



# MULTIMEDIA STORAGE DEVICES

## LESSON Q2.1

MS. LESLIE ARRIO, LPT



# WHAT IS MULTIMEDIA?

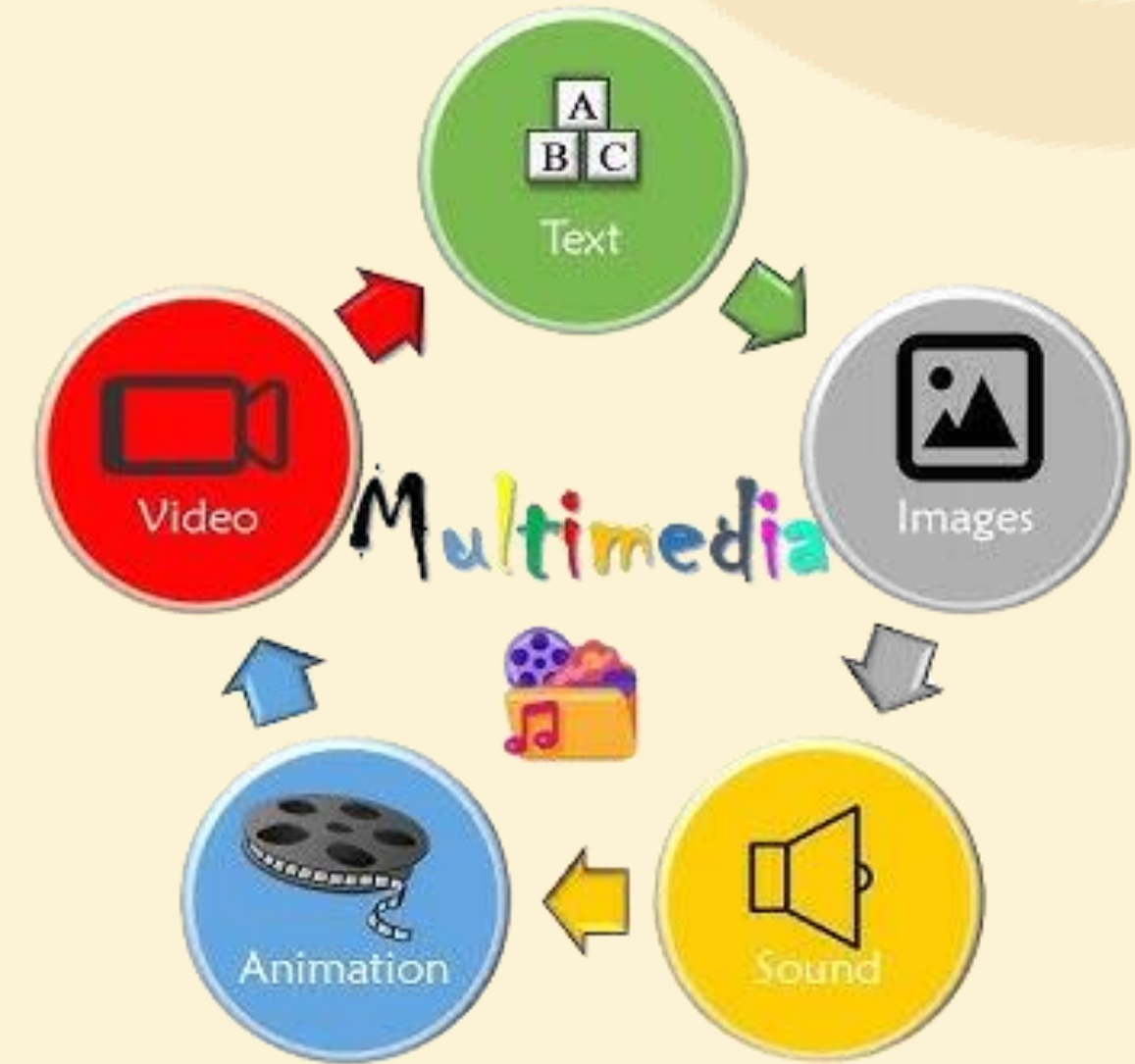


The word multi and media are combined to form the word multimedia. The word **“multi” signifies “many.”** Multimedia is a type of medium that allows information to be easily transferred from one location to another.



# WHAT IS MULTIMEDIA?

Multimedia is the presentation of text, pictures, audio, and video with links and tools that allow the user to navigate, engage, create, and communicate using a computer.



# OBJECTIVES:

1

Recognize the differences between primary and secondary storage devices

2

Identify the different multimedia storage devices

3

Distinguish correctly the functions of multimedia storage devices



# WHAT IS STORAGE DEVICE ?



**The storage unit is a part of the computer system which is employed to store the information and instructions to be processed.**

**storage device is hardware that is used for storing, porting, or extracting data files. It can also store information/data both temporarily and permanently.**

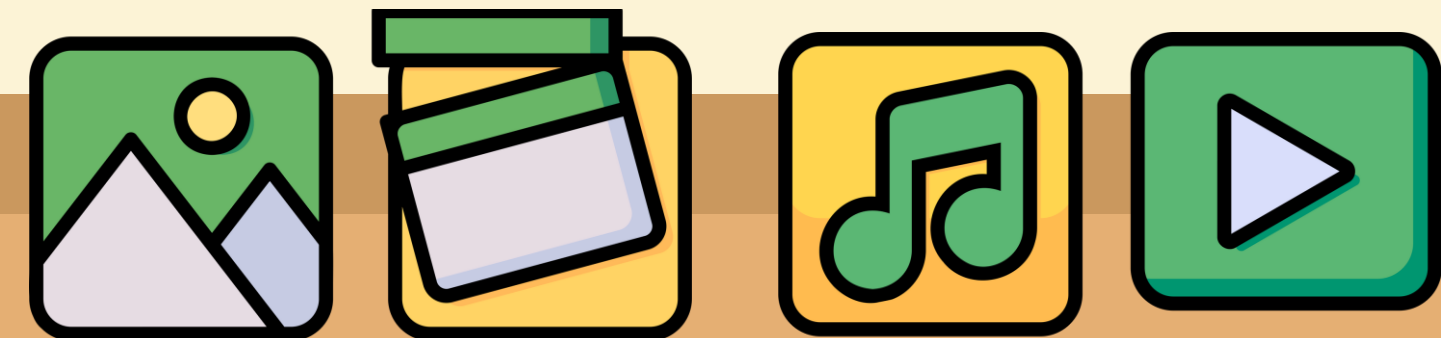


# WHAT IS STORAGE DEVICE ?



**The storage unit is a part of the computer system which is employed to store the information and instructions to be processed.**

**storage device is hardware that is used for storing, porting, or extracting data files. It can also store information/data both temporarily and permanently.**





# TYPES OF STORAGE DEVICE

Primary Storage Device



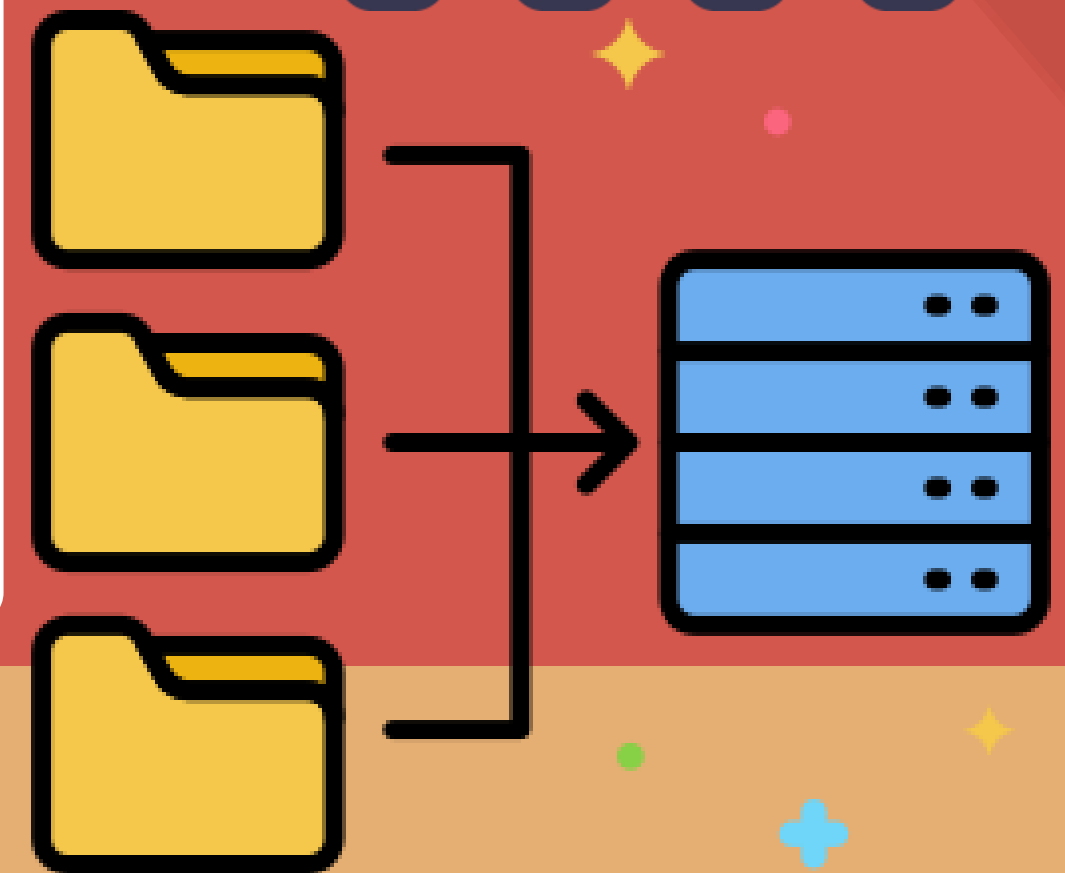
Secondary Storage Device



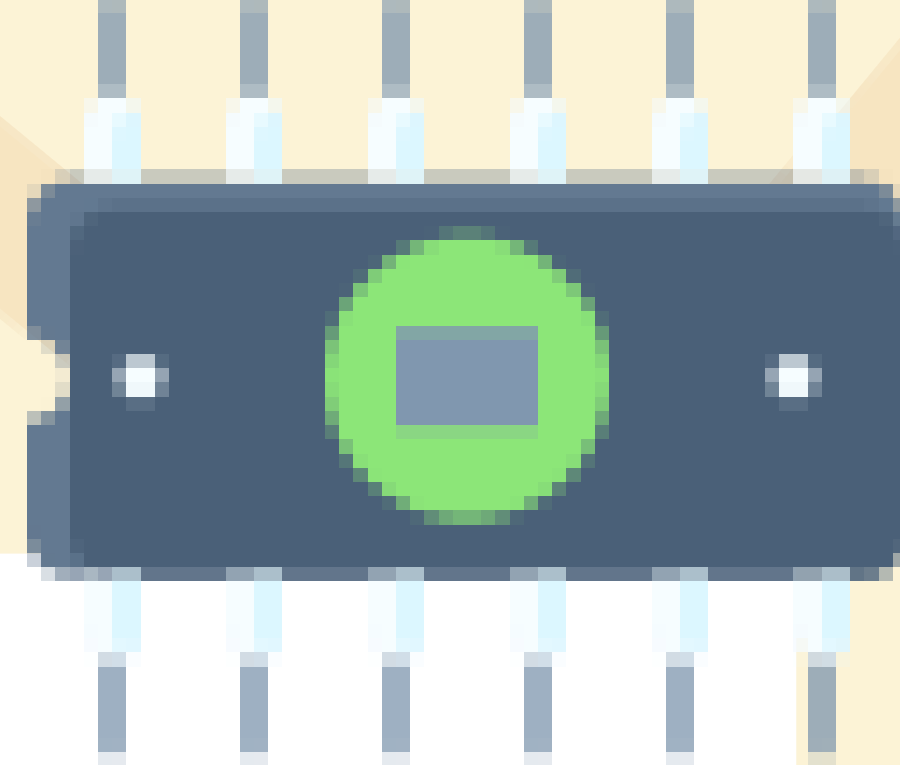
01

# PRIMARY STORAGE DEVICE

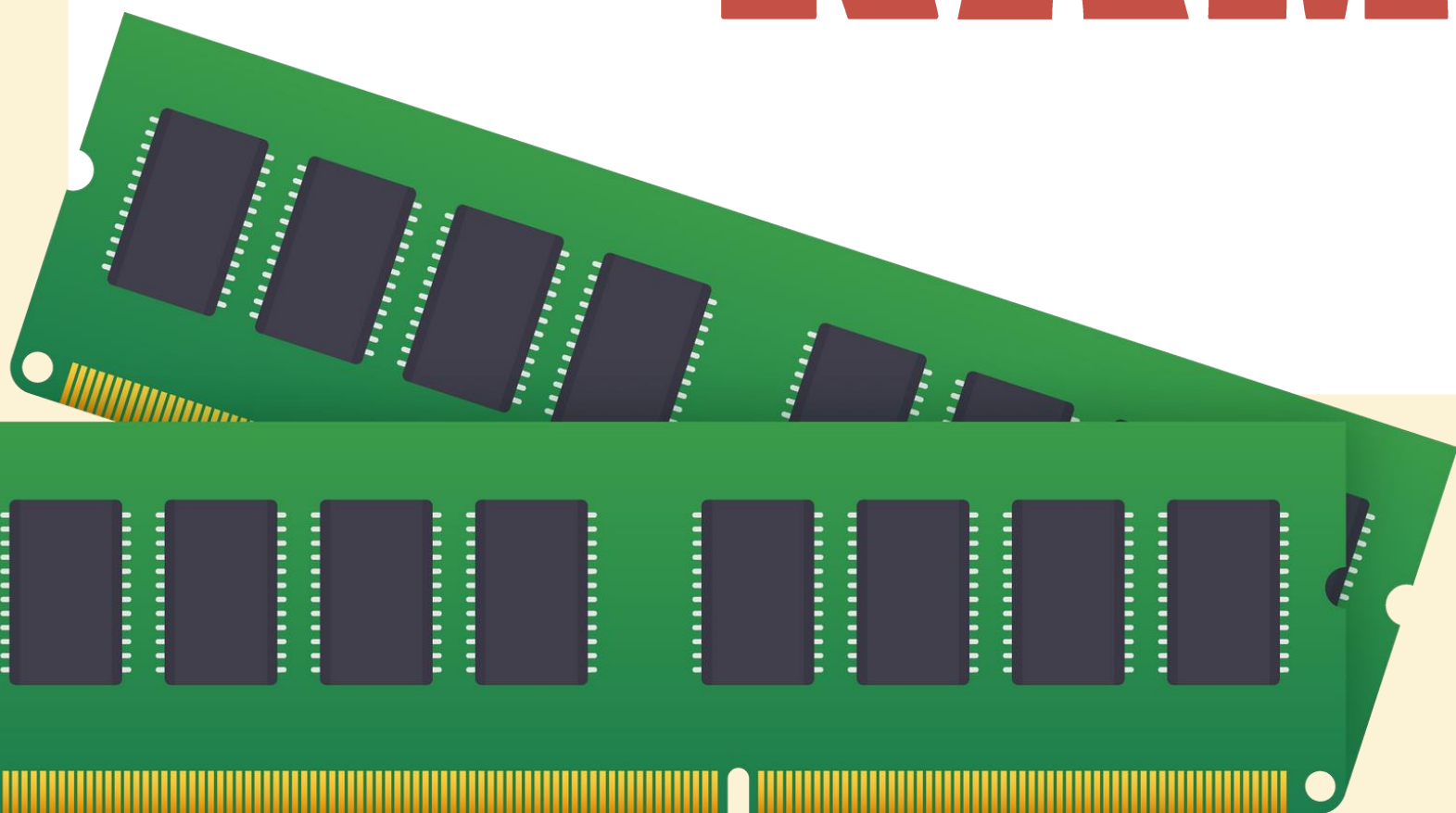
**Primary can store and retrieve data, as they are feed into it. The memory of a computer is the most important component of Central Processing Unit (CPU).**



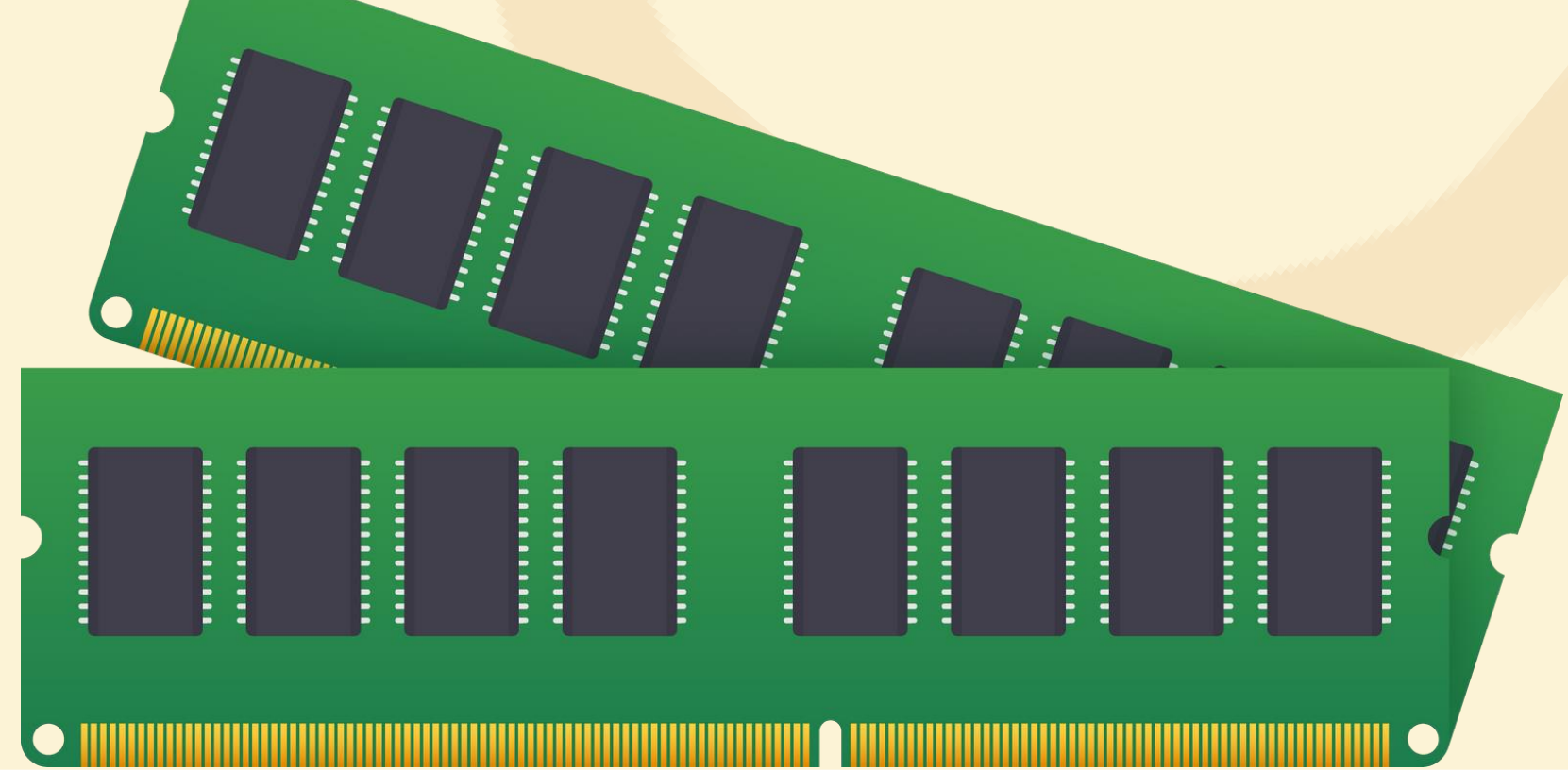




# RAM AND ROM

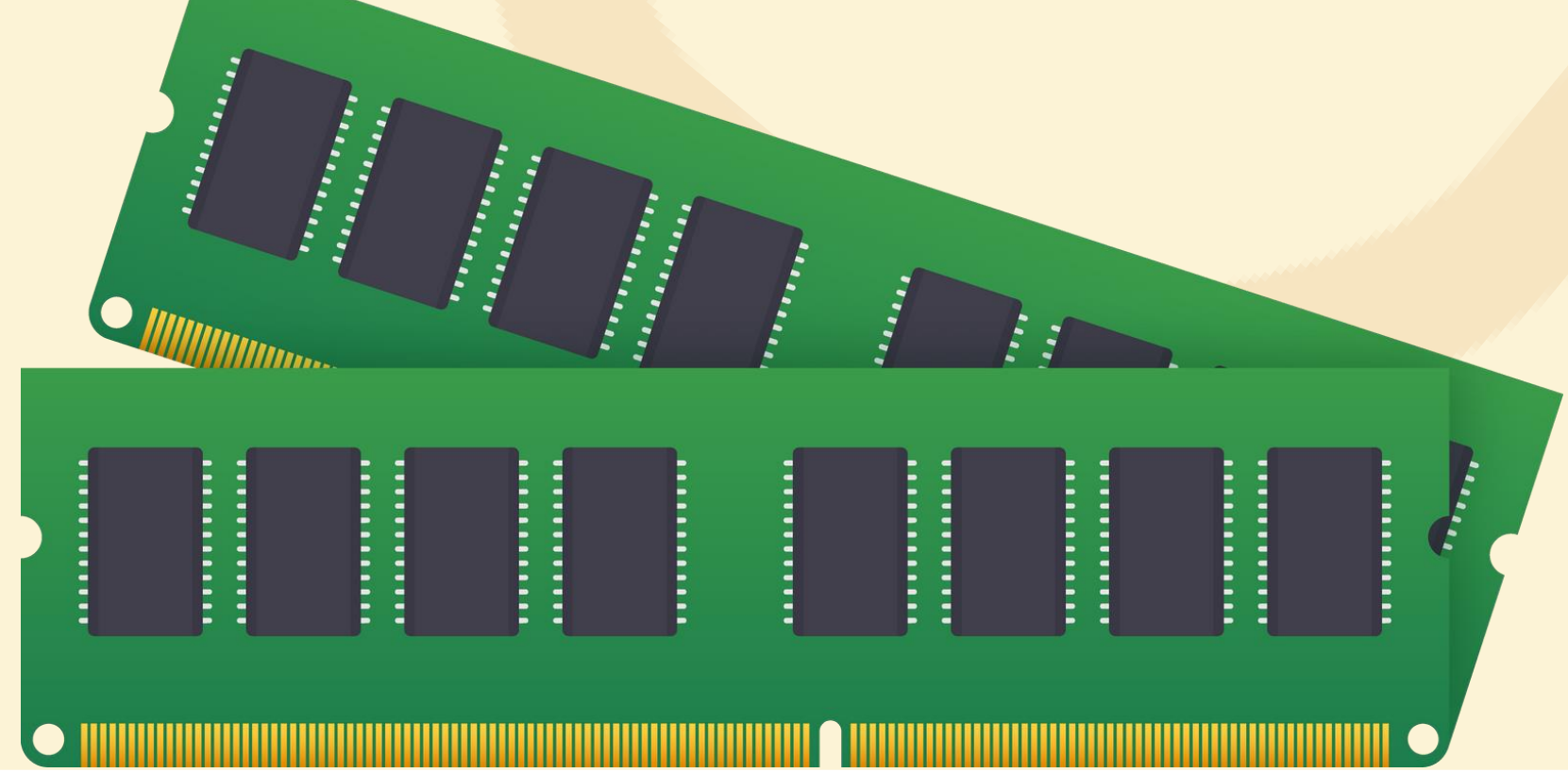


# RAM



**With the help of RAM, computers can perform multiple tasks like loading applications, browsing the web, editing a spreadsheet, experiencing the newest game, etc. It allows you to modify quickly among these tasks, remembering where you're in one task once you switch to a different task.**

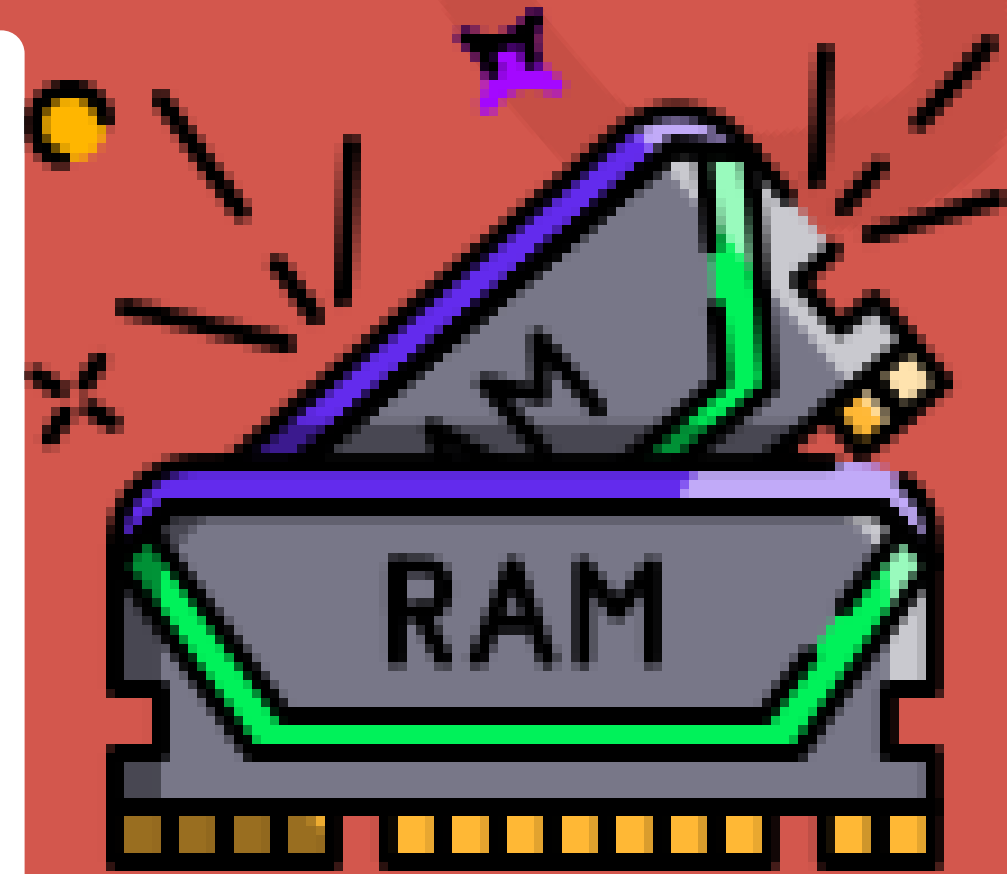
# RAM



**Electronic data storage** is storage which requires electrical power to store and retrieve that data. **Electronic data storage media** (including some forms of computer storage) are considered permanent (non-volatile) storage, that is, the data will remain stored when power is removed from the device.

# THREE TYPES OF RAM

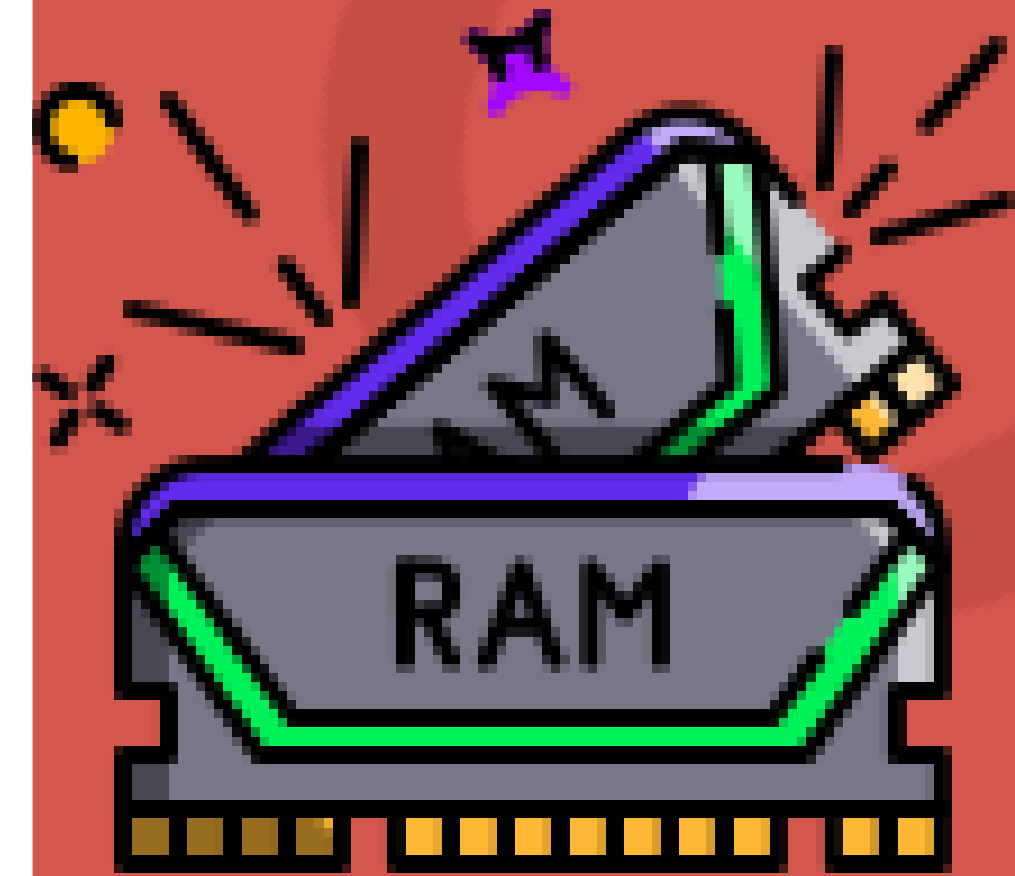
**DRAM** – It is used to store binary bits in the form of electrical charges that are applied to capacitors.



## DYNAMIC RANDOM ACCESS MEMORY

# THREE TYPES OF RAM

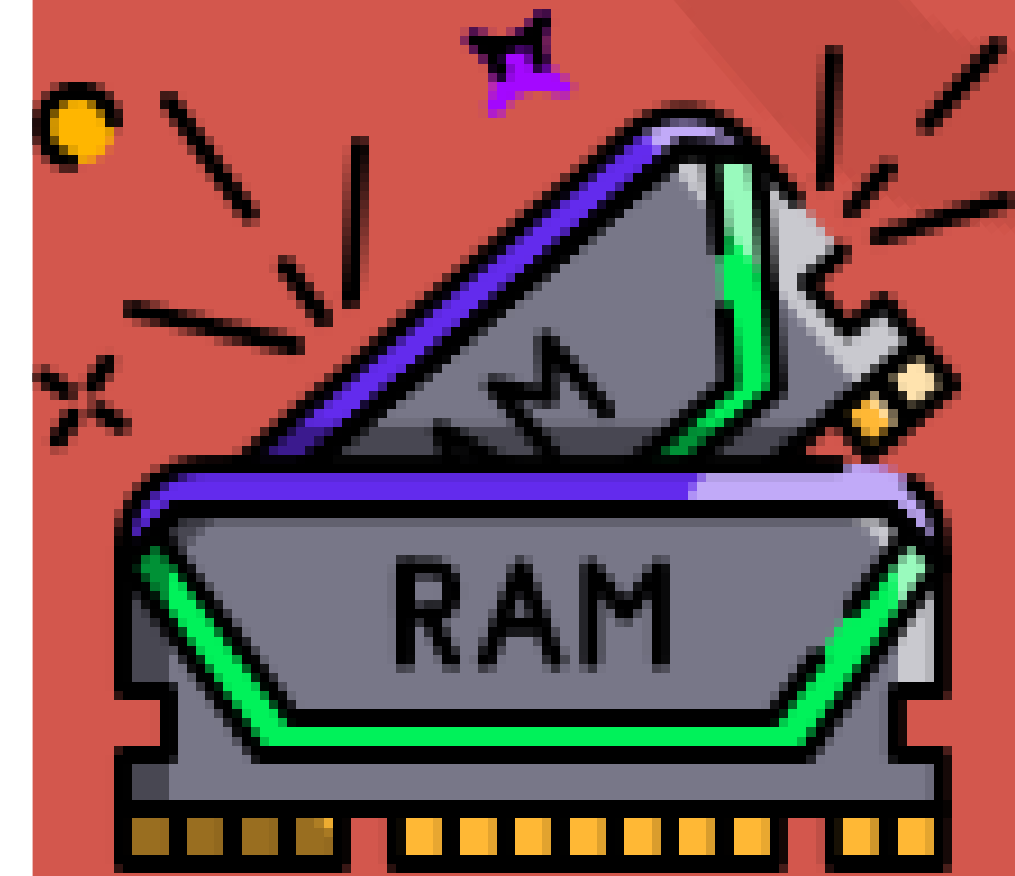
**SRAM** – It consists of circuits that retain stored information as long as the power supply is on. It is also known as volatile memory. It is used to build Cache memory. The access time of SRAM is lower and it is much faster as compared to DRAM



## STATIC RANDOM ACCESS MEMORY

# THREE TYPES OF RAM

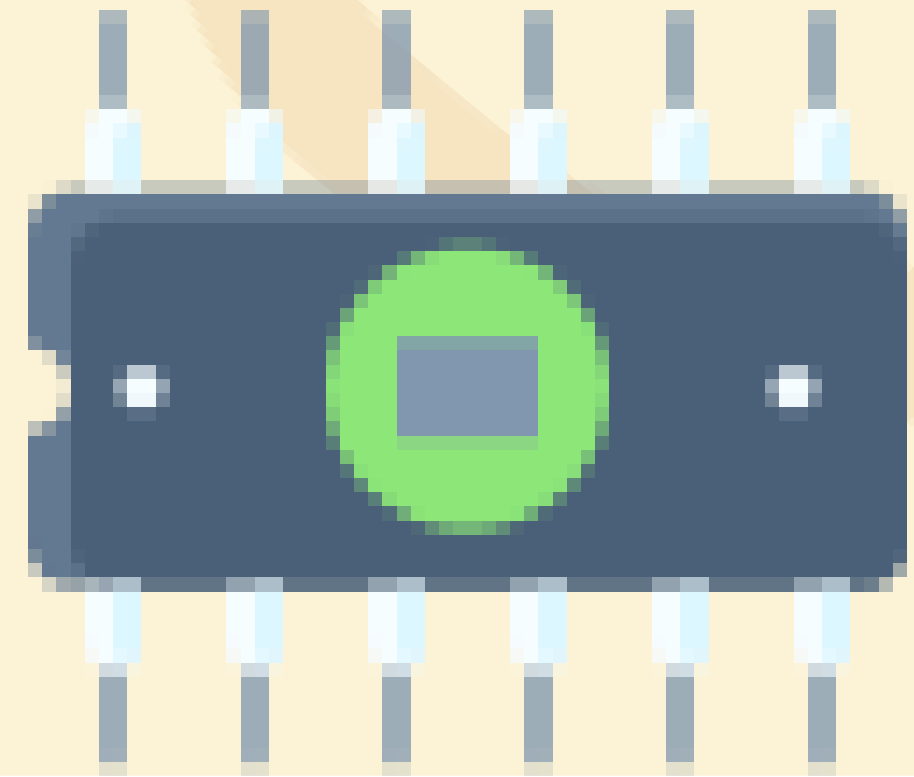
**SDRAM** interface makes higher transfer rates possible through more strict control of the timing of the electrical data and clock signals. Implementations often have to use schemes such as phase-locked loops and self-calibration to reach the required timing accuracy.



**SYNCHRONOUS DYNAMIC RANDOM ACCESS MEMORY**



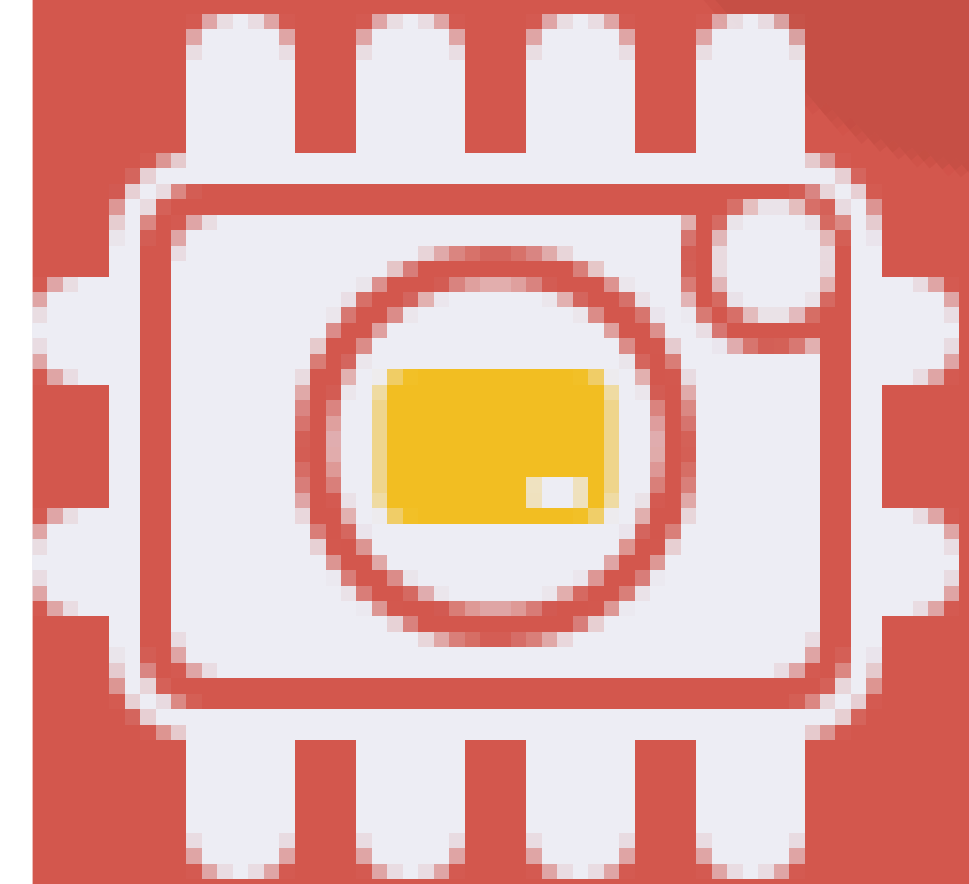
# ROM



The information is stored permanently during manufacture only once ROM stores instructions that are used to start a computer. This operation is referred to as bootstrap.

# THREE TYPES OF ROM

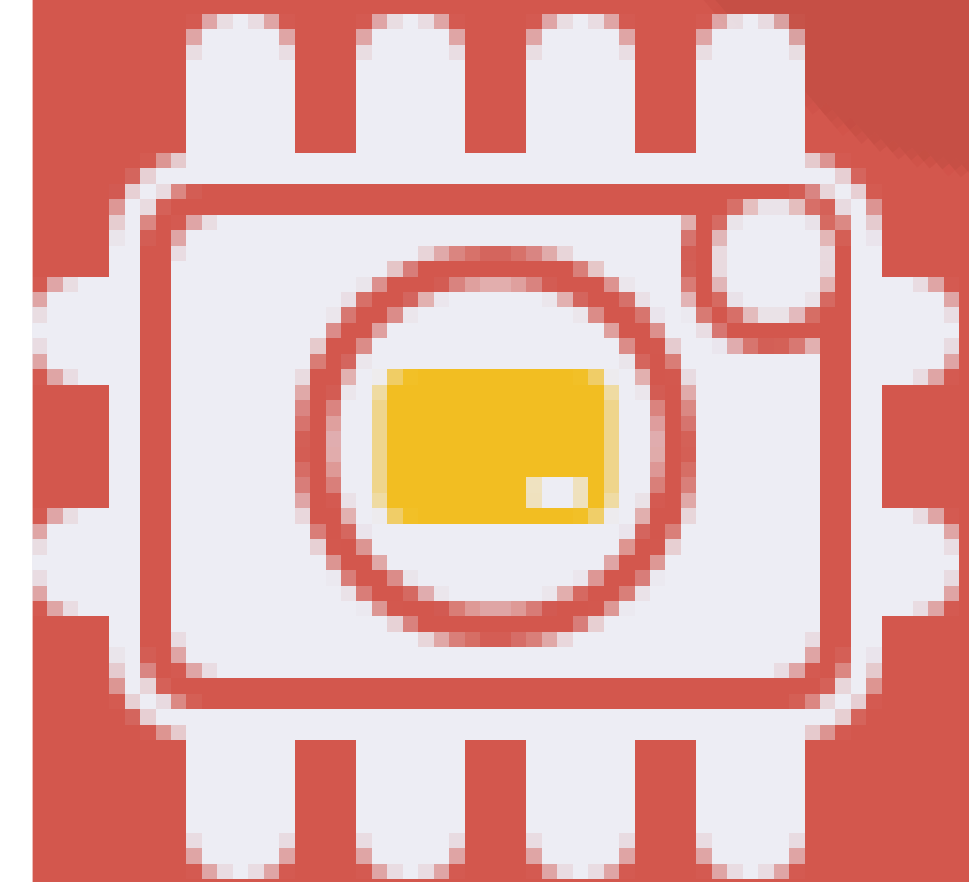
**PROM** is a type of read-only memory that can be amended only once by a user. It consists of the small fuses inside which are burnt open during programming. It is possible to program this memory only once and is not erasable.



## PROGRAMMABLE-READ-ONLY MEMORY

# THREE TYPES OF ROM

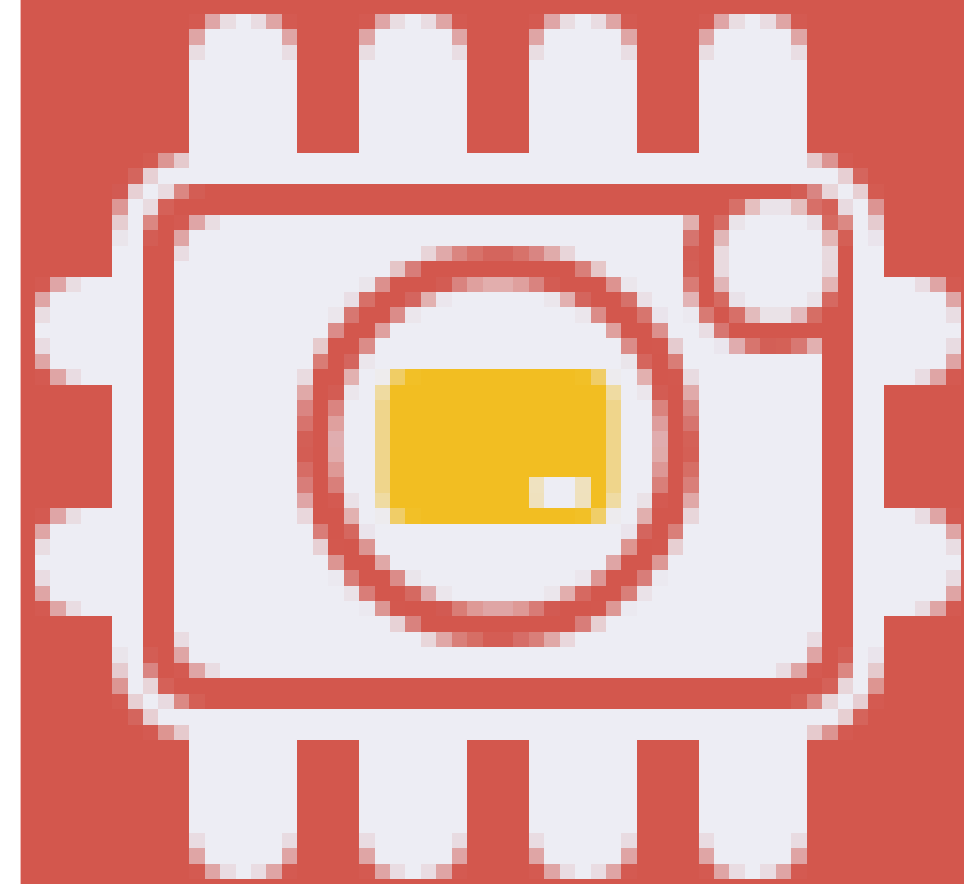
**EPROM** Another sort of memory that is possible to erase by exposing it to strong ultraviolet light source which has been previously stored on an EPROM and write new data onto the chip.



**ERASABLE PROGRAMMABLE READ-ONLY MEMORY**

# THREE TYPES OF ROM

**EEPROM** can be programmed and erased using electricity. It is possible to erase and reprogram it about ten thousand times. Erasing or programming, In EEPROM, any desired location can be separately erased and programmed.



**ELECTRICALLY      ERASABLE      PROGRAMMABLE**

**READ-ONLY MEMORY**

# Primary Storage Device

```
graph TD; A[Primary Storage Device] --> B[RAM]; A --> C[ROM]; B --> D[SRAM]; B --> E[DRAM]; B --> F[SDRAM]; C --> G[PROM]; C --> H[EPROM]; C --> I[EEPROM]
```

RAM

ROM

SRAM

DRAM

SDRAM

PROM

EPROM

EEPROM

# CACHE MEMORY

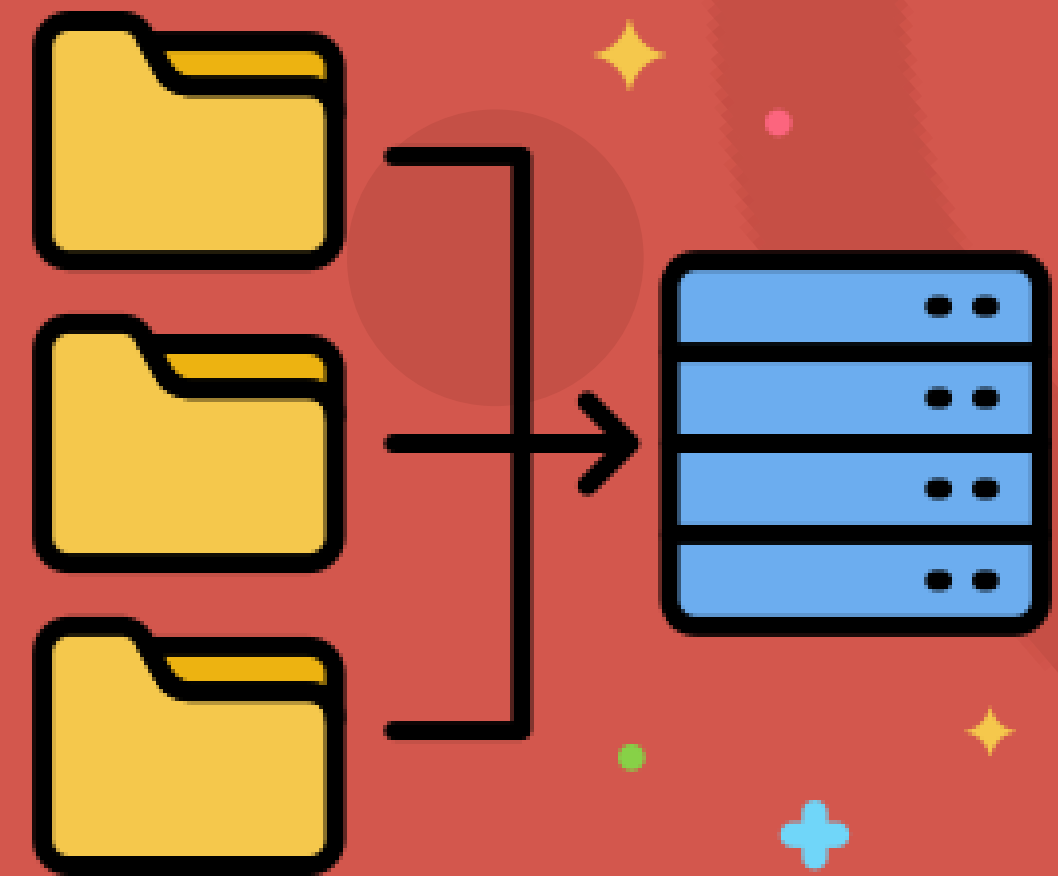


**is a special very high-speed memory. This cache memory stores data or instructions that the CPU is likely to use in the immediate future. Because this prevents the CPU from having to wait, this is why caching is used to increase read performance (Computer Hope, 2017)**

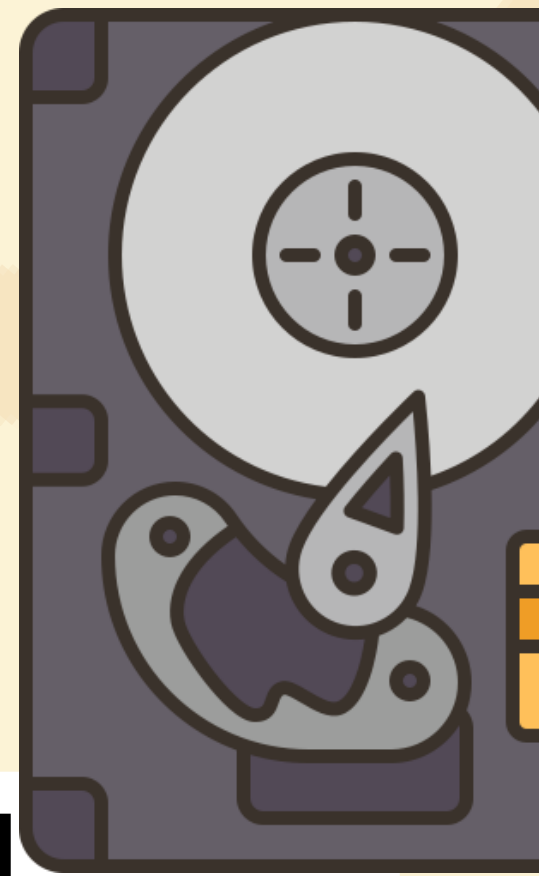


**Secondary memory is known as a Backup memory or Additional memory or Auxiliary memory. It is non-volatile and is used to store data and programs for later retrieval.**

- **Magnetic, Optical, Flash and Cloud**



# MAGNETIC STORAGE DEVICES



**Devices store data in the form of tiny magnetised dots. These dots are created, read and erased using magnetic fields created by very tiny electromagnets.**

- **FLOPPY DISK**
- **PORTABLE HARD DRIVE**
- **MAGNETIC TAPE**



# FLOPPY DISC

**Floppy discs are random access devices used for transfer small amounts of data between computers, or to back-up small files, etc.**



# HARD-DISK

**Hard disk drive (HDD) is a type of data storage device that is used in laptops and desktop computers. An HDD is a “non-volatile” storage drive, which means it can retain the stored data even when no power is supplied to the device.**



# PORTABLE HARD-DRIVE

**External hard drive is a storage device that connects to your computer through a USB (Universal Serial Bus). It provides extra storage capacity for backing up your data and storing files that you do not have room for on your computer's internal drive.**



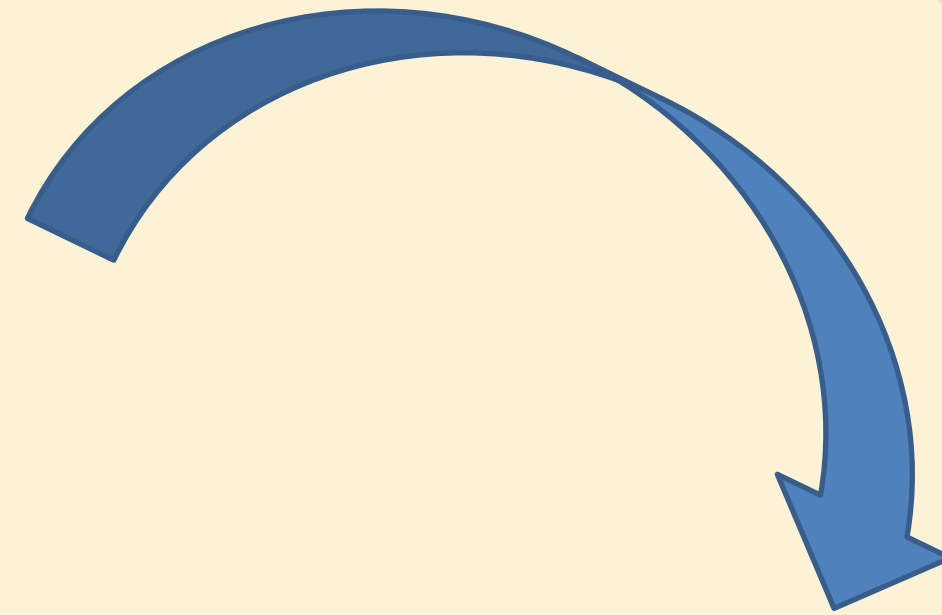
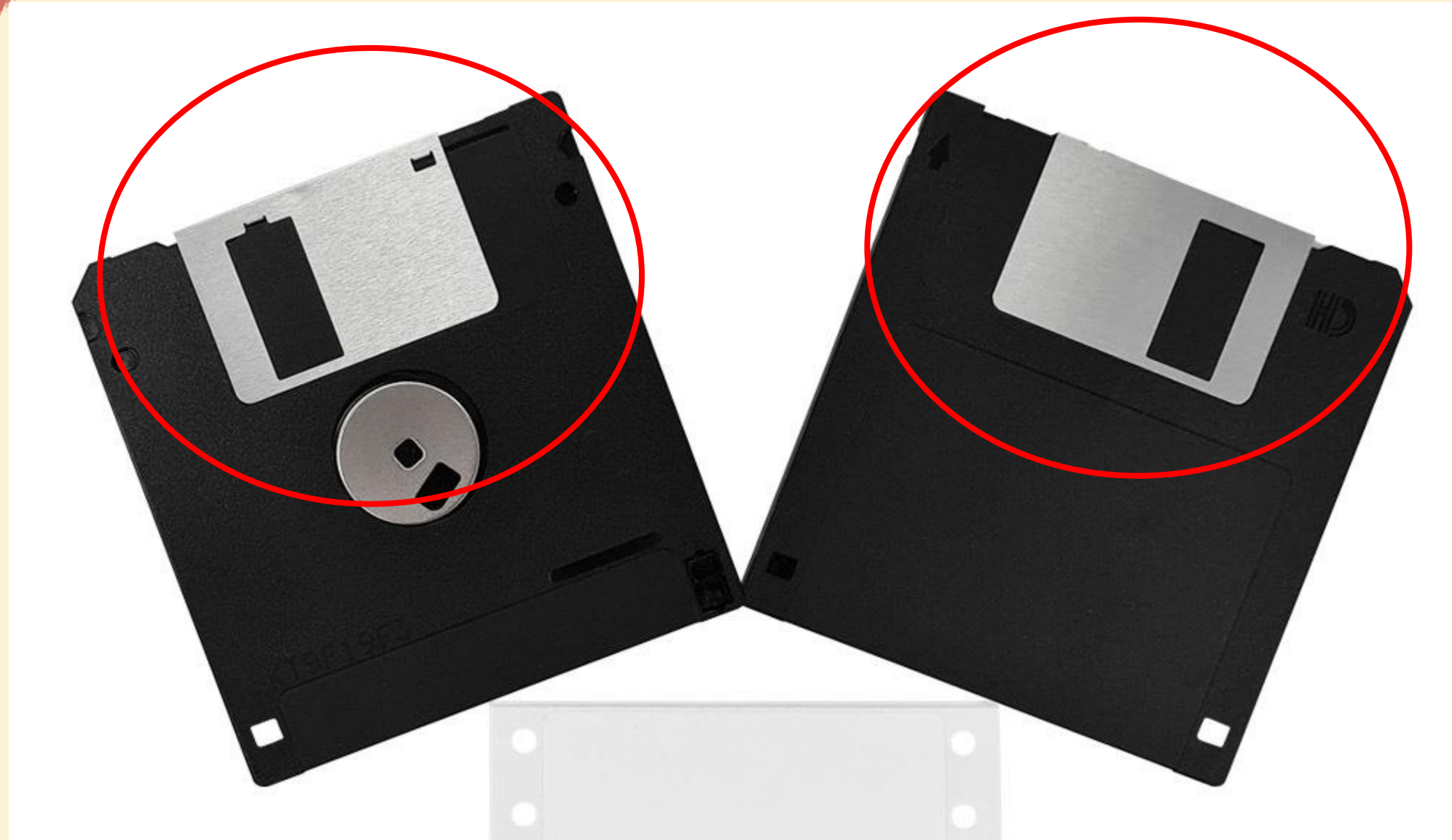


# Magnetised Dots.





# Magnetised Dots.



# MAGNETIC TAPE

Magnetic tape is a large capacity using a **serial access medium** which accessing individual files on a tape is slow.



# **SERIAL ACCESS MEDIUM**

**Using a serial access, it is necessary to start the beginning of the file and access each record until the required record is found.**

# Serial access



Song  
1

Song  
2

Song  
3

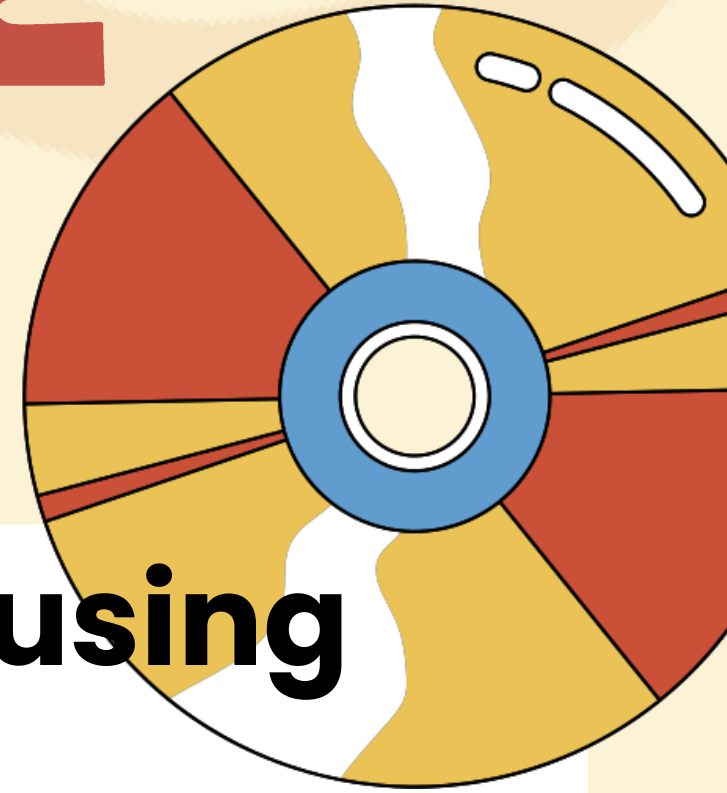
Song  
4

Song  
5

Song  
6

Song  
7

# OPTICAL STORAGE DEVICES



**save data as patterns of dots that can be read using light. A laser beam is the usual light source.**

**The beam is used in a high-power mode to actually mark the surface of the medium, making a dot. This process is known as 'burning' data onto a disc.**

- **CD-ROM**
- **DVD-ROM**





# **COMPACT DISC - READ-ONLY MEMORY**

**Discs can hold around 800MB of data. The data cannot be altered (non-volatile), so cannot be accidentally deleted. CD-ROMs are random-access devices.**



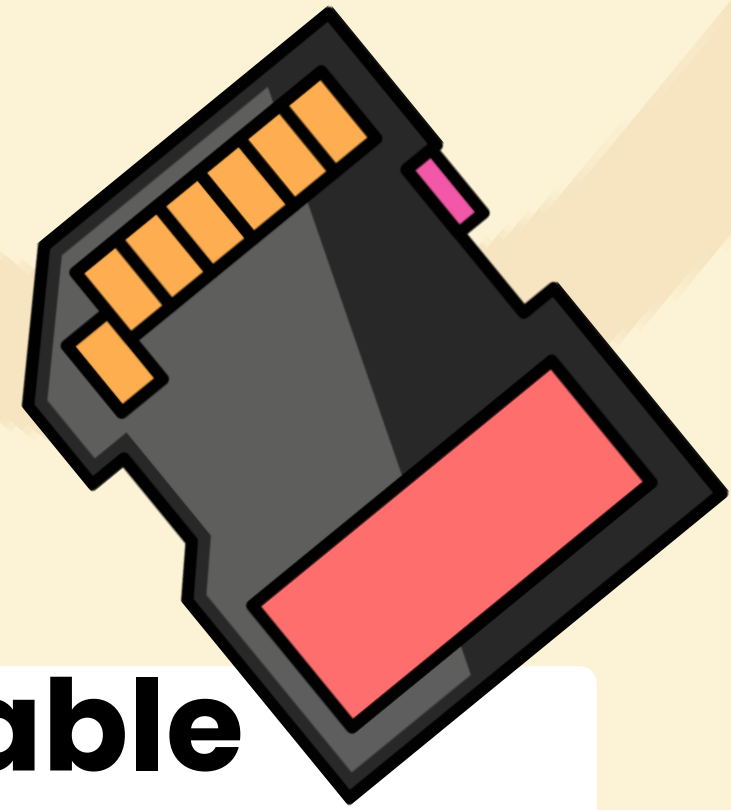


# **COMPACT DISC - READ-ONLY MEMORY**

**can hold around 4.7GB of data (a dual-layer DVD can hold twice that). since they can hold more data, they are also used to store high-quality video.**



# FLASH MEMORY



**is a type of Electronically-Erasable Programmable Read-Only Memory (EEPROM). Flash memory is non-volatile (like ROM)**  
**are based on electronic circuits with no moving parts (no reels of tape, no spinning discs, no laser beams, etc.)**

- **Memory Cards**

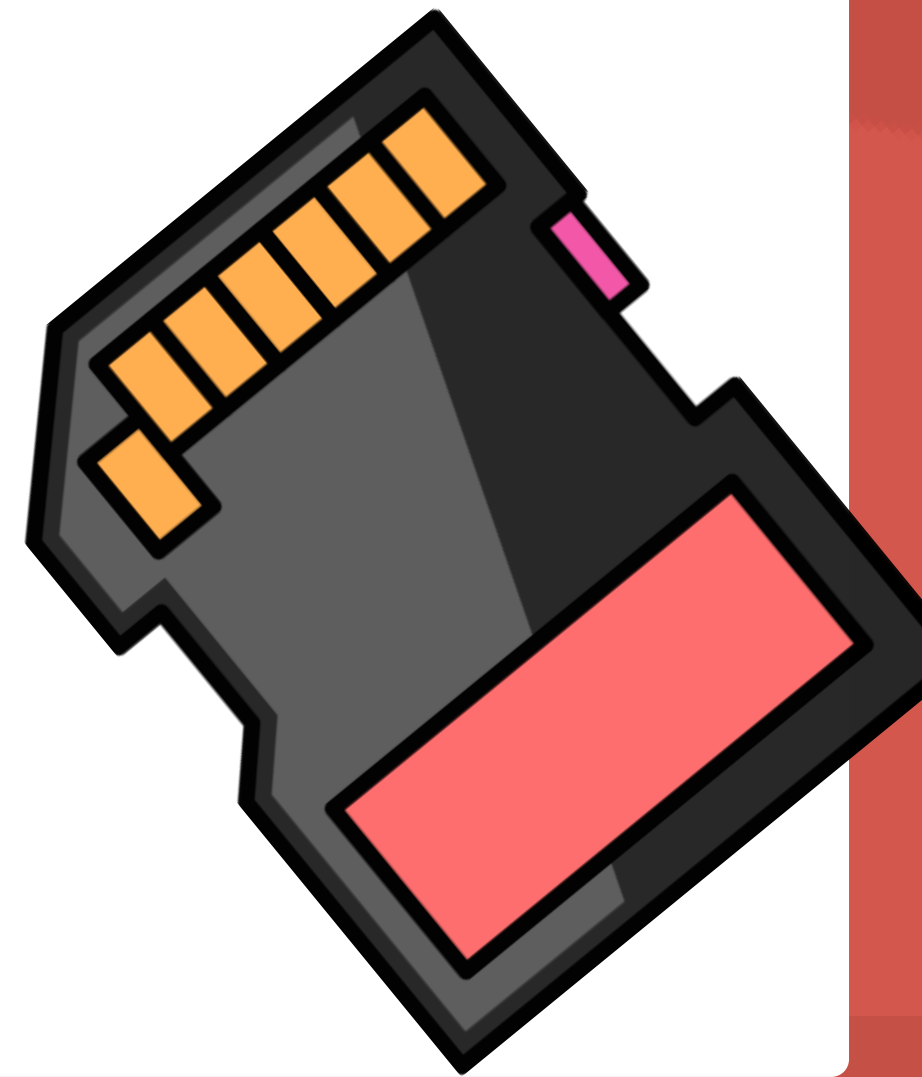
# MEMORY CARDS

Many of our digital devices (cameras, mobile phones, MP3 players, etc.) require compact, non-volatile data storage. Flash memory cards provide this and come in a variety of shapes and sizes.



# SD CARD

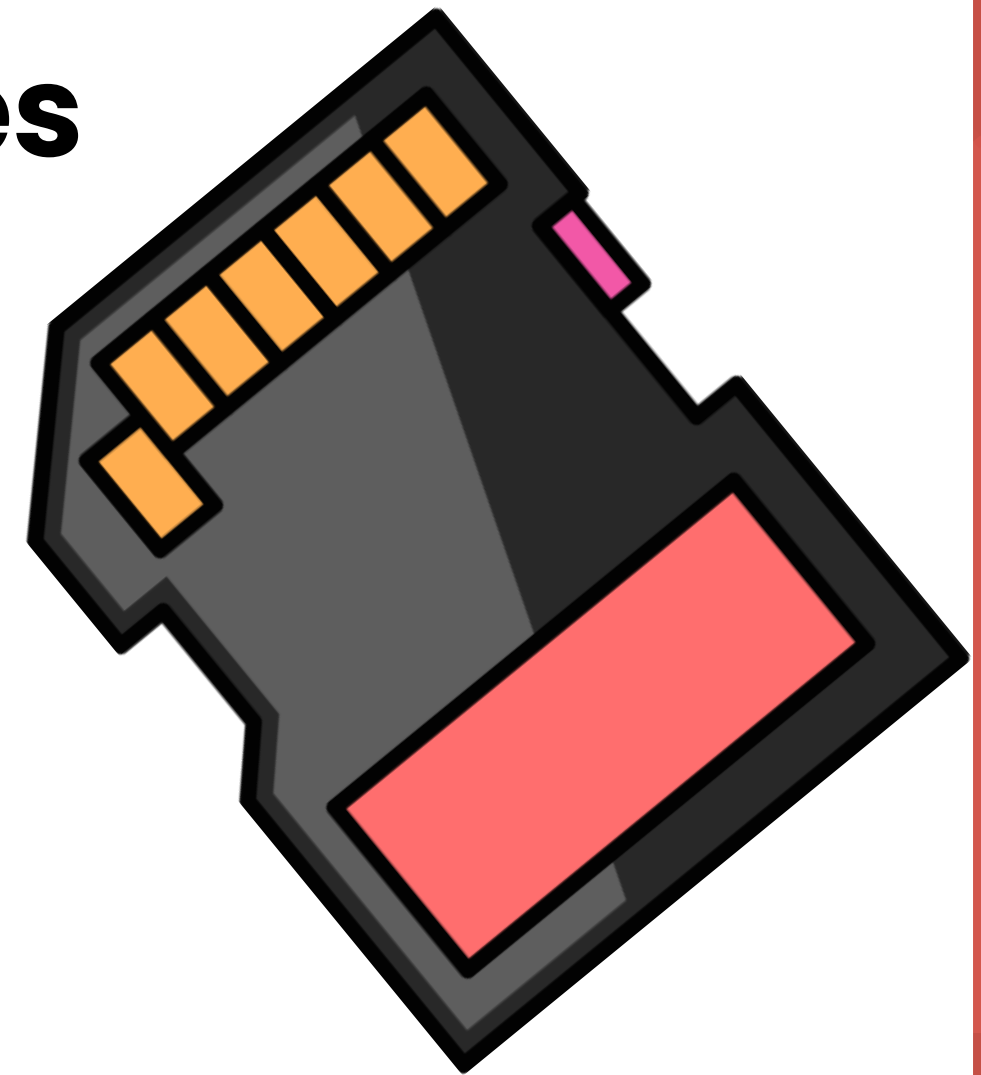
- **SD memory card stands for Secure Digital Memory Card or the so-called SD card. SD cards are used to save digital photos or videos.**
- **SD Card started 2GB Storage Capacity**



# THREE TIERS SD CARDS

**SD memory cards have three SD TIERS or standards that feature the capacities standards are:**

- **SD**
- **SDHC**
- **SDXC**
- **SDUC**



# TYPES OF SD CARDS

**SDHC (Secure Digital High Capacity)** memory cards are widely used in camcorders and cameras. One of the main reasons for their popularity is their high-capacity storage: an SDHC card can have up to 32GB.





# TYPES OF SD CARDS

**SDHC (Secure Digital High Capacity)** memory cards are widely used in camcorders and cameras. One of the main reasons for their popularity is their high-capacity storage: an SDHC card can have up to 32GB.





# TYPES OF SD CARDS

**SDUC (Secure Digital Ultra Capacity)**, **SDXC** (Secure Digital eXtended Capacity) and **SDHC** (Secure Digital High Capacity) were established to meet the growing demand for data heavy apps, 8K, 4K, and HD video and high-resolution image photography.

# TYPES OF SD CARDS

Type		Capacity
SD		2GB and under
SDHC	Secure Digital High Capacity	More than 2GB, up to 32GB
SDXC	Secure Digital Extended Capacity	More than 32GB, up to 2TB
SDUC	Secure Digital Ultra Capacity	More than 2TB, up to 128TB

# MICROSD CARDS

**MicroSD cards** are the smaller-sized version of SD cards and the biggest difference between the two is the form factor. They're also more versatile since they're often available with an SD adaptor that allows you to use microSD cards in hardware devices that only support SD cards. MicroSD cards are more commonly used to expand the storage system of smartphones, drones, gaming devices and cameras.

# MICROSD CARDS



# CLOUD STORAGE



**is a service model in which data is transmitted and stored on remote storage systems, where it is maintained, managed, backed up and made available to users over a network -- typically, the internet.**

# **HOW DOES CLOUD STORAGE WORK?**

**When customers purchase cloud storage from a provider, they turn over most aspects of the data storage to the vendor, including security, capacity, storage servers and computing resources, data availability and delivery over a network.**

**Customer applications can access the stored cloud data through traditional storage protocols or application programming indicators (APIs), or they can also be moved to the cloud.**

# EXAMPLE OF CLOUD STORAGE



OneDrive  
5 GB



iCloud  
5 GB



Google Drive  
15 GB

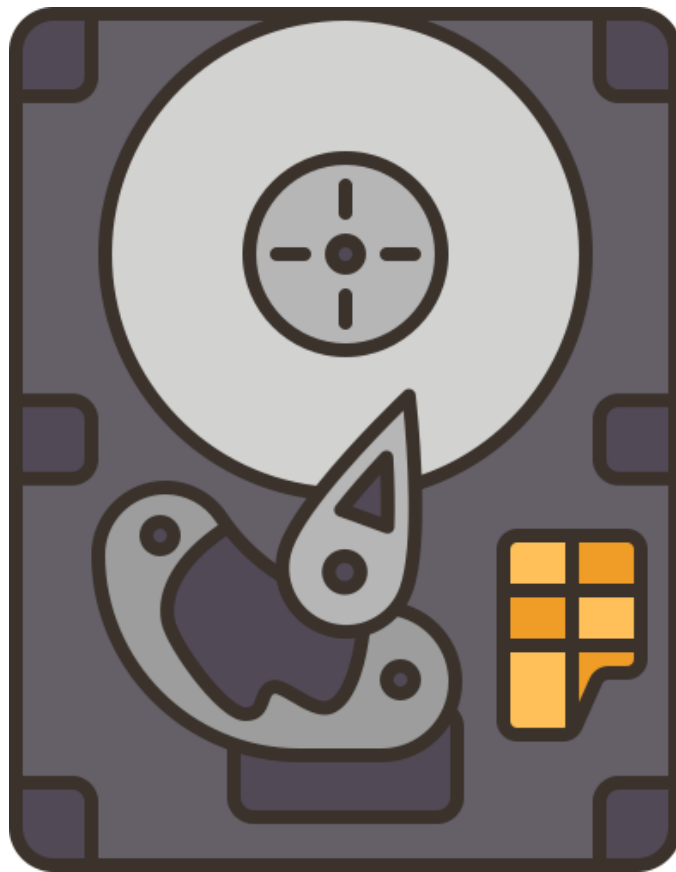


Dropbox  
2 GB

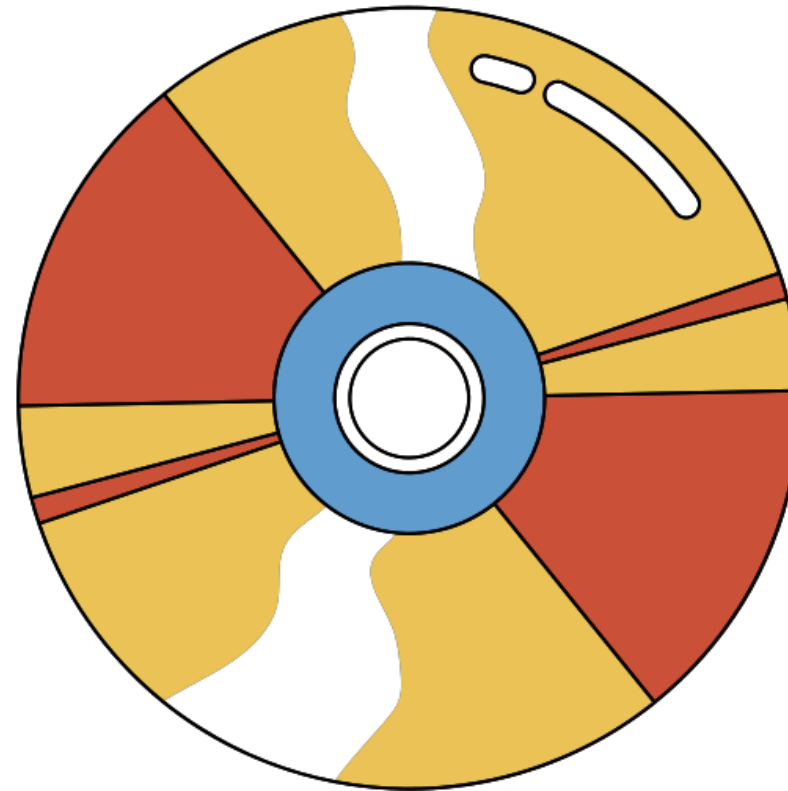


# GROUP ACTIVITY

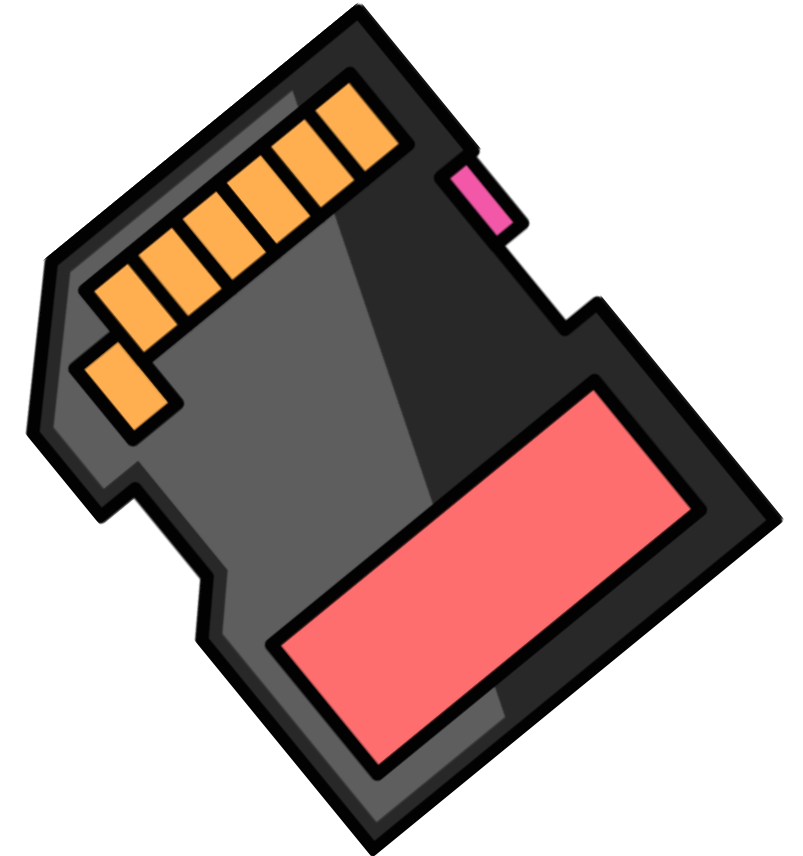
## "Multimedia Storage Device Poster"



**MAGNETIC STORAGE DEVICES**



**Optical Drive Storage Device**



**Flash Memory**

**Materials** - Art supplies, 1 Cartolina

**Significance** - Encourages creativity and reinforces understanding of multimedia storage devices.

**Instructions** -

- 1) Each group creates a poster showcasing a multimedia storage device.
- 2) The poster should include images, functions, and advantages of the chosen storage device.
- 3) Students present their posters to the class.

## Rubric:

- **Creativity and design – 30 %**
- **Accuracy of information – 40 %**
- **Presentation skills – 30%**

**100**

## Assessment Questions:

- 1) Describe the function of a chosen multimedia storage device.
- 2) What are the advantages of using multimedia storage device
- 3) How do primary storage devices enhance computer performance compared to secondary storage devices?



**HOW TO MANAGE**

**memory and**

**storage space?**

# **MEDIA AND STORAGE REQUIREMENTS**

**Video, Audio and Image require vast amount of data for their representation.**

**There are 3 main reasons for compression:**

- **Large Storage**
- **Doesn't allow playing back uncompressed multimedia data**
- **Network Bandwidth**

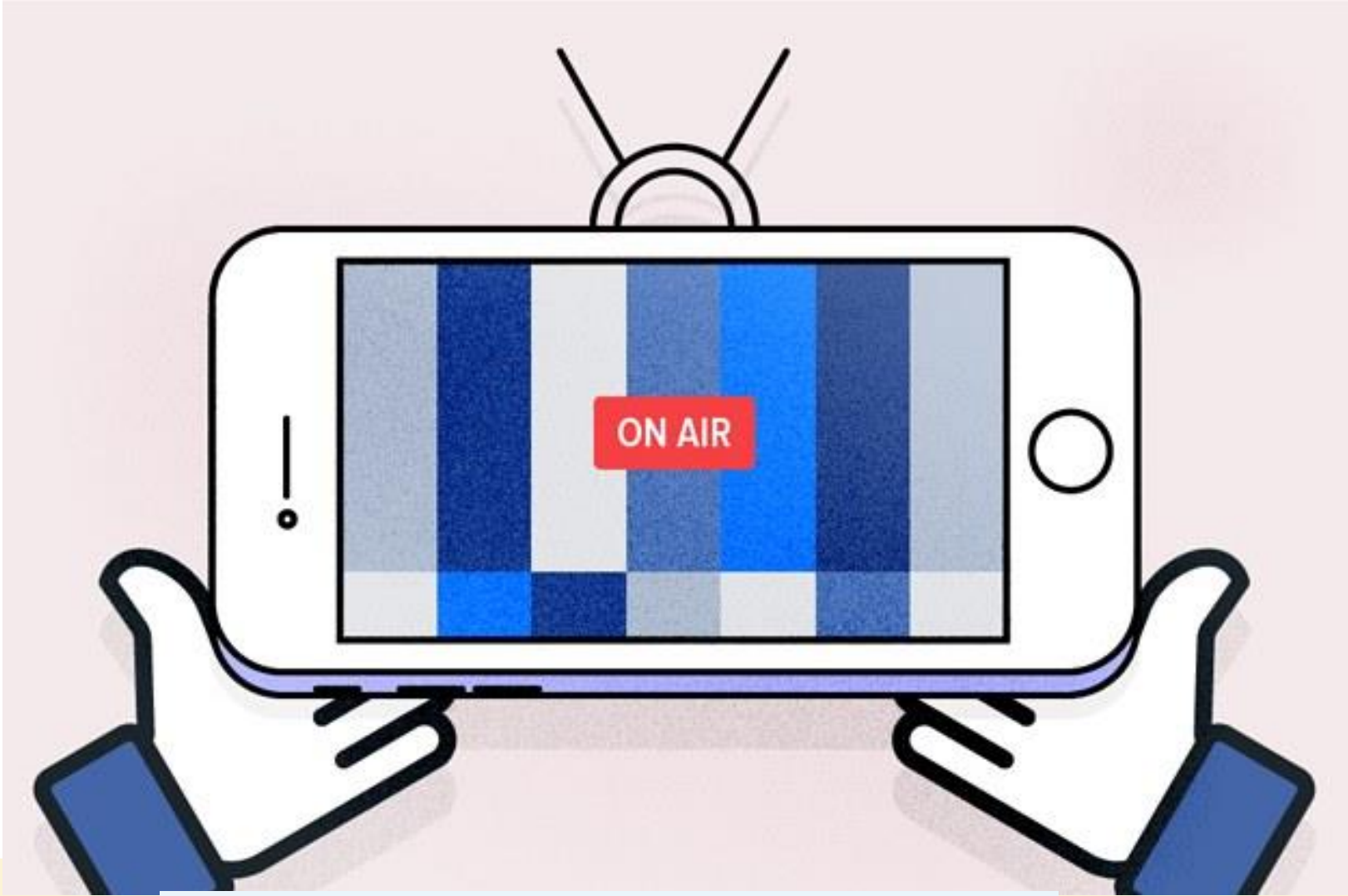
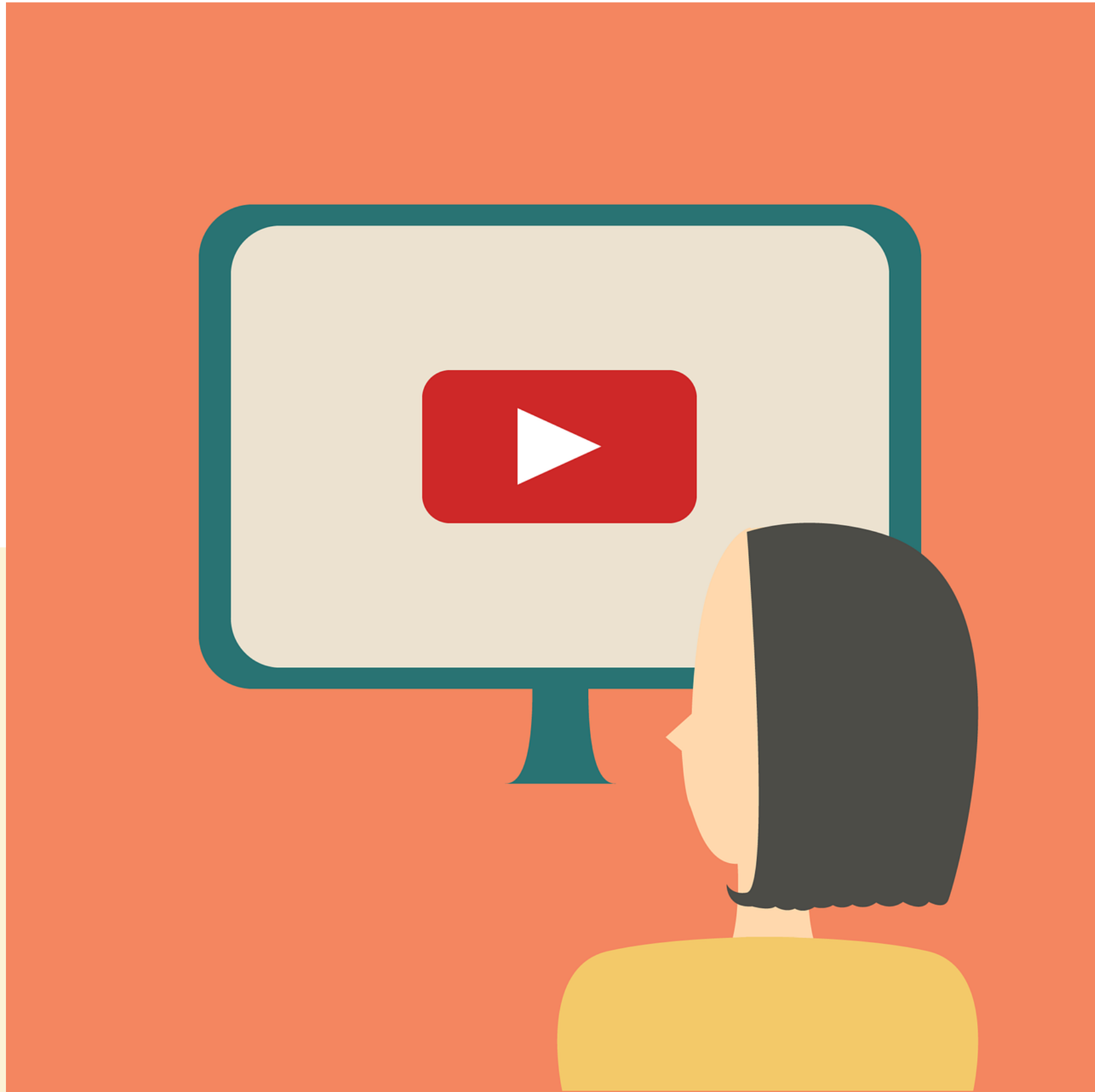


# DIGITAL VIDEO

**Digital video** is audio/visual content in a **binary format**, with information is presented as a sequence of digital data.

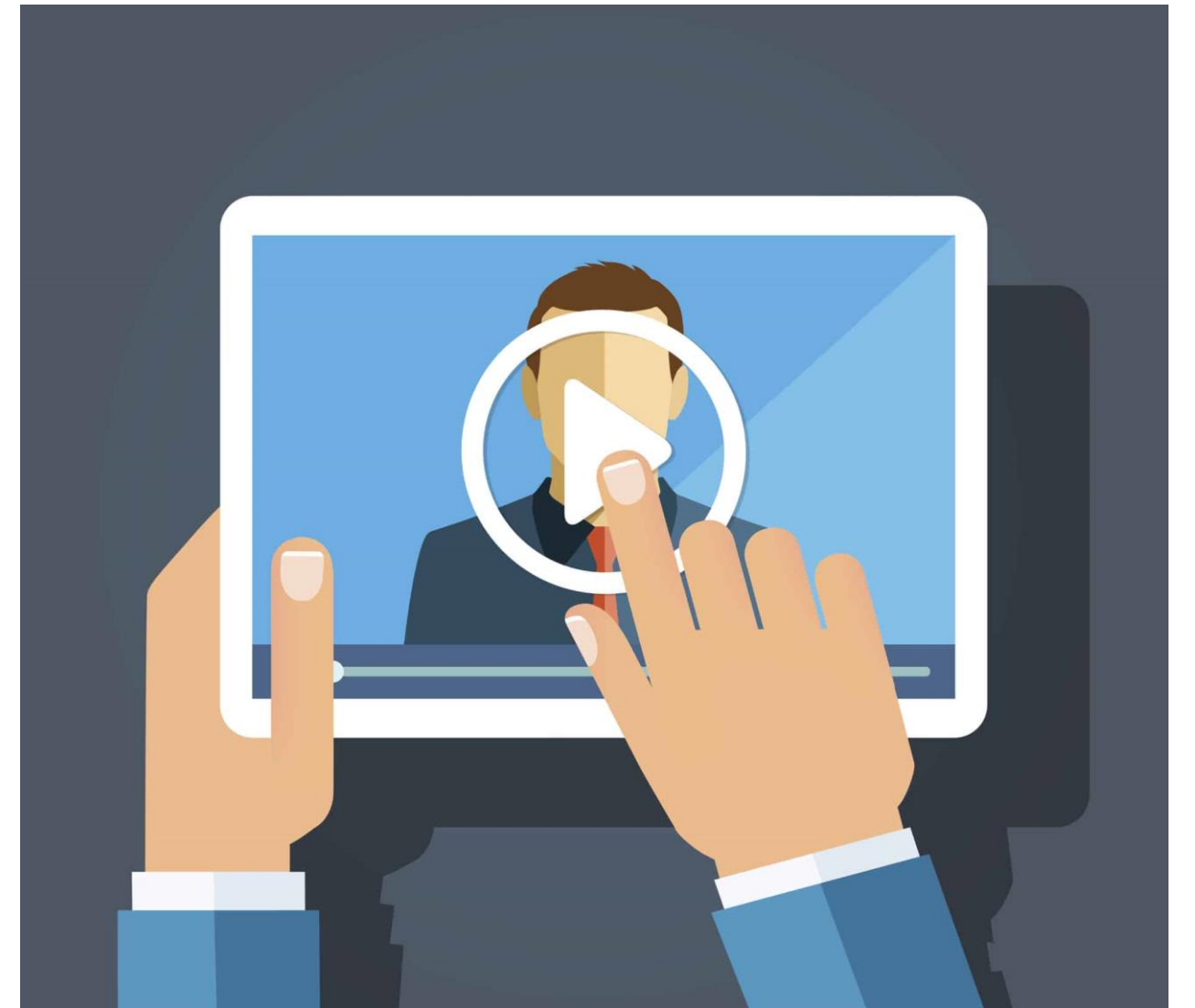






# DIGITAL VIDEO

**Digital** **video** **is**  
**audio/visual content in a**  
**binary** **format,** **with**  
**information is presented**  
**as a sequence of digital**  
**data.**



# **Analog vs Digital**

**Analog signal is a continuous signal which represents physical measurements.**

**Digital signals are discrete time signals generated by digital modulation.**

# **DIGITAL VIDEO**

**Digital video, three (3) factors consider:**

- **Frame rate**
- **Colour Resolution**
- **Spatial Resolution**

**frame per second (fps)** means how many frames are squeezed into one second of video. So, if a video is captured and played back at 24fps, that means each second of the video shows 24 distinct still images.



# FRAME RATE





# 24FPS

**This is the standard for movies and TV shows, and it was determined to be the minimum speed needed to capture video while still maintaining realistic motion. Even if a film is shot at a higher frame rate, it's often produced and displayed at 24fps.**

# 24FPS

**Computer monitor, however, uses a process called "progressive scan" to update the screen.**

**Colour Resolution** refers to the number of colours displayed on the screen at one time. Computers deal with colour in an RGB (red-green-blue) format, while video uses a variety of formats. One of the most common video formats is called **YUV**

**Spatial resolution – or in other words, "How big is the picture?". Since PC and Macintosh computers generally have resolutions in excess of 640 by 480**

**Spatial resolution** – Resolution means the number of dots, or pixels, in each video frame. The more pixels a video has, the more detail it will have and the clearer and more realistic it will look.

# NEED FOR VIDEO COMPRESSION

**COMPRESSION**– method for reducing the data used to encode digital video content. This reduction in data translates to benefits such as smaller storage requirements and lower transmission bandwidth requirements, for a clip of video content.



# NEED FOR VIDEO COMPRESSION

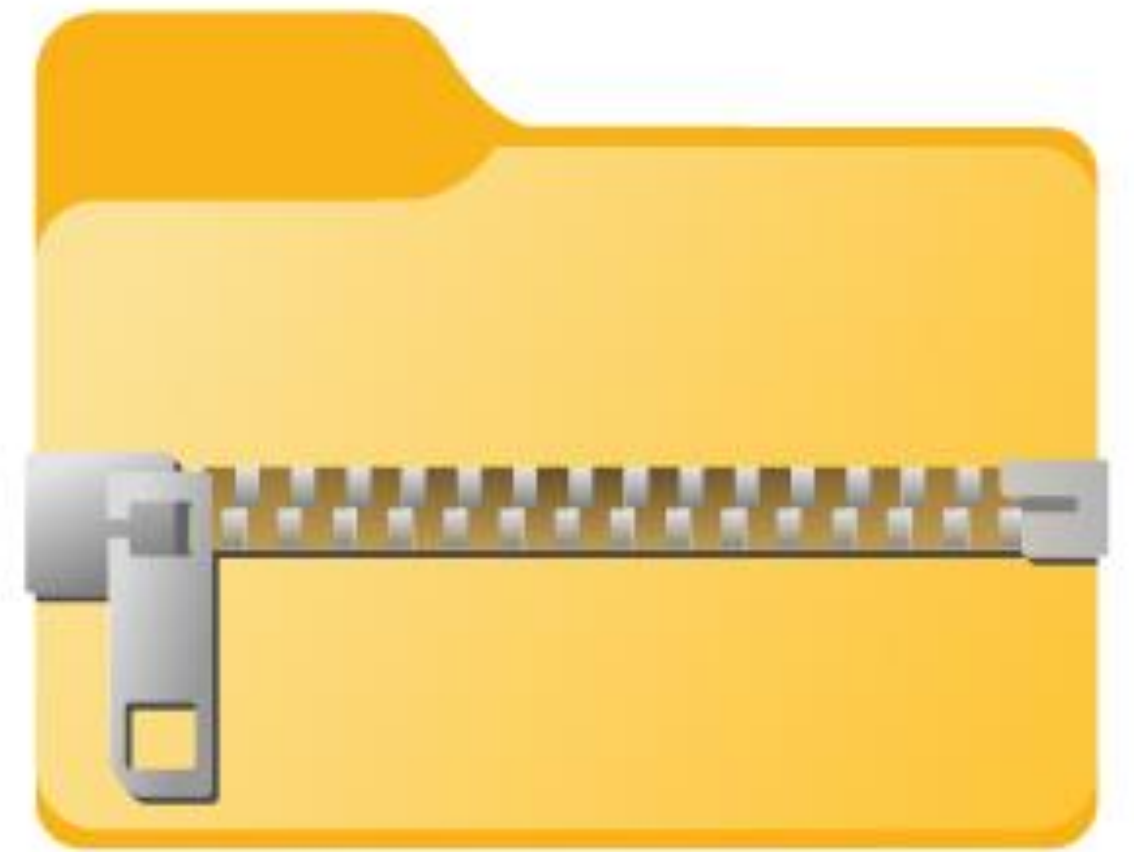
**With more colours, higher resolution, faster frame rates and better quality, you will need more computer power and will require more storage space for your video.**

**HOW WILL YOU  
COMPRESS THE VIDEO  
TO SAVE DATA  
STORAGE?**

# 1. Zip the video

## Windows

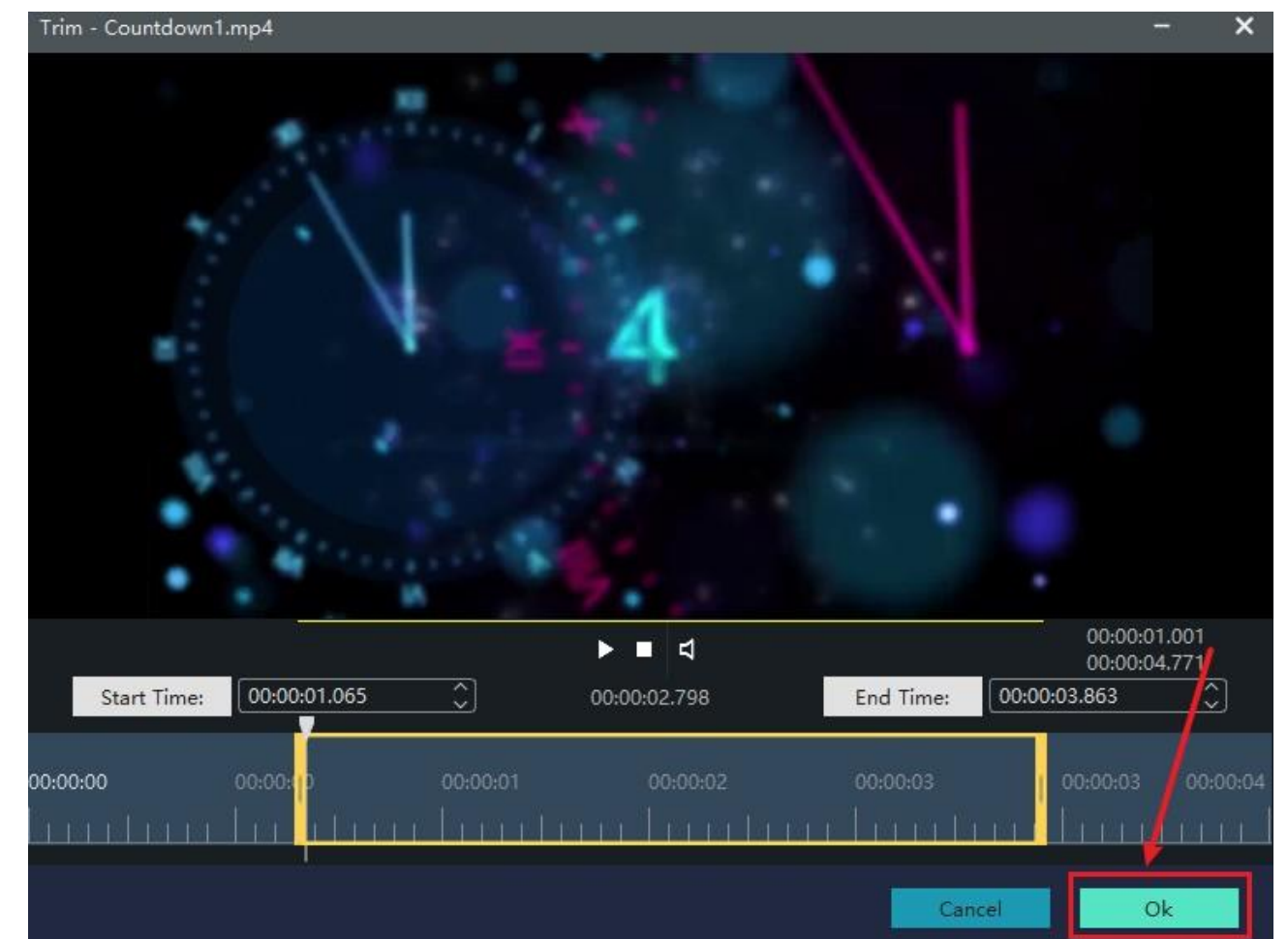
- Find the video file in File Explorer.
- Right-click on the file. Hover over then select "Compressed (zipped) folder" from the submenu.



# 2. Trimming the Video

**Shortening the overall runtime of the video by trimming out these unneeded parts will help reduce the video file size.**

**Each file should have a much lower size than before**



# **3. Changing the resolution**

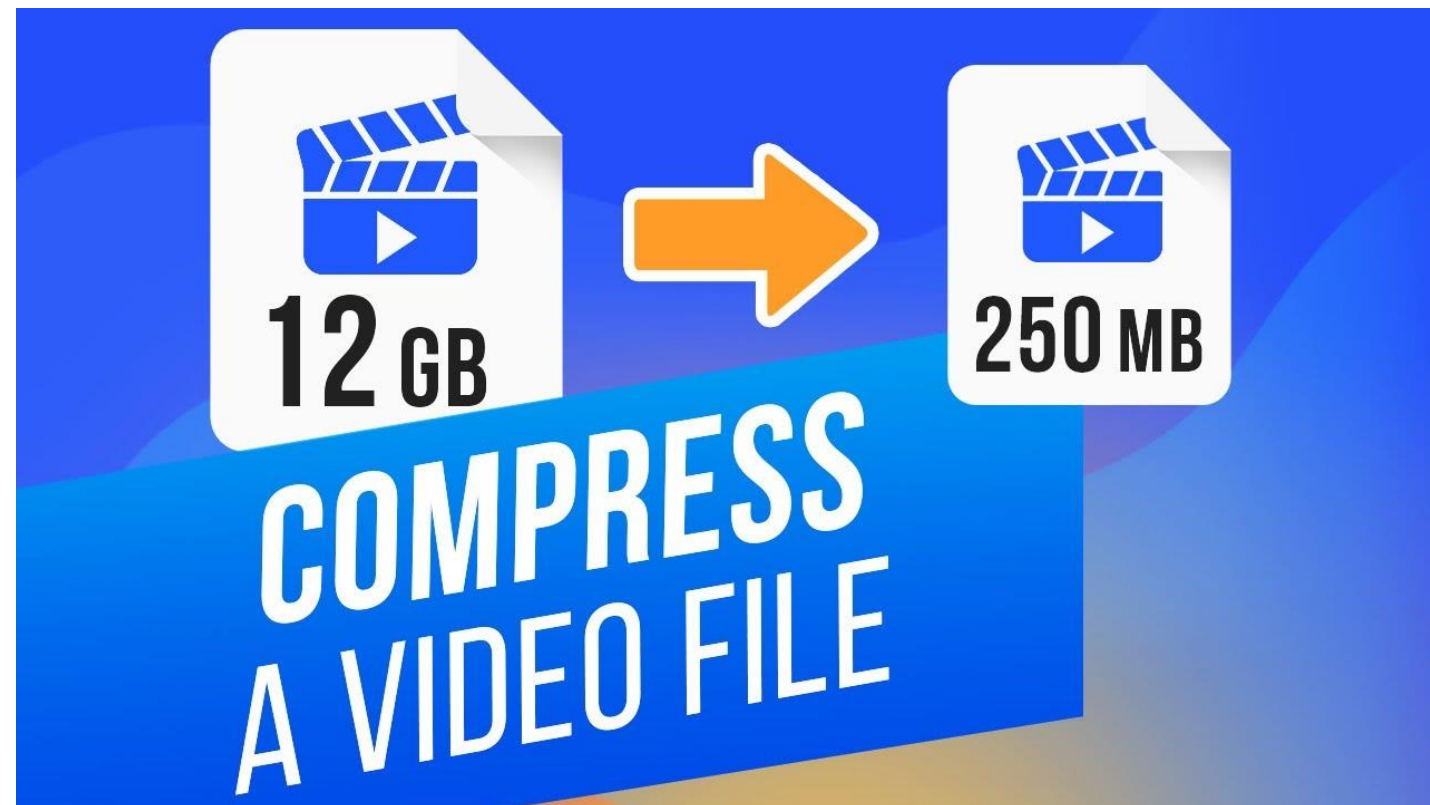
**Resolution of a video determines the size in height and width that the video will be created.**

**Larger resolution videos will dramatically increase file size.**

- 1920 x 1080 (1080p)**

# 4. Changing the File Format

**Converting your video to another format may be able to shave some of that extra size down.**





# **VIDEO FILE FORMAT**

**A video file format is an extension at the end of a video file, such as MP4 AVI, or MOV. These file formats may vary in several ways, including file size, compression, and compatibility.**

# **1. MP4 stands for MPEG-4 Video file. Developed by the Moving Pictures Experts Group**

**most common file type for videos. The MP4 format is the standard format for web videos because MP4 videos are high-quality with relatively small file sizes.**



**2. MOV** file format was designed by Apple to support the Quicktime MultiMedia, it is a video file format that can store various types of media, such as audio, video, text, and images.



**3. AVI (Audio Video Interleave) container format from Microsoft that has been widely used for video playback in the Windows world. AVI was the first A/V format for Windows.**



**Files are unique because they offer *very high-quality audio*, which is a feature you don't get in some of the other video types. Because AVI files offer excellent video and audio quality, file sizes are typically much larger.**



**Lossy compression**

**vs**

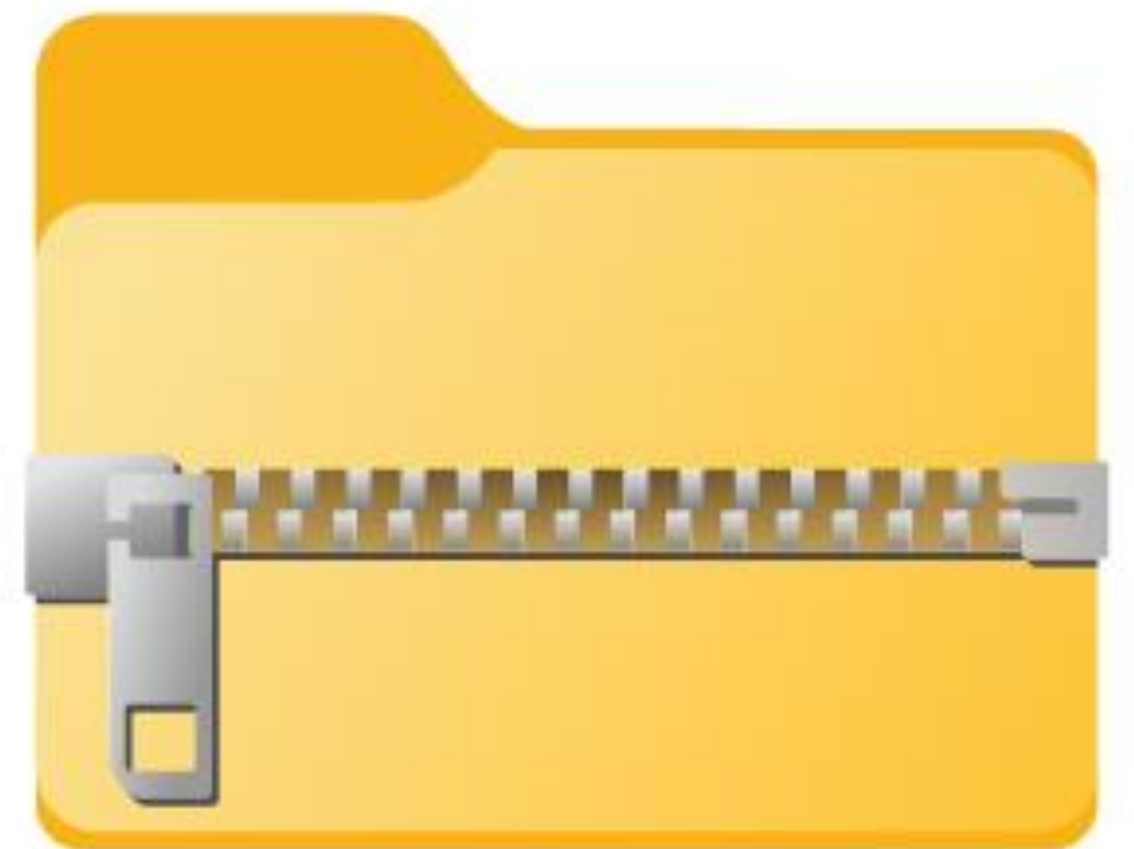
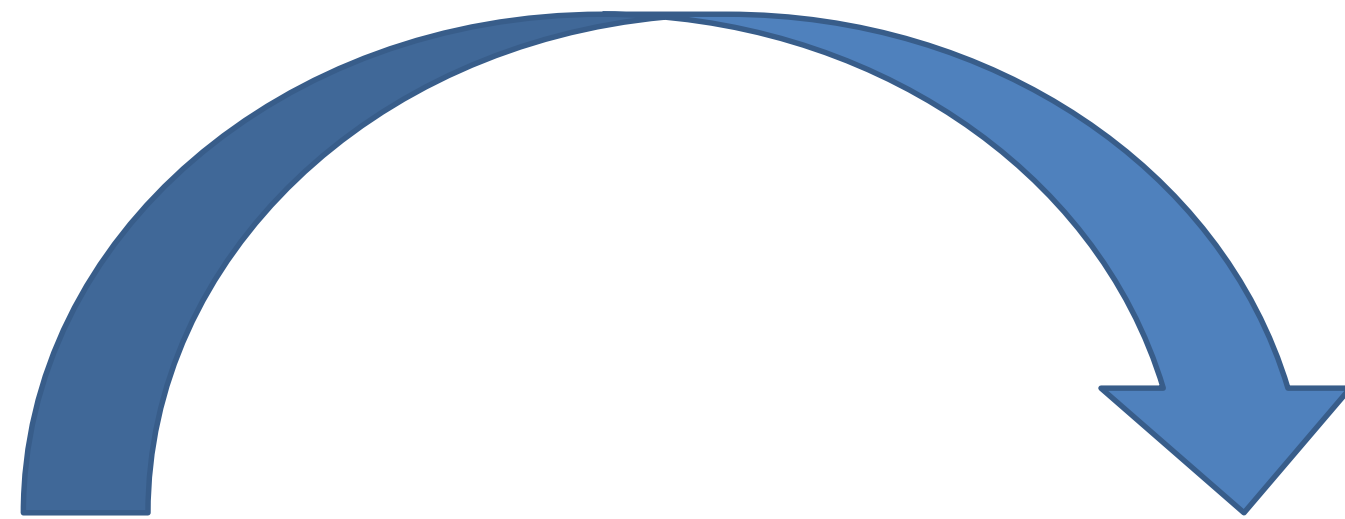
**Lossless compression**



**Lossy compression refers to any type of compression that reduces file size by removing data from your video. It's called "lossy" because your video will lose data with this method. Lossy compression it can seriously impact the quality of your video if you overdo it.**



**Lossless videos can be decompressed to the original size without data loss. The advantage of lossless compression is still in good quality, but it may not be able to compress the video as much smaller data.**





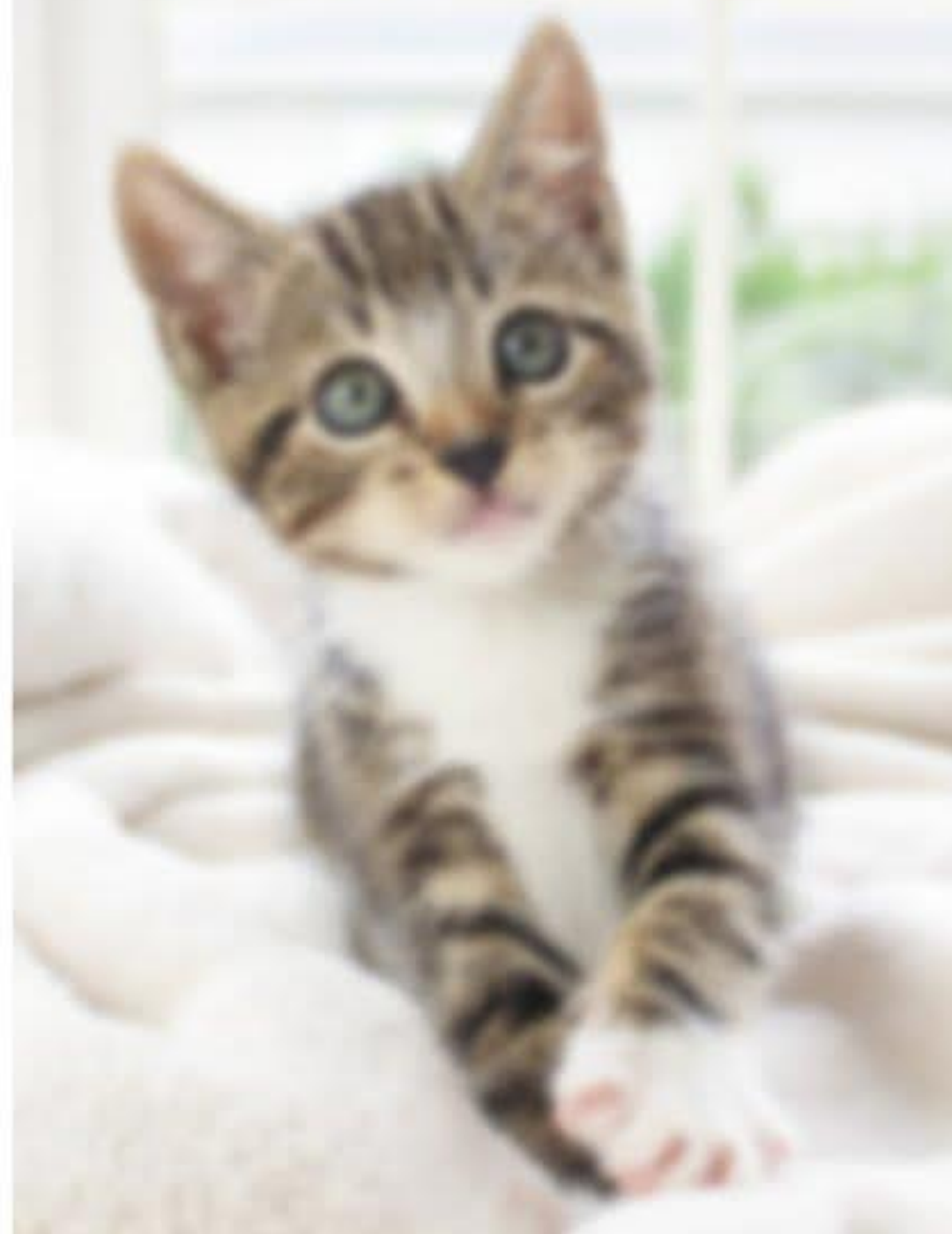
**ORIGINAL**  
**976 KB**



**LOSSLESS**  
**834 KB**



**LOSSY**  
**212 KB**



# How to find the Format of Video File?

**On a Windows PC, right-click the video file and select “Properties,” then click on the “Details” tab. This will tell you the video and audio codec, file format, and more.**



# AUDIO FILE

**An audio file format is a file format for storing digital audio data on a computer system. The bit layout of the audio data is called the **audio coding format** and can be uncompressed, or compressed to reduce the file size**

# Uncompressed formats

1. **WAV** (Waveform Audio File)- retains all the original data. This can be especially useful for video projects in which exact synchronization is important.



# Uncompressed formats

**2. AIFF** (Audio Interchange File Format) files are like WAV files in that they retain all of the original sound and take up more space.



# Lossy formats

**Lossy audio formats lose data in the transmission. They don't decompress back to their original file size, so they end up smaller, and some sound waves are lost.**

- **MP3**
- **AAC**
- **Ogg Vorbis**

# MP3

**MP3 files work on most devices, and the files can be as small as one-tenth the size of lossless files. MP3 is fine for the consumer, since most of the sound it drops is inaudible**



# AAC

**Advanced Audio Coding, or AAC files (also known as MPEG-4 AAC), take up very little space and are good for streaming, especially over mobile devices.**



# Ogg Vorbis

**Audio codec that Spotify uses. It's great for streaming, but the compression results in some data loss. Experts consider it a more efficient format than MP3, with better sound.**

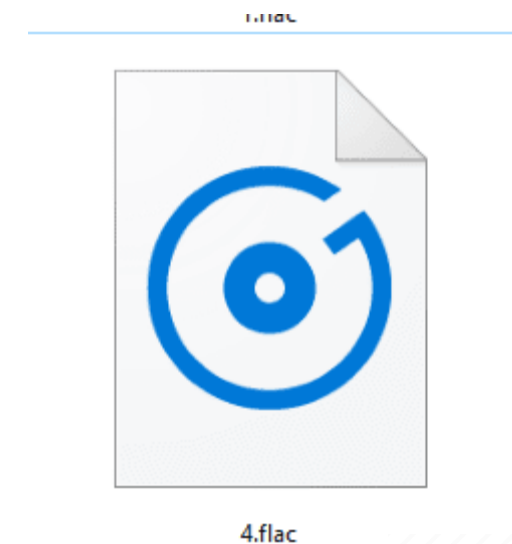




# Lossless formats

**These files decompress back to their original size, keeping sound quality intact.**

- **FLAC** – **Free Lossless Audio Codec**
- **ALAC** – **Apple's Lossless Audio Codec**



# IMAGE FILE

**An image file format is a file format for a digital image. There are many formats that can be used, such as JPEG, PNG, and GIF.**

# JPEG

**JPEG is the most common image format used by digital cameras and other photographic image capture devices; it is the most common format for storing and transmitting photographic images on the World Wide Web.**



# PNG (Portable Network Graphic)

**PNG's compression is among the best that can be had without losing image information. PNG supports three main image types: true color, grayscale and palette-based**



# GIFs (Graphic Interchange Format)

**GIFs can be used for small animations and low-resolution film clips. it is not usually used as a format for digital photography**



# Units of storage

Unit	Description	Example
Bit	1 or 0	A single pixel in a black and white picture
Byte	8 bits	A single character
Kilobyte	1024 bytes	A small email is about 2 kilobytes
Megabyte	1024 kilobytes	MP3 files take up about 1 megabyte per minute
Gigabyte	1024 megabytes	1 gigabyte can hold about 300 MP3 songs
Terabyte	1024 gigabytes	1 terabyte can hold about 100 DVD-quality films
Petabyte	1024 terabytes	1 petabyte can hold enough MP3 songs to play continuously for over 2000 years - without repeating!