2

HOW THE WEB WORKS

OVERVIEW

- The internet vs. the web
- History of the web
- What servers do
- What browsers do
- URLs
- How web pages are constructed

Internet vs. Web

internet
International network of connected computers

protocol
A standardized method for transferring data or documents over a network (for example, FTP, STMP, HTTP)

web
Information shared over the internet using the Hypertext Transfer Protocol (HTTP), which is one of many ways to share information over the internet

A Brief History of the Web

- Started at CERN, a particle physics lab in Geneva, Switzerland
- 1989: Tim Berners-Lee proposed a system for sharing documents via “hyperlinks”
- 1990: Prototypes built, first by Tim B-L, then Robert Cailliau
- 1992: Approximately 25 servers worldwide
- 1993: Web opened up for commercial use

The Web Server

server
A program that delivers documents and data on request

web server
Any computer running **web server software**

The Web Server (cont'd)

IP address
A unique number assigned to a device connected to the internet (IP = Internet Protocol). Example: 199.27.145.64

Domain Name System (DNS)
A system that allows internet users to refer to servers by name rather than number

Domain name
A name assigned to a web server (easier to use than IP numbers). Example: oreilly.com

DNS server
A server that matches domain names to their respective IP addresses

The Browser

- The software that requests data or documents from the web server
- Also referred to as the **client** or **user agent**
- Could be on a desktop machine, smartphone, other connected device, or an assistive device such as a screen reader
- The program in the browser that interprets HTML/CSS/JavaScript is called the **rendering engine**

Server-side vs. Client-side

Indicates which machine is doing the processing:

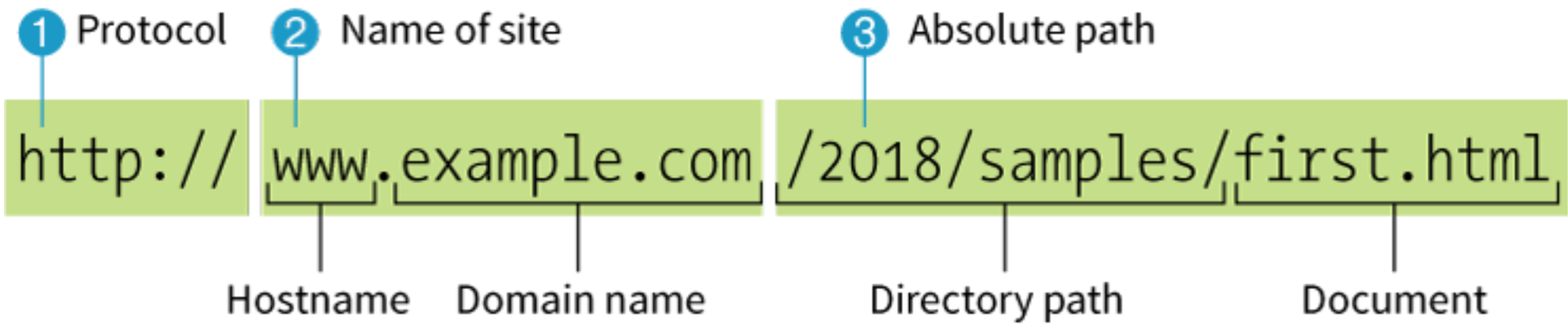
- **Client-side** applications run on the user's machine
- **Server-side** applications use the processing power of the server

Web Page Addresses (URLs)

URL = Uniform Resource Locator

Every page and resource on the web
has its own URL

Parts of a URL



1. Identifies the **protocol** as “web” (HTTP)
2. Identifies the site by its **domain name**
3. **Path** through directories on the server to the target file

What's Going On with Simple URLs

http://**example.com**/index.html

1. The **protocol** is implied and will be added by browser
2. **Domain name** is identified
3. If there is no **path** or filename, it means the URL is pointing to a default file (usually *index.html*)

Anatomy of a Web Page

The page you see in the browser window is nearly always made up of multiple files, including:

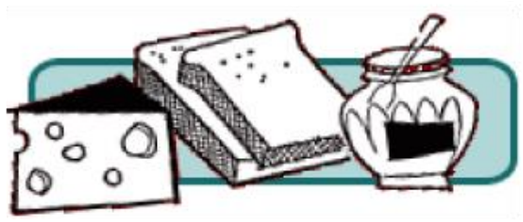
- An **HTML document** (gives the content structure)
- **Style sheets** (describes how it should look)
- **Images and other media** (embedded on the page on the fly)
- **Scripts** (add behaviors and functionality)

A Web Page and Its Components

index.html

```
<!DOCTYPE html>
<html>
<head>
  <meta charset="utf-8">
  <title>Jen's Kitchen</title>
  <link rel="stylesheet" href="kitchen.css" type="text/css">
</head>

<body>
<h1><img src="foods.png" alt="food illustration"> Jen's Kitchen</h1>

<p>If you love to read about <strong>cooking and eating</strong>, would like to learn about some of the best
restaurants in the world, or just want a few choice recipes to add to your collection, <em>this is the site
for you!</em></p>

<p><img src="spoon.png" alt="spoon illustration"> Your pal, Jen at Jen's Kitchen</p>

<hr>
<small>Copyright 2018, Jennifer Robbins</small>
</body>
</html>
```

foods.png

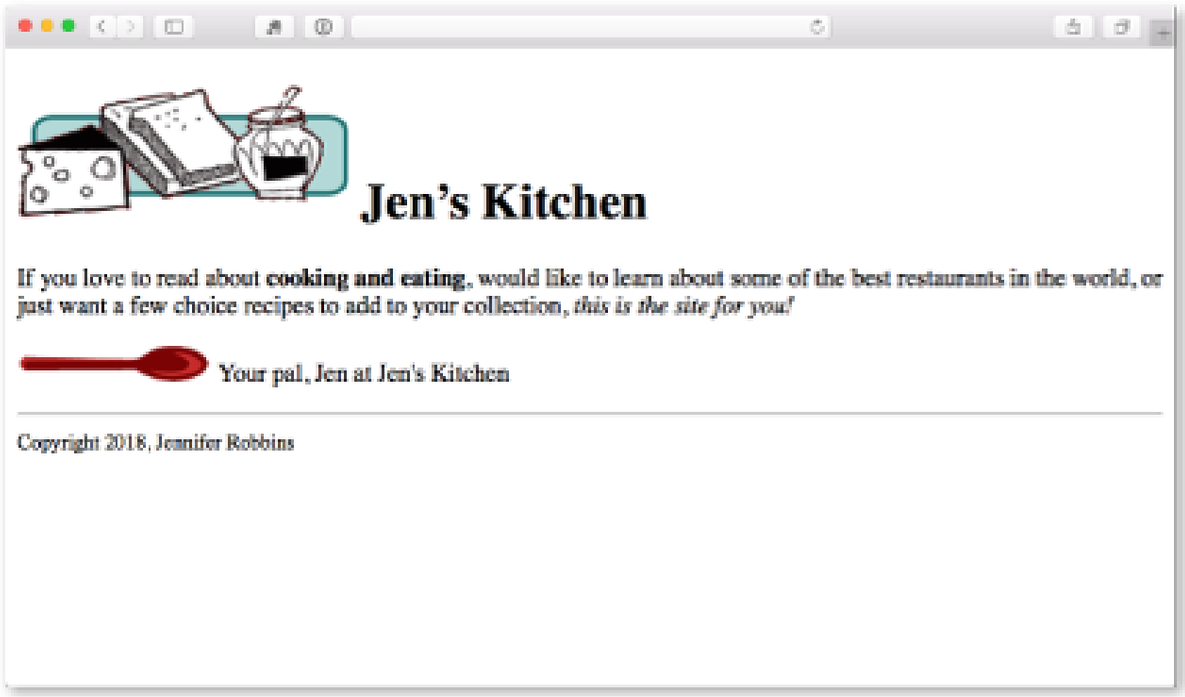


spoon.png

kitchen.css

```
body { font: normal 1em Verdana; width: 80%; margin: 1em auto; }

h1 { font: italic 3em Georgia; color: rgb(23, 109, 109);
     margin: 1em 0 1em; }

img { margin: 0 20px 0 0; }

h1 img { margin-bottom: -20px; }

small { color: #666666; }
```

What Style Sheets Do

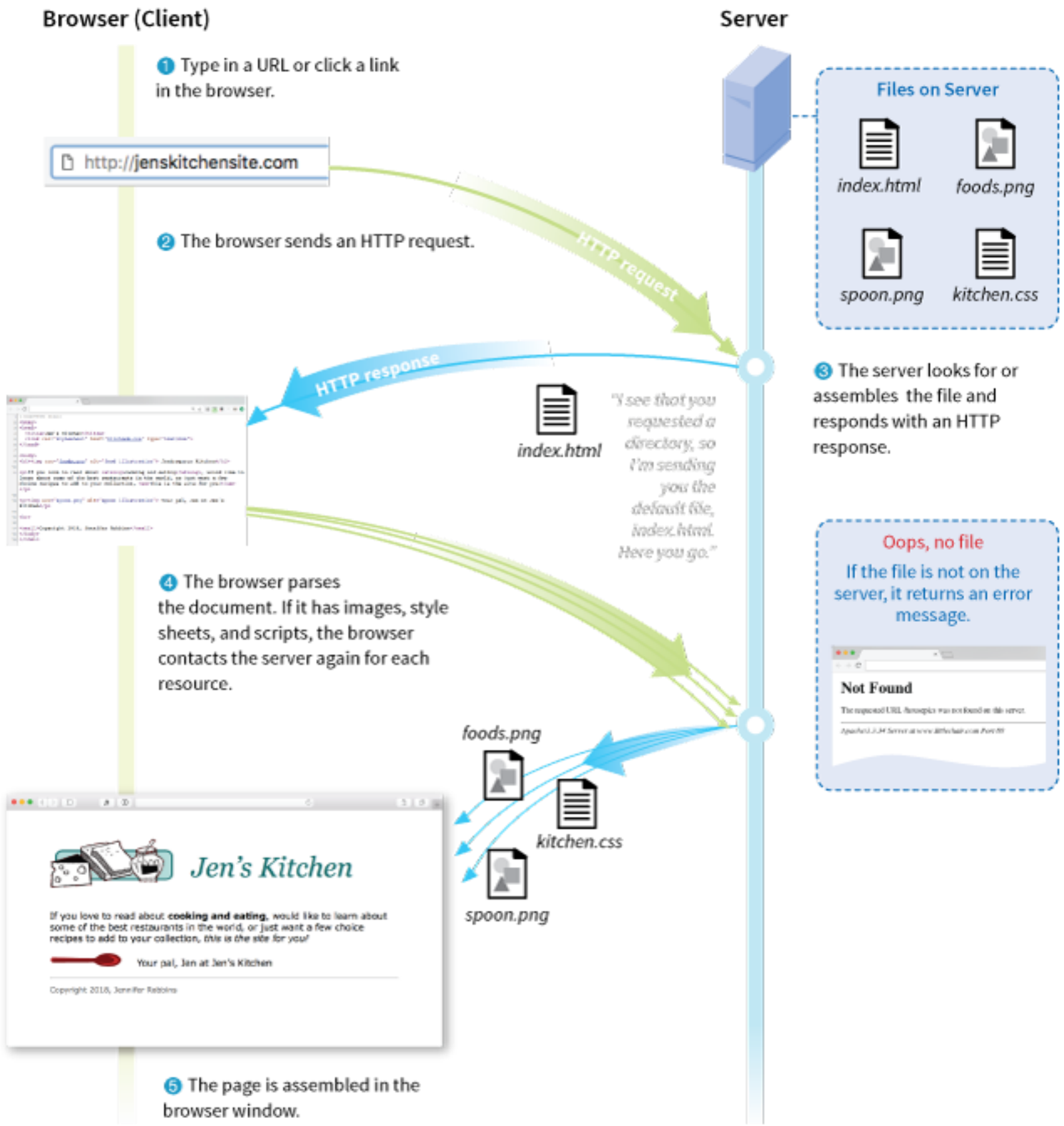


Browser's default rendering

Simple style sheet applied

Web Page Assembly Process

1. Request a page using its URL
2. Browser sends HTTP request to server
3. Server returns the file (or a “404 Not Found” message)
4. Browser looks at the HTML document. If there are external files (like images or style sheets), it contacts the server again for each resource
5. The server returns the additional files, and the browser assembles the final page


Browser (Client)
Server
1 Type in a URL or click a link in the browser.
http://jenskitchensite.com
2 The browser sends an HTTP request.
HTTP request
HTTP response
Files on Server
index.html
foods.png
spoon.png
kitchen.css
3 The server looks for or assembles the file and responds with an 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.
Not Found
4 The browser parses the document. If it has images, style sheets, and scripts, the browser contacts the server again for each resource.
foods.png
kitchen.css
spoon.png
Jen's Kitchen
If you love to read about cooking and eating, would like to learn about 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
5 The page is assembled in the browser window.