Topic 1:

Introduction to Fundamental Website Development

Course Code: CIS121

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Module Aims

- To give students an understanding of website design and development:
  - How to build websites using HyperText Markup Language (HTML) and Cascading Style Sheets (CSS)
  - Factors that influence the design of websites
  - How to the specify the design of websites
  - Strategies for testing websites

Scope and Coverage

- The Internet, IoT, and the World Wide Web (WWW)
- How the WWW works
- The importance of web standards
- Challenges of web design:
  - Browsers
  - Screen Resolution
  - Accessibility

Learning Outcomes

By the end of this topic, students will be able to:

- Define the Internet, IoT, and the World Wide Web.
- Describe in broad terms what happens when a browser views a web page.
- Explain what HTML, CSS and web standards are.
- Describe the challenges involved in designing web pages to be understood by as many different people as possible.

The Internet, IoT and the WWW

- Questions:
  - What is the Internet?
  - What is IoT?
  - What is WWW?

- Write a definition of the Internet
- Write a definition of IoT (Internet of things)
- Write a definition of the WWW
- Describe the differences between the three

The Internet

- The world-wide network of computer networks sharing information
- Information shared over the Internet (not exhaustive)
  - Email
  - FTP
  - Instant Messaging
  - WWW
  - Chat
  - VOIP e.g. Skype
  - P2P (Peer-to-peer) networks

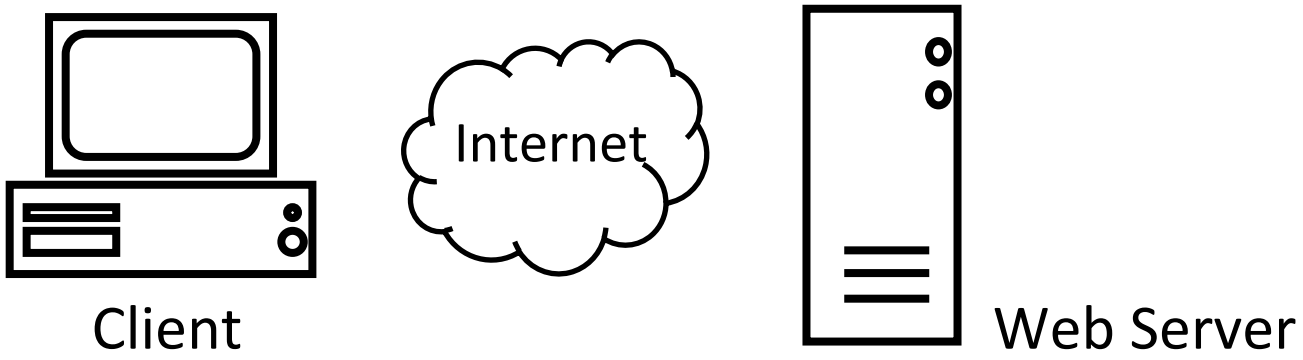
Internet of Things (IoT)

- A network of internet-connected objects that are able to collect and exchange data using embedded sensors.
- IoT device:
  - Any stand-alone internet-connected device that can be monitored and/or controlled from a remote location.
- IoT applications:
  - Smart Home
  - Wearables

The World Wide Web (WWW)

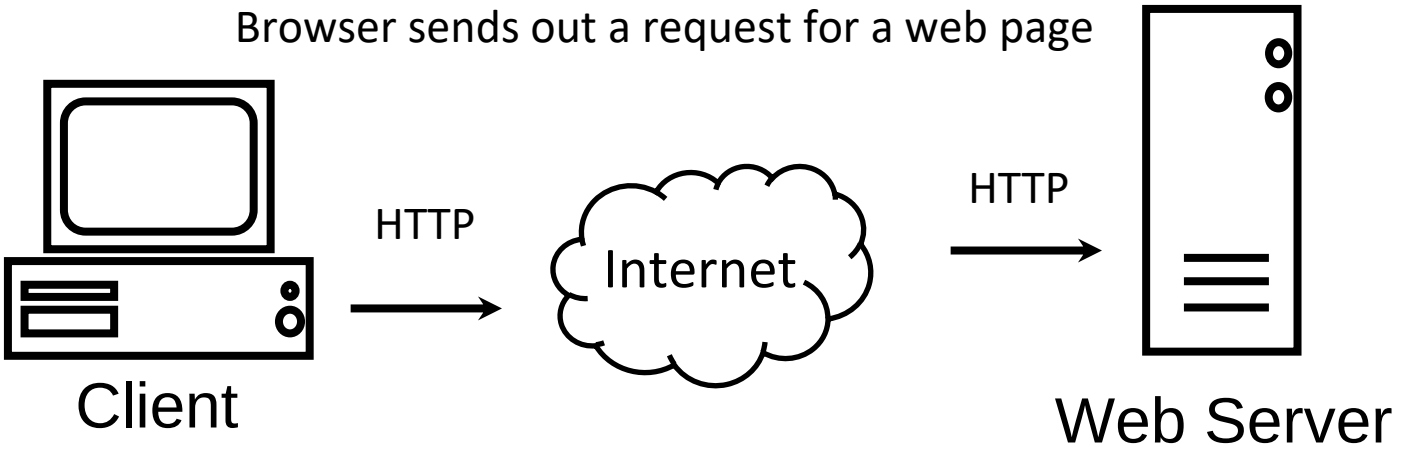
- The worldwide collection of millions of inter-linked documents (web pages) on the Internet
- Two main technologies define the WWW
  - HTML (HyperText Markup Language)
    - The language used to write web pages
  - HTTP HyperText Transfer Protocol
    - The communication rules that specify how web pages are transmitted over the Internet

How the WWW works - 1



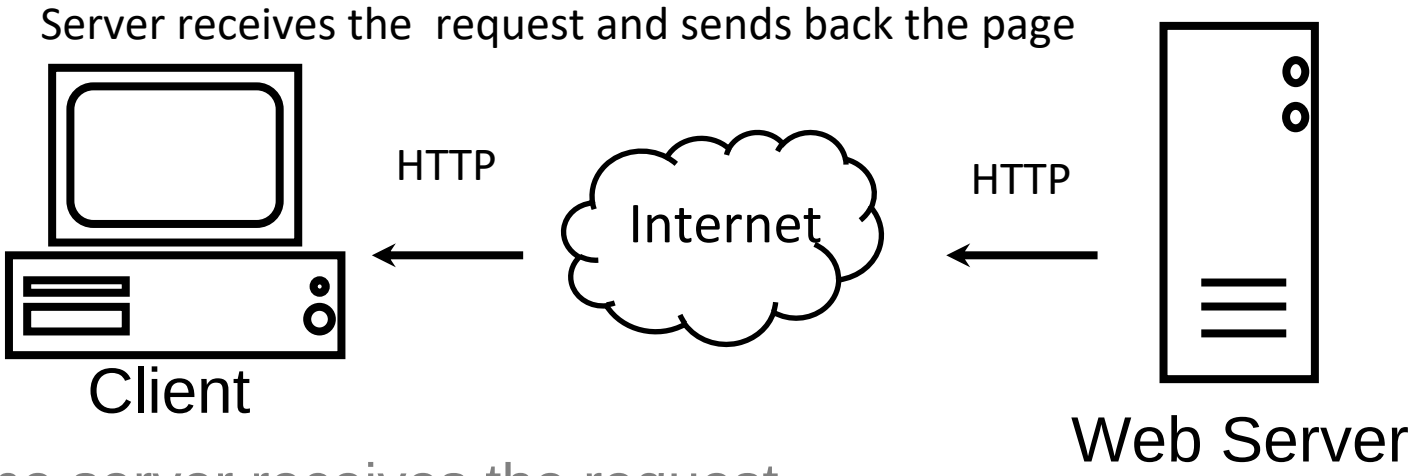
- On the Internet, there are two types of machine: clients and servers.
- Servers provide services to users of the Internet.
- Clients use services on the Internet.
- When we ‘surf the web’, we are clients

How the WWW Works - 2



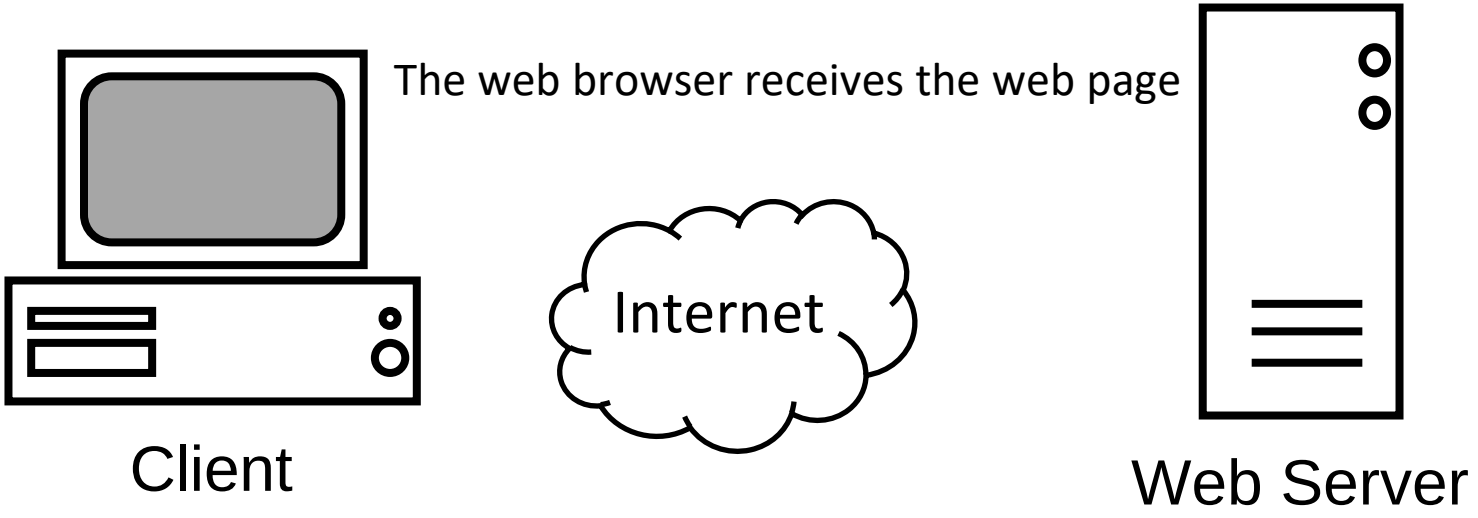
- The user selects the address of a web page they want to view, e.g. http://tinyurl.com/6ynbvx
- Web addresses are known as URLs (Universal Resource Locators)
- The request is made using HTTP

How the WWW Works - 3



- The server receives the request
- If the client is allowed the requested page:
  - The server finds the web page (a HTML document)
  - Sends a copy back over the Internet to the client
- Again HTTP is used for communication between the client and server

How the WWW Works - 4



- The web browser understands HTML and displays the web page for the user.
- The user views the page, clicks on a hyperlink and the whole process starts over again.

HTML (HyperText Markup Language)

```
<!DOCTYPE html>
<html>
 <head>
  <title>A simple HTML Document</title>
 </head>
 <body>
  <h1>This is a heading</h1>
  <p>This is a paragraph</p>
 </body>
</html>
```

- This is an example of a HTML document.
- HTML describes the structure of a web page, i.e. which part of the page is a heading, a paragraph, a list, a table etc.

CSS (Cascading Style Sheets)

```
body{
        font-family:arial;
        font-size:0.8em;
        background-color:blue;
        color:red;
}
h1{
        font-family:Georgia,"Times New Roman",Times,serif;
}
p{
        line-spacing:0.5em;
}
```

- CSS specifies the design of a web page:
  - E.g. the fonts, colours, positions of different parts of the page

The World Wide Web Consortium (W3C) - 1

- The WWW was invented in 1989 by Tim Berners-Lee
  - He then founded the World Wide Web Consortium (W3C) in 1994.
  - As of March 2011, there are 323 members from organisations such as Apple, Google and Microsoft.

The World Wide Web Consortium (W3C) - 2

- The W3C oversee the continued development of the WWW
  - The W3C is an international community that develops open standards to ensure the long-term growth of the Web.
  - Members reach an agreement over the development/ future of new web technologies.

Web Standards

- The specifications and guidelines the W3C produce are known as web standards:
  - Examples of web standards are the HTML and CSS specifications.

- The standards aim to provide web technologies that support the greatest number of web users.

- When we create websites, it is important to follow web standards:
  - Following web standards ensures that we can be confident our websites will be accessible to as many users as possible.

The Challenges of Web Design

- When we design a website, it should be understood by as many people as possible.
  - This can be difficult
- Challenges of web design:
  - Different web browsers
  - Different devices and screen resolution
  - Accessibility
  - Usability

Different Web Browsers - 1

- Users surf the web using many different web browsers.
- Task:
  - Name as many different web browsers as you can.

Different Web Browsers - 2

- Popular web browsers:
  - Google Chrome
  - Safari (Mac OS)
  - Mozilla Firefox
  - Internet Explorer (often abbreviated to IE)
  - Opera
  - Lynx (text only)
  - Konqueror
- Popular mobile web browsers:
  - Opera Mini
  - Mobile Safari
  - Skyfire

Different Web Browsers - 3

- Several websites provide analysis of global browser usage, e.g. StatCounter. (http://gs.statcounter.com/)
- Getting reliable accurate data can be difficult.
  - Statistics are often based on limited number of sites
- Browser usage often varies between different countries.

Different Web Browsers - 4

- How can we design a web page that works across a range of different web browsers?
  - Different web browsers support different features of HTML
  - Different browsers interpret CSS rules in different ways
- Use W3C web standards
  - Most recent browsers support web standards
- Test
  - View the site in as many different browsers as possible before making a site ‘live’.

Different Devices and Screen Resolution - 1

- Users surf the web using many different devices, not just a desktop PC.
- Task:
  - Name as many different web enabled devices as you can.

Different Devices and Screen Resolution - 2

- Some web-enabled devices include:
  - Desktop computers
  - Netbooks
  - Mobile phones
  - Smart phones
  - Tablets
  - Handheld games consoles
  - MP3 Players
  - E-readers

Different Devices and Screen Resolution - 3

- Different devices have different-sized displays:
  - A mobile device may have a screen resolution as small as 128 x 128 pixels.
  - Most desktop computers have a screen resolution that is at least 1024 x 768.
- Screen resolution is an important factor in web design:
  - Users should not have to scroll horizontally.
  - Important information (such as main navigation options) should be instantly visible to the user.

Different Devices and Screen Resolution - 4

- How can we design a web page that works across a range of different display resolutions?

- Fixed web page design:
  - Design the page width for the lowest popular resolution e.g. 1024x768.
  - On large displays, large amounts of empty space.

- Fluid web page design:
  - The page width re-sizes to fit the size of the browser window.
  - On large displays, the line length can affect the readability of text.

Designing for Mobile Devices - 1

- The number of users who access the web from mobile devices is growing.
- Question :
  - What makes surfing the web on a mobile device (e.g. a mobile phone) difficult?

Designing for Mobile Devices - 2

- How can we design a web page that works for mobile users?
- Create a separate site just for mobile users.
- Even ‘mainstream’ sites should be designed to make them usable by mobile users.

Accessibility

- Accessibility is about designing websites that people with disabilities can use.

- Task:
  - Name different disabilities that would affect someone's ability to use websites.

Accessibility – Disabilities - 1

- Visual
  - People that are blind or have limited vision.
  - They may not be able to see web pages clearly.
- Motor
  - People that have limited or no use of hands.
  - They could struggle to use conventional input devices that require fine motor control.

Accessibility – Disabilities - 2

- Auditory
  - People that are deaf or hard of hearing.
  - They could struggle to understand audio and video content on the web.
- Cognitive
  - People with cognitive disabilities may struggle to use websites with complex language, navigation, or interaction processes.

Accessibility - Assistive Technologies

Technologies that assist a disabled person:

- Visually impaired
  - Blind users will often use a ‘screen reader’ to surf the web
  - A screen reader reads out the contents of a page
- Motor impaired users
  - May use specially designed keyboards, mouth wands, eye tracking, voice recognition

Accessibility - Why Accessibility is Important

- Designing websites that are accessible is important.
- Disabled users make up a significant proportion of web users.
- Accessible sites assist older web users.
- Many countries have legal requirements to support disabled users.
- Accessible sites also assist mobile users.

Accessibility - Designing for Accessibility

- Use web standards:
  - Web standards are designed so that the web will be accessible.
- As we go through the module, we will consider other strategies for making our web pages accessible.

Usability

- Designing effective websites involves much more than deciding the look and feel of a site.
- Usability is about designing a site where users can accomplish tasks quickly and easily.
- Usability includes factors such as:
  - Site structure
  - Navigation
  - Interface design
  - How long the pages take to download

References

- About W3C
  - Available at: http://www.w3.org/Consortium/
- Niederst, J. *Web Design in a Nutshell: A Desktop Quick Reference*. O'Reilly Media.
- W3C WAI Resources on Introducing Web Accessibility
  - Available at: http://www.w3.org/WAI/gettingstarted/Overview.html

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Any Questions?