

Virtual Machine

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Abstract- The interest in virtualization has been growing rapidly in the IT industry because of inherent benefits like better resource utilization and ease of system manageability. The experimentation and use of virtualization as well as the simultaneous deployment of virtual software are increasingly getting popular and in use by educational institutions for research and teaching. This paper stresses on the potential advantages associated with virtualization and the use of virtual machines for scenarios, which cannot be easily implemented and/or studied in a traditional academic network environment, but need to be explored and experimented by students to meet the raising needs and knowledge-base demanded by the IT industry.

I. INTRODUCTION

The concept of virtual machines was first developed by IBM in the 1960s to provide concurrent, interactive access to a mainframe computer. Each virtual machine is a replica of the underlying physical machine and users are given the illusion of running directly on the physical machine. Virtual machines also provide benefits like isolation, resource sharing, and the ability to run multiple flavors and configurations of operating systems with different set of software technology and configuration..

II. PROPOSED CONCEPT

Virtualization is the single most effective way to reduce IT expenses while boosting efficiency and agility—not just for large enterprises, but for small and midsize businesses too. VMware virtualization lets you:

- Run multiple operating systems and applications on a single computer.
- Consolidate hardware to get vastly higher productivity from fewer servers.
- Speed up and simplify IT management, maintenance, and the deployment of new applications -

Virtualization addresses IT's most pressing challenge the infrastructure problem that compels IT department's big percent of their budget into maintenance, leaving scant resources for business-building innovation. The difficulty stems from the architecture of X86 computers: they're designed to run just one operating system and application at a time. As a result, even small data centers have to deploy many servers. Virtualization software solves the problem by enabling several operating systems and applications to run on one physical server or "host." Each self-contained "virtual machine" is isolated from the others, and uses as much of the host's computing resources as it requires

How Virtualization Works

The heart of virtualization is the "virtual machine" (VM), a tightly isolated software container with an operating system and application inside. Because each virtual machine is completely separate and independent, many of them can run simultaneously on a single computer. A thin layer of software called a hypervisor decouples the virtual machines from the host and dynamically allocates computing resources to each virtual machine as needed.

This architecture redefines your computing equation and delivers:

- 1) Many applications on each server. As each virtual machine encapsulates an entire machine, many applications and operating systems can be run on one host at the same time.
- 2) Maximum server utilization, minimum server count. Every physical machine is used to its full capacity, allowing you to significantly reduce costs by deploying fewer servers overall.
- 3) Faster, easier application and resource provisioning. As self-contained software files, virtual machines can be manipulated with copy-and-paste ease. This brings unprecedented simplicity, speed and flexibility to IT provisioning and management.
- 4) Virtual machines can even be transferred from one physical server to another while running, via a process known as live migration. You can also virtualize business-critical apps to improve performance, reliability, scalability and reduce costs.

Levels of Virtualization

- Server Consolidation- Virtualizing one or two servers is just the beginning. The next step is to aggregate a server cluster into a single consolidated resource.
- Desktop Virtualization- VMware enables you to deliver secure virtual desktops as a managed service for remote and branch office employees. Our virtual desktop solutions increase business flexibility, simplify management and reduce your costs.
- Storage Consolidation- VMware offers an automated, easy-to-deploy solution that virtualizes storage—combining your existing server disks into a shared pool, without the cost and complexity of purchasing a SAN system.
- Software-Defined Data Center -Ultimately, you can attain the full efficiency and agility of cloud computing by virtualizing, pooling and automating all data center resources—servers, storage, networking, security and availability—and tying everything together with policy-based provisioning and automated operations management. The result is a software-defined data center where:
 - Capacity expands and contracts as needed.
 - Applications can be provisioned on-demand.
 - Every application is assured of the right levels of performance, compliance and security.
 - IT can shift resources and budget away from infrastructure management and maintenance, toward creating innovations that give your company an edge.

VMware Advantages



- The most mature, proven, and comprehensive platform. VMware vSphere is fifth-generation virtualization—many years ahead of any alternative. It delivers higher reliability, more advanced capabilities, and greater performance than competing solutions. VMware’s virtualization pre-eminence is recognized universally by analysts and overwhelmingly by the marketplace.
- High application availability. Purchased separately, high-availability infrastructure remains complex and expensive. But VMware integrates robust availability and fault tolerance right into our platform to protect all your virtualized applications. Should a node or server ever fail, all its VMs are automatically restarted on another machine, with no downtime or data loss. Wizard-based guides for ease of installation. VMware’s wizard-based guides take the complexity out of setup and configuration. You can be up and running in one-third the deployment time of other solutions.
- Simple, streamlined management. VMware lets you administer both your virtual and physical environments from a “single pane of glass” console right on your web browser. Time-saving features such as auto-deploy, dynamic patching, and live VM migration reduce routine tasks from hours to minutes. Management becomes much faster and easier, boosting productivity without adding to your head count.

- Higher reliability and performance. Our platform blends CPU and memory innovations with a compact, purpose-built hypervisor that eliminates the frequent patching, maintenance and I/O bottlenecks of other platforms. The net result is best-in-class reliability and consistently higher performance; for heavy workloads.
- Superior security. VMware's hypervisor is far thinner than any rival, consuming just 144 MB compared with others' 3-to-10 GB disk profile. Our small hypervisor footprint presents a tiny, well-guarded attack surface to external threats, for airtight security and much lower intrusion risk.
- Greater savings. VMware trumps other virtualization solutions by providing higher VM density per host—elevating per-server utilization rates. You can run many more applications on much less hardware than with other platforms, for significantly greater savings in capital and operating costs.
- Affordability. VMware is highest in capabilities, but not cost. Our small business packages consolidate more of your applications on fewer servers, with greater performance—delivering the industry's lowest total cost of ownership (TCO).

IV.CONCLUSION

Virtualization can create real world business environment as closely as possible in configuration setting, so that students/professional can interact with technologies just as they would in a work setting. In educational institutions, it is not always possible to provide such laboratory which can provide software as well configuration to each discipline of the institutions; the reality in most institutions is to have shared laboratories, used by different students and disciplines. This problem can be alleviated by the use of virtual machines, allowing each student to build his/her own network experiment, using the appropriate topology, and thus not disturbing the other activities running in the lab [20]. Student(s) who would like to understand for example network protocols or security issues can freely download already pre-built virtual appliances and install the required software to work on their specific projects. The performance study conducted in this paper, although on small scale, shows that there would be no significant performance overhead on a virtual network of host machines and virtual machines

REFERENCES

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- [2] Robert P. Goldberg, "Survey of virtual machine research", *Harvard University* 1974.