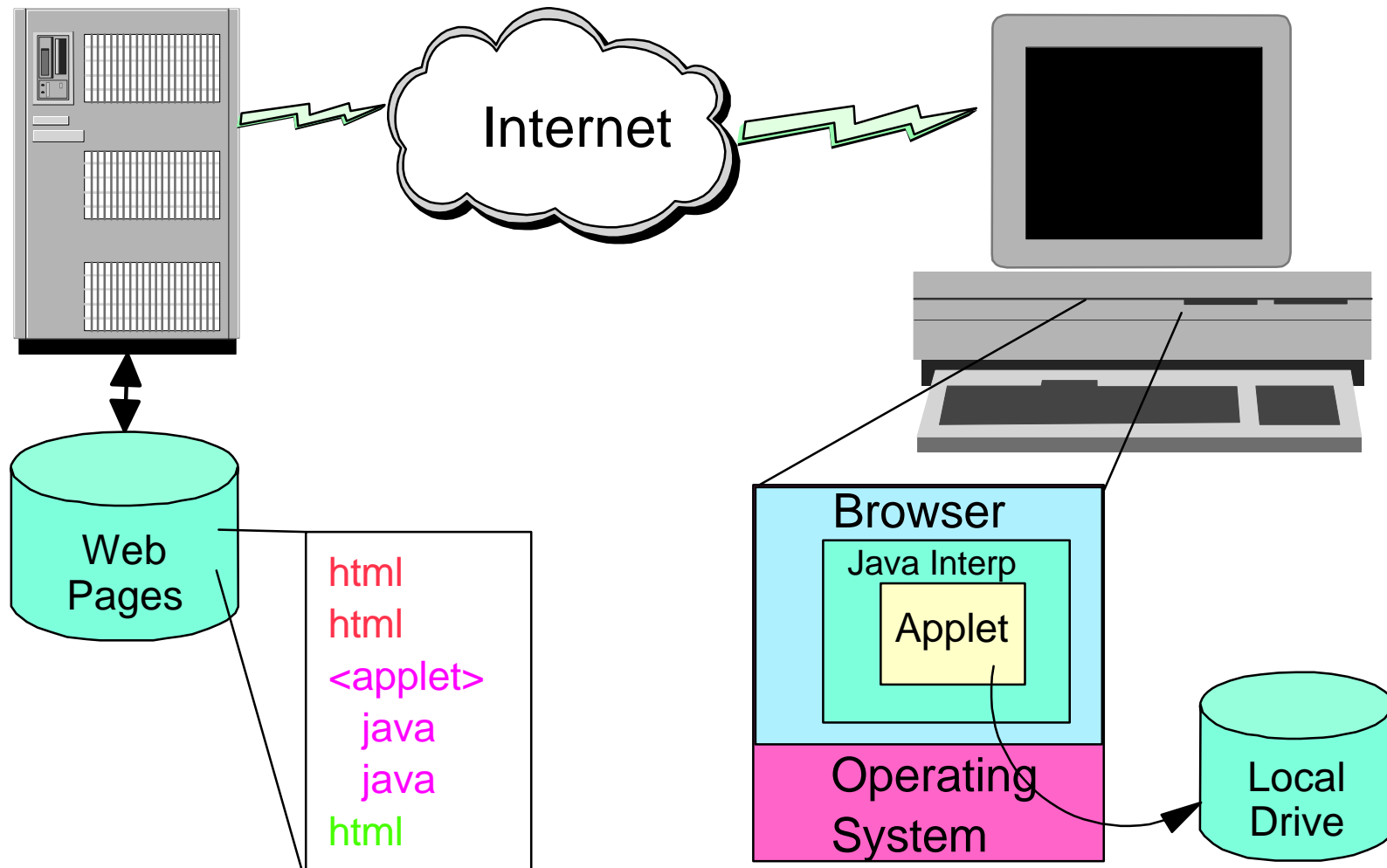
- Plug-ins
 - ✓ Enhance Browser Functionality
 - ✓ Downloadable
 - ✗ Platform and Browser specific
 - ✗ Not safe
- ActiveX Controls
 - ✓ Familiar to (Windows) programmers
 - ✓ Easy to convert existing controls to ActiveX
 - ✓ Large number quickly available
 - ✓ Similar to DLL, VBX, OCX calls
 - ✗ Windows/Processor architecture specific
 - ✗ Direct machine access

Java

- From Sun Microsystems
- Placed in public domain (copyright retained)
- Leverages C++ technology and skills with Smalltalk style class library
- Smaller and more consistent than C++
- Very rapid takeup by all major vendors (Microsoft, Netscape, IBM, Borland, Symantec etc.)
- Key Features
 - Platform independent
 - Fully Object Oriented
 - Downloadable
 - Clean Interfaces
 - "Sandbox" for safety
 - Java Virtual Machine
 - Java DB Kit
 - Java Remote Invocation
 - "Beans" component model JAR archives

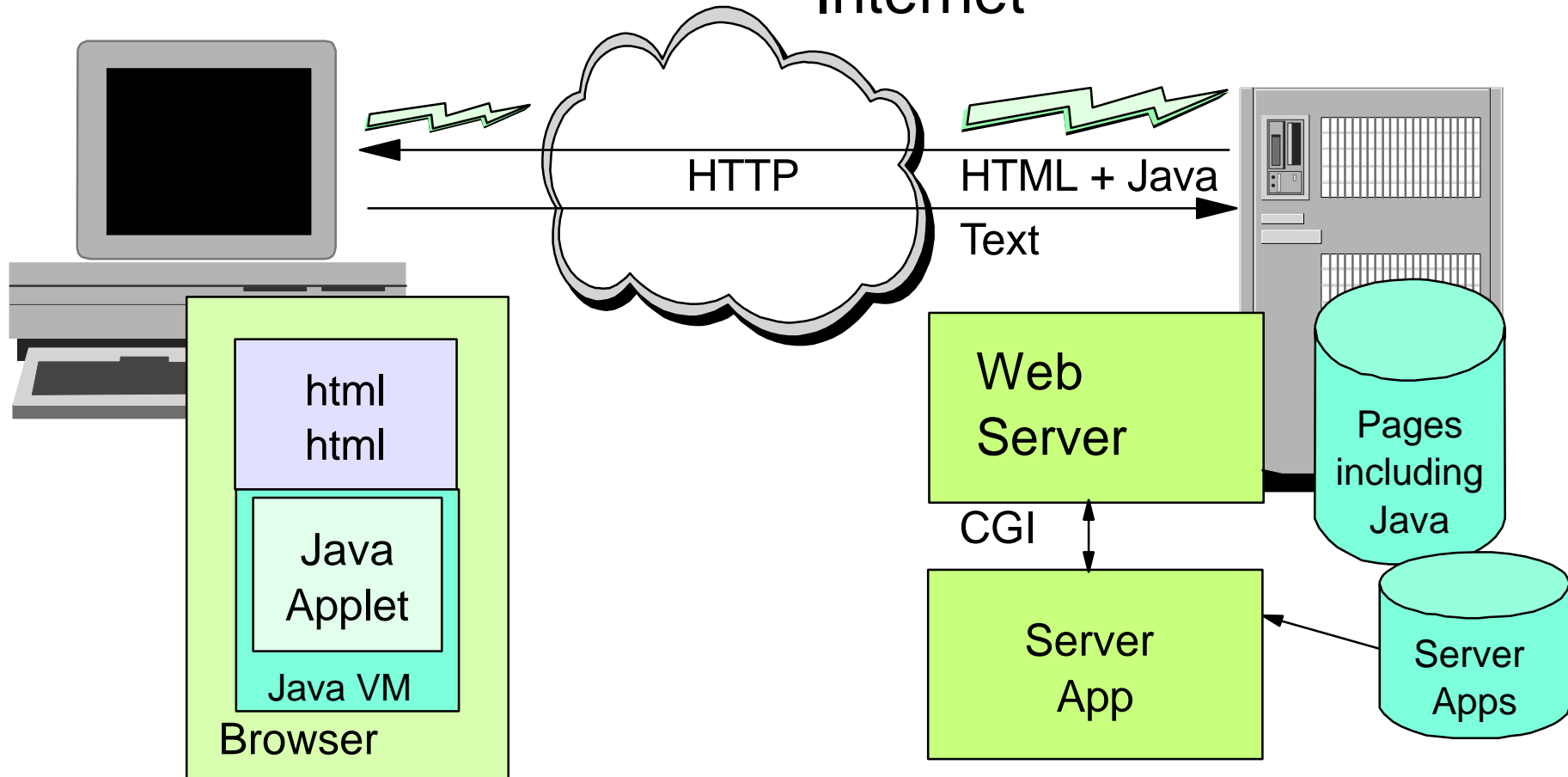


Java Environment



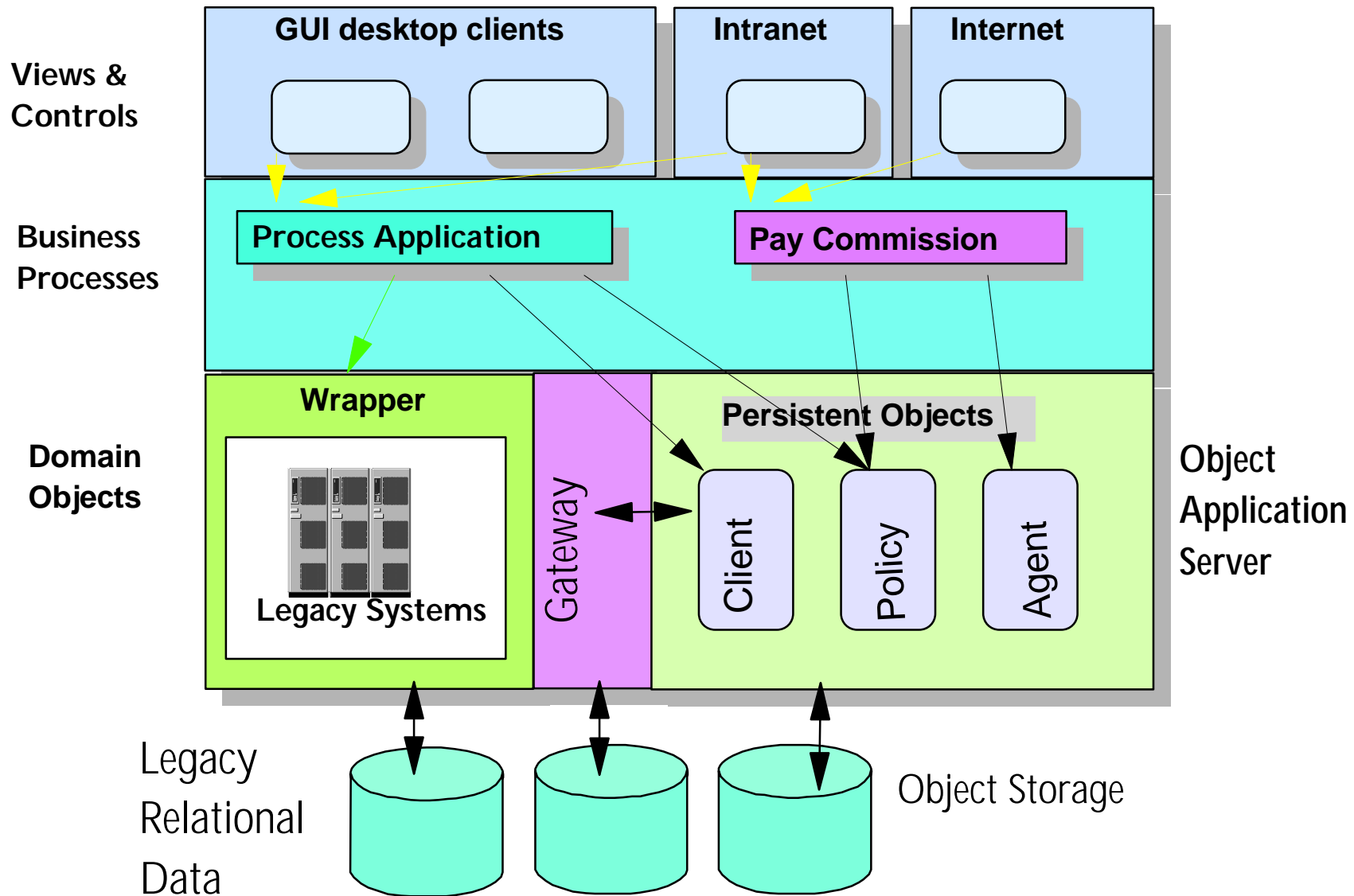
Internet as Client Server Platform -

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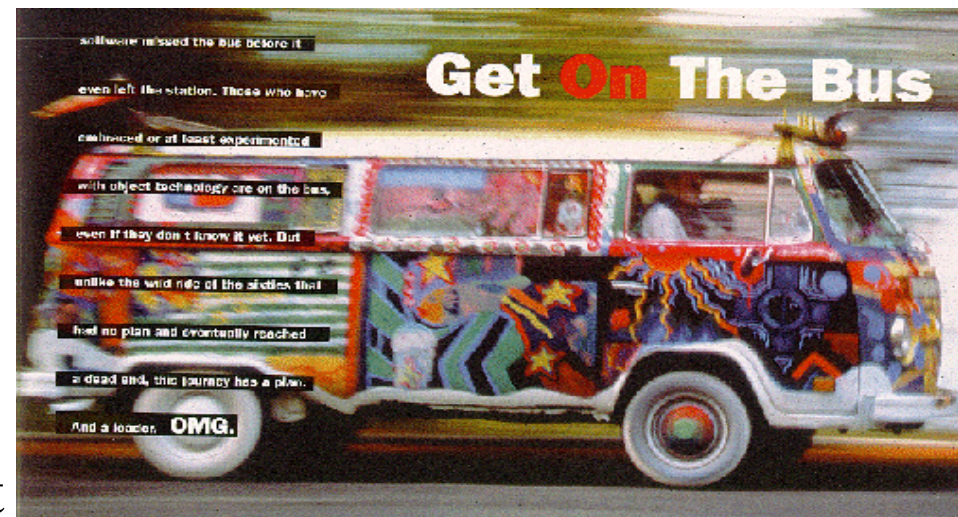
- Intelligence at the workstation
- Portable applications
- No session/transaction/event management

Layered Application Architecture



Role of Standards

- Ideally we could develop in a language appropriate to our project and application AND
- Integrate with other applications written in other languages
- Distributed Object Standards attempt to make this possible
 - ▶ even when the objects reside in different architectures, machines and locations
- Competing Architectures
 - ▶ CORBA from OMG
 - SOM, DSOM (IBM)
 - DOE from Sun
 - PDO from Next
 - ▶ COM/DCOM from Microsoft
 - ▶ Java Beans from Sun



Portable Components

- Until recently, components were restricted to single environments
- That is changing rapidly
 - ▶ CORBA (OMG) provides distributed object messaging and interface standard
 - ▶ Various vendors have implementations: PDO (Next), DOE (Sun), DSOM (IBM)
 - ▶ Microsoft has countered with VBX, OCX, and Active X
 - ▶ Sun has confused everyone with Java and Java Beans
- Microsoft OLE 2 and Distributed COM are becoming real
- OpenDOC is solid and is now seeing rapid deployment

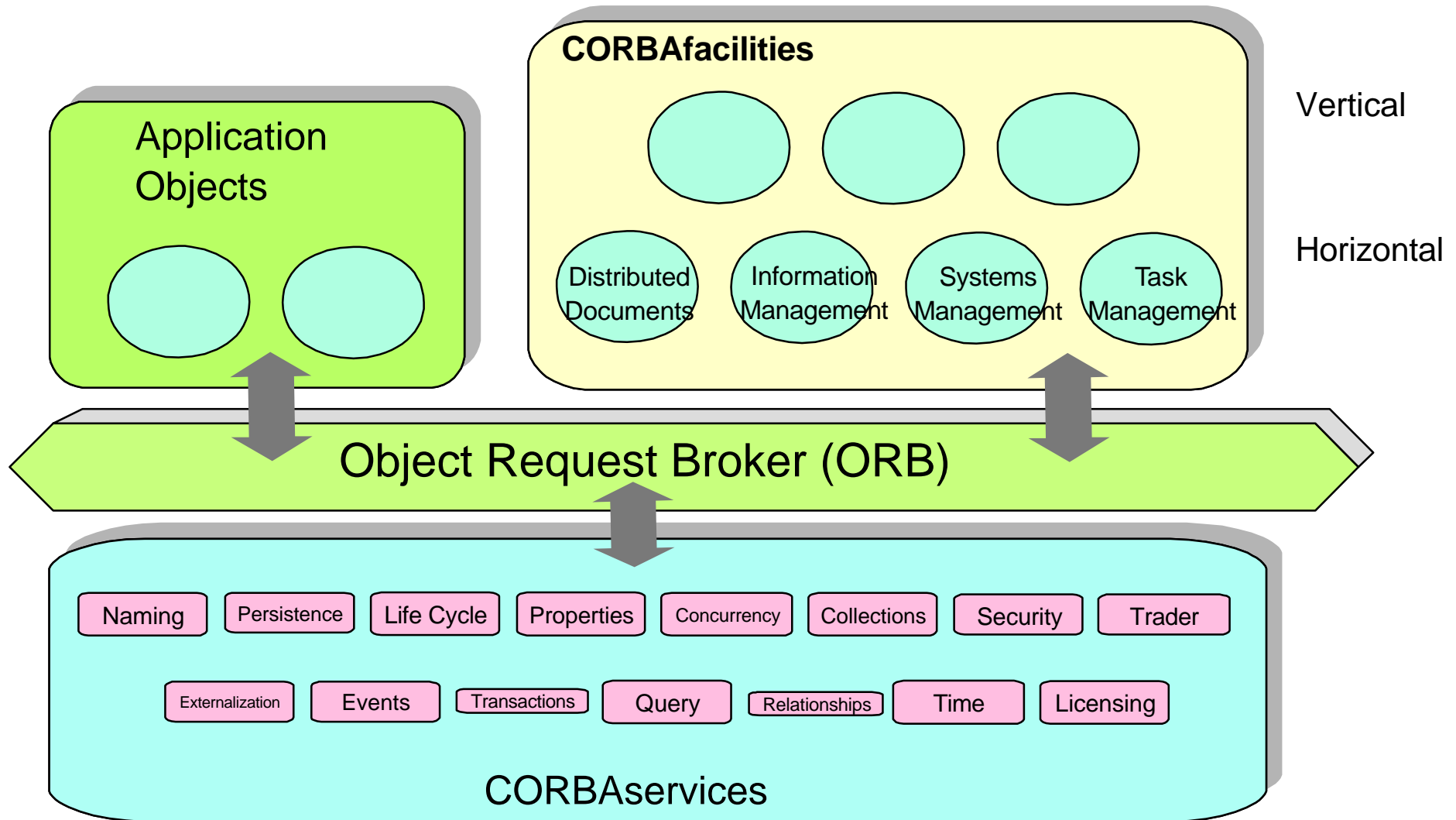


Object Management Group



- Non-profit group founded 1991
- 700+ participants including all major players
 - ▶ Microsoft a member, but not an implementor
- Define Standards for Exploiting Object Technology including:
 - ▶ Object Management Architecture
 - ▶ Common Object Request Broker Architecture (CORBA)
 - ▶ Internet Inter ORB Protocol ("*eyeop*")
 - ▶ Business Object Framework
- Not a committee based approach, but rather Tender/Proposal based

Object Management Architecture

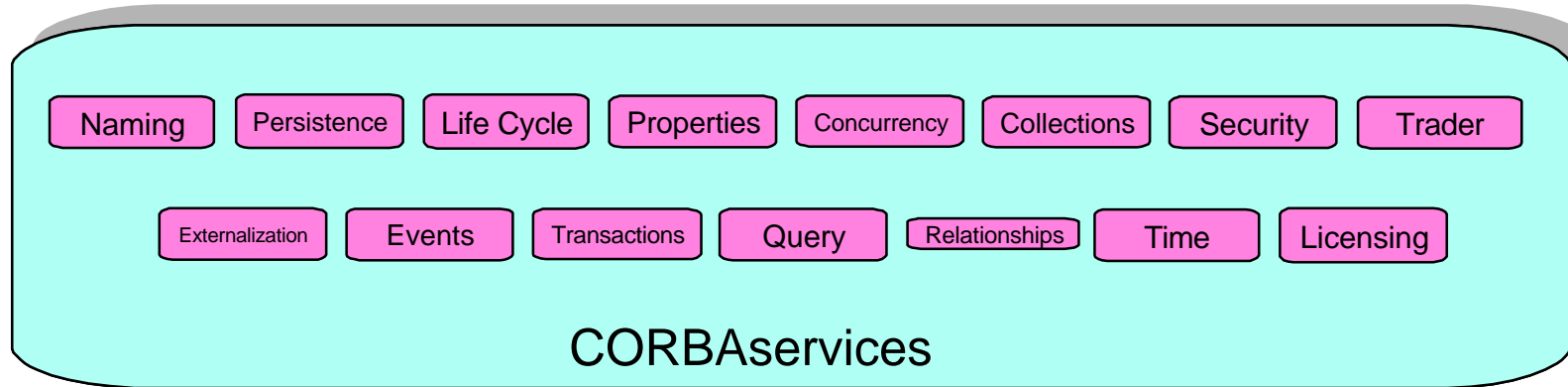


Object Request Brokers

Object Request Broker (ORB)

- Provides an object "bus"
- Transparent communication medium between objects
 - ▶ Locally
 - ▶ Distributed
 - ▶ Across platforms
 - Processor families
 - Languages
 - Communications Protocols
- Distributed object middleware facilities
 - ▶ Static and dynamic method invocation
 - ▶ High level language bindings
 - ▶ Self describing
 - ▶ Local/Remote transparency
 - ▶ Built in security/transactions
 - ▶ Polymorphic messaging
 - ▶ Coexistence

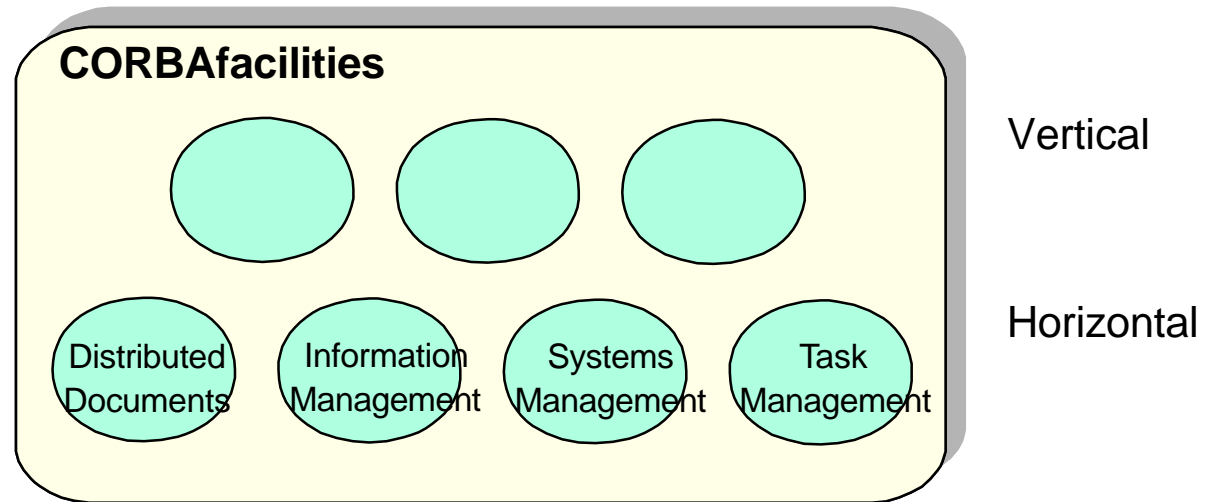
CORBA Services



- **Lifecycle:** creating, copying, moving and deleting components
- **Persistence:** storing on object, relational database and OS files
- **Naming:** location, uniqueness across contexts, directory interface
- **Event:** register/deregister interest in events, create event channels
- **Concurrency Control:** lock manager
- **Transaction Service:** Two phase commit coordination among recoverable components. Allows nested transactions.
- **Relationship Service:** associations between components, also across naming context
- **Externalization:** streams for import/export of component data
- **Query:** query for objects. SQL superset. (SQL3 and OQL)
- **Licensing:** metering use of components for royalty gathering
- **Properties:** associate named values with a component (e.g. current date)
- **Time:** synchronising times. Triggering events
- **Security:** authentication, access, confidentiality and non-repudiation
- **Trader:** "Yellow Pages" and bid mechanisms
- **Collection:** basic collection classes

CORBAfacilities

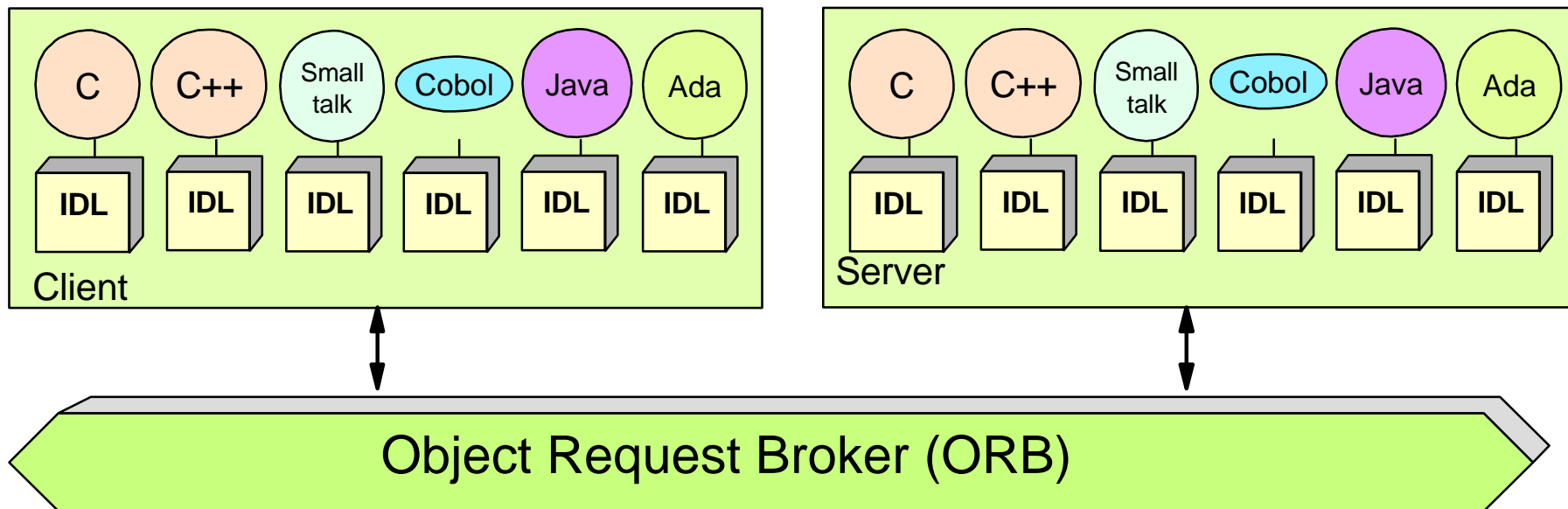
- IDL defines frameworks
- Provide direct support to applications
- Deal with Business Objects
- Examples: OpenDoc
Mobile Agents



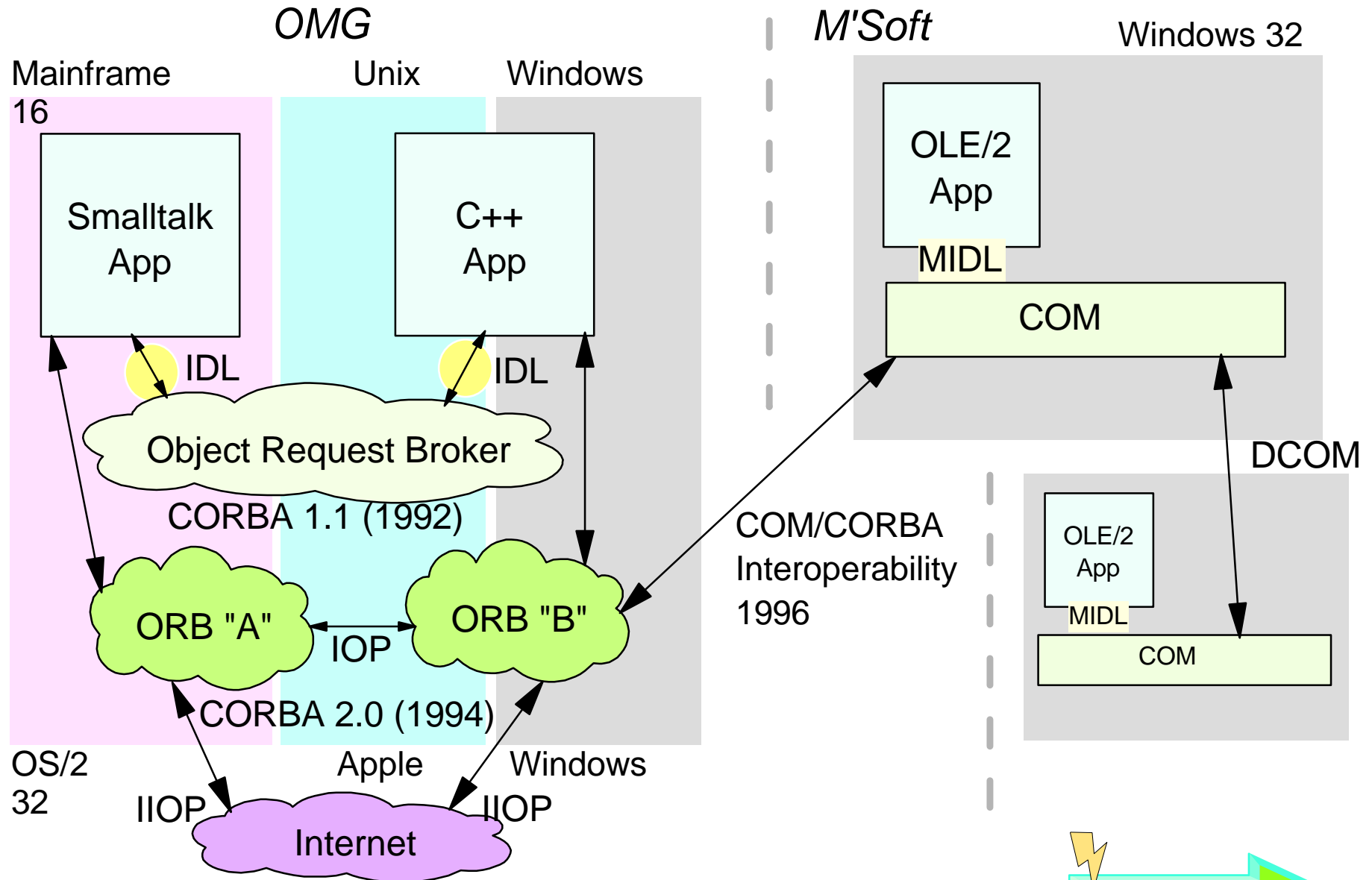
- W.I.P.
- Mobile Agents
 - ▶ Object which moves with state
 - ▶ Itinerary
 - ▶ Auto activation on arrival
 - ▶ Agent Transfer Manager
- Vertical facilities still to come
 - ▶ Customer Objects
 - ▶ Electronic Commerce
 - ▶ Health Care
 - ▶ Manufacturing etc.

IDL

- Interface Definition Language
 - ▶ NOT a programming language
 - ▶ Declarative only, implementation is vendor specific
 - ▶ Language and OS independent definition of APIs
- Grammar derived from C++ (subset) with extensions for distributed concepts
- Allows definition of component's attributes, inheritance, exceptions raised, typed events generated, methods supported
- Introspection supported



Distributed Object Standards



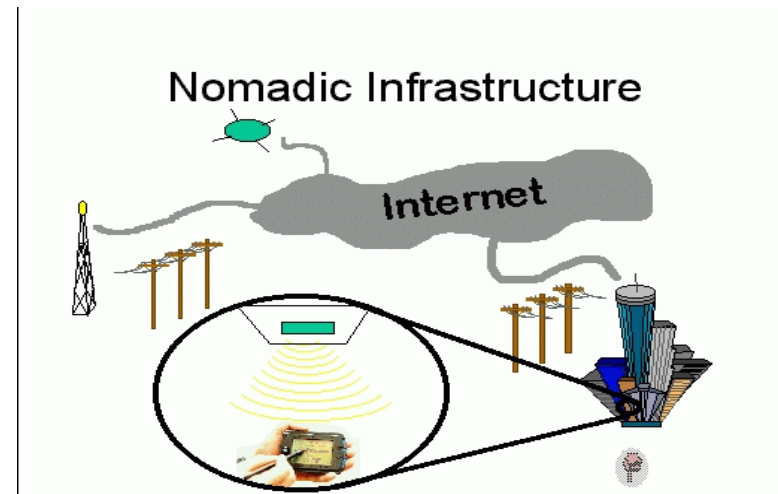
Orbletts

- If we can run Java applets in a browser
- AND if we can write a light ORB in Java
- THEN we can create a downloadable ORB
- WHICH turns any browser into a CORBA applications platform!
- Commercial Products:
 - ▶ Visigenic VisiBroker for Java (prev. Black Widow)
 - ▶ Sun's Joe
 - ▶ Iona's OrbixWeb



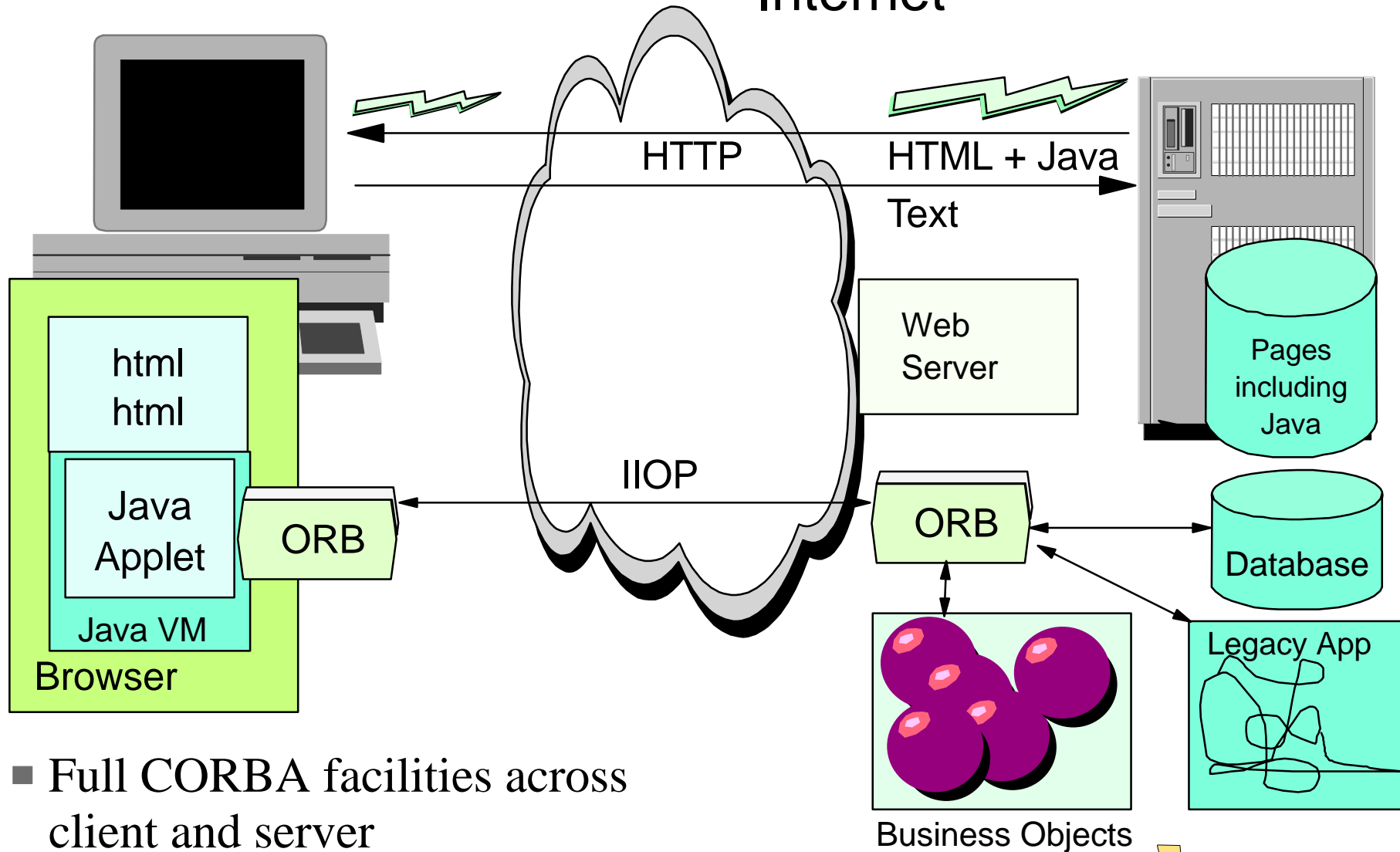
Ubiquitous ORB's

- "The next version of Netscape Navigator and Netscape SuiteSpot Servers will be IIOP-compliant. IIOP will be integral to everything we do. Netscape Navigator will be able not only to browse content but also to browse objects. We expect to distribute 20 million IIOP clients over the next 12 months and millions of IIOP-based servers over the next couple of years. We'll put the platform out there so that people can start developing for it." *Marc Andreessen, Netscape Cofounder, Oct 1996*
- Reality with Netscape Communicator (Vsn 4 of Netscape)
- CORBA may become as ubiquitous as TCP/IP



Internet as Client Server Platform -

1997
Internet



- Full CORBA facilities across client and server
- Stable platform for processing, electronic

CORBA & DCOM Compared

- Open Industry Standard
- Fully Object Oriented
 - ▶ Inheritance
 - ▶ Unique Object Identity
- Neutral
 - ▶ Language (IDL)
 - ▶ Platform (MF, Unix, Apple, Win16, Win32, OS2)
- Defines services and facilities which are provided to developer
- Language binding or dynamic interpretation
- Automatic object persistence
- Performance overhead but scalable
- Stable Spec. & Certification Service



- Proprietary "de-facto standard"
- Object Based
 - ▶ No inheritance
 - ▶ No unique identity (pointers to function entry points)
- Specific
 - ▶ C++
 - ▶ Win32
- Defines how a developer should do what is necessary
- Binary interface (but accessible from VB)
- Developer responsible for keeping "alive"
- Efficient but difficult to scale
- Moving target - "Code supercedes Spec."



Implications for Business

- Who has bought in?
 - ▶ Sun/JavaSoft, Netscape, IBM, Apple, HP, DEC, NCR
- What does it let you do?
 - ▶ Write applications that
 - Are portable across platforms, OSs, GUIs
 - Operate on a global distributed basis
 - Are robust, flexible, safe
 - Discover capabilities around them at run time
 - Fully leverage business objects
- Provided that you
 - ▶ Adopt object oriented modeling methods
 - ▶ Adopt a layered architecture
 - ▶ Use IDL to define the interfaces to your objects
 - ▶ Use CORBA compliant middleware and capable browsers

Inspired

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