Secondary Memory

Primary vs Secondary Memory

Primary Memory is volatile

An example of this RAM 

Secondary Memory is non-volatile

An example of this is the HDD (Hard Disk Drive) 

It is non-volatile (it retains data even in the absence of power)

Types of Secondary Storage

Magnetic Hard Drives (HDD)

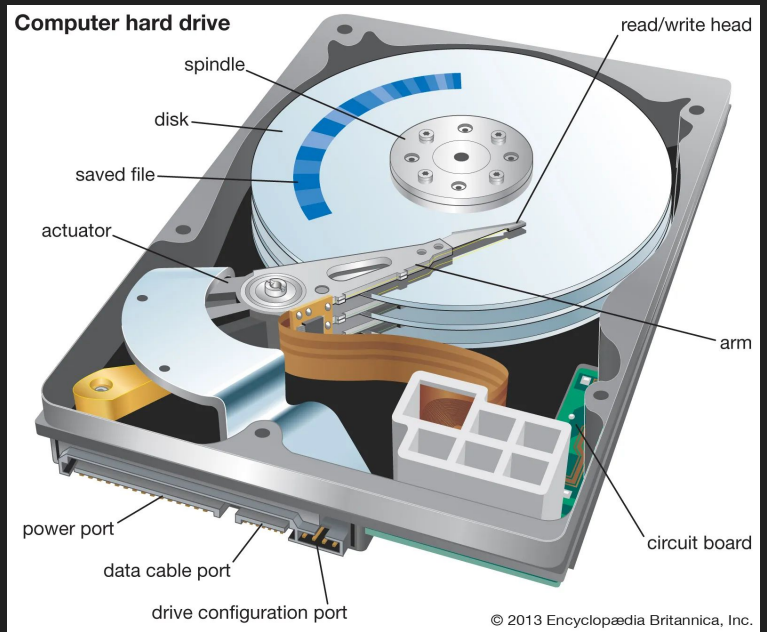
Solid state hybrid Drives (SSHD)

Solid state drives (SSD)

Magnetic Hard Drives

Have been around since the 1950s.

Use spinning disks and a read/write arm to read or write data to the disk.



Magnetic Hard Drives

Disk speeds measured in RPM (revolutions per minute)

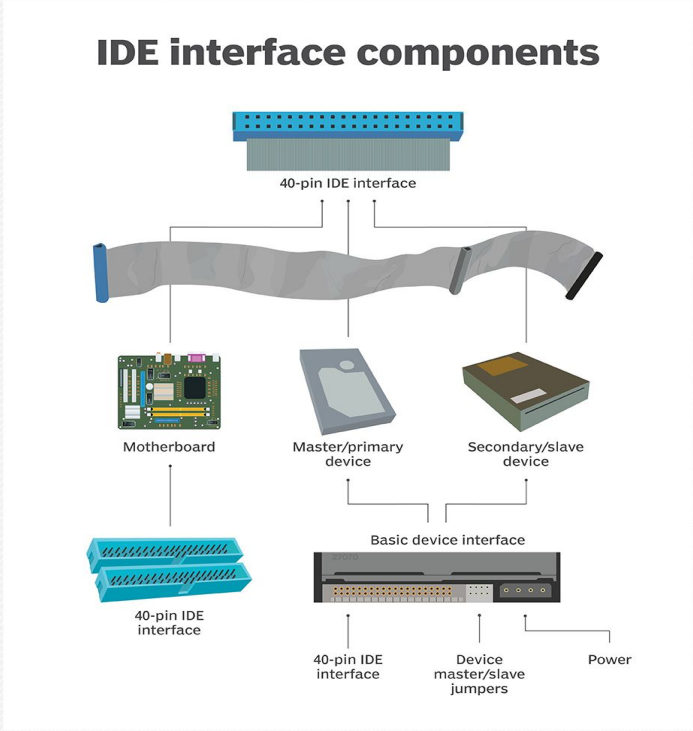
Typical speeds:5400rpm (laptop HDD),7200RPM(desktop HDD), 10,000+RPM(high end computers)

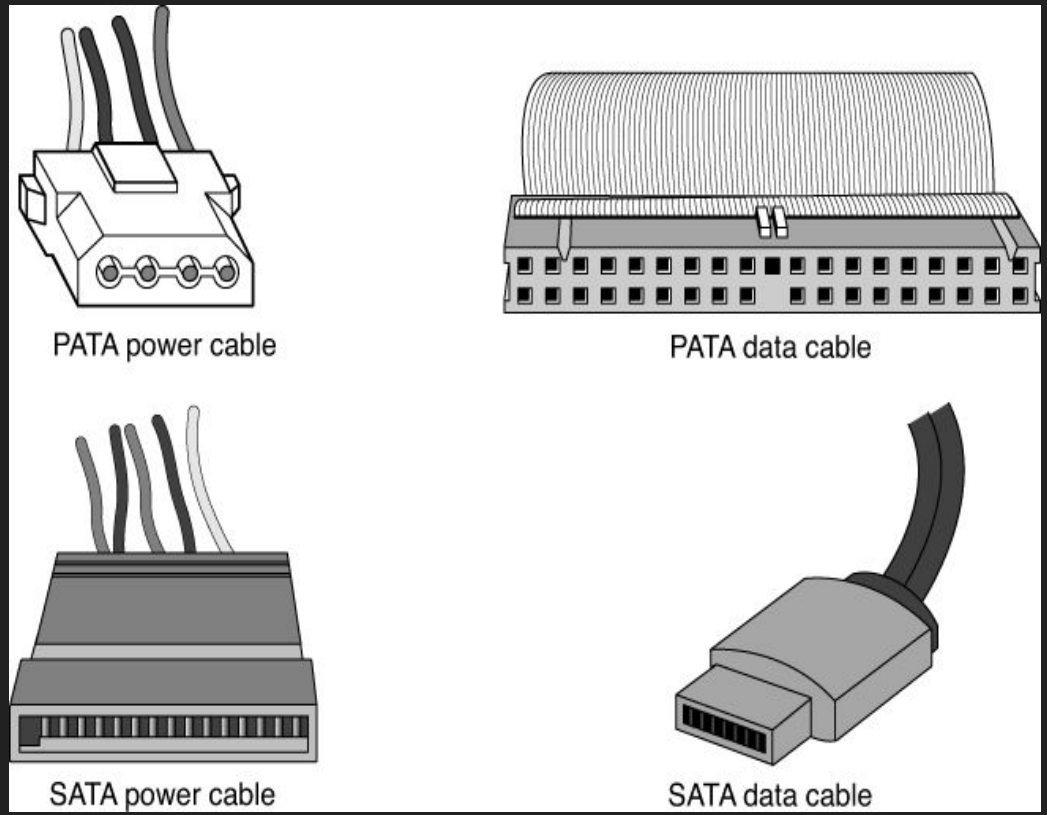
Today they connect via SATA interface (6Gb/s)

Before they connected via the SATA interface

Come in 3.5 inch(desktop) or 2.5 inch(laptop) inch sizes

SATA vs PATA


IDE interface components
40-pin IDE interface
Motherboard
Master/primary device
Secondary/slave device
Basic device interface
40-pin IDE interface
40-pin IDE interface
Device master/slave jumpers
Power


PATA power cable
PATA data cable
SATA power cable
SATA data cable

SSD

No moving parts

Use flash memory chips to store data

Come in different form factors:

2.5” connects via SATA interface

M.2 connects via PCIe interface

More expensive than HDD

M.2 NVMe SSD

Use flash memory for data storage

Non-Volatile Memory express

Questions and Exercises

1. What is the latest standard for SATA?

SATA 3.0

2. What is the latest software standard used to interface with the SATA drives?

AHCI (Advanced Host Controller Interface)

3. What is the speed limit for SATA drives using this software?

6 gb/s (750 mb/s)

4. What BUS do M.2 NVMe drives use?

PCIe (peripheral component interconnect express)

5. What is the speed limit of NVMe drives?

Typically up to 3500 mb/s or more, depending on PCIe version

6. Find and embed a link of a motherboard that has an M.2 slot using NVMe.

https://www.asus.com/motherboards-components/motherboards/prime/

Questions and Exercises

9. List the average price of a 256GB M.2 NVMe, a 1TB M.2 NVMe and a 2TB M.2 NVMe. Provide links to where you can buy each one.

256GB M.2 NVMe: ~$30 Link
1TB M.2 NVMe: ~$60 Link
2TB M.2 NVMe: ~$100 Link

10. M.2 SSD's typically come in 3 sizes. What are they?

2242, 2260, 2280

11. What does the 22 in these sizes represent?

Width in millimeters

12. What do the last 2 digits in these sizes represent?

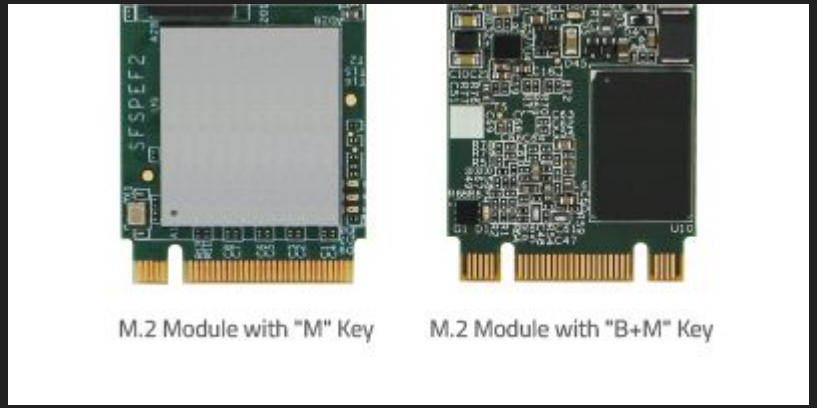
Length in millimeters

13. M.2 use 3 keys. What are they?

B Key, M key, B+M key

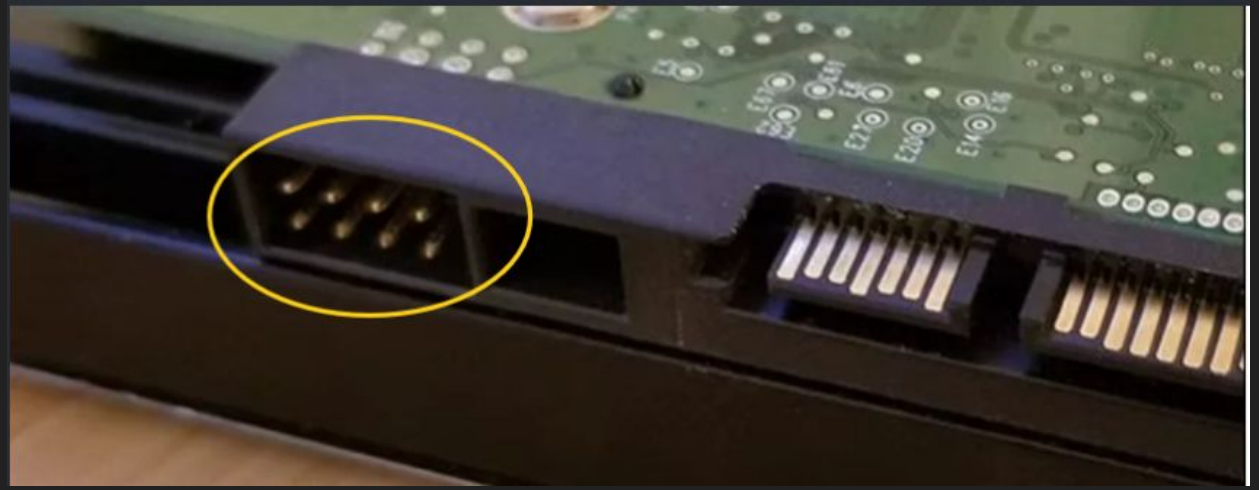
14. What is a key?

A key is a notch on the M.2 SSD card that determines compatibility with the connector on the motherboard.



Questions and Exercises

15. Read https://www.howtogeek.com/347878/what-do-the-electrical-pins-on-the-back-of-your-hard-drive-do/ and explain what the circled pins are used for and how you would use them.



15.

The circled pins on a SATA drive are power jumper pins, used for advanced features such as Power-Up In Standby (PUIS) or Spread Spectrum Clocking (SSC). These are mainly used in enterprise systems or for specific BIOS-controlled power management. You can use them by attaching jumper blocks to enable or disable these features based on the drive documentation.