The Sysadmin's Warm-Up

Prepared by Mark on June 9, 2026

Most of you have seen a hard drive.
Many have touched one, and a lucky few have taken one apart.
These devices have two interesting properties:

- They hold valuable data
- They inevitably fail

Needless to say, this is a problem.
We would like to design a system that tolerates hard drive failures without data loss.

Definition 1:
You can think of a hard drive as a long string of bits.
Assume all hard drives in the following problems have the same size.
If a hard drive "fails", all data on it is instantly lost.

Problem 2:
Suppose we have two hard drives. How can we arrange our data so that…

- We get 1 TiB of usable storage
- We lose no data if any one drive fails

Problem 3:
Suppose we have three hard drives. How can we arrange our data so that…

- We get 2 TiB of usable storage
- We lose no data if any one drive fails