RLX Technologies Server Blades

Summary
RLX Technologies has designed its product line to support parallel applications with high-performance compute clusters of server blades.

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Overview

RLX Technologies was one of the first vendors to produce a product for the server blade market in 2000. Today its product line has evolved to include server blade products with dual Intel processors and a comprehensive suite of management tools.

Server Blades

RLX hardware offerings include four server blade products and two enclosures (also known as chassis) for the server blades. Two of the server blades are based on Intel processors that are designed for mobile or laptop PCs, and these are uniprocessor blades which may be installed in the RLX 300ex chassis. The other two server blades support up to two Intel Xeon server processors each, and these may be installed in the RLX 600ex chassis. Specifically, the server blades are as follows:

- ServerBlade 800i with support for one 800MHz Intel Pentium III Low-Voltage processor
- ServerBlade 1200i with support for one 1.2GHz Intel Pentium III mobile processor
- ServerBlade 2800i with support for one or two 2.0GHz Intel Pentium 4 Xeon processors
- ServerBlade 3000i with support for one or two 3.0GHz Intel Pentium 4 Xeon processors

Figure 1: An RLX Server Blade
RLX Technologies Server Blades

Source: RLX Technologies, Inc.

Enclosures

The 300ex chassis is 3U (where a U is 1.75 inches of vertical rack space) in size. If an industry standard, 42U rack was completely filled with 300ex chassis, the rack could have as many as 336 ServerBlade 800i or 168 ServerBlade 1200i uniprocessor servers. The 600ex chassis is 6U high and can house up to 70 ServerBlade 2800i or 3000i servers (that is, 140 processors) in a full rack.

The 300ex has a management switch card for out-of-band management and an optional 10/100 data switch. It is designed to reduce the total number of cables required in a rack by as much as 24 to 1.

The 600ex is supported by an optional Gigabit Switch Card, which consists of two (for redundancy) Gigabit switches and four 10/100/1000Base-T ports. These ports provide communications links between the server blades in their chassis and the external storage and network environment. The 600ex also supports a Gigabit Passthrough Card, which is a lower-cost option providing 20 10/100/1000Base-T copper connections for each chassis.

Further specifications for the RLX ServerBlade and chassis products are detailed in the table “Overview: RLX ServerBlades.”

Typical Applications

RLX’s server blade products were originally positioned for “edge of network” applications, such as Web serving. More recently, RLX has turned its attention to the market for high-performance, compute-intensive (HPC). These applications can benefit from scaling out the number of server nodes in a cluster. Many applications in this market—such as bioinformatics, financial analysis, 3-D modeling and weather simulation applications—have been ported to Linux, and in some cases, these applications may be prime candidates for a server blade platform. Rather than running compute-intensive applications on large supercomputers, as was usually the case in the past, the applications may run instead on a high-performance cluster of server blades for a much lower cost. To run a compute-intensive application on a cluster of server blades, the application must be parallelized. When calculating a formula, for example, each server blade may calculate a portion of the formula simultaneously, and the results are then combined.

ActivManage

To manage the server blade infrastructure and to optimize application performance in the server blade environment, RLX offers ActivManage, a suite of management tools including Control Tower XT, ActivStat and ActivConfig.

Control Tower XT

Control Tower XT supports the functions of deploying, managing and re-provisioning RLX ServerBlades. It is designed especially to support environments with hundreds or thousands of server blades that need to be quickly deployed and re-provisioned on the fly. The system administrator, working locally or located remotely from the ServerBlades, uses the software tools in Control Tower XT to install operating systems, BIOS components and application software images and to perform upgrades. Control Tower XT also provides performance tracking information and sends alerts about the hardware components or software applications as needed. Control Tower XT is a separately licensed product (although it is also included in RLX’s turnkey solutions).

Control Tower XT comes pre-installed on a Control Tower Blade in the first RLX chassis that the customer purchases. But Control Tower can manage all of the components in its own rack as well as RLX
components in other racks on the same network. Thus, only one copy of Control Tower XT is required for all of the ServerBlades and all of the RLX chassis in the network. Its predecessor, RLX Control Tower 4, continues to be supported on the 300ex chassis. Control Tower XT is supported on both the 300ex and 600ex chassis.

RLX has recently introduced a new version of Control Tower, called Control Tower 1.1. This version enables the RLX customer administrator to monitor not only RLX ServerBlades but also server blades from other vendors, such as IBM, Dell and HP, all from the same console. The management software gathers data on the status of these other server blades and even performs some rudimentary provisioning, such as loading an image onto a server blade. Control Tower 1.1 also includes enhanced provisioning functions, such as provisioning based on policies set by the customer.

**ActivStat**

ActivStat is a liquid crystal display (LCD) interface and display that is found on each RLX ServerBlade and chassis. It displays the status of each blade and chassis, and it displays alerts if problems occur. ActivStat can continue to operate even if the operating system on the blades is down and even if Control Tower XT is unavailable. ActivStat supports “on the blade” or “on the chassis” management, allowing administration of the resources at the rack. All ActivStat information is also displayed in Control Tower XT for console-based management.

**ActivConfig**

ActivConfig is a blade configuration tool that is provided standard on each RLX ServerBlade. ActivConfig is used to identify and store the logical and physical relationships between devices and is used by Control Tower in handling automated provisioning tasks.

**ActivCluster: RLX Turn-Key Cluster Solutions**

To simplify deployment for its customers, RLX has developed three turn-key solutions: the RLX Compute Cluster Solution, the RLX Message Passing Interface (MPI) Compute Cluster Solution and the RLX Basic Local Alignment Search Tool (BLAST) Cluster Solution.

**RLX Compute Cluster Solution**

To get started running a compute-intensive application on a high-performance cluster of server blades, RLX offers the Compute Cluster Solution, which is composed of an RLX 300ex chassis, an RLX Control Tower Blade and five RLX ServerBlades (more may be purchased optionally). The Control Tower Blade is preinstalled with RLX’s LSF Plug-in. LSF is a high-performance cluster management tool from Platform Computing, Inc.

**RLX MPI Compute Cluster Solution**

Many parallel applications rely on the MPI protocol to support communications between servers or nodes that are executing a task in parallel. MPI is available as open source and in commercial distributions. RLX utilizes MPI/Pro from MPI Software Technology, Inc., in its MPI Compute Cluster Solution. This turnkey solution also includes all of the components of the RLX Compute Cluster Solution, above.

**RLX BLAST Cluster Solution**

BLAST is an application used in the bioinformatics industry to search for data in genetic databases. These massive searches can be divided into smaller searches, making BLAST a good candidate for high-performance computing clusters. The RLX BLAST Cluster Solution includes a chassis, a Control Tower blade with the RLX LSF Plug-in, five (or more) ServerBlades and licenses for BLAST and BLAST scripts.
RLX Technologies Server Blades

Storage Management

When external storage is required for an application running on RLX ServerBlades, RLX recommends network attached storage (NAS) systems. RLX has partnered with Network Appliance, Inc., and NetApp storage management tools can be used to mount and view storage volumes to groups of RLX ServerBlades.

Future Road Map

Later in 2003, RLX plans to introduce Infiniband, providing a low-latency interconnect for RLX server blades. RLX also plans to support Fiber Channel on the 600ex enclosure supporting ServerBlade 2800i and ServerBlade 3000i later in 2003.

Table 1: Overview: RLX ServerBlades

<table>
<thead>
<tr>
<th>Blade Specifications</th>
<th>ServerBlade 800i</th>
<th>ServerBlade 1200i</th>
<th>ServerBlade 2800i</th>
<th>ServerBlade 3000i</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processors Supported</td>
<td>Intel Low-Voltage Pentium III</td>
<td>Intel Pentium III-M</td>
<td>Intel P4 Xeon</td>
<td>Intel P4 Xeon</td>
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<tr>
<td>Processor Clock Speed (Hz)</td>
<td>800M</td>
<td>1.8G</td>
<td>2.8G</td>
<td>3G</td>
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<tr>
<td>Number of Processors per Blade</td>
<td>1</td>
<td>1</td>
<td>1-2</td>
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<tr>
<td>Level 2 Cache per Processor (bytes)</td>
<td>512K</td>
<td>512K</td>
<td>512K</td>
<td>512K</td>
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<tr>
<td>Min./Max. Memory per Blade (bytes)</td>
<td>256M/1G</td>
<td>256M/2G</td>
<td>256M/8G</td>
<td>256M/8G</td>
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<tr>
<td>Number of Available Network Interface Cards (NICs)</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Number and Type of Available Input/Output (I/O) Slots</td>
<td>3</td>
<td>3</td>
<td>4</td>
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</tbody>
</table>

Storage

<table>
<thead>
<tr>
<th>Internal Storage Type Supported</th>
<th>Ultra ATA/66</th>
<th>Ultra ATA/66</th>
<th>ATA/100 IDE</th>
<th>ATA/100 IDE</th>
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<tbody>
<tr>
<td>Max. Internal Disk Speed (rpm)</td>
<td>—</td>
<td>—</td>
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<td>—</td>
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<tr>
<td>Hot-Pluggable Internal Disks</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<tr>
<td>RAID Support on Internal Disks</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Max. Internal Storage Capacity (bytes)</td>
<td>120G</td>
<td>120G</td>
<td>60G</td>
<td>60G</td>
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</table>
Table 1: Overview: RLX Server Blades

<table>
<thead>
<tr>
<th>Blade Specifications</th>
<th>ServerBlade 800i</th>
<th>ServerBlade 1200i</th>
<th>ServerBlade 2800i</th>
<th>ServerBlade 3000i</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>External Storage</strong></td>
<td>NAS solution via NetApp</td>
<td>NAS solution via NetApp</td>
<td>NAS solution via NetApp (1)</td>
<td>NAS solution via NetApp (1)</td>
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<tr>
<td><strong>Enclosure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enclosure Model Supported</td>
<td>300ex</td>
<td>300ex</td>
<td>600ex</td>
<td>600ex</td>
</tr>
<tr>
<td>Size of Enclosure</td>
<td>3U</td>
<td>3U</td>
<td>6U</td>
<td>6U</td>
</tr>
<tr>
<td>Max. Number of Blades Supported per Chassis</td>
<td>24</td>
<td>12</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Max. Number of Processors Supported in a Rack</td>
<td>336</td>
<td>168</td>
<td>140</td>
<td>140</td>
</tr>
<tr>
<td><strong>Software Specifications</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Server Management Software</td>
<td>RLX Control Tower</td>
<td>RLX Control Tower</td>
<td>RLX Control Tower</td>
<td>RLX Control Tower</td>
</tr>
<tr>
<td>Remote Management Software</td>
<td>RLX Control Tower</td>
<td>RLX Control Tower</td>
<td>RLX Control Tower</td>
<td>RLX Control Tower</td>
</tr>
<tr>
<td>Provisioning Tool</td>
<td>RLX Control Tower</td>
<td>RLX Control Tower</td>
<td>RLX Control Tower</td>
<td>RLX Control Tower</td>
</tr>
<tr>
<td><strong>Warranty</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard Warranty (2)</td>
<td>One year, on-site, parts and labor with next-business-day response</td>
<td>One year, on-site, parts and labor with next-business-day response</td>
<td>One year, on-site, parts and labor with next-business-day response</td>
<td>One year, on-site, parts and labor with next-business-day response</td>
</tr>
</tbody>
</table>

(1) RLX plans to support Fiber Channel in 3Q03.
(2) Extended warranties are also available from RLX.

Analysis

In the past, customers who required high-performance platforms for compute-intensive applications needed a supercomputer or, at least, a large symmetric multiprocessing (SMP) system to run their application. When additional processing power was needed for the application, the system was “scaled up” with additional processors. Today, clusters of server blades provide an alternative platform for many HPC applications. A cluster of server blades is less expensive than a supercomputer or large SMP system. Customers can “scale out” the cluster by adding more server nodes to the cluster as needed. A cluster of server blades also provides greater flexibility as the customer can add and reconfigure blades, storage and I/O to the cluster as needed. Finally, compute clusters today are often based on industry
standard hardware components and open source (Linux) software, so customers may be able to avoid proprietary implementations that lock them into one vendor.

Traditionally, HPC applications were found only in the realm of scientific and academic computing centers. However, today many of these scientific applications are required to support the business decisions made by companies in industries such as the oil industry and the automotive industry. Thus, business enterprises today may have HPC applications in their data center portfolio.

Within a cluster of server blades, the communications interconnects between the blades and controllers is key to the overall performance of the application. Interconnect choices include, among others:

- Fast Ethernet, supporting bandwidth up to 100 bps, a relatively inexpensive, industry standard interconnect across copper wires
- Gigabit Ethernet, supporting bandwidth up to 1000 bps, also an industry standard interconnect across copper wires
- Scalable Coherent Interface (SCI) switch from Dolphin, supporting bandwidth up to 1.33 Gbps
- Myrinet, a switch-based technology from Myricom supporting a variety of bandwidths including two times Gigabit Ethernet
- Infiniband, a fabric-based technology supporting bandwidths ranging from 2.5 Gbps to 30 Gbps. Products based on Infiniband are slowly becoming available. Intel has backed off from its involvement in Infiniband development, but a number of server vendors have pledged support for this technology.

Not all compute-intensive, parallel applications will be appropriate for a high-performance cluster of RLX server blades. To run well on a high performance cluster, some applications require that the blades communicate extensively among themselves as they process their portions of the application. In a RLX ServerBlade cluster based on 300ex enclosures, communications take place across the two 10/100 Ethernet interfaces found on each server blade. This relatively slow interface limits the number and type of compute-intensive applications that are appropriate for an RLX 300ex-based cluster to just those that have low to moderate parallel requirements. The RLX 600ex enclosure provides faster interconnects and so may be appropriate for a wider range of HPC applications.

The turnkey solutions provided by RLX provide convenience of ordering and ease of deploying for customers, but the product combinations in these solutions are not unique to RLX. Platform Computing’s LSF compute cluster management product, for example, is supported on server blades from Dell, IBM, HP and others, in addition to RLX Technologies. BLAST distributions are available from a variety of sources including free open source. What makes the RLX turnkey solutions stand out is the focus and experience that RLX provides in the market for high-performance compute clusters. While many other server blade vendors target their products primarily for “edge of network” applications, such as Web serving and security/firewall, RLX has directed its resources and skills at understanding and fulfilling the requirements of compute cluster customers.

### Pricing

<table>
<thead>
<tr>
<th>Product</th>
<th>List Price (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ServerBlade 800i with one 800MHz processor, no memory, no disk</td>
<td>989</td>
</tr>
</tbody>
</table>

_Gartner Research_  
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Table 2: Pricing: RLX Technologies Server Blades

<table>
<thead>
<tr>
<th>Product</th>
<th>List Price (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server Blade 1200i with one 1.2GHz processor, no memory, no disk</td>
<td>1,241</td>
</tr>
<tr>
<td>Server Blade 2400i with two 2.8GHz processors, no memory, no disk</td>
<td>3,373</td>
</tr>
<tr>
<td>Server Blade 3000i with two 3GHz processors, no memory, no disk</td>
<td>4,398</td>
</tr>
<tr>
<td>300ex Chassis</td>
<td>2,464</td>
</tr>
<tr>
<td>600ex Chassis</td>
<td>4,497</td>
</tr>
<tr>
<td>256MB memory</td>
<td>150</td>
</tr>
<tr>
<td>512MB memory</td>
<td>300</td>
</tr>
<tr>
<td>40GB hard disk drive</td>
<td>200</td>
</tr>
<tr>
<td>Control Tower 4</td>
<td>149</td>
</tr>
</tbody>
</table>

GSA Pricing
No.

Competitors

Dell

Dell offers one server blade product, the PowerEdge 1655MC, which is housed in the PowerEdge 1655 Enclosure. The 1655MC supports one or two Pentium III processors at either 1.26GHz or 1.4GHz. Each blade supports up to 144GB of internal Small Computer Systems Interface (SCSI) storage. External storage may be Dell’s own PowerVault or EMC’s NAS storage products. The 1655’s enclosure is 3U in height and can hold up to six blades, for a total of 168 processors in an industry standard rack. A keyboard/video/mouse (KVM) switch is available so that the administrator can interact hands-on with the server blades.

By partnering with supercomputer manufacturer Cray, Inc., and with interconnect manufacturer Myricom, Inc., Dell has developed clustered configurations of its PowerEdge 1655MC server blades for high-performance computing clusters. These clusters run Red Hat Linux, and Dell recommends the message-passing interface from MPI Software Technology, Inc.

HP

HP’s family of server blades, labeled the ProLiant BL servers, includes two categories: the e-Class and p-Class. The e-Class currently contains just one model, the ProLiant BL10e, while the p-Class includes the ProLiant BL20p, the BL20p G2 (that is, the second generation of the BL20p) and the BL40p. The ProLiant BL10e is a uniprocessor server blade utilizing an ultra-low voltage version of the Pentium III processor from Intel. The p-Class models support Intel Xeon processors. The ProLiant BL20p and BL20p G2 support up to two processors, while the ProLiant BL40p supports up to four processors.

To house the server blades, HP offers the e-Class Server Blade Enclosure for the e-Class blades and the p-Class Server Blade Enclosure for the p-Class blades. These enclosures measure 3U and 6U in height, respectively. The 3U, e-Class enclosure can hold up to 20 of the ProLiant e-Class BL10e server blades, for a maximum of 280 processors in a rack. The p-Class enclosure measures 6U. It can support eight of the ProLiant BL20p or BL20p G2 server blades, or two of the ProLiant BL40p server blades. An industry
standard rack could house up to six p-Class Server Blade Enclosures for a total of 48 dual-processor blades or 12 four-processor blades in a rack.

IBM

IBM's chassis for its server blades, called the BladeCenter, is 7U high and can house 14 blades. The blades themselves, called BladeCenter HS20s, are hot-swappable. These blades support one or two Xeon processors operating at either 2.0GHz or 2.4GHz. Memory ranges from 512MB to 8GB per blade. IBM Director software is used to manage the BladeCenter and its blades. An optional module of IBM Director, called the Remote Deployment Manager, helps customers to deploy new blades quickly. IBM Director and Remote Deployment Manager are supported on both Windows and Linux operating systems.

IBM also offers a prepackaged cluster of blades, called the IBM eServer 1350. The 1350 cluster can contain IBM Blade Center HS20 server blades or more traditional Intel-based, rack-mounted servers from IBM. In fact, a combination of IBM server blades and rack-mounted servers can be combined in one 1350 cluster. The 1350 cluster requires a specialized 42U rack available from IBM. The cluster is managed with IBM’s Cluster Systems Management (CSM) for Linux, which runs on Red Hat or SuSE Linux distributions. The optional file system in the cluster is GPFS for Linux, a parallel file system that supports compute-intensive clusters of server nodes.

Linux Networx

Linux Networx offers hardware components, software tools, and services and support for high-performance compute clusters. Its Evolocity II (E2) system support up to 50 nodes (or 100 processors) in a 42U rack. Linux Networx systems come standard with Fast Ethernet interconnects, with Gigabit Ethernet, Myricom’s Myrinet or Quadrics’ QsNet interconnects available optionally. Customers may purchase systems and software separately, or they may purchase clustered solutions, which include the hardware, Linux operating system from Red Hat and cluster management tools. Cluster management is provided by Linux Networx’ Clusterworx, which includes configuration and monitoring functions.

Linux Networx and HP have entered into an agreement for HP to resell Linux Networx clustering software for clusters of its ProLiant servers, including Intanium 2-based servers, in the future. At the time this report was written, HP had not yet begun to offer Linux Networx software with its ProLiant BL family of server blades.

RackSaver

RackSaver, Inc., offers server blade products for customers with high-performance compute cluster requirements. Its BladeRack product line includes the following:

- RSC-4432, a 44U cabinet containing 32 server nodes (where each node may be configured with up to two Intel Xeon, Pentium III, or P4 processors or AMD Athlon XP or MP processors) and a choice of dual Ethernet, Gigabit Ethernet, Dolphin SCI or Myrinet interconnects.
- The High density, Interconnected, Vertically cooled, Enterprise cluster (HIVE), a smaller cabinet containing 11 server nodes (where each node may be configured with up to two processors), a choice of Ethernet or Infiniband interconnects.
- RackSwitch, a management tool that provides remote monitoring, power-on and power-off functions via a Linux command line or a Java-based graphical interface.

Strengths

Extreme Density
RLX Technologies Server Blades

With support for up to 336 processors (based on uniprocessor servers) or 140 processors (based on dual processor servers), RLX ServerBlades pack a large amount of processing power in a single rack. Only IBM supports more processors, and more powerful ones, in its BladeCenter.

Comprehensive Suite of Management Tools

The suite of tools in RLX’s ActivManage product set addresses a wide variety of functions that are required in a compute cluster. RLX tools cover performance monitoring, static provisioning, dynamic provisioning and now cluster virtualization through RLX’s new HPC Cluster Manager software. Some competitor’s management tools provide only rudimentary functionality.

Turn-Key Solutions

Cobbling together a cluster for compute-intensive applications can be a cumbersome process. RLX has simplified the startup phase by offering pre-configured turn-key solutions.

Limitations

Limited Cluster Interconnects

RLX products support only Fast Ethernet interconnects between blades, chassis and external I/O and networking. Without support for faster interconnects, RLX products are not appropriate for highly parallel applications.

Most HPC Applications Favor 64-bit Processors

RLX is targeting their server blades for applications requiring high-performance computing clusters, and currently, most of these applications are supported on 64-bit platforms, not the 32-bit processors found in RLX server blades. Therefore, potential customers may find that their application isn’t supported on RLX server blades without rewriting or convincing the independent software vendor (ISV) to port the application to 32 bit. RLX claims that many ISVs are already retooling their applications for the less-expensive 32-bit market, and we agree that more HPC application software will be supported on 32-bit platforms in the next few years.

Insight

RLX Technologies’ ServerBlade products are designed to serve as compute-intensive clusters of high-performance nodes. The slim server blades provide extremely high density in a standard rack environment, and RLX’s management tools provide the wide range of functionality required for high-performance clusters. The relatively slow interconnects found on the RLX s300ex, however, will limit the less expensive RLX solutions to applications with low parallel requirements. The RLX 600ex enclosure and the ServerBlade 2800I and 3000I may be suitable for a wider range of HPC applications. The vendor’s plans to support Infiniband and FiberChannel will make clusters of RLX server blades a stronger platform for HPC applications.