



# Mahasarakham University

มหาวิทยาลัยมหาสารคาม

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# Computer Architecture: Harddisk

(โครงสร้างของคอมพิวเตอร์: ฮาร์ดดิสก์)

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# Outline

- Hard Disk Drive





# What is a Hard Disk Drive?

- The hard disk drive is the main data storage hardware device in a computer.
- The operating system, software titles, and most other files are stored in the hard disk drive.
- The hard disk drive is also known as HDD (abbreviation), hard drive, hard disk.



# Important Hard Disk Drive Facts

- Hard drives were invented over 50 years ago and have been used in personal computers since the mid-1980s.



# Important Hard Disk Drive Facts

- The hard drive is sometimes referred to as the “C drive” due to the fact that Microsoft Windows designates the “C” drive letter to the primary partition on the primary hard drive in a computer default.



# Popular Hard Disk Drive Manufacturers

- Seagate
- Western Digital
- Hitachi





# Hard Disk Drive Description

- Most hard drives also have jumper setting on the back end to define how the motherboard is to recognize the drive when more than one is present.
- These settings vary from drive to drive so check with your hard drive manufacturer for details.







# How a Hard Drive Works

- There is a large circular “plate” of magnetic material called a platter, divided into billions of tiny areas.
- Each one of those area can be independently magnetized (to store a 1) or demagnetized (to store a 0).
- Magnetism is used in computer storage because it goes on storing information even when the power is switched off.





# How a Hard Drive Works

- The platters are the most important parts of a hard drive.
- They are disks made from a hard material such as glass or aluminium, which is coated with a thin layer of metal that can be magnetized or demagnetized.





# How a Hard Drive Works

- A small hard drive typically has only one platter, but each side of it has a magnetic coating.
- Bigger drives have a series of platters stacked on a central spindle, with a small gap in between them.
- The platters rotate at up to 10,000 revolutions per minute (rpm) so the read-write heads can access any part of them.



# What are the parts in a hard drive?



# What are the parts in a hard drive?

- 1. Actuator that moves the read-write arm. In older hard drives, the actuators were stepper motors.
- The read-write arm more quickly, precisely, and reliably than stepper motors and less sensitive to problems such as temperature variations.



# What are the parts in a hard drive?

- 2. Read-write arm swings read-write head back and forth across platter.
- 3. Central spindle allows platter to rotate at high speed.
- 4. Magnetic platter stores information in binary form.
- 5. Plug connections link hard drive to circuit board in personal computer.



# What are the parts in a hard drive?

- **6. Read-write head** is a tiny magnet on the end of the read-write arm.
- **7. Circuit board** on underside controls the flow of data to and from the platter.
- **8. Flexible connector** carries data from circuit board to read-write head and platter.
- **9. Small spindle** allows read-write arm to swing across platter.



# What are the parts in a hard drive?

- Actuator Arm แขนหัวอ่าน มีลักษณะเป็นแท่งเหล็กยาวๆ ใช้รับคำสั่งจากวงจรให้เลื่อนไปยังตำแหน่งที่ต้องการ ต้องทำงานร่วมกับหัวอ่าน
- Platter จานแม่เหล็ก มีลักษณะเป็นจานกลมๆ เคลือบด้วยสารแม่เหล็กวางซ้อนกันหลายๆ ชั้น ขึ้นอยู่กับความจุ แผ่นแม่เหล็กจะติดกับมอเตอร์สำหรับหมุน (Spindle Motor) และสามารถเก็บข้อมูลได้สองด้าน





# What are the parts in a hard drive?

มอเตอร์หมุนแผ่นแม่เหล็ก (Spindle Motor) เป็นตัวควบคุมจานแม่เหล็กให้หมุนไปยังตำแหน่งที่ต้องการเพื่อบันทึกหรือแก้ไขข้อมูล ปกติจะมีความเร็วในการหมุน 7200 ต่อนาที และด้วยเทคโนโลยีในปัจจุบันสามารถหมุนได้เป็น 10000 รอบต่อนาที



# How computers store information?

- Computers are electronic machines that process information in digital format.
- Instead of understanding words and numbers, as people do, they change those words and numbers into strings of zeros and ones called **binary**.



# How computers store information?

- A single letter "A" is stored as eight binary numbers: 01000001.
- In fact, all the basic characters on your keyboard (the letters A-Z in upper and lower case, the number 0-9, and the symbols) can be represented with different combinations of just eight binary numbers.
- A question mark (?) is stored as 00111111, a number 7 as 00110111.
- Virtually all computers know how to represent information with this "code," because it's an agreed, worldwide standard. It's called **ASCII** (American Standard Code for Information Interchange).



# How computers store information?

- Computers can represent information with patterns of zeros and ones.





# How do hard drives work?

- <https://www.youtube.com/watch?v=wteUW2sL7bc>



# References

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