

# Tytuł szkolenia: Linux Fundamentals (GL120)

Kod szkolenia: U8583S

## Wprowadzenie

This is a challenging course that focuses on the fundamental tools and concepts of Linux and Unix. Students gain proficiency using the command line. Beginners develop a solid foundation in Unix, while advanced users discover patterns and fill in gaps in their knowledge. The course material is designed to provide extensive hands-on experience. Topics include basic file manipulation; basic and advanced filesystem features; I/O redirection and pipes; text manipulation and regular expressions; managing jobs and processes; vi, the standard Unix editor; automating tasks with shell scripts; managing software; secure remote administration; and more.

## Adresaci szkolenia

### Prerequisites

Students should be comfortable with computers. No familiarity with Linux or other Unix operating systems is required.

## Cel szkolenia

## Czas i forma szkolenia

- 35 godzin (5 dni x 7 godzin), w tym wykłady i warsztaty praktyczne.

## Plan szkolenia

### Module 1: What is Linux?

- Unix and its Design Principles
- FSF and GNU
- GPL – General Public License
- The Linux Kernel
- Linux Kernel and Versioning
- Components of a Distribution
- Slackware
- SUSE Linux Products
- Debian
- Ubuntu
- Red Hat Linux Products
- Oracle Linux

### Module 2: Login and Exploration

- Logging In
- Running Programs
- Interacting with Command Line
- Desktop Environments
- GNOME
- Starting X
- Gathering Login Session Info
- Gathering System Info
- uptime & w

- got root?
- Switching User Contexts
- sudo
- Help from Commands and Documentation
- whereis
- Getting Help Within the Graphical Desktop
- Getting Help with man & info
- Lab Tasks
  - Login and Discovery
  - Help with Commands
  - Switching Users with su

### **Module 3: The Linux Filesystem**

- Filesystem Support
- Unix/Linux Filesystem Features
- Filesystem Hierarchy Standard
- Navigating the Filesystem
- Displaying Directory Contents
- Filesystem Structures
- Determining Disk Usage with df and du
- Determining Disk Usage (GUI)
- Disk Usage with Quotas
- File Ownership
- Default Group Ownership
- File and Directory Permissions
- File Creation Permissions with umask
- SUID and SGID on files
- SGID and Sticky Bit on Directories
- Changing File Permissions
- User Private Group Scheme
- Lab Tasks
  - Navigating Directories and Listing Files
  - Disk and Filesystem Usage
  - File and Directory Ownership and Permissions
  - Introduction to Troubleshooting Labs
  - Troubleshooting Practice: Filesystem

### **Module 4: Manipulating Files**

- Directory Manipulation
- File Manipulation
- Deleting and Creating Files
- Managing Files Graphically
- Drag and drop with Nautilus
- Physical Unix File Structure
- Filesystem Links
- File Extensions and Content
- Displaying Files
- Previewing Files
- Producing File Statistics
- Displaying Binary Files
- Searching the Filesystem
- Alternate Search Method
- Lab Tasks

- Manipulating Files and Directories
- File Examination & Search Commands

#### **Module 5: Shell Basics**

- Role of Command Shell
- Communication Channels
- File Redirection
- Piping Commands Together
- Filename Matching
- File Globbing and Wildcard Patterns
- Brace Expansion
- Shell and Environment Variables
- Key Environment Variables
- Which and Type
- General Quoting Rules
- Nesting Commands
- Lab Tasks
  - Redirection and Pipes
  - Wildcard File Matching
  - Shell Variables
  - Shell Meta-Characters
  - Command Substitution

#### **Module 6: Archiving and Compression**

- Archives with tar
- Archives with cpio
- The gzip Compression Utility
- The bzip2 Compression Utility
- The XZ Compression Utility
- The PKZIP Archiving/Compression format
- GNOME File Roller
- Lab Tasks
  - Archiving and Compression

#### **Module 7: Text Processing**

- Searching Inside Files
- The Streaming Editor
- Text Processing with Awk
- Replacing Text Characters
- Text Sorting
- Duplicate Removal Utility
- Extracting Columns of Text
- Combining Files and Merging Text
- Comparing File Changes
- Lab Tasks
  - Processing Text Streams
  - Text Processing

#### **Module 8: Regular Expressions**

- Regular Expression Overview
- Regular Expressions
- RE Character Classes
- Regex Quantifiers
- RE Parenthesis
- Lab Tasks
  - Pattern Matching with Regular Expressions

- Extended Regular Expressions
- Using Regular Expressions with sed

#### **Module 9: Text Editing**

- Text Editing
- Pico/GNU Nano
- Pico/Nano Interface
- Nano configuration
- Pico/Nano Shortcuts
- vi and Vim
- Learning Vim
- Basic vi
- Intermediate vi
- Lab Tasks
  - Text Editing with Nano
  - Text Editing with Vim

#### **Module 10: Messaging**

- System Messaging Commands
- Controlling System Messaging
- Internet Relay Chat
- Instant Messenger Clients
- Electronic Mail
- Sending Email with sendmail
- Sending and Receiving Email with mailx
- Sending and Receiving Email with mutt
- Sending Email with Pine
- Evolution
- Lab Tasks
  - Command Line Messaging
  - Messaging with talkd
  - Command Line Email
  - Alpine

#### **Module 11: Command Shells**

- Shells
- Identifying the Shell
- Changing the Shell
- Configuration Files
- Script Execution
- Shell Prompts
- Bash: Bourne-Again Shell
- Bash: Configuration Files
- Bash: Command Line History
- Bash: Command Editing
- Bash: Command Completion
- Bash: "shortcuts"
- Bash: prompt
- Setting Resource Limits via ulimit
- Lab Tasks
  - Linux Shells
  - Bash History
    - Aliases
  - Bash Login Scripts

- The Z Shell

#### **Module 12: Introduction to Shell Scripting**

- Shell Script Strengths and Weaknesses
- Example Shell Script
- Positional Parameters
- Input & Output
- Doing Math
- Comparisons with test
- Exit Status
- Conditional Statements
- Flow Control: case
- The for Loop
- The while and until Loops
- Lab Tasks
  - Writing a Shell Script

#### **Module 13: Process Management and Job Control**

- What is a Process?
- Process Lifecycle
- Process States
- Viewing Processes
- Signals
- Tools to Send Signals
- nohup and disown
- Managing Processes
- Tuning Process Scheduling
- Job Control Overview
- Job Control Commands
- Persistent Shell Sessions with Screen
- Using screen
- Advanced Screen
- Lab Tasks
  - Job Control Basics
  - Process Management Basics
  - Screen Basics
  - Using Screen Regions
  - Troubleshooting Practice: Process Management

#### **Module 14: At and Cron**

- Automating Tasks
- at/batch
- cron
- The crontab Command
- crontab Format
- /etc/cron.\*/ Directories
- Anacron
- Lab Tasks
  - Creating and Managing User Cron Jobs
  - Adding System cron Jobs
  - Troubleshooting Practice: Automating Tasks

#### **Module 15: Managing Software**

- Downloading with FTP
- FTP
- lftp

- Command Line Internet
  - Non-interactive
- Command Line Internet
  - Interactive
- Managing Software Dependencies
- Using the Yum command
- Using Yum history
- YUM package groups
- Configuring Yum
- yumdownloader
- Popular Yum Repositories
- Using the Zypper command
- Zypper Services and Catalogs
- The dselect & APT Frontends to dpkg
- Aptitude
- Configuring APT
- Lab Tasks
  - Command Line File Transfers
  - Using Yum
  - Using Zypper
  - Managing Yum Repositories
    - Managing Zypper Repositories
  - Using APT
  - Adding an APT repository

#### **Module 16: The Secure Shell (SSH)**

- Secure Shell
- ssh and sshd Configuration
- Accessing Remote Shells
- Transferring Files
- Alternative sftp Clients
- SSH Key Management
- ssh-agent
- Lab Tasks
  - Introduction to ssh and scp
  - SSH Key-based User Authentication
  - Using ssh-agent

#### **Module 17: Mounting Filesystems & Managing Removable Media**

- Filesystems Concept Review
- Mounting Filesystems
- NFS
- SMB
- Filesystem Table (/etc/fstab)
- AutoFS
- Removable Media
- Lab Tasks
  - Accessing NFS Shares
  - On-demand filesystem mounting with AutoFS

#### **Module 18: Printing**

- Legacy Print Systems
- Common UNIX Printing System
- Defining a Printer

- Standard Print Commands
- Format Conversion Utilities
- enscript and mpage
- Lab Tasks
  - Printing
  - Configuring Print Queues

#### **Appendix A: The X Window System**

- The X Window System
- X Modularity
- X.Org Drivers
- Configuring X Manually
- Automatic X Configuration
- Xorg and Fonts
- Installing Fonts for Modern Applications
- Installing Fonts for Legacy Applications
- The X11 Protocol and Display Names
- Display Managers and Graphical Login
- Starting X Apps Automatically
- X Access Control
- Remote X Access (historical/insecure)
- Remote X Access (modern/secure)
- XDMCP
- Remote Graphical Access with VNC and RDP
- Specialized X Servers
- Lab Tasks
  - Remote X with XDMCP
  - Configure X Security
  - Configure a VNC Server
  - Configure a VNC Server
  - Configure a VNC Server
  - Launching X Apps Automatically
  - Secure X

#### **Appendix B: Emacs**

- Emacs
- The Emacs Interface
- Basic Emacs
- More Emacs Commands
- Lab Tasks
  - Text Editing with Emacs