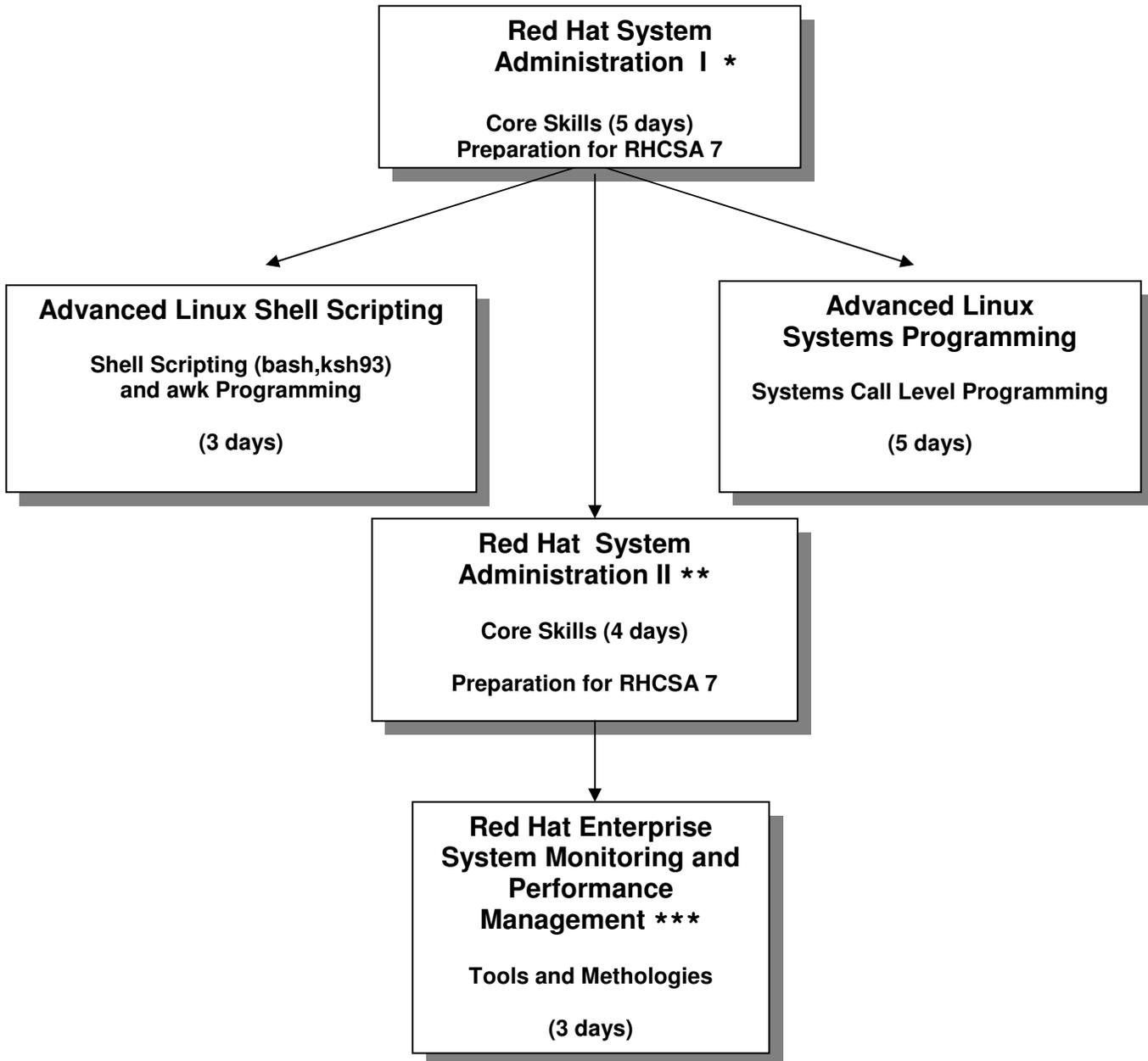


Red Hat Enterprise Linux (RHEL 7) Courses



- equivalent to Red Hat courses: *(124) **(134) ***(442)
- all participants use their own virtualized RHEL 7 system for hands-on and lab exercises

For more information, contact:

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Red Hat System Administration I

COURSE DESCRIPTION

This course presents the basic working environment of a **Linux** system. It introduces commonly required operations that can be performed by entering commands interactively in a command terminal, along with functions available in the **GNOME** Desktop Environment . This course will concentrate on **Red Hat Enterprise Linux (RHEL), version 7 (all update levels)**.

This course is the **equivalent** of Red Hat course **124**, with **additional shell scripting topics**.

COURSE OBJECTIVES

Each participant will be able to use **RHEL 7 Bash Shell** techniques and commands to maintain collections of files, create files using interactive editor utilities, create and execute basic command procedures, communicate with other users, and tailor the interactive environment to meet their needs. Basic administrative features to setup a functioning **RHEL 7** system will also be shown.

COURSE TOPICS

Understanding the User Environment

- RHEL 7** system overview
- process concepts
- the graphical environment (**GNOME**)

Getting Started with the Command Language

- logging into an **RHEL 7** system
- Bash** shell syntax rules
- documentation via **man**, **info** and **pinfo**
- command line editing and history control
- shortcut control keys

Red Hat System Administration I

COURSE TOPICS

Configure Secure Communications with OpenSSH

utilities that support a trusted environment

rsh, rlogin, rcp

required packages and services

.rhosts file

defining **ssh** keys

setup on client and server systems

Managing Files

file specification syntax

device specifications

directory specifications

regular expressions and special characters

RHEL 7 commands to manipulate files

file permission mechanisms

Creating and Editing Text Files

command line utilities to control file (content)

vim editor

key operations

importance of **.vimrc**

Improving the User Interface

controlling the history mechanism

creating command aliases

redirection of input and output

using hard and symbolic links

process control commands

Monitor and Manage Linux Processes

obtaining system information

show process information and attributes

control process execution

background

daemon

signals (**kill**)

Red Hat System Administration I

COURSE TOPICS

User Level Archival Operations

tar utility syntax

tar commands for product access

using compression/uncompression commands

gzip / gunzip

System Installation and Updating

installation types and methods

installing the **RHEL 7** operating system

maintaining the system via patches

managing system software

package information (**rpm, yum**)

installing packages (**rpm, yum**)

removing packages (**rpm, yum**)

creating and using (**yum**) repositories

Startup and Shutdown

components involved in the **Linux** boot

GRUB loader stages and configuration

default bootstrap

boot to single-user mode

RHEL 7 startup methods, tools, and procedures

understanding **systemd** (daemons, files)

comparing **systemd targets** to **run levels**

systemctl and **journald** commands

adding services to the startup mechanisms

shutdown methods and control

Managing of System Users

UID and **GID** concepts

creation of a user account

security through **password aging**

controlling access by groups

Red Hat System Administration I

COURSE TOPICS

Analyzing Logging Information

collection mechanism
configuring **rsyslogd**
rsyslog.conf

Monitoring System Activity

informational utilities
vmstat
iostat
mpstat
pidstat
top
contents of the **/proc** hierarchy files

Network Setup and Configuration

available tools
Network Manager
nmcli
nmtui, nmtui-edit
host names and related files
configuring network devices

Virtualization

available tools
virt-install
virt-manager
virsh
creating a **kvm**
controlling a **kvm**

Red Hat System Administration I

COURSE DURATION

This course normally requires **five** (5) days, approximately 50% lecture and 50% lab time.

COURSE PREREQUISITES

This course is considered to be the basic **Red Hat** course. Experience with any interactive system is helpful.

This course is the **first** of **two courses** used in preparation for the examination to achieve the **Red Hat Certified System Administrator (RHCSA 6)** certification.

Advanced Linux Shell Scripting

COURSE DESCRIPTION

This course presents to the **Linux / Unix** computer professional (user, systems administrator, application/system programmer) the techniques needed to develop advanced shell and reporting type procedures. The techniques shown are applicable to all **Linux** system variants.

COURSE OBJECTIVES

Each participant will be able to use **bash** shell, **Korn** shell, and **awk** capabilities to maintain collections of files, manipulate data, implement process communication, synchronization, and data sharing. Brief comparisons in techniques and performance considerations with **Perl** will also be shown.

COURSE TOPICS

Review of (Core) Shell Scripting Features

- Importance of signatures
- Methods of script execution
- Debugging shell scripts
- Variable types
- Looping statement constructs
- Decision statements

Advanced Techniques in Shell Scripts

- Alternative script execution methods
- Defining a **trap** step debugger
- Here Document** data
- Defining and using functions
- Using string pattern expressions
- Indexed array creation and access
- Option processing with **getopts**

Advanced Linux Shell Scripting

COURSE TOPICS

Advanced Techniques in Korn Shell Scripts

- Availability of variable data
- Defining and using **nameref** variables
- Active variables (and tied functions)
- Features of **Associative arrays**
- Direct control of file **I/O** (**exec, read, print**)
 - User-defined file descriptors
- Interprocess communication/synchronization
 - Co-processes
 - Reassignment of file descriptor paths
- TCP** and **UDP** port access
 - Attaching to network listener processes

awk Scripting Features

- Importance of signatures
- Methods of script execution
- Patterns and actions
- Output formatting
- Defining and using associative arrays
- the **getline()** function
- awk** supplied function features
 - string handling
 - information
 - callouts for system features
 - arithmetic operations
- Defining and using functions
 - Passing arguments to functions

Introduction to Perl Scripting

- History, versions, ports
- Perl** capabilities
- Comparison with shell scripts

Advanced Linux Shell Scripting

COURSE DURATION

This course normally requires **three** (3) days, approximately 50 % lecture, and 50 % lab time.

COURSE PREREQUISITES

This is an advanced **Linux / Unix** course. It is assumed that participants either have attended a **Linux or Unix Essentials** course, or have equivalent command line experience with the **bash** and/or **Korn** shells.

Advanced Linux Systems Programming

Course Description

This course introduces the participants to system level programming in the **C language** in a **Linux** environment. The course focuses on **Linux** system calls and library functions, how to use them, and their underlying mechanisms. The course deals with many facets of the **Linux** operating system, including: introduction to **Linux** kernel structure, I/O, Signals, Signal handlers, Timers, Processes, Multi-Tasking, Inter-Process Communication (**IPC**) Pipes, Shared memory, Message Queues, Semaphores, Networking, Sockets, using **TCP/IP** and **UDP/IP**. Throughout the course the information presented is related to the participant through: the execution of common **Linux** user/administrator commands, and writing, compiling, and executing example **C language** programs which demonstrate the use of system routines and accessing system data structures on a live **Linux** system.

This course is the **equivalent** of **Red Hat** course **251**.

Course Objectives

Upon completion of this course the participant will be able to:

- Explain the programmable mechanisms in a **Linux** environment
- Write applications using standard **Linux** system calls and library functions

Course Topics

System Programming Environment of Linux

Environment of a **C** language program

System level programming requirements:

C compiler issues

Header files and libraries

Special data types used

Useful functions

Error handling (basic)

Documentation

Security Issues

Advanced Linux Systems Programming

Course Topics

File Systems

- Types of file I/O
- File I/O structures
- File I/O access types
- Dealing with **STDIN, STDOUT, STDERR**
- Creating and using temporary files
- Directory file access and manipulation
- Permissions

Process Creation and Control

- Attributes (username, UID, PID, Groups)
- Creation methods
- Multi-tasking
- Shells
- Synchronization
- An introduction to **POSIX** threads

Synchronization and System Information

- Time issues
 - how time is maintained
 - timers
- General synchronization
 - semaphores
 - mutexes
 - spinlocks and barriers
 - signals (generation and handling)
- System information
 - uname
 - hostname
 - load averages

Interprocess Data Communication Facilities

- Overview of **Linux** IPC Facilities
- Memory Mapped files
- Pipes and Named Pipes
- Messages Queues
- Creating and Using Shared Memory structures

Advanced Linux Systems Programming

Course Topics

Sharing Code Between Processes

- Building shared object (libraries)
- Static Linking
- Dynamic Linking

Networking

- Concepts and basic requirements
- Socket creation and usage
- TCP/IP level connections
- UDP/IP level connections

Course Duration

This course normally requires **five** (5) days, 60% lecture, 40% hands on lab exercises.

Course Prerequisites

It is assumed that the participant has a solid background in basic **Linux** utilities and editors (such as **vim**), and a working knowledge of the **C** (or **C++**) programming language(s).

Red Hat System Administration II

COURSE DESCRIPTION

This course will present the commands and methods needed to setup and manage a **RHEL 7** system. The course will also use a problem solving approach in the lab exercises to teach system administrators advanced topics, for long-term management of the system.

This course is the **equivalent** to **Red Hat** course **134**, and is a continuation and companion to **Red Hat** course **124**, and is the second preparation course for the **RHCSA 7** certification examination.

Systems: **Red Hat Enterprise Linux Version 7 (all update levels)**

COURSE OBJECTIVES

On completion of this course, a systems administrator should be able to install, update, and boot the **RHEL 7** operating system; set up user accounts and directories; prepare queues for use; perform backups for integrity and performance reasons; monitor the system for performance and do basic setup of network software and capabilities.

COURSE TOPICS

Creating and Editing Text Files

- vim** editor

 - key operations

 - contents of **.vimrc**

- vim** editor variants (**vimdiff**, **gvim**)

- alternative editors (**gedit**, **nano**)

Scheduling Tasks and Operations

- batch job scheduling with **at**

- batch job scheduling with **crontab**

- operation scheduling with **systemd** timers

- logging

Red Hat System Administration II

COURSE TOPICS

Regular Expressions

definition

usage with **grep** and **sed**

Controlling Processes

running priority (**nice** values)

processor affinity (**taskset**)

System Installation and Updating

installation types and methods (review)

installing the **RHEL 7** operating system via **kickstart**

Startup and Shutdown

controlling kernel operations via boot time arguments

GRUB loader manipulation

alternative menu entries

Boot time troubleshooting

shutdown methods

Managing of System Users and Files

special permission codes

access Control Lists (**ACLs**)

files

directory (defaults)

security through **PAM password aging**

group level password controls

connecting to an **LDAP** server

Red Hat System Administration II

COURSE TOPICS

Commands to Manipulate Disks/Filesystems

partitioning disk surfaces with **fdisk** and **parted**
creating **ext2/ext3/ext4/xfs** file systems (**mkfs**)
file system structures information (**tune2fs, xfs_info**)
verifying file system structures (**fsck, xfs_repair**)
making file systems available to software (**mount**)
configuring swap space(s)

Logical Volume Management (LVM)

physical volumes
volume groups
logical volumes
resizing **LVM** based file systems
LVM based swap space

Network Accessible Storage

NFS

basic server setup
basic client setup

Samba/CIFS

share setup
accessing shares (**smbclient, mount**)

Maintaining System and Network Integrity

software firewall
firewalld
iptables
SELinux basics
Log file control (**logrotate**)

Red Hat System Administration II

COURSE DURATION

This course normally requires **four** (4) days, approximately 60% lecture, and 40% lab time.

COURSE PREREQUISITES

It is assumed that the participant has successfully completed the **Red Hat System Administration I (RH 124)** course, or has equivalent system administration experience on a **RHEL 7** server.

Red Hat Enterprise Linux Systems Administration

System Monitoring and Performance Management

COURSE DESCRIPTION

The **Red Hat Enterprise Linux Systems Administration: System Monitoring and Performance Management** course introduces participants to performance management principles, monitoring utilities / tools, and analysis for the **RHEL 7** Operating Environment. The course includes a review of **RHEL 7** subsystems, along with the utilities provided to monitor system efficiency including **sar** and the ***stat** family of tools. In each area of discussion, emphasis will be placed on writing tools for monitoring and analysis. These tools will include **Korn shell** scripts, **Perl** procedures, and **C language** programs.

This course is the **equivalent** to **Red Hat** course **442**.

Systems: **Red Hat Enterprise Linux Version 7 (all update levels)**

COURSE OBJECTIVES

On completion of this course, a systems administrator should be able to:

- Describe performance management fundamentals
- Use the **RHEL 7** and third-party tools to analyze performance
- Write tools in various languages
- Use **RHEL 7** performance data extensions
- View and set kernel-based tuning parameters
- Monitor and report on process and thread activity
- Modify **CPU** scheduling and virtual memory operations
- Enable dynamic monitoring via **SystemTap** in all major areas

Red Hat Enterprise Linux Systems Administration

System Monitoring and Performance Management

COURSE TOPICS

Performance Basics

- Describe the principles of performance analysis
- Describe the performance management process
- Terms used to describe performance aspects
- Factors affecting system performance
- Performance metrics
- Virtual system caching
 - Effects of computer architecture

RHEL 7 Monitoring Capabilities

- Monitoring tools provided with **RHEL 7**
 - ***stat** family of programs
 - sar / sadc**
 - Third party / freely available tools
 - uptime**
 - ManageEngine**
 - tools from **Red Hat**
- Introduction to **SystemTap**
- Kernel tunables (viewing, changing via **sysctl**)

Memory Management

- Memory layout and distribution
- Memory usage by the kernel
- Process creation
- Process virtual address space
- Buffer Cache (and allocation control)
- Shared Memory / Page Caching
- Paging and Swapping
- Monitoring Tools

Red Hat Enterprise Linux Systems Administration

System Monitoring and Performance Management

COURSE TOPICS

CPU Management

- Software priorities concepts
- Impact of the **nice** parameter
- Priority boosting
- Adjusting **CPU** scheduling mechanisms
- Tuning (**Java**) threaded applications
- Process states
- Monitoring tools

I/O Management

- Breakdown of disk I/O
- Measuring Disk and I/O
- ext3/ext4/xfs** performance
 - File system structure concepts
 - File system caching
 - Name Lookup (meta-data) caching
 - Tuning the cache sizes and algorithms
 - (Re-)Defining the **I/O** scheduler
 - File system performance statistics
 - ext3** parameters to improve efficiency
 - write strategies to **ext3/ext4/xfs** buffering
- Monitoring Tools

Network Management

- TCP/IP** Layers
- Socket controls
- Controlling network services
- Setting network buffer values
- Monitoring tools

Summaries

- Memory management
- CPU management
- I/O management
- Network management
- User program management

Red Hat Enterprise Linux Systems Administration

System Monitoring and Performance Management

COURSE DURATION

This course normally requires **three** (3) days, approximately 60% lecture, and 40% lab time.

COURSE PREREQUISITES

It is assumed that the participant has successfully completed the **Red Hat System Administration I (RH 124)** and **Red Hat System Administration II (RH 134)** courses, or has equivalent system time as a user and a working systems administrator.