TOP500 - Overview

- Listing of the 500 most powerful Computers in the World
- Yardstick: Rmax from Linpack
  \[ Ax = b, \text{ dense problem} \]
- Updated twice a year:
  - ISC'xy in Germany, June xy
  - SC'xy in USA, November xy
- All data available at www.top500.org

TOP500 list – Data shown

- Manufacturer
- Computer Type
- Installation Site
- Location
- Year
- Installation Type
- Installation Area
- # Processors
- \( R_{\text{max}} \)
- \( R_{\text{peak}} \)
- \( N_{\text{max}} \)
- \( N_{1/2} \)
- \( N_{\text{world}} \)

- Manufacturer or vendor
- indicated by manufacturer or vendor
- Customer
- Location and country
- Year of installation/last major update
- Academic, Research, Industry, Vendor, Class.
- e.g. Research: Energy / Industry: Finance
- Number of processors
- Maximal LINPACK performance achieved
- Theoretical peak performance
- Problemsize for achieving Rmax
- Problemsize for achieving half of Rmax
- Position within the TOP500 ranking
## Top500 - Team

- Hans-Werner Meuer, University of Mannheim
- Erich Strohmaier, NERSC/LBNL
- Jack J. Dongarra, University of Tennessee
- Horst D. Simon, NERSC/LBNL
- Anas Nashif, Prometeus GmbH

More Information at [www.top500.org](http://www.top500.org) or [cluster.top500.org](http://cluster.top500.org)

### 20th List: The TOP10

<table>
<thead>
<tr>
<th>Rank</th>
<th>Manufacturer</th>
<th>Computer</th>
<th>$R_{\text{max}}$ [TF/s]</th>
<th>Installation Site</th>
<th>Country</th>
<th>Year</th>
<th>Area of Installation</th>
<th># Proc</th>
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<tbody>
<tr>
<td>1</td>
<td>NEC</td>
<td>Earth-Simulator</td>
<td>35.86</td>
<td>Earth Simulator Center</td>
<td>Japan</td>
<td>2002</td>
<td>Research</td>
<td>5120</td>
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<tr>
<td>2</td>
<td>HP</td>
<td>ASCI Q, AlphaServer SC</td>
<td>7.73</td>
<td>Los Alamos National Laboratory</td>
<td>USA</td>
<td>2002</td>
<td>Research</td>
<td>4096</td>
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<tr>
<td>3</td>
<td>HP</td>
<td>ASCI Q, AlphaServer SC</td>
<td>7.73</td>
<td>Los Alamos National Laboratory</td>
<td>USA</td>
<td>2002</td>
<td>Research</td>
<td>4096</td>
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<tr>
<td>4</td>
<td>IBM</td>
<td>ASCI White SP Power3</td>
<td>7.23</td>
<td>Lawrence Livermore National Laboratory</td>
<td>USA</td>
<td>2000</td>
<td>Research</td>
<td>8192</td>
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<tr>
<td>5</td>
<td>Linux NetworX</td>
<td>MCR Cluster – Quadrics</td>
<td>5.69</td>
<td>Lawrence Livermore National Laboratory</td>
<td>USA</td>
<td>2002</td>
<td>Research</td>
<td>8192</td>
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<tr>
<td>6</td>
<td>HP</td>
<td>AlphaServer SC ES45 1 GHz</td>
<td>4.46</td>
<td>Pittsburgh Supercomputing Center</td>
<td>USA</td>
<td>2001</td>
<td>Academic</td>
<td>3016</td>
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<td>7</td>
<td>HP</td>
<td>AlphaServer SC ES45 1 GHz</td>
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<td>Commissariat a l’Energie Atomique (CEA)</td>
<td>France</td>
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<td>Xeon Cluster - Myrinet2000</td>
<td>3.34</td>
<td>Forecast Systems Laboratory - NOAA</td>
<td>USA</td>
<td>2002</td>
<td>Research</td>
<td>1536</td>
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<td>9</td>
<td>IBM</td>
<td>pSeries 690 Turbo</td>
<td>3.16</td>
<td>HPCx</td>
<td>UK</td>
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<tr>
<td>10</td>
<td>IBM</td>
<td>pSeries 690 Turbo</td>
<td>3.16</td>
<td>NCAR (National Center for Atmospheric Research)</td>
<td>USA</td>
<td>2002</td>
<td>Research</td>
<td>1216</td>
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Performance Development

![Performance Chart](chart1.png)

Projected Performance Development

![Projected Performance Chart](chart2.png)
Processor Type

![Graph showing Processor Types](image)

Processor Types

![Graph showing Processor Types](image)
### Excerpt from the 20th list

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<th>Rmax [TF/s]</th>
<th>Installation Site</th>
<th>Country</th>
<th># Proc</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Linux NetworX</td>
<td>MCR Linux Cluster Xeon 2.4 GHz - Quadrics/ 2304</td>
<td>5.694</td>
<td>Lawrence Livermore National Laboratory</td>
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<td>Forecast Systems Laboratory - NOAA</td>
<td>USA</td>
<td>2002</td>
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<td>17</td>
<td>Atipa Technology</td>
<td>P4 Xeon 1.8 GHz - Myrinet</td>
<td>2.207</td>
<td>Louisiana State University</td>
<td>USA</td>
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<td>22</td>
<td>Dell</td>
<td>PowerEdge 2650 Cluster P4 Xeon 2.4 GHz</td>
<td>2.004</td>
<td>University at Buffalo, SUNY, Center for Computational Res.</td>
<td>USA</td>
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<td>32</td>
<td>Dell</td>
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<td>1.272</td>
<td>Sandia National Laboratories</td>
<td>USA</td>
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<td>42</td>
<td>Hewlett-Packard</td>
<td>rx5670 Itanium2 Cluster - Quadrics</td>
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<td>Oil Company, Houston</td>
<td>USA</td>
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<td>43</td>
<td>Legend Group</td>
<td>DeepComp 1800 - P4 Xeon 2 GHz - Myrinet</td>
<td>1.046</td>
<td>Academy of Mathematics and System Science Beijing</td>
<td>China</td>
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<td>46</td>
<td>Linux NetworX</td>
<td>LCRC Xeon 2.4 GHz - Myrinet</td>
<td>1.007</td>
<td>Argonne National Laboratory</td>
<td>USA</td>
<td>361</td>
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### NOW - Clusters

![Graph of NOW - Clusters](image)
Cluster on the Top500

Processor Breakdown for the 93 Clusters

- Pentium III, 28, 30%
- Pentium 4, 24, 26%
- Alpha, 25, 27%
- Itanium, 4, 4%
- AMD, 8, 9%
- Sparc, 4, 4%

Chip Technologies

Chip Technologies

- ECL
- CMOS: proprietary
- CMOS: off the shelf

Linpack Efficiency; Average 67%

Linpack Efficiency

Efficiency

Rank

1 39 77 115 153 191 229 267 305 343 381 419 457 495