18

*Short Topics in System Administration*

*Jane-Ellen Long, Series Editor*

**Deploying the VMware Infrastructure**

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Authors’ Note: We have changed some names for VMware products from the first printing of this booklet in order to adhere to product name changes that the company has undertaken. These include changes from VirtualCenter to VMware vCenter and from Virtual Desktop Manager to VMware View Manager.

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Contents

Acknowledgments v
Foreword vii

1. Introduction 1
VMware Technology Overview 1

2. What Is Virtualization? 5
Virtual Machines 6
Characteristics of a Virtual Machine 6
Components of the VMware Infrastructure 9
Additional VMware and Third-Party Components 12

3. The Benefits of Infrastructure Virtualization 15
Capital Expense Reduction 15
Operational Expense Reduction 15
Improved Agility 15
Summary of Benefits 16
The Business and Operational Case for Virtualization 16
Return on Investment (ROI) 18
ROI/TCO Calculator 20

4. Use Cases for Virtualization 23
Production Environments 23
Software Test/Development and Testing 23
Disaster Recovery 23
Remote Offices 24
Desktops 24

5. Virtualizing Your IT Infrastructure 25
VMware Server Consolidation Methodology 25
Identifying Virtualization Candidates 26
Conducting a Virtualization Assessment 27
Inventory 27
Application Resource Considerations 27

6. Building a VMware Infrastructure 31
Server Hardware 31
Storage Hardware 33
ESX 34
VMware vCenter Installation 36

7. Managing the VMware Infrastructure 39
VMware vCenter Server 39
Virtual Machine Provisioning 40
Infrastructure Management with VMware vCenter 43
Virtual Machine Deployment 48
Migration of Virtual Machines to Alternate Platforms 49
VMware Update Manager 51
8. Migrating Candidates  53
   VMware Physical-to-Virtual Process  53
   VMware Converter  53
   Third-Party Migration Tools  54
   Considerations for Successful Migrations  54
   Virtual-to-Physical Process  55
   Virtual-to-Virtual Process  55

9. Optimization  57
   ESX Optimization  57
   Virtual Machine Optimization  61
   VMware VMmark  62

10. Disaster Recovery and Security  63
    Backup and Recovery Strategies  63
    Networking Strategies for Disaster Recovery  66
    Security Considerations  67

11. Advanced Capabilities  69
    VMware High Availability  69
    VMware Consolidated Backup  69
    Virtual Machine Snapshots  71
    Site Recovery Manager  72

12. Virtual Desktop Infrastructure  73
    VDI Overview and Planning  73
    Connection Brokering  74
    Vendor-Specific Implementations  76

Appendix. Virtualization Technologies  79
   Operating System Virtualization  79
   Hardware Virtualization  79
   Virtual Machine Monitor  80
   CPU Virtualization  81
   Device Virtualization  82
   Other Forms of Virtualization  82

About the Authors  85
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Thank you to the USENIX Association for inviting me to create and deliver tutorials around VMware virtualization technology for the past few years, and for encouraging the publication of this booklet for the SAGE community. USENIX continues to hold a high standard for both the research and administration aspects of system administration.

This booklet is dedicated to Diane Greene and Mendel Rosenbloom for their leadership, support, and friendship.

This booklet gives you a starting point for understanding the VMware Infrastructure and deploying it for cost reduction, quicker deployments of systems, and better control of resource utilization, as well as datacenter management and high availability. Welcome to VMware Infrastructure.

John Y. Arrasjid
VCP, VMware, Inc.
After years of working in the computer industry, we have come to realize that although almost everything has been done before, approaches to problems have changed.

The evolution in processing power and declining costs has driven many of these changes. In the early days of computing, hardware was expensive. In the 1960s, virtual machines were developed on mainframe computers, notably from IBM, to enable multiple users to share expensive resources. In the 1970s came mini-computers, such as those from Digital Equipment Corporation, which were cheaper and enabled decentralized computing at a departmental level. In both cases, remote terminals accessed these shared systems.

In the 1980s, personal computers (IBM, Apple) and UNIX engineering workstations (Sun, DEC, SGI) further popularized decentralized computing, as microprocessors became faster and cheaper. Instead of having to share a departmental computer, each user had his or her own, and virtual machines became less popular.

In parallel, during the 1980s, graphical user interfaces became popular in PCs. Client-server computing arose as a method to meld interactive local user-interfaces (either on a PC or a thin client) with a central server. The desktop PC architecture evolved into business-class servers, offering inexpensive commodity-based pricing for systems that have many of the capabilities of mini or mainframe computers. Client-server computing faded away as centralized Web-based systems started to take over, and the pendulum started to swing back towards centralized computing.

At the same time, the processors were increasingly underutilized as servers had multiple processors, each with multiple cores, and software demands flagged behind hardware capabilities. The proliferation of computers spread the workload to ever more distributed yet underutilized systems. Even desktop PCs were underutilized, because they also used faster processors.

Systems proliferated, but centralized computing continued to regain popularity as Web-based computing took hold. But unlike the central mainframes of the 1970s, the new model of centralization often consisted of a complex mesh of servers, frequently configured as multi-tiered systems.

Yet these systems were becoming harder to manage. Not only were there more of them, but they came from many vendors (not just IBM anymore), and the pace of change accelerated, which put higher demands on the need to rapidly test and deploy systems. The proliferation of desktop PCs continues to pose complex management problems.

Some concepts from the past have returned to help with this situation. Virtual machines, which were almost forgotten in the 1990s, re-emerged as a method to install and consolidate many server systems into one physical machine. Many virtual machines can run on
one host. Fast networks and CPUs now enable PCs to be hosted as virtual machines in central servers accessed from thin clients, just like the old time-sharing terminals, which improves the manageability of desktop computing. Complex, multi-tiered systems can be tested and deployed using virtual machines, which helps bring a wide array of configurations to the fingertips of developers, with no need to configure them by hand. Virtual machines present a common platform that simplifies software distribution for software developers—this helps tame the headaches of software installation and returns us to the simplicity of the “good old days” when there were few target platforms to worry about. Finally, the rise of Web-based systems has led to another reason to move back to the datacenter: cloud computing. Virtual machines offer a great solution for treating an entire cluster of servers as a single shared resource, sliced and diced according to the computing needs of the moment, not unlike the central mainframes of the past.

For the first-time user of virtualization, John Arrasjid and his co-authors have outlined and discussed the world of virtualization in layman’s terms. Along with explaining how virtualization can be applied to today’s businesses, they have shown how incredible the return on investment can be in terms of resource utilization and staff productivity. For Privacy Networks, as a software company, the ability to use virtualization has increased our sales-demo capabilities, engineering test productivity, and deployment of email archiving software for customers as a virtual appliance in a VMware environment. I (Todd Massey) am continually amazed at the uses we come up with for virtualization in our company. As you learn more about deploying enterprise-class virtualization, think outside the box—for business today, virtualization can increase productivity in ways that seem almost limitless.

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