

Red Hat Certificate of Expertise in Performance Tuning exam (EX442).

Course Overview

This course discusses system architecture with an emphasis on understanding the implications on system performance, methods for testing the effects of performance adjustments, open source benchmarking utilities, methods for analyzing system and networking performance, and tuning configurations for specific application loads.

This course can help you prepare for the [Red Hat Certificate of Expertise in Performance Tuning exam \(EX442\)](#). This version of the course includes the exam.

Course content summary

- Tuning for use-case scenarios (for example, HPC, large memory, database, and file server)
- Tuning for power consumption
- Tuning virtual machines (host and guest)
- Tuning memory and caches
- Tuning CPU and memory utilization using cgroups
- Gathering performance metrics and other data for tuning purposes

Audience and prerequisites

Audience for this course

- Experienced Linux system administrators responsible for maximizing resource utilization through performance tuning

Prerequisites for this course

- RHCE certification or equivalent experience

Outline for this course

Introduction to performance tuning

Understand the basic principles of performance tuning and analysis.

Collecting, graphing, and interpreting data

Gain proficiency in using basic analysis tools and in evaluating data.

General tuning

Learn basic tuning theory and mechanisms used to tune the system.

Hardware profiling

Understand and analyze hardware.

Software profiling

Analyze CPU and memory performance of applications.

Mail server tuning

Learn about basic storage tuning using an email server as an example.

Large memory workload tuning

Understand memory management and tuning.

HPC workload tuning

Understand tuning for CPU-bound applications.

File server tuning

Understand storage and network tuning in the context of a file server application.

Database server tuning

Tune memory and network performance using a database application as an example.

Power usage tuning

Tune systems with power consumption in mind.

Virtualization tuning

Tune 'host' and 'guest' for efficient virtualization.

Note: Course outline is subject to change with technology advances and as the nature of the underlying job evolves. For questions or confirmation on a specific objective or topic, please [contact a training specialist](#).

Recommended next exam or course

[Red Hat Certificate of Expertise in Performance Tuning exam \(EX442\)](#)

Hands-on, performance-based, 4-hour exam.

This course prepares you for these credentials

[Red Hat Certified Architect — RHCA](#)

RHCA certification incorporates the skills plus advanced networking services security, system monitoring, and performance tuning.

[Certificates of Expertise](#)

Certificates of Expertise are incremental credentials attached to an RHCE certification that demonstrate skills and knowledge in specialized areas

In preparation

Red Hat recommends that candidates earn Red Hat Certified System Administrator (RHCSA) or Red Hat Certified Engineer (RHCE) before attempting this exam but neither is required.

Study points for the exam

To help you prepare, the exam objectives highlight the task areas you can expect to see covered in the exam. Red Hat reserves the right to add, modify, and remove exam objectives. Such changes will be made public in advance.

Candidates should be able to perform the tasks listed below:

- Use utilities such as vmstat,iostat,mpstat,sar, gnome-system-monitor, top, powertop and others to analyze and report system and application behavior
- Configure systems to provide performance metrics using utilities such as RRDtool
- Use the Pluggable Authentication Modules (PAM) mechanism to implement restrictions on critical system resources
- Use /proc/sys, sysctl and /sys to examine and modify and set kernel run-time parameters
- Use utilities such as dmesg, dmidecode, x86info, sosreport etc. to profile system hardware configurations
- Analyze system and application behavior using tools such as ps, strace, top and Valgrind
- Configure systems to run SystemTap scripts
- Alter process priorities of both new and existing processes
- Configure systems to support alternate page sizes for applications that use large amounts of memory
- Given multiple versions of applications that perform the same or similar tasks, choose which version of the application to run on a system based on its observed performance characteristics
- Configure disk subsystems for optimal performance using mechanisms such as swap partition placement, I/O scheduling algorithm selection, file system layout and others
- Configure kernel behavior by altering module parameters
- Calculate network buffer sizes based on known quantities such as bandwidth and round-trip time and set system buffer sizes based on those calculations
- Select and configure tuned profiles.
- Manage system resource usage using control groups

As with all Red Hat performance-based exams, configurations must persist after reboot without intervention

What you need to know

Red Hat encourages all candidates for the Red Hat Enterprise Performance Tuning Expertise exam (EX442) to consider taking the [Red Hat Certificate of Expertise in Performance Tuning \(RH442\)](#) training course. Attendance in this class is not required, so one can choose to take just the exam. Many successful candidates who have come to class already possessing substantial skills and knowledge have reported that the class made a positive difference for them.

While attending Red Hat classes can be an important part of one's preparation to take this exam, attending class does not guarantee success on the exam. Previous experience, practice, and native aptitude are also important determinants of success.

Many books and other resources on system administration for Red Hat's products are available. Red Hat does not officially endorse any as preparation guides for its exam. Nevertheless, you may find additional reading deepens understanding and can prove helpful.

Exam format

This exam is a performance-based evaluation of system administration skills and knowledge. Candidates perform a number of routine system administration tasks and are evaluated on whether they have met specific objective criteria. Performance-based testing means that candidates must perform tasks similar to what they perform on the job.

Prospective employers of people with the Red Hat Certificate of Expertise in Performance Tuning should verify any and all claims by people claiming to hold this credential by requesting their certificate number and verifying it using the Red Hat [certification verification tool](#).

The exam is organized as follows:

- Performance Tuning: 4.0 hours

Scores and reporting

Official scores for exams come exclusively from Red Hat Certification Central. Red Hat does not authorize examiners or training partners to report results to candidates directly. Scores on the exam are usually reported within 3 U.S. business days.

Exam results are reported as section scores. Red Hat does not report performance on individual items, nor will it provide additional information upon request.

Audience and prerequisites

- Experienced Linux system administrators responsible for maximizing resource utilization through performance tuning
- An RHCE interested in earning Red Hat Certified Architect (RHCA)

Prerequisites for this exam

Exam candidates should:

- Be Red Hat Certified System Administrators or have comparable work experience and skills (Red Hat Certified Engineer would be even better)
- Have taken the [Red Hat Enterprise Performance Tuning \(RH442\) course](#) or have extensive work experience in performance tuning
- Review the Red Hat Certificate of Expertise in Performance Tuning exam (EX442) objectives