COMPUTER ORGANIZATION AND ARCHITECTURE

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Memory is the faculty by which the mind stores and remembers information. - Oxford Dictionary

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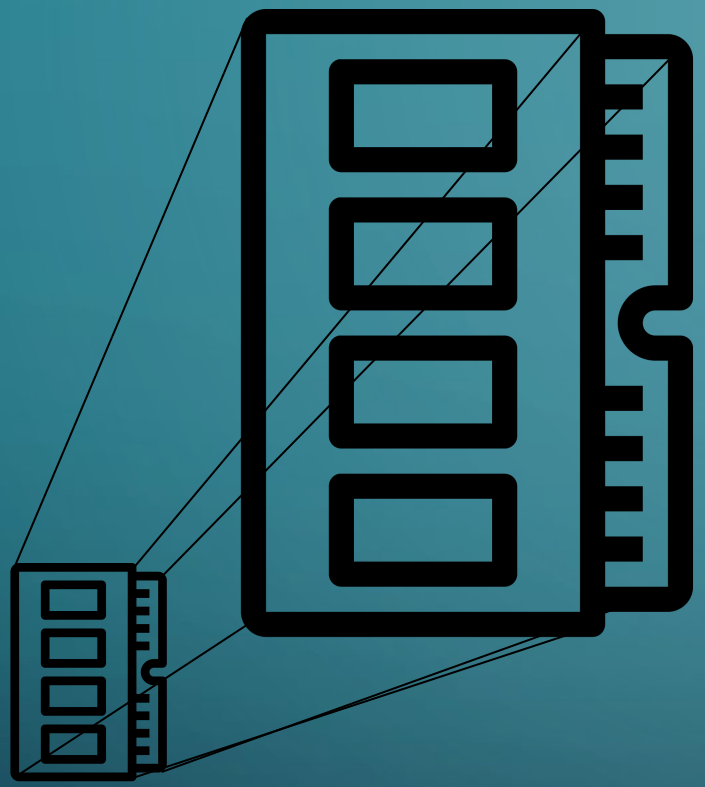
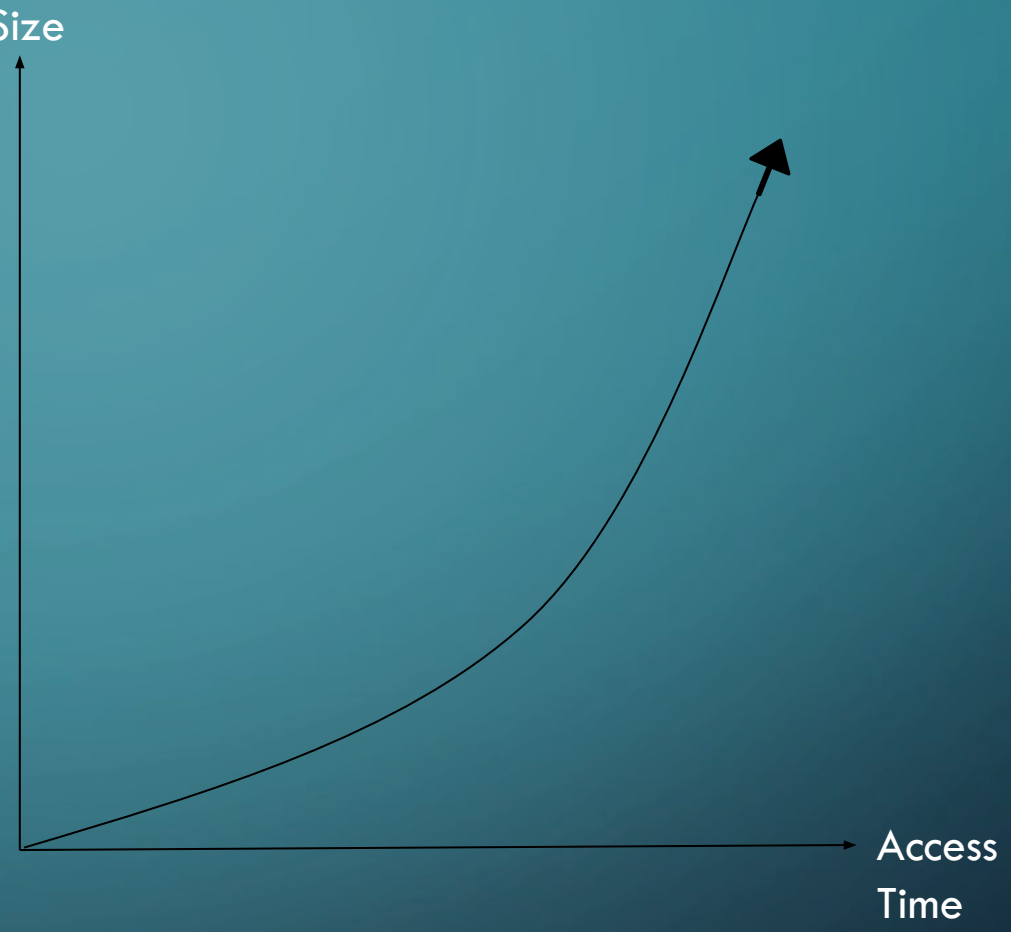
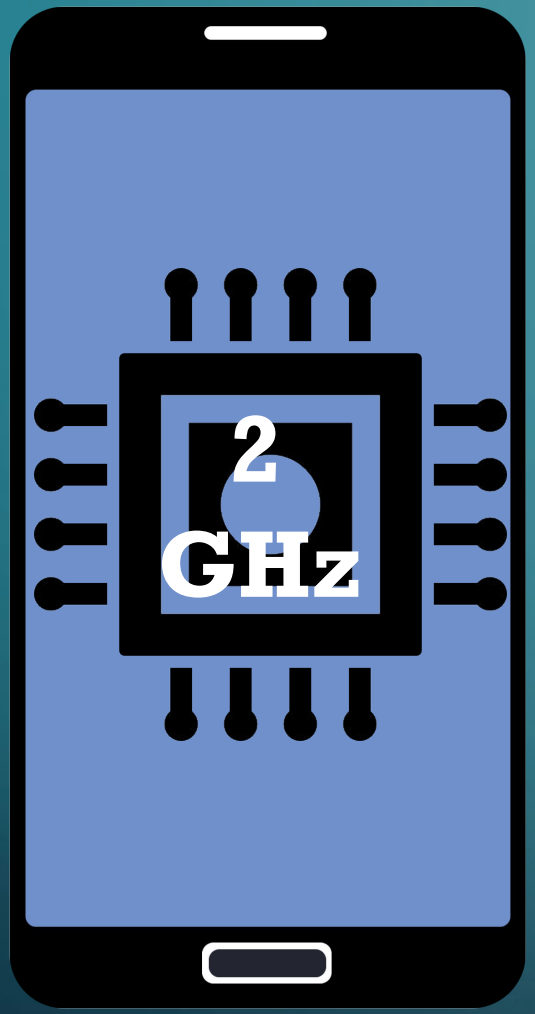




Is Larger Memory a solution?.

If memory is increased, the time to access it also increased.

TIME IS THE KEY FACTOR



Frequency: 2 GHz

Time: $\frac{1}{\text{Frequency}}$

$= \frac{1}{2 \times 10^{9}}$ Sec.

$= \frac{1}{2} \times 10^{-9}$ Sec.

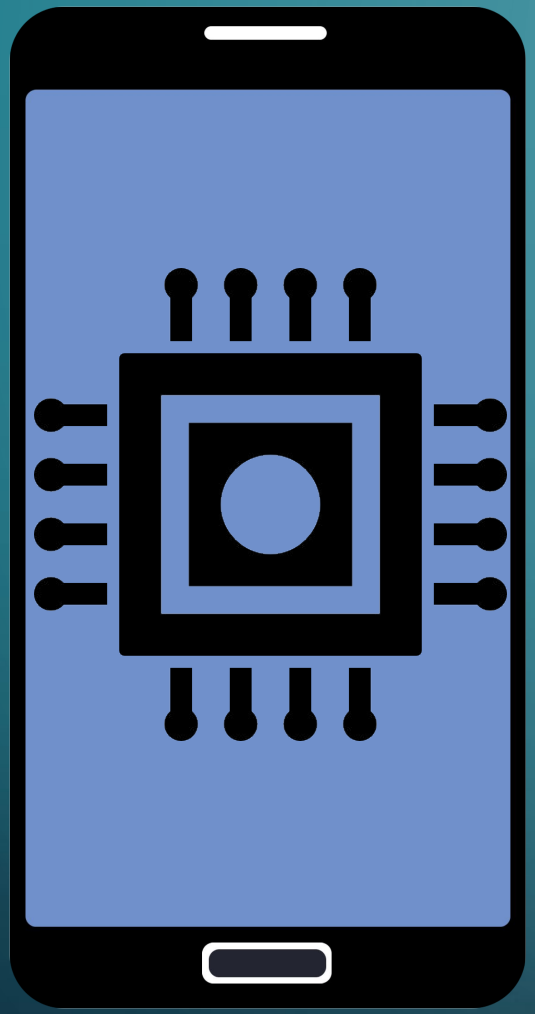
$= \frac{1}{2}$ nsec.

$= 0.5 \times 10^{-9}$ sec.

$= 0.5 \times 10^{-9}$ sec.

Abbr.	Prefix name	Decimal size	Size in thousands
K	kilo-	10^3	1,000
M	mega-	10^6	$1,000^2$
G	giga-	10^9	$1,000^3$
T	tera-	10^{12}	$1,000^4$

Prefix	Analog value
p (pico)	10^{-12}
n (nano)	10^{-9}
μ (micro)	10^{-6}
m (milli)	10^{-3}
k (kilo)	10^3 (1000)
M (mega)	10^6 (1,000,000)
G (Giga)	10^9 (1,000,000,000)
T (Tera)	10^{12} (1,000,000,000,000)



Fun Activity:

1. Get your phone
2. Go to your settings,
3. About phone
4. All specs or similar
5. Check your phone processor speed ex. Octa core max 2.30 Ghz

OS	Android 10, upgradable to Android 12, MIUI 14
Chipset	Qualcomm SM7150-AC Snapdragon 732G (8 nm)
CPU	Octa-core (2x2.3 GHz Kryo 470 Gold & 6x1.8 GHz Kryo 470 Silver)
GPU	Adreno 618

6. Or goto gsmarena site and search your phone, look for CPU part. And then let's solve.
7. Then type your phone speed and answers in the in-call messages with your processor time speed.

Frequency: 2.3 GHz

Time: $\frac{1}{\text{Frequency}}$

$= \frac{1}{2.3 \times 10^{9} \text{ sec.}}$

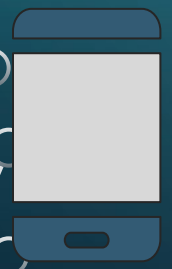
$= \frac{1}{2.3} \times 10^{-9} \text{ sec.}$

$= 0.43 \times 10^{-9} \text{ sec.}$

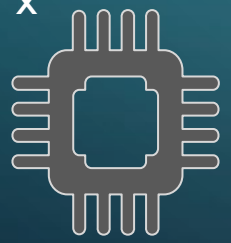
$= 0.43 \text{ nsec.}$

2 x 0.43 nsec.

For 1 core
On Kryo 470
gold



2 x



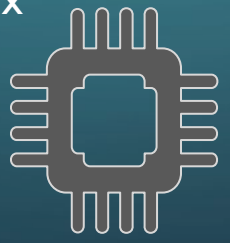
OS	Android 10, upgradable to Android 12, MIUI 14
Chipset	Qualcomm SM7150-AC Snapdragon 732G (8 nm)
CPU	Octa-core (2x2.3 GHz Kryo 470 Gold & 6x1.8 GHz Kryo 470 Silver)
GPU	Adreno 618

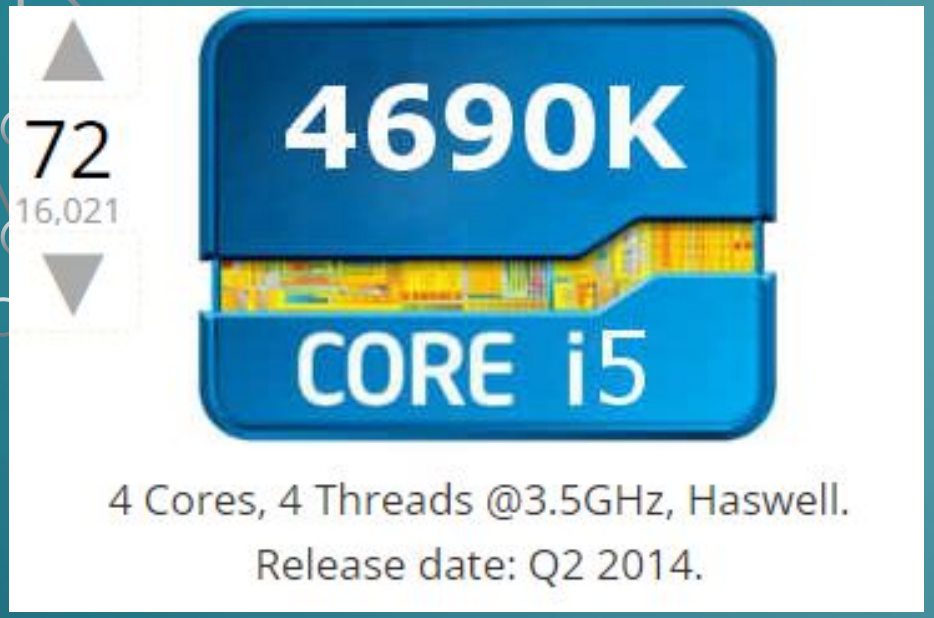
For 1 core
On Kryo 470
Silver

$= 0.56 \text{ nsec.}$

6 x 0.56 nsec.

6 x





https://cpu.userbenchmark.com/

Frequency: 3.5 GHz

Time: $\frac{1}{\text{Frequency}}$

Solve the time

If memory is faster than the cpu
then the cpu will remain idle for most of the time.

In Memory you must consider the ff.

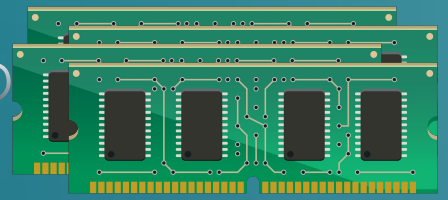
Speed
Size
Cost

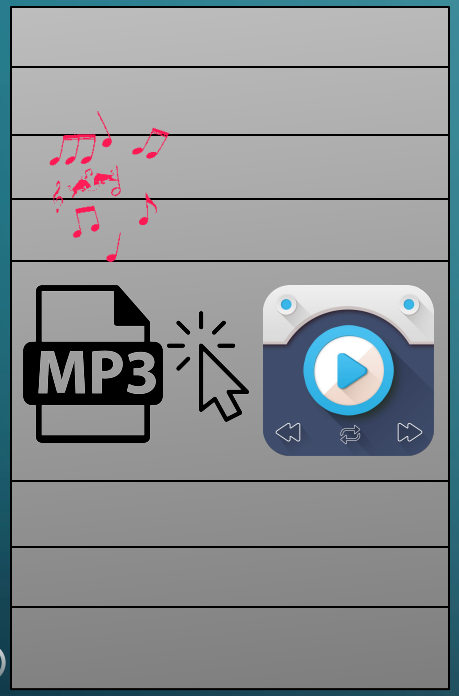
That's why there are various memory devices associated to our computer devices (PC, Smartphones, Tablets, etc.)

Types of Computer Memory

Primary Memory

- Perform immediate task
- Direct access to CPU

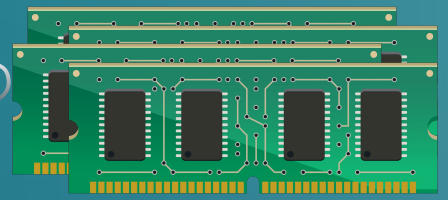




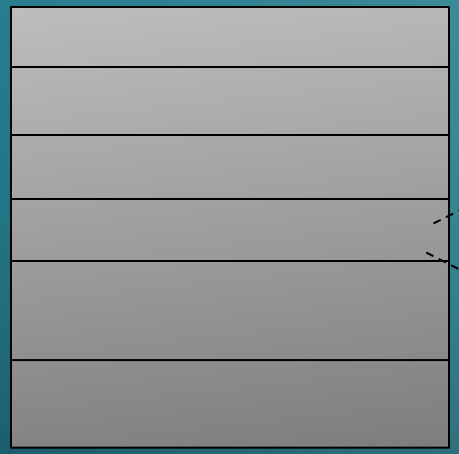
Secondary Memory

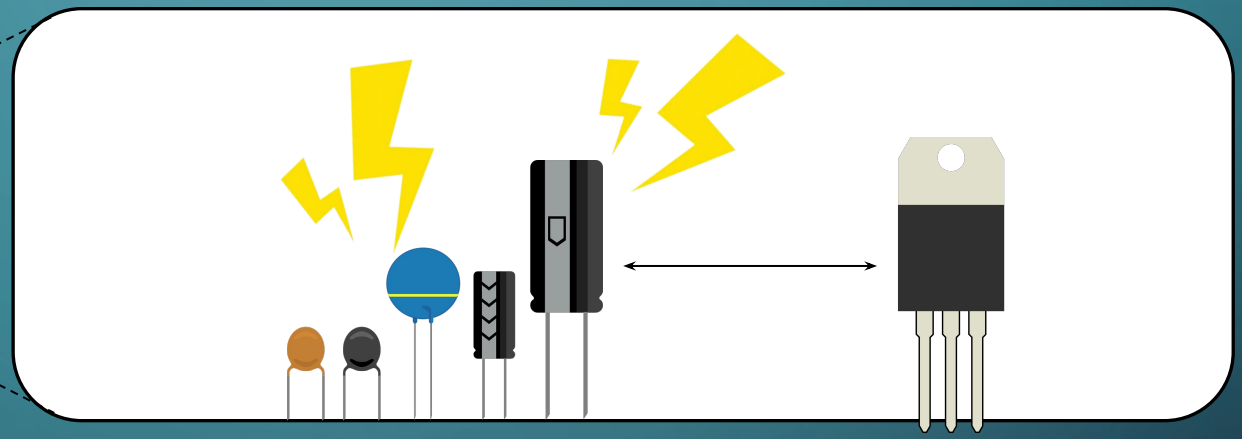
- Permanent Storage
- not immediately accessible by a computer or processor

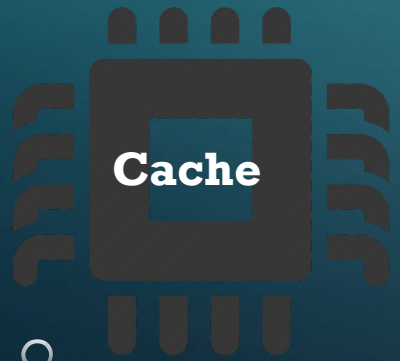
Primary Memory



Dynamic Random Access Memory
D.R.A.M.



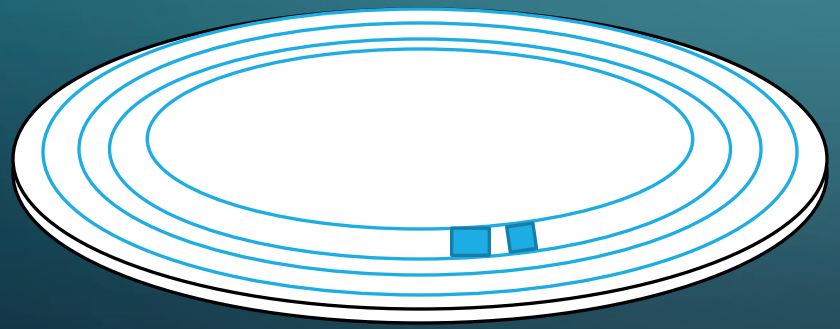




Static Random Access Memory
S.R.A.M.

Secondary Memory:

- Slower than Primary Memory
- Retains Data Permanently.
- Bigger in Size
- Cost-Effective
- Semi-Random accessibility



Sequential Movement is used to go to a particular block where data is stored.
That's why Time is longer

Cache Memory Mapping

Virtual Memory Mapping

Words

Words

Cache

(Or) Blocks

CPU

Main Memory

Pages

Secondary Memory

This is the part where the CPU only recognized.

That's why we need Operating System to act as the middle man.

How does computer memory works?