



# Introduction to SOA & Web 2.0

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# Overview

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- Gartner Top 10 Technologies
- SOA Definition
- Deriving Web Services from SOA
  - SOAP Web Services
  - REST Web Services
- Examples of Real World Web Services
- Examples of the Best Web 2.0 Software of 2010
- Web 2.0 and SOA Relationship



# Gartner on Web Services

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- The industry analyst firm Gartner recently reported that
  - By 2006, 60 percent of the \$527 billion IT professional services industry will be based on exploiting Web services and technology
  - By 2008, 80 percent of all software development would be based on SOA
- This means that more than half of all software development will revolve around the Web technology



# Gartner Top Tech for 2007-2010

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- Green IT: Power efficiency
- Unified communications: PBX => IP Telephony
- Business process modeling
  - Top-level process services must be defined jointly by a set of roles
  - Fill a critical role as a compliment to SOA development



# Gartner Top Tech for 2007-2010

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## □ Metadata management

- Enables optimization, abstraction and semantic reconciliation of metadata to support reuse, consistency, integrity and shareability

## □ Virtualization 2.0

- Improve IT resource utilization and increase the flexibility needed to adapt to changing requirements and workloads.



# Gartner Top Tech for 2007-2010

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- Mashup and composite apps.
  - By 2010, Web mashups will be the dominant model (80 percent) for the creation of composite enterprise applications
  
- Web platform and WOA
  - Software as a Service (SaaS) is becoming a viable option in more markets



# Gartner Top Tech for 2007-2010

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## □ Computing fabric

- Allow several blades to be merged operationally over the fabric, operating as a larger single system image that is the sum of the components from those blades

## □ Real world Web

- Information from the Web is applied to the particular location, activity or context in the real world.



# Gartner Top Tech for 2007-2010

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## □ Social software

- Expect significant consolidation as competitors strive to deliver robust Web 2.0 offerings to the enterprise
- Social software technologies will increasingly be brought into the enterprise to augment traditional collaboration



# SOA Definition

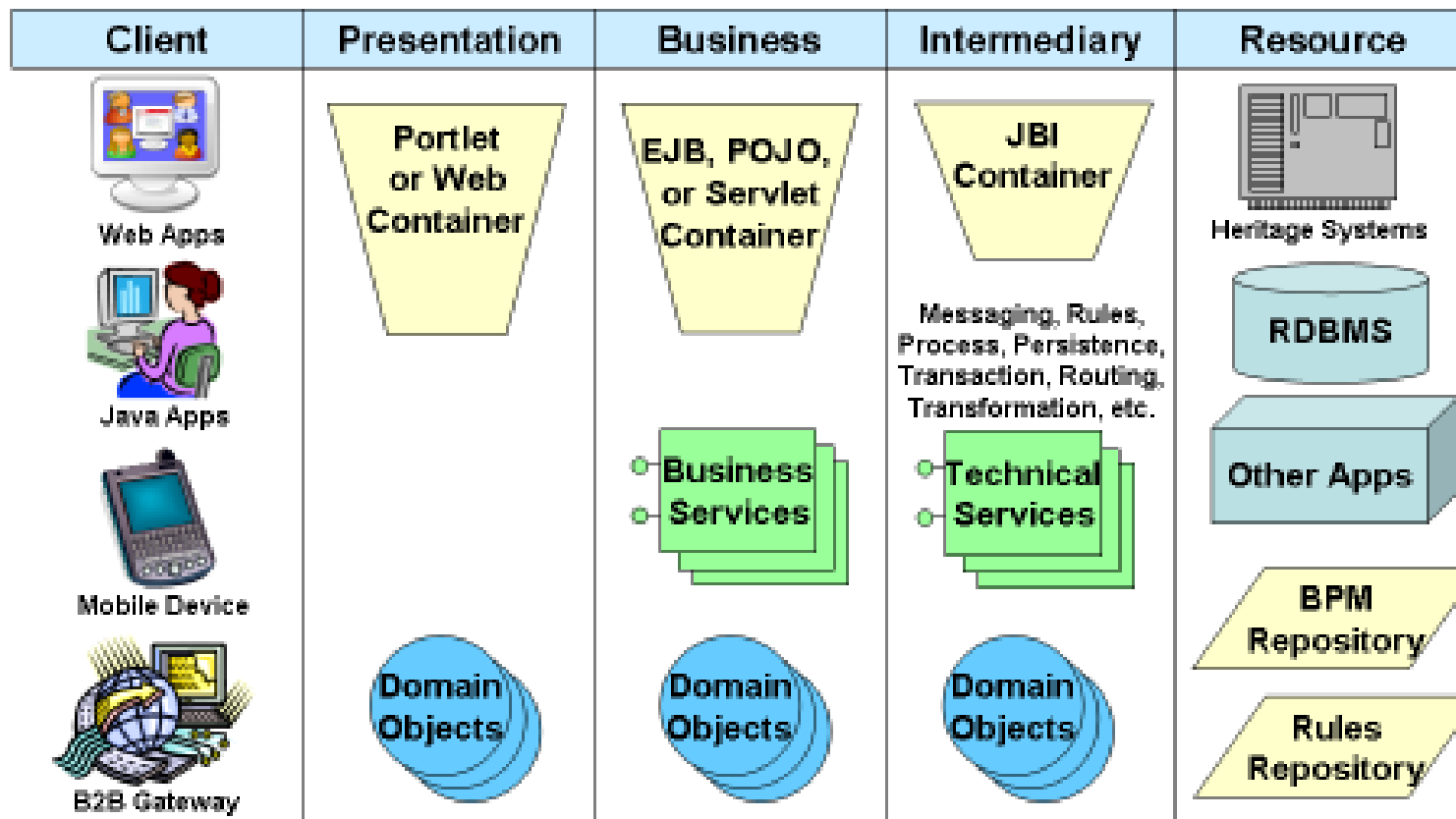
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- ❑ SOA is an architectural style whose goal is to achieve loose coupling among interacting software agents
- ❑ As we build more software systems, we see similar situations and patterns
- ❑ Naturally, we want to reuse the functionality of existing systems rather than building them from scratch



# SOA Tiers and Components

## Logical SOA Tiers and Components





# Service Definition

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- A service is a unit of work done by a service provider to achieve desired end results for a service consumer
- Both provider and consumer are roles played by software agents on behalf of their owners
  - An agent is a program acting on behalf of a person or organization



# Why do We Need a Service?

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- We want experts to do work for us
  - We are not experts in everything
- Consuming a service is usually cheaper and more effective than doing the work ourselves



# Full Service-Oriented Architecture

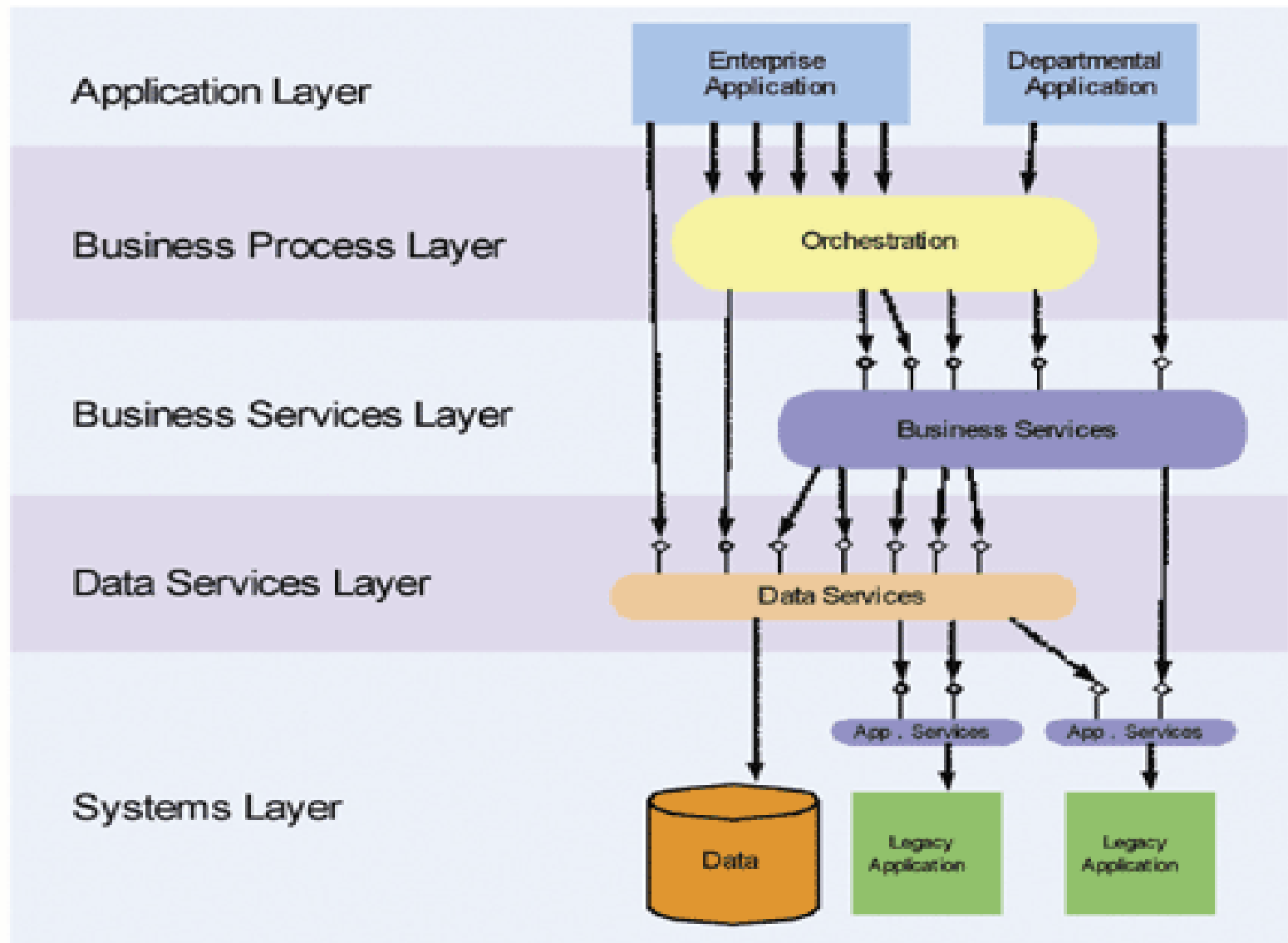


FIGURE 2 | Classic view of a robust SOA



# Deriving Web Services from SOA

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- A Web service is a SOA with at least the following additional constraints
  - Interfaces must be based on Internet protocols such as HTTP, FTP, and SMTP
  - Except for binary data attachment, messages must be in XML



# Two Styles of Web Services

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## □ SOAP web services

- Except for binary data attachment, messages must be carried by SOAP
- The description of a service must be in WSDL

## □ REST web services

- A REST web service is an SOA based on the concept of “resource”
- A resource is anything that has a URI



# SOAP Request

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```
<?xml version="1.0" encoding="UTF-8"?>
<soapenv:Envelope
xmlns:soapenv="http://schemas.xmlsoap.org/soap
/envelope/"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:ns1="http://duke.org/hello">
  <soapenv:Body>
    <ns1:hello>
      <name>John</name>
    </ns1:hello>
  </soapenv:Body>
</soapenv:Envelope>
```



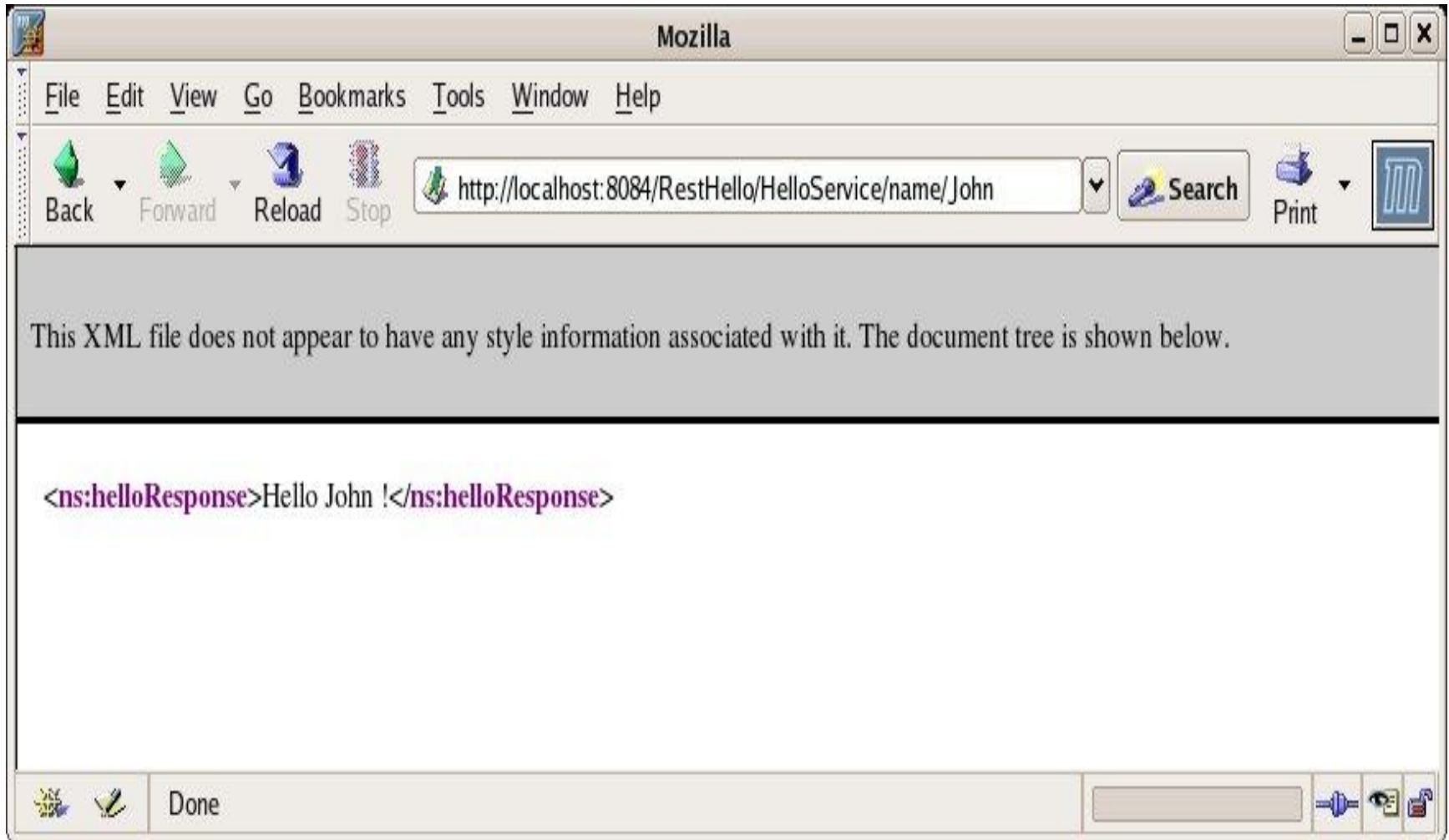
# SOAP Response

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```
<?xml version="1.0" encoding="UTF-8"?>
<soapenv:Envelope
xmlns:soapenv="http://schemas.xmlsoap.org/soap
/envelope/"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:ns1="http://duke.org/hello">
  <soapenv:Body>
    <ns1:helloResponse>
      <return>Hello John !</return>
    </ns1:helloResponse>
  </soapenv:Body>
</soapenv:Envelope>
```



# REST Client for REST Service





# Amazon Web Services

□ <http://aws.amazon.com>

The screenshot shows a browser window titled "Amazon Web Services - Bon Echo (Thai WBR Patch Beta4a)". The address bar contains "http://aws.amazon.com/". The page features the Amazon Web Services logo, a navigation menu with "About AWS", "Products", "Solutions", "Resources", "Support", and "Your Account", and a "Get Started" section with a "Sign Up Now" button. The main content area includes a "Welcome to the Cloud" message and a "News & Events" section with a table of recent updates.

**Welcome to the Cloud**  
Amazon Web Services makes cloud computing a reality for hundreds of thousands of customers looking for a cost-effective infrastructure to deploy highly scalable and dependable solutions.  
[Learn how you can benefit from cloud computing](#)

**Get Started**  
Sign up for a free AWS account.  
[Sign Up Now](#)

**Developers**  
Simply sign up & start developing in the cloud with these resources and tools:

- Technical Documentation
- Cloud Architectures Whitepaper (pdf)
- Amazon Machine Images
- AWS Community Forums

**Business Managers**  
Learn how Amazon Web Services enables you to reach business goals faster:

- AWS Solutions for Enterprise Customers
- Security Whitepaper (pdf)
- Case Studies & Customer Testimonials
- AWS Blog

**Explore Products**

- Infrastructure Services
  - Amazon Elastic Compute Cloud
  - Amazon SimpleDB
  - Amazon Simple Storage Service
  - Amazon Simple Queue Service
  - AWS Premium Support
- Payments, Billing, and E-Commerce
- On-Demand Workforce
- Web Search and Information

**News & Events**

What's New?	Media Coverage	Events
Sep 22, 2008	Oracle Products Licensed for Amazon Web Services	
Sep 18, 2008	New AWS Service Under Development for Content Delivery	
Sep 05, 2008	Amazon Web Services Security Whitepaper	
Sep 03, 2008	Announcing the AWS Start-Up Challenge - Win \$100,000 in Prizes	
Aug 25, 2008	Amazon SimpleDB Releases QueryWithAttributes	

[view all](#)



# Amazon Web Services List (1/2)

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## □ Infrastructure Services

- Amazon Elastic Compute Cloud
- Amazon SimpleDB
- Amazon Simple Storage Service
- Amazon Simple Queue Service
- AWS Premium Support

## □ Payments, Billing, and E-Commerce

- Amazon Flexible Payments Service
- Amazon DevPay
- Amazon Fulfillment Web Service



# Amazon Web Services List (2/2)

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- On Demand Workforce
  - Amazon Mechanical Turk
- Web Search and Information Services
  - Alexa Web Search
  - Alexa Web Information Service
  - Alexa Top Sites
  - Alexa Site Thumbnail



## Amazon Simple Storage Service (Amazon S3)

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- ❑ Amazon S3 is storage for the Internet. It is designed to make web-scale computing easier for developers.
- ❑ Amazon S3 provides a simple web services interface that can be used to store and retrieve any amount of data, at any time, from anywhere on the web
- ❑ It gives any developer access to the same highly scalable, reliable, fast, inexpensive data storage infrastructure that Amazon uses to run its web sites



# InfiniteBits :: FTP Access to Amazon S3

□ <http://www.infinitebits.info/>



## FTP Access to Amazon S3

InfiniteBits is the only FTP gateway to Amazon S3. Using our service, you can connect to your Amazon S3 account using any FTP client.

### Features

InfiniteBits also allows you to manage your S3 storage space exactly like a file system. It also gives you capabilities such as file splitting and renaming that are not available through native Amazon S3.

- Upload/download files and folders
- Move/rename files and folders
- Transfer files over 5GB
- Set public/private permissions on files
- Resume broken transfers
- Subaccounts to give your customers their own logins and private file areas

### Pricing

InfiniteBits is \$4.95 per month for 10GB transfer per month.

### See it in action

InfiniteBits is not a tool you download. It is an FTP gateway hosted by us. There is nothing to see; rather, you connect to us using your favorite FTP client. Our service routes your FTP commands over to your S3 account and performs the operations for you.



# InfiniteBits

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- InfiniteBits allows you to manage your S3 storage space exactly like a file system
  - Giving you capabilities that are not available through native Amazon S3
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# The History of the Term Web 2.0

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- Web 2.0 was originally coined by O'Reilly's Dale Dougherty
- It was to describe the forces behind the huge success of Internet companies and applications
  - Companies: Google, eBay, Amazon, iTunes
  - Applications: Wikipedia, BitTorrent



# What is Web 2.0?

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- Web 2.0 describes Web experiences that fundamentally engage users by
  - Allow them to participate in sharing information and enriching data freely
  - Readily offering their core functionality as open services to be composited or “mashed up” into new services and sites
  - Placing the Web at the center of the software experience both in terms of data location as well as where the software is



# Web 2.0 Architecture

## Web 2.0 Architecture

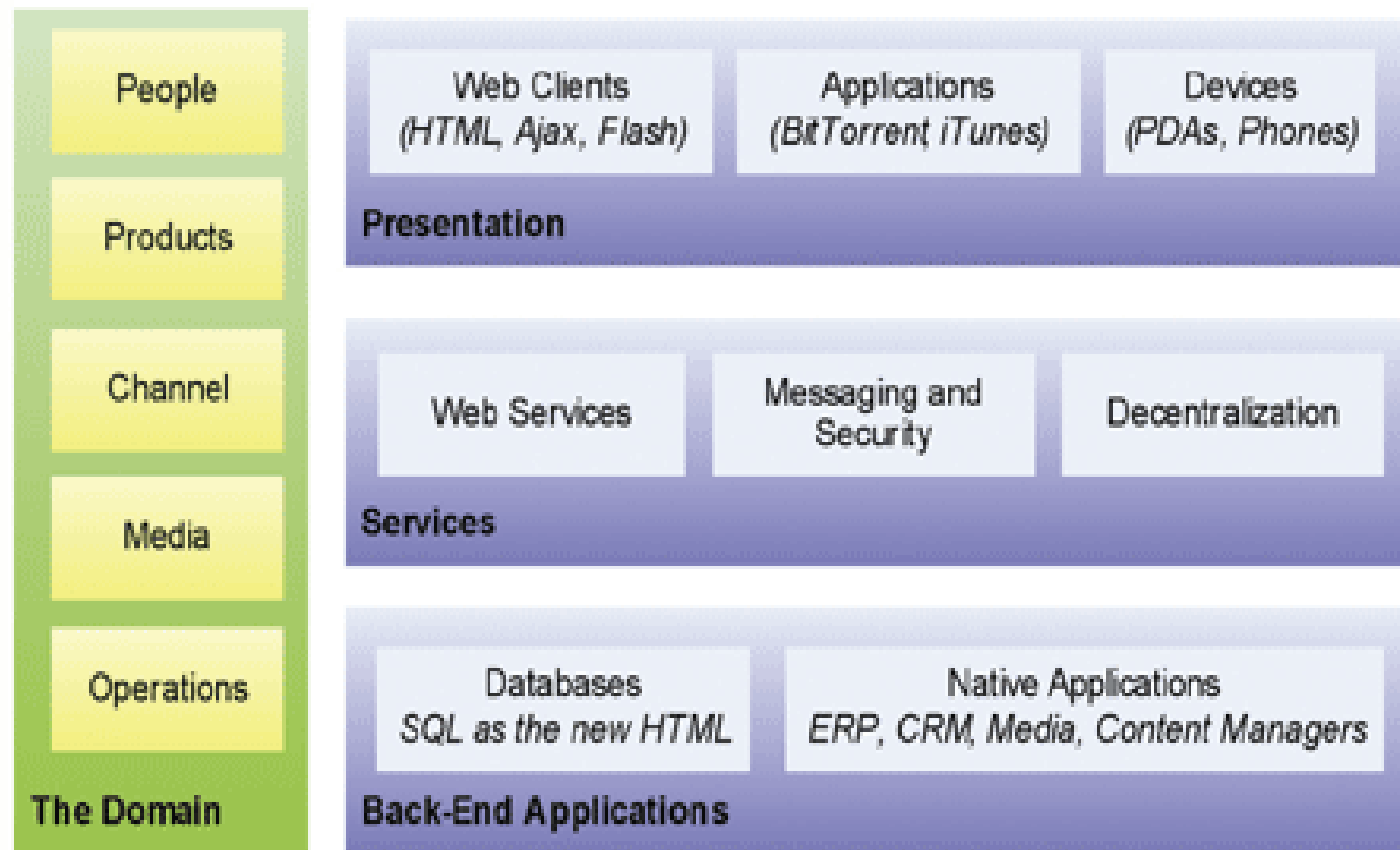


FIGURE 1 | One conceptual view of Web 2.0 architecture



# Web 2.0 Characteristics

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- Tim O'Reilly provides seven classic characteristics of Web 2.0 software
  - Web as platform
  - Harnessing collective intelligence
  - Data is the next Intel inside
  - End of the software release cycle
  - Lightweight programming models
  - Software above the level of a single device
  - Rich user experience



# Web as Platform

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- ❑ Software and services are now the same thing
- ❑ **The Web has become a computing platform** in its own right
- ❑ The Web is where most software is moving for cost, convenience, agility, and increased overall value



# Harnessing Collective Intelligence

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- The network effects of massive amounts of users make the collaborative Web a much more potent force than stand-alone software
- Online collaborative entities such as Wikipedia are a network effect of the **combined contributions of their users**
  - Classic example of Web 2.0



# Data is the Next Intel Inside

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- The core functionality of many modern information systems is not software
- It's the **valuable data** within the system that is actually more important
  - Google's search database
  - Amazon's products and associated reviews
- The data these sites possess are their real assets



# End of the Software Release Cycle

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- When software is on the Web, upgrading becomes a different experience
- Upgrades and improvements to service are **instantly available** and encouraged to be as **nondisruptive** as possible



# Lightweight Programming Models

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- When the clients of Web software are numerous and diverse
  - Complex standards can get in the way
- Web 2.0 leverages the easiest methods that work well
  - Lead to simpler services such as **REST** and **RSS** instead of SOAP and WS-\* standards



# Software Above the Level of a Single Device

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- PCs are an increasingly smaller aspect of the Web
- With so many **different devices** such as mobile phones, PDAs, and even digital video recorders becoming connected to the Web
  - Providing and consuming functionality and connectivity
- The software as a Service landscape of the Web now includes these in the picture



# Rich User Experiences

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- The Web has ceased to be about static Web pages
- They still exist, but they are much less important
- The AJAX browser application model is famously a Web 2.0 technique
  - Provide the **full interactive experience** of native applications to the user
  - Leveraging **XML Web services on the backend to provide access to data and services**



# The Rising of Internet Users

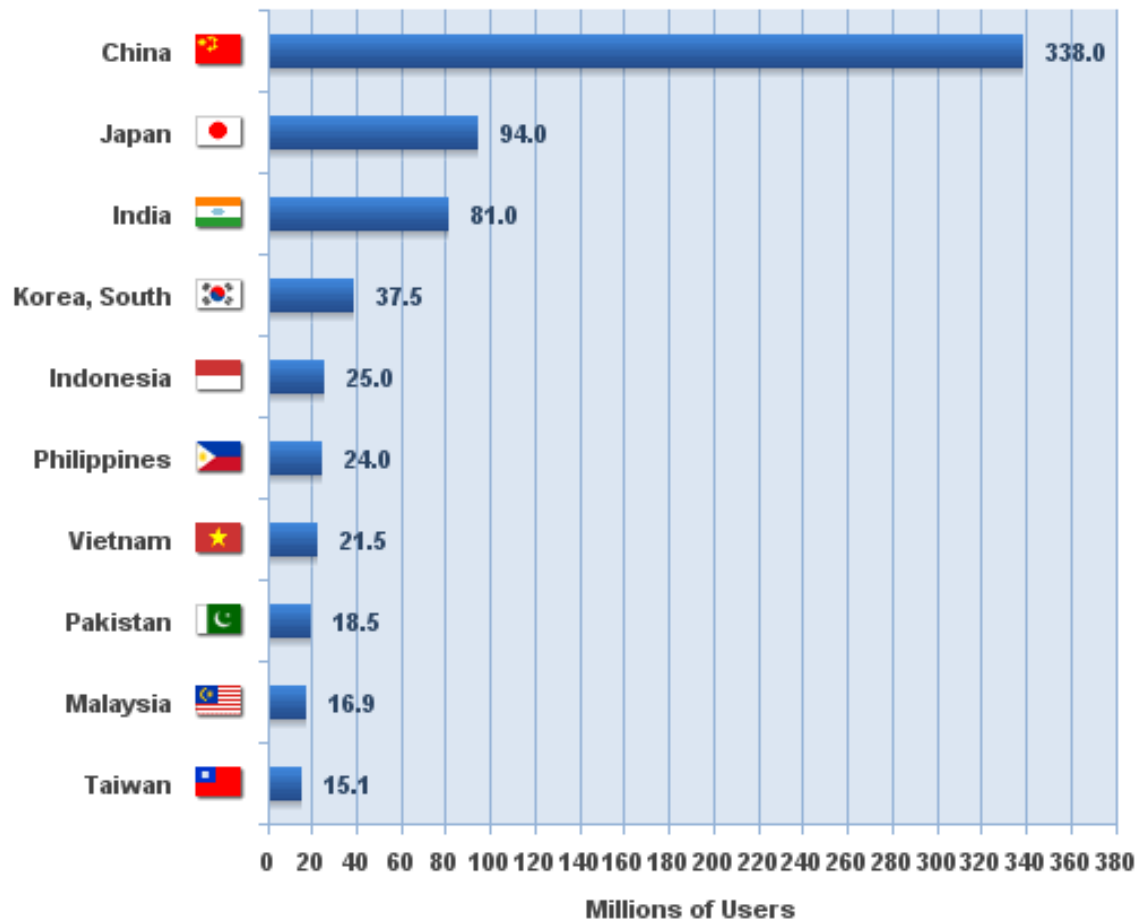
Internet Usage and World Population Statistics are for June 30, 2009

<b>WORLD INTERNET USAGE AND POPULATION STATISTICS</b>						
<b>World Regions</b>	<b>Population ( 2009 Est.)</b>	<b>Internet Users Dec. 31, 2000</b>	<b>Internet Users Latest Data</b>	<b>Penetration (% Population)</b>	<b>Growth 2000-2009</b>	<b>Users % of Table</b>
<a href="#"><u>Africa</u></a>	991,002,342	4,514,400	<b>65,903,900</b>	6.7 %	1,359.9 %	3.9 %
<a href="#"><u>Asia</u></a>	3,808,070,503	114,304,000	<b>704,213,930</b>	18.5 %	516.1 %	42.2 %
<a href="#"><u>Europe</u></a>	803,850,858	105,096,093	<b>402,380,474</b>	50.1 %	282.9 %	24.2 %
<a href="#"><u>Middle East</u></a>	202,687,005	3,284,800	<b>47,964,146</b>	23.7 %	1,360.2 %	2.9 %
<a href="#"><u>North America</u></a>	340,831,831	108,096,800	<b>251,735,500</b>	73.9 %	132.9 %	15.1 %
<a href="#"><u>Latin America/Caribbean</u></a>	586,662,468	18,068,919	<b>175,834,439</b>	30.0 %	873.1 %	10.5 %
<a href="#"><u>Oceania / Australia</u></a>	34,700,201	7,620,480	<b>20,838,019</b>	60.1 %	173.4 %	1.2 %
<b>WORLD TOTAL</b>	6,767,805,208	360,985,492	<b>1,668,870,408</b>	<b>24.7 %</b>	362.3 %	100.0 %



# Asia Top 10 Internet Countries

## Asia Top 10 Internet Countries - 2009 Q2



Thailand has 13,416,000 (20.3%) Internet Users



# SEOmоз's Web 2.0 Awards 2008

## Category: Bookmarking

<http://del.icio.us>

The screenshot shows a browser window titled "Delicious - Bon Echo (Thai WBR Patch Beta4a)" with the address bar set to "http://del.icio.us". The page features the "delicious social bookmarking" logo and navigation buttons for "Join Now" and "Sign In". A main banner reads "All your stuff in one place. Get to your bookmarks from any computer, anytime, anywhere." Below this is a search bar with the text "Search the biggest collection of bookmarks in the universe..." and a "Search Delicious" button. The "Popular Bookmarks" section lists three items:

- "20 sitios para aprender CSS" with 87 bookmarks and tags: css, webdesign, tutorial, web, diseño.
- "In Depth: 8 hacks to make Firefox ridiculously fast | PCAnswers" with 102 bookmarks and tags: firefox, hacks, tweaks, performance, howto.
- "Dirty Secret Of The Bailout: Thirty-Two Words That None Dare Utter" with 81 bookmarks and tags: politics, economics, bailout, economy, corruption.

A "Popular Tags" sidebar on the right lists: design, blog, video, software, tools, music, programming, webdesign, reference, tutorial. A notification at the top right states "New bookmarks saved in the last minute: 170".



# SEOMoz's Web 2.0 Awards 2008

## Category: Employment and Jobs

### Newest Job Posts

#### Web Developer-B2B

WhyCleveland, Inc. | Cleveland, OH

### Standout News

Rainbow USA Saves More Than \$125,000 with Standout Jobs



# Comparison of Web 2.0 and SOA Concepts

	Web 2.0	SOA
Service Model	Web services	Web services
Perferred Service Standards	HTTP, XML, RSS, REST	WSDL, UDDI, SOAP, BPEL, WS-*



# Comparison of Web 2.0 and SOA Concepts

	Web 2.0	SOA
Composition Mechanisms	Web server aggregation (remixing, mash-ups)	Orchestration, coordination, service wrapping
Reusability	Yes, very	Yes, somewhat
User Interface	Yes, explicit with AJAX and emphasis on RIAs	No, implicit



# Comparison of Web 2.0 and SOA Concepts

	Web 2.0	SOA
Architectural Principles	<ul style="list-style-type: none"><li>❑ Enhancement by extension</li><li>❑ Autonomy</li><li>❑ Radical Test</li><li>❑ Participation</li><li>❑ Loose Coupling</li><li>❑ Reusability</li><li>❑ Personalization</li></ul>	<ul style="list-style-type: none"><li>❑ Autonomy</li><li>❑ Statelessness</li><li>❑ Service Contracts</li><li>❑ Interface First Design</li><li>❑ Loose Coupling</li><li>❑ Consumability</li><li>❑ Discoverability</li></ul>



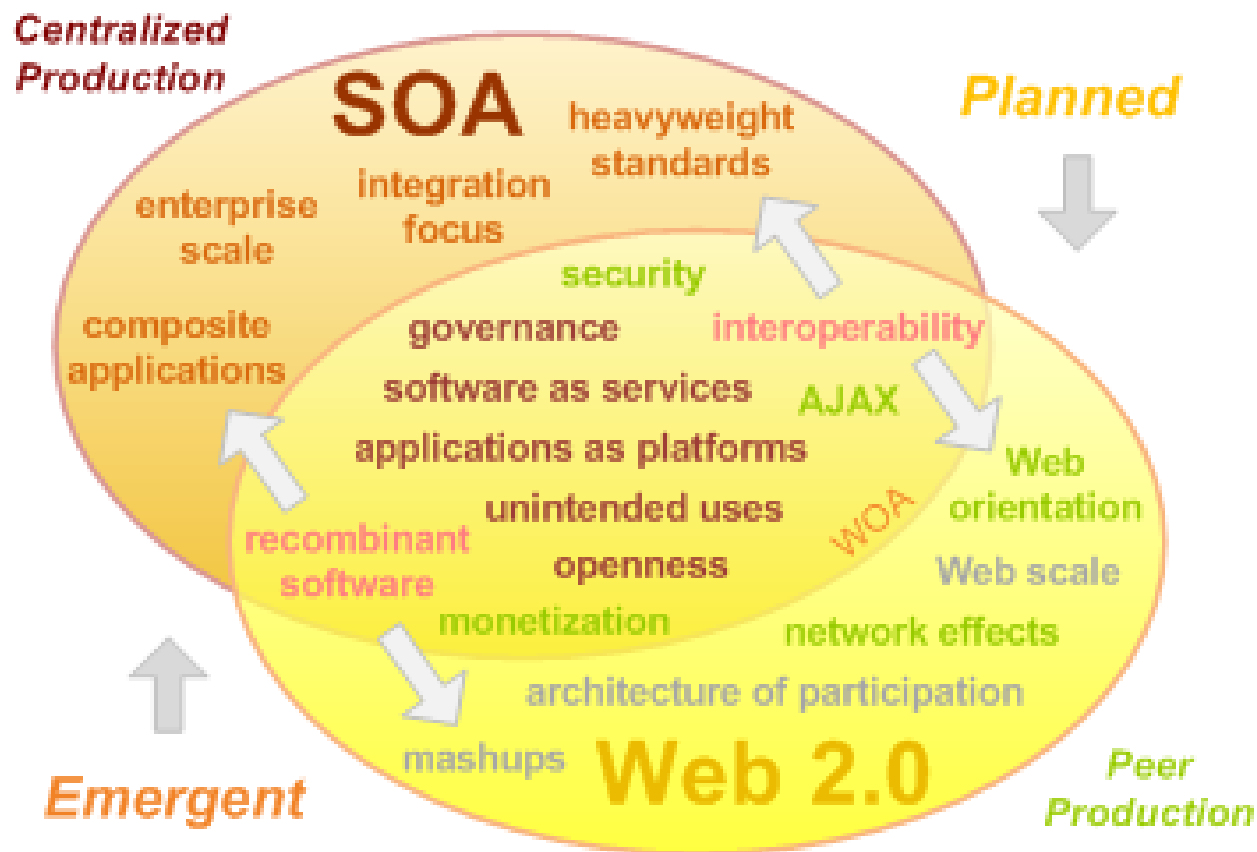
# Comparison of Web 2.0 and SOA Concepts

	Web 2.0	SOA
Core Competencies	<ul style="list-style-type: none"><li>❑ Software as a Service,</li><li>❑ Control over data sources</li><li>❑ Trusting users as co-developers</li><li>❑ Harnessing collective intelligence</li></ul>	<ul style="list-style-type: none"><li>❑ Functional encapsulation</li><li>❑ Data as an asset</li><li>❑ System and data integration</li><li>❑ B2B self-service</li><li>❑ Open standards</li></ul>



# SOA and Web 2.0

## The Two Top-Level Organizing Principles in Modern Software Continue to Converge





# SOA vs. Web 2.0

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## □ What SOA and Web 2.0 Shares

- Open access via standards.
- Embrace Web services
- Encourage composition and reuse

## □ What SOA and Web 2.0 Differs

- SOA usually has a more complex, hard-wired service model
- Web 2.0 encourages simpler, malleable forms with clear overlap in the middle.



# Connections between Web 2.0 and SOA

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- Web 2.0 can indeed be conceptualized as a Global SOA
  - Already ousting millions of services and thousands of composite applications
- Businesses that are currently implementing SOA will need to connect their Web-facing apps to their internal SOAs
  - Further use and composition by their business partners and customers



## How Web 2.0 and SOA Complete Each Other

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- Web 2.0 emphasizes a social aspect that SOA is completely missing
  - Web 2.0 talks about presentation and the front end is displayed to the user
  - SOA is largely silent on the issue of presentation, though it admits its existence
- SOA has much more central configuration control while Web 2.0 has no command and control structure



# Web 2.0 and SOA Conclusion

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- Web 2.0 is really the Global SOA available to the whole world today
- Web 2.0 will also be connected to your local SOA in ways you will need
- Be prepared to leverage Web 2.0 and SOA and reap the benefits of these emerging mindsets and toolkits



# Enterprise Mashups in the Web 2.0 Era

## Enterprise Mashups in the Web 2.0 Era:

Adding a social and business  
context to the "Global SOA"





# References (1/2)

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