



Bharat Petroleum Fuels Growth with VMware for Rapid Application Deployment and Generates Server Consolidation Cost Savings

VMware ESX Server Achieves a 17:1 Server Consolidation, Smooth OS Migration, Shortened Time-to-Market with Faster Testing and Development, and Saves Money with Better Server Utilization

RESULTS

- 17:1 server consolidation ratio
- Created efficient test, development, integration and production environment for in-house applications
- Cut server deployment time from hours to minutes
- Improved CPU utilization rate by 400 percent
- Reduced annual hardware expenditures
- Improved server utilization up to 400 percent
- Speed up application testing and deployment from months to weeks
- Improve time-to-market of B2B and B2C in-house applications
- Saved physical space and cooling costs
- Created scalable infrastructure to support more virtual machines with additional CPUs

Need to Replace Old Servers, Add More Server Resources, Migrate to New Server Operating System and Achieve Centralized Management

Bharat Petroleum Corporation Limited (BPCL), a leading petroleum refining and distribution company is India's second largest company by revenue. This Fortune 500 listed company markets Engine Oils, Gasoline, Liquefied Petroleum Gas (LPG), Kerosene and Industrial Fuels to the domestic and industrial sector. It manages a network of over 5,701 petrol stations and 1,980 LPG distributors across the country.

BPCL is known to be a technology-savvy company with an IT department that was formed in 1964. Today, BPCL has an IT team of more than 200 professionals comprising of ERP, infrastructure, developers and services IT professionals which supports over 5,000 desktop users and 3100 SAP users across 350 locations.

The company was using Intel-based tower servers more than five years old that occupied significant floor space in the data center. Beyond space constraints, it became a challenge to manage the server sprawl. Anil Kumar Kaushik, Deputy General Manager, IIS Infrastructure explains, "Each of our applications was residing on its own dedicated server. There were 17 servers running 17 different applications. We wanted to consolidate all the applications onto a single server.

The company was also rapidly running out of server resources to support its testing and production

requirements. "Each of our in-house developers needed their own server for testing and development, the number kept growing," says Kaushik. "We needed additional storage, RAM and processor speed to meet their requirements."

In August 2002, BPCL started to look for a solution. After an exhaustive search, Kaushik found that VMware ESX Server solution was the only robust and versatile virtual machine technology that would meet his needs, enabling server consolidation, centralized management and rapid application development through virtual machines. Soon after, BPCL looked for a local partner with the expertise and capability to deliver VMware solutions.

VMware ESX Server Proves Its Mettle in Simulation

As part of the selection criteria, Kaushik wanted to ensure that VMware ESX Server could successfully support the Bharat Petroleum's multiple applications and work well in test and production environments. Kaushik emphasizes, "Our department plays a critical role in the company; we are responsible for providing the IT support to the various business units to enable them to carry out their respective activities efficiently and effectively at optimal costs. It is critical to maintain high service levels." Kaushik's team wanted assurance that their solution would support the company's IT infrastructure 24 hours a day, seven days a week, with no extended downtime.

With the help of IBM India, which provided a 4-CPU server for the proof of concept exercise, Kaushik's infrastructure services team attached 100 GB of

"VMware ESX server is a great solution. We definitely recommend to anyone considering server consolidation to go with VMware solutions. It is a revolutionary and proven concept that can drastically reduce TCO. We've used it very successfully in our company."

Anil Kumar Kaushik, Deputy General Manager, IIS Infrastructure



VMWARE ESX SERVER AT WORK

- VMware ESX Server on IBM xSeries 440 single CPU server with 6GB RAM, connected to SAN
- IBM Fast T 900 with two 16-port SAN Switch connected to 3 TB of total storage
- IBM Tivoli Storage Manager Client on Servers for virtual machine backup to IBM LTO Tape Library model no. 3584
- Host Operating system: Windows 2000
- Guest Operating system: Windows 2000 Server
- Production Applications: Domain Controller, Exchange 2000 Server Instant Messaging, IBM Tivoli Gateway Servers, GAAP Application Server with SQL 2000
- Test Applications: IIS and SQL 2000, .Net Server with SQL 2000, IBM WebSphere, Etrust Antivirus 7.0, IBM MQSeries and EAI servers, IBM Tivoli Storage Manager

external storage to VMware ESX server for testing purposes in January 2003. They simulated the interoperability of various applications migration by creating seven virtual machines with Windows 2000 server as the guest operating system, and tested applications such as Domain Controller, Exchange 2000 Server, SQL 2000, Web Server and IIS based application servers.

A group of system administrators and applications developers took one month to rigorously test the system for interoperability between virtual machines as well as physical servers. The proof of concept was successful; VMware ESX server dramatically reduced the set-up time for OS configuration easily supported multiple applications and worked seamlessly with other software applications and hardware devices.

VMware ESX Server Wins over New Fans

Over a two month period, BPCL configured and set-up the ESX Server and migrated the applications in phases to the new server. Explaining the cautious approach, Kaushik says, "Virtualization technology is still a very new concept. To give the team confidence that this really works, we led by example and started the migration of applications residing in servers for the infrastructure group. Once the applications were up and running smoothly, the application and services group began to use it extensively as they saw that the ESX server was working well."

Using ESX server, BPCL now has over 17 virtual machines running on one physical machine, and plans to adopt a scale-up approach by adding more CPUs to further boost the processing power of their IBM X440 server. BPCL's in-house application team runs tests of new B2B and B2C services on the

VMware server. The team also configured a 2-node Microsoft Cluster server on VMware and used it for testing new applications before porting on production cluster server.

More than 50 people in the IT team use ESX server locally and also access it remotely from BPCL's Chennai and Mumbai offices. According to Kaushik, the scalability and robustness of the ESX server is apparent from the number of users accessing virtual machines at any one point in time, which ranges widely from five to 2,000 users, depending on the application.

VMware Enables BPCL to Scale Up With Ease

VMware ESX Server helps BPCL to meet both its business and technical goals, providing benefits including:

- **Server Consolidation.** Currently, BPCL is able to put 17 virtual machines on one server. With additional CPUs and RAM, the server can support up to 30 virtual machines, allowing BPCL to increase server and CPU utilization dramatically. "Overall, server consolidation was a major gain for us," Kaushik says. "It has reduced the population of the standalone test and development servers. We are now able to virtualize our infrastructure to meet changing demands without additional investment."
- **Cost Savings.** "We've reduced the recurring cost for additional servers for items such as annual maintenance, power consumption, administration and manpower," Kaushik says. He estimates total cost savings to be approximately US\$30,000.
- **Ease of Migration and Faster Server Deployment.** VMware software enables the BPCL IT team to be more responsive to business needs.



The migration process was smooth. By creating a master copy of its Windows 2000 server operating system, Kaushik says the IT team was able to dramatically reduce server set-up time from a many hours to few minutes. "We now enjoy great flexibility in creating any number of virtual machines and assigning resources as per the individual requirement without delay," he says. "We use VMware software to dynamically reallocate resources as to meet ad-hoc requirements."

- **Faster Application Testing and Development.**

VMware software gives BPCL the ability to quickly react to changing business needs. "The application developers and testers like the software because we can create a virtual machine immediately for them to work on," Kaushik says. "Before we had ESX Server, it would take up to three months to procure a server. Now, we don't have to wait for the hardware before starting our application development. Once the testing is completed, we migrate the virtual machine application to the actual production server environment." Another benefit is the reusability of the virtual machine resources. Once a testing job is completed, the virtual machine is available for other purposes thereby optimizing server resources.

Future Plans to Optimize Server Utilization with VMware Software

Pleased with the performance of ESX server, Kaushik has plans to add more CPU-processing power to his current server. "Today, we are working in a single CPU environment," says Kaushik. "We are going to test some of the applications in a dual CPU environment. If that works out well, we intend to scale up to 8 CPUs, which gives us greater processing power and performance within the same server.

"This means further savings for us without the need to invest in another standalone server," he adds.

"We also have plans to test Linux on ESX Server and other VMware solutions to discover new ways to maximize our resources. VMware software is definitely the solution of choice for maximum cost savings from server consolidation and for greater flexibility and scalability in rapid application testing and development."

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