

Introduction

Bill Calkins has been training Solaris System Administrators for more than 13 years. This book contains the training material that he uses in his basic and advanced Solaris administration courses that, over the years, have helped thousands of Solaris administrators become certified. This is our fourth edition of the *Solaris Training Guide: System Administrator*. It began with Solaris 2.6, 7, 8, and now 9. Administrators from around the world have used this book when instruction from a Sun training center is either not available, or not within their budget. Many of you have written with your success stories, suggestions, and comments. Your suggestions are what keep making this guide more valuable.

This book provides training materials for anyone interested in becoming a Sun Certified System Administrator for Solaris 9. When used as a study guide, this book will save you a great deal of time and effort searching for information you will need to know when taking the exam. This book covers the exam objectives in enough detail for the inexperienced administrator to learn the objectives and apply the knowledge to real-life scenarios. Experienced readers will find the material in this book to be complete and concise, making it a valuable study guide. This book is not a cheat sheet or cram session for the exam; it is a training manual. In other words, it does not merely give answers to the questions you will be asked on the exam. We have made certain that this book addresses the exam objectives in detail, from start to finish. If you are unsure about the objectives on the exam, this book will teach you what you need to know. After reading each chapter, assess your knowledge on the material covered using the review questions at the end of the chapter. When you have completed reading a section, use the practice exam and the end of the book

and the test engine on the CD-ROM to assess your knowledge of the objectives covered on each exam. This CD-ROM contains sample questions similar to what you are likely to see on the real exams. More sample questions are available at www.UnixEd.com, so make sure you visit this site to find additional training and study materials.

How This Book Helps You

This book teaches you how to administer the Solaris 9 operating system. It offers you a self-guided training course of all the areas covered on the certification exams by installing, configuring, and administering the Solaris 9 operating environment. You will learn all of the specific skills to administer a system and specifically to become a Sun Certified System Administrator for Solaris 9.

Throughout the book, we provide helpful tips and real-world examples that we have encountered as system administrators. In addition, we provide useful, real-world exercises to help you practice the material you have learned. The setup of this book is discussed in the following sections.

- ▶ **Organization**—This book is organized according to individual exam objectives. Every objective you need to know for installing, configuring, and administering a Solaris 9 system is in this book. We have attempted to present the objectives in an order that is as close as possible to that listed by Sun. However, we have not hesitated to reorganize them as needed to make the material as easy as possible for you to learn. We have also attempted to make the information accessible in the following ways:

- This introduction includes the full list of exam topics and objectives.
 - Each chapter begins with a list of the objectives to be covered, exactly as they are defined by Sun. Throughout each section, material that is directly related to the exam objectives is identified.
 - Each chapter also begins with an outline that provides you with an overview of the material and the page numbers where particular topics can be found.
- ▶ **Instructional Features**—This book is designed to provide you with multiple ways to learn and reinforce the exam material. The following are some of the helpful methods:
- **Objective Explanations**—As mentioned previously, each chapter begins with a list of the objectives covered in the chapter. In addition, immediately following each objective is an explanation in a context that defines it more meaningfully.
 - **Study Strategies**—The beginning of each chapter also includes strategies for studying and retaining the material in the chapter, particularly as it is addressed on the exam.
- ▶ **Exam Tips**—Throughout each chapter you'll find exam tips that will help you prepare for exam day. These tips are written by those who have already taken the Solaris 9 certification exams.
- **Key Terms**—A list of key terms appears near the end of each chapter.
 - **Notes**—These appear in the margin and contain various types of useful information such as tips on technology or administrative practices, historical background on terms and technologies, or side commentary on industry issues.
 - **Warnings**—When using sophisticated information technology, mistakes or even catastrophes are always possible because of improper application of the technology. Warnings appear in the margins to alert you to such potential problems.
 - **Step-by-Steps**—These are hands-on, tutorial instructions that walk you through a particular task or function relevant to the exam objectives.
 - **Exercises**—Found at the end of the chapters in the “Apply Your Knowledge” section, exercises are performance-based opportunities for you to learn and assess your knowledge.
- ▶ **Suggested Readings and Resources**—At the end of each chapter we've prepared a list of additional resources that you can use if you are interested in going beyond the objectives and learning more about topics that are presented in the chapter.
- ▶ **Extensive Practice Test Options**—The book provides numerous opportunities for you to assess your knowledge and practice for the exam. The practice options include the following:
- **Review Questions**—These questions appear in the “Apply Your Knowledge” section at the end of each chapter. They allow you to quickly assess your comprehension of what you just read in the chapter. Answers to the questions are provided later in a separate section titled “Answers to Review Questions.”
 - **Practice Exam**—A practice exam is included in the “Final Review” section for each exam (as discussed later).
 - **PrepLogic**—The PrepLogic software included on the CD-ROM provides further practice questions.

NOTE

PreLogic Software For a complete description of the PreLogic test engine, please see Appendix C, “Using the *PreLogic, Preview Edition, Software.*”

- ▶ **Final Review**—This part of the book provides you with three valuable tools for preparing for the exam, as follows:
 - **Fast Facts**—This condensed version of the information contained in the book will prove extremely useful for last-minute review.
 - **Study and Exam Prep Tips**—Read this section early on to help you develop study strategies. This section provides you with valuable exam-day tips and information on exam/question formats such as adaptive tests and case study-based questions.
 - **Practice Exam**—A full practice exam is included with questions written in styles similar to those used on the actual exam. Use the practice exam to assess your readiness for the real exam.
- ▶ **Appendixes**—The book contains valuable appendixes as well, including a glossary (Appendix A), a description of what is on the CD-ROM (Appendix B), and instructions for using the PreLogic software (Appendix C).

These and all the other book features mentioned previously will enable you to thoroughly prepare for the exam.

CONVENTIONS USED IN THIS BOOK

- ▶ **Commands**—In the steps and examples, the commands you type are displayed in a special monospaced font.


```
lp -d<printer name> <filename> <return>
```
- ▶ **Arguments and Options**—In command syntax, command options and arguments are enclosed in < >. (The italicized words within the < > symbols stand for what you will actually type. You don't type the < >.)
 - Left button—Select
 - Middle button—Transfer/Adjust
 - Right button—Menu

The Select button is used to select objects and activate controls. The middle mouse button is configured for either Transfer or Adjust. By default, it is set up for Transfer, which means this button is used to drag or drop list or text items. You use the left mouse button to highlight text, and then you use the middle button to move the text to another window or to reissue a command. The middle button can also be used to move windows around on the screen. The right mouse button, the Menu button, is used to display and choose options from pop-up menus.
- ▶ **Menu Options**—The names of menus and the options that appear on them are separated by a comma. For example, “Select File, Open” means to pull down the File menu and choose the Open option.

- ▶ **Code Continuation Character**—When a line of code is too long to fit on one line of a page, it is broken and continued to the next line. The continuation is preceded by a backslash.

AUDIENCE

This book is designed for anyone who has a basic understanding of Unix and wants to learn more about Solaris system administration. Whether you plan to become certified or not, this book is the starting point to becoming a Solaris System Administrator. It's the same training material that Bill uses in his Solaris System Administration classes. This book covers the basic as well as the advanced system administration topics you need to know before you begin administering the Solaris operating system. Our goal was to present the material in an easy-to-follow format, with text that is easy to read and understand. The only prerequisite is that you have used Unix, you have attended a basic Unix class for users, or you have studied equivalent material so that you understand basic Unix commands and syntax. Before you begin administering Solaris, it's important that you have actually used Unix.

This book is also intended for experienced system administrators who want to become certified or update their current certification. To pass the certification exams, you need to have a solid understanding of the fundamentals of administering Solaris. This book will help you review the fundamentals required to pass the certification exams.

THE SUN CERTIFIED SYSTEM ADMINISTRATOR EXAMS

To become a Sun Certified System Administrator, you need to pass two exams: CX-310-014 (Part I) and CX-310-015 (Part II). Part I is a prerequisite for Part II. You will not receive a certificate until you have passed both examinations. Also, if you are already certified in Solaris 2.6, 7, or 8, you can use this book to take the upgrade exam, CX-310-016, to become certified on Solaris 9.

Beware of fakes. We have seen some Web sites promoting their own certification programs, so be sure to evaluate them carefully. Certification programs promoted by these sites are not the same as the Sun certification program, and you will not receive a certificate from Sun until you pass Sun's exams from a certified Sun testing center. Go to my Web site (www.UnixEd.com) for links to the real exams and information on Sun's certification program if you are in doubt.

EXAM CX-310-014

Exam CX-310-314 objectives are covered in the following sections.

Manage File Systems

List the different types of file systems and file types in the Solaris operating environment. Understand how to add disk devices to a system and the device files associated with each disk. Understand how to use the format utility. Understand how to create file systems and configuration files.

Install Software

Describe the methods used and the sequence of steps required to perform the Solaris 9 operating environment software installation on a Sun system. Identify the function of the package administration commands. Understand how to install, verify, and remove operating system patches.

Perform System Boot Procedures

Understand the entire boot process with knowledge of the various configuration files and startup scripts. Understand how to use and execute boot PROM commands. Match the Solaris run levels to their intended functions. Understand the function of the files or directories accessed during the boot process. Understand the commands used to change the run level of a system to a specified state.

Perform User and Security Administration

Understand all aspects of administering users and groups. Understand how to set and verify file and directory permissions.

Manage Network Printers and System Processes

Describe the purpose, features, and functionality of the print management tools available in the Solaris operating environment. Understand the LP print service directory structure, and the Solaris operating environment printing process. Understand the commands that display information for all active processes on the

system. Understand the effect of sending a specified signal to a process. Understand the various methods used to terminate an active process.

Perform System Backups and Restores

Understand the functional capabilities of the various backup, archive, and restore utilities in Solaris 9. Identify the commands and steps required to back up and restore a file system.

EXAM CX-310-015

Exam CX-310-315 objectives are covered in the following sections.

Describe Network Basics

Define the function of each layer within the seven-layer OSI model and TCP/IP model. List the features and functions of the Ethernet. Describe the characteristics of RARP and ARP. Identify the commands that display information about the local network interface. Describe the relationship between the RPC service and the `rpcbind` process and how to list registered RPC services. Identify the steps necessary to start and stop network services via the command line.

Manage Virtual File Systems and Core Dumps

Understand the benefits of using the automount utility and each of the types of automount maps. Understand how to configure, start, and stop the automounter. Understand the Solaris pseudo file systems. Understand

swap and all of the steps required to create and add swap to the system. Understand how to manage the crash and core dump configuration.

Manage Storage Volumes

Explain the purpose, features, and functionalities of RAID, and identify the guidelines to follow when using RAID 0, RAID 1, and RAID 5, including hardware considerations. Define key SVM concepts, including volumes and state databases.

Control Access and Configure System Messaging

Understand the commands used to create, modify, and delete access control lists (ACLs) on files. Understand how to use and configure the Role-Based Access Control (RBAC) facility in Solaris 9. Understand `syslog` and how to configure it. Understand the syntax of the `syslog` configuration file and its effect on `syslog` behavior.

Set Up Naming Services

Understand the purpose of each type of name service available in Solaris 9 and be able to compare and contrast their functionality. Understand how to configure the name service switch file for each type of name service. Understand the processes and components of the NIS master server, NIS slave server, and NIS client. Know the steps required to configure an NIS master, slave, and client. Understand the steps required to add, update, and propagate an NIS map. Understand how to configure the DNS and LDAP client.

Perform Advanced Installation Procedures

Understand the purpose of the three JumpStart servers. You need to know all of the commands used to set up and modify a JumpStart session between a server and its clients. In a nutshell, you need to know everything about configuring a Solaris JumpStart session. Explain how to use the Flash installation feature, and describe requirements and limitations of this feature. Explain how to create and use a Flash archive and how to use a Flash archive for installation with WebStart, interactive install, and JumpStart.

EXAM CX-310-016 (SOLARIS 9 UPGRADE EXAM)

If you're already certified on Solaris 2.6, 7, or 8, you'll only need to take the CX-310-016 upgrade exam to update your certification. Here are the objectives for that exam:

Configure JumpStart Variables Using Configuration Files

Explain how to establish a boot-only server, identification service alternatives, configuration service alternatives, and installation service alternatives. Troubleshoot JumpStart problems such as booting, identification, configuration, install, or begin/finish scripts; analyze and select a course of action to resolve the problem.

Perform a Flash Install

Explain how to create and use a Flash archive and how to use a Flash archive for installation with WebStart, interactive install, and JumpStart.

Manage Patches

Explain how to obtain, install, and remove patches using the command line.

Configure RBAC

Explain fundamental concepts of Role-Based Access Control (RBAC), including rights, roles, profiles, authorizations, administrator profile shells, and RBAC databases and explain how to build user accounts, rights, and profiles.

Perform User Administration

Explain how to manage user accounts, and describe systemwide initialization files.

Configure the Solaris Volume Manager

Explain the purpose, features, and functionalities of RAID, and identify the guidelines to follow when using RAID 0, RAID 1, and RAID 5, including hardware considerations. Define key SVM concepts, including volumes and state databases.

UFS Snapshot

Explain how to perform UFS restores and special case recoveries.

Configure DNS and LDAP

Given a description of a naming service client, identify the steps and commands to configure the DNS and LDAP client.

SUMMARY

It's not uncommon for exam objectives to change or be shifted around. It's highly recommended that before you start this book, you visit the author's Web site at www.UnixEd.com to get the most up-to-date list of exam objectives, the errata for this book, up-to-date sample exam questions, and any other last-minute notes about these exams. We will provide all of the information you need to pass the exam—all you need to do is devote the time. Learning the objectives is the first step; the next step is to practice. You need to have access to a system running Solaris 9 so that you can practice what you have learned. Unless you have a supernatural memory, it's going to be difficult to pass the exams without practice.

In the back of this book is the PrepLogic software test CD that will prepare you for the questions you might see on the exam. It will thoroughly test your knowledge on all the exam objectives. If you are weak in any area, the sample questions will help you identify that area so that you can go back to the appropriate chapter and study the topic.

ADVICE ON TAKING THE EXAM

More extensive tips are found in the “Study and Exam Prep Tips” and throughout the book, but keep in mind the following advice as you study for the exam:

- ▶ **Read all the material**—This book includes information not reflected in the exam objectives to better prepare you for the exam and for real-world experiences. Read all of the material to benefit from this.
- ▶ **Do the step-by-step exercises and complete the exercises in each chapter**—This will help you gain experience.

- ▶ **Use the questions to assess your knowledge**—Each chapter contains review questions and exam questions. Use these to assess your knowledge and determine where you need to review material.
- ▶ **Review the exam objectives**—Develop your own questions and examples for each topic listed. If you can develop and answer several questions for each topic, you should not find it difficult to pass the exam.
- ▶ **Relax and sleep before taking the exam**—Time for taking the examination is limited. However, if you have prepared and you know Solaris network administration, you will find plenty of time to answer all of the questions. Be sure to rest well for the stress that time limitations put on you as you take the exam.
- ▶ **Review all of the material in the fast facts the night before or the morning that you take the exam.**
- ▶ **If you don't know the answer to a question, just skip it and don't waste much time**—Don't be lazy during the examination, and answer all the questions as quickly as possible.
- ▶ **Visit my Web site, www.UnixEd.com. It contains the following:**
 - Late-breaking changes that Sun might make to the exam or the objectives. You can expect Sun to change the exams frequently. Make sure you check my Web site before taking the exam.
 - A FAQs page with frequently asked questions and errata regarding this book or the exams.
 - Links to other informative Web sites.
 - Additional practice questions and sample exams.

- An online forum where you can discuss certification-related issues with other system administrators.
- Additional study materials, training programs, and online seminars related to Solaris certification.
- You can also email me directly from this Web site with questions or comments about this book. I always personally try to answer each one.

When you feel confident, take the real exams and become certified. Don't forget to drop me an email and let me know how you did (wca1kins@UnixEd.com).