

Web Services –  
Amazon Ecommerce Service,  
Comparisons among Web Services

SIV851 – Special Module on e-governance

Dept. Of Comp. Sc. and Engineering,

IITD

Semester I, 2023

# Web Programming: Web Services

2 parts:

(i) Client – Side

XML, XHTML, Javascript, CSS

(i) Server – Side

(a) PHP, Ajax, Java, JSP, Web-database

(b) Web Services



# Today

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- Web Services – Introduction
- “Remote Procedure Call” in WS
  - Binding, Marshalling...
- Using TCP as the transport for RPCs
  - Connectivity Issues: NAT, Firewall



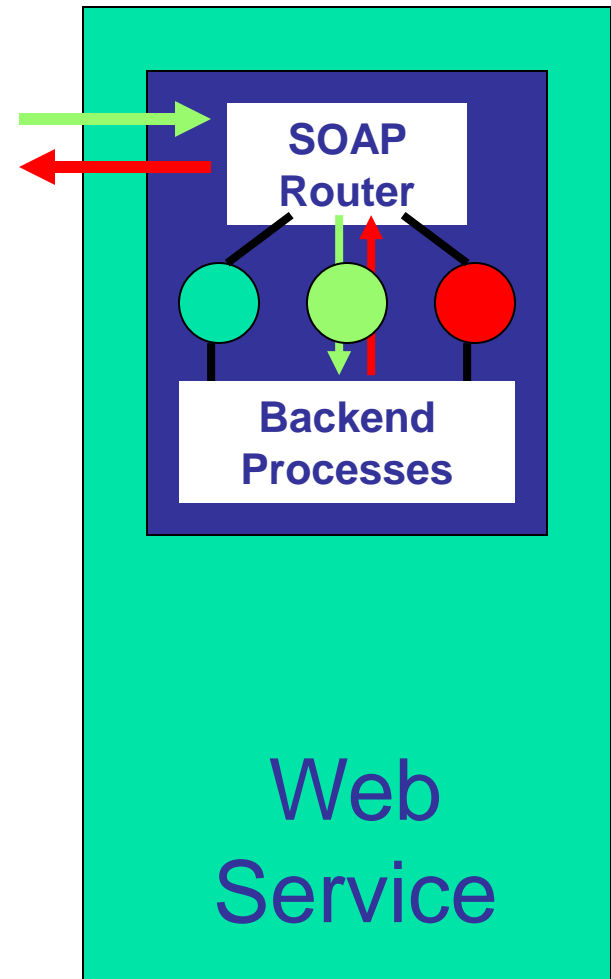
# What are Web Services?

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- Today, we normally use Web browsers to talk to Web sites
  - Browser names document via URL (lots of fun and games can happen here)
  - Request and reply encoded in HTML, using HTTP to issue request to the site
- Web Services generalize this model so that computers can talk to computers

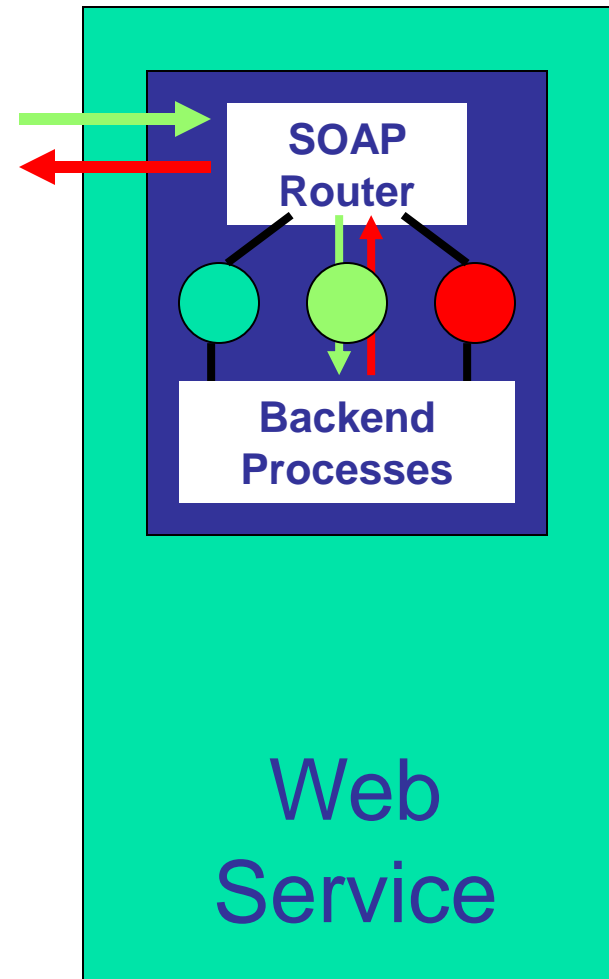
# What are Web Services?

Client System



# What are Web Services?

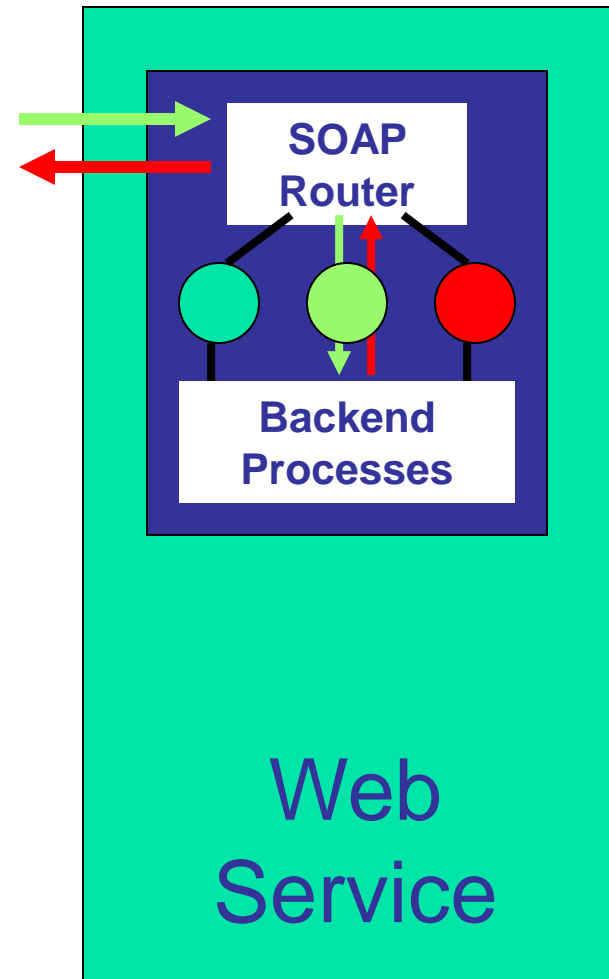
- “Web Services are software components described via WSDL which are capable of being accessed via standard network protocols such as SOAP over HTTP.”



# What are Web Services?

- "Web Services are software components described via WSDL which are capable of being accessed via standard network protocols such as SOAP over HTTP."

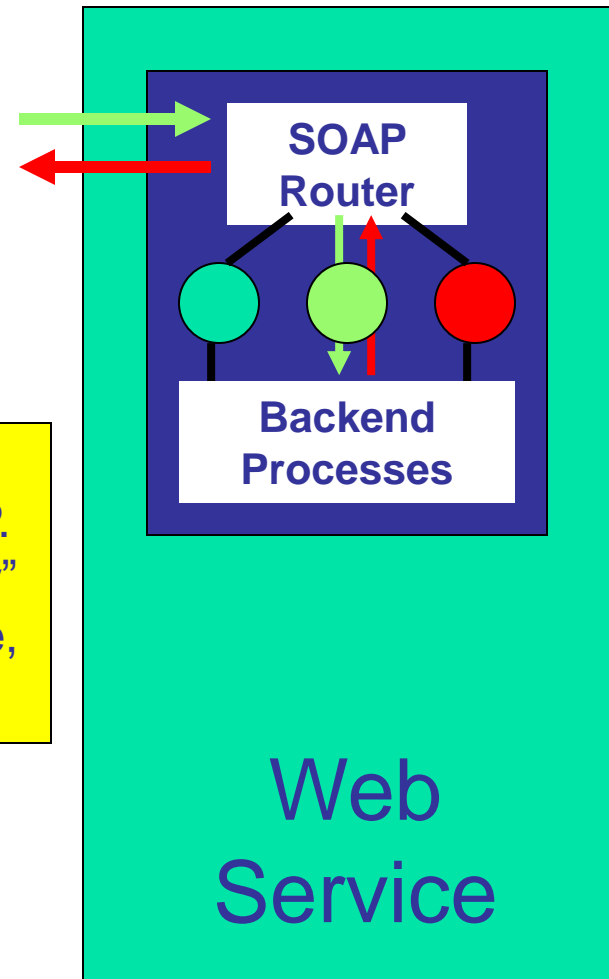
Today, SOAP is the primary standard. SOAP provides rules for encoding the request and its arguments.



# What are Web Services?

- “Web Services are software components described via WSDL which are capable of being accessed via standard network protocols such as SOAP over HTTP.”

Similarly, the architecture doesn't assume that all access will employ HTTP over TCP. In fact, .NET uses Web Services “internally” even on a single machine. But in that case, communication is over COM

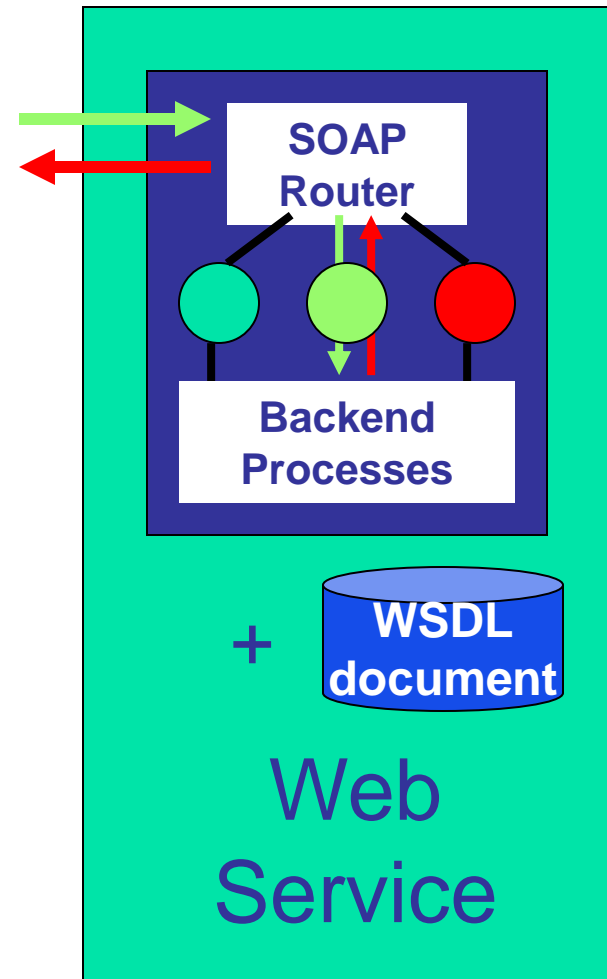




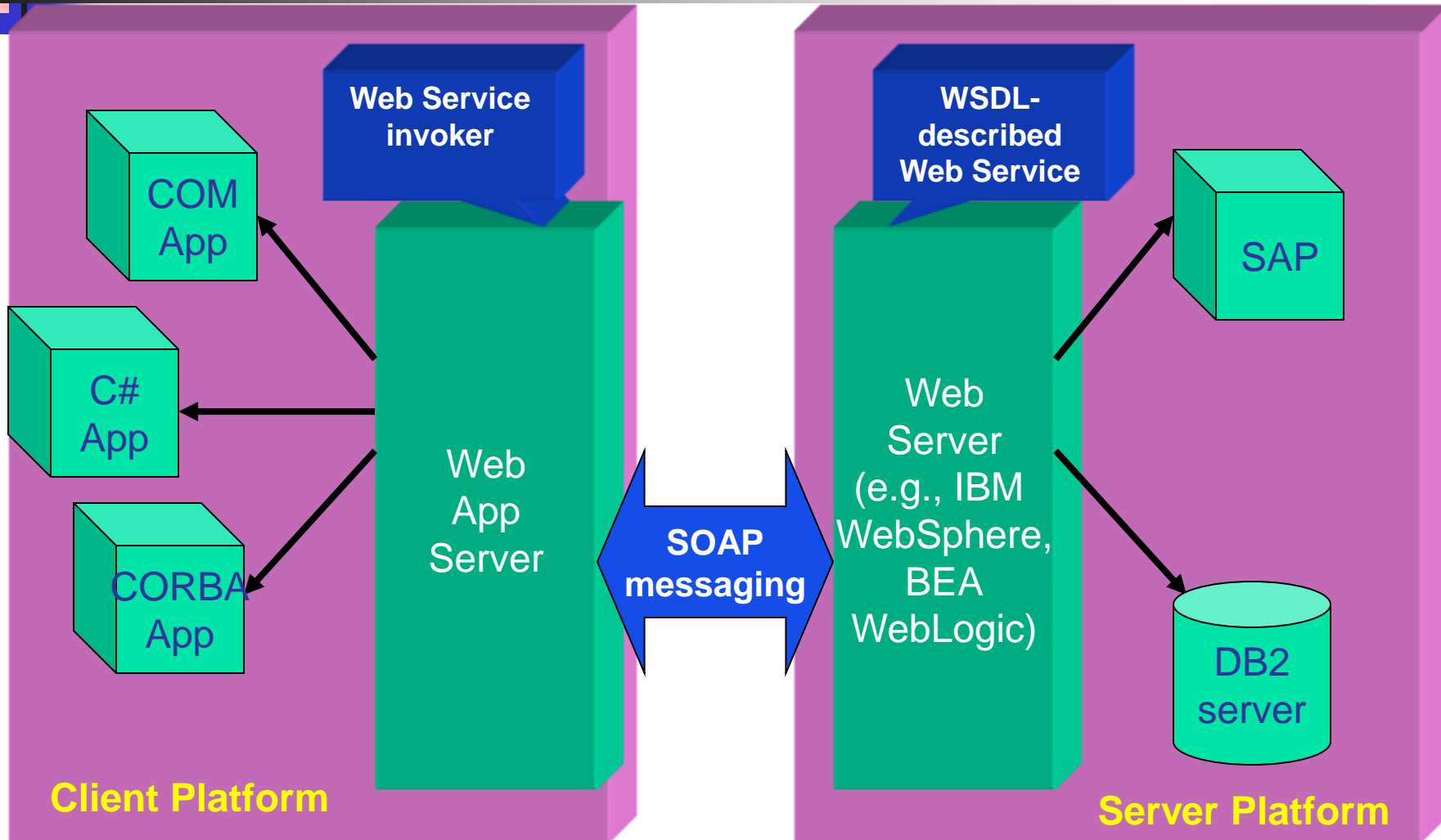
# What are Web Services?

- "Web Services are software components described via WSDL which are capable of being accessed via standard network protocols such as SOAP or HTTP."

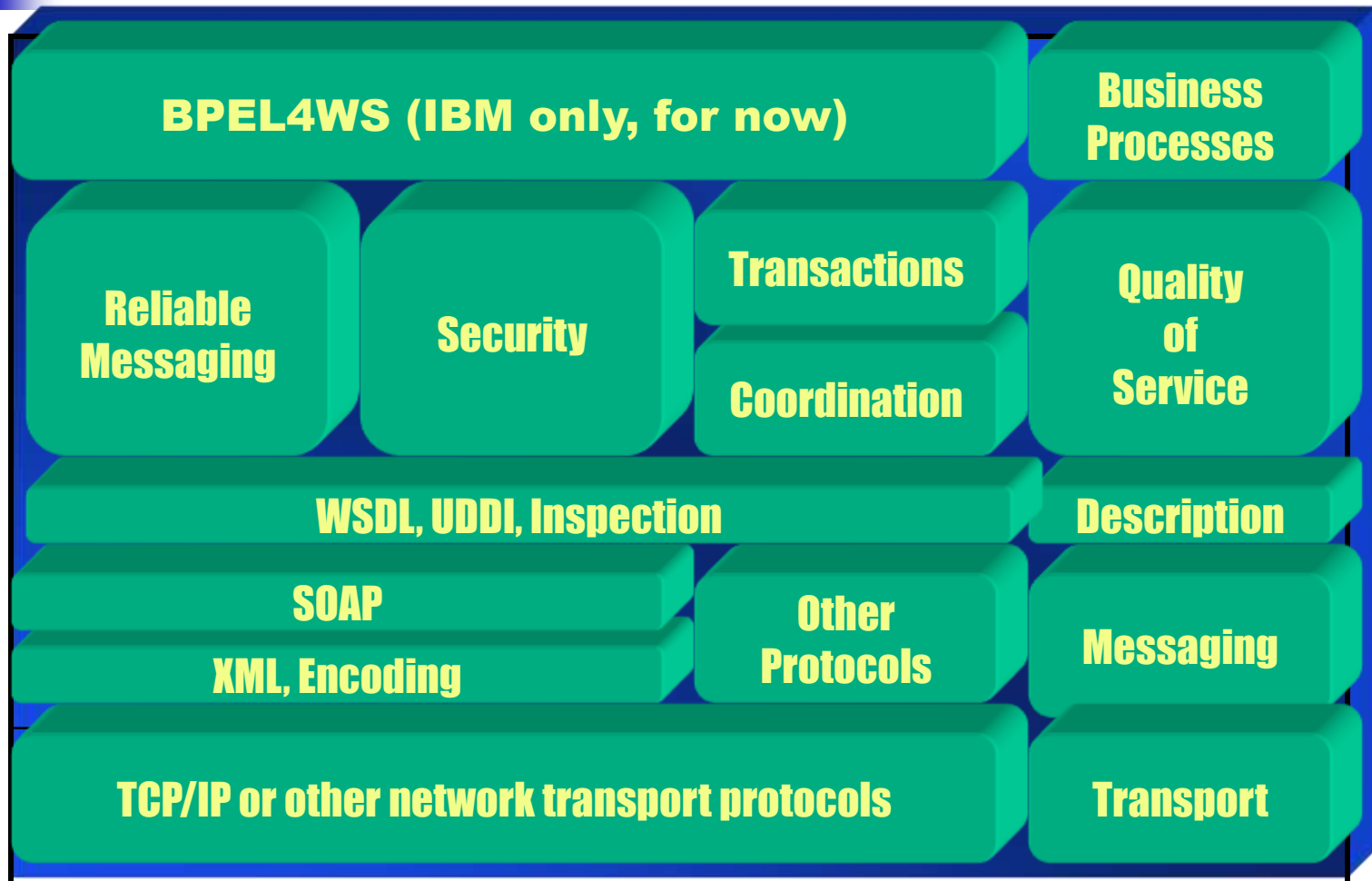
WSDL documents are used to drive object assembly, code generation, and other development tools.



# Web Services are often Front Ends



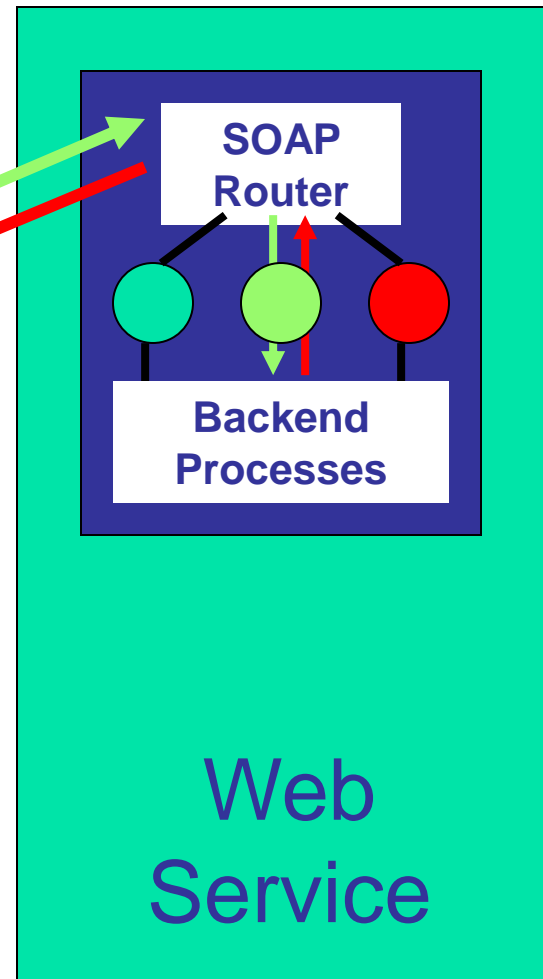
# The Web Services "stack"



# What are Web Services?

- Amazon would hand out "serverlets" for 3<sup>rd</sup> party developers to use
- This connects their applications directly to Amazon's system

serverlet





# Advantages of web services?\*

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- Web services provide interoperability between various software applications running on various platforms.
  - “vendor, platform, and language agnostic”
- Web services leverage open standards and protocols. Protocols and data formats are text based where possible
  - Easy for developers to understand what is going on.
- By piggybacking on HTTP, web services can work through many common firewall security measures without requiring changes to their filtering rules.

\*: From Wikipedia



# How Web Services work

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- First the client *discovers* the service.
  - More in next lecture!
- Typically, client then *binds* to the server.
  - By setting up TCP connection to the discovered address .
  - But binding not always needed.



# How it works...

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- Next build the SOAP request: (*Marshaling*)
  - Fill in what service is needed, and the arguments. Send it to server side.
  - XML is the standard for encoding the data (but is very verbose and results in HUGE overheads)
- SOAP router routes the request to the appropriate server (assuming more than one available server)
  - Can do load balancing here.



## How it works...

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- Server unpacks the request, (*Demarshaling*) handles it, computes result.
- Result sent back in the reverse direction: from the server to the SOAP router back to the client.





# Marshalling Issues

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- Data exchanged between client and server needs to be in a platform independent format.
  - “Endian”ness differ between machines.
  - Data alignment issue (16/32/64 bits)
  - Multiple floating point representations.
  - Pointers
  - (Have to support legacy systems too)



# Discovery

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- This is the problem of finding the “right” service
  - In our example, we saw one way to do it – with a URL
  - Web Services community favors what they call a URN: Uniform Resource Name
- But the more general approach is to use an intermediary: a discovery service



# Example of a repository

Name	Type	Publisher	Toolkit	Language	OS
<a href="#">Web Services Performance and Load Tester</a>	Application	<a href="#">LisaWu</a>		N/A	Cross-Platform
<a href="#">Temperature Service Client</a>	Application	<a href="#">vinuk</a>	<a href="#">Glue</a>	Java	Cross-Platform
<a href="#">Weather Buddy</a>	Application	<a href="#">rdmgh724890</a>	<a href="#">MS .NET</a>	C#	Windows
<a href="#">DreamFactory Client</a>	Application	<a href="#">billappleton</a>	<a href="#">DreamFactory</a>	Javascript	Cross-Platform
<a href="#">Temperature Perl Client</a>	Example Source	<a href="#">gfinke13</a>		Perl	Cross-Platform
<a href="#">Apache SOAP sample source</a>	Example Source	<a href="#">xmethods.net</a>	<a href="#">Apache SOAP</a>	Java	Cross-Platform
<a href="#">ASS 4</a>	Example Source	<a href="#">TVG</a>	<a href="#">SOAPLite</a>	N/A	Cross-Platform
<a href="#">PocketSOAP demo</a>	Example Source	<a href="#">simonfell</a>	<a href="#">PocketSOAP</a>	C++	Windows
<a href="#">easysoap temperature</a>	Example Source	<a href="#">a00</a>	<a href="#">EasySoap++</a>	C++	Windows
<a href="#">Weather Service Client with MS- Visual Basic</a>	Example Source	<a href="#">oglimmer</a>	<a href="#">MS SOAP</a>	Visual Basic	Windows
<a href="#">TemperatureClient</a>	Example Source	<a href="#">jgalyan</a>	<a href="#">MS .NET</a>	C#	Windows



# Repository summary

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- A database listing servers
- Each is described using the UDDI language, which is defined over XML
  - Hence can be searched with XML queries
- An extensible standard
  - Defines some required information about interfaces available and argument types, etc
  - But services can provide extra information too.

## Web Services

- Remote Procedure Call ( RPC ) –  
Procedure A calls another procedure B on a different computer system
- A) LAN based
- B) ( LAN + Internet ) based →  
Grid Computing
- C) Web based → **Web Services**

# Examples of Web Services:

- 1. Google Health
- 2. Microsoft Health Vault
- 3. Dossia
- (Non-profit Consortium of Major Employers)
- 4. Map Services: Google Maps API, Yahoo, MS
- 5. Amazon – AWS
- 6. Yahoo
- 7. many others

# Applications

- 1. Google Maps API-
- Open a map location, click on selected objects (Post Offices) → there is an API that allows one to download the X,Y Coordinates in a File
- 2. Use Postgres (GIS) or Oracle Spatial, or IBM DB2 (spatial) → queries on maps
- 3. Use Google coordinates to locate a new MAP.

# Examples of Web Services (AWS)

1. Motivation
2. Amazon E-Commerce Service (ECS)?
  - What is ECS?
  - How to use?
3. Summary



# 1. Motivation

- Existing Web services
- (Amazon, Google, Yahoo, More . . .)
- Examples of connecting to Web services.
  
- Topic 1:
  - **Amazon's Web Service (ECS)**

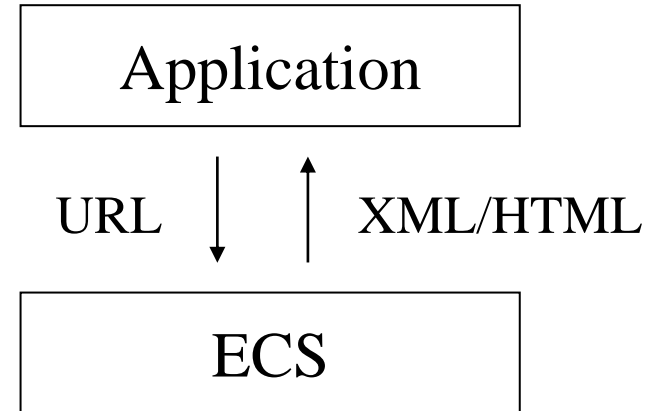
## 2. Amazon E-Commerce Service (ECS)

- Web Service -> can retrieve goods
- (Books, DVD, Software, Toys, more . )
- information provided by Amazon.com
  
- ECS is now used in 6 countries:
- USA, UK, Germany, Japan, France, Canada

## 2-1. Two ways for using ECS

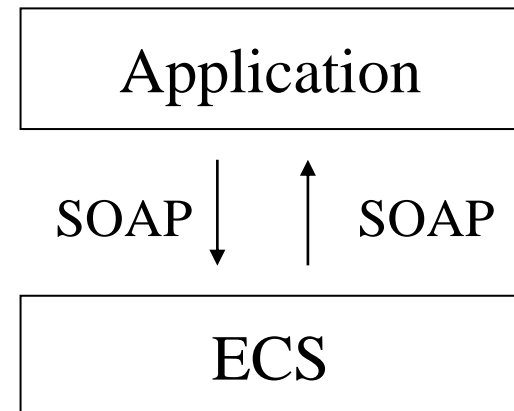
- **REST** [2] ← Used this time

- Request: URL + Parameter
- Response: XML/HTML



- **SOAP**

- Request: SOAP (XML)
- Response: SOAP (XML)



## 2-2. Access Key ID Acquisition

1. Visit the following site to get “Access Key ID”
  - <https://aws-portal.amazon.com/gp/aws/developer/registration/index.html>
2. You will receive an email that A.K.ID is attached
3. You will be able to get A.K.ID
  - Example (mine): **0HT4JR7X5STKFMNT3YR2**

## 2-3. Request Message Composition

`http://webservices.amazon.com/onca/xml?`

`Service=AWSECommerceService&` ← Use ECS (fixed)

`Operation=ItemSearch&` ← Search Goods Information

`SubscriptionId=0HT4JR7X5STKFMNT3YR2&` ← A. K. ID

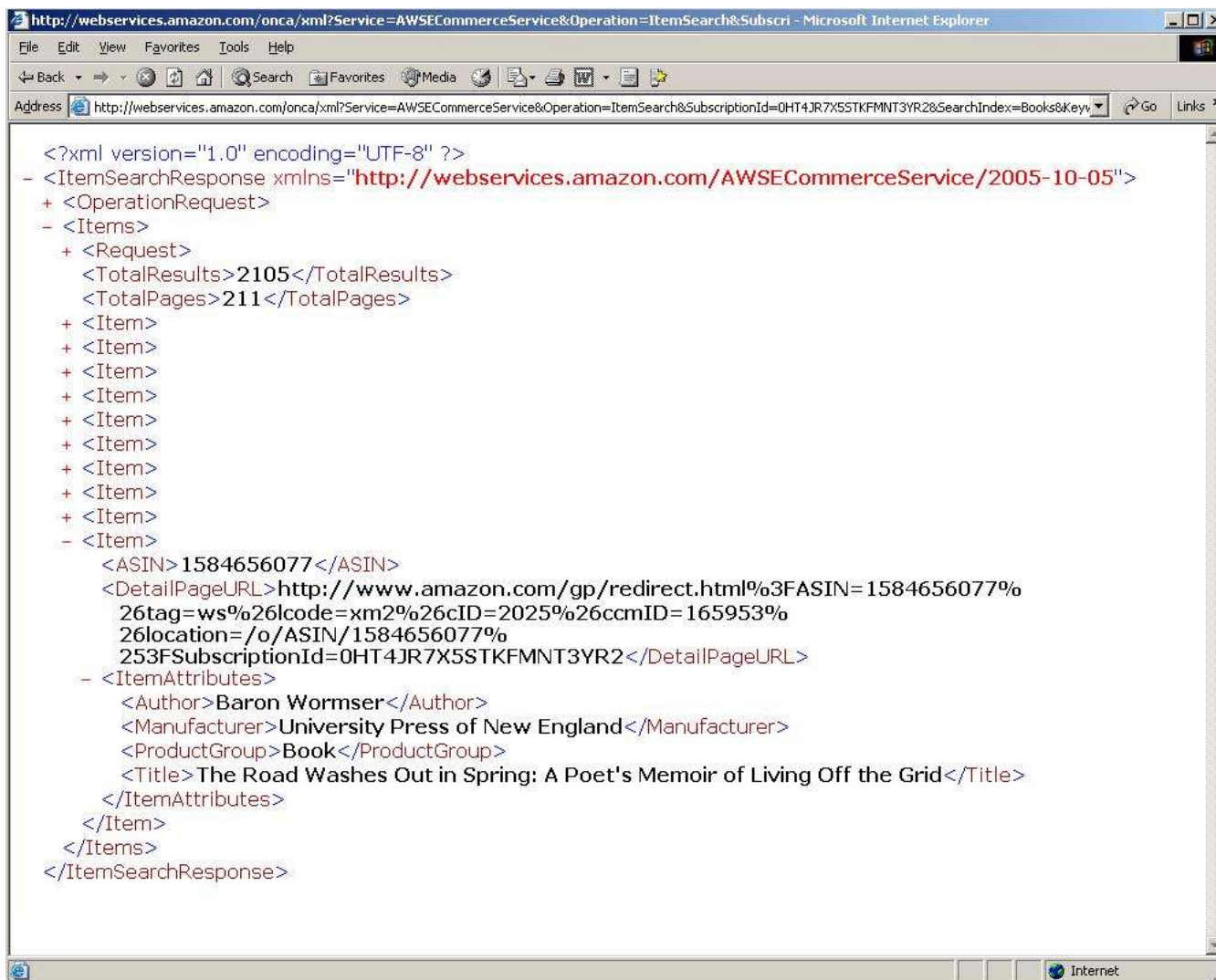
`SearchIndex=Books&` ← Search Target

`Keywords=GRID&` ← Keyword

`ContentType=text/xml` ← Output format (XML)

※ Linefeed must be eliminated when you use this.

## 2-4. Response Message Example



```
<?xml version="1.0" encoding="UTF-8" ?>
- <ItemSearchResponse xmlns="http://webservices.amazon.com/AWSECommerceService/2005-10-05">
+ <OperationRequest>
- <Items>
+ <Request>
  <TotalResults>2105</TotalResults>
  <TotalPages>211</TotalPages>
+ <Item>
+ <Item>
+ <Item>
+ <Item>
+ <Item>
+ <Item>
+ <Item>
+ <Item>
+ <Item>
+ <Item>
- <Item>
  <ASIN>1584656077</ASIN>
  <DetailPageURL>http://www.amazon.com/gp/redirect.html%3FASIN=1584656077%
    26tag=ws%26code=xm2%26cID=2025%26ccmID=165953%
    26location=/o/ASIN/1584656077%
    253FSubscriptionId=0HT4JR7X5STKFMNT3YR2</DetailPageURL>
- <ItemAttributes>
  <Author>Baron Wormser</Author>
  <Manufacturer>University Press of New England</Manufacturer>
  <ProductGroup>Book</ProductGroup>
  <Title>The Road Washes Out in Spring: A Poet's Memoir of Living Off the Grid</Title>
</ItemAttributes>
</Item>
</Items>
</ItemSearchResponse>
```

## 2-5. Request Parameters (1)

<http://webservices.amazon.com/onca/xml?Service=AWSECommerceService&Operation=>

●	Notes
ItemSearch	Search Goods Information
ItemLookup	Acquire Goods Information
SimilarityLookup	Search related product

## 2-5. Request Parameters (2)

<http://webservices.amazon.com/onca/xml?Service=AWSECommerceService&Operation=ItemSearch&SubscriptionId=0HT4JR7X5STKFMNT3YR2&SearchIndex=●>

●	Notes
Blended	All goods
Books	-
DVD	-
Software	-
Toys	-



## 2-5. Request Parameters (3)

<http://webservices.amazon.com/onca/xml?Service=AWSECommerceService&Operation=ItemSearch&SubscriptionId=0HT4JR7X5STKFMNT3YR2&SearchIndex=Books&Keywords=GRID&Content Type=●>

●	Notes
text/xml	XML response
text/html	HTML response

## 2-5. Request Parameters (4)

`http://webservices.amazon.com/onca/xml?Service=AWSECommerceService&Operation=ItemSearch&SubscriptionId=0HT4JR7X5STKFMNT3YR2&SearchIndex=Books&Keywords=GRID&ContentType=text/xml&ResponseGroup=●,●,●...`

<b>●</b>	<b>Notes</b>
Images	Goods Image URL
EditorialReview	Manufacturer comment
Reviews	Customer comment
SalesRank	Ranking
BrowseNodes	Category
Similarities	Related Product

### 3. Summary

- Amazon's Web Service can be used by specifying URL.
- Exercise (please try later)
  - **ECS using SOAP**

# References

- [1] Amazon Web Service, <http://aws.amazon.com>
- [2] Roy Thomas Fielding, “Architectural Styles and the Design of Network-based Software Architectures”, 2000, <http://www.ics.uci.edu/~fielding/pubs/dissertation/top.htm>
- [3] ...

## 2-2. Products provided by Amazon.co.jp

- Japanese Books (Slide #)
- English Books
- Electric appliance
- Consumer electronics
- Music CD
- VHS
- DVD
- Software
- Toys
- Video games

**All of these product information can be retrieved by using ECS.**

## 3-1. REST vs. SOAP (1)

- The advantages of using REST
  - Easy to build (no toolkits required)
  - Lightweight (no extra information described)
- The disadvantages of using REST
  - Only HTTP can be used.
  - Secure messaging is not established.

## 3-2. REST vs. SOAP (2)

- The advantages of using SOAP
  - Several protocols can be applied. (HTTP, FTP, SMTP, etc.)
  - Secure messaging (an XML is enveloped)
- The disadvantages of using SOAP
  - Difficult to use (Require toolkits)

## 4. Summary

- ECS can be implemented by two ways: REST and SOAP
- ECS allows users to retrieve product information provided by Amazon.



# Study – Case 2 (Google and other WSs)

1. Development Environment Building
2. Google AJAX Search API
3. Amazon E-Commerce Service
4. Yahoo! Web Service
5. How to integrate?
6. Summary

# 1. Development Environment

- Windows 10
- Apache 2.0.5
- PHP 5.1.4
  - For using Amazon and Yahoo Web Service
- JavaScript
  - For using Google Web Service

# Install Flow

## 1. Install Apache

- <http://httpd.apache.org/>

## 2. Install PHP (ver. – compatible with Apache)

- <http://www.php.net/downloads.php>

## 3. Modify php.ini

- This is initialize setup for PHP.
- This setting makes a program access WSDL file from your computer or standardize character encoding.
- C:\WINNT\php.ini (This is case of old Windows OS)

## 2. Google AJAX Search API

- Google AJAX Search API is a **JavaScript library** that allows users to embed Google Search in web pages or web applications.
- Google AJAX Search API provides
  - Web Search
  - Local Search
  - Video Search
  - Blog Search
  - News Search
  - Book Search.

# More Details

- Yahoo! Developer Network  
(USA) :<http://developer.yahoo.com/>
- Yahoo! Developer Network  
(Japan) :<http://developer.yahoo.co.jp/>
- – Tutorial for web search, image search, movie search  
and some other service is available.
- – Also, sample codes for other programming language  
such as JavaScript and Python are available.

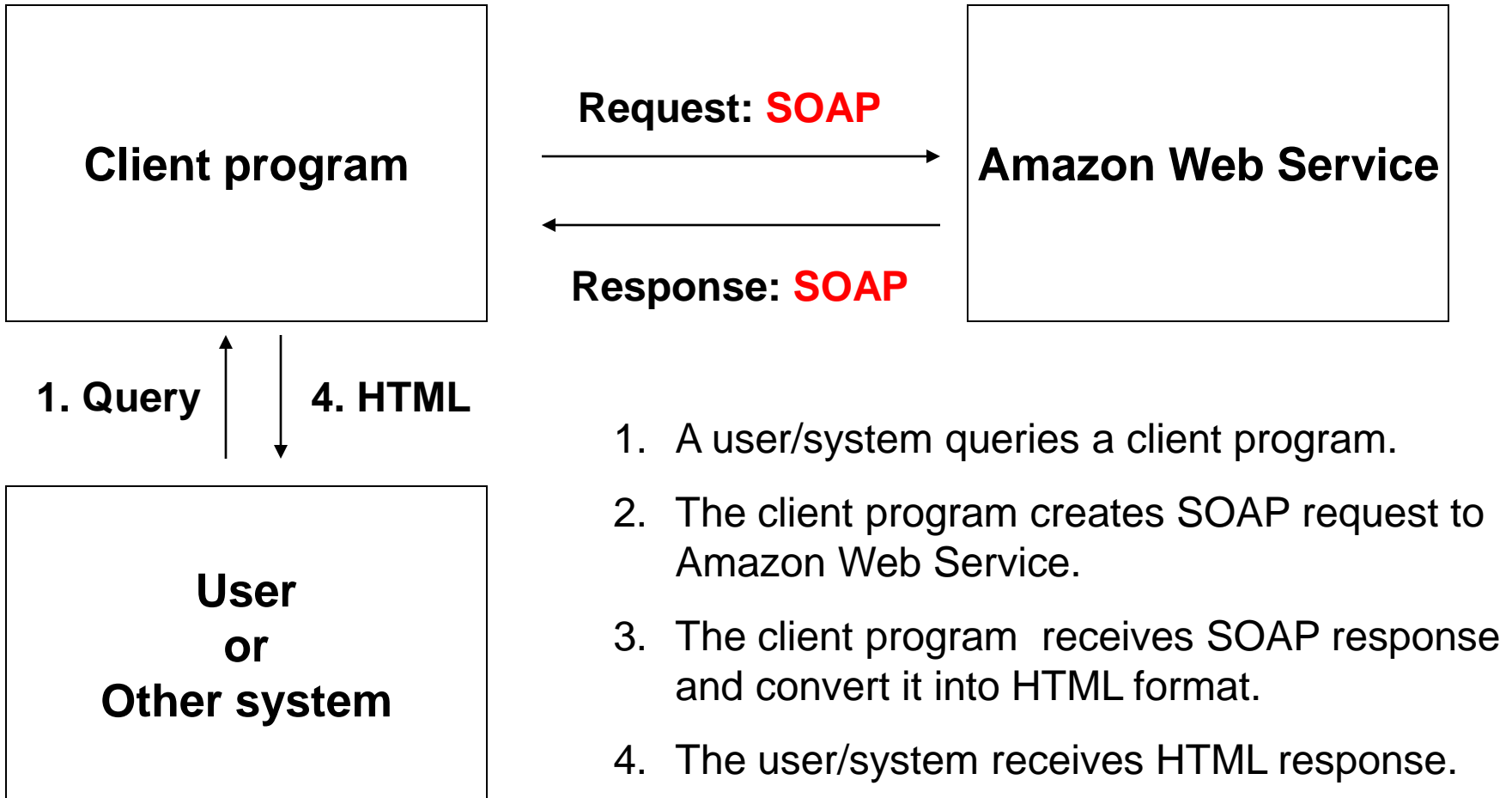
# 4. Amazon E-Commerce Service

- Amazon E-Commerce Service enables users to retrieve product information provided by Amazon.com
- Product information includes:
  - Japanese Books
  - English Books
  - Electric appliance
  - Consumer electronics
  - Music CD
  - VHS
  - DVD
  - Software
  - Toys
  - Video games, etc.

# How to use?

1. Get **Access Key ID**:
  - <https://aws-portal.amazon.com/gp/aws/developer/registration/index.html>
2. Receive email attaching Access Key ID
3. Make programs using the Access Key ID

# Overview



1. A user/system queries a client program.
2. The client program creates SOAP request to Amazon Web Service.
3. The client program receives SOAP response and convert it into HTML format.
4. The user/system receives HTML response.



# example



Mozilla Firefox  
http://localhost/Amazon/showAmazonSearchResult.php

  
10日でおぼえるXML入門教室 第2版

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XMLマスター教科書 ベーシックV2

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XQuery+XMLデータベース入門 DB2 9無償版で実感するXML DB用標準クエリー言語の基本

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DB(ディービー)マガジン 2007年04月号 [雑誌]

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XMLデータベース入門以前

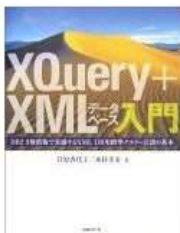
System tray: 日本語, 音量, 電源, 100%



[10日でおぼえるXML入門教室 第2版](#)



[XMLマスター教科書 ベーシックV2](#)



[XQuery+XMLデータベース入門 DB2 9無償版で実感するXML DB用標準クエリー言語の基本](#)



[DB \(ディービー\) マガジン 2007年 04月号 \[雑誌\]](#)



# More Details

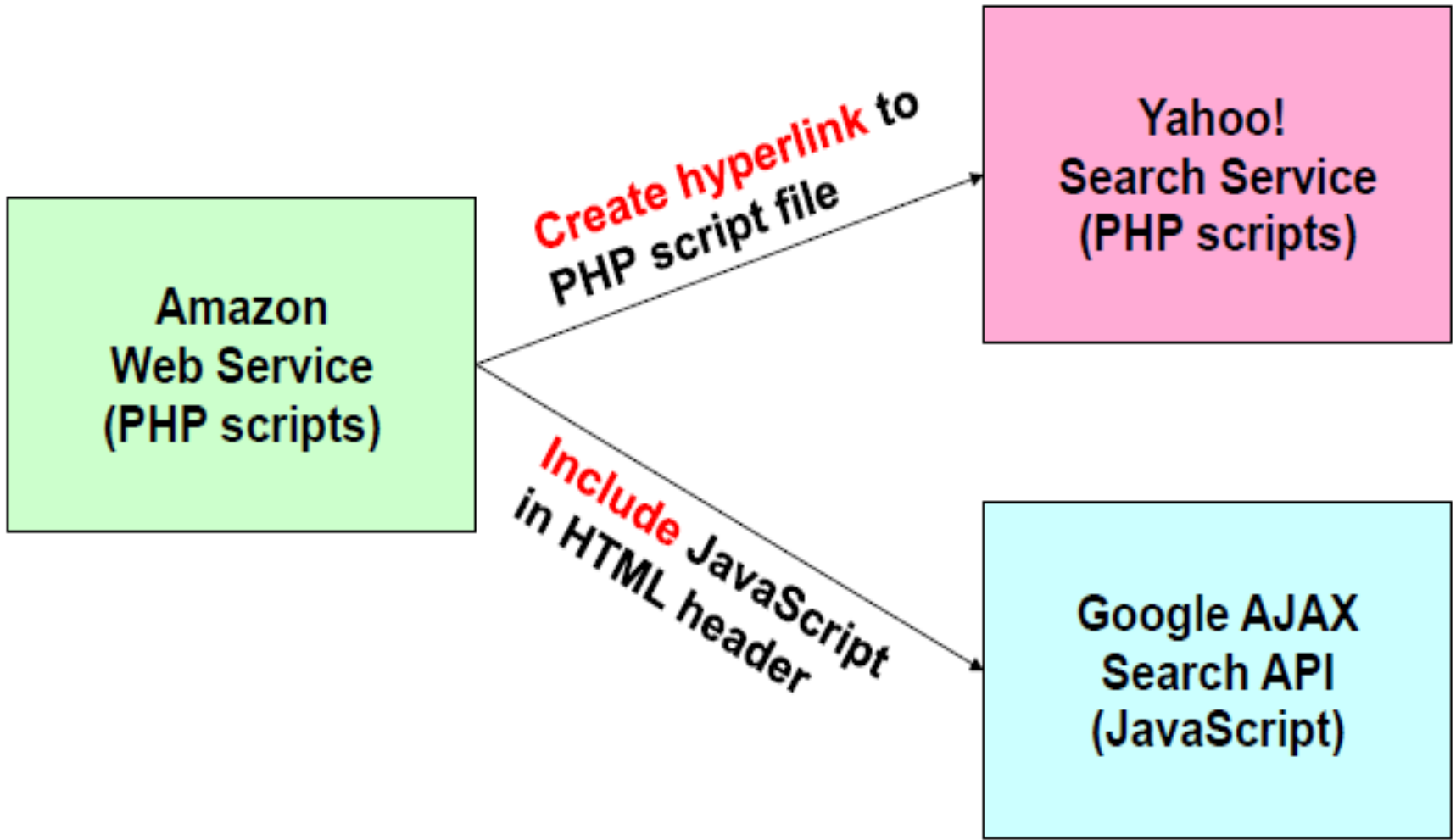
- **Amazon Web Services Developer**

- **Connection:**

- <http://developer.amazonwebservices.com/connect/index.jspa>

- – Tutorial for Amazon Web Service is available.
      - – Many solutions using Amazon Web Service are introduced.

# How to Integrate



## 6. Summary

- Google AJAX Search API can be described in simple JavaScript, so it is good starting point of using Web Service.
- Amazon and Yahoo Web Service can be described in PHP scripts.
- Coordination of these scripts makes it possible to integrate Web Services.

# Study Developer's Page AWS, Google, Yahoo

- 1. Find List of Services offered by Google
- 2. Summary of steps about how to connect and use web services
- See next slide:

# List of WSSs

- URL for google map API :
  1. code sample
  - <https://developers.google.com/maps/documentation/javascript/examples/?hl=en>
  2. how to get API key
  - <https://developers.google.com/maps/documentation/geocoding/get-api-key>
- maps API
  1. google map
  - Link: /api/google-maps
  - Provider: Google
  - API Documentation URL: <https://developers.google.com/maps>
  - Live Demos: <http://www.morethanamap.com/>
- ...Continues

# List of WSSs

- 2. microsoft bing maps
- Link: [/api/microsoft-bing-maps](#)
- Provider: Microsoft
- API Documentation URL: <http://www.microsoft.com/maps/choose-your-bing-maps-API.aspx>
- Live Demos:  
<https://www.bingmapsportal.com/isdk/ajaxv7#CreateMap1>
  
- 3. Openlayers
- Link: [/api/openlayers](#)
- Provider: OpenLayers
- API Documentation URL: <http://openlayers.org/>
- Live Demos: <http://openlayers.org/en/v3.2.0/examples/>