SOA and EDA
An Architectural Viewpoint

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Programming On the Web

• HTTP based communication protocols
• Web servers receive external requests
• Applications pick up the requests from web servers
Applications

Read-only pages, Email, Chat, Search engines, news-servers, citation index, bibliographies, online courses, video conferencing, online services and transactions, conference management servers, gaming, journal review processes, books and multimedia, governance and business processes..
Let's look at some architectural variations
A Single Process Simple Monolithic Application

Process

Data

Control Thread
A Data-oriented Application

\[ P \rightarrow Q \rightarrow D \]
A Three Tiered Architecture

UI

BL

DB
Model View Controller
Concurrent Tasks

UI

T1  T2  T..  Tn

Data
More User Roles and hence, multiple Views

UI  U..  Um

T1  T2  T..  Tn

DB
More Data Sites

UI  U..  Um

T1  T2  T..  Tn

D1  D..  Dp
Users are scattered over a wide area
Some users are local
A Peer-Peer Collaboration
The Concerns of Interoperability
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Some Architectural Concerns

• Business Logic
• Data Design
• Interfaces, Descriptions and Discovery
• Performance and QoS
• Replication and High Availability
• Scalability and Load balancing
• Security, Access Policies, Accounting
• Reusable and Adaptable Applications
• Interoperability and Legacy Integration
Service Orientation
Evolution of Service Orientation

Functions
Remote Procedure Calls
Remote Method Invocations
Interoperable Middleware
Web Services
What's a Service?

- A program called service user
- A program called service provider
- A protocol through which they communicate
- Service provider guarantees postconditions
- Service user fulfills preconditions
Publish-Find-Bind/Use

- a service
- Registry
- another service
- client application
Publish-Find-Bind/Use

a service

Registry

another service

client application
Publish-Find-Bind/Use

a service

Registry

another service

client application
Publish-Find-Bind/Use

a service

Registry

another service

client application
A typical scenario

• Clients ---- download a client-side program and use it (PULL model)
• Server side --- accepts client requests and serve them through local service supports
• Communication and security protocols
• Traditional computational layering techniques at server side
  – Service dispatch, parallelism, database layer
  – Firewalls, filters, loggers
• Service descriptions and discovery
Cluster Computing/Grid Backbone

Web Server
Cluster Computing/Grid Backbone

Web Server
Some Internet Programming Techniques

- Applets – code that gets downloaded with an html page
- XML-based standards for communication and data representation
- Forms, Scripts, Servlets...
- SOAP (simple object access protocol)
- Self Description (eg WSDL)
- Programs can discover programs (UDDI) – universal description, discovery and integration
Event-Driven Architecture

- Events are a major abstraction in the domain
- Events occur as a result of something changing within the system
- Some applications are interested in some specific events
Parameters

- Event sources, called publishers
- Event subscribers, or event handlers
- Event types
- Event priorities and Service guarantees
- Event Buffers, Event spaces
Event Publishing

Push type publishers

Pull type publishers
Event Delivery

Pull type subscribers

Push type subscribers
Event Spaces

• Remember events for pull subscribers
• Pull events from pull publishers
• Push events onto push subscribers
• Receive events from push publishers
An EDA

Event Space

publishers

subscribers

push

pull

push

pull
EDA and SOA

- SOA is about thinking in terms of well-defined services, contracts, protocols and interoperability
- EDA is about having to handle events in an event-major system
- The components in EDA could be services themselves
Interoperability and Availability Issues

System already in place, and it's working

Address interoperability

Address Availability

Standardization

New Applications, Extensions