SOLID STATE DRIVES

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EARLY HISTORY

• Charged Capacitor Read Only Store (CCROS)
  • Lead to EEPROMS and FLASH

• Core memory
  • Used in early NASA space programs
  • Cores were strung together by hand
MORE HISTORY

• 1970-1989
  • SSD technology was implemented into supercomputers
  • Dataram started selling the Bulk Core
  • Texas Memory Systems developed an SSD for oil companies

• 1990s
  • SSDs used mainly by military and aerospace industries
NAND FLASH MEDIA

- Contains NAND cells arranged in planes
  - Allows parallel access to the NAND
- Data moves in and out through a cache element

NAND TYPES

- 3 types
  - Single level cell (SLC)
  - Multiple level cell (MLC)
  - Triple-level cell (TLC)

<table>
<thead>
<tr>
<th></th>
<th>SLC</th>
<th>MLC</th>
<th>TLC</th>
</tr>
</thead>
<tbody>
<tr>
<td>P/E cycles</td>
<td>100k</td>
<td>10k</td>
<td>5k</td>
</tr>
<tr>
<td>Bits per cell</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Seek latency (µs)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Read latency (µs)</td>
<td>25</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>Write latency (µs)</td>
<td>250</td>
<td>900</td>
<td>1500</td>
</tr>
<tr>
<td>Erase latency (µs)</td>
<td>1000</td>
<td>3000</td>
<td>5000</td>
</tr>
</tbody>
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ADVANTAGES

• Power Draw
• No moving parts
• Speed
DISADVANTAGES

• High Price
• Limited Capacity
• Shorter Life Cycle

CONCLUSIONS

• Although they are expensive, SSDs hold many advantages over platter drives
• Many consumers use SSDs for program files and use larger HDDs for media storage
• SSDs represent the alleviation of the data storage bottleneck
BIBLIOGRAPHY

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