

# **Exposure CS 2021** **for CS1**

## **Chapter 1 Section 9-10 Slides**

**Introduction to Computer Science:  
Programming Languages & Networking**

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# Section 1.9

What is

Programming?

# **Program Definition**

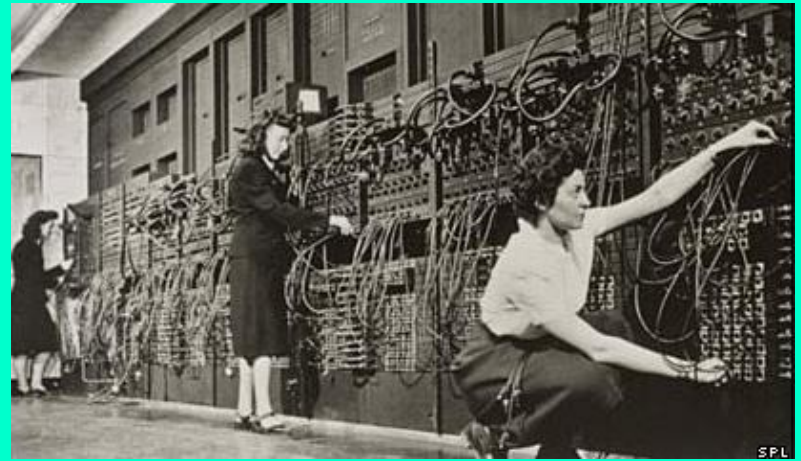
***A program* is a sequence of instructions that makes a computer perform a desired task.**

***A programmer* is a person who writes a program for a computer.**

# Programming in Machine Code

Programming in *Machine Language* a.k.a. *Machine Code* means you are directly manipulating the 1s and 0s of the computer's binary language.

In some cases, this means you are manipulating the wires of the machine.



In other cases, you are flipping switches *on* and *off*.

Even if you had the ability to “type” the 1s and 0s, machine language would still be incredibly tedious.

# “Amazing Grace”

In the 1940s, Grace Hopper did not like the way we were programming computers. There had to be a better way. The whole reason computers were invented in the first place was to do tedious. It should be possible to program a computer using English words instead of 1s and 0s.

Grace Hopper wrote the first *compiler* (a type of translator) in 1952 for the language A-0. This paved the way for the other languages that followed. Many of these were also created in part or in whole by Grace Hopper.

Her immeasurable contributions to computer science have earned her the nickname “Amazing Grace”. The Cray XE6 *Hopper* supercomputer and the USS *Hopper* Navy destroyer are also named after her.



# Types of Languages

## Low-Level Languages

Languages that function at, or very close to 1s and 0s.  
Powerful, but very difficult.

Examples: Machine Language, Assembly Language

## High-Level Languages

Languages that use English-like words as instructions.  
Easier, but less powerful.

Examples: BASIC, Pascal, FORTRAN, COBOL, LISP, Java, Python

## Very High-Level Languages

Languages that use clickable pictures as instructions.  
Example: Lego Mindstorms NXT



# Computer Translators

A *translator* (compiler or interpreter) translates a high-level language into low-level machine code.

A *compiler* translates the entire program into an executable file before execution.

An *interpreter* translates one program statement at a time during execution.

Most modern languages use a compiler.

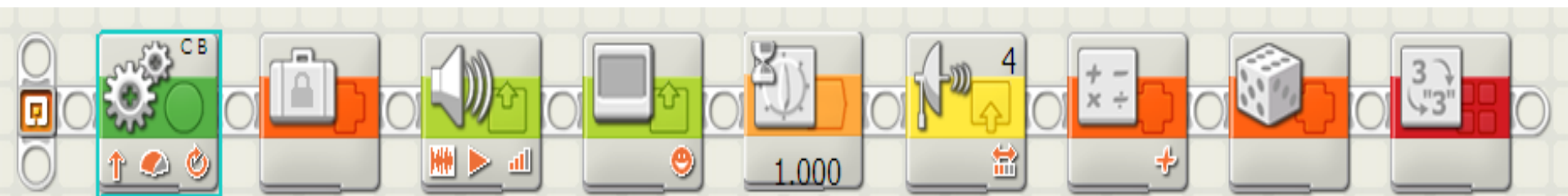
# Programming Languages

Year	Language	Purpose / Significance
1957	<b>FORTRAN</b>	First successful programming language. Designed for mathematicians, scientists and engineers.
1959	<b>COBOL</b>	Created (largely by Grace Hopper) to handle record processing to make it ideal for the business community.
1964	<b>BASIC</b>	Designed as a simple, easy-to-learn language to give non-math and non-science majors the ability to use computers.
1967	<b>Logo</b>	A visual language designed for young children. Introduced Turtle Graphics.
1969	<b>Pascal</b>	Designed specifically for the purpose of teaching proper programming techniques, as opposed to the quick-and-dirty style of programming in BASIC.
1972	<b>C</b>	Popular with professional programmers because they combine the readability of high-level languages with the power of low-level languages. These are essentially “medium-level languages”. C++ added Object Oriented Programming.
1983	<b>C++</b>	



# Programming Languages

Year	Language	Purpose / Significance
1990	<b>HTML</b>	Created by Tim Berners-Lee along with the 1 <sup>st</sup> web server & the 1 <sup>st</sup> web browser. No he did not “invent the Internet,” but he did invent the <i>Word Wide Web</i> . HTML is the language used by all web browsers. Without it, “surfing the net” wouldn’t be possible.
1994	<b>Python</b>	A powerful language that was designed to be simple like BASIC, but less “wordy” than Pascal. Uses an interpreter.
1995	<b>Java</b>	The first Platform Independent computer language. “Platform Independence” means that a program created on one computer will work and have the exact same output on any other computer. Requires the use of OOP.
2006	<b>Lego NXT</b>	A “very-high level language” where you program with pictures instead of words. An example of NXT is below:



# What language will you learn this year?



python

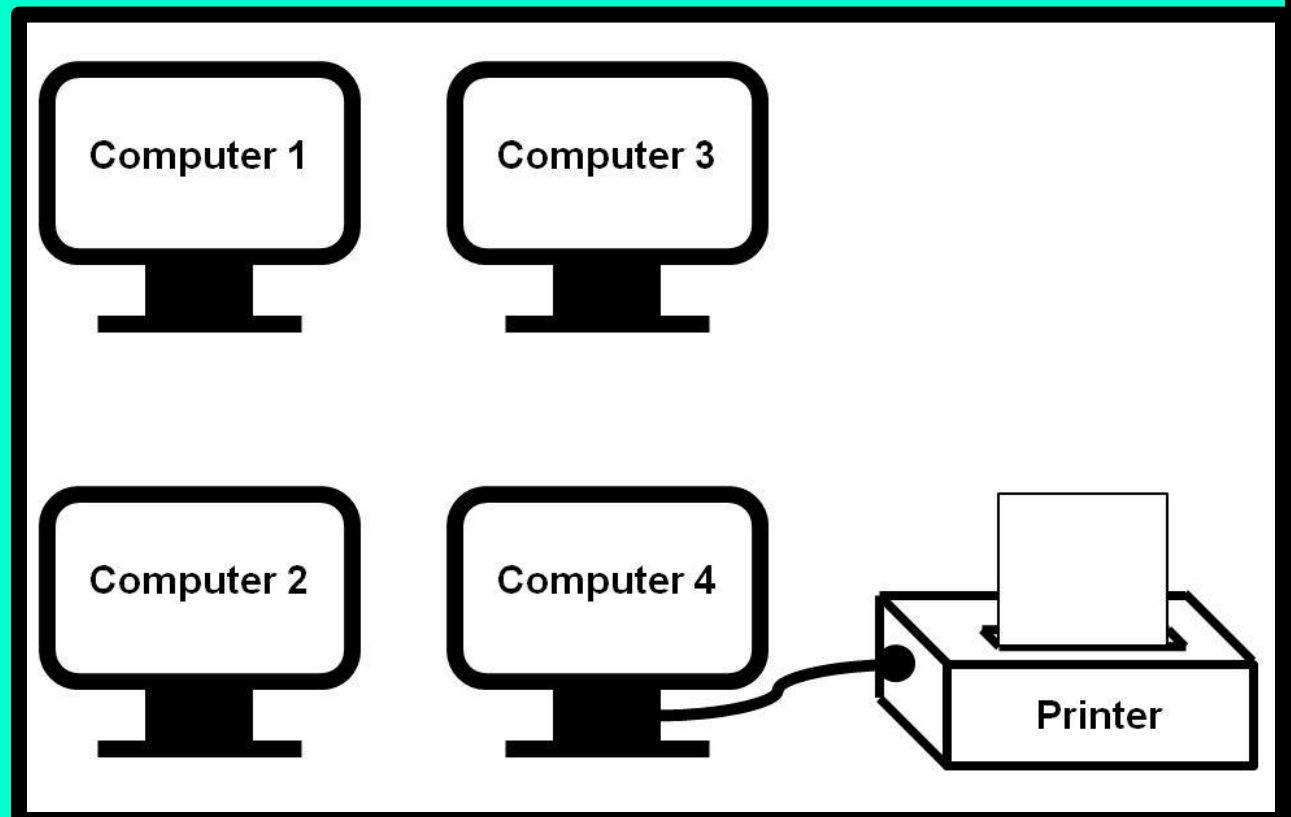
# Section 1.10

# Networking

# SneakerNet

Early personal computers were not networked at all. Every computer was a stand-alone computer. Some computers were hooked up to printers and many others were not. If you needed to print something, and you were not directly connected to a printer, you

saved your work to a floppy disk, put on your sneakers, and walked to the printing computer. Sharing files was done in the same way.

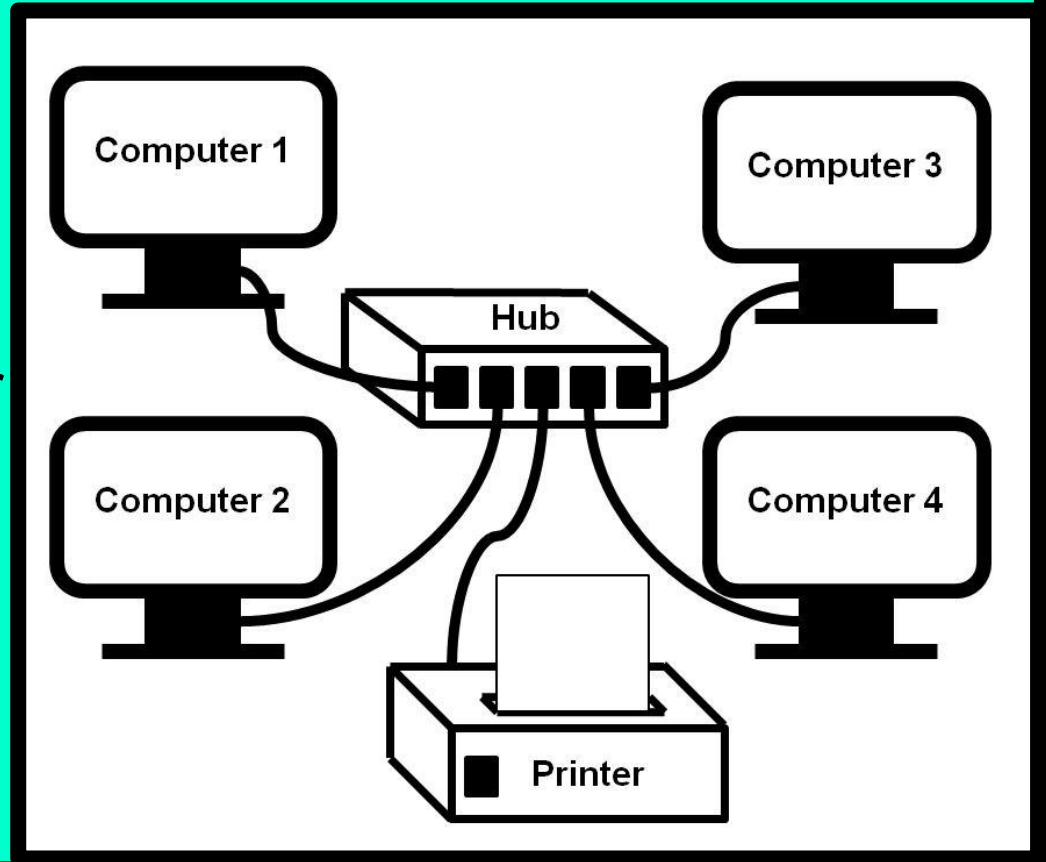


# Peer-To-Peer Networks

The 1<sup>st</sup> practical networks for personal computers were peer-to-peer networks. These are small groups of computers with a common purpose all connected to each other. These types of networks were frequently called Local Area Networks or LANs.

The term “peer-to-peer network” means every computer on the network is equal. In other words, there is no single computer controlling the others.

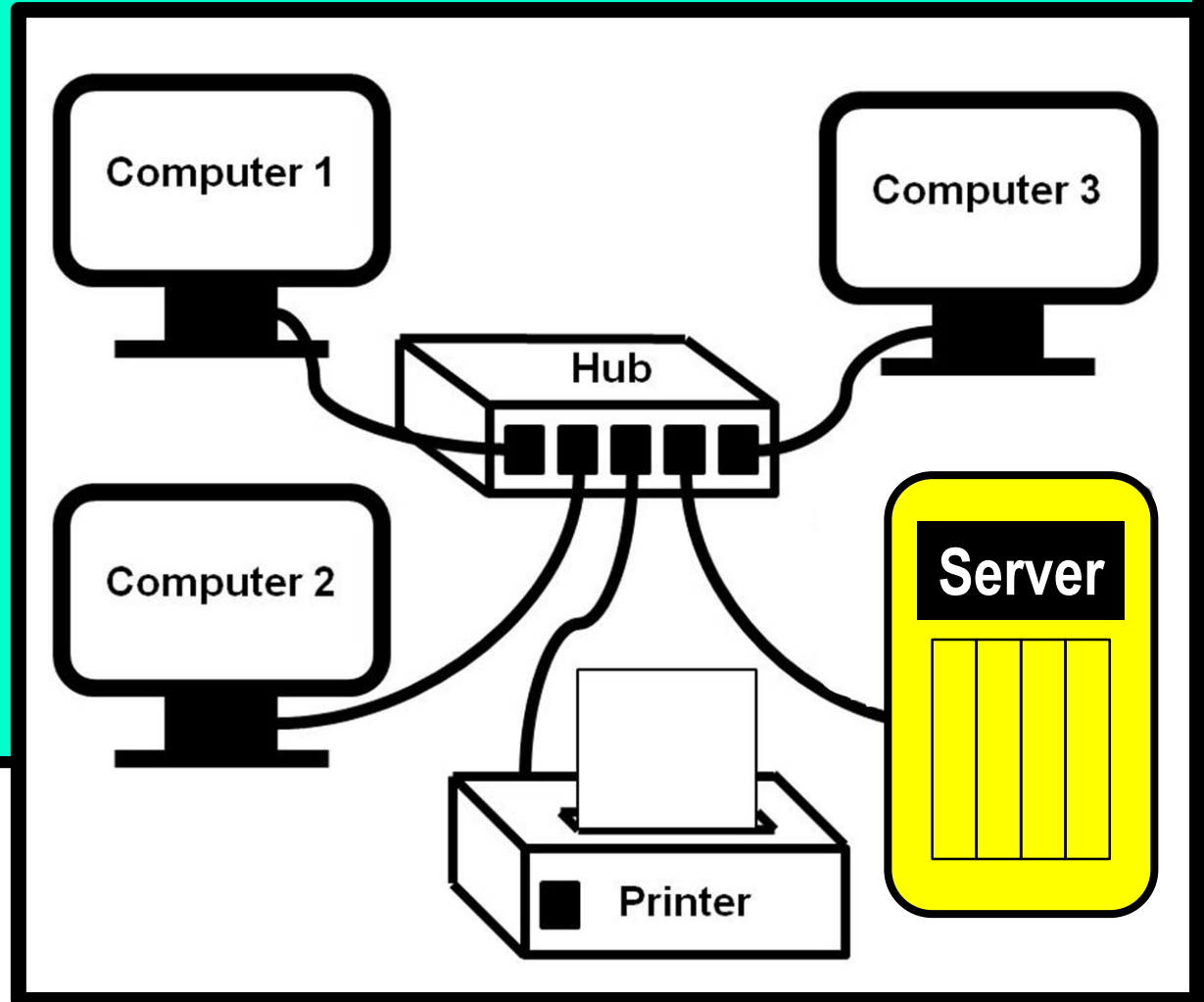
This type of network does not work well when you have more than 10 computers.



# Client-Server Networks

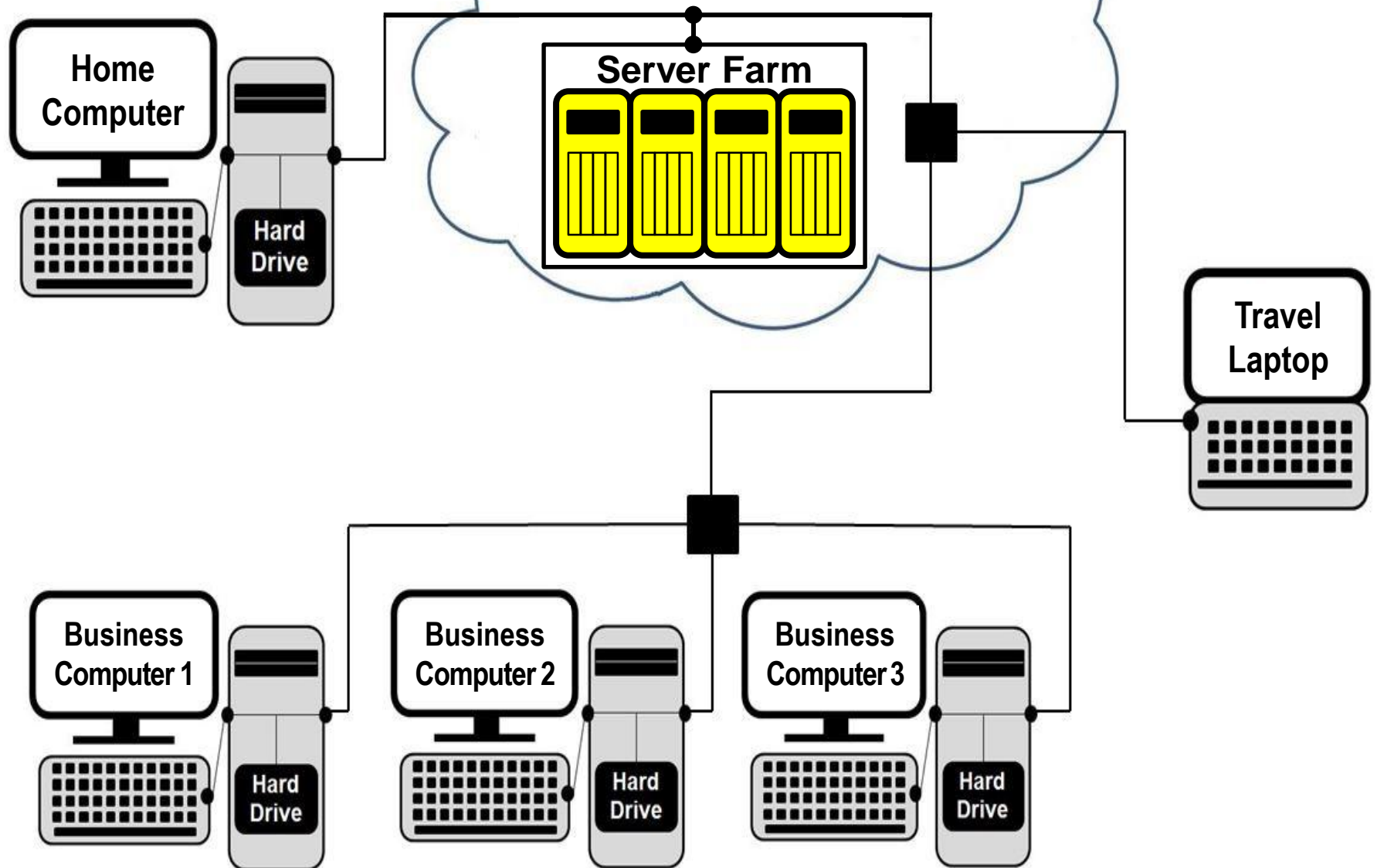
A *server* is a special computer that is connected to the LAN for one or more purposes. It *services* the other computers in the network which are called *clients*.

Servers can be used for printing, login authentication, permanent data storage and communication.

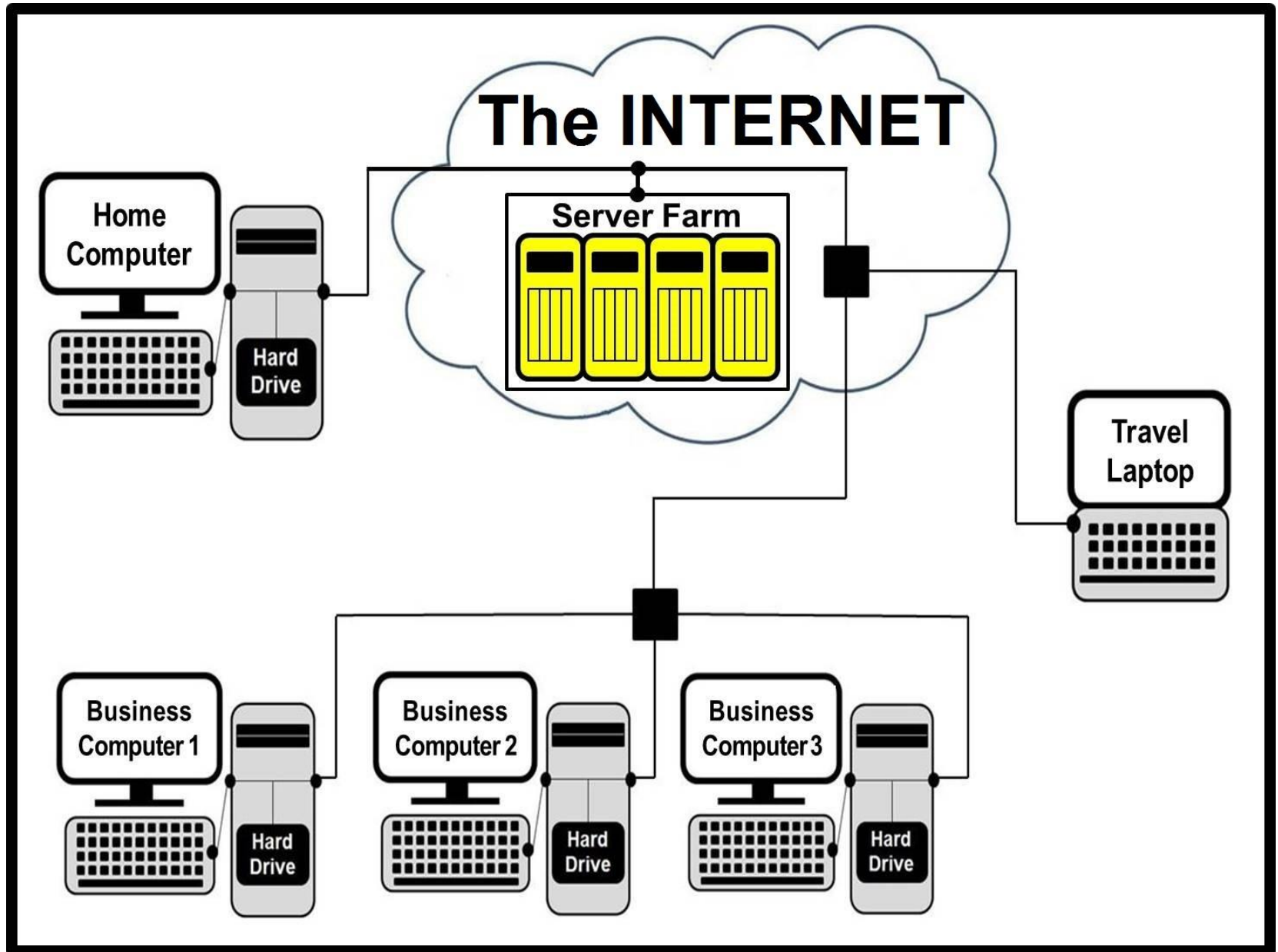




# THE INTERNET



“The Cloud” is just a metaphor for “The Internet.”



# The Department of Defense

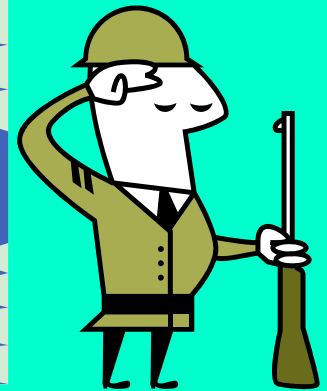
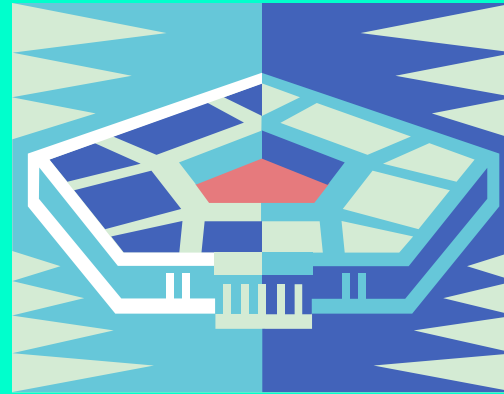
The **Internet** has existed since the 1960s and has its origins in the "Cold War." During the Cold War there was a major concern about the country being paralyzed by a direct nuclear hit on the Pentagon.

A means of communication had to be created that was capable to keep working regardless of damage created anywhere.

This was the birth of the Internet.

The Internet has no central location where all the control computers are located.

Any part of the Internet can be damaged and all information will then travel around the damaged area.



Many people confuse the  
World Wide Web with the Internet.  
The WWW invented by Tim Berners-Lee  
in 1990 is PART of the Internet.

# The Modern Internet

Normally, businesses and schools have a series of LANs that all connect into a large network called an Intranet.

An *Intranet* behaves like the Internet on a local business level.

This promotes *security, speed* and saves *cost*.

Now the moment you, your school, your business, or your home, connects to the outside world and giant world-wide network known as the *Internet*, you have access to millions of lines of telecommunications.

This will cost money and every person, every school, every business, who wants this access needs to use an *Internet Service Provider* or *ISP*.

You pay a monthly fee to the ISP for the Internet connection. The amount of money you pay depends on the speed of your Internet connection.