

Unit II: Hardware and Software**Chapter 10: Web Technologies****10.1: Goal:**

In this chapter, you will explore the technologies that power the modern web. You will learn how websites are created and delivered, how web browsers and servers communicate, and how web applications support communication, commerce, education, and entertainment. Understanding these technologies will help you become a more informed and effective user of the Internet.

10.2: Objectives:

- Explain the difference between the Internet and the World Wide Web.
- Describe how web browsers, web servers, URLs, and hyperlinks work together.
- Identify the major parts of a web address.
- Explain the roles of HTML, CSS, and JavaScript.
- Create a simple web page using basic HTML elements.
- Apply basic CSS formatting to a web page.
- Add headings, paragraphs, lists, links, and images to a page.
- Organize files and folders for a small website.
- Evaluate a web page for usability and accessibility.
- Publish or submit a simple web page.

10.3: Think About It

You visit websites every day to read news, complete assignments, shop, watch videos, and communicate with others.

But what happens after you enter a web address and press Enter?

How does your browser locate the correct page, download its contents, and display text, images, links, and videos in only a few seconds?

In this chapter, you will explore the technologies behind the web and create a web page of your own.

10.4: Opening Scenario

Carlos is applying for a summer internship. The application asks him to submit a link to a simple personal web page introducing himself, describing his skills, and displaying examples of his work.

Carlos uses social media and websites every day, but he has never created a web page. At first, he assumes he will need expensive software or advanced programming skills. He soon discovers that a basic web page can be created with a text editor and a few HTML instructions.

Carlos creates a page containing a title, short biography, list of skills, photograph, and links to several projects. He then adds simple CSS formatting to improve the page's appearance. By learning the foundations of web technology, Carlos becomes more than a web user: he becomes a web creator.

10.5: Why This Chapter Matters

The web is one of the most important communication and information systems in modern life. Nearly every organization uses websites to provide information, sell products, offer services, recruit employees, and communicate with customers.

Understanding basic web technologies helps students become more informed users of online information. It also provides a foundation for careers in business, communication, design, marketing, education, information technology, and software development.

Creating a web page gives students hands-on experience with structured information, file organization, digital design, accessibility, and problem solving.

10.6: Internet vs. the Web

The **Internet** and the **World Wide Web** are closely related, but they are not the same thing. The **Internet** is the worldwide network of computers, servers, cables, wireless connections, and other devices that communicate with one another. It provides the underlying infrastructure that allows information to travel around the world. Many services use the Internet, including email, messaging, video calls, online gaming, cloud computing, and the Web.

The **World Wide Web (Web)** is one service that operates on the Internet. It consists of websites, webpages, images, videos, and other resources that people access using a **web browser**. A simple way to remember the difference is to think of the Internet as the **transportation system** and the Web as one of the things traveling on that system. You can use the Internet without using the Web: for example, when sending an email or participating in an online game.

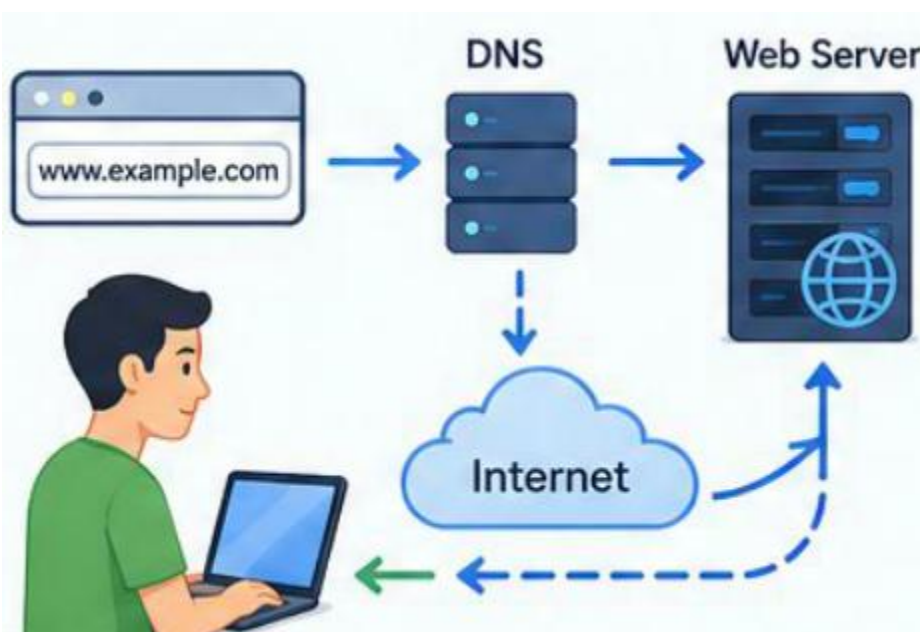
Internet vs. Web

Internet	World Wide Web
A global network connecting computers and devices	A collection of linked pages and resources
Supports email, file transfer, streaming, and other services	Accessed mainly through web browsers
Provides the underlying communication system	Uses the Internet to deliver web content

10.7: How a Web Page Reaches Your Screen

When you enter a web address (**URL**) or select a link, your **web browser** begins the process of locating and retrieving the webpage. First, the **Domain Name System (DNS)** helps translate the website's domain name, such as zebra0.com, into an **IP address** that computers use to locate the appropriate server. Your browser then sends a request across the Internet to the **web server** that hosts the website.

The web server responds by sending the files and data needed to build the page. These may include **HTML** for the page's structure and content, **CSS** for its appearance and layout, **JavaScript** for interactive features, and files such as images or video. The information travels across networks, typically in small units called **packets**, until it reaches your device. Your browser processes these resources and **renders** them, turning the code and data into the webpage you see and interact with on your screen.



10.8: Behind the Scenes: What Happens When You Visit a Website?

1. You enter a web address in a browser.
2. The browser determines the website's server address.
3. The browser sends a request across the Internet.
4. The web server locates the requested page.
5. The server sends the page files to the browser.
6. The browser reads the HTML and CSS.
7. The browser downloads images and other resources.
8. The completed page appears on the screen.

Example:

<https://www.zebra0.com/pages/welcome.html>

Part	Example	Purpose
Protocol	https://	Identifies how the browser communicates
Subdomain	www	Identifies a section or service
Domain	zebra0	Identifies the organization or website
Top-level domain	.com	Identifies the domain category
Path	/pages/welcome.html	Identifies a specific page or file

If you are typing the web address from a printed page, that is zebra (the animal) and 0 (the number)

10.9: Web Browsers and Search Engines

A **web browser** is software used to access, display, and interact with websites and other web content. When you enter a web address or select a link, the browser retrieves information from a web server and displays the resulting webpage. Browsers also provide features such as tabs, bookmarks, browsing history, downloads, privacy controls, and security warnings. Examples include Chrome, Edge, Firefox, and Safari.

A **search engine**, on the other hand, is an online service that helps you **find information on the Web**. Search engines maintain indexes of webpages and respond to keywords or questions by displaying relevant results. Google and Bing are examples. The important distinction is that **a browser lets you access the Web, while a search engine helps you find things on the Web**. You use a browser to visit a search engine, just as you use a browser to visit any other website.

10.10: The Structure of a Web Page

HTML, or Hypertext Markup Language, describes the structure and content of a web page. HTML uses elements, commonly called tags, to identify headings, paragraphs, links, images, lists, and other page components.

A Basic HTML Document

```
<!doctype html>
<html>
<head>
<meta charset="utf-8">
<title>Welcome</title>
</head>
<body>
<h1>Welcome to Zebra0.com</h1>
<p>Right click on this page and select "view page source" to see the html.</p>
</body>
</html>
```

Click the link to see the page: <https://www.zebra0.com/pages/welcome.html>, then right click and select "view source code" to see the html

10.11: Major Document Elements

Element	Purpose
<!DOCTYPE html>	Identifies the document as modern HTML
<html>	Contains the complete web page
<head>	Contains page information not displayed in the main page
<title>	Sets the title shown in the browser tab
<body>	Contains the visible page content

<code><h1></code>	Creates the main heading
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<code><p></code>	Creates a paragraph
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10.12: Common HTML Elements

Headings

`<h1>Main Heading</h1>`

`<h2>Section Heading</h2>`

`<h3>Subsection Heading</h3>`

Headings should be used in a logical order rather than selected only for their size.

Paragraphs

`<p>This is a paragraph of text.</p>`

Lists: `<ol>` is an ordered list with numbers; `<ul>` is unordered with dots.

`<ul>`

`<li>Photography</li>`

`<li>Travel</li>`

`<li>Cooking</li>`

`</ul>`

`<ol>`

`<li>Open the editor.</li>`

`<li>Create the HTML file.</li>`

`<li>Open the file in a browser.</li>`

`</ol>`

Links

`<a href="https://www.zebra0.com/pages/welcome.html">HTML Example</a>`

Images

Relative: If the image is in the same path as the webpage, you can type just file name instead of a full web address.

``

Absolute: If the image is on the same website, but not in the same path as the webpage, you can type just the path.

``

Emphasis

Important information

Emphasized text

10.13: Adding Color directly to HTML

```
<!doctype html>
<html>
<head>
<meta charset="utf-8">
<title>Welcome to Colors</title>
</head>
<body style="background-color:powderblue;">
<h1>Welcome to Zebra0.com</h1>
<p style="color:#A75AAD;"><strong>Right click on this page and select "view page source"
to see the html.</strong></p>
</body>
</html>
```

Notice that instead of just <body> a style with a background color of powder blue.

Another way to specify a color is to use the RGB value as shown for the paragraph.

In the next section, you will see a better way to add style to a document.

10.14: CSS: The Appearance of a Web Page

CSS, or Cascading Style Sheets, controls the visual presentation of a web page.

CSS can change:

- Fonts
- Text size
- Colors
- Spacing
- Borders
- Backgrounds
- Page layout

10.15: Basic CSS Example

```
<style>
body{
font-family: Arial, sans-serif;
max-width: 800px;
margin: auto;
padding: 20px;
}

h1{
color: navy;
}
</style>
```

A style rule contains a **selector**, a **property**, and a **value**.

```
h1{
color: navy;
}
```

- h1 is the selector.
- color is the property.
- navy is the value.

Visit <https://www.zebra0.com/pages/> and select the "Style" example.

Notice how the elements are nested:

```
<html>
<head>
  <style>
  </style>
</head>
<body>
  <h1></h1>
  <p></p>
</body>
</html>
```

This nesting is important, you can not have any overlapping elements.

10.16: Style Sheets

Instead of putting the style section on each page, you can create a separate CSS file and include it on each page in your website.

This will make all of the pages on your website have the same look.

If you decide to change the look of the page, you can just make the change on the style sheet and all of the pages will have the new look the second they are reloaded.

10.17: JavaScript and Interactive Pages

JavaScript is a programming language that can make web pages interactive. It can be used to:

- Display messages
- Validate forms
- Create menus
- Update page content
- Respond to button clicks
- Build games and web applications

10.18: PHP

When the server gets a request for a page with the extension .html, it retrieves the page and delivers it to the client.

When the server gets a request for a page with the extension .php, it retrieves the page, executes any php code to create the page that is delivered to the client.

The php file can have just a little php code or a lot.

Some of the things it can be used for are:

- Print the date and time
- Require a login and password
- Access a database

10.19: Example of PHP

The php code is shown in bold, the code shown displays the current date

```
<!doctype html>
<html>
<head>
<meta charset="utf-8">
<title>Today's Date</title>
</head>
<body>
<?php
//Display the date
$today=date("F j, Y");
echo '<h1>Today is '.$today.'</h1>';
?>
</body>
</html>
```

Page Delivered to Client:

```
<!doctype html>
<html>
<head>
<meta charset="utf-8">
<title>Today's Date</title>
</head>
<body>
<h1>Today is August 10, 2026</h1>
</body>
</html>
```

You can view all of the examples by visiting <https://www.zebra0.com/pages/>

Because PHP code is executed on the server, the user cannot see the php code, just the resulting page that is created on the server.

10.20: Website Files and Folders

A small website should use an organized folder structure.

Important File Rules

- Use short, descriptive file names.
- Avoid spaces in file names.
- Use lowercase letters when possible.
- Keep related images in an images folder.
- Use the .html extension for HTML pages.
- Use the .css extension for external style sheets.
- Do not move or rename files after linking to them unless the links are updated.

Web Design and Usability

A usable web page should be:

- Easy to read
- Simple to navigate
- Visually consistent
- Organized with meaningful headings
- Responsive to different screen sizes
- Free from unnecessary clutter

Design Guidelines

- Use readable font sizes.
- Keep paragraphs reasonably short.
- Use sufficient contrast.
- Avoid excessive colors and fonts.
- Leave white space between sections.
- Keep navigation consistent.
- Test every link.

10.21: Web Accessibility

Accessible websites can be used by people with a wide range of abilities and assistive technologies.

Important practices include:

- Add meaningful alternative text to informative images.
- Use headings in a logical order.
- Use descriptive link text.
- Provide sufficient color contrast.
- Do not rely only on color to communicate meaning.
- Make keyboard navigation possible.
- Add captions or transcripts to multimedia.
- Identify the page language.
- Use clear, meaningful page titles.

Descriptive Links

Avoid:

`<a href="schedule.html">Click here</a>`

Use:

`<a href="schedule.html">View the course schedule</a>`

Evaluating Online Information

Before trusting information on a website, consider:

- Who created the content?
- What qualifications does the author have?
- When was the information published or updated?
- Are credible sources provided?
- Is the site presenting facts, opinions, advertising, or satire?
- Does another reliable source confirm the information?
- Is the page attempting to manipulate the reader emotionally?

10.22: Chapter Summary

The **World Wide Web** has become an essential part of everyday life, providing access to information, education, entertainment, communication, shopping, government services, and many other resources. Although the terms *Internet* and *Web* are sometimes used interchangeably, they are not the same. The **Internet** is the worldwide network that connects computers and other devices, while the **Web** is a collection of interconnected pages and resources that are accessed through the Internet.

Web pages are stored on **web servers** and accessed using **web browsers** such as Chrome, Edge, Firefox, and Safari. When a user enters a **URL** or selects a link, the browser communicates with a web server using protocols such as **HTTP** and **HTTPS**. The server sends the requested files to the browser, which interprets them and displays the resulting web page. The **Domain Name System (DNS)** helps this process by translating easy-to-remember domain names into the numerical IP addresses computers use to locate one another.

Web pages are created using several important technologies. **HTML (Hypertext Markup Language)** provides the structure and content of a page, **CSS (Cascading Style Sheets)** controls its appearance and layout, and **JavaScript** can add interactivity and dynamic features. Modern websites may also use databases, cloud services, APIs, content management systems, and other technologies to provide more sophisticated services.

Because the Web contains an enormous amount of information, **search engines** help users locate relevant websites and resources. Search engines use automated systems to discover and index web pages and algorithms to determine which results to display. Effective Web users understand how to develop useful search terms, evaluate search results, recognize advertisements and sponsored content, and determine whether online information comes from a reliable source.

Modern web technologies also emphasize **accessibility, security, privacy, and responsive design**. Websites should be designed so that people with different abilities and people using assistive technologies can access their content. They should also work effectively on devices ranging from smartphones to large desktop monitors. Secure connections, strong authentication practices, and responsible handling of personal information help protect both website owners and users.

Understanding web technologies helps students move beyond simply **using** the Web to **understanding** what happens behind the scenes. Whether they are researching information, completing coursework, conducting business, communicating with others, or

creating their own web pages, knowledge of how the Web works helps students become more capable, informed, secure, and responsible digital citizens.