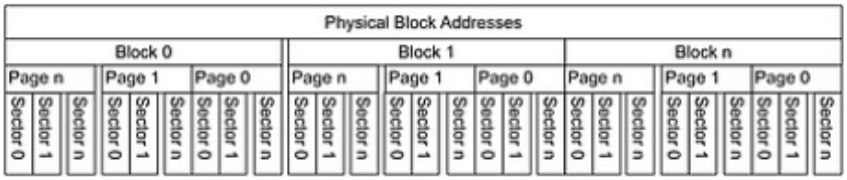
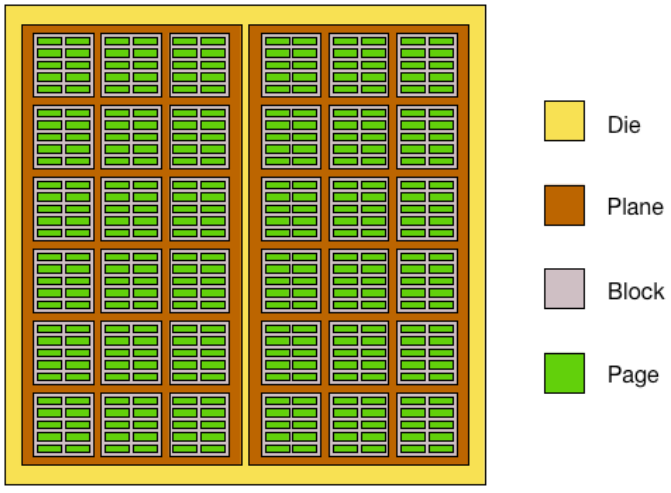
1 Flash-Based SSDs

Vocabularies

1. **Flash Solid-State Storage**
   - Is a type of non-volatile computer storage that stores and retrieves digital information using only electronic circuits, without any involvement of moving mechanical parts
2. **NAND-Based Flash**
   - Is an electronic non-volatile computer memory storage medium using NAND-gate that can be electrically erased and reprogrammed.
3. **Flash Page**
   - Is the smallest unit that can be programmed into flash
4. **Flash Block**
   - Is a group of pages and the smallest unit that can be erased.

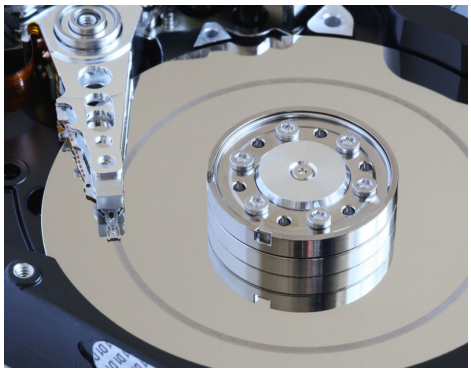




5. **Wear Out**

- Is similar to going past **expiration date**
- Means it has exceeded their endurance rating

6. **Single-Level Cell**
   - Is a type of cell in solid-state storage that stores one bit of data per transister (0 or 1)
7. **Multi-Level Cell**
   - Is a type of cell in solid-state storage that stores two bits of data (i.e 00, 01, 10, 11) per cell using two different levels of charge
8. **Triple-Level Cell**
   - Is a type of cell in solid-state storage that stores three bits of data per cell (i.e 000, 001, 010, 011, 100, 101, 110, 111)
9. **Head Crash**
   - Is a condition where the drive head makes contact with the recording surface



10. **Disturbance**
11. **Flash Transition Layer**
12. **Wear Leveling**
13. **Direct Mapped**
14. **Logging**
15. **Logical Block Address**
16. **Program Disturbance**

17. **In-Memory Mapping Table**
18. **Garbage**
19. **Garbage Collection (GC)**
20. **Dead Blocks**
21. **Cache Flush**
22. **Trim**
23. **Overprovision**
24. **Background**
25. **Page-Level FTL**
26. **Hybrid Mapping**
27. **Log Blocks**
28. **Switch Merge**
29. **Partial Merge**
30. **Full Merge**

1.1 Storing a Single Bit

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1.2 From Bits to Banks / Planes

1.3 Basic Flash Operations

1.4 From Raw Flash to Flash-Based SSDs

1.5 FTL Organization: A Bad Approach

1.6 A Log Structured FTL

1.7 Garbage Collection

1.8 Mapping Table Size

1.9 Hybrid Mapping

1.10 Wear Leveling

1.11 SSD Performance And Cost