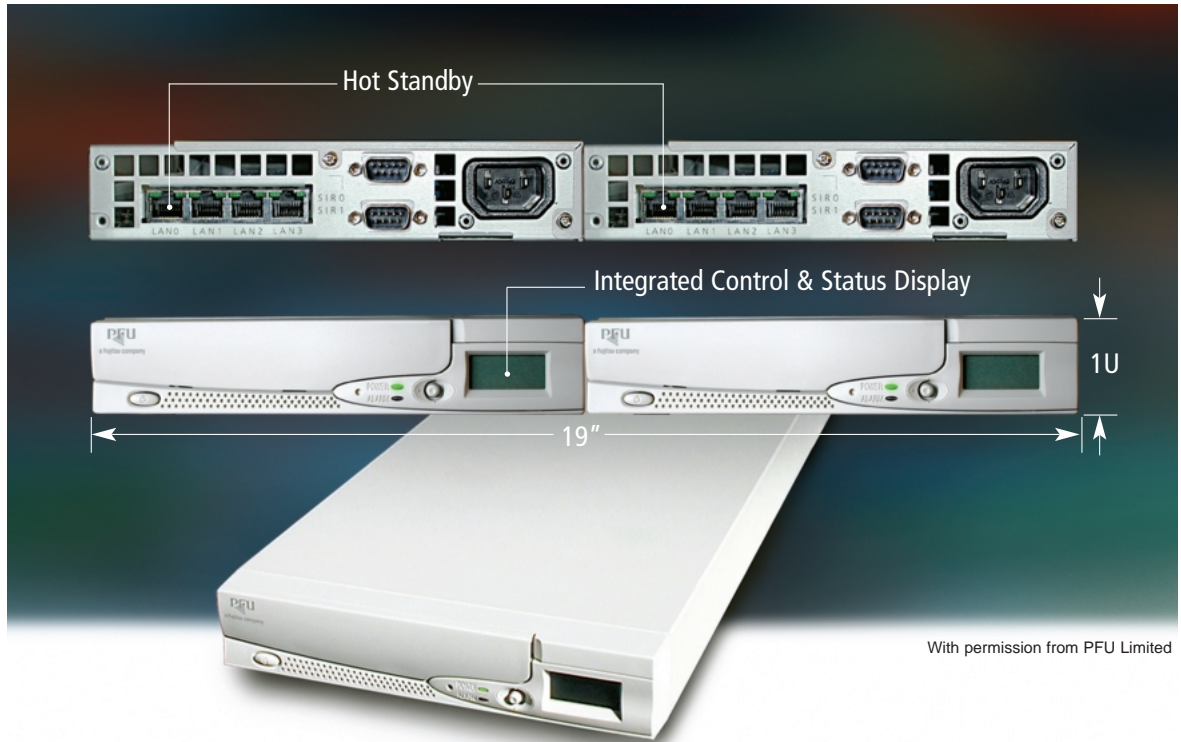


PFU Limited, Japan InterWay High-Density Appliance Server



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The Opportunity

PFU Limited of Japan specializes in high-density appliance server technology and products for the ODM market. Over the last four years general purpose servers have evolved into task specific appliance servers, doing a single task well. However, with increasing demand for network services, Internet Data Centers and Internet Service Providers have seen their needs for appliance servers escalate, while utilization rates are not always fully optimized. This is creating a second evolution in appliance servers, where a device can be instructed to service a specific load on demand, such as firewall protection, virus protection, web serving, e-mail serving, application serving, load balancing, and denial of service monitoring. Thus, balancing the load dynamically over the entire appliance server pool, and realizing a higher return of investment and service quality to the customer. In conjunction with the need to utilize available hardware to the maximum effectiveness, the pressure is also on to provide smaller appliance servers – due to space restrictions – and high-availability. The appliance server business is set to grow from \$2.8B in 2001 to an estimated \$13.7B in 2005 world wide according to IDC. With the InterWay and similar future products, PFU is well positioned to capitalize on this market in Japan with its ability to design appliance server products with tight space constraints in mind.

The Product

The InterWay appliance server is designed in a 1U (1.75-inch) height and half 19-inch rack width form factor. It is capable of functioning as a load balancer, firewall, virus wall, web server, e-mail server, or application server. The device has four 100Base-T Ethernet ports for network connectivity, management, and high-availability. It integrates a CD-ROM drive and power supply within the same chassis. A front panel provides on-site control and status read-outs. A CompactFlash™ slot makes it possible to quickly restore the device from a hard disk crash, while built-in sensors monitor critical factors, such as the internal fan performance, supply voltage swings, and the CPU temperature. The InterWay appliance server can be configured readily with CPU performances ranging from 400MHz to 700MHz, and memory up to 256MB.

The ability to fit two devices into a standard 1U, 19-inch rack provides twice the density possible with other solutions. Two devices can be configured side-by-side with one device in hot standby mode, communicating over an Ethernet port. Thus, making it possible to provide high-availability in half the rack space occupied by competing systems, and extremely suitable for mission critical deployments.

The Challenge

The height and width constraints of the InterWay appliance server posed a real challenge to the designers. The small form factor meant that extra care needed to be taken in terms of cooling. Fans needed to remain small on the one hand, while on the other hand enough airflow needed to be generated to cool CPU and memory sub-systems. The design should allow a single platform architecture to function in a wide range of CPU performances, from 400MHz up to 700MHz. Furthermore, the platform was required to be 1.5 times faster and able to accommodate twice the amount of system SDRAM than the current product generation. Compounding to the difficulties in meeting these tough design criteria was the fact that the design needed to be completed in a record time frame of only four months.

The Solution

The design team was able to meet all the requirements using the PFU Systems 500MHz RazorBlade™ product. It was able to drastically improve the productivity of the designers by avoiding having to design a complete x86 host system from scratch, and to focus resources on other parts of the system design, such as the enclosure, firmware, system monitoring, high-availability and software. The RazorBlade provided the designers with a standardized module-to-board and thermal system interface, across a product line with processor speeds from 400MHz to 700MHz. This made it possible to create a range of high-density appliance server products simultaneously in a short time. An achievement that would have been impossible otherwise.

The X-Bus interface on the RazorBlade allowed the designers to implement inexpensive programmable logic for fan and power supply monitoring and control, and front panel control and status display. The "thermal throttling" feature built into the BIOS of the RazorBlade insures that the RazorBlade cannot be damaged due to a rise of ambient temperatures beyond specified operating temperatures.

The high level of quality assurance standards that the RazorBlade is being manufactured against - with MTBF in excess of 7 years - further contributed to high-availability and reliability of the InterWay device. The standardized module-to-board interface makes it literally a snap to interchange RazorBlade modules, insuring long product life in addition to extended product life warranties of five years.

With the RazorBlade modules measuring only 5.7" x 3" x 0.4" (L x W x H), the design team was able to easily satisfy the requirement for a compact design with a small footprint. This compact footprint allowed the designers to add a CD-ROM drive, a power supply, and a 3.5" HDD instead of a 2.5" HDD for higher capacity, lower cost and higher reliability. The compact footprint also insured that enough room remained inside the InterWay for unobstructed airflow. In combination with the efficient thermal interface of the RazorBlade this resulted in much smaller fans and a smaller power supply than normally found in 1U, 19" rack mounted appliance servers.

"Through the unique features of the RazorBlade we were able to shave-off months of development time and associated costs, meeting the tough space and power criteria of Internet Data Centers and ISPs, and to beat deadlines bringing to market a unique line of high-density appliance servers", said Hiroshi Aoki, product manager, of PFU Limited.

The Alternatives

From the start of the project the designers at PFU had other alternatives, including designing an x86 system service processor module from scratch. PFU recognized early on the savings it would gain by adopting a System-On-Module approach. From further comparison between the RazorBlade and previous designs of appliance server products, the designers early on reached the conclusion that the RazorBlade offered superior features, such as complete and accurate technical documentation, a BIOS designed specifically for system service processor functionality, and a high level of quality with over 7 years of MTBF. The RazorBlade's patented watchdog timer based fail-safe-boot feature makes it virtually impossible to experience system boot failure. And since this feature includes booting from a network boot-server across a LAN, the RazorBlade is the most complete, standard off-the-shelf, high-availability system service processor on the market.

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