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File/Storage Management

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Disk Storage

- Data on a disk is ***persistent*** which requires special access mechanisms

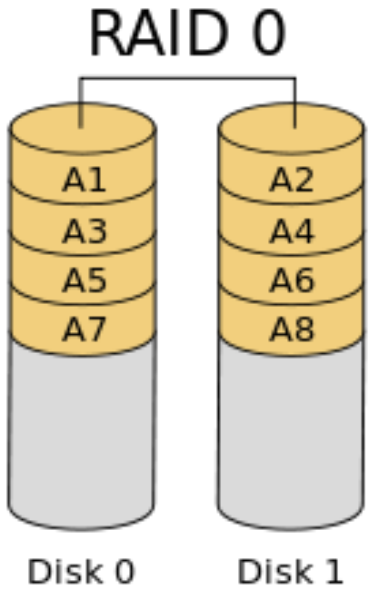
File Allocation and Management

- Similar to memory management:
  - contiguous allocation (deprecated)
    - external fragmentation
    - internal fragmentation
  - non-contiguous allocation
    - blocks/sectors instead of pages
  - Same algorithms for allocation

- The main difference is the access to addresses:
  - memory: random access time is ~ sequential access time
  - disk: sequential access faster than random access (no need for a ***seek*** operation)

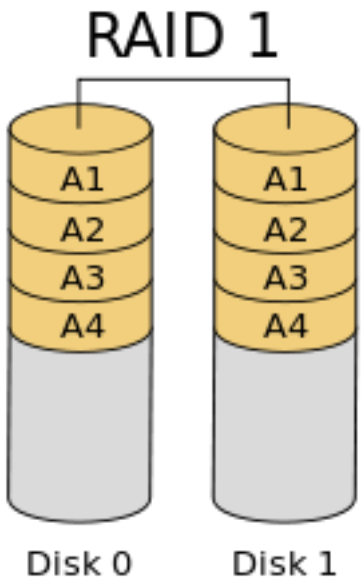
Virtual Storage: RAID 0

- data partitioned in stripes (blocks) distributed across the disks
  - no fault tolerance
  - performance of reading and writing better



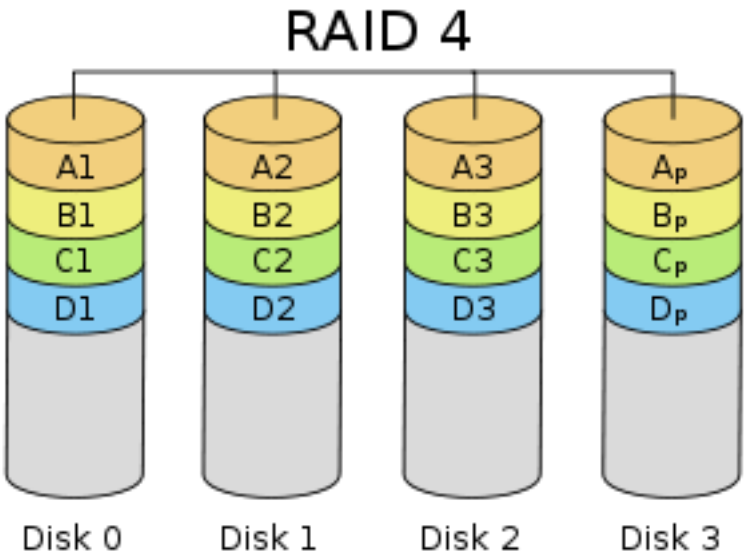
Virtual Storage: RAID 1

- "Mirroring"
  - increases performance of reading
  - writing not impacted
  - one failure is possible

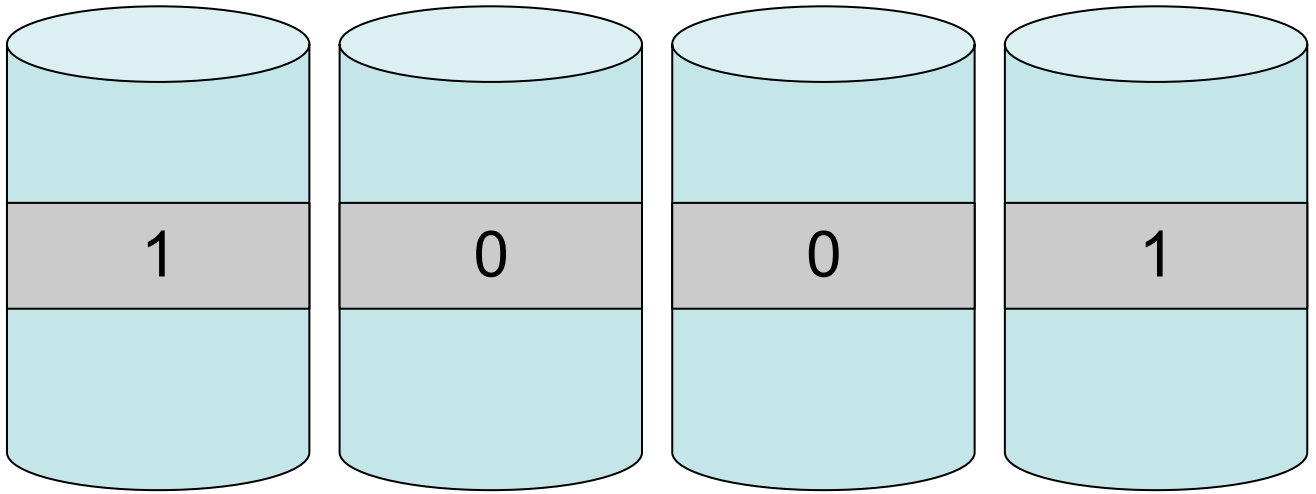


Virtual Storage: RAID 4

- blocks + parity disk which checks the values on all blocks of the same strip (using XOR)
  - reading is distributed
  - writing is a bottleneck as parity disk is always accessed
  - only 1 failure is possible at a time



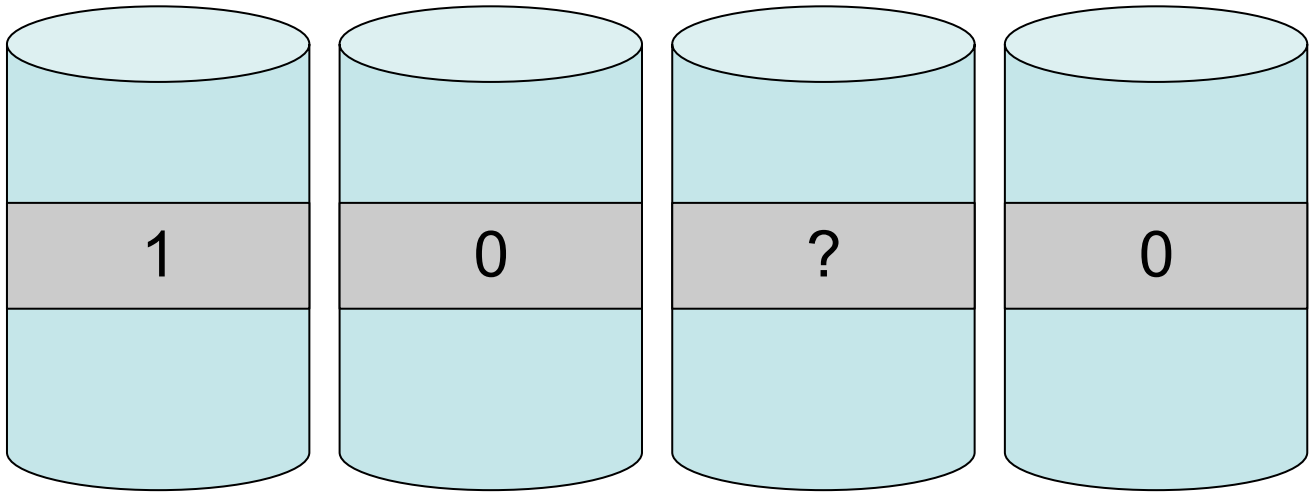
Parity Checking



parity disk

1 XOR 0 XOR 0 = 1

Parity Checking



parity disk

1 XOR 0 XOR ? = 0

Virtual Storage: RAID 5

- Same as RAID 4 (blocks) but distributed parity
  - write performance is increased (not always the same parity disk that is accessed when a write)