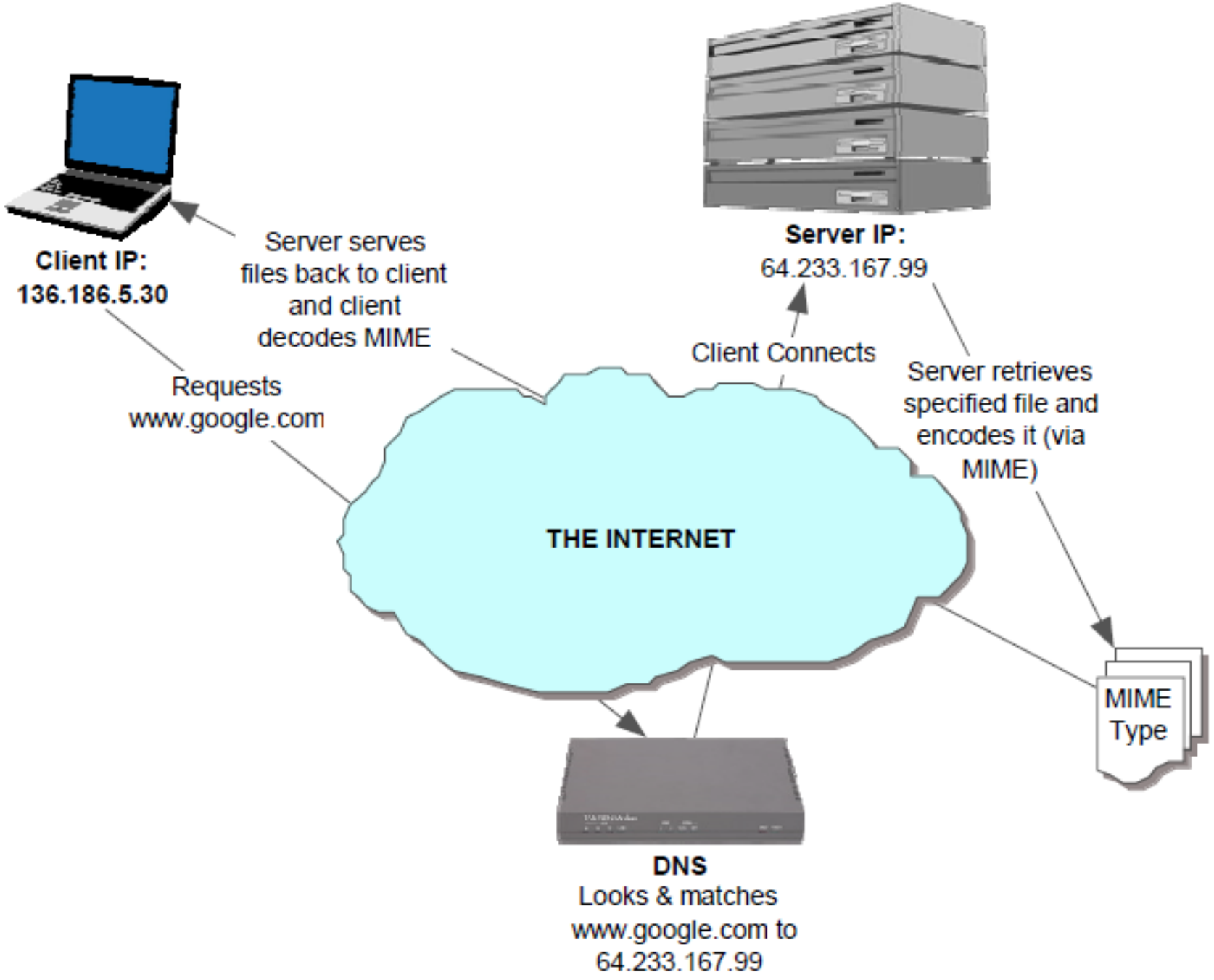
DT228/2 Web Development

WWW and Client server model


Client IP:
136.186.5.30
Server serves files back to client and client decodes MIME
Requests www.google.com
Server IP:
64.233.167.99
Client Connects
Server retrieves specified file and encodes it (via MIME)
THE INTERNET
MIME Type
DNS
Looks & matches www.google.com to 64.233.167.99

World Wide Web (WWW)

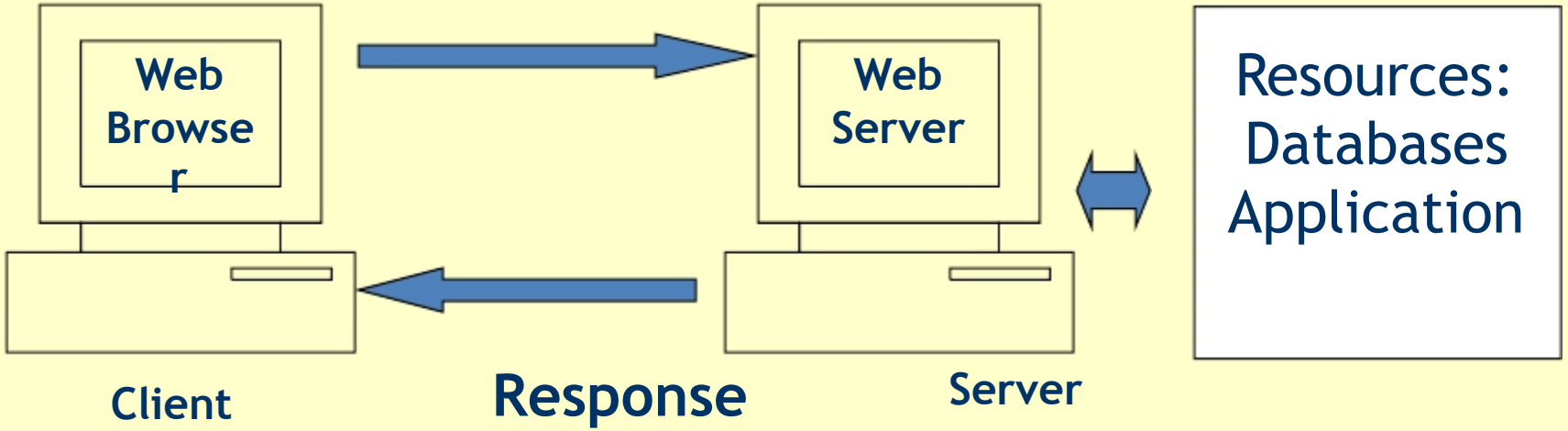
At a minimum, a website requires:

- 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

Request

e.g. "*Get* me a webpage"



e.g. "here's the web page"

WWW

- In early days of WWW, simple relationship between the browser and a distant server
- User requests a web page via the browser
- Server received request, server sent back the page that you wanted
- Web sites were often limited to ‘brochureware’
  - static pages
  - every user sees same pages
- Web sites heavily reliant on HTML to provide functionality

Wednesday, 25 Se

Welcome to Johnnie Fox's Pub website

Like 10,8 this.

Situated in Glencullen on top of the Dublin mountains, **Johnnie Fox's** is one of Ireland's oldest and most famous traditional Irish pubs - and we are also famed as the highest pub in the country. We are located approximately 25-35 minutes drive from Dublin City centre. (Please see our on-line map for routes and directions.)

At Johnnie Fox's we have Traditional Irish Music every night, plus on Saturday and Sunday afternoons. There are large bands that play through the year on selected dates. You can also see one of the top

-- JF Lates

CELEBRATIONS
live music every
on weekend da
playing from 3:3

If you are comi
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your seat on 0

Why not join us
and click LIKE s
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ENGLISH 中文 (CHINESE) ESPAÑOL

The New York Times

Wednesday, September 20, 2017 | Today's Paper | Video | 54°F | Dow +0.19% ↑

Mexico Quake Kills 200; Scene of Anguish at School Disaster

PAULINA VILLEGAS 2:07 PM ET

At least 30 children died at a school in Mexico City after it collapsed Tuesday. Rescuers found mostly lifeless bodies, but also some survivors.

The death toll across the country was expected to

Opi

NEWS ANALYSIS | WORLD REVIEW

American Democracy Is Drowning in Money

By CELESTINE BOHLEN

What do all those dollars buy?

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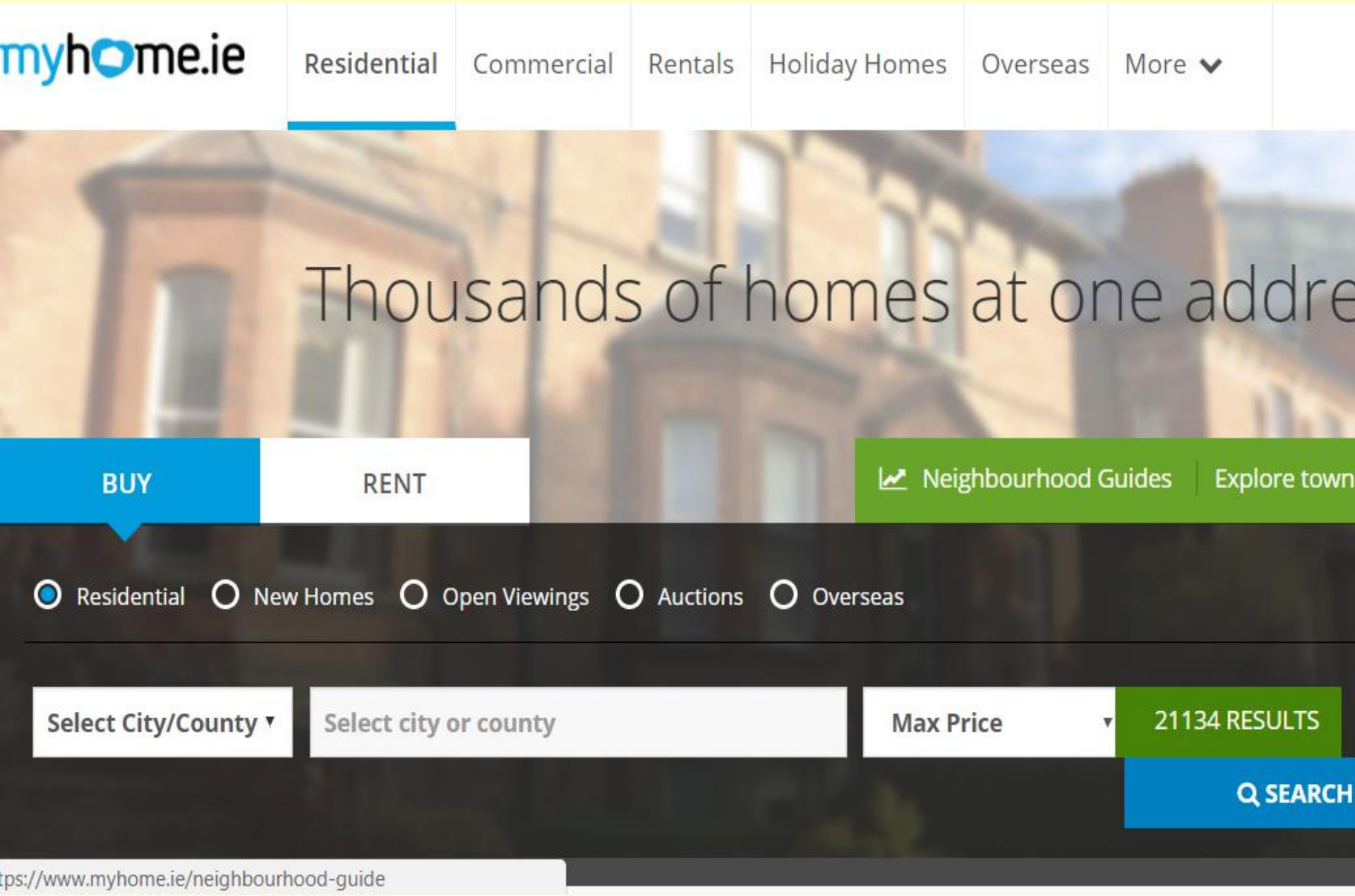
- Douthat: Expect the Inquisition
- When Will Black Lives Matter in St. Louis?
- Germany's 'Boring' Election Is a Victory for the Right
- Going Undercover With the


myhome.ie
Residential
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BUY
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New Homes
Open Viewings
Auctions
Overseas
Select City/County
Select city or county
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SEARCH
tps://www.myhome.ie/neighbourhood-guide

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, Pathon, Ruby

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)

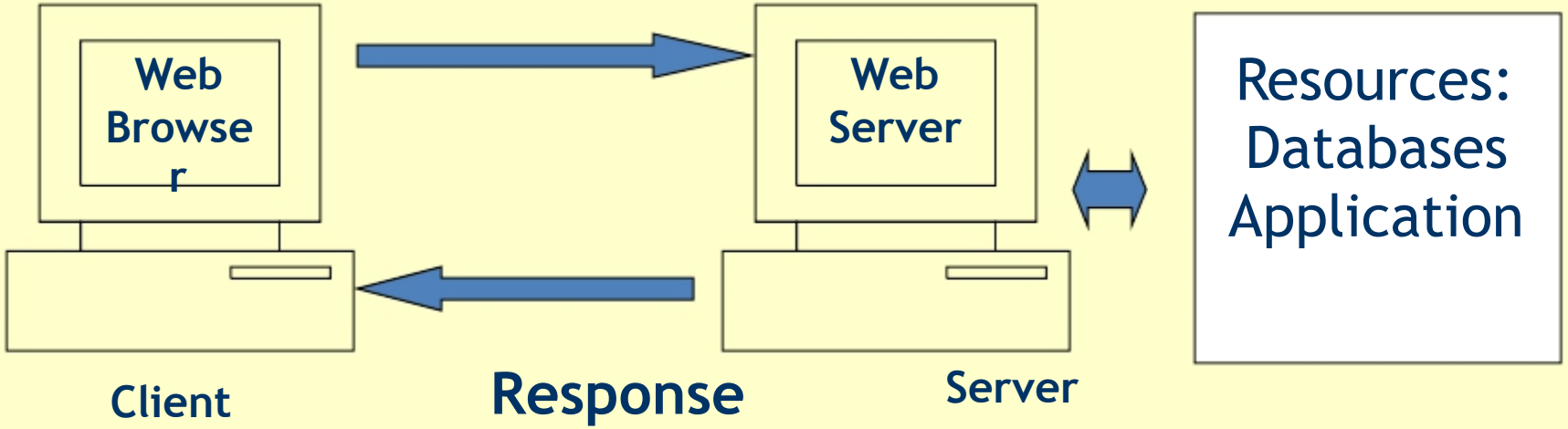
Detailed purpose and major uses of server-side scripting

1. Insertion of continuously changing content into a web page
2. Authentication, authorization and session tracking
3. Template-driven page generation
4. Personalization and customization of content based on authentication and authorization defined above in (2).
5. Dynamic image generation, e.g. page counters, human-readable characters for security, maps, overlays etc.
6. Dynamic generation of CSS and Javascript.
7. Generating and reading HTTP headers.
8. Handling POST form input
9. Device mapping
10. Retrieval of data in response to query string parameters and insertion into a web page.
11. Communication with other programs, libraries and APIs.
12. Re-use of persistent business objects.

WWW and Client-Server model

Request

e.g. "*Get* me a webpage"

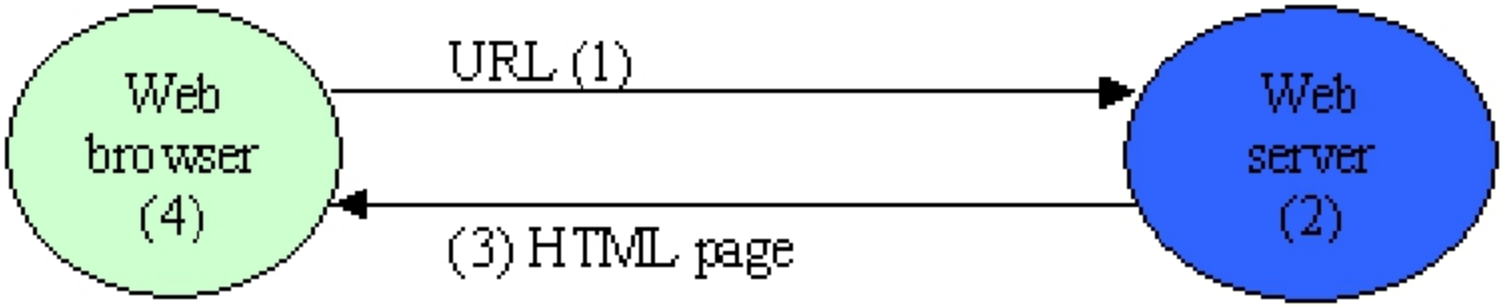


e.g. "here's the web page"

Client side versus server side processing

- Need to understand the difference as each one has limitations and specific purposes
- Client side processing occurs on the client machine (i.e. machine that has requested the web page)
- Server side processing occurs on the server

Client side processing



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 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 / XHTML /XML, Style Sheets

Client Side Scriptings:

e.g. JavaScript, VBScript /Jscript, Dynamic HTML, JQuery

Example

```
HTML>
<HEAD>
<TITLE>Example error message display </TITLE>
<SCRIPT> type = “text/javascript”>

   <!—-
    document writeln (“<h1>you have not entered your
name”<h1>2);
    // - ->
</SCRIPT>
</HEAD>
<BODY> <BODY BGCOLOR="white"> <H1 align="center">Simple
Test</H1> … etc
```

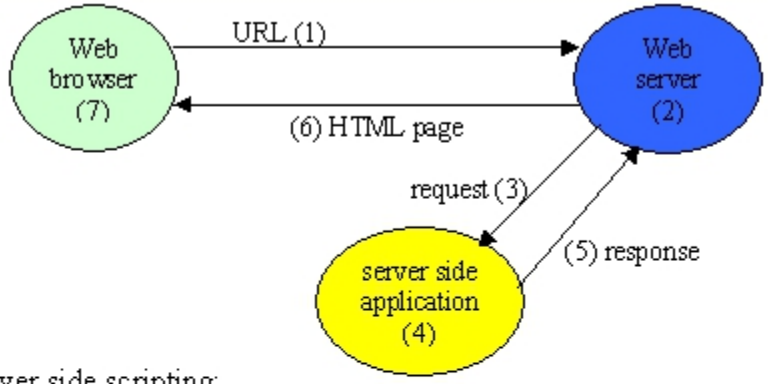
Limitations of client-side technologies

- 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
- SSI (server-side includes)

Older, standards-based scripting languages

- ASP – Active Server pages
- PHP – Personal Home page
- Ruby

In-process scripting languages

- Python
- Java

High level Non-scripting languages

Server-Side scripting

- Servers-side technologies include a range of scripting technologies
- 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.
- 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

Server-Side scripting

- 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>
<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>
```

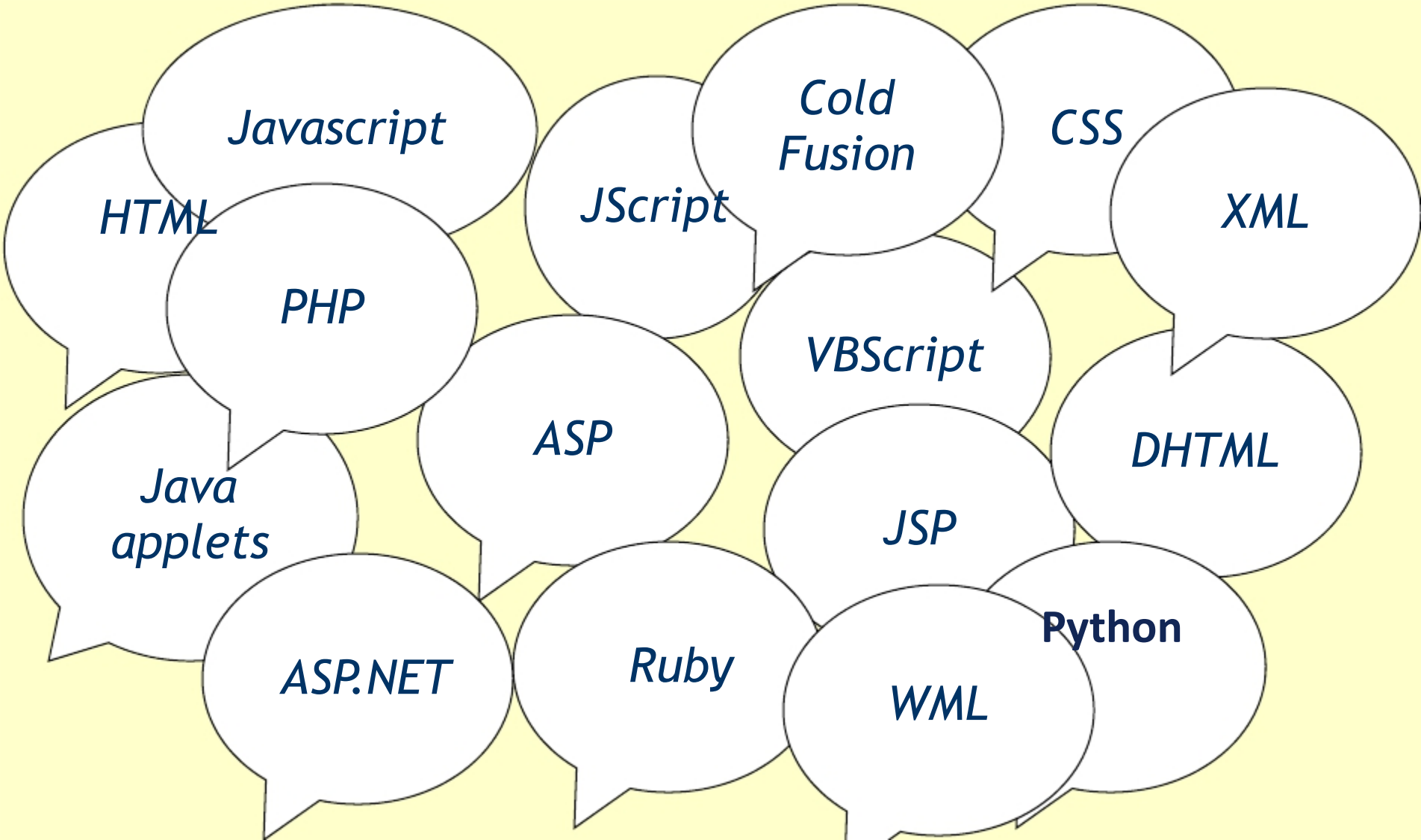
HTML Form Calls ASP page (on next page)

ASP 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 IE or FireFox.
- Interpreted by browser
- Client side
- Tag based
- Different browser may interpret tags differently e.g. <frame>

WML- client side

- Wireless markup language
- The WAP equivalent of HTML -
- Supports WAP technology for mobile devices
- Client side
- Fewer tags than HTML
- Supports WML Scripts
- Used on less powerful client devices

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*

More info: http://javascript.internet.com/

VBScript *–client and server side*

A Scripting language, similar to Javascript

A lighter weight version of Microsoft's Visual Basic.

Developed by Microsoft, and does not work in Netscape. A simplified variant of Visual Basic.

Used for client processing and also the default programming language within Active Server Pages

More info:

http://msdn.microsoft.com/scripting/default.htm?/scripting/vbscript

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 full control 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.

More info: http://www.w3.org/Style/

Java Applets – client side

Java applets are programs written in Java that are downloaded onto and run on a Web browser.

Applets can provide functionality to the client machine such as enhanced presentation, graphics, validation. etc

The main difference between an applet and a fully-blown Java application is that an applet is restricted in functionality for security reasons; for instance, it cannot freely access the client hard drive.

When you go to a website, you do not know what applets are included in it, and who wrote them and why – hence the security restrictions applied to Java Applets.
More info: http://java.sun.com/

DHTML – Dynamic HTML – Client side

"Animated" HTML. E.g. button changes colour, graphic moves from one part of the screen to the other.

Refers to the combination of HTML, CSS and JavaScript, and other web site enhancing software which together allow creating web pages that interact with the user.

More info: http://wdvl.com/Authoring/DHTML/

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.

More info: http://wdvl.com/Authoring/ASP/

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.
More info: http://java.sun.com/products/servlet/

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.

More info:
http://wdvl.com/Authoring/Languages/PHP/

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.

Cold Fusion – Server side

ColdFusion, from Allaire, provides a set of HTML-like tags which were initially targeted at embedding database queries into web pages, but it has since been extended to support a wide variety of data sources for dynamic content generation.

The adoption of HTML-like tags has the advantage that there is a single, consistent style of syntax throughout the page; the ColdFusion tags are comfortable to web designers because they look just like the other tags present in the document.

ColdFusion supports both UNIX and Microsoft Windows platforms.

Server Side JavaScript – Server side

Used with Netscape servers

Server-Side JavaScript uses JavaScript as its scripting language.

Server-side JavaScript included in an HTML document is enclosed in a <SERVER>...</SERVER> tag pair.

SSJS adds built-in features for database and email support, session management, and interoperability with server-side Java classes using Netscape's LiveWire technology.

File extension = .js

Compiled language.

XML

XML (extensible mark-up language) – is a simple,
very flexible mark-up language (like HTMl). It is used throughout the web to as the basis for new mark-up languages such as Wireless Mark-Up (WML) and the latest version of HTML (XHTML).

XML by itself does not do anything – it is usually used for defining the structure of data. For example, providing information in a generic format that will be sent to a variety of channels – e.g. web site, and wireless devices

Example:

< phonenum> 2876637 </phonenum>
<address> 34 talbot street </address>

user defined tags

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?

Some websites/web applications will only need client side technologies

Many use both client *and* server

Client or server side?

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?

- 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