Your assignment...

- Prepare an answer for your assigned question.
- Use Chapter 1 in the book and this PowerPoint to procure information.

Prepare a PowerPoint presentation to:

1. Show your answer and additional information/facts – make sure you understand and can explain your answer.
   - Provide as much information and detail as possible.
   - Add graphics to enhance.
2. Where in the book did you find your information? Include the page number.
3. What more do you need to find out to help you better understand this question?

Be prepared to share your information with the class.
The digital revolution is an ongoing process of social, political, and economic change brought about by digital technology, such as computers and the Internet.

The technology driving the digital revolution is based on digital electronics and the idea that electrical signals can represent data, such as numbers, words, pictures, and music.
The Digital Revolution

- Digitization is the process of converting text, numbers, sound, photos, and video into data that can be processed by digital devices.

- The digital revolution has evolved through four phases, beginning with big, expensive, standalone computers, and progressing to today’s digital world in which small, inexpensive digital devices are everywhere.

> FIGURE 1-1
From Victrolas to stereos, and from boomboxes to iPods, music is only one aspect of life that’s been affected by technology.
The Digital Revolution

### FIGURE 1-2
As the digital revolution progressed, technology changed, as did the way we use it.

<table>
<thead>
<tr>
<th>Expired</th>
<th>Tired</th>
<th>Uninspired</th>
<th>Desired</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data processing</td>
<td>Personal computing</td>
<td>Network computing</td>
<td>Cloud computing</td>
</tr>
<tr>
<td>Big corporate and government computers</td>
<td>Desktop computers</td>
<td>Laptop computers</td>
<td>Smartphones and tablets</td>
</tr>
<tr>
<td>Custom applications</td>
<td>Standalone applications</td>
<td>Monolithic software suites</td>
<td>Handheld apps and cloud-based apps</td>
</tr>
<tr>
<td>CB radios</td>
<td>Dial-up Internet access</td>
<td>Cable and satellite Internet access</td>
<td>4G and Wi-Fi Internet access</td>
</tr>
<tr>
<td>ARPANET</td>
<td>AOL and CompuServe</td>
<td>The Web and virtual worlds</td>
<td>Social media</td>
</tr>
<tr>
<td>Arcade games</td>
<td>2-D action games</td>
<td>3-D multiplayer games</td>
<td>Touchscreen micro-games</td>
</tr>
</tbody>
</table>
Some historians mark the 1980s as the beginning of the digital revolution, but engineers built the first digital computers during World War II for breaking codes and calculating missile trajectories.

Computers were operated by trained technicians.

Back then, processing components for computers were housed in closet-sized cabinets that did not usually include a keyboard or display device.
Data Processing

- Data processing is based on an input-processing-output cycle.
- Data goes into a computer, it is processed, and then it is output.

FIGURE 1-4
Data processing is the computing model for the first phase of the digital revolution. The concept of large computers performing tasks based on the input-processing-output cycle represents the primary way computers were used from the 1940s through the 1970s. Data processing installations still exist today, but other technologies emerged, making computing available to a more diverse group of users. See an example of data processing.
Personal Computing

The model for the second phase of the digital revolution, personal computing is characterized by small, standalone computers powered by local software.

Local software refers to any software that is installed on a computer’s hard drive.
Personal Computing

FIGURE 1-5

The most popular uses for personal computers were word processing and gaming; sound systems and graphics capabilities were primitive. The Internet wasn’t open to public use, so computing was not a social experience.
Network Computing

- The third phase of the digital revolution materialized as computers became networked and when the Internet was opened to public use.
- A computer network is a group of computers linked together to share data and resources.
- The Internet is a global computer network originally developed as a military project, and was then handed over to the National Science Foundation for research and academic use.
Network Computing

- The Web (short for World Wide Web) is a collection of linked documents, graphics, and sounds that can be accessed over the Internet.
- During the period from 1995–2010, computing was characterized by the Web, e-mail, multiplayer games, music downloads, and enormous software applications, such as Microsoft Office, Norton’s Internet Security Suite, and Corel Digital Studio.
Cloud Computing

- Local applications are being eclipsed by cloud computing, which characterizes the fourth phase of the digital revolution.
- Cloud computing provides access to information, applications, communications, and storage over the Internet.
- The expansion of cloud computing is due in part to convergence, a process by which several technologies with distinct functionalities evolve to form a single product.
Cloud Computing

FIGURE 1-7
The "cloud" represents Internet-based services, such as applications and social media, that are available from computers and handheld digital devices.
Cloud Computing

- Convergence is important to the digital revolution because it created sophisticated mobile devices whose owners demand access to the same services available from full-size computers on their desks.
- Social media are cloud-based applications designed for social interaction and consumer-generated content.
Cloud Computing

**FIGURE 1-9**
Social media include many popular services.

**Social networking services:**
- Post your profile and interact with friends
- Facebook, Google+, LinkedIn

**Wikis:**
- Collaborate with others to create interlinked documents
- Wikipedia, Wikimedia

**Media sharing:**
- Post and share photos, music, and videos
- Flickr, Photobucket, YouTube, Metacafe, Vimeo

**Blogging services:**
- Create online commentary arranged in chronological order
- WordPress, Google, Blogger, TypePad

**Microblogging:**
- Post short messages and respond to other participants’ messages
- Twitter, Tumblr
Digital Society

- Digital technologies and communications networks make it easy to cross cultural and geographic boundaries.
- Anonymous Internet sites, such as Freenet, and anonymizer tools that cloak a person’s identity, even make it possible to exercise freedom of speech in situations where reprisals might repress it.
- Citizens of free societies have an expectation of privacy.
- Intellectual property refers to the ownership of certain types of information, ideas, or representations.
Digital technology is an important factor in global and national economies, in addition to affecting the economic status of individuals.

Globalization can be defined as the worldwide economic interdependence of countries that occurs as cross-border commerce increases and as money flows more freely among countries.

Some individuals are affected by the digital divide, a term that refers to the gap between people who have access to technology and those who do not.

Digital technology permeates the very core of modern life.
Section B: Digital Devices

- Computer Basics
- Computer Types and Uses
- Microcontrollers
A computer is a multipurpose device that accepts input, processes data, stores data, and produces output, all according to a series of stored instructions.
Computer Basics

- Computer input is whatever is typed, submitted, or transmitted to a computer system.
- Output is the result produced by a computer.
- Data refers to the symbols that represent facts, objects, and ideas.
- Computers manipulate data in many ways, and this manipulation is called processing.
- Central Processing Unit (CPU)
- Microprocessor

**Chapter 1: Computers and Digital Basics**
Memory is an area of a computer that temporarily holds data waiting to be processed, stored, or output.

Storage is the area where data can be left on a permanent basis when it is not immediately needed for processing.

A file is a named collection of data that exists on a storage medium.

The series of instructions that tells a computer how to carry out processing tasks is referred to as a computer program.

Software
Computer Basics

- A stored program means that a series of instructions for a computing task can be loaded into a computer’s memory
- Allows you to switch tasks
- Distinguishes a computer from other simpler and less versatile digital devices
Computer Basics

- Application software is a set of computer programs that helps a person carry out a task.
- Software applications are sometimes referred to as apps, especially in the context of handheld devices.
- The primary purpose of system software is to help the computer system monitor itself in order to function efficiently.
  - Operating system (OS)
A personal computer is a microprocessor-based computing device designed to meet the computing needs of an individual.
Computer Types and Uses

- Handheld digital devices include familiar gadgets such as iPhones, iPads, iPods, Garmin GPSs, Droids, and Kindles.
- These devices incorporate many computer characteristics.
- Handheld devices can be divided into two broad categories: those that allow users to install software applications (apps) and those that do not.

![Figure 1-16](image)

*Figure 1-16: Tablet computers, high-end mobile phones, and similar handheld devices allow you to install your choice of application software.*
Computer Types and Uses

- A videogame console, such as Nintendo’s Wii, Sony’s PlayStation, or Microsoft’s Xbox, is not generally referred to as personal computer because of their history as dedicated game devices.
The term workstation has two meanings:

- An ordinary personal computer that is connected to a network
- A powerful desktop computer used for high-performance tasks
The purpose of a server is to serve computers on a network (such as the Internet or a home network) by supplying them with data.

A mainframe computer (or simply a mainframe) is a large and expensive computer capable of simultaneously processing data for hundreds or thousands of users.

A computer falls into the supercomputer category if it is, at the time of construction, one of the fastest computers in the world.

A compute-intensive problem is one that requires massive amounts of data to be processed using complex mathematical calculations.
FIGURE 1-20

This IBM z9 mainframe computer weighs 2,807 pounds and is about 6.5 feet tall.
Microcontrollers

- A microcontroller is a special-purpose microprocessor that is built into the machine it controls.
- Microcontrollers can be embedded in all sorts of everyday devices.

FIGURE 1-22
A microcontroller is a self-contained chip that can be embedded in an appliance, vehicle, or other device.
Section C: Digital Data Representation

- Data Representation Basics
- Representing Numbers, Text, Images, and Sound
- Quantifying Bits and Bytes
- Circuits and Chips
Data Representation Basics

- Data representation refers to the form in which data is stored, processed, and transmitted.
- Digital data is text, numbers, graphics, sound, and video that has been converted into discrete digits such as 0s and 1s.
- Analog data is represented using an infinite scale of values.

**FIGURE 1-24**
A computer is a digital device, more like a standard light switch than a dimmer switch.
Representing Numbers, Text, Images, and Sound

- Numeric data
  - Binary number system

- Character data
  - ASCII, EBCDIC, Extended ASCII, and Unicode

<table>
<thead>
<tr>
<th>Decimal (Base 10)</th>
<th>Binary (Base 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>5</td>
<td>101</td>
</tr>
<tr>
<td>6</td>
<td>110</td>
</tr>
<tr>
<td>7</td>
<td>111</td>
</tr>
<tr>
<td>8</td>
<td>1000</td>
</tr>
<tr>
<td>9</td>
<td>1001</td>
</tr>
<tr>
<td>10</td>
<td>1010</td>
</tr>
<tr>
<td>11</td>
<td>1011</td>
</tr>
<tr>
<td>1000</td>
<td>111101000</td>
</tr>
</tbody>
</table>

FIGURE 1-25
The decimal system uses ten symbols to represent numbers: 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. The binary number system uses only two symbols: 0 and 1.
Figure 1-26: The Extended ASCII code uses eight 1s and 0s to represent letters, symbols, and numerals. The first 32 ASCII characters are not shown in the table because they represent special control sequences that cannot be printed. The two blank entries are space characters.
## Quantifying Bits and Bytes

<table>
<thead>
<tr>
<th>Bit</th>
<th>One binary digit</th>
<th>Gigabit</th>
<th>$2^{30}$ bits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Byte</td>
<td>8 bits</td>
<td>Gigabyte</td>
<td>$2^{30}$ bytes</td>
</tr>
<tr>
<td>Kilobit</td>
<td>1,024 or $2^{10}$ bits</td>
<td>Terabyte</td>
<td>$2^{40}$ bytes</td>
</tr>
<tr>
<td>Kilobyte</td>
<td>1,024 or $2^{10}$ bytes</td>
<td>Petabyte</td>
<td>$2^{50}$ bytes</td>
</tr>
<tr>
<td>Megabit</td>
<td>1,048,576 or $2^{20}$ bits</td>
<td>Exabyte</td>
<td>$2^{60}$ bytes</td>
</tr>
<tr>
<td>Megabyte</td>
<td>1,048,576 or $2^{20}$ bytes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*FIGURE 1-29*
Quantifying Digital Data
An integrated circuit (IC) is a super-thin slice of semiconducting material packed with microscopic circuit elements.
The electronic components of most digital devices are mounted on a circuit board called a system board, motherboard, or main board.
Section D: Digital Processing

- Programs and Instruction Sets
- Processor Logic
Programs and Instruction Sets

- Computers and dedicated handheld devices all work with digital data under the control of a computer program.
- Computer programmers create programs that control digital devices. These programs are usually written in a high-level programming language.
- The human-readable version of a program created in a high-level language by a programmer is called source code.
Programs and Instruction Sets

FIGURE 1-34
A compiler converts statements written in a high-level programming language into object code that the processor can execute.

Watch a compiler in action.

FIGURE 1-35
An interpreter converts high-level statements one at a time as the program is running.

Watch an interpreter in action.
A microprocessor is hard-wired to perform a limited set of activities, such as addition, subtraction, counting, and comparisons, called an instruction set.

Each instruction has a corresponding sequence of 0s and 1s.

The end product is called machine code.

An op code (short for operation code) is a command word for an operation such as add, compare, or jump.

The operand for an instruction specifies the data, or the address of the data, for the operation.
Programs and Instruction Sets

```c
#include <stdio.h>
int main ()
{
  int i;

  for (i=1; i<=100; i=i+1)
    printf("%d\t",i);
  return(0);
}
```

**FIGURE 1-36**
The source code program in the left column prints numbers from 1 to 100. This source code is converted to machine language instructions shown in the right column that the computer can directly process.
Processor Logic

- The ALU (arithmetic logic unit) is the part of the microprocessor that performs arithmetic operations.
- The ALU uses registers to hold data that is being processed.
- The microprocessor’s control unit fetches each instruction, just as you get each ingredient out of a cupboard or the refrigerator.
- The term instruction cycle refers to the process in which a computer executes a single instruction.
FIGURE 1-37
The control unit fetches the ADD instruction, then loads data into the ALU’s registers where it is processed.

FIGURE 1-38
The instruction cycle includes four activities.

1. Fetch instruction
2. Interpret instruction
3. Execute instruction
4. Increment pointer to the next instruction
The control unit’s instruction pointer indicates M1, a location in memory. The control unit fetches the “Add two numbers” instruction from M1. This instruction is then sent to the ALU. The instruction pointer then changes to M2. The processor fetches the instruction located in M2, moves it to a register, and executes it. See how it works.
Section E: Password Security

- Authentication Protocols
- Password Hacks
- Secure Passwords
Security experts use the term authentication protocol to refer to any method that confirms a person’s identity using something the person knows, something the person possesses, or something the person is:

- A person can be identified by biometrics, such as a fingerprint, facial features (photo), or retinal pattern.
- A user ID is a series of characters—letters and possibly numbers or special symbols—that becomes a person’s unique identifier.
- A password is a series of characters that verifies a user ID and guarantees that you are the person you claim to be.
When you create an account, you are usually required to enter a user ID and password. Then you are required to confirm the password to make sure you typed it correctly.
When someone gains unauthorized access to your personal data and uses it illegally, it is called identity theft.

Hackers employ a whole range of ways to steal passwords.

A dictionary attack helps hackers guess your password by stepping through a dictionary containing thousands of the most commonly used passwords.

The brute force attack uses password-cracking software, but its range is much more extensive than the dictionary attack.
Password Hacks

- If hackers can’t guess a password, they can use another technique called sniffing, which intercepts information sent out over computer networks.
- An even more sophisticated approach to password theft is phishing.
- A keylogger is software that secretly records a user’s keystrokes and sends the information to a hacker.
Secure Passwords

Use passwords that are at least eight characters in length. The longer the password, the tougher it is to crack.

Use a combination of letters, numbers, and special characters such as $, #, if permitted.

Use uppercase and lowercase letters if the hosting computer is case sensitive.

Use a passphrase based on several words or the first letters of a verse from a favorite poem or song. For example, the words from the nursery rhyme "Jack and Jill went up the hill" can be converted to jjwuth. You can then insert special characters and numbers, and add some uppercase letters to create a password that still makes sense to you personally, such as J&J w^th!ll. This type of password appears random to anyone else but you.

Do not use a password based on public information such as your phone number, Social Security number, driver’s license number, or birthday. Hackers can easily find this information, and other personal facts such as names of your spouse, children, or pets.

Avoid passwords that contain your entire user ID or part of it. A user ID of bjeffe coupled with a password of bjeffe123 is an easy target for password thieves.

Steer clear of words that can be found in the dictionary, including foreign words. Dictionary attacks can utilize foreign language dictionaries. Even common words spelled backwards, such as drowssap instead of password, are not tricky enough to fool password-cracking software.
Secure Passwords

- Strive to select a unique user ID that you can use for more than one site
- Maintain two or three tiers of passwords

Tier 1: High security
- Password: BBx98$$NN26
- Uses: Online banking, PayPal, iTunes, Amazon.com

Tier 2: Low security
- Password: MyDogRover

FIGURE 1-45
Tiered passwords reduce the number of user IDs and passwords that you have to remember; however, the disadvantage is that a hacker who discovers one of your passwords will be able to use it to access many of your accounts.
Secure Passwords

- A password manager (sometimes called a keychain) stores user IDs with their corresponding passwords and automatically fills in login forms.

**FIGURE 1-47**
Password managers help you keep track of all your passwords. If you’ve never used a password manager and want to see how one works, start the guided tour for this figure in your interactive eBook.

**FIGURE 1-48**
Some password managers are portable so that you can carry them with you on a USB flash drive.