Programming in Design

Lecture 01 – Introduction to Web Programming and Web Design

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Web Programming

- **What is web programming?**
  - The process of writing, testing and maintaining the code of a website.

- **What is a website?**
  - A collection of web documents or resources (e.g. web pages, multimedia content), which are usually identified with a common domain name, and published on a web server.

- **How to write the code for a website?**
  - A website is written using a programming language for web.

Web Programming

- **What is a programming language?**
  - A programming language is a vocabulary and set of grammatical rules for instructing a computer to perform specific tasks.
  - Examples of programming languages for web: HTML, CSS, Javascript, PHP, ASP, …
  - More general programming languages: C, C++, Java, C#, Python, …

- **What is the best programming language?**
  - There is no "best programming language". It depends on the goals of the application, platform, programmer's skills, etc.

Internet vs. Web

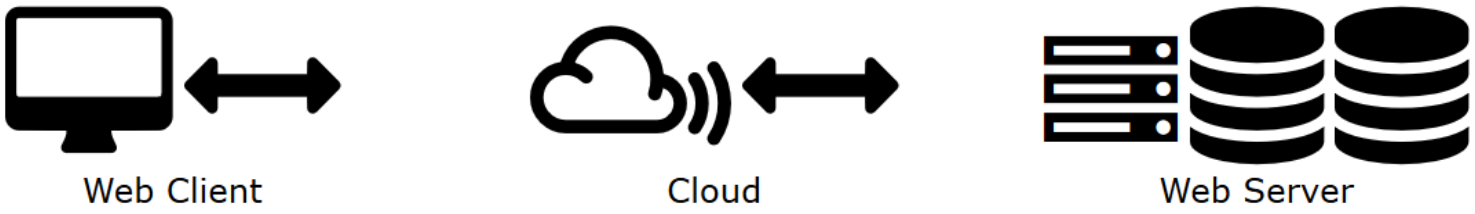
- **Internet:** a physical network connecting millions (or billions) of computers (and other devices) using the same protocols for sharing and transmitting information (TCP/IP).

- **World Wide Web:** a collection of interlinked multimedia documents that are stored on the Internet and accessed using a common protocol (HTTP).

- **Key distinction:** Internet is hardware while the Web is software, along with data, documents, and other media.
  - Many other Internet-based applications exist. Examples: email, instant messaging services, file-sharing services, etc.

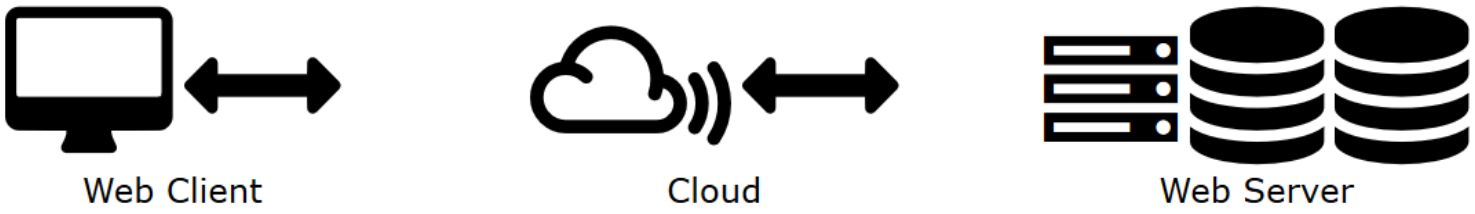
World Wide Web Communication

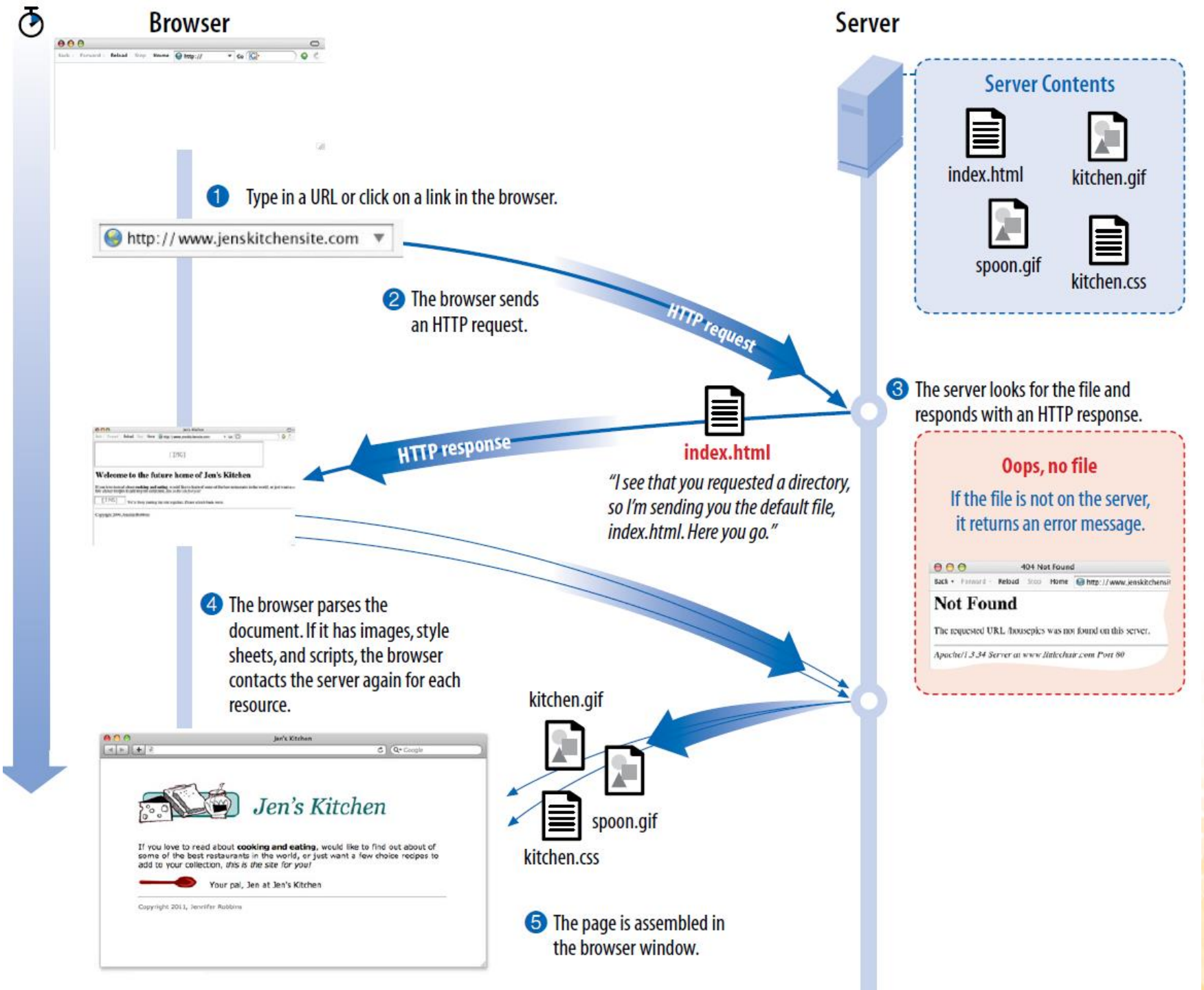
- The web is about communication between web clients and web servers.
  - **Clients** are often browsers (Chrome, Edge, Firefox), but they can be any type of program or device.
  - **Servers** are most often computers in the cloud.



HTTP Request / Response

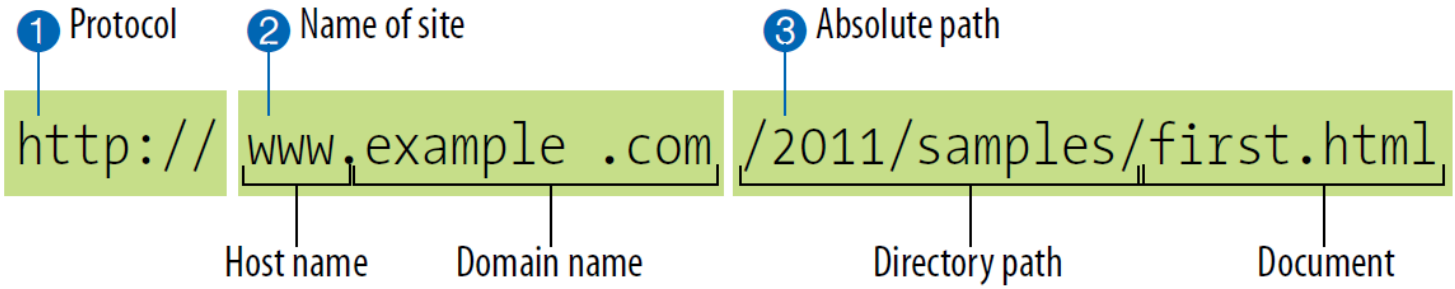
- Communication between clients and servers is done by requests and responses:
  1. A client (a browser) sends an HTTP request to the web;
  2. A web server receives the request;
  3. The server runs an application to process the request;
  4. The server returns an HTTP response (output) to the browser;
  5. The client (the browser) receives the response.




Browser
Server
Server Contents
index.html
kitchen.gif
spoon.gif
kitchen.css
1 Type in a URL or click on a link in the browser.
http://www.jenskitchensite.com
2 The browser sends an HTTP request.
HTTP request
3 The server looks for the file and responds with an HTTP response.
HTTP response
index.html
"I see that you requested a directory, so I'm sending you the default file, index.html. Here you go."
Oops, no file
If the file is not on the server, it returns an error message.
404 Not Found
Not Found
The requested URL /housepics was not found on this server.
4 The browser parses the document. If it has images, style sheets, and scripts, the browser contacts the server again for each resource.
kitchen.gif
spoon.gif
kitchen.css
Jen's Kitchen
If you love to read about cooking and eating, would like to find out about of some of the best restaurants in the world, or just want a few choice recipes to add to your collection, this is the site for you!
Your pal, Jen at Jen's Kitchen
Copyright 2011, Jennifer Robbins
5 The page is assembled in the browser window.

Web Page Addresses (URLs)

- Every page and resource on the Web has its own special address called a URL, which stands for Uniform Resource Locator.

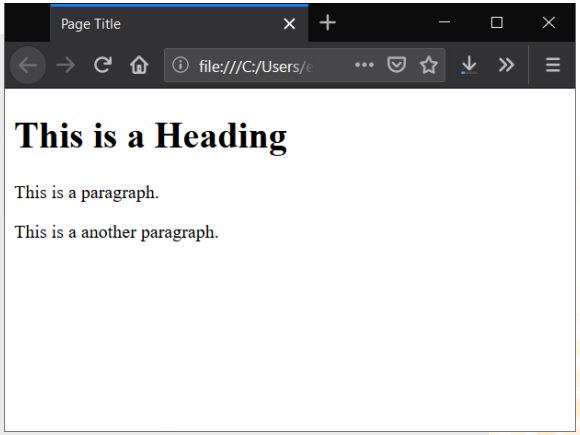


HTML (Hypertext Markup Language)

- HTML is the language used to create web page documents.

- HTML is not really a programming language: it is a markup language, which means it is a system for identifying and describing the various components of a document.

```
<!DOCTYPE html>
<html lang="en">
  <head>
    <title>Page Title</title>
  </head>
  <body>
    <h1>This is a Heading</h1>
    <p>This is a paragraph.</p>
    <p>This is another paragraph.</p>
  </body>
</html>
```



CSS (Cascading Style Sheets)

- While HTML is used to describe the content in a web page, the Cascading Style Sheets (CSS) is used to describe how that content should look.
  - Fonts, colors, background images, line spacing, page layout, etc.

```
body{
  background-color:lightblue;
}
h1{
  color:blue;
  font-size:40px;
}
p{
  font-family:verdana;
  font-size:20px;
}
```

JavaScript

- JavaScript is a scripting language that is used to add interactivity and behaviors to web pages.
  - JavaScript can update and change both HTML and CSS, calculate, manipulate and validate data.
  - JavaScript is a full programming language that contains variables, functions, conditional statements, loop statements, data structures, etc.

```
<script>
  function myFunction(a, b)
  {
    var result = a * b;
    return result;
  }

  var x = myFunction(2, 5);
  document.getElementById("resultlocation").innerHTML = x;

</script>
```

Frontend vs. Backend

- **Frontend** refers to any aspect of the design process that appears in or relates directly to the browser.
  - Graphic design and image production;
  - Interface design;
  - HTML document, style sheet development, JavaScript code;

- **Backend** refers to the programs and scripts that work on the server behind the scenes to make web pages dynamic and interactive.
  - Forms processing and database programming;
  - Server-side web applications using PHP, JSP, Ruby, ASP.NET, Java, etc.

What is the Web?

How to Design for Web?

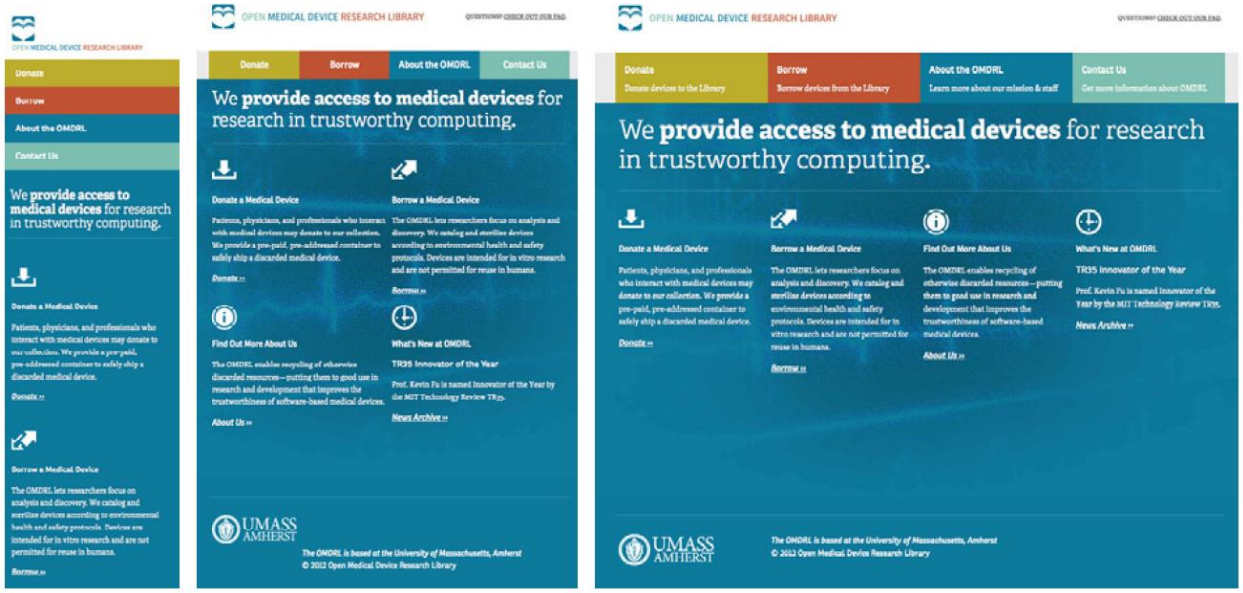
- Web designers never know exactly how the pages they create will be viewed.

- The challenges of designing for all existing devices goes beyond addressing differing screen sizes.
  - Different network speeds;
  - Context where the webpage is being accessed;
  - Different browser implementations;

- When writing a webpage, always follow the HTML, CSS, and JavaScript standards as documented by the World Wide Web Consortium (W3C).

Responsive Web Design

- Responsive web design is a strategy for providing custom layouts to devices based on the size of the viewport (browser window).
  - Provide single HTML document to all devices, but apply different style sheets (CSS) based on the screen size in order to provide the most optimized layout for that device.



What is a “Good” Website Design?

- Examples of “good” website designs?

- Some basic principles:
  - Purpose;
  - Consistency;
  - Typography, Readability and Communication;
  - Color Palette and Imagery;
  - Grid Based Layouts;
  - Mobile Compatibility;
  - Fast Loading;
  - Easy Navigation;

What is a “Bad” Website Design?

- Examples of “bad” website designs?
  - https://blinkee.com/
  - http://arngren.net/
  - http://www.greatdreams.com/
  - http://www2.pnwx.com/
  - http://www.patimex.com/
  - https://www.lingscars.com/
  - …

Assignment 1: Good Design / Bad Design

- **Analyze a set of 5 storytelling websites**: 3 that have a “good” UI design and 2 that have a “bad” UI design.
  - Through visual content analysis, describe in your own words “what works” and what does not in terms of design in the chosen websites.
    - You must analyze elements such as fonts, color palettes, layouts, aspects of usability, originality, responsiveness, complexity, and other relevant aspects.
  - Based on the analysis, describe the structure of your storytelling website (use the examples of existing websites to illustrate your ideas).
    - You must define elements such as layout, story presentation, animations, interactions, and other relevant aspects to illustrate your project.
  - Deliverables:
    - A report (PDF file) containing the analysis with annotated screencaps and other relevant illustrations.
    - A presentation (slides) describing the structure of the proposed storytelling website (for a 3 minutes pitch).

Assignment 1: Good Design / Bad Design

- Some examples of storytelling websites:
  - http://www.sbs.com.au/theboat/
  - http://pierrehermenicolasbuffe.com/en
  - http://rice.jennytypes.com/
  - http://thegreytales.net/en/
  - http://www.pbs.org/independentlens/interactive/after-the-storm/
  - http://www.sbs.com.au/hiroshima/
  - http://hobolobo.net/
  - http://andeinerseite.video
  - https://chooseyourstory.com/
  - https://infinite-story.com/

Further Reading

- Robbins, J. N. (2018). **Learning web design: A beginner's guide to HTML, CSS, JavaScript, and web graphics** (5th ed.), O'Reilly Media. ISBN: 978-1491960202.

  - **Chapter 2: How the Web Works**
  - **Chapter 3: Some Big Concepts You Need to Know.**