

Computer Literacy *101*

Computer Literacy 101

Why Computers?

The universal digital representation of information

Mechanical systems used to store physical documents, pictures, music and all other media have been replaced by a single digital mechanism.

The universal digital processor

All this information can be processed by a single general-purpose device, the digital computer. This device has replaced many complex analog mechanical devices used for working with information and media. The **commoditization** of computer technology allows all computers equal capability and are differentiated by capacity and speed.

Computer Literacy 101

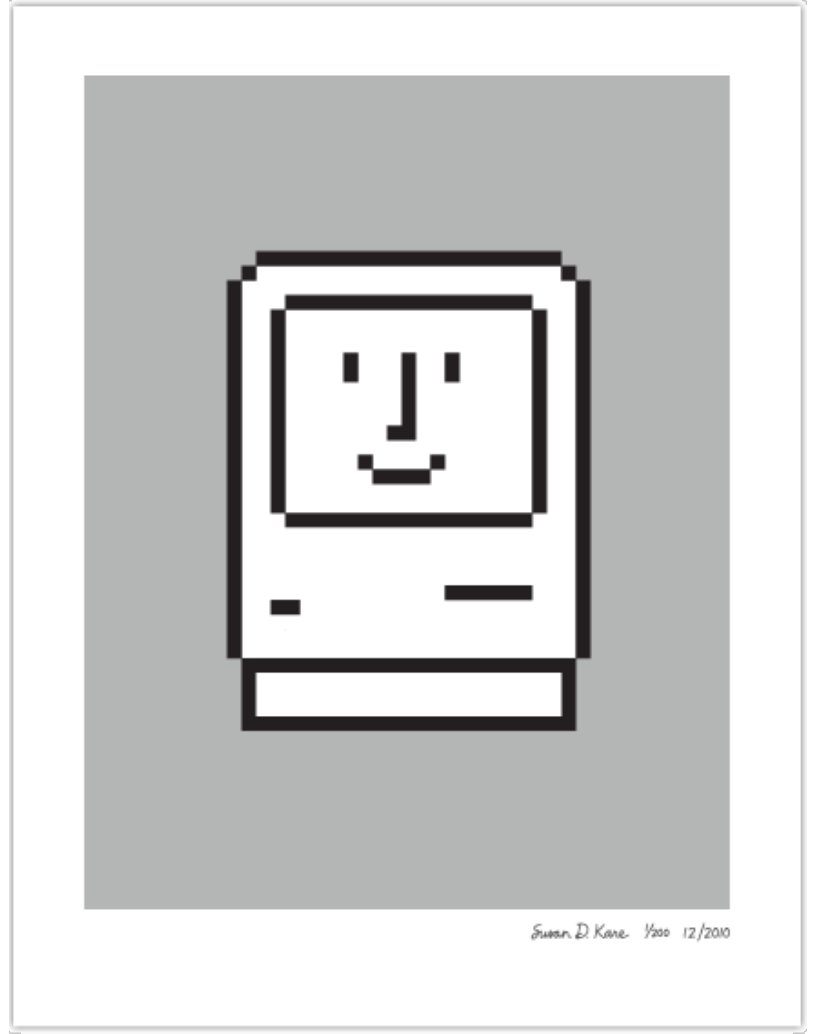
The universal digital network

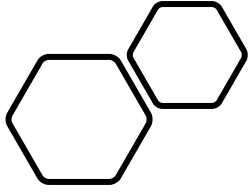
The network 'Internet' allows all digital devices 'computers' constant real time access to each other and their information. This 'new medium' has consumed all forms of previous mediums. TV, radio, print etc.

The sum of these concepts has never happened before in our history. We are creating and consuming more media than anyone before us, our computers are now collecting more information about us than any organization(s) have ever had in history. We can have conversations with anyone in the world instantly and without delays. We can talk directly to maps and satellites, knowing our location we can map our directions. ***We can use computation to solve problems that used to be impossible or require building sized computers and teams of dedicated math and computer experts.***

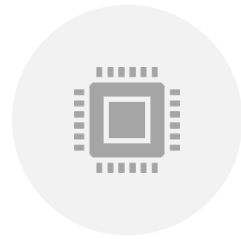
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**“What is a
Computer?”**





WHEN WE TALK ABOUT THE
REAL GUTS OF A COMPUTER, IT
REALLY STARTS WITH THESE
COMPONENTS



A MICROPROCESSOR AS A CPU
(CENTRAL PROCESSING UNIT)



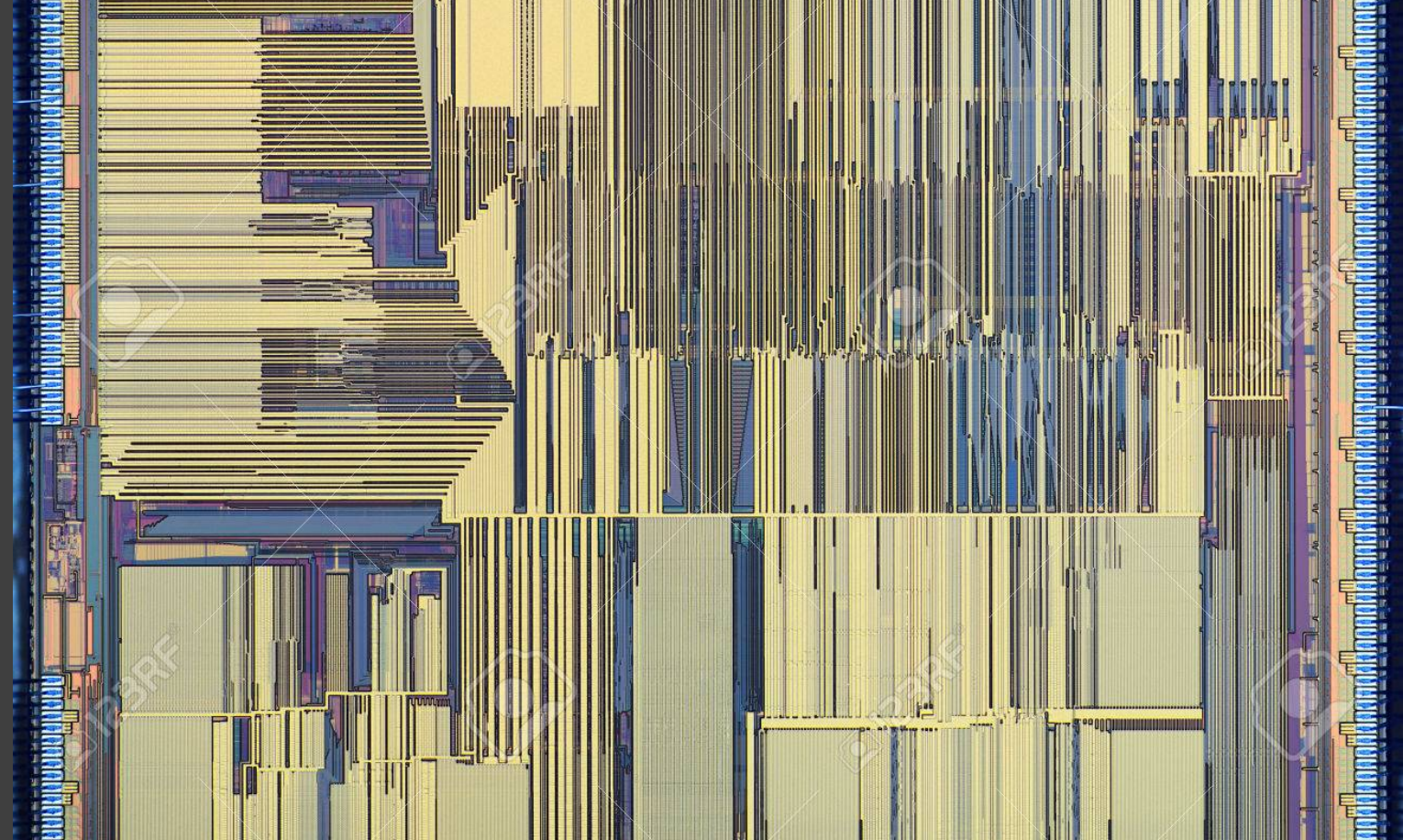
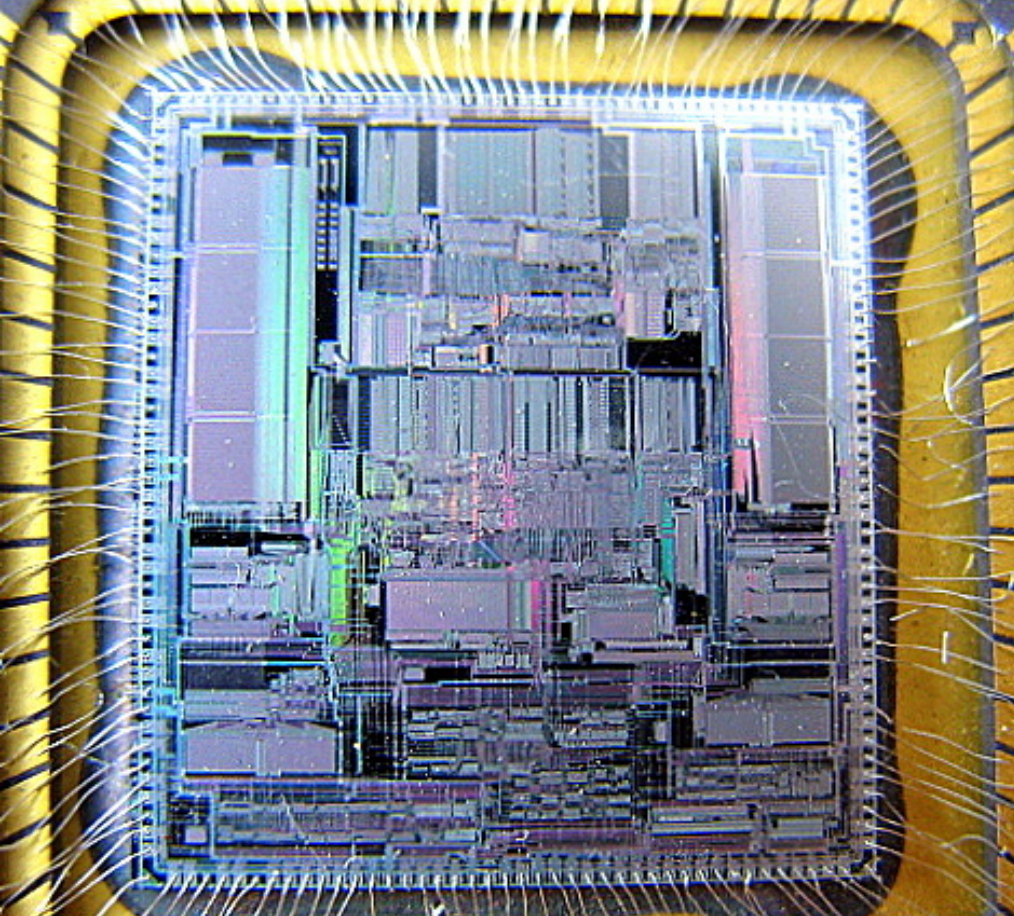
A BLOCK OF MEMORY



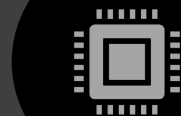
SOME FORM OF STORAGE



A BUS TO CONNECT IT ALL.



MICROPROCESSOR



A MICROPROCESSOR AS A CPU
(CENTRAL PROCESSING UNIT)



A MICROPROCESSOR AS A CPU
(CENTRAL PROCESSING UNIT)

~~MICROPROCESSOR~~

What is a **process**? What is a **processor**?

Essentially a Microprocessor processes logic instructions.

A very specific kind of logic. There are seven basic logic gates:

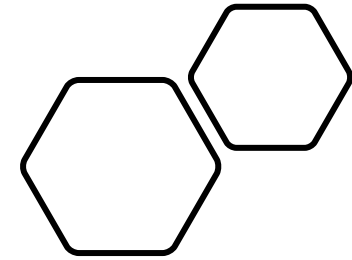
AND, OR, XOR, NOT, NAND, NOR, and XNOR



A BLOCK OF MEMORY

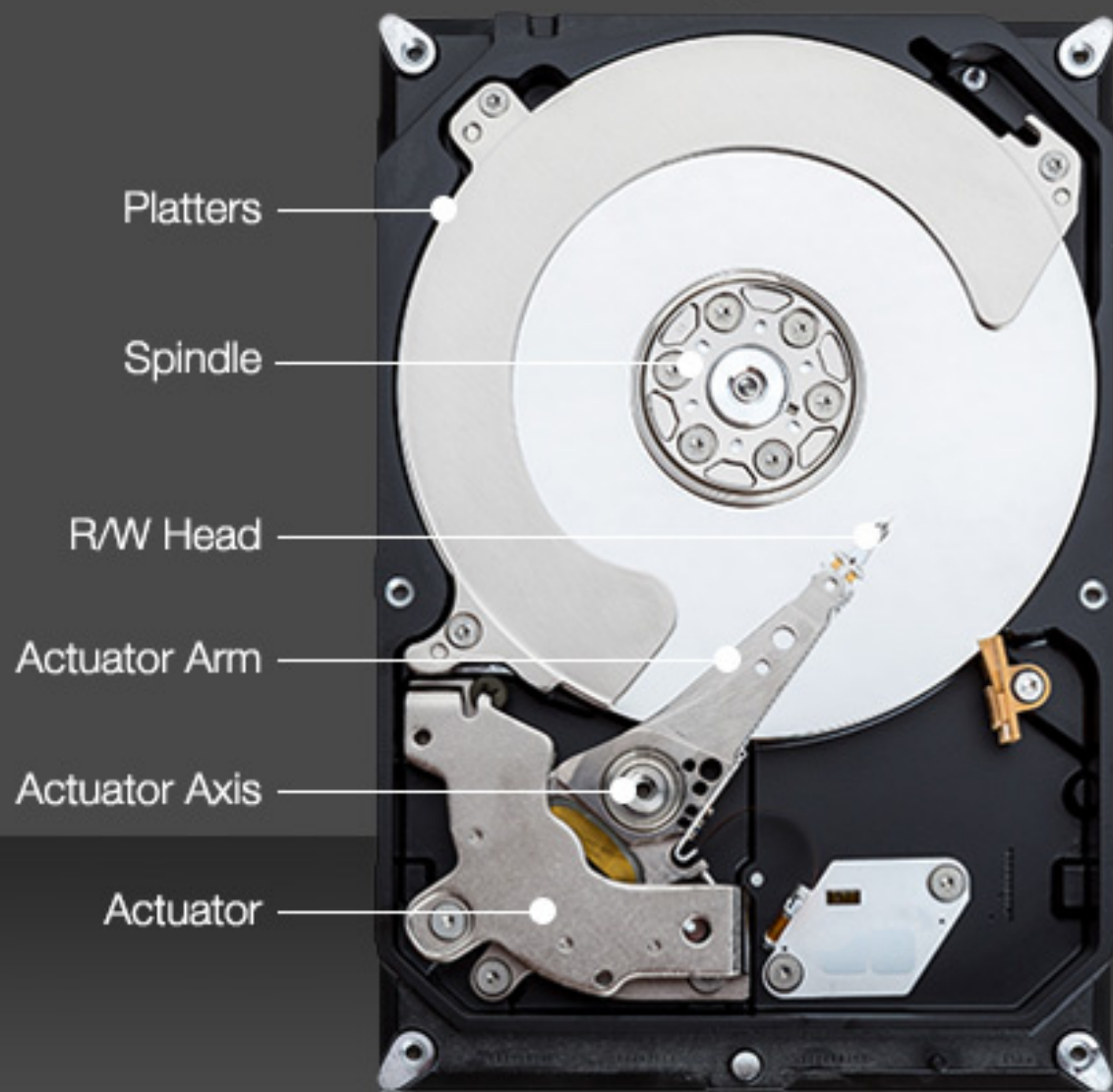
RAM Random Access Memory

We have this logic engine,
how do we give it a steady supply of
information to process? How do we save
all those logic answers? **Random** is kind of
confusing because for us memory was never
not random. **It really means the computer
can decide how it divides memory up and use it.**



HDD

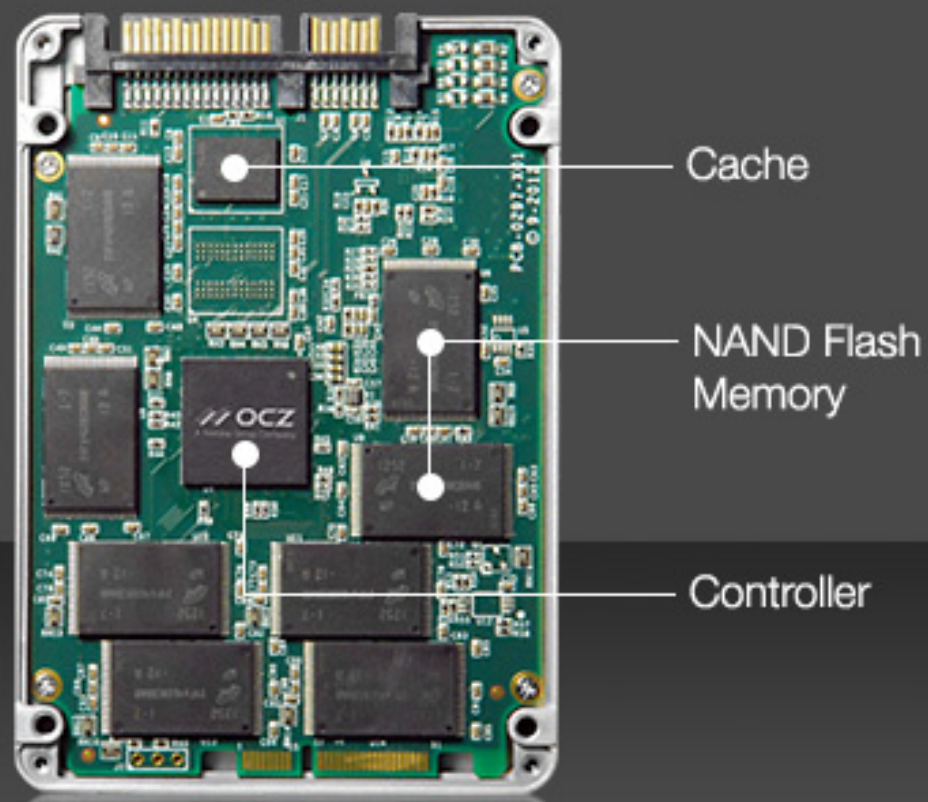
3.5"



Shock resistant up to 350g/2ms

SSD

2.5"



Shock resistant up to 1500g/0.5ms

STORAGE

A lot of us get lazy and call this 'memory' too, but its confusing and not accurate. If RAM is memory, its short term memory. It goes away when the computer is off. Storage is long-term memory that stays when the power is off.

We will talk more about storage this semester.



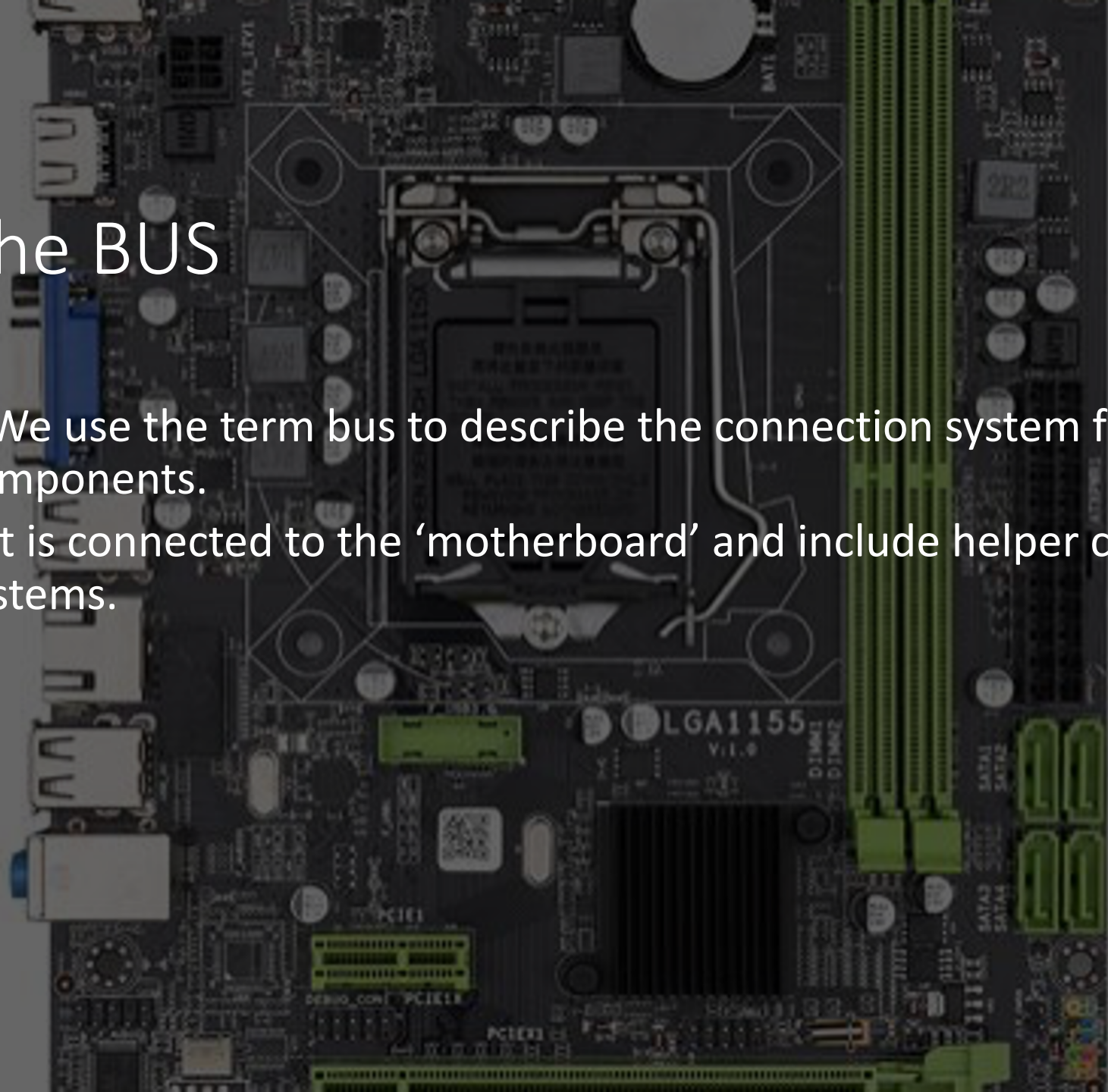
SOME FORM OF STORAGE



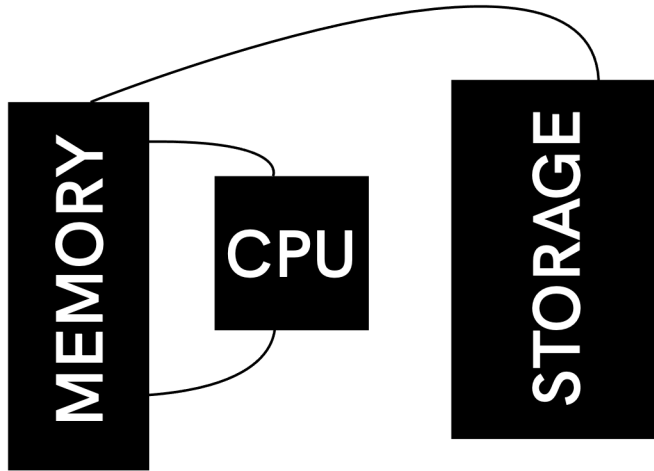


The BUS

- We use the term bus to describe the connection system for all the components.
- It is connected to the 'motherboard' and include helper chips and sub systems.



Lets put it all together:



So when you see a 64Bit Processor running at 3.6 GHz clock speed

the chip takes in 64bits 3,600,000,000 times in a second

The CPU is the point around which everything revolves. It takes in bits (1 and 0) in chunks. We define the type of system by the number of chunks. **Currently we have 64 bit systems.** We have evolved from 16, and 32.

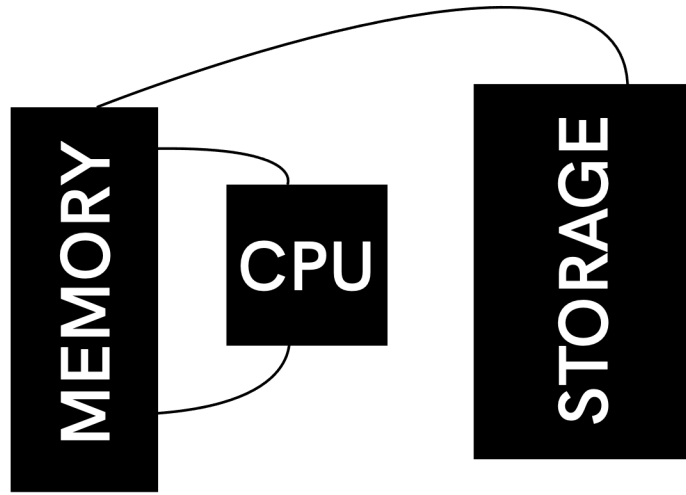
We use hertz to represent the clock. The clock or pulse is the cycle where everything moves through the system. The CPU has its own designation of hertz.

Memory has a speed designation but its not in hertz (so not really helpful other than general terms).

The BUS has its own designation of hertz.

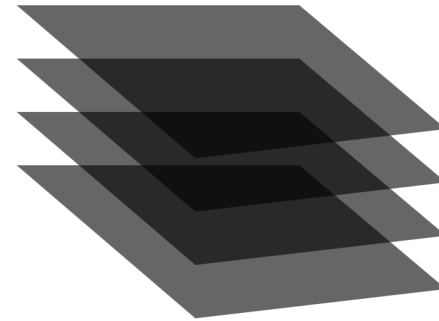
The reason performance inside a computer varies is balancing different components the faster the compnent the more expensive.

Lets put it all together:



So lets confuse things a little. We are talking about a single core processor. We can increase power and performance without making our whole computer bigger by stacking CPUs like pancakes.

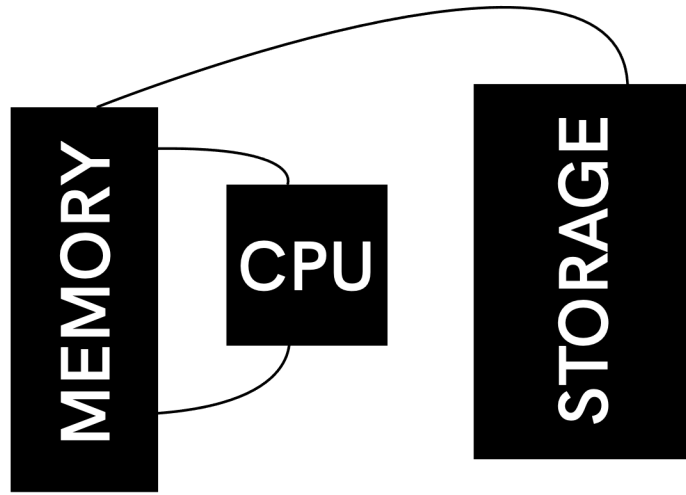
when we use multiple processors we use the term **THREAD** to describe communication between each processor and memory.



} **Quad Core**

When you hear the term 'cache' that is a smaller very fast block of memory the CPU can use instead of going out to regular memory

Lets put it all together:



The other thing the bit depth of a system effects is how much memory (RAM) a computer can use. We currently use Gigabyte (1 million) designations for memory. With older 32bit systems we maxed out at 4GB. 64 bit systems can theoretically use a rediculously high amount of ram. Because of manufacturing costs and a desire for faster memory we are slowly increasing our 'average' amount of RAM. For higher end machines 32GB is becomming common, 64GB is monstrous. The average is 16GB and 8GB is common and perfectly usable for most things.

All modern computers use GB for memory but we used to have MB (millions) and before that the original PC Microcomputers used K(1000) 16k was standard.

So what is a GPU (Graphics Processing Unit)?

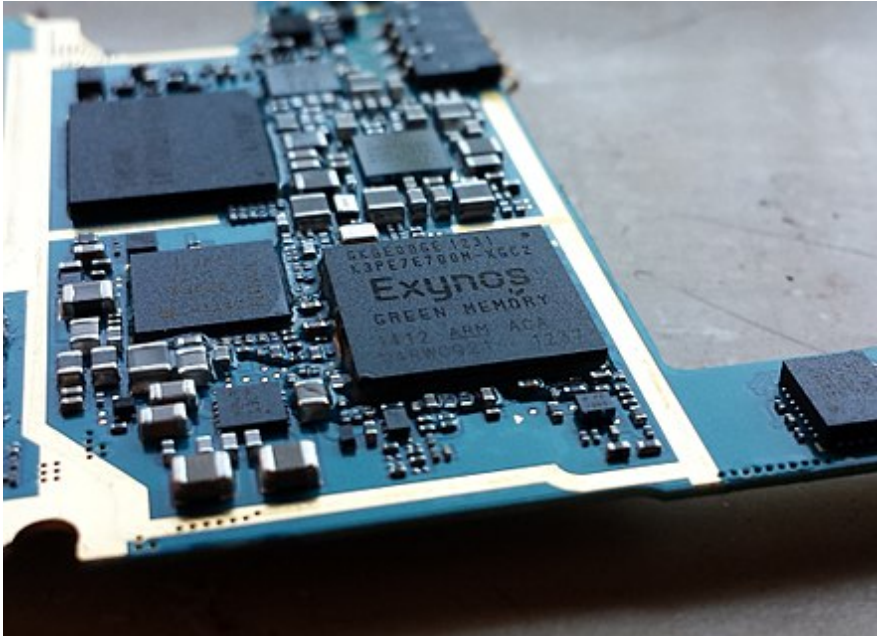
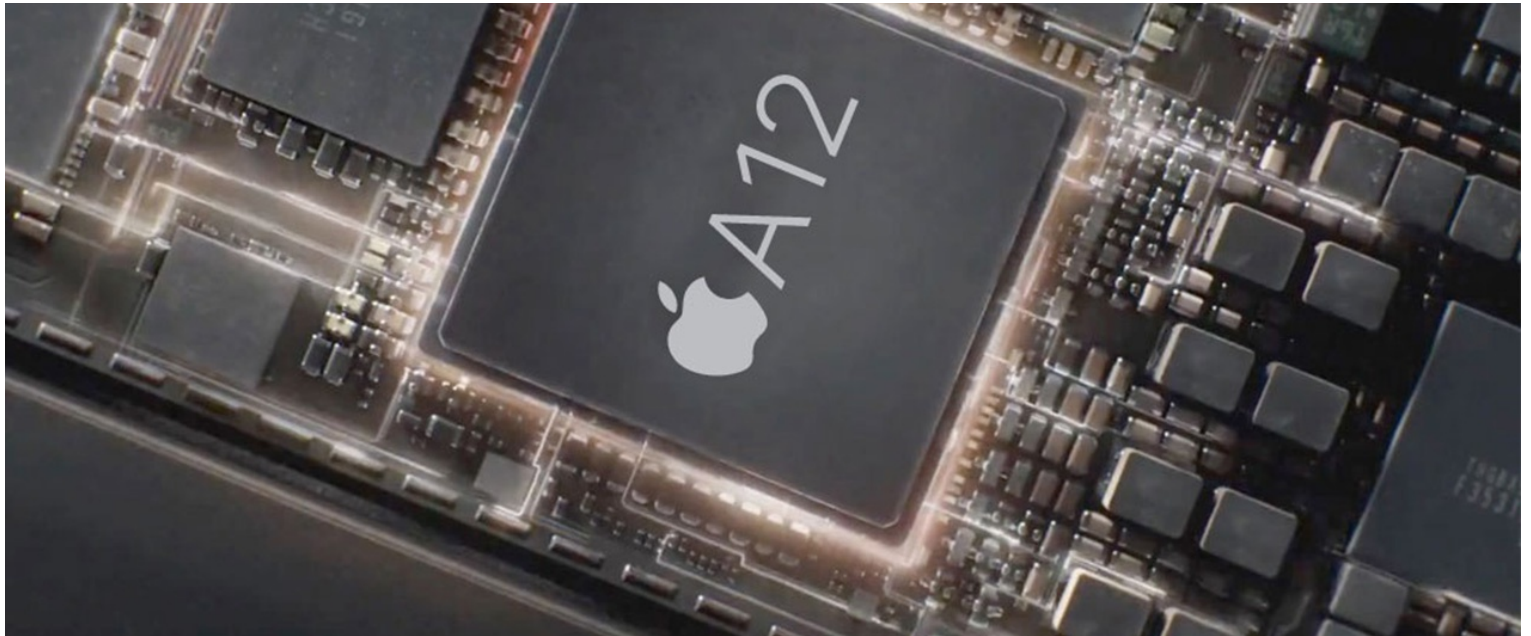
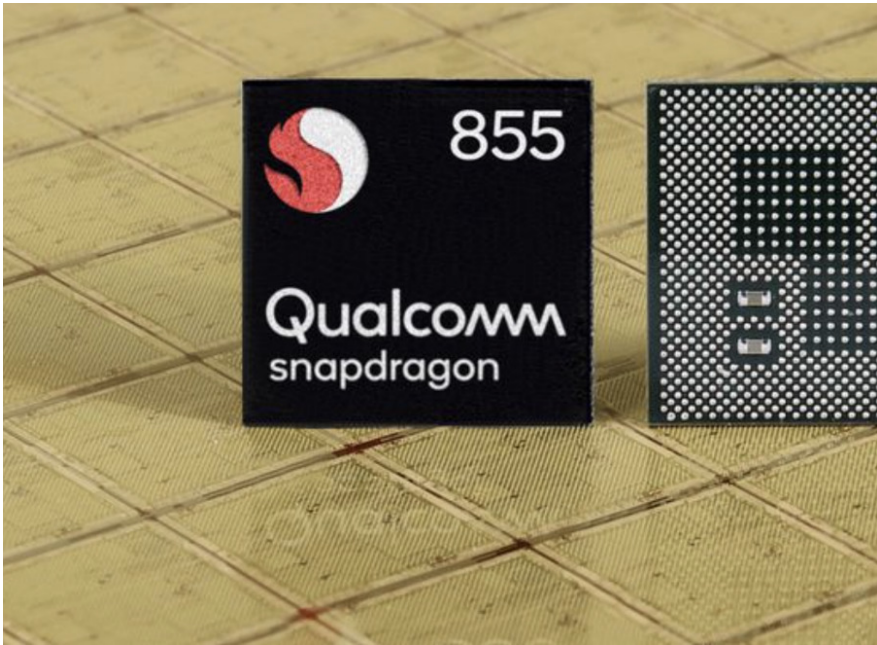
The 'Video' system of a computer lets you see the display on your screen.

In basic terms a 'Graphics Card' is designed help generate images that require a lot of computation.

We usually associate them with games, but they also serve in 3d applications and applications that use video effects. As we evolve our interfaces and systems to visualize and create 'spaces' the more we rely on GPU power.

The CPU is made for general use its job is to tackle everything. The GPU is hyper focused on ripping through simple Repetitive tasks like graphics.





System On a Chip SOC
CPU GPU RAM & BUS
