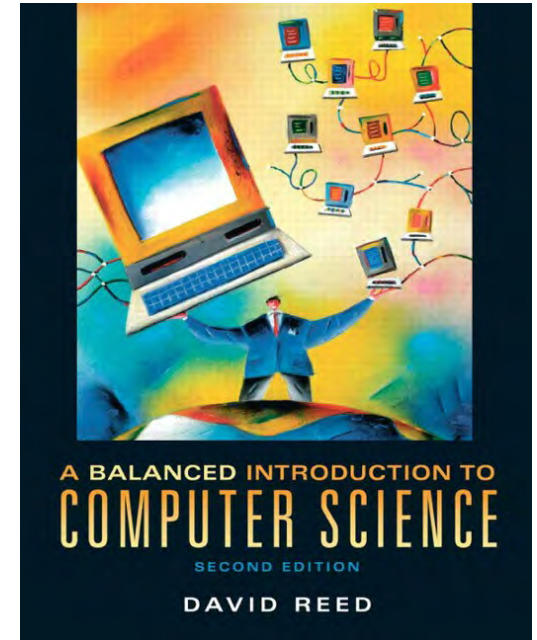


A Balanced Introduction to Computer Science, 2/E

David Reed, Creighton University

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Chapter 14

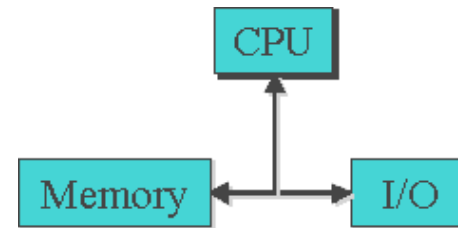
Inside the Computer - the
von Neumann Architecture

CPU Subunits and Datapath



recall the von Neumann architecture

- Central Processing Unit (CPU)
- Input/Output devices
- Memory



the CPU acts as the brain of the computer

- it obtains data and instructions from memory
- it carries out instructions
- it stores results back to memory

the program instructions that are executed by the CPU are in the *machine language* of that CPU

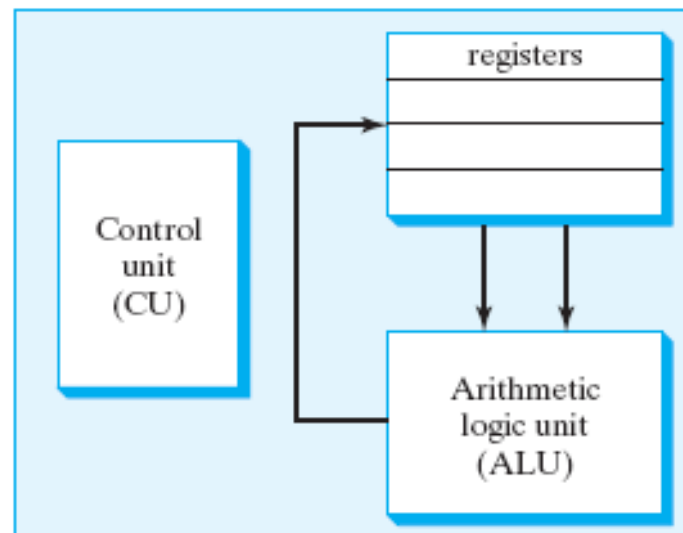
- users can write programs in a high-level language, but those high-level instructions must be translated into machine language before executing
 - ▣ even programs that exhibit complex behavior are specified to the CPU as sequences of simple machine-language commands
 - ▣ the CPU can execute these instructions at such a high speed that complex programmatic behavior is achieved

CPU Subunits



the CPU is comprised of several subunits, each playing a specific role in processor functioning

- *Arithmetic Logic Unit (ALU)*: circuitry that performs the actual operations on data (addition, subtraction, bit manipulations)
- *Registers*: memory locations built into the CPU (to provide fast access)
 - ▣ the transfer of data between registers and main memory occurs across a collection of wires called a *bus*
- *Control Unit (CU)*: circuitry in charge of fetching data and instructions from main memory, as well as controlling the flow of data between registers and the ALU

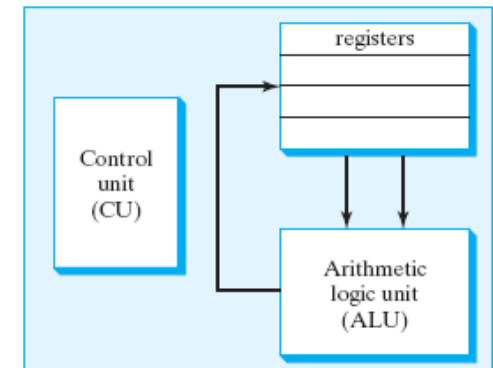


CPU Datapath Cycles



the path that data follows within the CPU, traveling along buses from registers to the ALU and then back to registers, is known as the *CPU datapath*

- a single rotation around the CPU datapath is referred to as a *CPU datapath cycle*



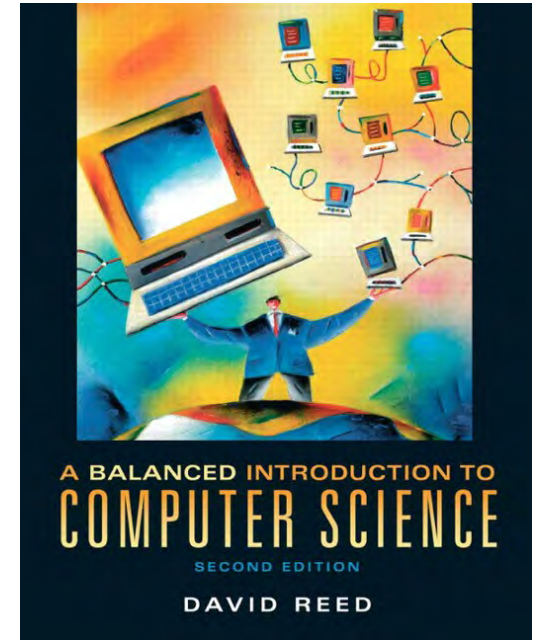
recall earlier that we defined CPU speed as measuring the number of instructions that a CPU can carry out per second

- CPU speed = the number of CPU cycles per second
 - e.g., a 2.5GHz CPU can perform 2.5 billion cycles per second
- CPUs cannot be compared solely on the basis of their speeds
 - since CPUs have different instruction sets, one CPU may be able to complete more complex tasks in a single cycle
 - so, a slower CPU with a richer instruction set may complete some tasks faster

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Chapter 1 Computer Basics

Quick Net & Web Overview



the Internet is a vast, international network of computers

- the physical connections between computers vary, but the overall effect is that computers around the world can communicate and share resources
- the Internet traces its roots back to 1969, when the U.S. government sponsored the first long-distance computer network
- starting with only 4 computers, the network would eventually evolve into today's Internet

the World Wide Web is a collection of software that spans the Internet and enables the interlinking of documents and resources

- the basic idea for the Web was proposed by Tim Berners-Lee in 1989
- his system interlinked documents (including multimedia elements such as images and sound clips) over the Internet
- through the use of well-defined rules, or *protocols*, that define how they are formatted, documents could be shared across networks on various types of computers

Internet \neq World Wide Web



THINK:

Internet is *hardware*

- consists of computers around the world and the communications links that connect them

World Wide Web is *software*

- consists of Web pages, images, sound files, etc., and the software that stores and retrieves these files

the Internet could exist without the Web

- and did, in fact, for many years (applications included email and news groups)

the Web couldn't exist without the Internet

- the Internet is the hardware that stores and executes the Web software



Viewing a Web Page

a *Web page* is a text document that contains additional formatting information in a language called HTML (HyperText Markup Language)

a *Web browser* is a program that accesses a Web page, interprets its content, and displays the page

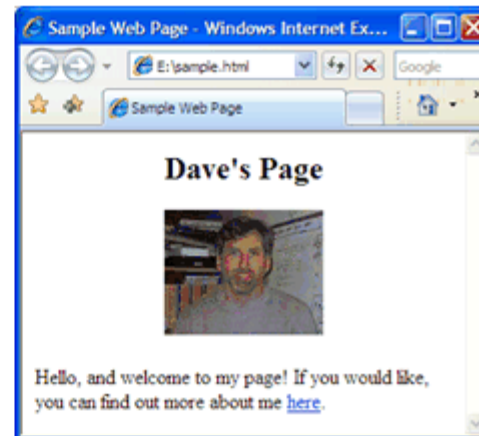
```
sample.html - Notepad
File Edit Format View Help
<html>
<!-- sample.html          Dave Reed -->
<!-- Sample web page.    -->
<!------->
<head>
<title> sample web Page </title>
</head>
<body>
<div style="text-align:center">
<h2>Dave's Page</h2>

</div>
<p>hello, and welcome to my page! If you
would like, you can find out more about me
<a href="personal.html">here</a>.</p>
</body>
</html>
```

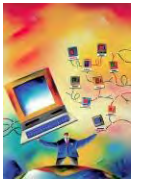
A Web page is a text document that contains HTML formatting.



A Web browser is a program that interprets the HTML and displays the page.



Web Addresses

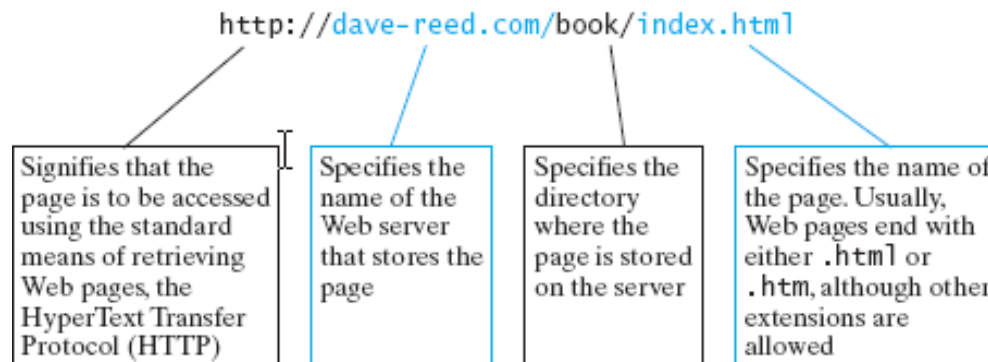


a *Web server* is an Internet-enabled computer that stores Web pages and executes software for providing access to the pages

- when you request a Web page, the browser sends a request over the Internet to the appropriate server
- the server locates the specified page and sends it back to your computer

Web pages require uniform names to locate and identify them uniquely

- each page is assigned a *Uniform Resource Locator (URL)*
- URL's are commonly referred to as *Web addresses*
- the different parts of the Web address provide information for locating the page





Viewing Local Web Pages

a Web browser can be used to view pages stored on the same computer

- can go through the File menu to select the local page, or
- can enter the File location in the address box (without the `http` prefix)

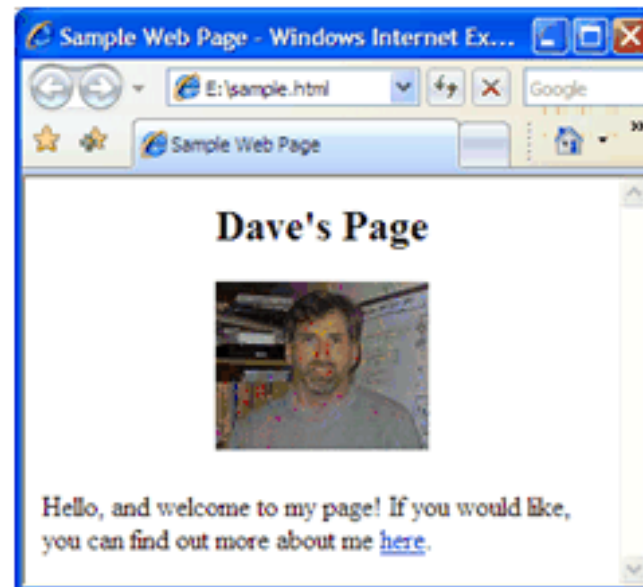
this feature is handy when developing Web pages

- can create a Web page and view it in the browser before uploading to a server



Note: the Web address (URL) does not begin with `http://`

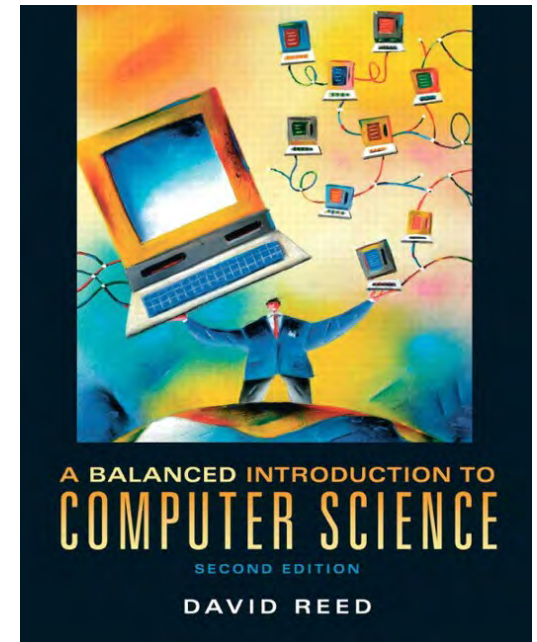
This means that the file is stored locally on the user's computer (here, on the E : drive).



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Chapter 2 HTML and Web Pages

HTML & Web Pages



recall: a Web page is a text document that contains additional formatting information in the HyperText Markup Language (HTML)

- HTML specifies formatting within a page using *tags*
- in its simplest form, a tag is a word or symbol surrounded by brackets (<>)

```
sample.html - Notepad
File Edit Format View Help
<html>
<!-- sample.html          Dave Reed -->
<!-- Sample web page.    -->
<!------->
</html>

<head>
<title> sample web Page </title>
</head>

<body>
<div style="text-align:center">
<h2>Dave's Page</h2>

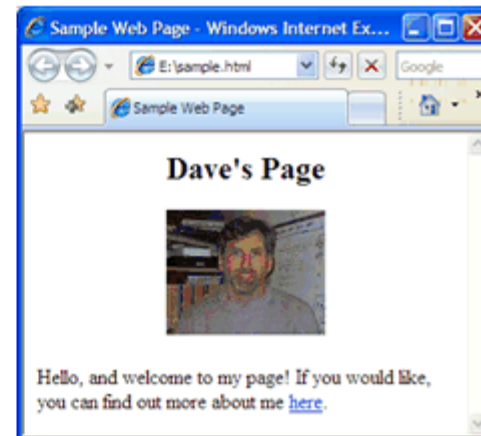
</div>

<p>hello, and welcome to my page! If you
would like, you can find out more about me
<a href="personal.html">here</a>.</p>
</body>
</html>
```

A Web page is a text document that contains HTML formatting.



A Web browser is a program that interprets the HTML and displays the page.



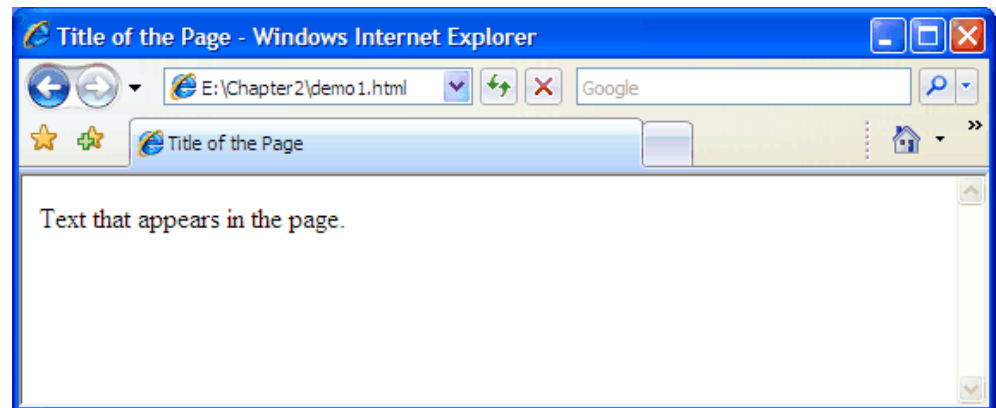
HTML Tags



required tags in a Web page:

- `<html>` and `</html>` enclose the entire HTML document
- the HEAD section (enclosed between `<head>` and `</head>`) contains information that the browser uses to control the look of the page
 - ▣ the HEAD can contain a title for the browser window, enclosed between `<title>` and `</title>`
- the BODY section (enclosed between `<body>` and `</body>`) contains the text that will appear in the page

```
1. <html>
2.  <!-- demo1.html           Dave Reed  -->
3.  <!-- This is a simple Web page.  -->
4.  <!-- ===== -->
5.
6.  <head>
7.    <title> Title of the Page </title>
8.  </head>
9.
10. <body>
11.   <p> Text that appears in the page. </p>
12. </body>
13. </html>
```



HTML Elements



tags and the text they enclose form an *HTML element*

```
<title> Title of the Page </title>
```

 is a TITLE element

```
<head>
```

```
  <title> Title of the Page </title>
```

```
</head>
```

is a HEAD element (which contains a nested TITLE element)

most HTML elements have opening and closing tags, but not all

```
<!-- demo1.html    Dave Reed -->
```

 is a COMMENT element

- a comment is ignored by the browser (it does not appear in the rendered page)
- comments are used by the page developer to document page features

Web Home Info



Using Filezilla, go to the top and enter

Host: shell.uoregon.edu

Username: christie (your username)

Password: *****(your password)

Port: 22

In the window on the right-hand side, double click the public_html directory.
That's where your home page will be stored.