Solid State Disk Drives

- Solid State Drives (SSD) employ Flash Memory
  - They mimic the electrical interfaces of hard drives
  - SSD's can plug into hard disk sockets
  - They provide higher performance,
    - lower weight & less power consumption
    - Greater tolerance to shock
  - They are more costly and have a lower storage capacity

Solid State Disk Drives

- SSD's have no moving parts as with HDDs
  - They are truly random access
  - No rotational latency or seek delay
  - Response times are shorter
  - Yield higher input/output operations per second (IOPS)
  - Generate less heat
  - Provide quite operation
  - Cost more per gigabyte of storage than HDDs
  - Fragmentation is not a problem as with hard drives

SSD Features

- Hard disks have effectively equal read, write and erase times
- SSD's use different read and write mechanisms
  - Writes take longer than reads
  - Write performance can be up to 50% lower than read performance
  - Blocks cannot simply be overwritten
    - they must first be erased and then written
- There is a limit to how may write cycles can be performed
- The cells fail after tens of thousands of write cycles
- Repeated write cycles may cause cells to become stuck at 0
- Wear leveling techniques are distribute the writes

SSD Features

- Wear leveling
- Requested blocks are mapped onto physical block addresses
- Controller monitors how often physical blocks are used
- Adjusts mapping table to ensure all blocks share the load
- This is required when SSD's are used as secondary storage

- Wear leveling is less of an issue for other applications
- BIOS
- Digital cameras
- Music or video players

SSD Features

- Management of free space
  - Unused blocks that are erased can be used immediately
  - Unused blocks containing unneeded data must first be erased
- Entire blocks are erased (e.g. 4KB)
- SSD use is expanding with the declining cost of flash memory
- Their greater reliability means less frequent replacement