EXAM CRAM

The Smart Way to Study™

VCP-310 Exam

VCP

VMware Certified Professional

Elias N. Khnaser

VCP Exam Cram, VMware Certified Professional

Copyright © 2009 by Que Publishing

All rights reserved. No part of this book shall be reproduced, stored in a retrieval system, or transmitted by any means, electronic, mechanical, photocopying, recording, or otherwise, without written permission from the publisher. No patent liability is assumed with respect to the use of the information contained herein. Although every precaution has been taken in the preparation of this book, the publisher and author assume no responsibility for errors or omissions. Nor is any liability assumed for damages resulting from the use of the information contained herein.

ISBN-13: 978-0-7897-3805-9
ISBN-10: 0-7897-3805-8

Library of Congress Cataloging-in-Publication Data

Khnaser, Elias N.

VCP exam cram : VMware certified professional / Elias Khnaser.— 1st ed.

p. cm.

ISBN 978-0-7897-3805-9 (pbk. w/cd)

1. Electronic data processing personnel—Certification. 2. Virtual computer systems—Examinations—Study guides. 3. VMware. I. Title.

QA76.3.K498 2009

005.4'3—dc22

2008044885

Printed in the United States of America

First Printing: December 2008

Trademarks

All terms mentioned in this book that are known to be trademarks or service marks have been appropriately capitalized. Que Publishing cannot attest to the accuracy of this information. Use of a term in this book should not be regarded as affecting the validity of any trademark or service mark.

VMware, the VMware "boxes" logo and design, Virtual SMP, and VMotion are registered trademarks or trademarks (the "Marks") of VMware, Inc. in the United States and/or other jurisdictions. You are not permitted to use the Marks without the prior written consent of VMware.

Warning and Disclaimer

Every effort has been made to make this book as complete and as accurate as possible, but no warranty or fitness is implied. The information provided is on an "as is" basis. The author and the publisher shall have neither liability nor responsibility to any person or entity with respect to any loss or damages arising from the information contained in this book or from the use of the CD or programs accompanying it.

Bulk Sales

Que Publishing offers excellent discounts on this book when ordered in quantity for bulk purchases or special sales. For more information, please contact

U.S. Corporate and Government Sales
1-800-382-3419
corpsales@pearsontechgroup.com

For sales outside of the U.S., please contact

International Sales
+1-317-581-3793
international@pearsontechgroup.com

Associate Publisher
David Dusthimer

Acquisitions Editor
Betsy Brown

Development Editor
Andrew Cupp

Managing Editor
Patrick Kanouse

Senior Project Editor
Tonya Simpson

Copy Editor
Chuck Hutchinson

Indexer
Ken Johnson

Proofreader
Water Crest Publishing

Technical Editors
Chris Huss
Joseph Noga
Thomas Reich

Publishing Coordinator
Vanessa Evans

Book Designer
Gary Adair

Composition
Gina Rexrode

Preface

Virtualization is one of the hottest topics in the tech industry today. The leader in the virtualization space at the present time is without a doubt VMware with its virtual infrastructure offering. As VMware software began to take its place in the data center and demand respect in the industry, the need for a certification path became clear. Such a certification separates those who have studied the technology and can apply it at a professional level from those who have just installed it and started messing with it. I am a big believer that there is no alternative to studying a technology thoroughly. There is only so much you can learn from installing it and using it in only a few specific circumstances, because that exposes you only to limited features and obscures you from harnessing the full potential of the software by leveraging features you probably never knew existed. For this reason and many more, I am a strong believer that you should study the software, learn it, and then use it hands on as much as possible. It is by doing this that you truly master the software.

When you have studied and understand a software, taking a certification exam becomes relatively easy. For example, if you've thoroughly studied, you know that the maximum amount of physical memory that ESX 3.5 supports is 256GB. However, someone who just installs the software and starts using it may not know this because the software installation does not require this knowledge at the time of installation.

This book aims to present the information you need to recap and reinforce your existing knowledge of VMware Infrastructure 3 and properly prepare you to confidently take the VCP-310 exam. The book is structured in a way to help you with your final exam preparation and contains enough information to make it a true test preparation book, but in a concise manner.

Introduction

Welcome to the *VCP Exam Cram*. The purpose of this book is to properly prepare you and equip you with the needed knowledge to successfully sit and pass the VCP-310 exam. Here, we provide a general overview of the VMware certification program and discuss how this *Exam Cram* book will help you reach your goals of becoming certified.

This book, as with its predecessors in the *Exam Cram* family of certification books, concentrates on reinforcing your knowledge of the subject matter at hand and preparing you to sit the exam. That being said, this book will not teach you everything there is to know about the technology because this is not its primary purpose. We instead concentrate on the material that is most likely to appear on the test.

Before you dive in head first into the information provided, we recommend you take the self-assessment that immediately follows this introduction. This self-assessment will help you evaluate your knowledge of the VMware material both in the real world and under ideal exam circumstances.

Based on the results of the self-assessment, you may feel that additional education is necessary. Numerous resources are available, including

- Official VMware-authorized training. VMware Infrastructure 3: Install & Configure V3.5 is the ideal course for the VCP exam.
- VMware product documentation and technical white papers are available at http://www.vmware.com.
- VMware VI3: ESX Server 3.5 & VC 2.5 Training DVD by Elias Khnaser goes in depth on the subject matter and is a great way to learn again and again at your own pace. See http://www.eliaskhnaser.com.
- Other books, including *Mastering VMware Infrastructure 3* by Chris McCain, are also excellent resources on the subject.

Although reading a book is an excellent way of learning, we strongly recommend that you take the knowledge you acquire from book learning and use it to install and configure VMware ESX Server and VirtualCenter. Hands-on experience is imperative not only to your successful completion of the exam, but also to your successful endeavors in properly implementing and maintaining an ESX environment.

About the VMware VCP Program

The VMware VCP program was designed to allow candidates to demonstrate their expertise with the software by completing certain requirements and passing an exam. The program is open to any individuals who complete the requirements. There are many advantages to becoming VCP certified. For some, it will be for career advancement; for others, it will be to become VMware partners, and so on.

The requirements set forth by VMware on becoming a VCP are as follows:

- Attend a VMware authorized course. These instructor-led courses provide a great learning method and hands-on exposure to the product.
- Gain hands-on experience with the product.
- Sit and pass the VCP-310 exam to demonstrate your expertise on the matter.

VMware also provides various documents on its website that help you gain a better understanding of the topics that you will be challenged on during the exam. I would like to single out the VI3 Exam blueprint as a great reference for the exam.

Taking a VMware Certification Exam

As of this writing, VMware Education requires you to attend a VMware-authorized training class to fulfill your eligibility on becoming a VMware Certified Professional (VCP). After you have attended the VMware-authorized class and have completed your preparations for taking the exam, you need to register at a VMware testing center in your area. Currently, all VMware certification exams are administered by Pearson VUE. You can register online at http://www.pearsonvue.com/vmware or by calling 1-800-676-2797 in the United States and Canada. Outside the Americas, please consult the Pearson VUE website for contact information in your region of the world.

The VCP-310 exam costs $175 USD and must be booked at least 24 hours in advance. You may reschedule your exam up to 24 hours before the date you intend on taking it. Cancellation may be subject to a fee, so please consult the Pearson VUE website for more details on the policy.

When scheduling the exam, you need to provide personal identification to validate your identity, the name and number of the exam you want to take, and a method of payment. Online registration requires the creation of a personal

account with Pearson VUE; this account will track all the exams you have taken, with the result of the exam in the form of a pass/fail. Your account will also be used for all future tests you want to take that are administered by Pearson VUE. On the day of the exam, you must provide appropriate identification to verify your identity. Typically, two forms of identification are required, with one of them being a photo ID.

Plan to arrive at the exam location at least 10 to 15 minutes early so that you can fill out any last-minute forms, be seated, relax, and prepare prior to the start of the exam. All VMware exams are completely closed book. No study aids—or anything else for that matter—are permitted into the testing area. This includes coats, bags, or purses, all of which must be left with the administrator before entering the room. The best advice is to bring as little as possible with you to the test facility.

In the test room, the administrator logs you in to your exam, verifying that your user ID and exam number are correct. After you review the introduction information, the exam begins.

The VCP-310 VMware Certification exam has 75 questions, and native English speakers have 105 minutes to complete the exam. Non-English speakers have an additional 30 minutes, for a total of 135 minutes. The testing application is Windows based and presents a single question per screen. On the top right, you will find the time and number of questions remaining.

Questions are typically multiple choice, and the difficulty level varies from question to question. You can expect the following:

- **Select the correct answer:** With these types of multiple-choice questions, you are asked to choose the one correct answer that most appropriately answers the given question. In some situations, different answers may be correct under slightly different configurations, so make sure you read the question carefully and answer it according to what is asked in the specific question.
- **Select all that apply (or don't apply):** These types of questions ask you to select all the answers listed that correctly apply to the question given. None of the answers to all of them may apply, so be sure to read these types of questions carefully. In many cases, subtle wording has been purposely used to trip up those who aren't paying attention. Partial credit is not given for these types of questions. Unless the correct answer is given, you receive no credit for the question.
- **True or False:** These types of questions present you with the option to agree with the statement in the question or refuse it. Read the question carefully and choose true or false.

When your test is scored, no added penalty is given for a wrong answer compared to a giving no answer at all, so answering every question asked is worthwhile even if you are not sure and must guess. To the best of its ability, VMware has attempted to make the questions as fair as possible and to ensure that all questions have a single correct answer. Of course, mistakes do happen, and a "poor" question may find its way onto your test, presenting you with a poorly worded or ambiguous question that may not have a clearly correct answer.

In this situation, the best thing to do is to answer the question to the best of your knowledge. You are not allowed to leave the test area with any written exam questions or notes or any kind of information, so you are not able to write down the question for later review. Clearly, you can contact VMware regarding a particular ambiguous question so that it may be corrected on future tests, but you should not expect that your exam will be rescored because of a single question. If you have properly and adequately prepared for the exam, a single question will have no bearing on whether you pass or fail.

After you complete the exam, the testing software responds with your score after a few seconds and informs you whether you have passed or failed. The VCP-310 exam requires a minimum score of 75% to pass the exam.

If you don't pass the exam, the key point is not to become discouraged. We have all had days when things just didn't quite go as well as we had hoped. Take some time after the exam to review areas where you struggled during the test. Maybe a particular area caught you by surprise, or you felt you had a stronger handle on it than you actually did. The best method in this situation is to return as soon as possible to the study process and brush up on your weak areas in preparation for another exam attempt.

You can reschedule a new test through Pearson VUE as soon as available if you so choose. We recommend that you schedule time sooner rather than later so that material that you have already studied is still fresh in your mind. You are required to pay the full fee to take the test again.

How to Prepare for the Exam

Preparing for the VCP exam, as with any other technical exam, requires that you dedicate time to both acquiring and studying directly related material to the VCP-310 exam. To pass this exam, you are expected to know the different components and technologies that make up the VMWare Infrastructure 3 suite, which includes intimate knowledge of both ESX Server 3.5 and VirtualCenter 2.5.

NOTE

There is significant information to absorb and go through that is required for you to pass the VCP-310 exam. Therefore, if your plan is to study the night before or a few days before the exam, don't expect to be fully prepared on the day of the exam.

The following is a general list of material that can be helpful in preparing you for the VCP-310 exam:

- This *Exam Cram* book, which provides you with a concise and thorough review of the material considered vital to your exam-taking success. This book serves as a supplement to reinforce your knowledge of the technology.
- VMware ESX Server 3.5 and VirtualCenter 2.5 evaluation kits from VMware. By acquiring an evaluation of the software, installing it, and getting intimately familiar with it, you are training yourself hands on, and this knowledge is extremely valuable as you learn better as you do things. This step also takes you from the theoretical to the practical.
- VMware-authorized training course. The instructor-led four-day class enables you to focus your training on a mixture of lecture and hands-on labs. The instructor-led class is filled with valuable information and helpful labs and is sure to prime you for the VCP exam in addition to its being a requirement for fulfilling the VCP requirements.
- VMware Infrastructure 3 Training DVD from http://www.eliaskhnaser.com is a great way to learn, reinforce existing knowledge, or simply have handy as a reference any time you need it. The DVD is filled with information and goes beyond the VCP-310 requirements. It is a study-at-your-own-pace training course.
- Exam preparation tests from respectable vendors. Getting accustomed to the types of questions that are asked on the VCP exam is extremely helpful; you will find that VMware has some sample questions on its website. You may also find certification exam vendors that sell respectable preparation tests.

What This Book Will Do

This book is designed to be read as a pointer to the areas of knowledge you will be tested on. In other words, you might want to read the book one time just to get insight into how comprehensive your knowledge of this topic is. The book is also designed to be read shortly before you go for the actual test. We think you can use this book to get a sense of the underlying context of any topic in the chapters or to skim-read for Exam Alerts, bulleted points, summaries, and topic headings.

We have drawn on material from VMware's own listing of knowledge requirements, from other preparation guides, and from the exams themselves. We have also drawn from a battery of technical websites, as well as from our own experience with VMware ESX Server and the exam. Our aim is to walk you through the knowledge you will need.

What This Book Will Not Do

This book will *not* teach you everything you need to know about VMware Infrastructure 3 and ESX Server 3.5. The scope of the book is exam preparation. The book is intended to ramp you up and give you confidence heading into the exam. This book reviews what you need to know before you take the test, with its fundamental purpose dedicated to reviewing the information needed on the VMware certification exam.

This book uses a variety of teaching and memorization techniques to analyze the exam-related topics and to provide you with everything you need to know to pass the test.

About This Book

We suggest that you read this book from front to back. You will not be wasting your time because nothing we have written is a guess about an unknown exam. We have had to explain certain underlying information on such a regular basis that we have included those explanations here.

After you have read the book, you can brush up on a certain area by using the index or the table of contents to go straight to the topics and questions you want to re-examine. We have tried to use the headings and subheadings to provide outline information about each given topic. After you have been certified, we think you will find this book useful as a tightly focused reference and an essential foundation of VMware Infrastructure 3 configuration and management.

How to Use This Book

Each *Exam Cram* chapter follows a regular structure, along with graphical cues about especially important or useful material. The structure of a typical chapter is as follows:

- **Opening hotlists:** Each chapter begins with lists of the terms you need to understand and concepts you need to master before you can be fully conversant in the chapter's subject matter. We follow the hotlists with a few introductory paragraphs, setting the stage for the rest of the chapter.
- **Topical coverage:** After the opening hotlists, each chapter covers the topics related to the chapter's subject.
- **Exam Alerts:** Throughout the text, we highlight material most likely to appear on the exam by using a special Exam Alert that looks like this:

EXAM ALERT

This is what an Exam Alert looks like. An Exam Alert stresses concepts, terms, or best practices that will most likely appear in one or more certification exam questions. For that reason, we think any information presented in an Exam Alert is worthy of unusual attentiveness on your part.

  Even if material is not flagged as an Exam Alert, *all* the content in this book is associated in some way with test-related material. What appears in the chapter content is critical knowledge.

- **Notes:** This book is an overall examination of ESX Server configuration, management, and troubleshooting. As such, we delve into many aspects of computer networks. Where a body of knowledge is deeper than the scope of the book, we use notes to indicate areas of concern.

NOTE

Cramming for an exam will get you through a test, but it will not make you a competent professional. Although you can memorize just the facts you need to become certified, your daily work in the field will rapidly put you in water over your head if you do not know the underlying principles.

- **Tips:** We provide tips that will help you to build a better foundation of knowledge or to focus your attention on an important concept that reappears later in the book. Tips provide a helpful way to remind you of the context surrounding a particular area of a topic under discussion.

TIP

This is how tips are formatted. Keep your eyes open for these, and you'll become an ESX Server guru in no time!

- **Practice questions:** This section presents a short list of test questions related to the specific chapter topic. Following the questions are explanations of both correct and incorrect answers. The practice questions highlight the areas we found to be most important on the exam.

The bulk of the book follows this chapter structure, but we would like to point out a few other elements:

- **Practice Exams:** The book has two practice exams so you can practice on all the exam topics.
- **Practice Exam Answer Explanations:** Each practice exam is followed by an answer key that includes thorough explanations to each question so you know why you got it wrong or right.
- **Glossary:** Near the back of the book is an extensive glossary of important terms used in this book.
- **Cram Sheet:** This feature appears as a tear-away sheet inside the front cover of this *Exam Cram* book. It is a valuable tool that represents a collection of the most difficult-to-remember facts and numbers we think you should memorize before taking the test. Remember, you can dump this information out of your head onto a piece of paper as soon as you enter the testing room. These are usually facts that we have found require brute-force memorization. You need to remember this information only long enough to write it down when you walk into the test room. Be advised that you will be asked to surrender all personal belongings other than pencils before you enter the exam room itself.

  You might want to look at the Cram Sheet in your car or in the lobby of the testing center just before you walk into the testing center. The Cram Sheet is divided under headings, so you can review the appropriate parts just before each test.
- **CD:** The CD features an innovative practice test engine so you can practice taking the exam electronically. See Appendix B, "What's on the CD-ROM?," for more details.

CHAPTER 8

VMware Infrastructure Security and Web Access

Terms you'll need to understand:

- ✓ Roles
- ✓ Privileges
- ✓ vpxuser
- ✓ Web Access
- ✓ Generate Remote Console URL

Concepts and techniques you'll need to master:

- ✓ What a role is and how to create it and assign users and groups to it
- ✓ How to assign permissions to objects in the inventory
- ✓ The difference between VirtualCenter security and ESX Server security
- ✓ The limitations of Web Access

With great power comes great responsibility. Your responsibility is to make sure that the virtual infrastructure you have deployed is secure and that role-based access has been implemented so that the right users have the necessary security permissions to perform their daily tasks. This chapter is dedicated to security in VMware Infrastructure.

VI Security Model

The VMware Infrastructure security model consists of both VirtualCenter security and ESX Server security. The security model revolves around users and groups that are assigned *roles*. These roles constitute a collection of rights or *privileges* to perform certain tasks.

Users, Roles, Privileges, and Permissions

The cornerstones of the VMware Infrastructure (VI) security model are the users, groups, roles, privileges, and permissions that you can assign at different levels and to different objects within your infrastructure. Properly configuring and assigning these rights and permissions enables you to enforce accountability. Taking a closer look at each of these cornerstones helps you better design your security solution:

- **User and group:** An account that is allowed to log in to the VMware infrastructure. A group is a collection of accounts with rights to log in and perform other tasks within the VMware Infrastructure.
- **Role:** A collection of privileges that a user or group is allowed to perform.
- **Privilege:** An allowed action or function within a role. In other words, a privilege allows a user or group to perform a certain task.
- **Permission:** A right assigned to an object in the inventory and grants a user or group the right to interact with that object according to selected roles and privileges.

NOTE

You can choose from about 100 preconfigured privileges.

Working with Roles

Familiarizing yourself with roles is an imperative task of building your access control into the Virtual Infrastructure. To help you get started, Table 8.1 shows a set of default roles available to you.

Table 8.1 Default Roles

Default ESX Roles	Default VirtualCenter Roles	Custom Roles
No Access	No Access	User-created roles
Read-Only	Read-Only	
Administrator	Administrator	
	Virtual Machine Administrator	
	Datacenter Administrator	
	Virtual Machine Power User	
	Virtual Machine User	
	Resource Pool Administrator	
	VCB User	

The easiest way to get to the Roles panel is to log in to ESX Server or VirtualCenter using your VI client. Click the Administration tab and then the Roles tab, as shown in Figure 8.1.

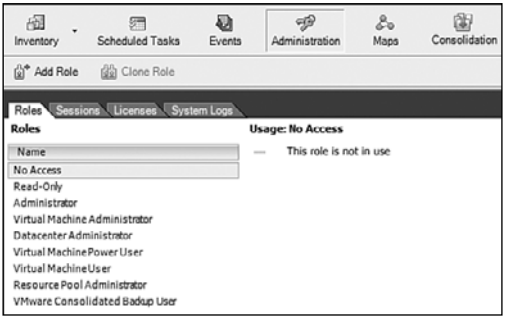

FIGURE 8.1
Roles panel.

EXAM ALERT

The VCP exam is sure to quiz you on the difference between the ESX host roles and the VC Server roles, so make sure you know which roles belong where.

On the Roles panel, you can right-click any role and edit it. However, we recommend that you maintain the integrity of the existing roles and create your own custom roles if the need arises. To do so, you can right-click anywhere in the Roles pane and click Add to start the new role creation, as shown in Figure 8.2.

NOTE

Custom roles cannot be shared between ESX Server and VirtualCenter.

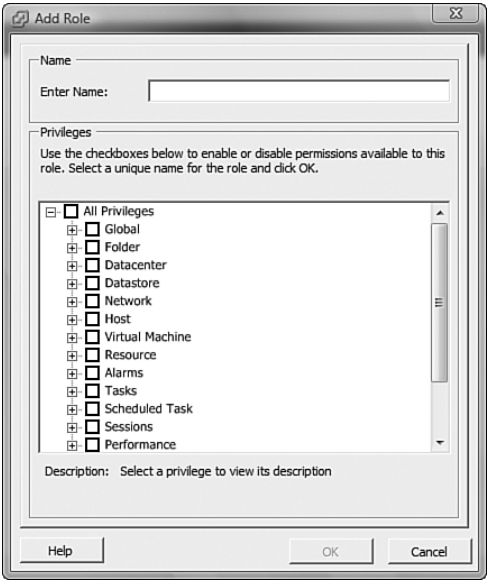

FIGURE 8.2
Add new role.

Assigning Permissions

After you have crafted the appropriate roles for your environment, it is time to apply them to the right inventory object to allow your users and groups access only to the part of the inventory tree that you want them to have access to. To apply permissions, find the object in the tree on which you want to implement security, right-click it, and select Add Permission. This brings you to a screen similar to the one shown in Figure 8.3 that allows you to choose a user or group and assign the corresponding role that you want the user or group to have for this inventory object.

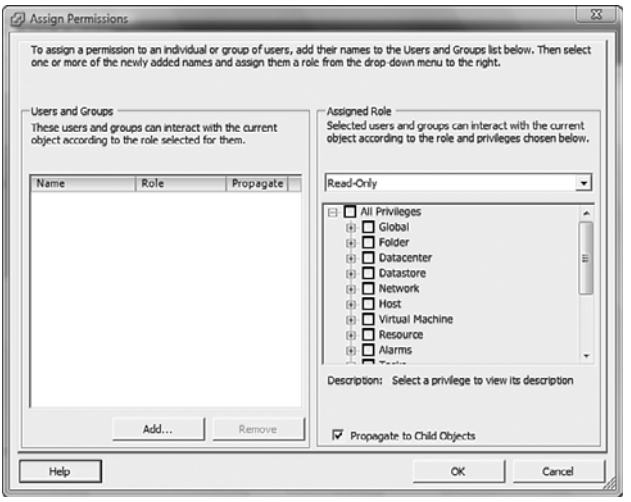

FIGURE 8.3
Assign permissions.

When assigning permissions, you may choose to have these permissions propagate from the object where the permission originated and downward to all the child objects. To do this, simply place a check mark in the check box next to Propagate to Child Objects, as shown in Figure 8.3.

If a conflict arises when assigning permissions, the most restrictive of the permissions takes precedence. For instance, if a user is part of a group in the Administrator role but the user is explicitly assigned a Read-Only role on a particular object, the most restrictive of the permissions takes precedence, thereby allowing the user only Read-Only permissions to the object. Keep in mind though that if permissions do not propagate down to any child objects, the user has Read-Only permission over the object but has full permissions over the child objects. The reason behind this is Propagate permissions is not enabled, which means you are slapping explicit permissions on this object only, but not its child object. The child objects in this case inherit the permissions given to the user's group.

EXAM ALERT

Knowing how permissions are applied and the precedence of permissions are topics that are sure to come up on the exam.

When explicitly assigned, permissions take precedence and the most restrictive permissions are enforced.

VirtualCenter Security

VirtualCenter is a Windows-based application to be installed on a Windows-based operating system. It has two types of directory repositories to select from:

- **Local:** If VirtualCenter is installed on a Windows server that is part of a workgroup, the users and groups that are local members of this server can be configured to have access in VirtualCenter.
- **Domain:** If VirtualCenter is part of an Active Directory domain, in addition to the ability to configure local users and groups, you can also configure users and groups from Active Directory.

By default, the local Administrators group is assigned the Administrator role at the top of the inventory list in VirtualCenter. If the VC server is member of a domain, the Domain Admins group is also added by default.

ESX Server Security

The ESX Server security revolves around the Service Console, and because the Service Console operating system is based on Red Hat Linux, the users and groups that you find in the ESX Server are Linux users and groups. These users and groups can be configured to grant direct access to an ESX host.

NOTE

ESX Server users and groups do not sync and cannot be used to assign roles and privileges in VirtualCenter.

TIP

Do not configure permissions using ESX users and groups. The reason behind this is the permissions you assign on a per ESX Server level do not propagate to other ESX hosts; therefore, using a common users and groups directory makes it easier to manage permissions.

By default, the following users are assigned the Administrator role in ESX Server:

- *root* is the equivalent of the administrator in the Windows world and is the highest user account that is created by default.
- *vpxuser* is added to the Administrators group in ESX after the ESX Server is joined to VirtualCenter. VirtualCenter uses this user to authenticate itself to the ESX host to send preapproved commands.

While the vpxuser is used to authenticate VirtualCenter to ESX Server and pass preapproved commands, the root account actually executes these commands. So in this case, the vpxuser acts merely as a secure bridge between VirtualCenter and the ESX host, while the root user account is tasked with executing VirtualCenter tasks.

Web Access

Web Access is designed to allow you to manage virtual machines from anywhere without requiring special software to be installed on the host from which you are trying to connect. Web Access is not as robust or feature friendly as the VI client, and it allows for limited functionality but can be useful when you need to perform certain tasks from a machine that does not have the VI client installed or if you need to pass an administrative tool with limited features to a group like the helpdesk, for example.

To access Web Access, you need to point your Internet browser to either the IP address or fully qualified domain name (FQDN) of your ESX host or your VirtualCenter Server. If you point to your ESX host, you are able to manage virtual machines that are on this host only. If you log in to VirtualCenter Web Access, you are able to manage all your VMs.

After logging in to Web Access, you can select any VM in the list and you are able to perform the following tasks, shown in Figure 8.4:

- Enumerate VMs
- Launch console access to a VM
- Manipulate all power functions against a VM
- View a VM's status
- Edit VM configuration

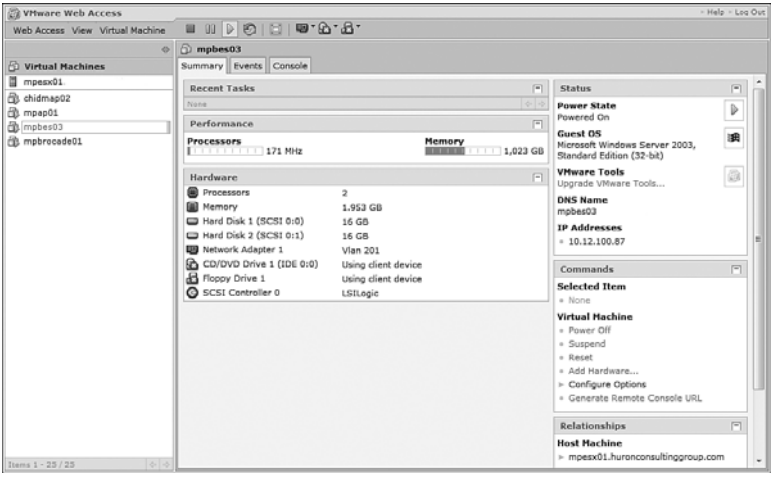

FIGURE 8.4
Virtual machine Web Access view.

EXAM ALERT

The exam will surely challenge your knowledge of the difference between Web Access and the full VI client. Know the limitations of the Web Access compared to the full VI client.

CAUTION

You cannot create VMs from Web Access; this function requires the VI in order to be completed.

NOTE

To launch a VM's console from Web Access, you need to have installed the VMware Virtual Infrastructure plug-in in your browser.

Web Access Minimum Requirements

The minimum system requirements to successfully connect and log in to Web Access are as follows:

On a Windows machine:

- Internet Explorer 6.0 or higher
- Firefox 1.0.7 or higher
- Netscape Navigator 7.0 or higher
- Mozilla 1.x

On a Linux machine:

- Firefox 1.0.7 or higher
- Mozilla 1.x
- Netscape Navigator 7.0 or higher

Remote Console URL

One of the very cool things you can do with Web Access is to generate a regular web URL to a particular virtual machine. This URL gives you or any user you send it to direct access to this virtual machine. This capability is useful when you want to provide someone access to a virtual machine directly; you can just as easily paste the URL link into an email and send it to that person.

To generate a URL for a VM, you can simply click the `Generate Remote Console URL` link shown in Figure 8.4. This brings you to a screen similar to the one shown in Figure 8.5 that allows you to configure different settings to control which user interface features the user has access to.

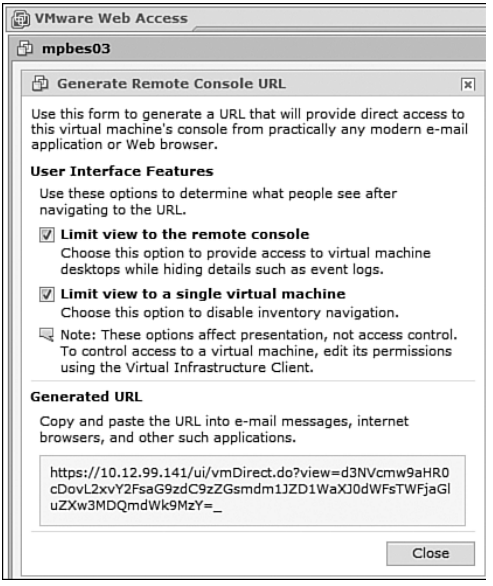

FIGURE 8.5
Generate Remote Console URL window.

Exam Prep Questions

1. What is a collection of privileges called in the security model of a VMware Infrastructure?

   - ❍ **A.** Role
   - ❍ **B.** Right
   - ❍ **C.** Access
   - ❍ **D.** Permission

2. Choose two roles that are default VirtualCenter roles.

   - ❍ **A.** Night-shift Operator
   - ❍ **B.** VCB User
   - ❍ **C.** Backup Administrator
   - ❍ **D.** Virtual Machine User

3. Which version of Internet Explorer is the minimum that can be used with Web Access?

- ❍ **A.** 4.0
- ❍ **B.** 5.0
- ❍ **C.** 6.0
- ❍ **D.** 7.0

4. Choose the roles that are not default ESX Server roles.

- ❍ **A.** Read-Only
- ❍ **B.** No Access
- ❍ **C.** Datacenter Administrator
- ❍ **D.** Resource Pool Administrator

5. Which version of Mozilla Firefox is the minimum that can be used with Web Access?

- ❍ **A.** 1.0.4
- ❍ **B.** 1.0.5
- ❍ **C.** 1.0.6
- ❍ **D.** 1.0.7

6. True or false: When using Web Access, you can access VMs only by accessing the VirtualCenter Server.

- ❍ **A.** True
- ❍ **B.** False

7. Approximately how many privileges are there by default in VMware Infrastructure?

- ❍ **A.** 50
- ❍ **B.** 75
- ❍ **C.** 100
- ❍ **D.** 150

8. True or false: Web Access can be used to create virtual machines.

- ❍ **A.** True
- ❍ **B.** False

9. True or false: ESX Server and VirtualCenter Server users and groups can be synchronized.

   - ❍ **A.** True
   - ❍ **B.** False

10. Which two user accounts are assigned to the ESX Server Administrator role by default?

    - ❍ **A.** adm
    - ❍ **B.** vpxuser
    - ❍ **C.** vpx
    - ❍ **D.** root

Answers to Exam Prep Questions

1. Answer **A** is correct. A collection of privileges is known as a role in a VMware Infrastructure.
2. Answers **B** and **D** are correct. From the list provided, the two roles that are available by default on a VirtualCenter server are VMware Consolidated Backup (VCB) User and Virtual Machine User.
3. Answer **C** is correct. Internet Explorer version 6.0 is the minimum that can be used to access Web Access.
4. Answers **C** and **D** are correct. The two roles that are not default ESX Server roles are Datacenter Administrator and Resource Pool Administrator.
5. Answer **D** correct. The minimum version of Mozilla Firefox that is supported with Web Access is 1.0.7.
6. Answer **B**, False, is correct. You can access the Web Access console by either pointing to the ESX Server or VirtualCenter Server IP address or FQDN. When pointing to the ESX host, you see only the VMs on that host, whereas when pointing the web access to the VC server, you see all the VMs.
7. Answer **C** is correct. There are approximately 100 privileges by default.

8. Answer **B**, False, is correct. Web Access cannot be used to create virtual machines. Web Access can be used only to manage VMs. To create virtual machines, you need to use the VI client.

9. Answer **B**, False, is correct. ESX Server and VirtualCenter Server users and groups cannot be synchronized.

10. Answers **B** and **D** are correct. The two user accounts that are assigned the administrator role by default on the ESX Server are root and vpxuser.

Index

NUMBERS

802.1Q VLAN tagging, 80

A

Active Directory Interface (VC 2.5), 118
Additional Services (VC 2.5), 118
addressing schemes
Fiber Channel SAN, 99-100
iSCSI, 102
administration via VC 2.5, 127
Administration tab, 129-130
Consolidation tab, 131
Events tab, 129
Inventory tab, 128
limits table, 132
Lockdown mode, 131
Maps tab, 130-131
plug-ins, 132
Scheduled Tasks tab, 128
VI client settings, 132
Administrator roles, assigning in ESX Server, 167
admission control, 215
affinity rule (DRS), 189
alarms
CMTP servers, 202
VM, 201, 203
Alpha folders, VC 2.5, 124
answers (practice exams)
exam 1, 243-253
exam 2, 275-286
anti-affinity rule (DRS), 189
application virtualization, 20

authentication, CHAP Authentication tab (iSCSI software initiator), 105
automation (DRS), 185
Available Memory setting (CPU/memory management), 177

B - C

backups
host options, 209
VC 2.5 servers, 133
VCB, 24, 209-210
VM options, 208
balloon-drivers (vmmemctl), 196-197
bandwidth, VM resource monitoring, 201
bare metal virtualization, 19
block-level transfers, 95
boot configuration, ESX 3.5 installations, 39

Capacity Planner Service (VMware). *See* VMware Capacity Planner Service
capacity planning (HA), 213-215
CD-ROM
ESX 3.5 installations
best practices, 37
boot configuration, 39
disk initialization, 36
disk partitioning, 37-38
Graphical mode, 35
media validation, 35
root passwords, 41
server network setting assignments, 40
Text mode, 35
time zone selection, 41
installing, 290-291
test modes
certification mode, 289
custom mode, 290
study mode, 289
certification, 11
candidate qualifications, 12
educational backgrounds, 13-14
hands-on experience, 14
exam preparation, 15
practice exams, 223-224, 255-256
web resources, 224, 256
certification mode (CD-ROM), 289
CHAP Authentication tab (iSCSI software initiator), 105
clone deployments, VM, 150
Clone to Template option, VM templates, 148
cloning, 153
clusters, 184
automation, 185
cluster-across-boxes scenarios, 218
cluster-in-a-box scenarios, 218
DRS clusters, 126
HA clusters, 126
physical-to-virtual cluster scenarios, 218
VC 2.5 inventories, 126
CMTP server alarms, 202
cold cloning, 153
cold migrations, VM, 151
compact storage option, VM templates, 148
Configuration tab (iSCSI software initiator), 104
configuring
boot, ESX 3.5 installations, 39
HA, requirements for, 212
MBR, 40
NAS datastores, 107
NTP client on ESX Server, 47
Consolidation tab (VC 2.5), 131
controllers. *See* storage processors
Convert to Template option, VM templates, 148

Converter Enterprise Service (VMware). *See* VMware Converter Enterprise Service
Core Services (VC 2.5), 118
CPU
CPU ready graphs, 199
management, 176-178
vCPU
CPU ready graph, 199
hyper-threading, 195
load balancing, 195
scheduling, 194-195
VMotion requirements, 181-182
creation wizard (VM)
Independent disk configuration, 145
virtual disk configuration, 143-144
custom mode (CD-ROM), 290
customizing guest OS on VM
Linux-based customizations, 150
Windows-based customizations, 149

D

Data Collector service. *See* VMware Capacity Planner Service
data storage, 94
Fiber Channel SAN
addressing schemes, 99-100
ESX 3.5 options, 96
HBA, 97
LUN, 98
storage processors, 98
storage systems, 98
switches, 98
zoning, 99
iSCSI
addressing schemes, 102
ESX 3.5 options, 102
hardware initiator, 105
software initiator, 103-104
VMFS multipathing, 111
NAS, 106-107
VC 2.5 requirements, 119
data transfers, 95
Database Interface (VC 2.5), 118
Database Server (VC 2.5), 122
datacenters, VC 2.5 inventories, 125
datastores
NAS, 107
VMFS, extending, 109-110
diagnostic data collection, troubleshooting ESX 3.5 installations, 48
Discovery and Analysis task (Guided Consolidation), 155
disk contention, 201
disk initialization, ESX 3.5 installation, 36
disk partitioning, ESX 3.5 installations, 33, 37-38
disk-based cloning, 154
Distributed Services (VC 2.5), 118
domain directory repositories (VirtualCenter), 166
DRS (Distributed Resource Schedulers), 23-24
affinity rule, 189
anti-affinity rule, 189
automation process, 185
clusters, 126, 184
CPU/memory management, 178
migration, 187
recommendations, 185
Dynamic Discovery tab (iSCSI software initiator), 104

E

education, VCP certification qualifications, 13-14
email messages, alarm thresholds, 201
emulation versus virtualization, 21
Enterprise edition (ESX Server), 55

ESX 3.5, 23
disk partitioning, 33
ESX Server licensing, 54-57
Fiber Channel SAN options, 96
hardware requirements, 32
hosts
backup options, 209
clusters, 126
management interface (VC 2.5), 118
split-brains, 215
installing
best practices, 37
boot configuration, 39
disk initialization, 36
disk partitioning, 37-38
Graphical mode, 35
media validation, 35
root passwords, 41
server network setting assignments, 40
Text mode, 35
time zone selection, 41
troubleshooting, 48
iSCSI options, 102
LUN support, 96
NAS datastores, 107
NTP client configuration, 47
SC redundancy, 77
Server Web interface, 44
SSH, accessing via, 45
VI client, accessing via, 43
VMFS
datastore extensions, 109-110
multipathing, 110-111
ESX Server
Administrator roles, assigning, 167
basis for, 25-26
Enterprise edition, 55
Foundation edition, 54
licensing, 54-55
Evaluation Mode, 56
host-based licensing, 56
Serial Number Mode, 56
server-based licensing, 57
permissions, configuring, 166
root users in, 167
security, 166
Standard edition, 54
vpxusers in, 167
ESXi, 23, 55
Ethernet ports, networking maximums table, 87
Evaluation Mode, ESX Server licensing, 56
Events tab (VC 2.5), 129
exams (certification)
candidate's educational background, 13-14
candidate's hands-on experience, 14
preparing for
practice exams, 223-224, 255-256
web resources, 224, 256
exams (practice)
exam 1
answers, 243-253
questions, 224-242
exam 2
answers, 275-286
questions, 256-274
MeasureUp, 290-291
experience (hands-on), VCP certification qualifications, 14
Explicit Failover Order policy, vSwitches, 87

F

fabric (Fiber Channel SAN). *See* switches, Fiber Channel SAN
Failback policy, vSwitches, 87

fault tolerance versus HA, 211

Fiber Channel SAN (Storage Area Networks)
addressing schemes, 99-100
ESX 3.5 options, 96
HBA, 97, 100
LUN, 98-100
storage processors, 98
storage systems, 98
switches, 98
zoning, 99

file-level transfers, 95

fixed multipathing, VMFS, 110

Forged Transmits security policies, vSwitches, 83

Foundation edition (ESX Server), 54

fully automated automation process (DRS), 185

G - H

GINA (Graphical Identification and Authentication), 142

Graphical mode, ESX 3.5 installations, 35

guest OS (operating system), VM
installing, 142-143
Linux-based customization, 150
Windows-based customization, 149

Guided Consolidation (VC 2.5), 154. *See also* VMware Capacity Planner
Discovery and Analysis task, 155
Plan Consolidation task, 156
VMware Capacity Planner Service, 155
VMware Converter Service, 155

HA (High Availability), 24, 133, 210
capacity planning, 213-215
clusters, 126
configuration requirements, 212
fault tolerance versus, 211
SC redundancy, 77, 212
Virtual Machine Failure Monitoring, 211

hands-on experience, VCP certification qualifications, 14

hard zoning Fiber Channel SAN switches, 99

hardware, ESX 3.5 installations
requirements, 32
troubleshooting, 48

hardware initiator (iSCSI), 105

HBA (Host Bus Adapters), Fiber Channel SAN, 97, 100

Heartbeat (UDP), VC 2.5 modifications, 123

HEC (Hardware Execution Context), vCPU scheduling, 194-195

help, technical support, 292

hiding LUN (Logical Unit Numbers). *See* LUN, masking

hosts
backup options, 209
datacenters, VC 2.5, 125
ESX 3.5 clusters, 126
failover capacity planning, 213-215
isolation, 216
licensing, ESX Server, 56
resource monitoring, 198
CPU ready graphs, 199
disk contention, 201
memory graphs, 200
network bandwidth, 201
split-brains, 215
virtualization, 19
VM, 201-203

hot cloning, 153

HTTP Web Service, VC 2.5 modifications, 122

HTTPS Web Service, VC 2.5 modifications, 122

hyper-threading vCPU, 195

hypervisors, 18

I

Independent disks, VM configuration, 145
Infrastructure Web Access service (VMware). *See* VMware Infrastructure Web Access service
initialization (disk), ESX 3.5 installation, 36
installing
CD-ROM, 290-291
Converter Enterprise, 153
ESX 3.5
best practices, 37
boot configuration, 39
disk initialization, 36
disk partitioning, 37-38
Graphical mode, 35
media validation, 35
root passwords, 41
server network setting assignments, 40
Text mode, 35
time zone selection, 41
troubleshooting, 48
license servers, 61
OS
guest OS on VM, 142-143
VM, 138, 142-143
VC 2.5
available services, 123
communication port modification, 122-123
component installation order, 122
internal vSwitches, 72
inventories (VC 2.5)
clusters in, 126
datacenters in, 125
folders in, 124
Inventory tab (VC 2.5), 128
iSCSI (Internet Small Computer System Interface)
addressing schemes, 102
ESX 3.5 options, 102
hardware initiator, 105
software initiator, 103
CHAP Authentication tab, 105
Configuration tab, 104
Dynamic Discovery tab, 104
enabling, 104
VMFS multipathing, 111

J - K - L

LAN (local area networks), VLAN, 78
802.1Q VLAN tagging, 80
trunk ports, 79
License Server service (VMware). *See* VMware License Server service
license servers, 60
installing, 61
losing, 63-64
troubleshooting, 63-64
verifying activity, 62
Licenses tab (VC 2.5), 130
licensing
ESX Server, 54-55
Evaluation Mode, 56
host-based licensing, 56
Serial Number Mode, 56
server-based licensing, 57
host-based licensing, ESX Server, 56
server-based licensing, ESX Server, 57
VI3, 61-62
ESX Server, 54-57
license key functions, 58-60
per instance, 60
per processor, 59-60
VC 2.5, 58
limits (VM CPU/memory management), 176
Linux-based guest OS customization, VM, 150
load balancing
vCPU, 195
vSwitches, 85-86

local cloning, 154
local directory repositories (VirtualCenter), 166
Lockdown mode (VC 2.5), 131
LUN (Logical Unit Numbers)
ESX 3.5 support, 96
Fiber Channel SAN, 98-100
masking, 98
rescan LUN, 96

M

MAC Address Changes security policies, vSwitches, 82
manual automation process (DRS), 185
Maps tab (VC 2.5), 130-131
masking (LUN), 98
MBR (Master Boot Record), configuring, 40
MeasureUp practice tests, 290-291
media validation, ESX 3.5 installation, 35
memory
Available Memory setting (CPU/memory management), 177
managing, 176-178
SC allocations, 34, 46
swap partition allocations, 34
VC 2.5 requirements, 119
virtual memory, 195
balloon-drivers (vmmemctl), 196-197
swap files, 197
transparent memory page sharing, 196
memory graphs (VM), 200
metadata files, VMFS, 108
migration
DRS effects of, 187
VM between hosts. ***See*** VMotion
monitoring
host resources, 198
CPU ready graphs, 199
disk contention, 201
memory graphs, 200
network bandwidth, 201
VM resources, 198
CPU ready graphs, 199
disk contention, 201
memory graphs, 200
network bandwidth, 201
Mount Service for VirtualCenter Service (VMware). *See* VMware Mount Service for VirtualCenter Service
MRU (Most Recently Used) multipathing, VMFS, 110
multipathing VMFS, 110-111
multiple adapter vSwitches, 74
Multiple Service Console ports, 75

N

***name_of_VM*-flat.vmdk files, 141**
***name_of_VM*-00000#-delta.vmdk files, 151**
***name_of_VM*-00000#.vmdk files, 151**
***name_of_VM*-Snapshot#.vmsn files, 151**
***name_of_VM*.vmdk files, 141**
***name_of_VM*.vmsd files, 141**
***name_of_VM*.vmx files, 141**
***name_of_VM*.vswp files, 141**
NAS (Network Attached Storage), 106-107
networks
bandwidth, VM resource monitoring, 201
failover detection policies, vSwitches, 86
server setting assignments, ESX 3.5 installations, 40
networks (virtual)
networking maximums table, 87
VLAN, 78
802.1Q VLAN tagging, 80
trunk ports, 79

vSwitches
defining, 70-71
Explicit Failover Order policy, 87
Failback policy, 87
internal vSwitches, 72
load-balancing policies, 85-86
multiple adapter vSwitches, 74
network failover detection policies, 86
NIC Team vSwitches, 74
NIC teaming, 84-87
Notify Switches policy, 86
physical switches versus, 71
security policies, 82-83
Service Console port groups, 75-76
single adapter vSwitches, 73
traffic shaping, 84
VM port groups, 77
VMkernel port groups, 76

NIC (Network Interface Cards)
networking maximums table, 87
Service Console NIC Teams, 76
single adapter vSwitches, 73
teaming, vSwitches, 74, 84
Explicit Failover Order policy, 87
Failback policy, 87
load-balancing policies, 85-86
network failover detection policies, 86
networking maximums table, 87
Notify Switches policy, 86

Nonpersistent mode (Independent disks), 145

Notify Switches policy, vSwitches, 86

notifications, alarm thresholds, 201

NTP (Network Time Protocol) client, ESX Server configuration, 47

.nvram files, 141

O - P

OS (operating systems), VM
customizing, 149-150
installing, 138, 142-143

P2V Converter, 24

partially automated automation process (DRS), 185

partitioning (disk)
ESX 3.5, 33
ESX 3.5 installations, 37-38

passwords (root), ESX 3.5 installations, 41

permissions
ESX Server configurations, 166
security, VI3, 162-164

Persistent mode (Independent disks), 145

physical machines versus VM, 22

physical NIC, selecting for servers, 40

physical switches versus vSwitches, 71

physical-to-virtual cluster scenarios, 218

Plan Consolidation task (Guided Consolidation), 156

plug-ins, VC 2.5 administration, 132

policies
port groups, security policies, 83
vSwitches
Explicit Failover Order policy, 87
Failback policy, 87
load-balancing policies, 85-86
network failover detection policies, 86
NIC teaming, 84, 86-87
Notify Switches policy, 86
security, 82-83
traffic shaping, 84

ports
Ethernet ports, networking maximums table, 87

port groups
security policies, 83
Service Console port groups, 75-76
VM port groups, 77
VMkernel port groups, 76
trunk ports, VLAN, 79
virtual ports, networking maximums table, 87
vSwitches, 74
Service Console port groups, 75-76
VM port groups, 77
VMkernel port groups, 76
practice exams
exam 1
answers, 243-253
questions, 224-242
exam 2
answers, 275-286
questions, 256-274
MeasureUp, 290-291
privileges (security), VI3, 162
Promiscuous Mode security policies, vSwitches, 82
PSOD (Purple Screen of Death), 48

Q - R

questions (practice exams)
exam 1, 224-242
exam 2, 256-274
Quiesce period, 184

recovery priority (VM), 217
redundancy
SC, 212
VC 2.5 servers, 133
remote cloning, 153
remote console URL, Web Access, 169
rescan LUN (Logical Unit Numbers), 96
reservations (VM CPU/memory management), 176
resource management
CPU, 176-178
memory, 176-178
VM, 177-178
resource monitoring
hosts, 198
CPU ready graphs, 199
disk contention, 201
memory graphs, 200
network bandwidth, 201
VM, 198
CPU ready graphs, 199
disk contention, 201
memory graphs, 200
network bandwidth, 201
resource pools, 178
restart priority (VM), 217
roles (security), VI3, 162-163
Roles tab (VC 2.5), 129
root access (SSH), enabling, 46
root folders, VC 2.5, 124
root passwords, ESX 3.5 installations, 41
root users, ESX Server security, 167

S

SAN (Storage Area Networks), Fiber Channel SAN
addressing schemes, 99-100
ESX 3.5 options, 96
HBA, 97
LUN, 98
storage processors, 98
storage systems, 98
switches, 98
zoning, 99
SC (Service Console), 26
memory allocations, 34, 46
redundancy, 77, 212

Scheduled Tasks tab (VC 2.5), 128
scheduling vCPU, 194-195
SCSI adapters, 143
security
ESX Server, 166
Lockdown mode (VC 2.5), 131
port groups, 83
VI3
ESX Server, 166-167
permissions, 162-164
privileges, 162
roles, 162-163
VirtualCenter, 166
vSwitches, 82-83
Serial Number Mode, ESX Server licensing, 56
Server Web interface (ESX), 44
server-based licensing, ESX Server, 57
servers
CMTP server alarms, 202
ESX Server
Administrator roles in, 167
Enterprise edition, 55
Foundation edition, 54
licensing, 54-57
network setting assignments, 40
NTP client configuration, 47
permissions configuration, 166
root users in, 167
security, 166
Standard edition, 54
vpxusers in, 167
license servers, 60
installing, 61
losing, 63-64
troubleshooting, 63-64
verifying activity, 62
network setting assignments, ESX 3.5 installations, 40
physical NIC selection, 40
user accounts, accessing via, 45
Service Console NIC Teams, 76
Service Console port groups, 75-76
Sessions tab (VC 2.5), 130
shares (VM CPU/memory management), 176-177
shortcuts (MeasureUp practice tests), creating, 291
simulation versus virtualization, 21
single adapter vSwitches, 73
sizing VC 2.5 databases, 121-122
SMP (Symmetric Multi-Processing), 24
snapshots, 145, 151
soft zoning, Fiber Channel SAN switches, 99
software initiator (iSCSI), 103
CHAP Authentication tab, 105
Configuration tab, 104
Dynamic Discovery tab, 104
enabling, 104
split-brains, 215
SSH (Secure Shell)
ESX 3.5 access via, 45
root access, enabling, 46
servers, accessing via user accounts, 45
Standard edition (ESX Server), 54
Static Discovery tab (iSCSI hardware initiator), 106
storage (data), 94
Fiber Channel SAN
addressing schemes, 99-100
ESX 3.5 options, 96
HBA, 97
LUN, 98
storage processors, 98
storage systems, 98
switches, 98
zoning, 99
iSCSI
addressing schemes, 102
ESX 3.5 options, 102

hardware initiator, 105
software initiator, 103-104
VMFS multipathing, 111
NAS, 106-107
VC 2.5 requirements, 119
virtualization, 20
VM templates, 148
storage processors, Fiber Channel SAN, 98
storage systems, Fiber Channel SAN, 98
Storage VMotion, 24
study mode (CD-ROM), 289
swap files (VMkernel), 197
swap partitions, memory allocations, 34
switches
Fiber Channel SAN, 98-99
Notify Switches policy, vSwitches, 86
physical switches versus vSwitches, 71
vSwitches
defining, 70-71
Explicit Failover Order policy, 87
Failback policy, 87
internal vSwitches, 72
load-balancing policies, 85-86
multiple adapter vSwitches, 74
network failover detection policies, 86
networking maximums table, 87
NIC Team vSwitches, 74
NIC teaming, 84-87
Notify Switches policy, 86
physical switches versus, 71
security policies, 82-83
Service Console port groups, 75-76
single adapter vSwitches, 73
traffic shaping, 84
VM port groups, 77
VMkernel port groups, 76
synchronizing time, VM, 147
System Logs tab (VC 2.5), 130
system requirements, CD-ROM installations, 290

T

technical support, 292
templates (VM), 147
Clone to Template option, 148
Convert to Template option, 148
creating, 148
storage, 148
VM deployments, 150
test modes (CD-ROM)
certification mode, 289
custom mode, 290
study mode, 289
tests (certification), 15
candidate's educational background, 13-14
candidate's hands-on experience, 14
preparing for
practice exams, 223-224, 255-256
web resources, 224, 256
tests (practice)
MeasureUp, 290-291
test 1
answers, 243-253
questions, 224-242
test 2
answers, 275-286
questions, 256-274
Text mode, ESX 3.5 installations, 35
time synchronization, VM, 147
time zones, selecting for ESX 3.5 installations, 41
traffic shaping, vSwitches, 84
transfers (data), 95
transparent memory page sharing, 196

troubleshooting
ESX 3.5 installations, 48
license servers, 63-64
VMotion, 180
trunk ports, VLAN, 79

U - V

Update Manager (VMware). *See* VMware Update Manager
URL (Uniform Resource Locators), remote console URL, 169
user accounts, server access via SSH, 45

V2V Converter, 24
VC 2.5 (VirtualCenter 2.5), 24
Active Directory Interface, 118
Additional Services, 118
administration, 127
Administration tab, 129
Consolidation tab, 131
Events tab, 129
Inventory tab, 128
limits table, 132
Lockdown mode, 131
Maps tab, 130-131
plug-ins, 132
Scheduled Tasks tab, 128
VI client settings, 132
alarm threshold messages, 202-203
backups, 133
Core Services, 118
Database Interface, 118
Database Server, 122
databases
designing, 119-120
sizing, 121-122
Distributed Services, 118
ESX host management interface, 118
Guided Consolidation, 116, 154
Discovery and Analysis task, 155
Plan Consolidation task, 156
VMware Capacity Planner Service, 155
VMware Converter Service, 155
hardware requirements, 118
High Availability, 133
installation process, 122-123
inventory design
clusters, 126
datacenters, 125
folders, 124
License Server, 122
licensing, 58
port matrix table, 116-117
security, 166
software requirements, 119
VI API, 118
VI Client, 122
VirtualCenter Server, 122
VMware Capacity Planner Service, 123
VMware Converter Enterprise Service, 116, 123
VMware Infrastructure Web Access service, 123
VMware License Server service, 123
VMware Mount Service for VirtualCenter Service, 123
VMware Update Manager, 116, 123
VMware VirtualCenter Server Service, 123
VCB (VMware Consolidated Backups), 24, 209-210
VCP certification, 11
candidate qualifications, 12
educational backgrounds, 13-14
hands-on experience, 14
exam preparation, 15
vCPU (virtual CPUs)
CPU ready graphs, 199
hyper-threading, 195
load balancing, 195
scheduling, 194-195

VI 3 (VMware Infrastructure), licensing, 61-62
ESX Server, 54-57
license key functions, 58-60
per instance, 60
per processor, 59-60
VirtualCenter 2.5, 58
VI API (Virtual Infrastructure Application Programming Interface), VC 2.5, 118
VI client (Virtual Infrastructure client), 26, 122
ESX 3.5 access via, 43
VC 2.5 administration, 132
VM guest OS installations, 142-143
Web Access versus, 167-168
VI SDK (Virtual Infrastructure Software Development Kit), VC 2.5, 118
VI3 (VMware Infastructure 3), 23
alarm threshold messages, 201
Converter, 24
data storage, 94
Fiber Channel SAN, 96-100
iSCSI, 102-105
NAS, 106-107
DRS, 23-24
ESX 3.5, 23
ESXi, 23
HA, 24
resource management, 176-178
SC, 26
security
ESX Server, 166-167
permissions, 162-164
privileges, 162
roles, 162-163
VirtualCenter, 166
SMP, 24
Storage VMotion, 24
Update Manager, 24
VCB, 24
VI client, 26, 167-168
Virtual Center 2.5, 24
VMFS, 25
VMkernel, 25
VMotion, 23-24
CPU requirements, 181-182
enabling, 180-181
errors, 180
host requirements, 179
stages of, 183-184
troubleshooting, 180
warnings, 180
Web Access
remote console URL, 169
system requirements for, 169
VI client versus, 167-168
VM creation, 168
VM launches via, 168
virtual disks
cloning, 153
snapshots, 145
VM configuration, 143-144
virtual hardware, 138-140
Virtual Machine Failure Monitoring, 211
virtual machines. *See* VM
virtual memory, 195
balloon-drivers (vmmemctl), 196-197
swap files, 197
transparent memory page sharing, 196
virtual networks
networking maximums table, 87
VLAN, 78
802.1Q VLAN tagging, 80
trunk ports, 79
vSwitches
defining, 70-71
Explicit Failover Order policy, 87
Failback policy, 87
internal vSwitches, 72
load-balancing policies, 85-86
multiple adapter vSwitches, 74
network failover detection policies, 86

NIC Team vSwitches, 74
NIC teaming, 84-87
Notify Switches policy, 86
physical switches versus, 71
security policies, 82-83
Service Console port groups, 75-76
single adapter vSwitches, 73
traffic shaping, 84
VM port groups, 77
VMkernel port groups, 76

virtual ports, networking maximums table, 87

VirtualCenter Server (VC 2.5), 122

VirtualCenter Server Service (VMware). *See* VMware VirtualCenter Server Service

virtualization
application virtualization, 20
bare metal virtualization, 19
defining, 18
emulation versus, 21
host-based virtualization, 19
hypervisors, 18
reasons for needing, 18-19
simulation versus, 21
storage virtualization, 20
VI3
components of, 23-24
SC, 26
VI client, 26
VMFS, 25

VLAN (virtual local area networks), 78
802.1Q VLAN tagging, 80
trunk ports, 79

VM (Virtual Machines), 20
affinity rule (DRS), 189
alarms, 201, 203
anti-affinity rule (DRS), 189
backup options, 208
benefits of, 21
clone deployments, 150
cloning, 153
cold migrations, 151
configuration maximums table, 156
Converter Enterprise, 152-153
CPU/memory management, 176
creation wizard
Independent disk configuration, 145
virtual disk configuration, 143-144
datacenters, VC 2.5, 125
defining, 138
GINA, accessing, 142
Guided Consolidation, 154-156
host isolation, 216
hosts, 201-203
Independent disk configuration, 145
memory graphs, 200
migration, 179, 187
name_of_VM -flat.vmdk files, 141
name_of_VM-00000#-delta.vmdk files, 151
name_of_VM-00000#.vmdk files, 151
name_of_VM-Snapshot.vmsn files, 151
name_of_VM.vmdk files, 141
name_of_VM.vmsd files, 141
name_of_VM.vmx files, 141
name_of_VM.vswp files, 141
naming, 138
.nvram files, 141
OS installations, 138
guest OS customizations, 149-150
guest OS installations, 142-143
physical machines versus, 22
port groups, vSwitches, 77
Quiesce period, 184
recovery priority, 217
resource management, 177-178
resource monitoring, 198
CPU ready graphs, 199
disk contention, 201

network bandwidth, 201
VM memory graphs, 200
resource pools, 178
SCSI adapters, 143
shares, assigning to, 177
snapshots, 151
templates, 147
Clone to Template option, 148
Convert to Template option, 148
creating, 148
deploying from, 150
storage, 148
time synchronization, 147
vCPU, scheduling, 194-195
VI3
components of, 23-24
SC, 26
VI client, 26
VMFS, 25
VMkernel, 25
virtual disks
configuration, 143-144
snapshots, 145
virtual hardware, 138-140
virtual memory, 195
balloon-drivers (vmmemctl), 196-197
swap files, 197
transparent memory page sharing, 196
.vmdk file extension, 21
VMotion
CPU requirements, 181-182
enabling, 180-181
errors, 180
host requirements, 179
stages of, 183-184
troubleshooting, 180
warnings, 180
VMware Tools, 146
vmware-#.log files, 141
vmware.log files, 141
.vmx file extension, 21
vmware.log files, 141
Web Access
creating via, 168
launches via, 168
remote console URL, 169
system requirements for, 169
VI client versus, 167-168

.vmdk file extension, 21

VMFS (Virtual Machine File Systems), 25
datastore extensions, 109-110
metadata files, 108
multipathing, 110-111
multiple host access in, 108

VMkernel (Virtual Machine File Systems), 25
port groups, vSwitches, 76
swap files, 197
vCPU, scheduling, 195
virtual memory, 195
balloon-drivers (vmmemctl), 196-197
transparent memory page sharing, 196

vmmemctl (balloon-drivers), 196-197

VMotion, 23-24, 179
CPU requirements, 181-182
enabling, 180-181
errors, 180
host requirements, 179
stages of, 183-184
troubleshooting, 180
warnings, 180

VMware Capacity Planner Service, 123, 155. *See also* Guided Consolidation

VMware Converter Enterprise Service, 116, 123, 152-155

VMware Infrastructure Web Access service, VC 2.5, 123

VMware License Server service, VC 2.5, 123

VMware Mount Service for VirtualCenter Service, VC 2.5, 123
VMware Tools, 146
VMware Update Manager, 24, 116, 123
VMware VirtualCenter Server Service, VC 2.5, 123
vmware-#.log files, 141
vmware.log files, 141
.vmx file extension, 21
volume-based cloning, 154
vpxusers, ESX Server security, 167
vSwitches (virtual switches)
defining, 70-71
internal vSwitches, 72
multiple adapter vSwitches, 74
networking maximums table, 87
NIC Team vSwitches, 74
physical switches versus, 71
policies
Explicit Failover Order policy, 87
Failback policy, 87
load-balancing policies, 85-86
network failover detection policies, 86
NIC teaming, 84-87
Notify Switches policy, 86
security, 82-83
traffic shaping, 84
ports, 74
Service Console port groups, 75-76
VM port groups, 77
VMkernel port groups, 76
single adapter vSwitches, 73

W - X - Y - Z

Web Access
remote console URL, 169
system requirements for, 169
VI client versus, 167-168
VM, 168
Web Server Ports, VC 2.5 modifications, 123
Windows-based guest OS customization, VM, 149

zoning Fiber Channel SAN switches, 99