UTA Physics Tier-II Computing Center Specification

Jae Yu
Sept. 12, 2002
## Total Number of Equipments for MRI 2002 and Tier II

<table>
<thead>
<tr>
<th>Items</th>
<th>MRI2002/Tier II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processing PC (dual CPU)</td>
<td>144/ 640</td>
</tr>
<tr>
<td>Disk/File Servers</td>
<td>6/ 30</td>
</tr>
<tr>
<td>Network Switches</td>
<td>20/ 90</td>
</tr>
<tr>
<td>IDE RAID Arrays w/ Disk Drives</td>
<td>36/ 180</td>
</tr>
<tr>
<td>Racks</td>
<td>11/ 50</td>
</tr>
</tbody>
</table>
### Specifications for Processing Computer Racks

- **Rack dimension:** 23”(W)x31”(D)x84”(h)+Access

<table>
<thead>
<tr>
<th>Item</th>
<th>Number</th>
<th>Weight (lbs)</th>
<th>Power (kW)/Actual running average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processing PC’s</td>
<td>32</td>
<td>30lbsx32=960</td>
<td>300Wx32=9.6/192Wx32=6.2</td>
</tr>
<tr>
<td>Switches</td>
<td>3</td>
<td>90</td>
<td>0.3/0.2</td>
</tr>
<tr>
<td>Rack</td>
<td>1</td>
<td>300</td>
<td>0.5 (Fan)</td>
</tr>
<tr>
<td>Subtotal/per rack</td>
<td></td>
<td>1350</td>
<td>9.2/6.7</td>
</tr>
<tr>
<td><strong>Total for MRI2002</strong></td>
<td></td>
<td>6240</td>
<td>49.9/34.1</td>
</tr>
<tr>
<td><strong>Total for 20 racks (expansion)</strong></td>
<td></td>
<td>27,000</td>
<td>184/134</td>
</tr>
</tbody>
</table>

- Heat load per rack for this configuration based on actual measurement is: 23,000BTU/rack
- Power consumption was computed using the nominal specs and actual measurements in a farm environment
Specifications for Data Storage Racks w/ 16 Bay RAID Arrays

- **Rack dimension: 23”(W)x31”(D)x84”(h)+Access**

<table>
<thead>
<tr>
<th>Items</th>
<th>Number</th>
<th>Weight (lbs)</th>
<th>Power (kW) / Expected running average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server</td>
<td>1</td>
<td>50</td>
<td>0.5/0.34</td>
</tr>
<tr>
<td>RAID Array w/ drv.</td>
<td>6</td>
<td>71lbsx6=426</td>
<td>960Wx6=5.76/330Wx6=1.98</td>
</tr>
<tr>
<td>Switch</td>
<td>1</td>
<td>30</td>
<td>0.3/0.2</td>
</tr>
<tr>
<td>Rack</td>
<td>1</td>
<td>300</td>
<td>0.5</td>
</tr>
<tr>
<td>Subtotal/per rack</td>
<td></td>
<td>806</td>
<td>7.1/3.02</td>
</tr>
</tbody>
</table>

**Total for MRI2002 (6 racks)**

- 4836
- 42.6/18.2

**Total for 30 racks (Expansion)**

- 24180
- 213/91

- Network infrastructure: multi-gigabit/sec fiber optic cables or better for each rack
- Power consumption was computed using the nominal specifications and anticipated actual usage
Specifications for the Room

- False floor for cabling under the floor
- Available height above the floor > 9’
- Requires an operation area of size 10’x12’
  - partitioned from the main computing area by glass walls for unobstructed monitoring
  - A glass access door
- Separate walled area for UPS systems
- Each rack space requires
  - individual power outlets with multiple plugs (3 sets of four?) with 20A each
  - individual network connections (10 ports)
- The Room
  - Reasonably good filtration and ventilation system to minimize dirt circulation
  - Air conditioning capacity to regulate relative humidity less than 60+/-10% and to keep the ambient temperature at 65-70°F at all times
  - Sufficient lighting in each row, giving total illumination equivalent to 150W bulbs at an 8’ distance
  - A direct access double door for easy move into the computing area.
  - Non-water based fire extinguishing system
  - Noise reduction capability
Area Configuration (Expanded)

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Jae Yu: Computing Center specs.
Summary for the Computer Center Spec.

- Total Power Capacity: 397 kW nominal (225kw Actual-running average)
- Average power per square foot: 221W/ft\(^2\) nominal (118W/ft\(^2\) Actual running average)
- Total Weight Support: 51180lbs
- Concentrated weight per square ft: 225lbs/ft\(^2\)
- Average load per square foot: 28.5lbs/ft\(^2\)
- Sufficiently good Air ventilation and filtration system
- Air conditioning for 250kW (855kBTU) capacity or better to regulate relative humidity at the level lower than 60+/-10% and to keep the temperature at 65-70°F
  - 23,000BTU/rack heat load
- Optical Network cabling for better than multi-gigabit/sec bandwidth
- An operation area (10’x12’)
- A walled UPS area
- UPS System at 240kVA (140kW): requires three 480V outlets (1&3 phases)~$240k
  - Size of UPS system: 3 x (40”x32”+50”x32”+ 50”x32”)

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Jae Yu: Computing Center specs.
ACS - UPS

• Has about 100 machines
• Total UPS capacity: 80kVA
  – 50 min full load
  – Actual power consumption: 25.6kVA
  – Can last up to 2.5 hours at this rate
• Cost for UPS: $80k complete, including removal of old system
• UPS Requires a 1 & 3 Phase 480V outlet
• Physical dimension
  – 2 battery units (50”x32”) + 1 control unit (40”x32”)
  – Requires a bypass panel: 30”(W)x11”(D)
• Cooling
  – Temperature: 68°F-72°F
  – Humidity: 60%+-10%
## Equipment Electrical Specs.

<table>
<thead>
<tr>
<th>Items</th>
<th>Amperage</th>
<th>Voltage</th>
<th>Number of cords</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server</td>
<td>3.9/ 2A (2.9A Actual)</td>
<td>115V</td>
<td>1</td>
</tr>
<tr>
<td>Processing PC</td>
<td>3.9/ 2A (2.5A Actual)</td>
<td>115/ 240V</td>
<td>1</td>
</tr>
<tr>
<td>RAID Arrays</td>
<td>7A/ 4A</td>
<td>115/ 230V</td>
<td>1</td>
</tr>
</tbody>
</table>
Processing PC Tech Specs

Power
- Optional, hot plug, redundant 275 Watts power supplies
- 110/220 Volts
- -48v DC Power Supply Option

Availability
- ECC memory
- Dual embedded NICs with failover and load balancing support
- Hot-plug hard drives
- Optional hot-pluggable redundant power supplies
- Dual channel embedded Ultra3 RAID with battery-backed cache
- Hot-plug redundant Cooling

Chassis
- Rack-Mountable 1U Chassis: 1.67" (4.24cm) H x 17.6" (44.70cm) W x 27.0" (68.58cm) D
- 1U rack height
- Weight 36 lb. (15.88 kg) max
- Active ID includes an illuminated indicator that provides basic system status information
- Front mounted Keyboard, Video and Monitor ports provide easy access for crash cart

Graphics
- Integrated VGA-compatible, ATI-Rage XL controller

Management
- Console Redirection
- Remote management support, including dead server management via DRAC II or Ethernet Based Access Control (EBAC)
### Optional Software

- Microsoft® Windows NT® Server, Version 4.0
- Microsoft® Windows® 2000 Server
- Microsoft Windows 2000 Advanced Server
- Red Hat® Linux® 7.1
- Red Hat® Linux® 7.2 and 7.3
- Novell® NetWare® 5.1
- Novell® NetWare® 6.0
- Dell Tape Backup Software by Veritas® Backup Exec™ and Computer Associates® ARCserve®
- More Software Options

### Environmental and Regulatory

#### Environmental

- Operating Temperature: 10°C to 35°C (50°F to 95°F)
- Storage Temperature: -40°C to 65°C (-40°F to 149°F)
- Operating Relative Humidity: 8% to 80% (non-condensing)
- Storage Relative Humidity: 5% to 95% (non-condensing)
- Operating Vibration: 0.25G at 3Hz to 200Hz for 15 minutes
- Storage Vibration: 0.5G at 3Hz to 200Hz for 15 minutes
- Operating Shock: 6 shock pulses of 41G for up to 2ms
- Storage Shock: 6 shock pulses of 71G for up to 2ms
- Operating Altitude: -16m to 3,048m (-50 ft to 10,000 ft)
- Storage Altitude: -16m to 10,600m (-50 ft to 35,000 ft)

#### Regulatory

- FCC (U.S. only) Class A
- DOC (Canada) Class A
- CE Mark (EN 55022 Class A, EN55024, EN61000-3-2, EN61000-3-3, EN60950)
- VCCI Class A
- UL 1950
- CSA 950
- EN 60950
Disk/File server Tech Specs cnt’d

**Poweredge™ 2550 Details**

**Power**

- 330 Watts
- 110/220 Volts
- Optional, hot plug/redundant power supplies

**Chassis**

- Rack-Mountable Chassis: 3.3” (h) x 16.75” (w) x 26.75” (d)
- 2U rack height
- Weight 50 lb.

**Operating Temperature**

- 10°C to 35°C (50°F to 95°F)

**Storage Temperature**

- -40°C to 65°C (-40°F to 149°F)

**Operating Relative Humidity**

- 8% to 85% (non-condensing)

**Storage Relative Humidity**

- 5% to 95% (non-condensing)

**Operating Vibration**

- 0.25G at 3Hz to 200Hz for 15 minutes

**Storage Vibration**

- 0.5G at 3Hz to 200Hz for 15 minutes

**Operating Shock**

- 6 shock pulses of 41G for up to 2ms

**Storage Shock**

- 6 shock pulses of 71G for up to 2ms

**Operating Altitude**

- -16m to 3,048m (50 ft to 10,000 ft)

**Storage Altitude**

- -16m to 10,660m (-50 ft to 35,000 ft)

**Regulatory**

- FCC (U.S. only) Class B
- DOC (Canada) Class B
- CE Mark (EN55022 Class B, EN55024, EN61000-3-2, EN61000-3-3, EN60950)
- VCCI Class B
- UL 1950
- CSA, 950
- EN 60950
RAID Array Tech Specs

**TECHNICAL SPECIFICATION**

**Main**
- **Form Factor:** 4U high - 19'' Rackmount
- **RAID Controller:** Cold Swappable, Intel80303 64bit CPU
- **Backplane Design:** 16x Ultra DMA hot-swap disk drives - intelligent, each disk acts as MASTER disk
- **Hot-Swap Components:** Hard Disk Drives, power supplies, cooling fans
- **Redundant Components:** Hard Disk Drives, power supplies, cooling fans
- **Management:** Temperature, Fan, power failure monitor and report. Audible alarm & status LEDs
- **Host Interface:** Dual Ultra 160 SCSI - up to 160MB/s per channel

**G-ForcePlus RT DATA**
- **Number of drive bays:** 16
- **RAID Controller Performance:** 95MB/s depending on Host and Applications
- **Controller cache/memory:** 128 - 512MB
- **Drive type:** Low-profile (1'' high) Ultra DMA HDDs
- **Drive capacity:** 60GB, 80GB, 120GB, 160GB, 200GB (up to 7400RPM)
- **Maximum capacity per enclosure:** 3200GB (using 16x 200GB disk drives)

**Power Requirements**
- **Input voltage:** 115/240 VAC 60/50Hz
- **Power supply rating:** 3x 320W hot-swap PSUs
- **Emission requirements:** FCC Class A and CE
- **Safety requirements:** UL1950, CSA no.290, TUV/EN 60950
- **Directive Physical Characteristics**
  - **Dimensions:** (RACKMOUNT) 483mm(W) x 470mm(D) x 175mm(H)
  - **Weight (without disk drives):** 22KG

**Environment**
- **Operating Temperature:** 5°C to 40°C
- **Non-Operating Temperature:** -40°C to 60°C
- **Relative Humidity:** 10% to 85% non-condensing