

Chapter 2

Application of Virtualization Technology in IaaS Cloud Deployment Model

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ABSTRACT

Virtualization is an old proven technology used for effective utilization of Servers, Storage, and Network for reducing IT expenses without compromising the efficiency and agility for all size businesses. The area of application of Virtualization is very diverse such as e-Learning, Social Networking, and Simulation are a few to be mentioned. This chapter focuses on different virtualization approaches, benefits, architecture of different open source and commercial Virtual Machine Manager (VMM) and Virtual Machines (VM) migration techniques. All the technical terms appearing in this chapter is either defined wherever they appear or explained in the Key Terms and Definitions section of the chapter. The hardware requirements of all the hypervisors are discussed for hassle free implementation and smooth reading of the chapter.

1. INTRODUCTION

Virtualization technology was developed by IBM Corporation by creating several Virtual Machines (VMs) on a single physical mainframe computer. The terminology

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virtualization was introduced by 1960 (R. J. Adair, R. U. Bayles, L. W. Comeau, R. J. Creasy (1966)). During those days only single application could be executed in a computer at a time. To overcome this problem the time-sharing technique was introduced to run several applications simultaneously for effective utilization of computing resources. One major disadvantage of time-sharing approach was the isolation of applications running. Furthermore, in the event of an application develops a hardware error all the applications running was affected. To isolate the application running on a single machine, virtualization technology was introduced (Deka, G. C., & Das, P. K. (2014)).

The creation and management of VMs have been referred to as platform or server virtualization (R. P. Goldberg (1974)). A virtualization system separates the OS from the underlying platform resources. Generally, lots of VMs run on a physical machine; limited by the number of cores, processing power of the CPU and capacity of physical memory (RAM). The Guest OS need not to be in the host machine. The guest systems are capable of accessing hardware devices such as a printer, hard disk drive, network interface card, graphic and audio card and exploiting the interfaces of these devices.

VMM partitions the physical servers into multiple VMs. Multiple VMs can share a single physical server simultaneously from various locations. Each VM represents a complete computing environment with a Processor, Random Access Memory (RAM), Virtual devices, etc.. The OS and other software of the VM does not change after the execution at the remote server.

1.1 Chronology of Virtualization: (Ramses Soto-Navarro, RHCE, 2012)

- 1968: IBM CP-67/CMS for System360 (mainframe).
- 1972: IBM VM/370 (mainframe).
- 1977: IBM OpenVMS (mainframe).
- 1980: PC, Client-server, Distributed computing.
- 1997: Apple Virtual PC for (Macintosh).
- 1998: VMware Technical Patent.
- 1999: VMware Virtual Platform (IA-32, x86).
- 2000: FreeBSD jails.
- 2000: IBM z/VM (mainframe).
- 2001: VMware ESX, VMware Workstation.
- 2003: Xen.
- 2004: Solaris Containers.
- 2004: Microsoft VirtualPC (acquired from Apple), MS Virtual Server.
- 2005: VMware Player.

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