Block Devices, RAID, etc.

**Diagram:**
- Server
- SCSI
- Disk
- Logical Block Address (LBA)
- Status, data
- Status, data

**Protocol:**
\[ P_1 \Rightarrow \text{write} \quad \ast \times \quad \text{OK} \]
\[ P_2 \Rightarrow \text{read} \quad \ast \times \quad \text{OK} \]

- If a write command completes successfully, you can read that data back.
- \( P_2 = P_1 \uparrow \)

**Access LBA1, LBA2**
- If \( LBA_2 > LBA_1 \)
- Contiguous and \( LBA_2 - LBA_1 \) is small \( \rightarrow 0 \)
- It will be fast
- Proportional: \( T \propto |LBA_2 - LBA_1| \)

**Redundant Array of 2x2 Disks**
- Striping (RAID0)
- If we have more than one disks.

- Fix algorithm will determine where the data goes to

\[ 0 \quad 2 \quad 7 \]
\[ 3 \quad 4 \quad 5 \]

\[ \text{Fix algorithm will determine where the data goes to} \]
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\[ 0 \quad 3 \quad 6 \]
\[ 1 \quad 4 \quad 7 \]
\[ 2 \quad 5 \quad 8 \]
if it goes to a signal drive.

\[
\begin{array}{c}
100 \\
10 \\
1500 \\
2 \\
50 \\
3000 \\
\end{array}
\]

3-500

2 mirroring (RAID1)

make another copy.

read from both for different data.

Consider Bit error

#1 0\011

#2 0\1011

Erasure 0\x 1\x

If a bit error occurs, the drive is dead.

parity (RAID3)

another disk for parity

it's used to recover.

block-interleaved parity (RAID4)
Keep the parity up to date

For every write to disk, update parity.

rotating parity RAID5

snapshot

write old data

snapshot state

e.g. snapshot volume

CBA