Computer-System Architecture

Diagram showing the computer system architecture with components such as CPU, disk controller, printer controller, tape-drive controller, and memory controller connected through a system bus.
Interrupt Time Line For a Single Process Doing Output
Two I/O Methods

Synchronous

Asynchronous
Device-Status Table

<table>
<thead>
<tr>
<th>device: card reader 1</th>
<th>status: idle</th>
</tr>
</thead>
<tbody>
<tr>
<td>device: line printer 3</td>
<td>status: busy</td>
</tr>
<tr>
<td>device: disk unit 1</td>
<td>status: idle</td>
</tr>
<tr>
<td>device: disk unit 2</td>
<td>status: idle</td>
</tr>
<tr>
<td>device: disk unit 3</td>
<td>status: busy</td>
</tr>
</tbody>
</table>

- request for line printer
  - address: 38546
  - length: 1372

- request for disk unit 3
  - file: xxx
  - operation: read
  - address: 43046
  - length: 20000

- request for disk unit 3
  - file: yyy
  - operation: write
  - address: 03458
  - length: 500
Moving-Head Disk Mechanism
Storage-Device Hierarchy

- Registers
- Cache
- Main memory
- Electronic disk
- Magnetic disk
- Optical disk
- Magnetic tapes
Migration of A From Disk to Register
Use of A System Call to Perform I/O

1. Trap to monitor
2. Perform I/O
3. Return to user

System call n

Case n

Resident monitor

User program

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Use of A Base and Limit Register

```
<table>
<thead>
<tr>
<th>base register</th>
<th>limit register</th>
</tr>
</thead>
<tbody>
<tr>
<td>300040</td>
<td>120900</td>
</tr>
</tbody>
</table>
```

```
<table>
<thead>
<tr>
<th>address</th>
<th>job</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>monitor</td>
</tr>
<tr>
<td>256000</td>
<td>job 1</td>
</tr>
<tr>
<td>300040</td>
<td>job 2</td>
</tr>
<tr>
<td>420940</td>
<td>job 3</td>
</tr>
<tr>
<td>880000</td>
<td>job 4</td>
</tr>
<tr>
<td>1024000</td>
<td></td>
</tr>
</tbody>
</table>
```
Hardware Address Protection

CPU address \( \geq \) base

trap to operating system monitor—addressing error

memory

base base + limit

\(<\) no yes no yes
Local Area Network Structure
Wide Area Network Structure

Diagram showing the structure of a wide area network with components labeled as follows:

- Network hosts (H)
- Communication processors (CP)
- Host operating systems
- User processes

The diagram illustrates the communication subsystem and the hierarchy of network hosts and communication processors.