IT 609
Network and System Administration

Storage and RAID

Tuesday September 07, 2021

RAID Storage

RAID

Keeping your stuff safe (hopefully)!

Acronym

- Redundant
- Array (of)
- Inexpensive/Independent
- Disk

Definitions

Striping - data striping is the technique of segmenting logically sequential data, such as a file, so that consecutive segments are stored on different physical storage devices.

Definitions

Mirroring - the replication of logical disk volumes onto separate physical hard disks in real time to ensure continuous availability.
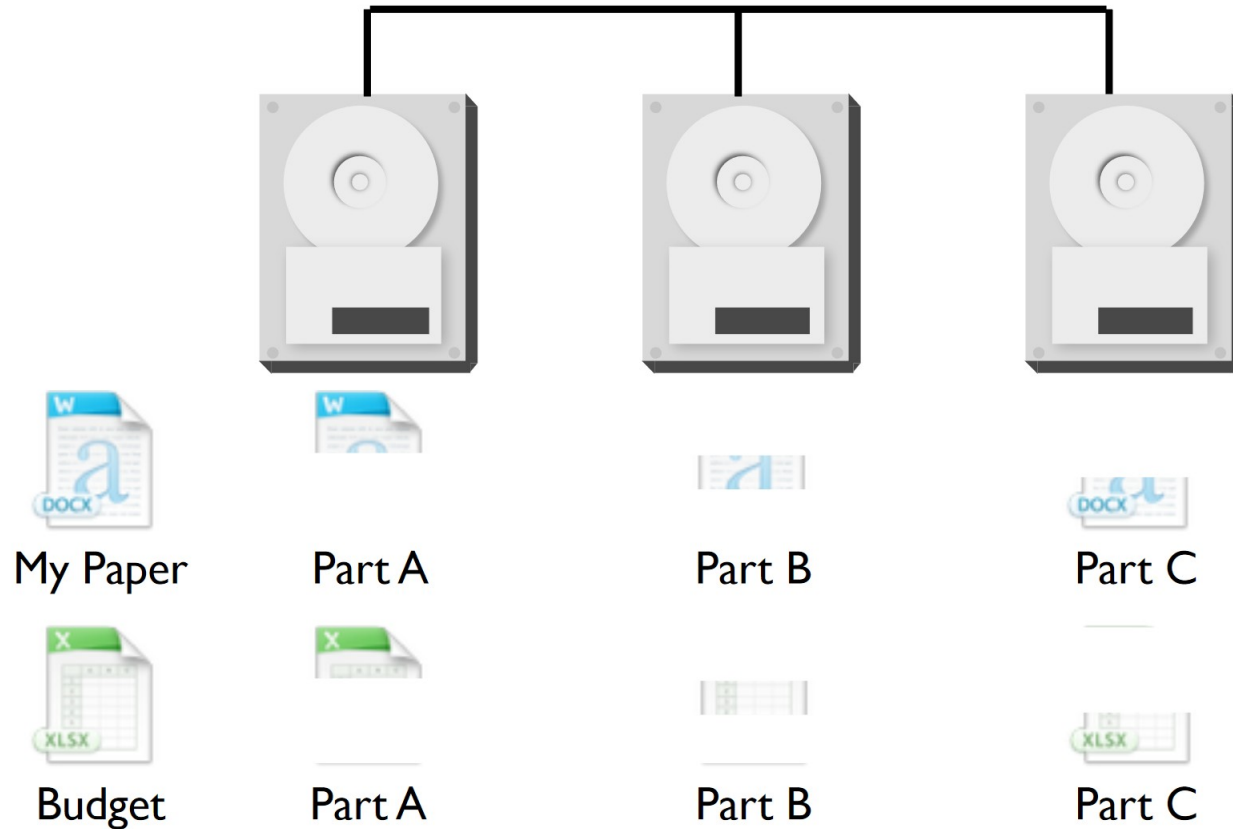
Definitions

Parity - If a drive in the array fails, remaining data on the other drives can be combined with the parity data (using the Boolean XOR function) to reconstruct the missing data.
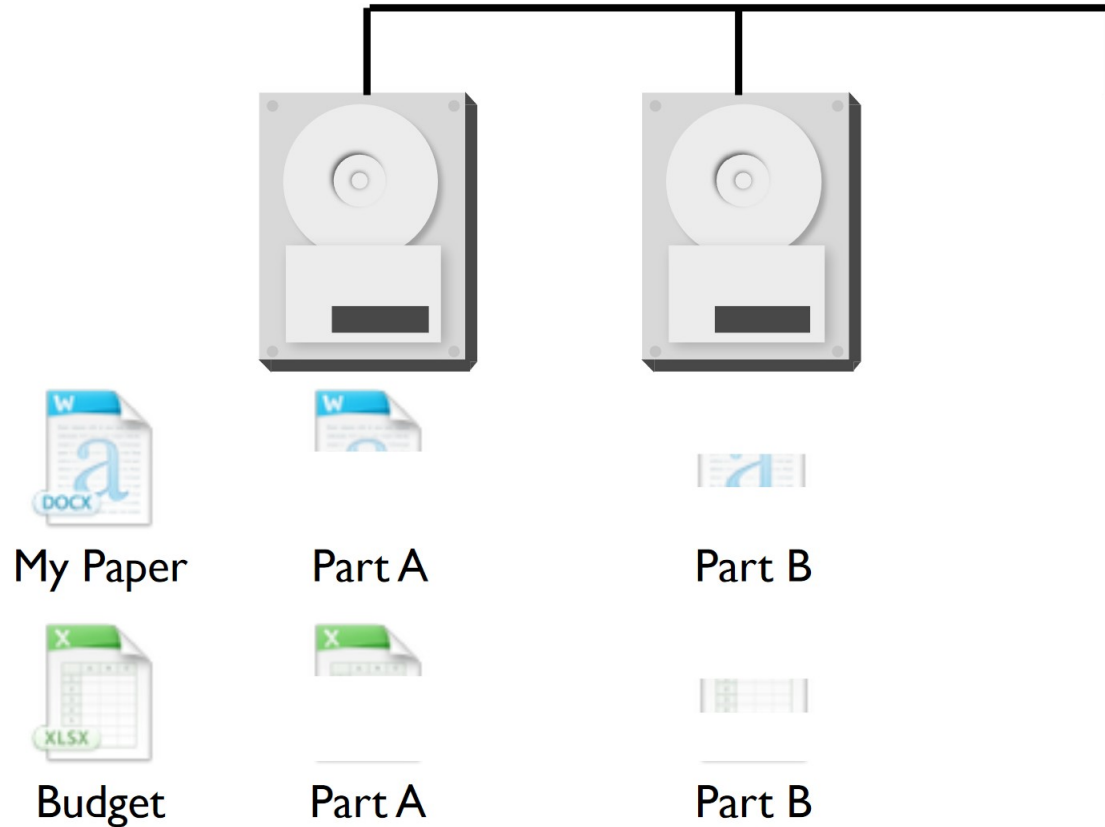
RAID Levels

- **JBOD** = Just a Bunch Of Disks
- **RAID 0** - Striping
- **RAID 1** - Mirroring
- RAID 2 - Hamming code, special hardware
- RAID 3 - Striped bits, dedicated parity disk
- RAID 4 - Striped blocks, dedicated parity disk
- **RAID 5** - Striped blocks with striped parity
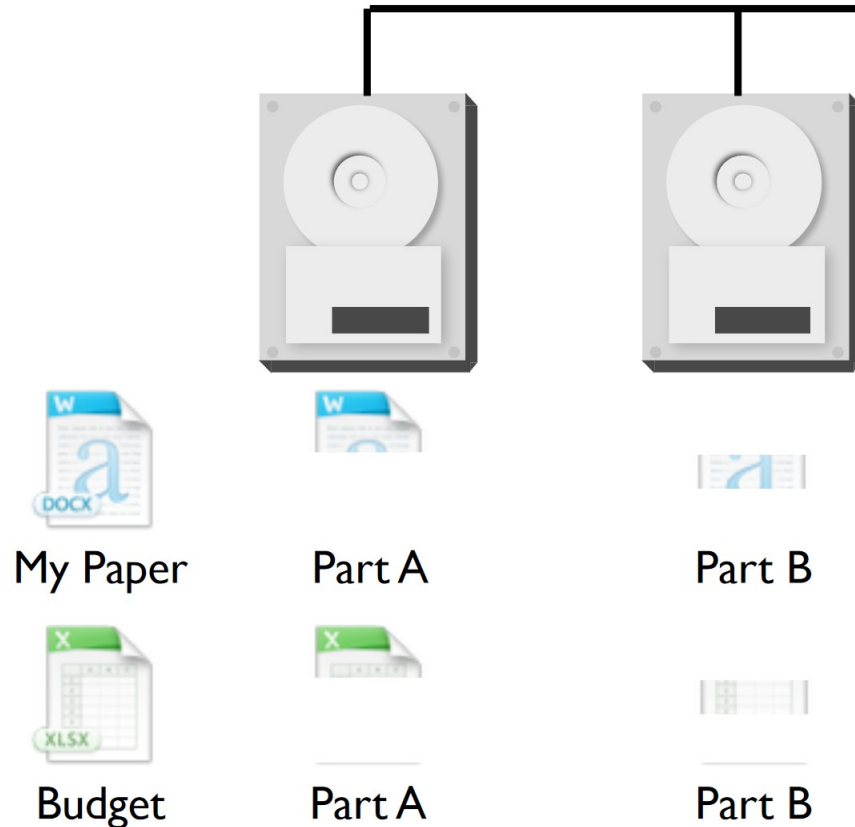- **RAID 6** - Striped blocks with striped parity x 2

RAID 0

My Paper   Part A   Part B   Part C

Budget   Part A   Part B   Part C

Striping

RAID 0

My Paper **Part A** **Part B**

Budget **Part A** **Part B**

Striping

RAID 0

My Paper   Part A   Part B

Budget   Part A   Part B

Now, you have a big Problem!

RAID 0 is not RAID!!!

Striping

RAID 1

Mirroring

RAID 1
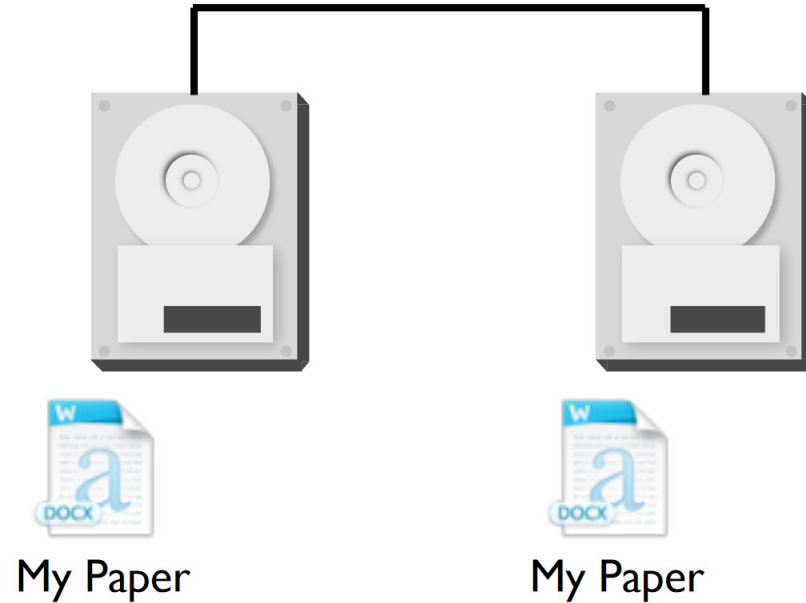
My Paper   My Paper
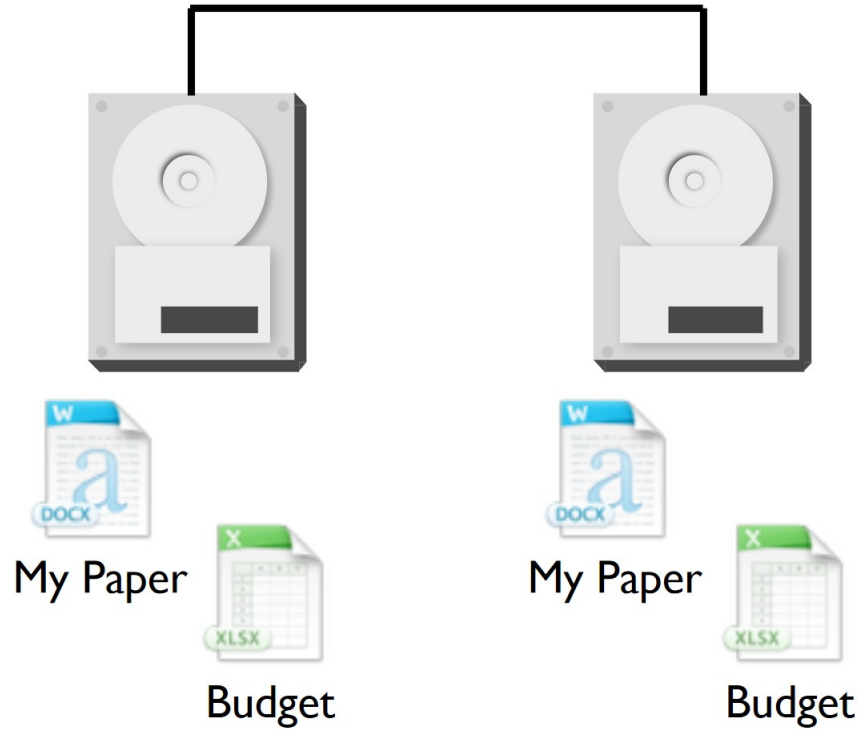
Mirroring

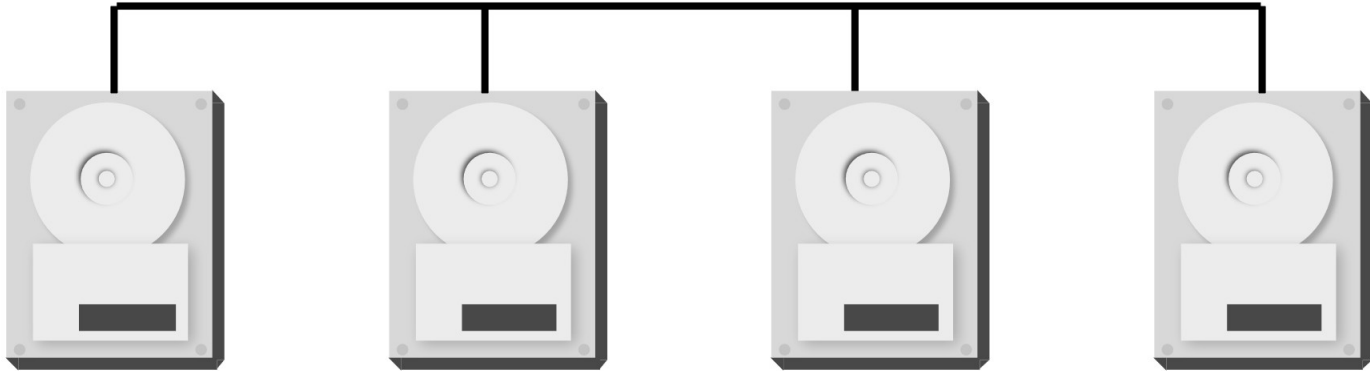# RAID 1
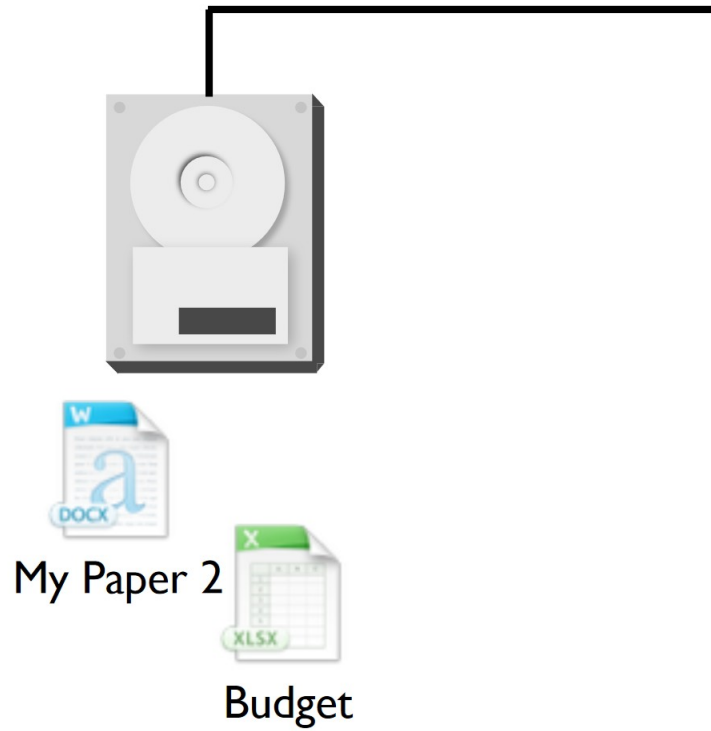
Mirroring

RAID 1

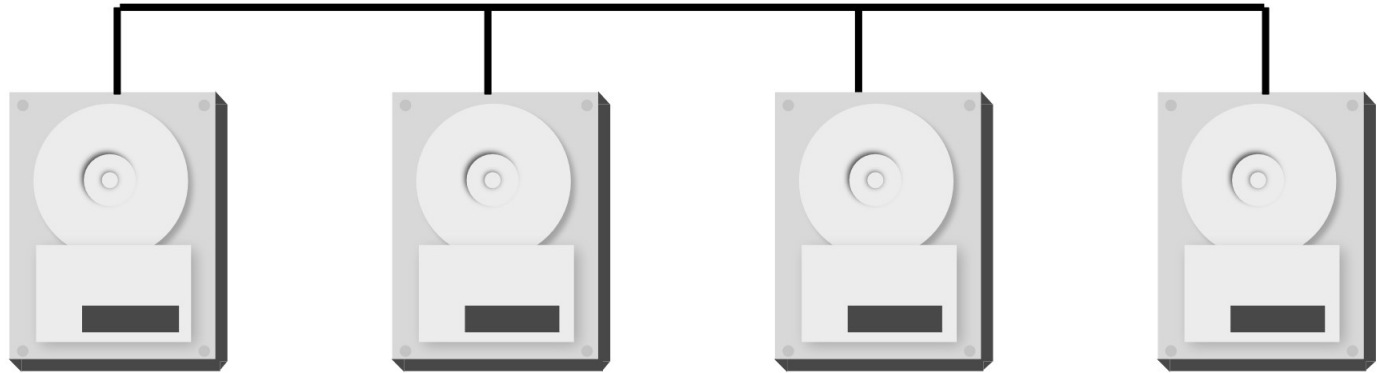# Mirroring

RAID 1
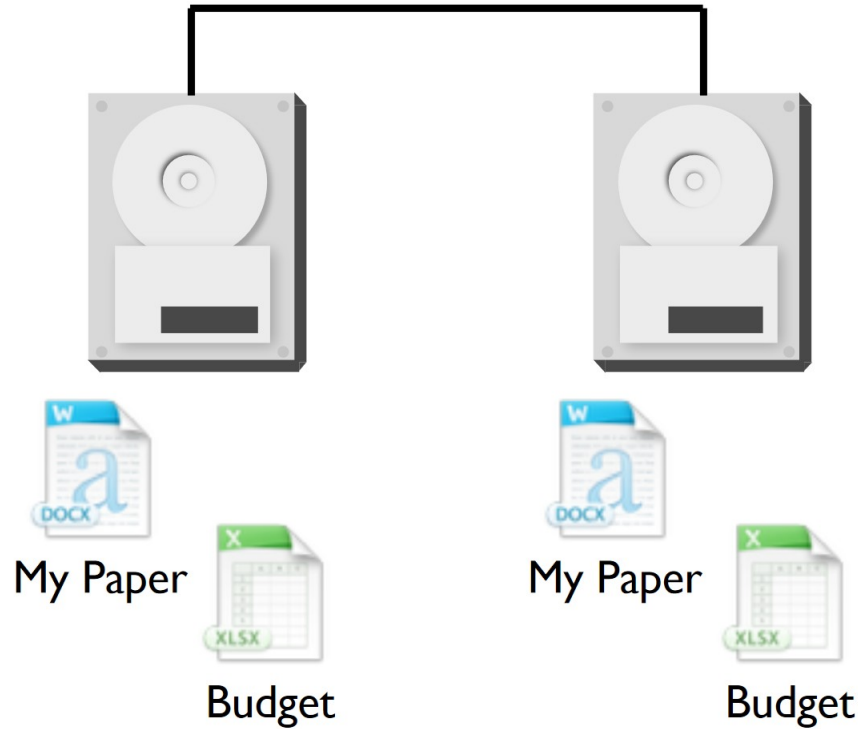
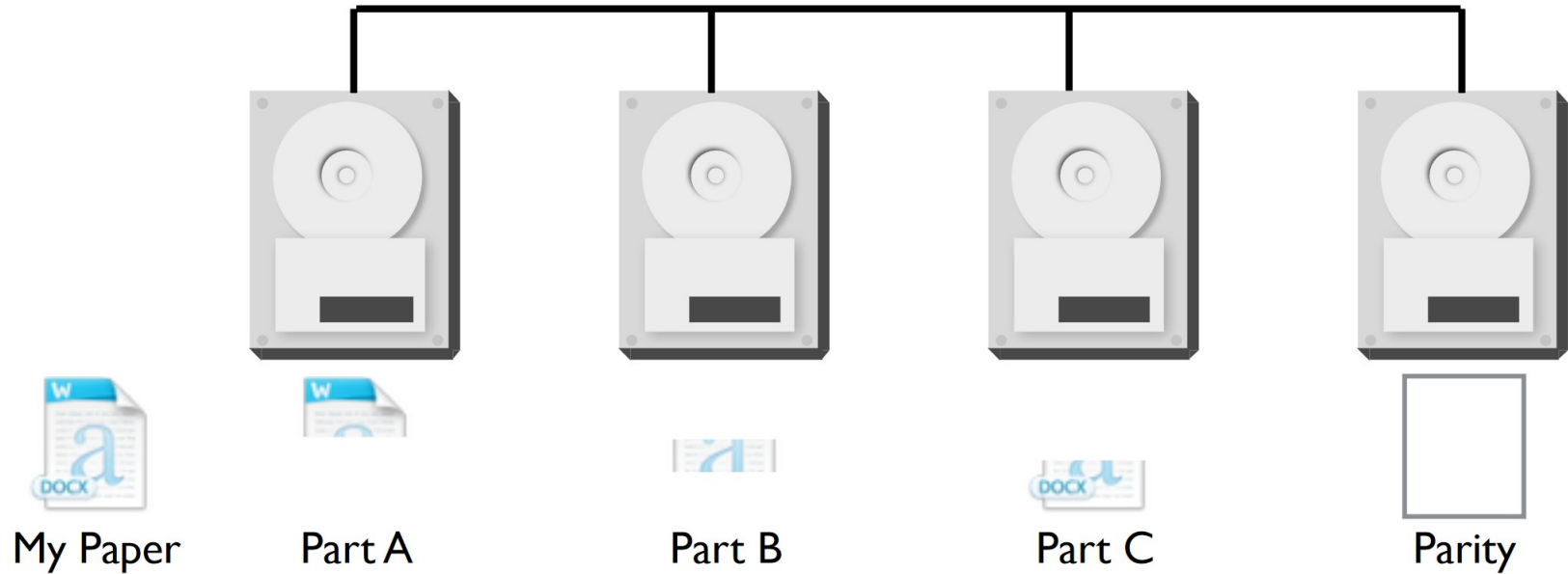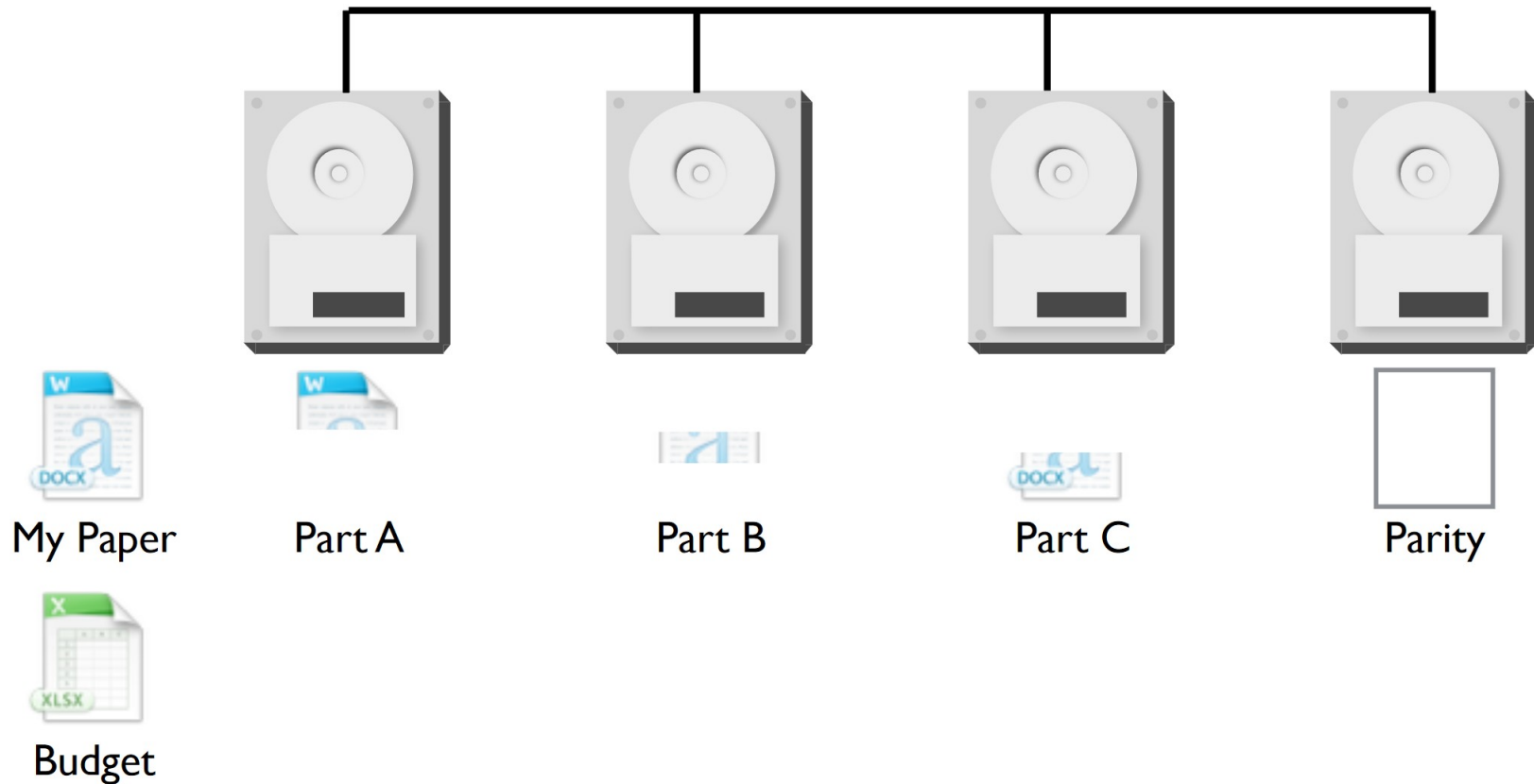
Mirroring

RAID 5

Striping w/ Parity
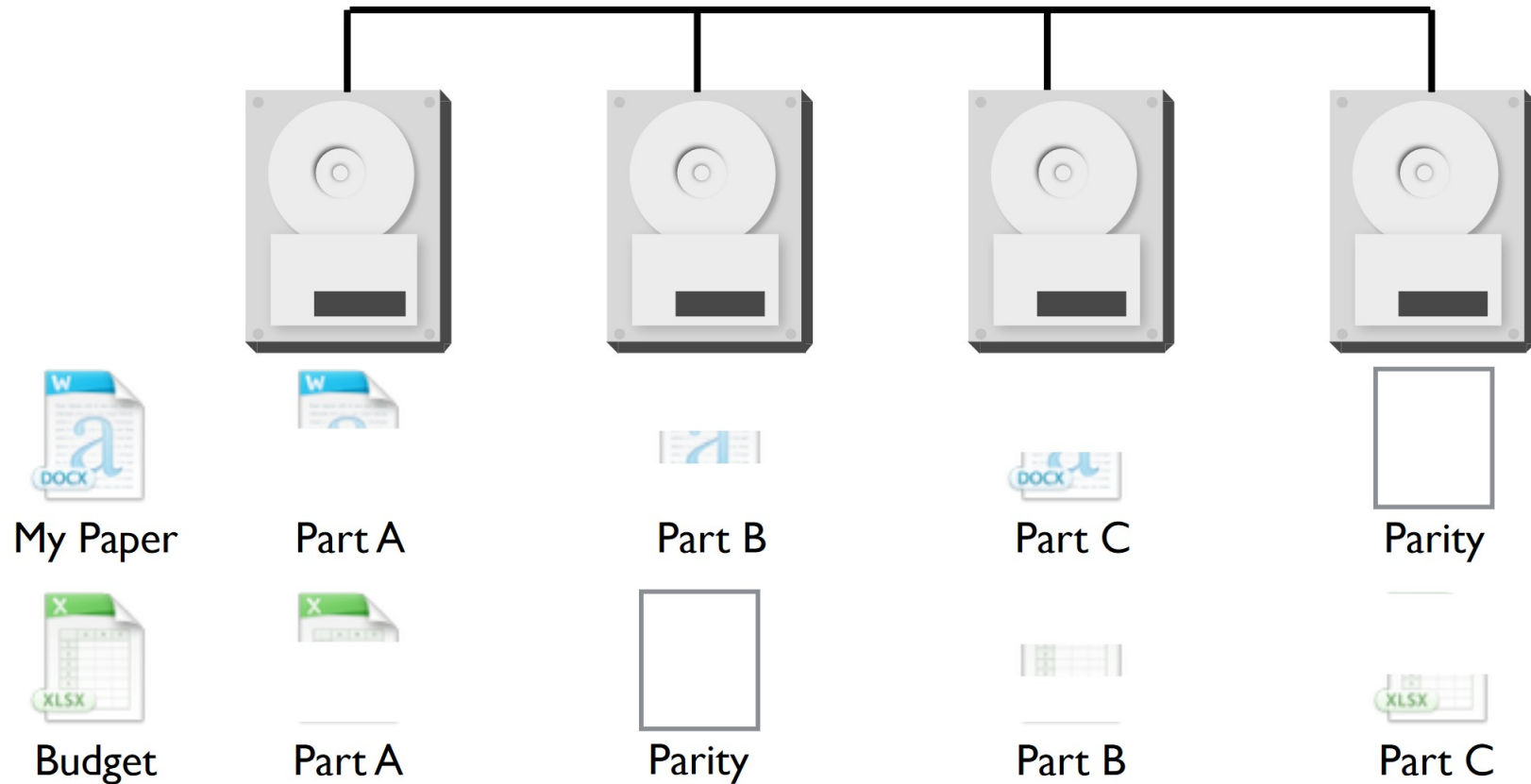
RAID 5

My Paper

Striping w/ Parity

RAID 5

My Paper   Part A   Part B   Part C   Parity

Striping w/ Parity

RAID 5

My Paper

Part A

Part B

Part C

Parity

Budget

Striping w/ Parity

RAID 5

My Paper — Part A — Part B — Part C — Parity

Budget — Part A — Parity — Part B — Part C

Striping w/ Parity

RAID 5

Striping w/ Parity
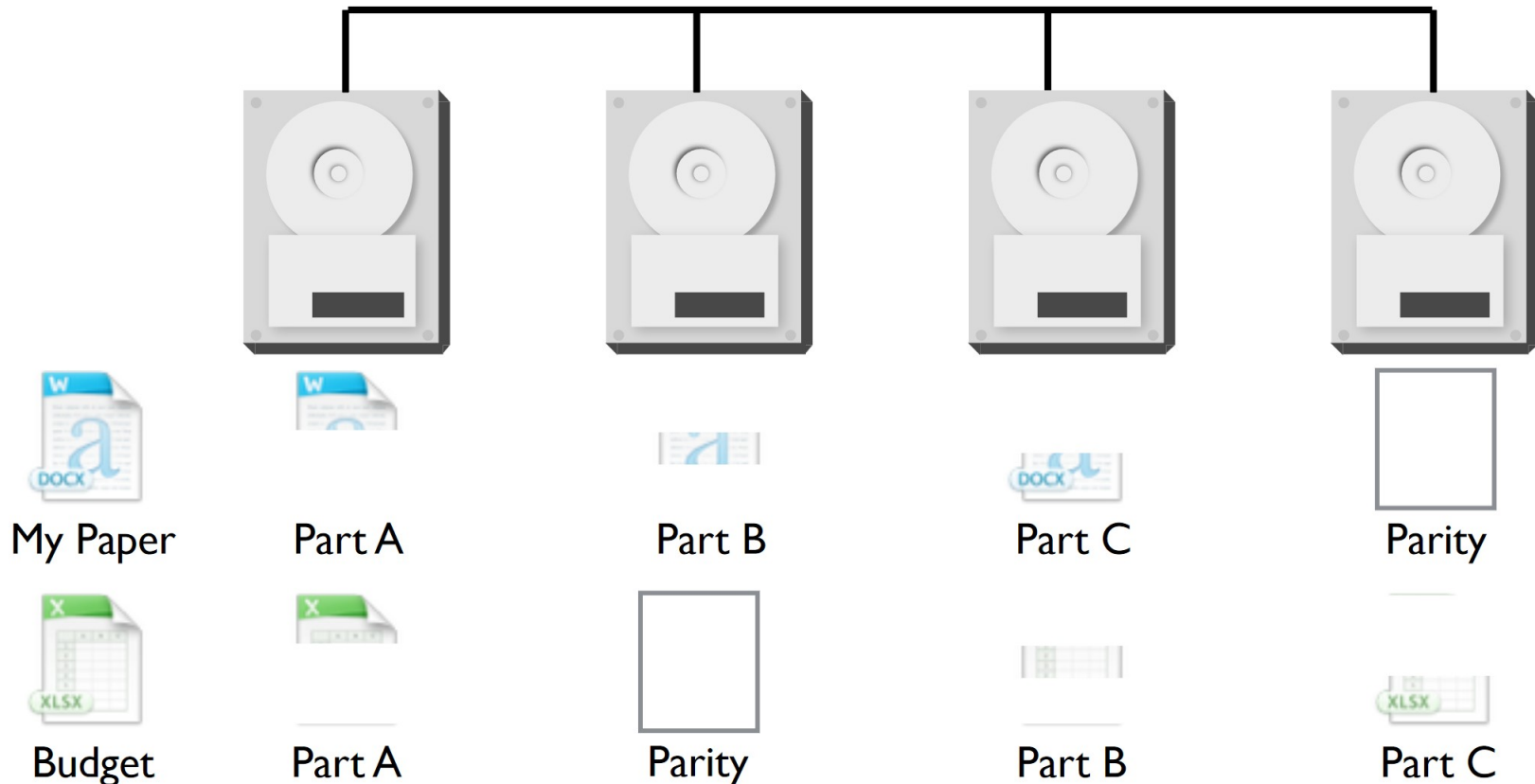
RAID 5

My Paper   Part A   Part B   Part C   Parity

Budget   Part A   Parity   Part B   Part C

Striping w/ Parity

RAID 6

Part A   Part B   Part C   Parity 1   Parity 2

Part A   Parity 1   Part B   Parity 2   Part C

Striping w/ 2x Parity

RAID 6

Part A

Part A

Part C

Part B

Parity 1

Parity 2

Striping w/ 2x Parity

RAID 6

Part A Part B Part C Parity 1 Parity 2

Part A Parity 1 Part B Parity 2 Part C
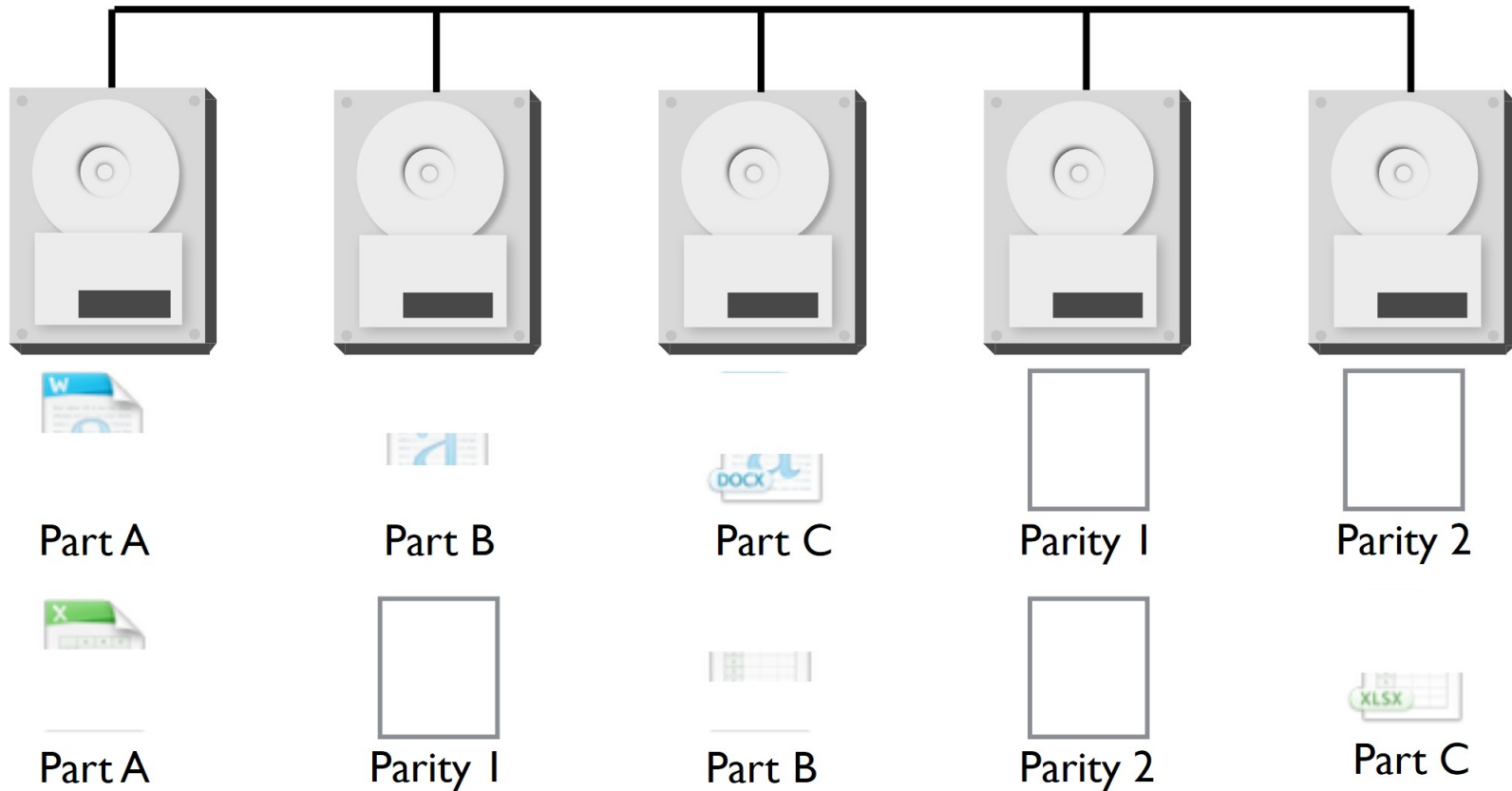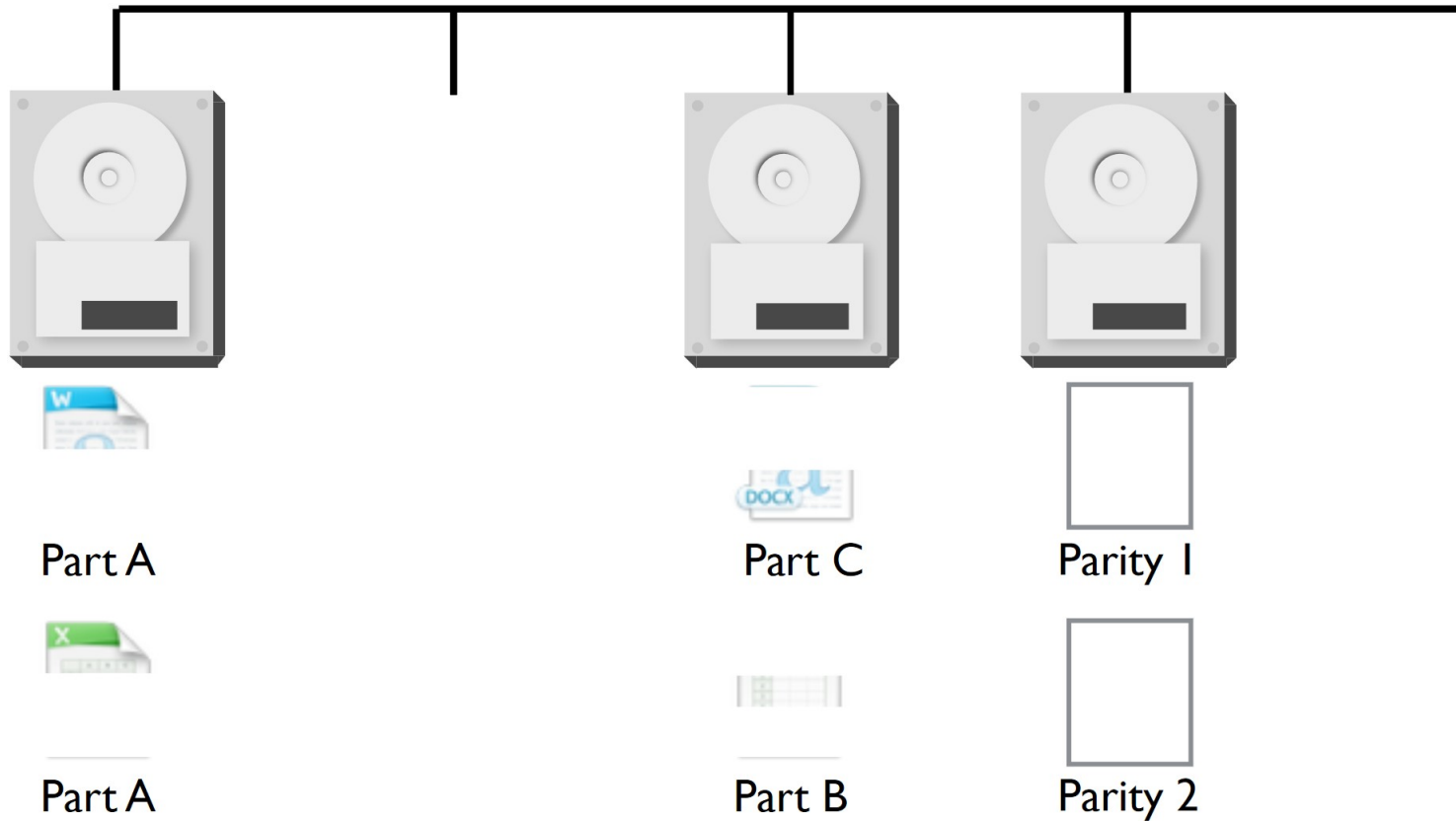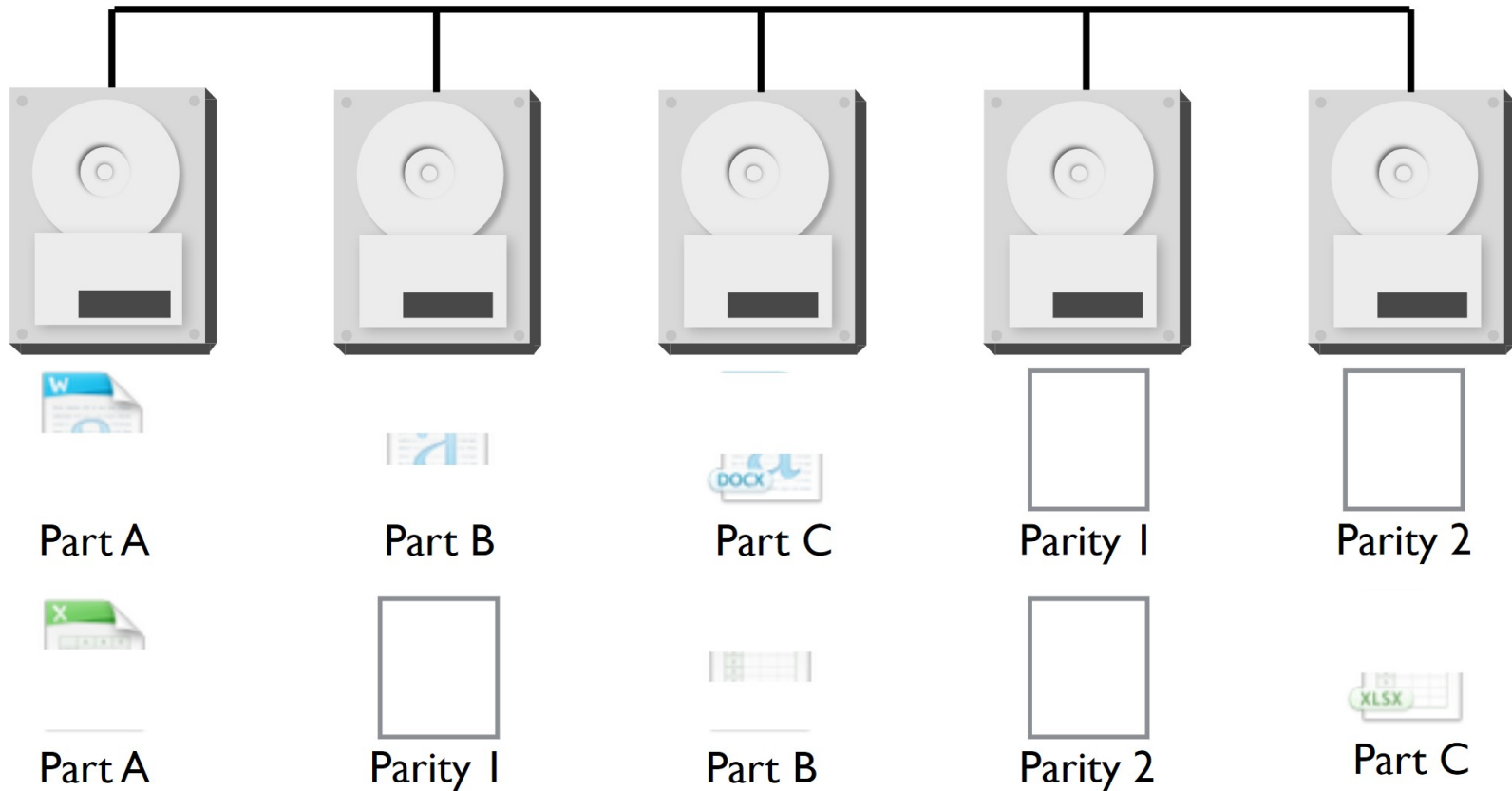
Striping w/ 2x Parity

Levels Compared

RAID	Redundant?	Disks Needed	+/-
0	No	2 or more	Speed
1	Yes	Pairs	Protection, but high overhead
5	Yes	3 or more	Good balance of speed and protection
6	Yes	4 or more	Added protection, but slower