RAID

Redundant Array of Independent Disks

RAID মানে হচ্ছে আমাদের Hard disk এর যতগুলো management রয়েছে সেই management গুলো কত level এ ভাগ করলে আমাদের Data কখনো হারাবে না বা loss হবে না।

For Example:-

Rupali bank maain branch → Motijil → main server

Sub branch → 500 → sub server

User → 5 lakh

এরকম্যায় data backup রাখার যে process তা পুরো টাই RAID.

consists of 7 levels

- Raid 0 → Live video streaming, live talkshow, cricket live
- Raid 1 → mission critical storage (accounting system)
- Raid 5
- Raid 6
- Raid 10

~~RAID 0~~

Structure of SRAM

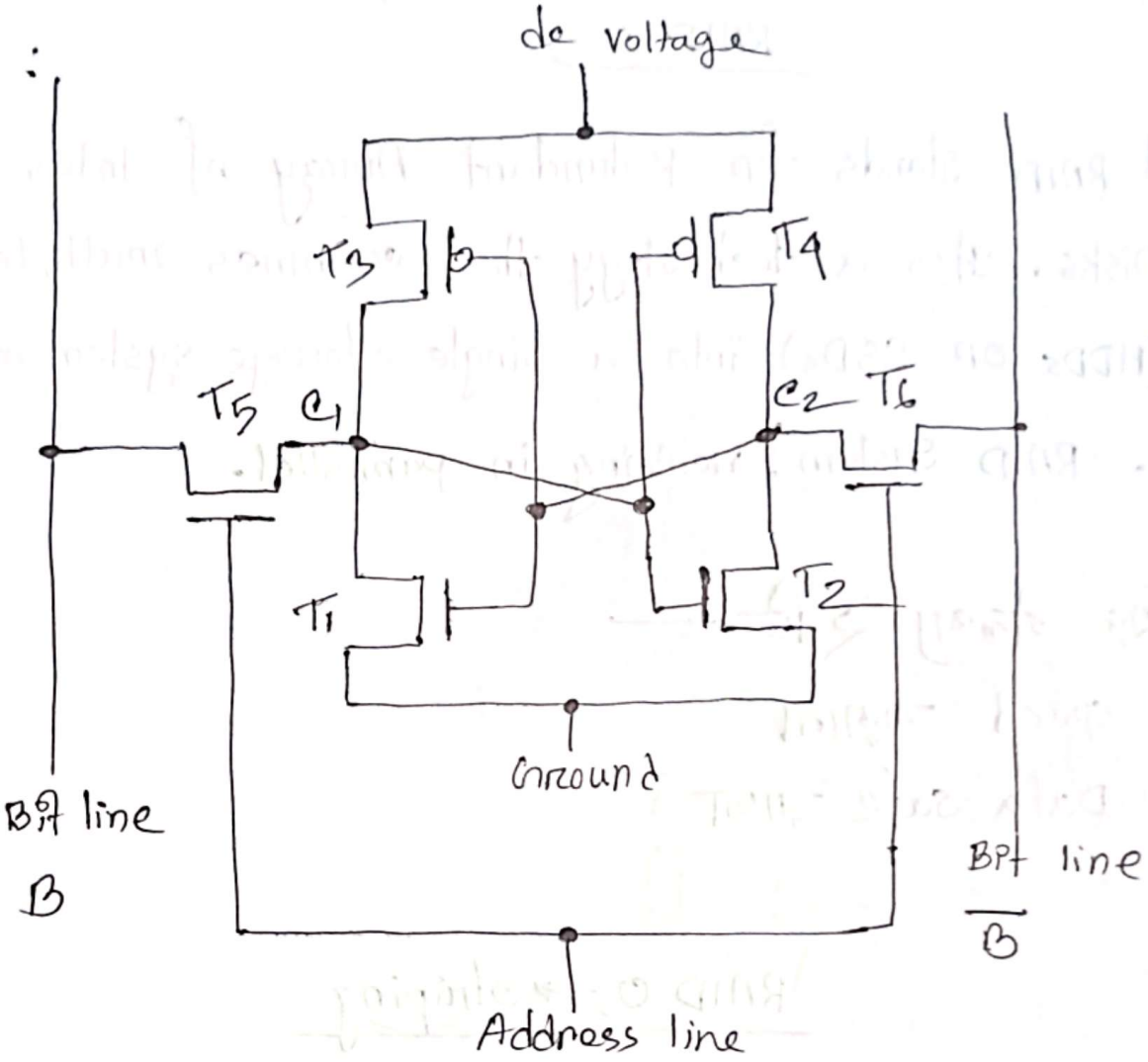
SRAM stands for Static Random access memory a type of volatile memory that retains data as long as power is supplied.

SRAM cell structure

Each SRAM cell typically consists of six transistors (6T)

→ 4 transistors (T1-T4) form a bistable latch (flip-flop) that can store one bit - either "1" or "0".

→ 2 transistors (T5-T6) acts as access transistors controlled by the word line (WL). These connect the latch to the bit lines (BL and BL') during read and write operations


dc voltage
T3
b
d
T4
T5
c1
c2
T6
T1
T2
Ground
BT line
B
BT line
B
Address line

RAID

~~Raid~~ RAID stands for Redundant Array of Independent Disks. It's a technology that combines multiple hard drives (HDDs or SSDs) into a single storage system to achieve. RAID system is working in parallel.

RAID -এর উদ্দেশ্য ২টি :—

(I) speed বাড়ানো

(II) Data safe রাখা

RAID 0 → striping

There are different RAID levels, each optimized for a specific situation -

(I) RAID 0 → configuration is used for Striping.

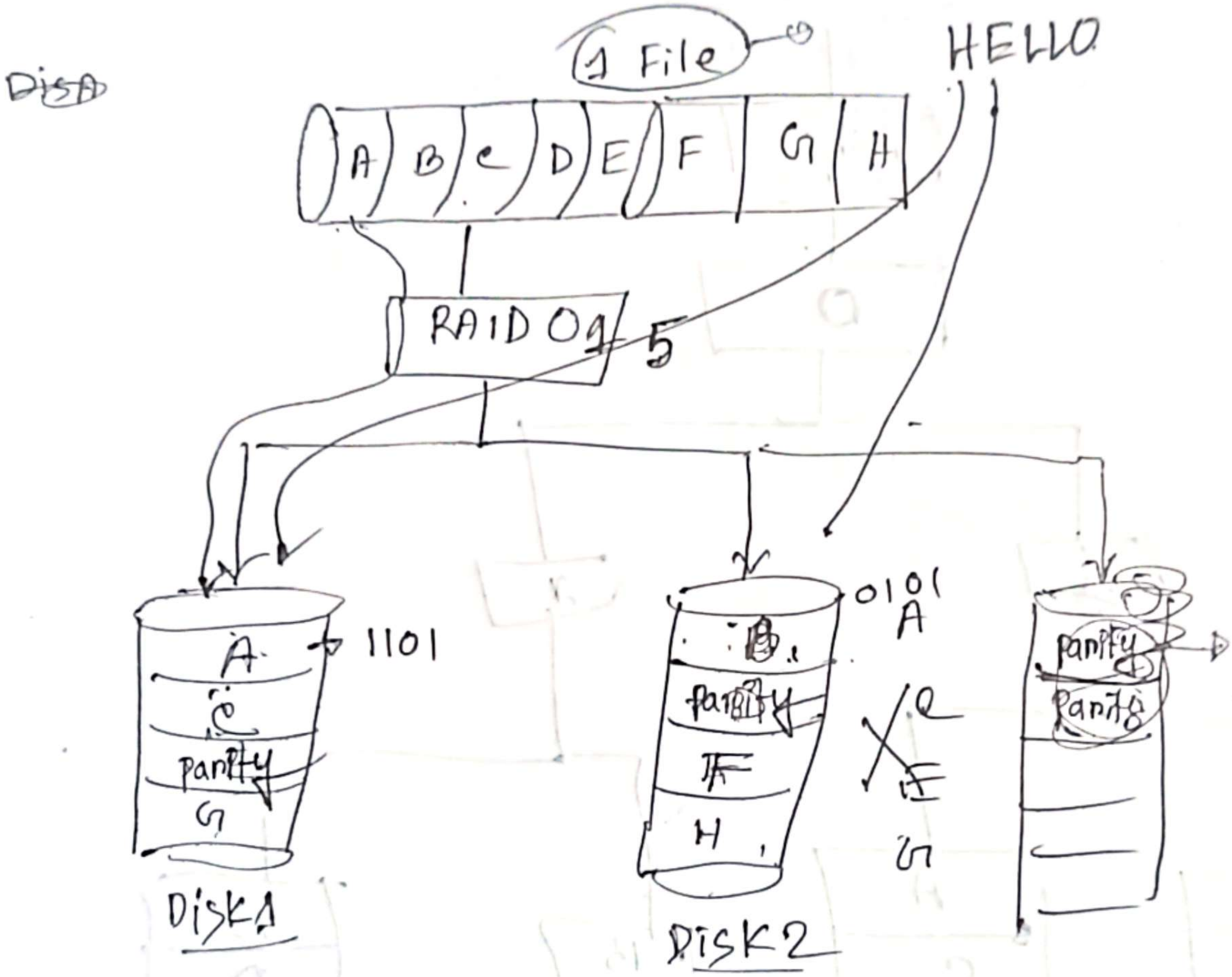
(II) RAID 1 — configuration is used for mirroring

(III) RAID 5 — configuration is used for striping with parity

(IV) RAID 6 — configuration is used for striping with two parity

(V) RAID 10 — configuration is a combination of RAID 0 and RAID 1

RAID 0



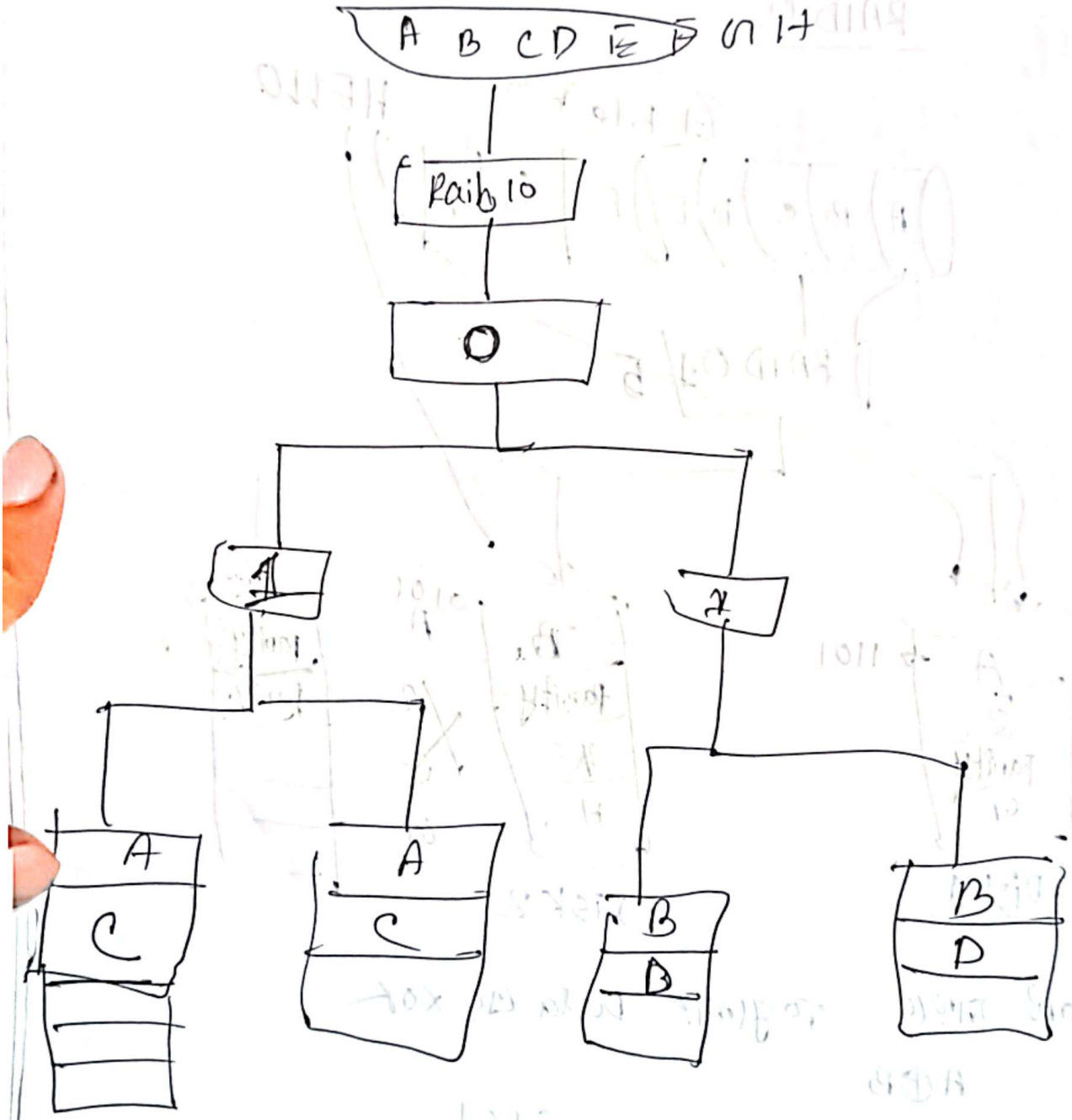
একটি ডাটার প্যারিটি? Data এর XOR,

A ⊕ B

1101 → A
0101
parity = 1000 → P

0101
1000
1101

parity = A ⊕ B ⊕ C


A B C D E F
Raid 10
O
A
Z
A
C
A
C
B
D
B
D

COA

chapter-06

External Memory

(1) Magnetic Disk:

A disk is a circular platter construct of nonmagnetic material, called the substrate, coated with a magnetizable material.

আগে এটা Aluminium দিয়ে বানাতো, এখন কাচ (glass) দিয়ে বানায়
কারণ glass এর অনেক সুবিধা:

- Improvement in the uniformity of the magnetic film surface to increase disk reliability
- A significant reduction in overall surface defects to help reduce read-write errors
- Ability to support lower fly heights (desenibe subsequently)
- Better stiffness to reduce disk dynamics → disk কম কাঁপে
- Greater ability to withstand shock and damage. → আঘাত সহ্য করার ক্ষমতা

@ Magnetic Read and Write mechanism

Data is written or read using a head — a small coil of wire. Many systems have two heads: write head and read head

Write mechanism:

→ Electric pulses go to the head. Current in the coil creates a magnetic field.

→ This field leaves "marks" on the disk surface — positive current makes one type of mark, negative makes the opposite

→ Head design:- A square donut shape with a gap on one side and coil on the other; the field emerges through the gap to magnetize the disk.

→ Reversing current flips the mark's polarity.

Reading mechanism:

→ old method:- As marks pass the coil, they induce current (generator-like), revealing polarity. Early disk used one head for both read/write

→ Modern method:- (Hard disk):
separated read head with magnetoresistive (MR) sensor, partially shielded.

→ MR material's resistance varies with mark polarity

→ current through it produces voltage shifts, decoding data.

→ Benefits:- Enable high speeds for denser shifts storage and faster access.

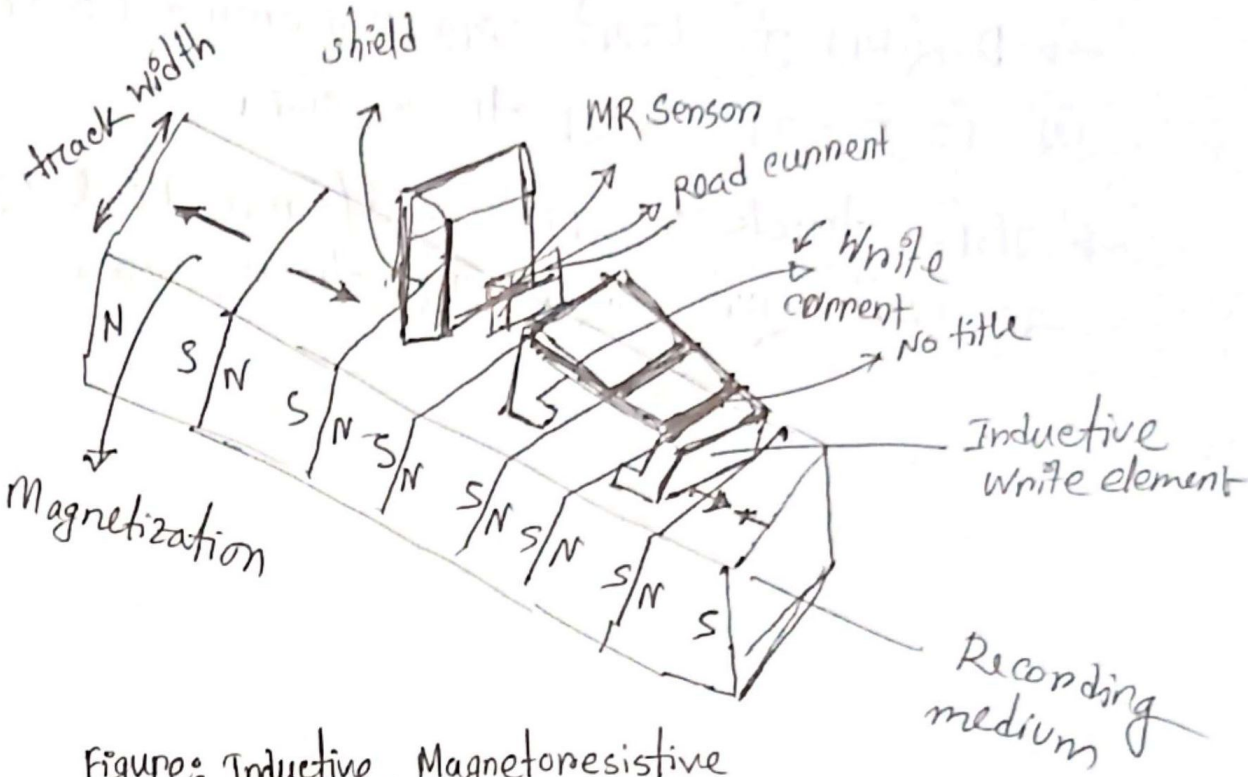


Figure: Inductive Magnetoresistive Read write

2. (b) Data Organization and Formatting:-

Hard disk এর মতো magnetic storage এ data রাখা সহজ নয় - কিছু physical limitation, speed problem এবং দক্ষতার কিছু ঝামেলা রয়েছে। মূলত এগুলো solve এর জন্য আমরা যে কাজ করি -

(i) Data organization (track, sector, CAV/zone recording)

(ii) Formatting (SYNCH, ID field, Error check)

Data organization এর মূল অংশগুলো —

① tracks :-

→ Disk এর পৃষ্ঠে একটি করে concentric (গোলাকার) রিং
এ বিভক্ত, যা আমরা track বলি।

→ প্রতিটি track এর প্রান্ত read/write Head এর সমান
এবং একটি পৃষ্ঠে হাজার হাজার track থাকে।

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