# WWW and Client Server Model

World Wide Web (WWW)

➤ The World Wide Web allows computer users to locate and view multimedia-based documents (i.e., documents with text, graphics, animations, audios or videos) on almost any subject.

➤ In the past, most computer applications executed on "stand-alone" computers (i.e., computers that were not connected to one another).

➤ The W3C homepage (www.w3.org) provides extensive resources on Internet and Web technologies.

World Wide Web (WWW)
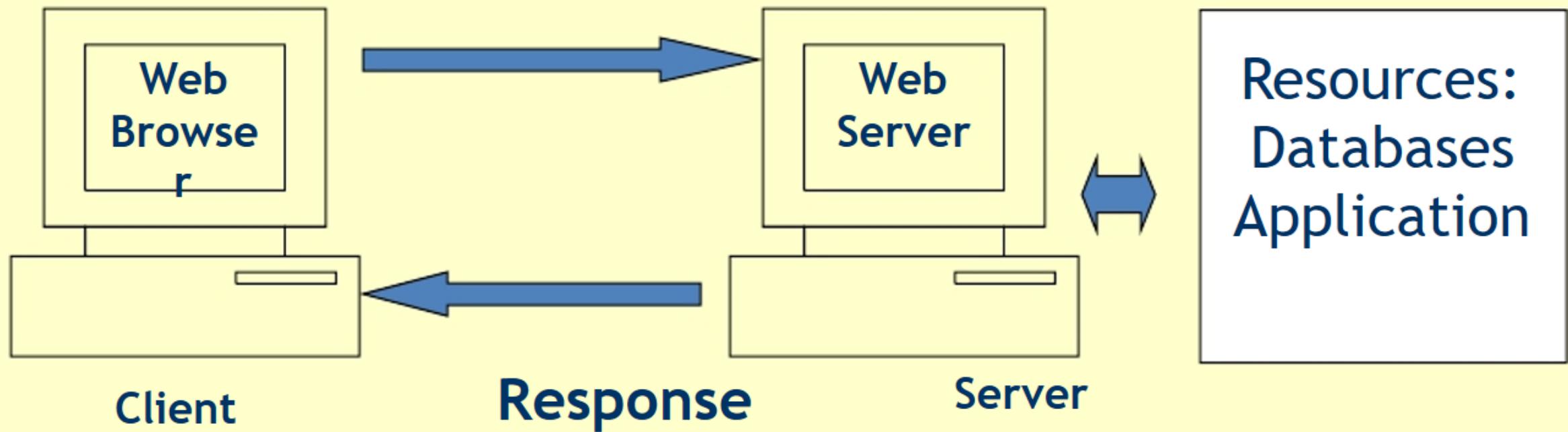
At a minimum, a website requires:

➢ A set of files, e.g. HTML files

➢ A piece of software residing on a computer connected to the internet which can display these files .. Web server

➢ Visitor's computer called the client, which has software capable of displaying the web files.

WWW and Client-Server Model

Johnnie Foxs
famed as
The Highest Pub in Ireland
Est. 1798

Book A Table

Gifts Cards
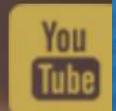
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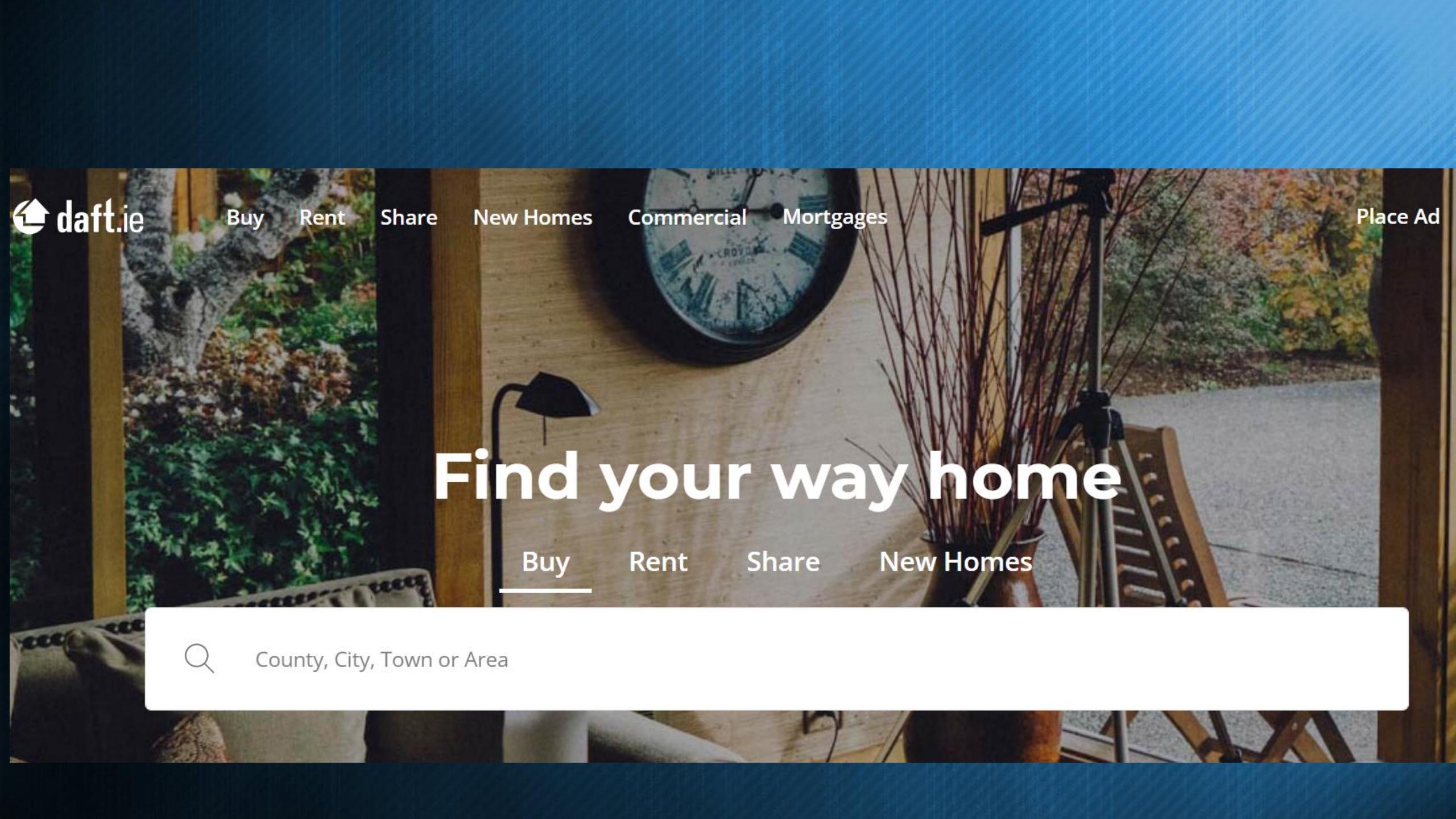
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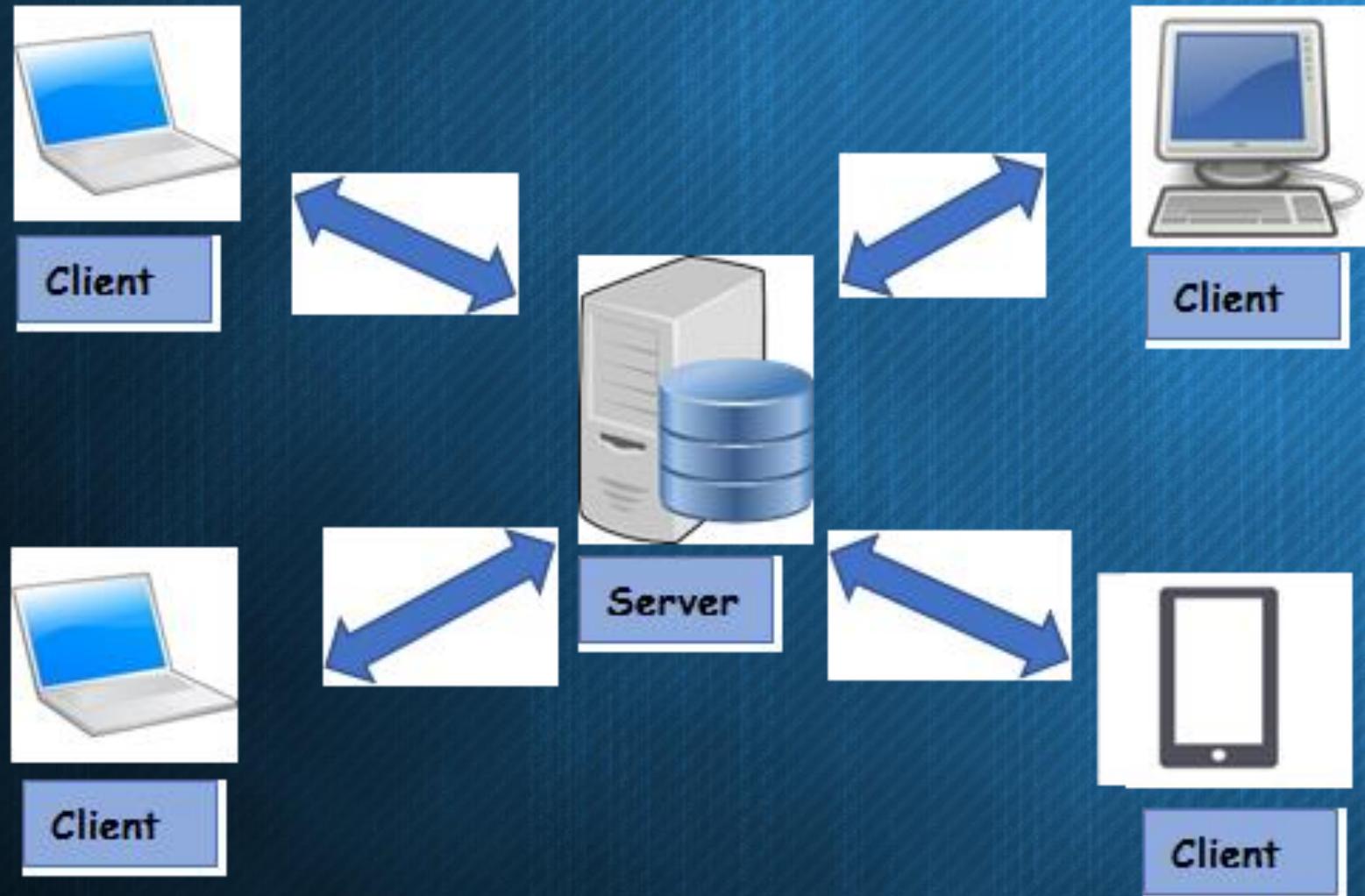
WWW

➤ Requirement grew for more sophisticated websites with dynamic content

  ➤ e.g. search engines, bulletin boards, shopping sites, personalisation --- Users see different pages, depending on user input

  ➤ HTML and client technology insufficient

  ➤ Web pages need to be generated 'on the fly' or dynamically

  ➤ A range of server-side technologies now available, such as JSP, ASP, PHP, Python...

WWW – Client Server model

➢World Wide Web uses Client Server Model

　➢Client (browser) sends request to server (web server) for resource ..

　➢Web server accesses resource

　➢Web server responds to client with resource

➢Browser/ web server communication:

　➢Need a protocol to communicate

　➢HTTP (Hyper Text Transfer Protocol)
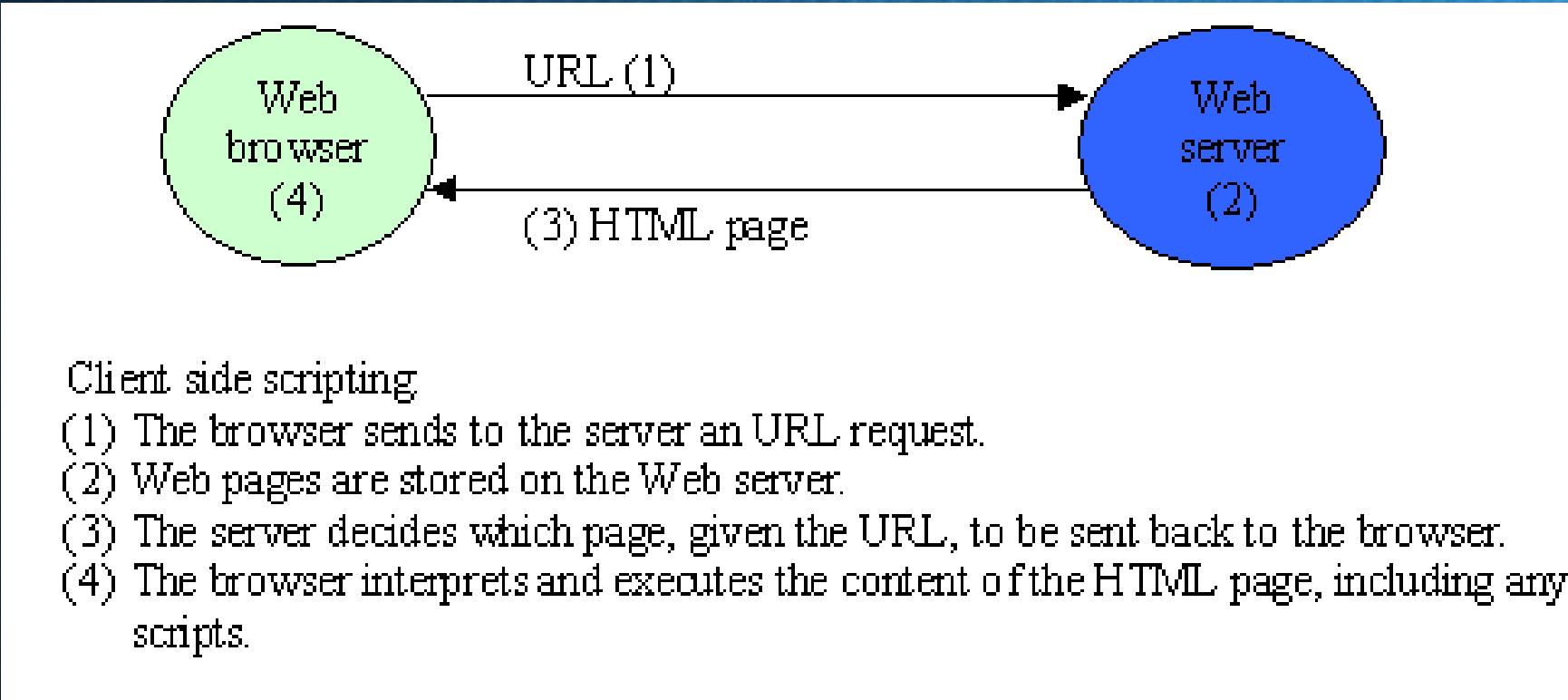
WWW and Client-Server model

Client side versus server side processing

- World Wide Web uses Client Server Model
  - Client (browser) sends request to server (web server) for resource ..
  - Web server accesses resource
  - Web server responds to client with resource
- Browser/ web server communication:
  - Need a protocol to communicate
  - HTTP (Hyper Text Transfer Protocol)

Client side processing

Web browser (4) — URL (1) → Web server (2)

Web server (2) — (3) HTML page → Web browser (4)

Client side scripting
(1) The browser sends to the server an URL request.
(2) Web pages are stored on the Web server.
(3) The server decides which page, given the URL, to be sent back to the browser.
(4) The browser interprets and executes the content of the HTML page, including any scripts.

Can perform functions without revisiting server – e.g. validation of user input on a form

Client side technologies

➢ Client side technology (e.g. java script, HTML) is run on the client machine

Used for :

➢ Presentation (I.e. text/images etc)

➢ Validation of user input

➢ Enhanced interactivity e.g. graphics, buttons

Reduces the number of visits to the server – (e.g. user input can be validated without having to revisit the server)

Client side technologies

➢ The following technologies are run on the client machine by the web browser

➢ Markup Languages: e.g. HTML, Style Sheets

➢ Client Side Scriptings: e.g. JavaScript, VBScript /Jscript, Dynamic HTML

➢ Some other frameworks like jQuery, Angular …

Example

```
<HTML>

<HEAD>

<TITLE>Example  error  message  display </TITLE>

<SCRIPT> type  =  "text/javascript">

<!--

document  writeln ("<h1>you  have  not  entered  your name </h1>" );

//  -  ->

</SCRIPT>

</HEAD>

BODY>  <BODY  BGCOLOR="white">  <H1  align="center">Simple

Test</H1>  …  etc
```
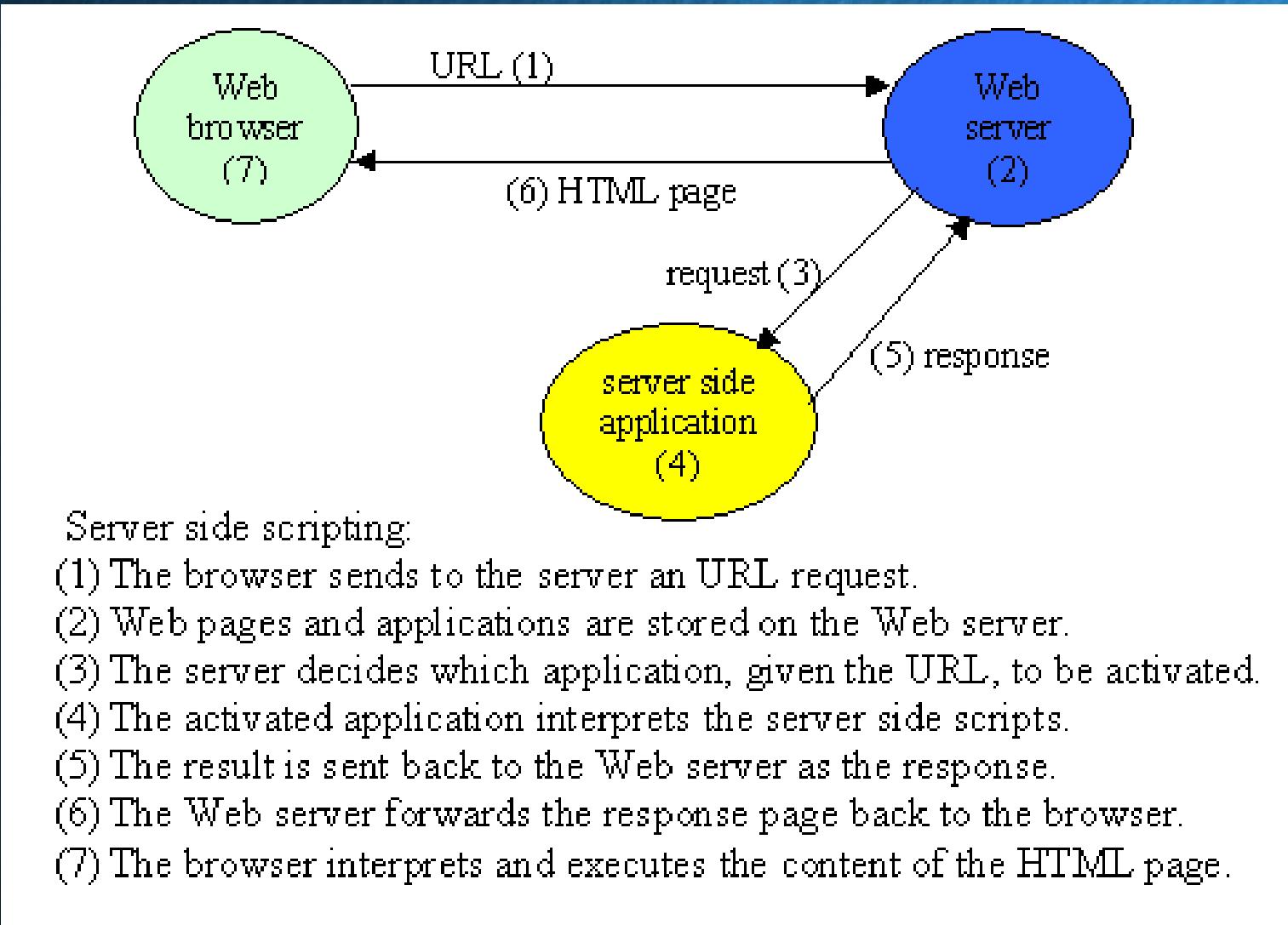
Limitations of client-side technologies

➢ Cannot implement functionality that requires returns customised information to the user – e.g. database searches

➢ Client machine/device must be sufficiently powerful (mobile devices)

➢ Need to ensure browser support client software

➢ Source code is visible

Server-Side functionality

➢ Server-side functionality needed to:

➢ generate dynamic content from a database (as opposed to static HTML pages)

➢ Process user requests/interactivity

➢ Retrieve information from users

➢ Manage sessions…   and more.

Server side processing

Server side scripting:
(1) The browser sends to the server an URL request.
(2) Web pages and applications are stored on the Web server.
(3) The server decides which application, given the URL, to be activated.
(4) The activated application interprets the server side scripts.
(5) The result is sent back to the Web server as the response.
(6) The Web server forwards the response page back to the browser.
(7) The browser interprets and executes the content of the HTML page.

Common Server Technologies

➢ Server Side Technologies are those that run at the server side.

Includes the following:

- CGI – Common Gateway Interface
- JSP – Java Server pages

- ASP – Active Server pages
- PHP – Personal Home page
- Ruby
- Python
- Java, Swift…

Server-Side scripting

➢ Servers-side technologies include a range of scripting Scripting:

➢ Where HTML is mixed with program code

➢ Only a small portion of the page is generated and templates or skeleton contain the headers, footers and other format information. technologies

➢ The page contains scripting information - **the web server has built-in interpreter** to make the modifications to the page based on the scripting information

➢ Common sever-side scripting technologies are:

  ➢ Active Server Pages (microsoft), Java Server Pages (sun)

  ➢ PHP, Pathon, Ruby

Scripts Reside on server

➤ Greater flexibility/functionality supported (e.g. database access

➤ Runs exclusive on server -> not concerned with client browser support. Result is sent over the network to the client

➤ Script/code not visible to client – only HTML and client-side scripts sent to client machine

Active Server Page Example – HTMl page

```html
<html>
<head>
<title>ASP   Example   2</title>
</head>
<body>
<form   method="POST" action="resultofexample2.asp">
<p>A=  <input  type="text"   name="ValueofA" size="20"></p>
<p>B=  <input  type="text"   name="ValueofB" size="20"></p>
<p><input  type="submit"  value="Calculate" name="B1"></p>
</form>
</body>
</html>
```

HTML Form Calls ASP page (on next page)
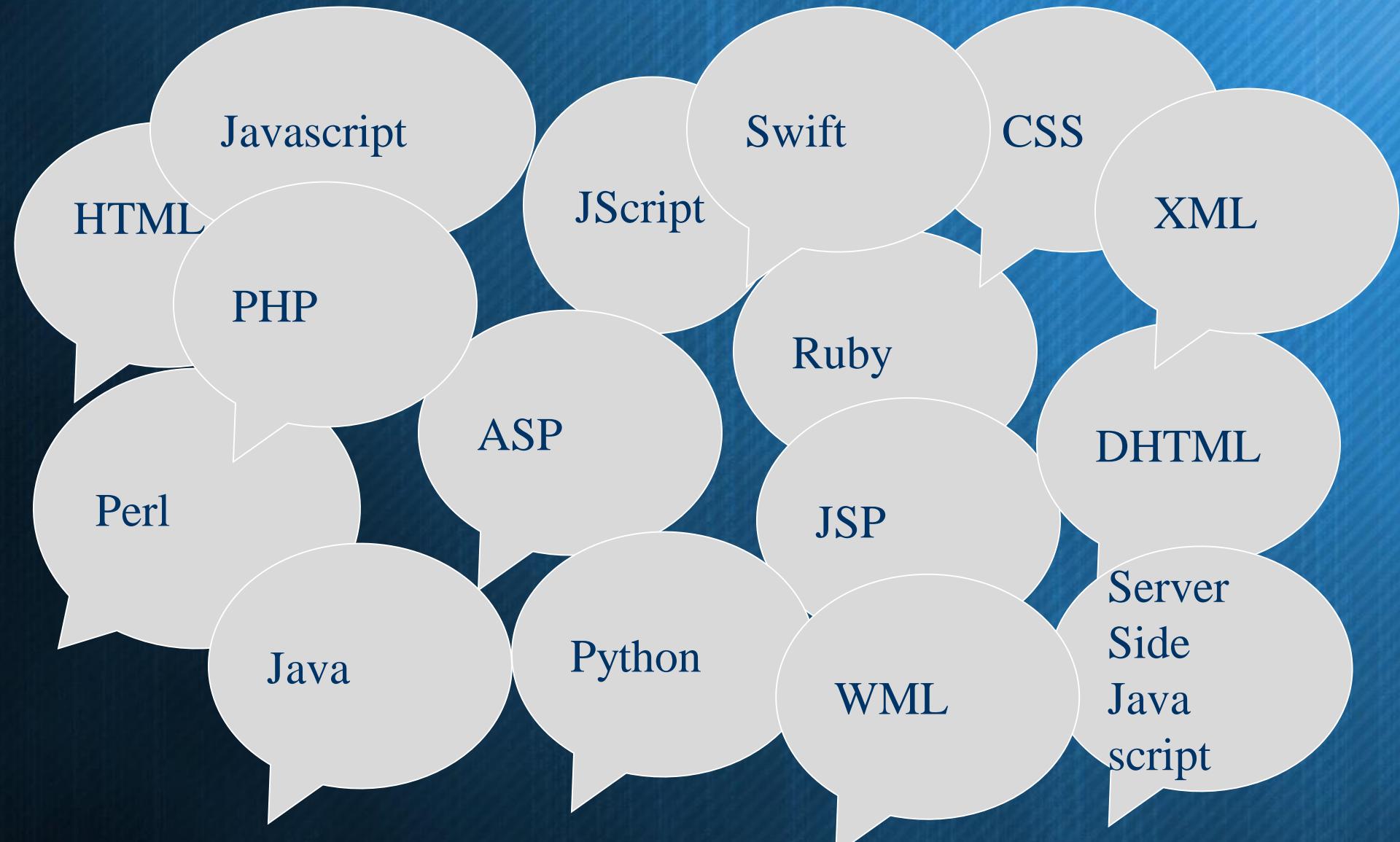
Active Server Page Example – ASP page

```
<html>
<head>
<title>Results   of   Example   2   ASP   Page</title>
</head>
<body>
<p>Example Page <%@language="vbscript"%>
<% dim A, B
A=Request.form("ValueofA")
B=Request.form("ValueofB")%></p>
<p>A+B = <%= eval(A)+eval(B)%></p>
<p>A-B = <%= eval(A)-eval(B)%></p>
<p>A*B = <%= eval(A)*eval(B)%></p>
</body></html>
```

Script(Not sent to client…
Not visible in "view source")

A quick tour of common client and server web technologies

HTML – client side

- Hyper Text Mark up language

- Used for rendering documents via web browser such as Chrome
  or FireFox

- Interpreted by browser

  - Client side

  - Tag based

- Different browser may interpret tags differently

JavaScript and Jscript Can be used as Client side AND server side

➢ A very simple scripting language for enriching the display and interactivity of web pages.

➢ Typical example is a button that changes color as you move your mouse over it. A more useful example is a menu that

➢ rolls out more details when you click a category; this is done without loading a whole new page, and even without connecting to the web server.

➢ JavaScript is Netscape's technology, but fully adopted by Microsoft. When JavaScript is used inside IE browser, it is called JScript.

➢ JavaScript is not related to Java, except that it somewhat resembles Java.It can be used within Active Server Pages

Cascading Style Sheets (CSS) – client side

➢ Instructions for the browser about how to display the page (font, layout, etc.).   Using CSS, the author of the web page has fullcontrol over what the user sees, regardless of the browser settings, etc.   In addition, CSS allows web designer to define complex formatting styles, and then use them with a short command, instead of specifying all the fonts, sizes, layout, etc., every time.

Python – Server side

➤ Python is an open-source programming language that claims to combine "remarkable power with very clear syntax." It's a standard component of most Linux distributions and Mac OS X, and can also be installed on Windows. Its users include YouTube, Google, Yahoo!, and NASA. Two popular web development frameworks for Python are Django and Zope.

Ruby on Rails – Server side

➢ Ruby on Rails (or Rails, as it's often called) is an open-source web application framework designed to make common development tasks easier through the use of tools, such as scaffolding, which automatically constructs some of the basic elements of a website. A notable feature of Rails is that the ActiveRecord library enables you to write code that works with any supported database, rather than having to write database-specific code, as is common with other server-side technologies. Twitter is perhaps the best known among prominent users of Rails.

Active Server Pages – ASP – server side

➢ Microsoft's leading server side technology for creating dynamic web pages. Works by default only with Microsoft web server software (but browser brand does not matter).

➢ Allows to execute scripting languages such as VBScript and JavaScript on the server. Better uniformity than client side processing (since the server is controlled by the website owner, while each browser is different) and offloads the processing from the user computer.

➢ Since ASP runs on the server, it also offers additional functionality not available with client-side scripting. For instance, an ASP page can connect to a database to get the information to be displayed. Pages that use ASP have extension .asp rather than .htm or .html.

Java Server Pages – JSP – server side

➢ JSP is similar in function to ASP and CGI. It allows a web server to process user input or perform some other functions and return the results to the user's browser.

➢ JSP files have an extension of .jsp

➢ JSP is supported by all major web server software.

PHP – Server side

➢ Scripting language for use on the server.Free (developed by Linux enthusiasts). Supported by all web servers. Similar to ASP in functionality, but simpler and less powerful.

ASP.NET- Server side

➢ The replacement for Classic ASP bears little resemblance to it apart from the name. The difference is so marked that previous experience of Classic ASP does little to smooth the transition from one technology to the other. ASP.NET uses the Microsoft .NET framework, and can be written in many different computer languages, the most popular being C# and VB.NET.

JSON

- JSON: JavaScript Object Notation.
- JSON is a syntax for storing and exchanging data.
- JSON is text, written with JavaScript object notation.
- When exchanging data between a browser and a server, the data can only be text.
- JSON is text, and we can convert any JavaScript object into JSON, and send JSON to the server.
- We can also convert any JSON received from the server into JavaScript objects.
- This way we can work with the data as JavaScript objects, with no complicated parsing and translations.

PHP vs. Ruby vs. Python

➢ PHP (Hypertext PreProcessor) is a server scripting language designed by Rasmus Lerdorf, a powerful tool to create dynamic and interactive websites. It is fast, flexible, widely-used scripting language for everything from a simple blog to the most popular and dynamic websites in the world.

➢ Who Uses PHP?

  ➢ Zend

  ➢ Yahoo

  ➢ Facebook

  ➢ Google

  ➢ NASA

  ➢ W3C

PHP vs. Ruby vs. Python

➢ Ruby (programming language) runs with Ruby on Rails or simply rails, an open source, full-stack web application framework. It is a dynamic, imperative object-oriented programming language developed by Yukihiro Matsumoto in Japan.

➢ Who Uses Ruby?

  ➢ Google Sketchup

  ➢ 37signals

  ➢ GitHub

  ➢ Shopify

  ➢ Indiegogo

  ➢ ThemeForest

PHP vs. Ruby vs. Python

➢ Python is a widely-used high-level (but it also used in a wide range of non-scripting language) design for programmers to express concepts with fewer lines of code. It was conceived in the late 1980s and was implemented by Guido van Rossum.

➢ Who Uses Python?

  ➢ Yahoo Map

  ➢ Zope Corporation

  ➢ Linux Weekly News

  ➢ Shopzilla

  ➢ Ultraseek

PHP vs. Ruby vs. Python

➢ Based on Jobs Tractor which analyzed more than 45,000 developer jobs advertised on Twitter during the 2016 12 months, the results are the following:

➢ PHP – 8,238

➢ Ruby – 2,937

➢ Python – 1,587

➢ Although PHP still has the higher statistics on this site, remember not to use statistics as the basis for learning or using a programming language.

Client or server side technology?

➢Some websites/web applications will only need client side technologies

➢Many use both client and server

Client or server side technology?

To determine whether client-side or server-side or both will be used for a web

application, need to consider:

➢Static web pages only?

➢Client-side may be sufficient

➢Validation of user input needed?

➢Client-side will reduce traffic back to server, server side will provide uniform response

➢Will the user be entering information/ searching? (I.e. likely to use database)

➢If database used, need server-side technologies

➢Session tracking required?

➢Server-side needed

Client or server side technology?

➢Volume of users (want to minimise traffic back to server)?

➢Use of Client-side reduces traffic back to server

➢Sensitivity of code?

➢Client-side code will be visible to visitors

➢Power of client device (e.g. PDA)?

➢Client side code runs on device -> restrictions?

➢Security limitations (e.g. users prevented from certain web pages)

➢Server-side provides ability to add security

➢Client Browser support

➢A consideration when using client-side

Client vs server technologies?

➢ A website for a small retailer, displaying location, map and staff descriptions

➢ Online daily newspaper displaying relevant news items and articles. Users can enter their details to subscribe.

➢ A transport website enabling users to enquire upon train timetables, destinations, prices. Information changes monthly.

➢ A temporary website, providing details of a concert. All information is static.

Questions

➢ A web design team are developing a web application for the Olympics Games. The application will provide bulletin board information, maps, hotel information and updates on event timetables and results. Explain how client-side and server-side web technologies may be used to develop the application. Give examples of each technology.

Summary

➢ Client server model for Web

➢ Different between client-side and server-side technologies

➢ Limitation of Client-side technologies

➢ Common Client-side and Server-side technologies

➢ Choosing use of client versus server-side technologies