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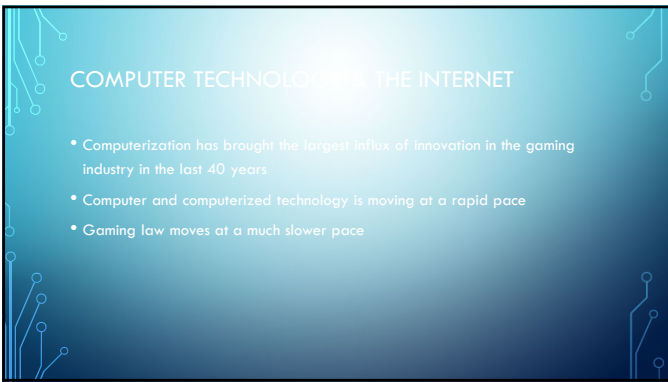
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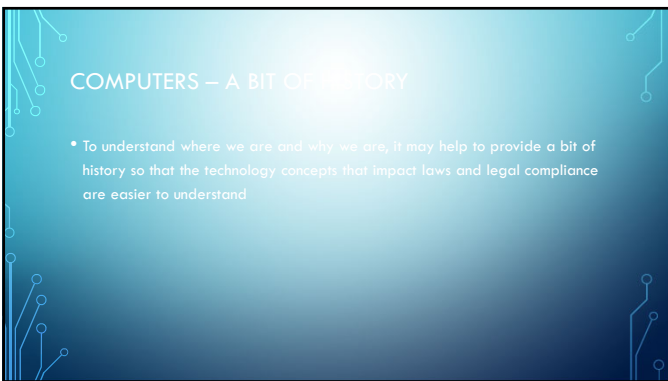
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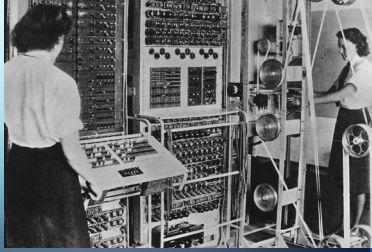
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### COMPUTERS – A BIT OF HISTORY

- Early computers, like Colossus pictured on the right, were single task single purpose machines
- Colossus was designed to apply binary math to encrypted communications to break the encryption



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### COMPUTERS – A BIT OF HISTORY

- Harvard 1 was a room sized mechanical electrical computer that calculated mathematical tables



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### COMPUTERS – A BIT OF HISTORY

- In 1943 the first programmable computer, ENIAC, began operation



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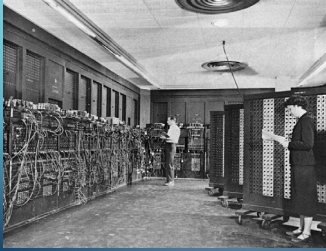
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### COMPUTERS – A BIT OF HISTORY



• While programmable for different tasks, ENIAC's programs were a series of switches and wires plugged into specific orders.

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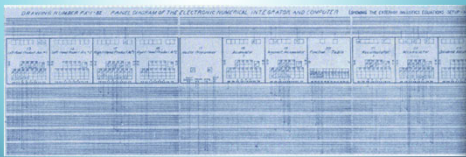
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### COMPUTERS – A BIT OF HISTORY



• Programs were "stored" on wiring/panel diagrams outside of the computer

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### COMPUTERS – A BIT OF HISTORY

• Programmers would read the panel/wiring diagrams to set the ENIAC computer up for a particular set of operations (a program)



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COMPUTERS – A BIT OF HISTORY

- Early programmers were primarily women



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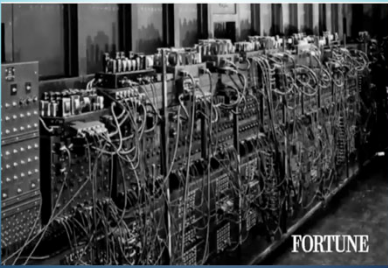
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COMPUTERS – A BIT OF HISTORY



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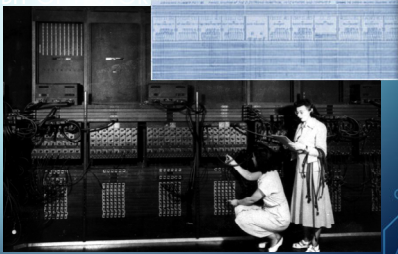
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COMPUTERS – A BIT OF HISTORY

- Clearly, storage through notes, and programming by creating a matrix of wires and switches was a labor intensive, time consuming task.
- IBM found a better way



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### COMPUTERS – A BIT OF HISTORY

- IBM had a history of using punch cards for tabulating
  - Punch cards were adapted from the textiles industry
- IBM adapted punch cards to store computer programs for digital computers



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### COMPUTERS – A BIT OF HISTORY

- Programs and data stored on punch cards can be reloaded and run on demand.
- However, programs only work when the cards are in the exact right order



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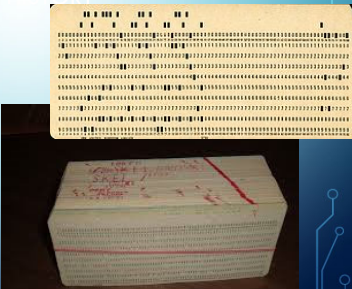
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### COMPUTERS – A BIT OF HISTORY

- While superior to diagram cards with wires and switches, punch cards had storage issues and the holes could wear out, ruining a program



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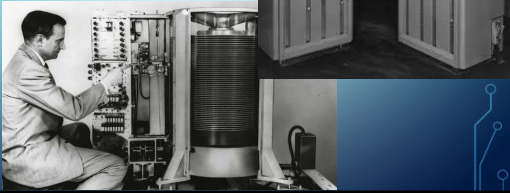
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### COMPUTERS – A BIT OF HISTORY

- The invention of drum memory and magnetic tape storage revolutionized computing



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### COMPUTERS – A BIT OF HISTORY

- With magnetic tape storage, data and programs could be stored, recalled and processed electronically
- This also allowed the first use of the computer terminal as we know it
- However, early implementations had 1 terminal per computer



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### COMPUTERS – A BIT OF HISTORY

- The character terminal allowed for direct input into the computer
- To facilitate terminal communications, the RS-232 serial interface became the de facto communications interface
- Serial communications allowed for communications to occur 1 bit at a time in one direction at a time



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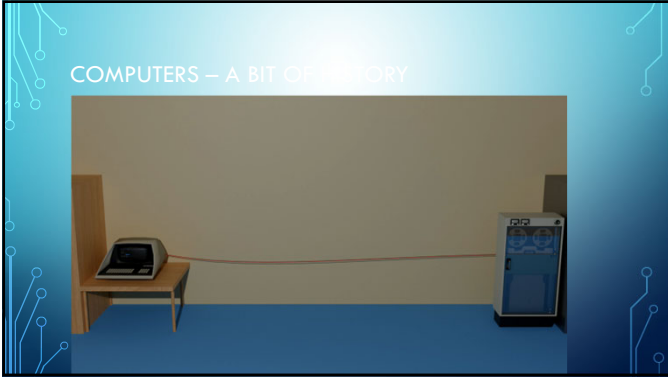
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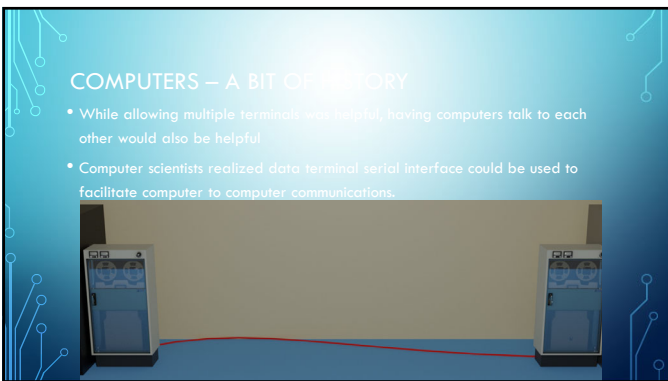
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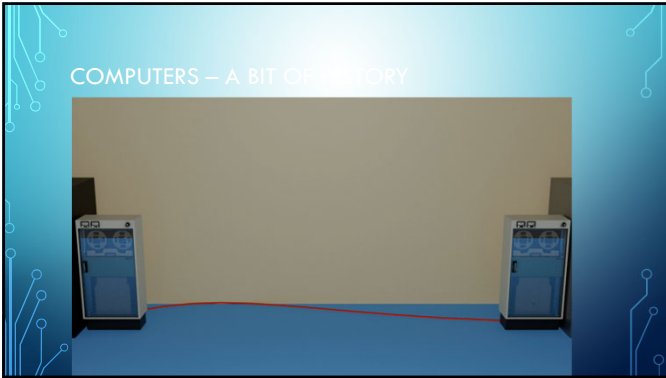
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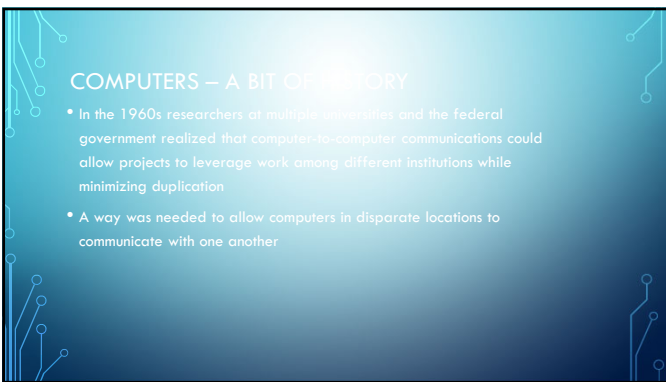
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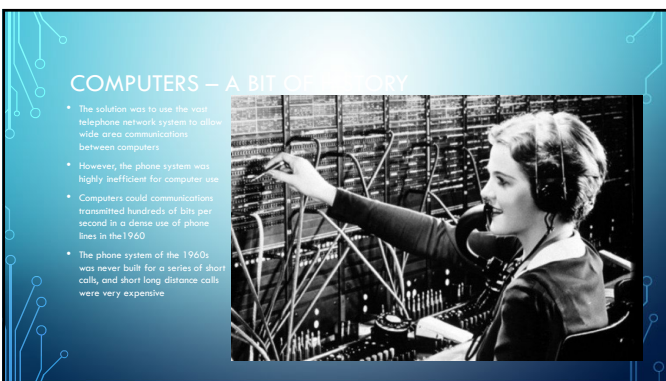
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**COMPUTERS – A BIT OF HISTORY**

- Computers could transmit up to 300 bits per second in the 1960s
- Phone calls were short for computers
- Also, each computer to computer communication would require a separate phone call because the phone network was a circuit switched network



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**COMPUTERS – A BIT OF HISTORY**

- Circuit switching is like tin cans on a string in that there is a dedicated line connecting the two ends of the communication



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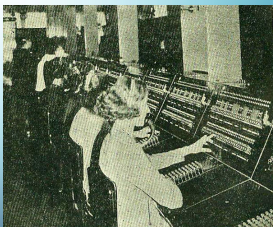
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**COMPUTERS – A BIT OF HISTORY**

- To make matters worse, the cost for long distance calls was significant as each circuit created by switches incurred additional cost



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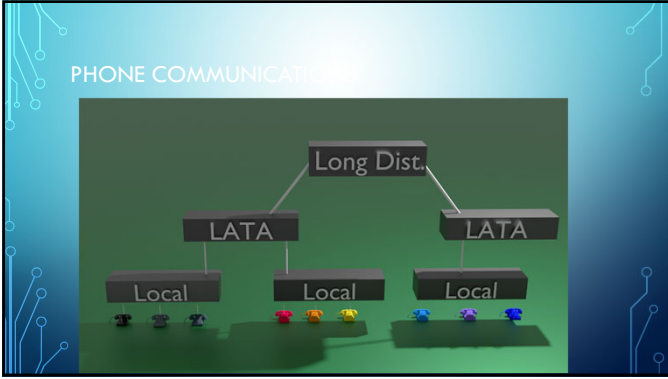
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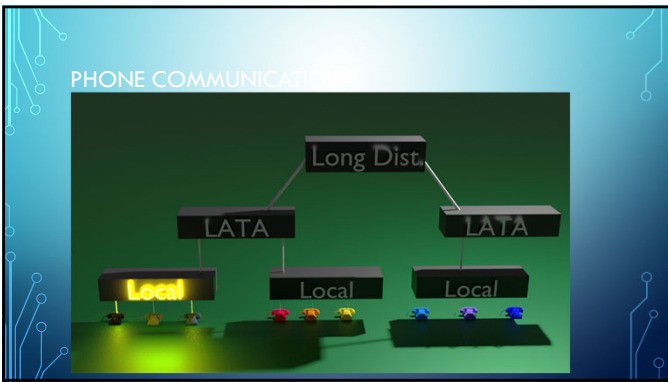
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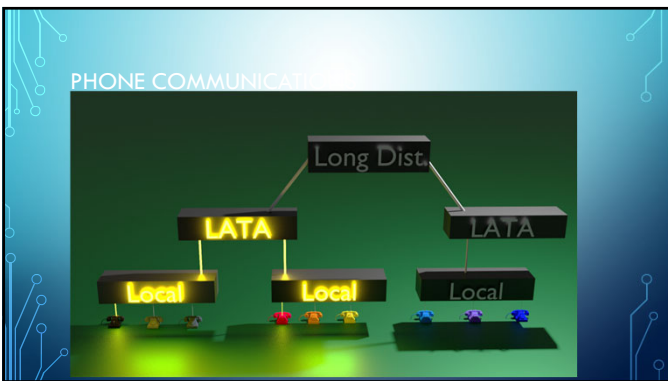
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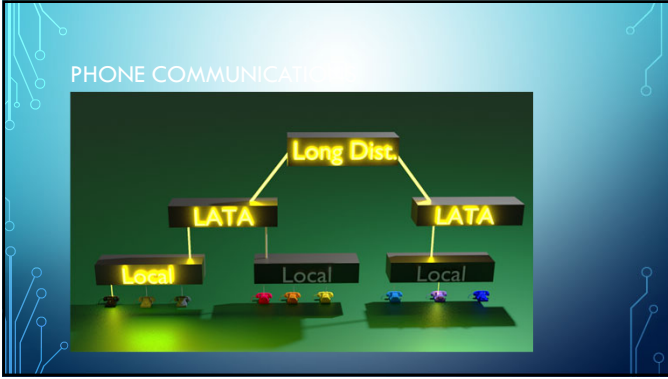
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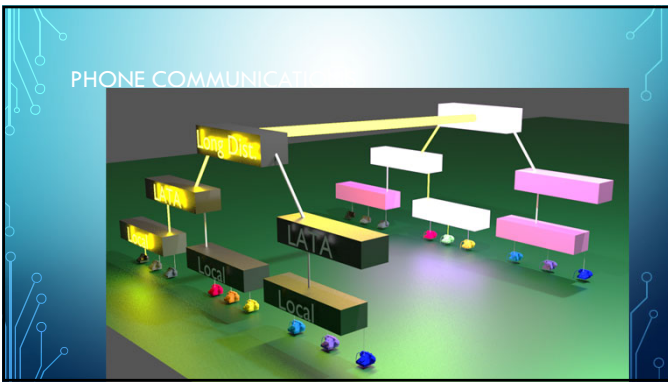
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COMPUTERS – A BIT OF HISTORY

- Circuit Switched Networks dedicate a communication line between two parties to a communication
- Do you know what happens when someone tries to establish communication with someone already on a dedicated line communication?



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COMMUNICATIONS

- A better solution was needed
- That solution was to use a persistent network in which information is broken into packets and routed between origin and destination

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COMMUNICATIONS



- <https://youtu.be/rHHpwcZiEW4>

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COMMUNICATIONS

- With wide area packet switching, an interconnection of networks was possible



- <https://youtu.be/7NpczlsnLU>

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COMMUNICATIONS

- With wide area packet switching, the use of networks was possible

This clip is for non-commercial use only

- <https://youtu.be/7NpczlsnLU>

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COMPUTING + COMMUNICATIONS

- On a packet switched network, every device has an IP address
  - MAC Terminal `ipconfig getifaddr en1`
  - Win CMD `ipconfig`

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COMPUTING + COMMUNICATIONS

Router

Laptop

Desktop

Game Device

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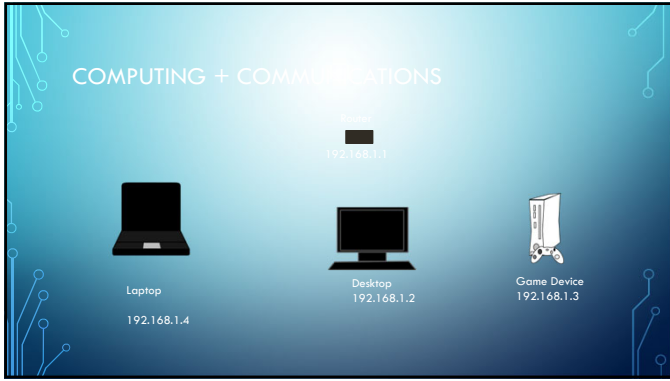
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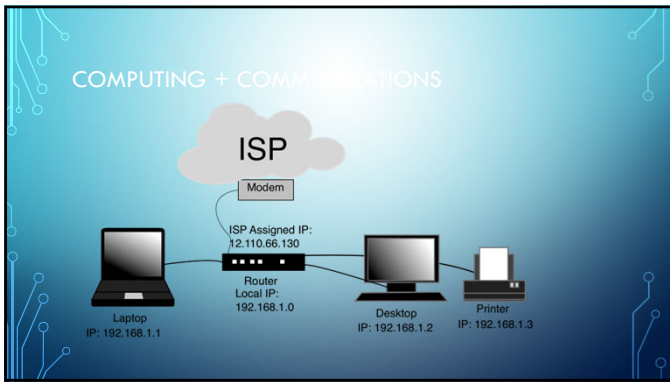
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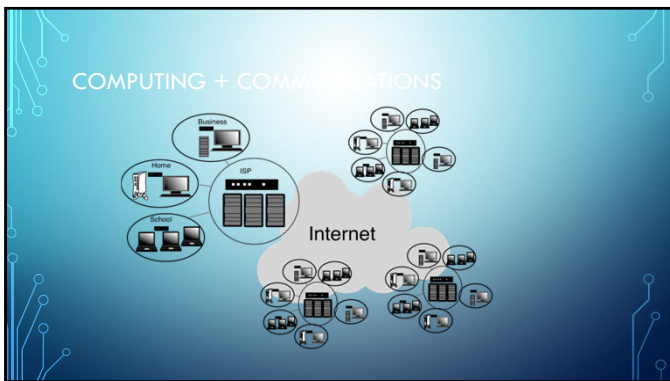
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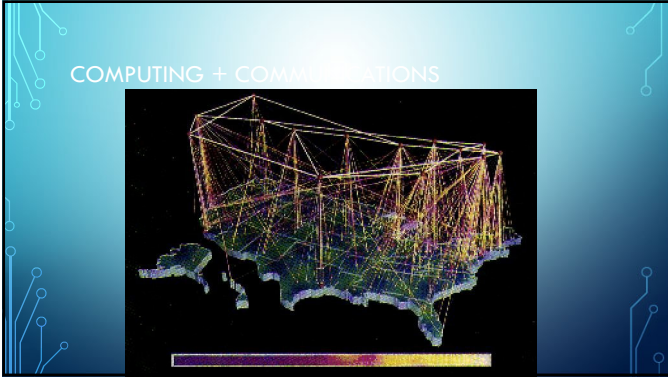
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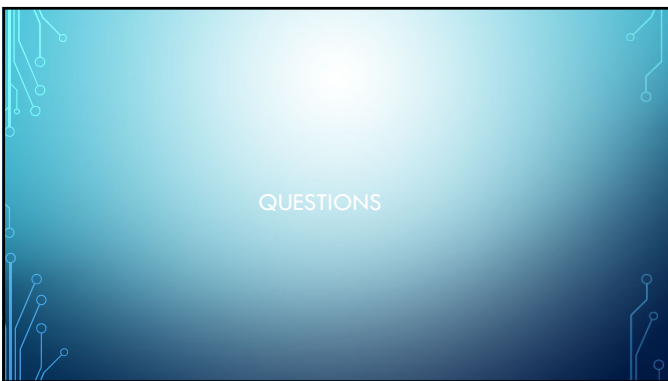
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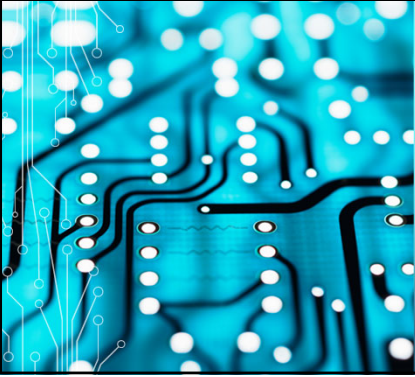
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