# Kilo, Mega, Giga…

<table>
<thead>
<tr>
<th>Power of 10</th>
<th>Power of 2</th>
<th>Value of Power of 2</th>
<th>Prefix</th>
<th>Abbreviation</th>
<th>Derivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>$10^3$</td>
<td>$2^{10}$</td>
<td>1,024</td>
<td>kilo</td>
<td>K</td>
<td>Greek for thousandth</td>
</tr>
<tr>
<td>$10^6$</td>
<td>$2^{20}$</td>
<td>1,048,576</td>
<td>mega</td>
<td>M</td>
<td>Greek for large</td>
</tr>
<tr>
<td>$10^9$</td>
<td>$2^{30}$</td>
<td>1,073,741,824</td>
<td>giga</td>
<td>G</td>
<td>Greek for giant</td>
</tr>
<tr>
<td>$10^{12}$</td>
<td>$2^{40}$</td>
<td>-</td>
<td>tera</td>
<td>T</td>
<td>Greek for monster</td>
</tr>
<tr>
<td>$10^{15}$</td>
<td>$2^{50}$</td>
<td>-</td>
<td>peta</td>
<td>P</td>
<td>Greek prefix for five</td>
</tr>
</tbody>
</table>
von Neumann Architecture
The Fetch-Execute Cycle

- Fetch the next instruction
- Decode the instruction
- Get data if needed
- Execute the instruction
RAM and ROM

• RAM: Random Access Memory
• ROM: Read-Only Memory
Magnetic Disks

(a) A single disk

(b) A hard disk drive

Figure 5.5 The organization of a magnetic disk
Measures of Disk Drive’s Efficiency

- **Seek time** is the time it takes for the read/write head to get positioned over the specified track.
- **Latency** is the time it takes for the specified sector to spin to the read/write head.
- **Access time** = **Seek time + Latency**. This is the time it takes for a block to start being read.
- **Transfer rate** is the rate at which data is transferred from the disk to memory.
Non-von Neumann Architectures

- **Synchronous processing**: Multiple processors apply the same program in lock-step to multiple data sets
- **Pipelining processing**: Multiple processors are arranged in tandem, where each contributes one part of an overall computation
- A *shared memory* configuration: Multiple processors share a global memory