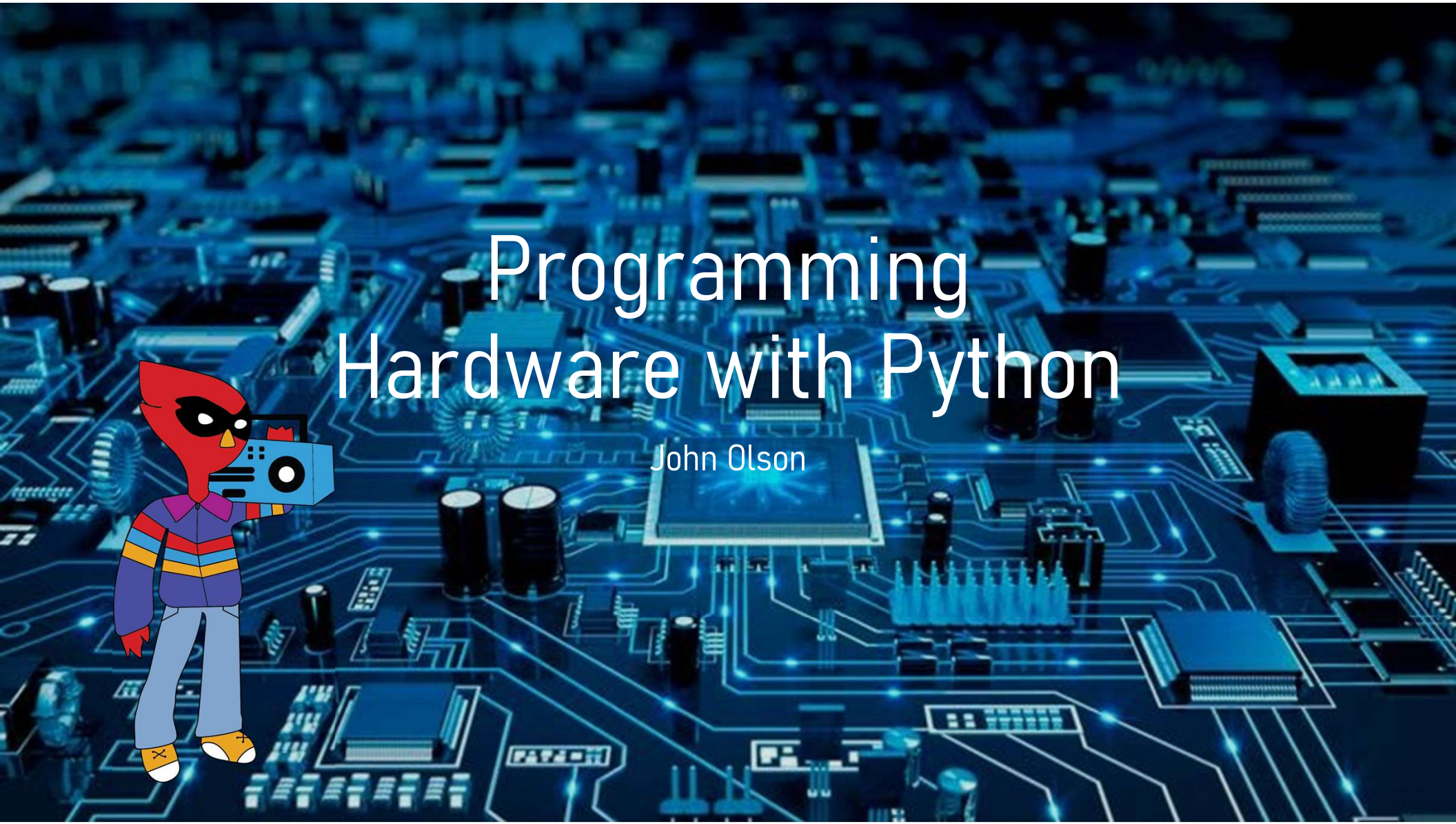
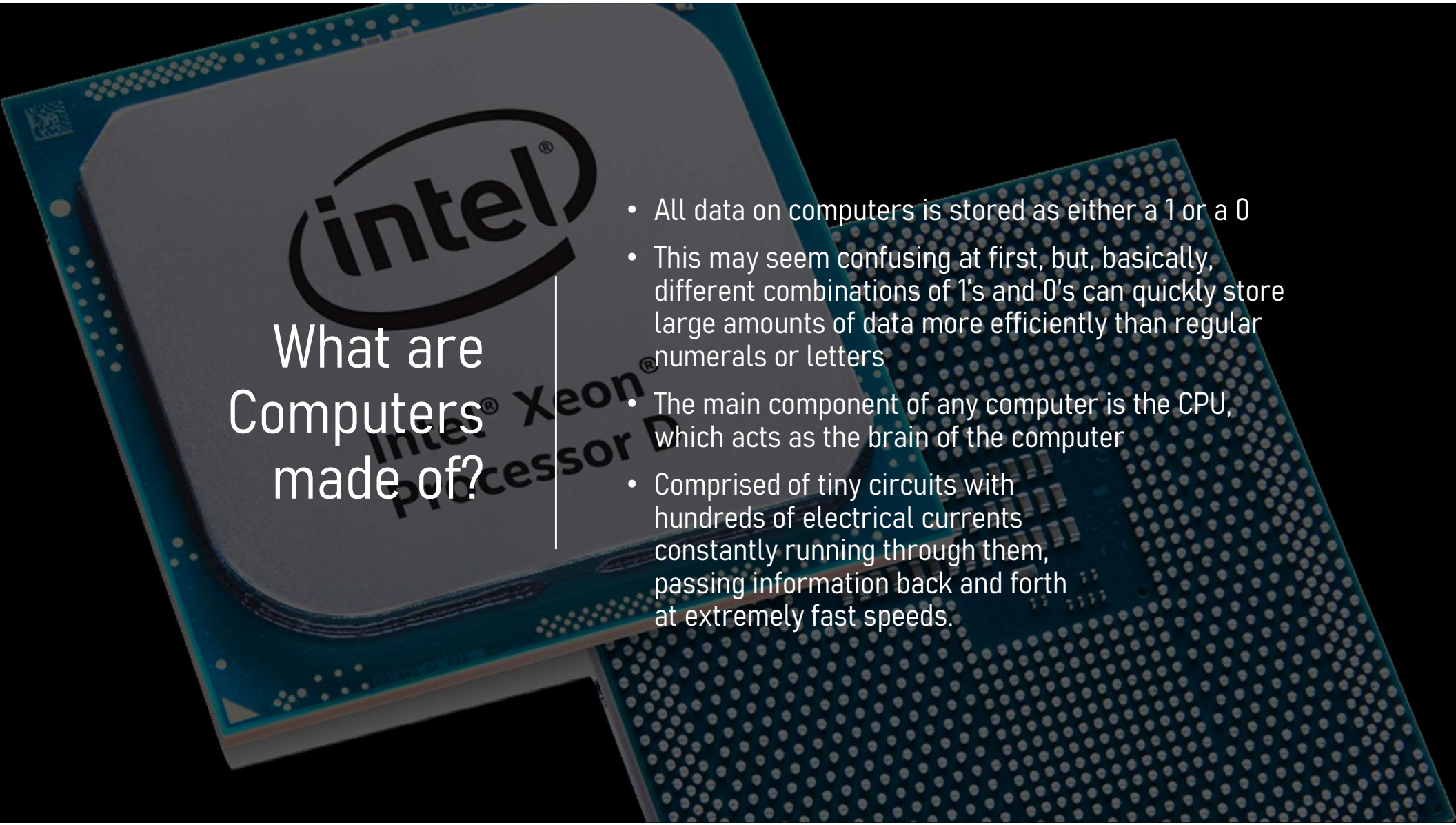

Programming
Hardware with Python
John Olson

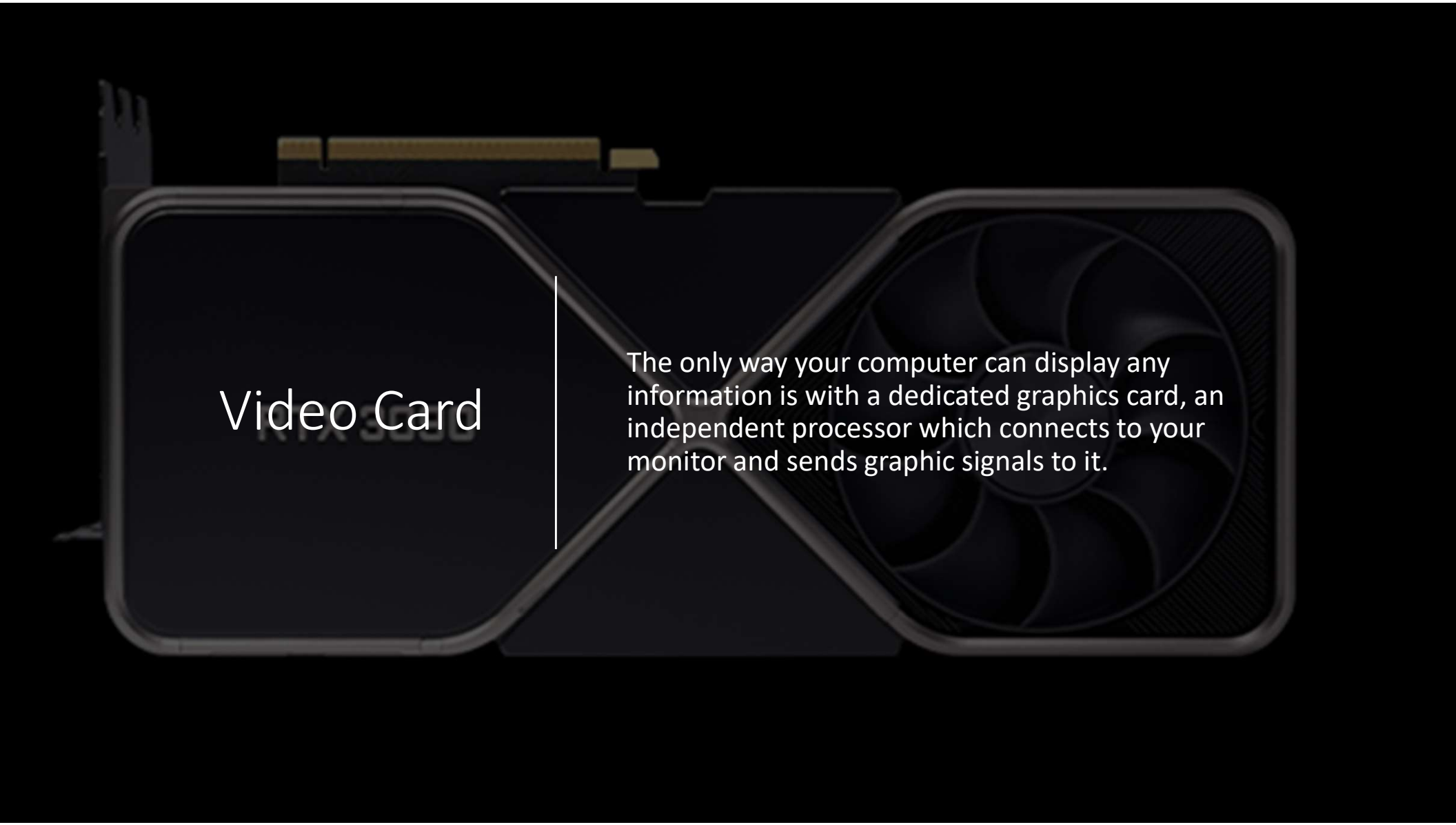
Introduction

Today, we will be going over basic hardware principles, how computers work, what they're made up of, and how they communicate. We'll start with this PowerPoint Presentation, and then move on to the Raspberry Pi's, where we'll get hands-on experience using the Python coding language.



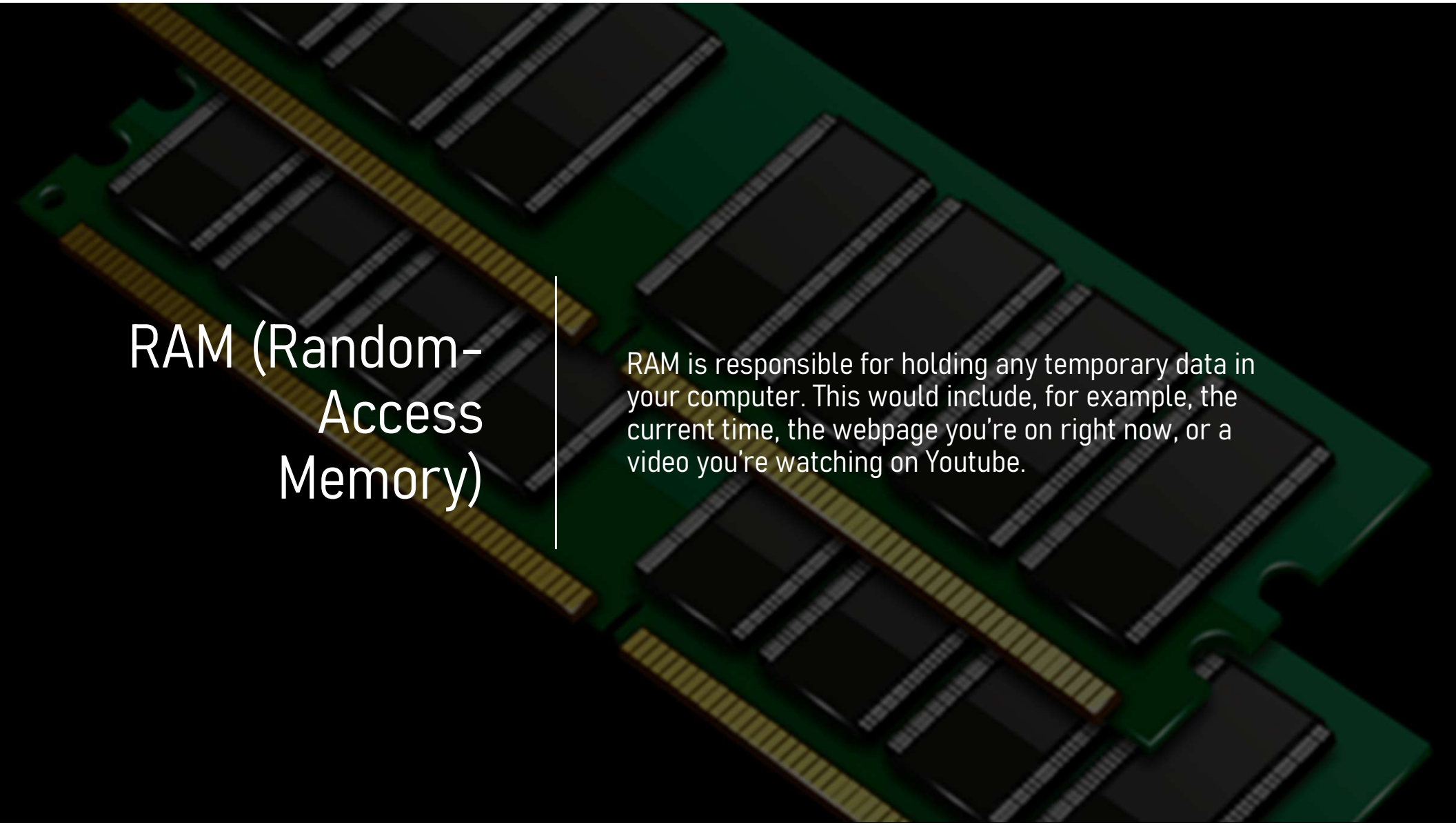
What are Computers made of?

- All data on computers is stored as either a 1 or a 0
- This may seem confusing at first, but, basically, different combinations of 1's and 0's can quickly store large amounts of data more efficiently than regular numerals or letters
- The main component of any computer is the CPU, which acts as the brain of the computer
- Comprised of tiny circuits with hundreds of electrical currents constantly running through them, passing information back and forth at extremely fast speeds.



Video Card

The only way your computer can display any information is with a dedicated graphics card, an independent processor which connects to your monitor and sends graphic signals to it.



RAM (Random-Access Memory)

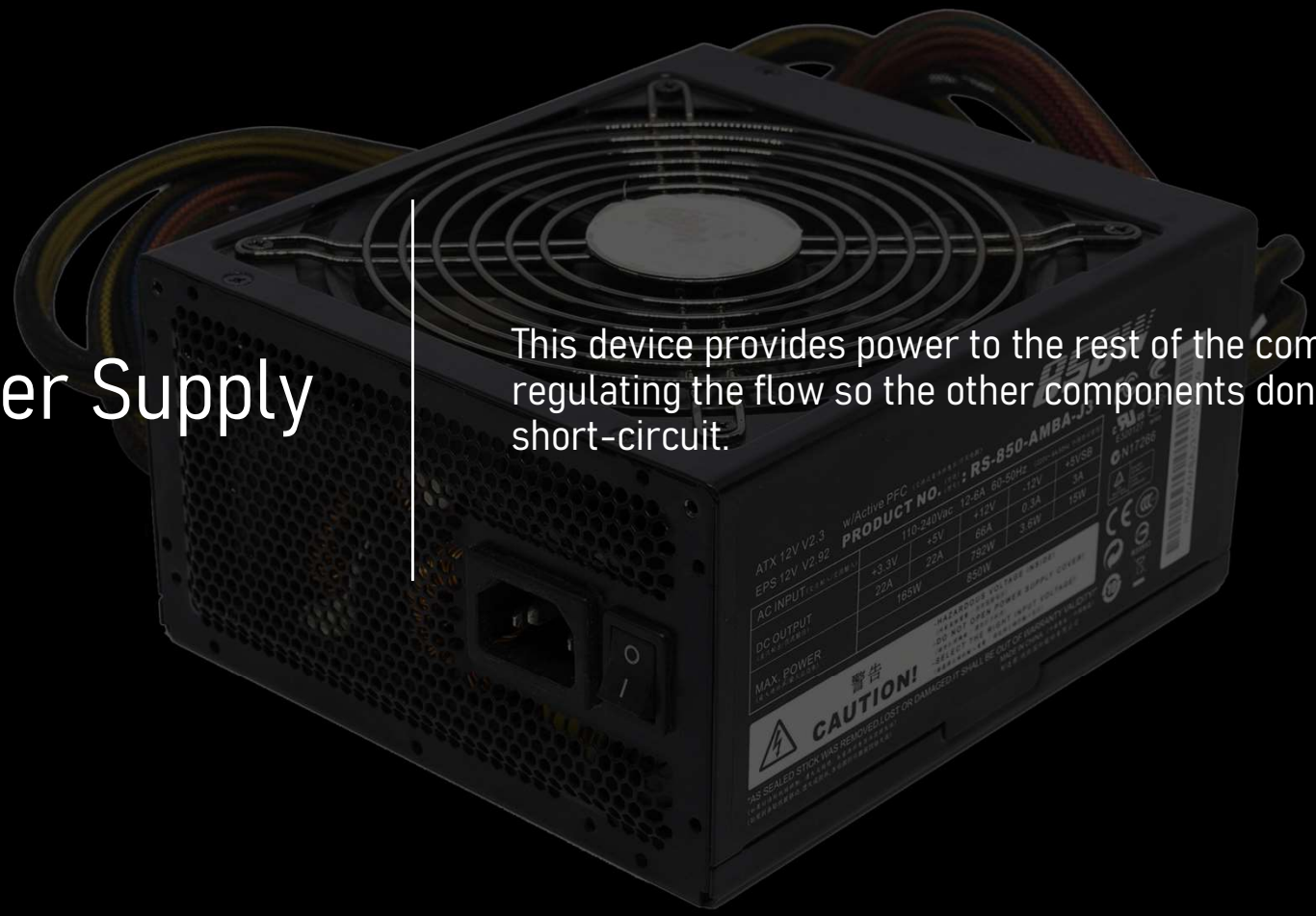
RAM is responsible for holding any temporary data in your computer. This would include, for example, the current time, the webpage you're on right now, or a video you're watching on Youtube.

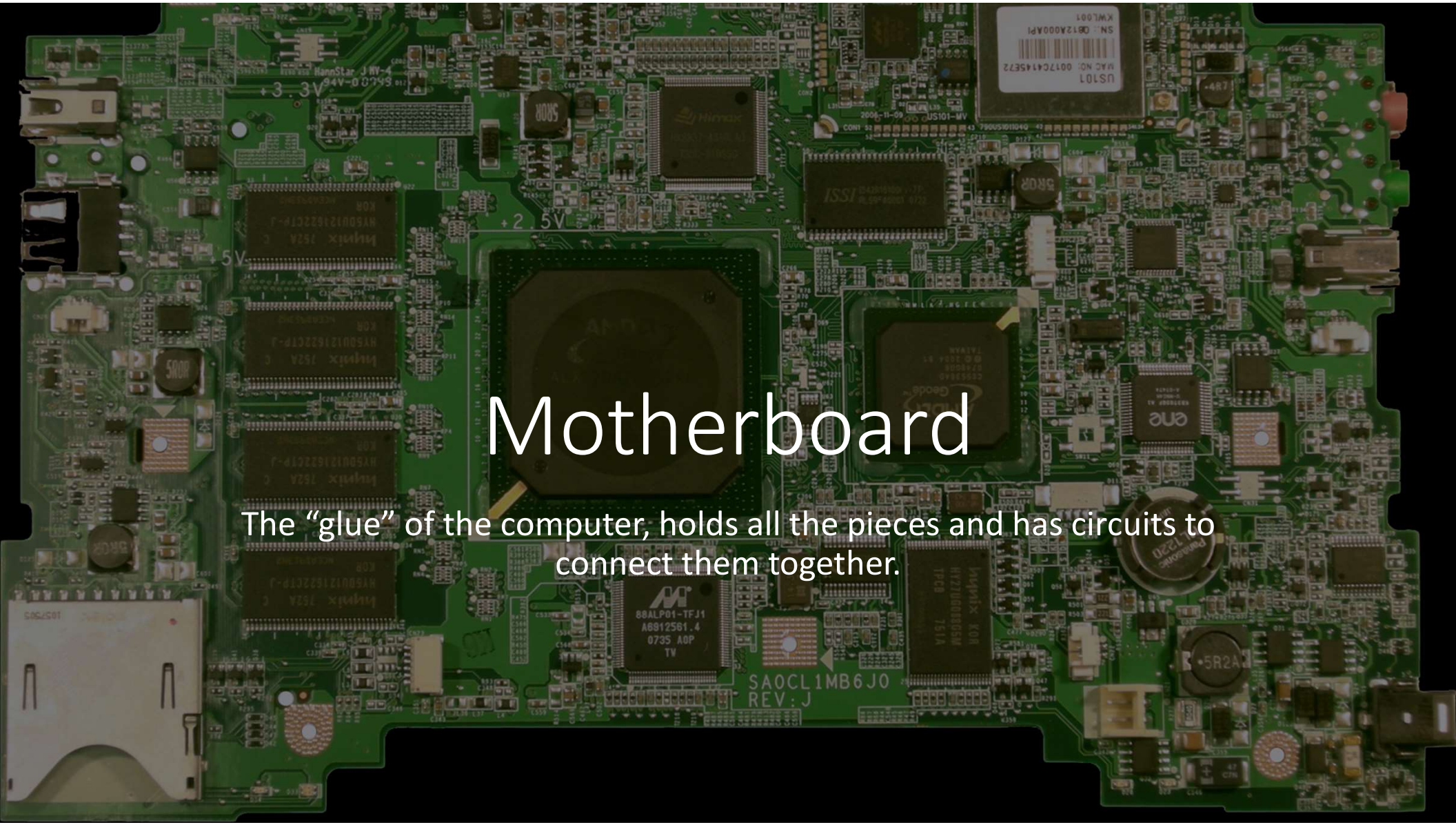
Hard Drive

Hard drives are for permanent storage, and often have much more space than RAM. Anything you keep on your computer for an extended period of time will be written into your hard drive.

Power Supply

This device provides power to the rest of the computer, regulating the flow so the other components don't short-circuit.





Motherboard

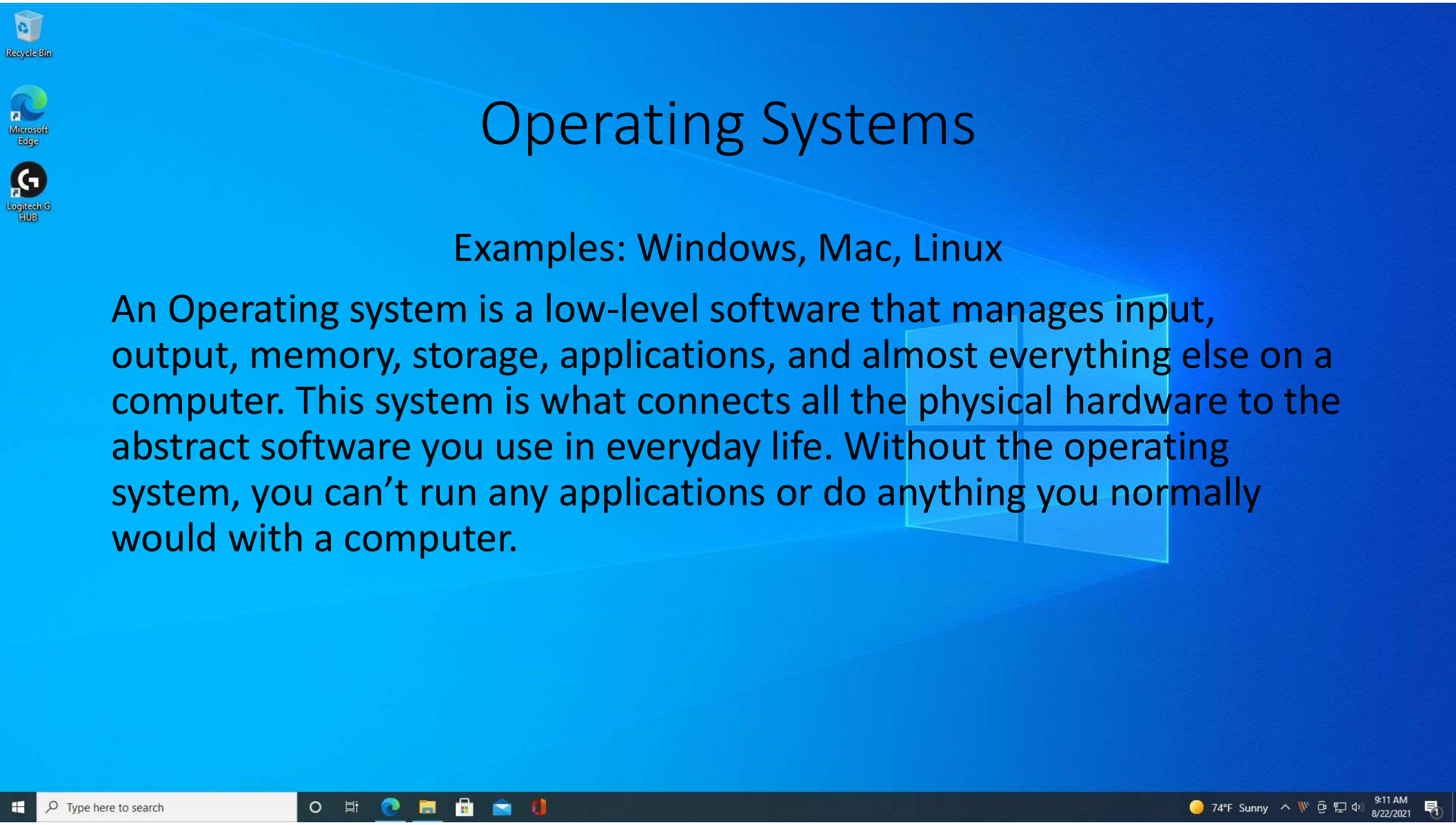
The “glue” of the computer, holds all the pieces and has circuits to connect them together.

Peripherals

Peripherals are all the external devices your computer connects to: monitors, keyboards, mice, flash drives, and countless other devices that can be connect to the motherboard.

Applications

To demonstrate these hardware principles, we'll be using a Raspberry Pi, a very small computer. To better grasp the concepts, we'll also be getting hands-on experience by learning to program these computers with Python.


Recycle Bin
Microsoft Edge
Logitech G HUB
Operating Systems
Examples: Windows, Mac, Linux
An Operating system is a low-level software that manages input, output, memory, storage, applications, and almost everything else on a computer. This system is what connects all the physical hardware to the abstract software you use in everyday life. Without the operating system, you can’t run any applications or do anything you normally would with a computer.
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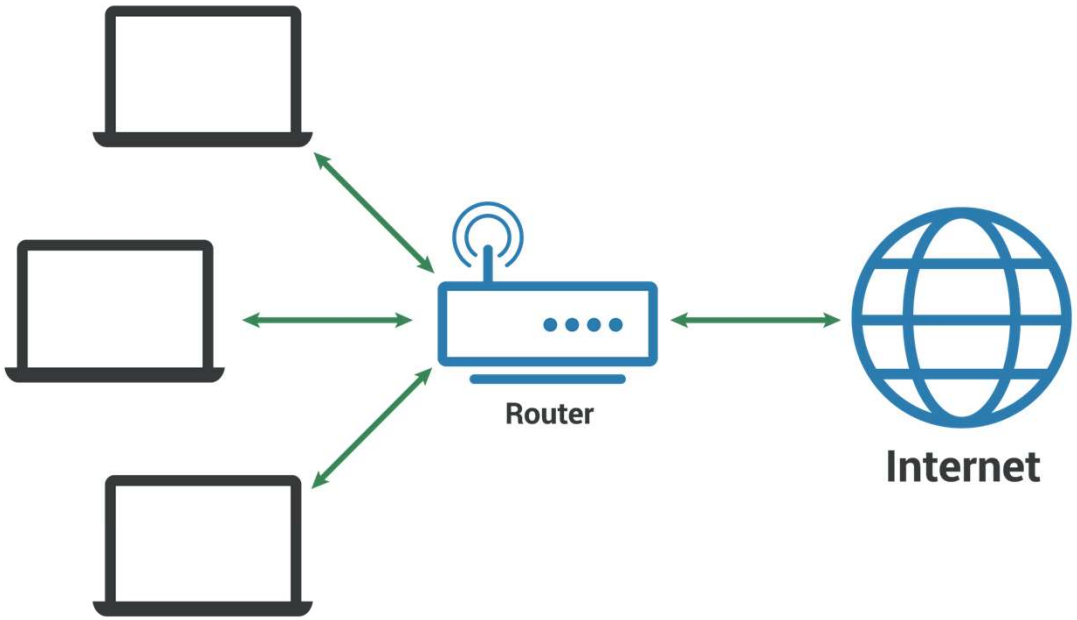
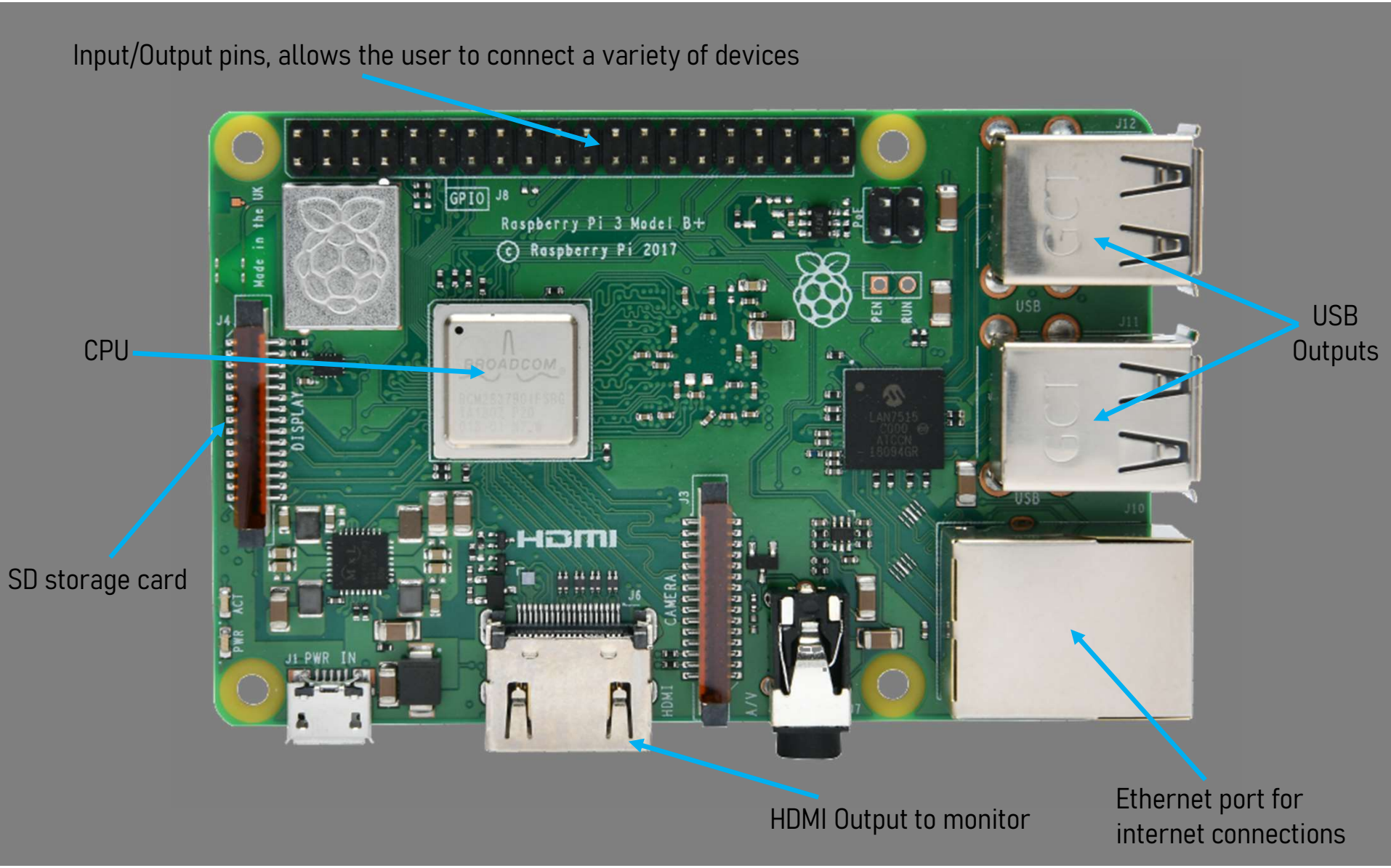
Local Networks

Your network connects to the larger internet through a device called a router. The router sends data signals to all the nearby computers and devices on the network, connecting them not only to the internet, but to each other. This allows the use of internal servers specific for the local area network (LAN for short).




Input/Output pins, allows the user to connect a variety of devices
CPU
SD storage card
USB Outputs
HDMI Output to monitor
Ethernet port for internet connections
GPIO
Raspberry Pi 3 Model B+
© Raspberry Pi 2017
Made in the UK
DISPLAY
HDMI
CAMERA
J1 PWR IN
PWR
ACT
USB
PEN
RUN
PoE
A/V