| Comparison of Linux+ 004 vs 005 | | | | |
|---|---|---|---|---|
| **my-id** | **Topic** | **Sub-topic** | **XK0-004** | **XK1-005** |
| **1** | **Hardware and System Configuration** | | 1.0 | |
| **2** | **Explain Linux boot process concepts** | | 1.1 | 1.1 |
| **3** | | Boot loaders | 1.1 | 1.1 |
| **4** | | GRUB | 1.1 | 1.1 |
| **5** | | GRUB2 | 1.1 | 1.1 |
| **6** | | Boot options | 1.1 | 1.1 |
| **7** | | UEFI/EFI | 1.1 | 1.1 |
| **8** | | PXE | 1.1 | 1.1 |
| **9** | | NFS | 1.1 | 1.1 |
| **10** | | Boot from ISO | 1.1 | 1.1 |
| **11** | | Broot from HTTP/FTP | 1.1 | 1.1 |
| **12** | | /etc/default/grub | 1.1 | 1.1 |
| **13** | | /etc/grub2.cfg | 1.1 | 1.1 |
| **14** | | /boot | 1.1 | 1.1 |
| **15** | | /boot/grub | 1.1 | 1.1 |
| **16** | | /boot/grub2 | 1.1 | 1.1 |
| **17** | | /boot/efi | 1.1 | 1.1 |
| **18** | | Boot modules and files | 1.1 | 1.1 |
| **19** | | mkinitrd | 1.1 | 1.1 |
| **20** | | dracut | 1.1 | 1.1 |
| **21** | | grub2-install | 1.1 | 1.1 |
| **22** | | grub2-mkconfig | 1.1 | 1.1 |
| **23** | | initramfs | 1.1 | 1.1 |
| **24** | | EFI files | 1.1 | 1.1 |
| **25** | | vmlinuz | 1.1 | 1.1 |
| **26** | | vmlinux | 1.1 | 1.1 |
| **27** | | kernel panic | 1.1 | 1.1 |
| **28** | **Given a scenario, install, configure, and monitor kernel modules** | | 1.2 | |
| **29** | | lsmod | 1.2 | 1.7 |
| **30** | | insmod | 1.2 | 1.7 |
| **31** | | modprobe | 1.2 | 1.7 |
| **32** | | modinfo | 1.2 | 1.7 |
| **33** | | dmesg | 1.2 | x |
| **34** | | rmmod | 1.2 | 1.7 |
| **35** | | depmod | 1.2 | 1.7 |
| **36** | | /usr/lib/modules/[kernelversion] | 1.2 | x |
| **37** | | /usr/lib/modules | 1.2 | x |
| **38** | | /etc/modprobe.conf | 1.2 | x |
| **39** | | /etc/modprobe.d/ | 1.2 | x |
| **40** | **Given a scenario, configure and verify network connection parameters** | | 1.3 | |
| **41** | | ping | 1.3 | 1.5 |
| **42** | | netstat | 1.3 | 1.5 |
| **43** | | nslookup | 1.3 | 1.5 |
| **44** | | dig | 1.3 | 1.5 |
| **45** | | host | 1.3 | 1.5 |
| **46** | | route | 1.3 | 1.5 |
| **47** | | ip | 1.3 | 1.5 |
| **48** | | ifconfig | 1.3 | 1.5 |

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| **49** | | ifcfg | 1.3 | 1.5 |
| **50** | | ethtool | 1.3 | 1.5 |
| **51** | | ss | 1.3 | 1.5 |
| **52** | | iwconfig | 1.3 | x |
| **53** | | nmcli | 1.3 | 1.5 |
| **54** | | brctl | 1.3 | x |
| **55** | | nmtui | 1.3 | 1.5 |
| **56** | | /etc/sysconfig/network-scripts/ | 1.3 | 1.5 |
| **57** | | /etc/sysconfig/network | 1.3 | x |
| **58** | | /etc/hosts | 1.3 | x |
| **59** | | /etc/network | 1.3 | x |
| **60** | | /etc/nsswitch.conf | 1.3 | 1.5 |
| **61** | | /etc/resolv.conf | 1.3 | 1.5 |
| **62** | | /etc/netplan | 1.3 | x |
| **63** | | /etc/sysctl.conf | 1.3 | 1.7 |
| **64** | | /etc/dhcp/dhclient.conf | 1.3 | x |
| **65** | | bonding | 1.3 | x |
| **66** | | aggregation | 1.3 | x |
| **67** | | active/passive | 1.3 | x |
| **68** | | load balancing | 1.3 | x |
| **69** | **Given a scenario, manage storage in a Linux environment** | | 1.4 | |
| **70** | | Basic partitions | 1.4 | 1.1 |
| **71** | | raw devices | 1.4 | 1.1 |
| **72** | | GPT | 1.4 | 1.1 |
| **73** | | MBR | 1.4 | 1.1 |
| **74** | | FUSE | x | 1.1 |
| **75** | | RAID | x | 1.1 |
| **76** | | File system hierarchy | 1.4 | 1.1 |
| **77** | | real file systems | 1.4 | x |
| **78** | | virtual file systems | 1.4 | x |
| **79** | | relative paths | 1.4 | 3.1 |
| **80** | | absolute paths | 1.4 | 3.1 |
| **81** | | Device mapper | 1.4 | x |
| **82** | | LVM | 1.4 | 1.3 |
| **83** | | mdadm | 1.4 | 1.3 |
| **84** | | multipath | 1.4 | 1.3 |
| **85** | | XFS tools | 1.4 | 1.3 |
| **86** | | LVM tools | 1.4 | 1.3 |
| **87** | | EXT tools | 1.4 | 1.3 |
| **88** | | mdadm | 1.4 | 1.3 |
| **89** | | fdisk | 1.4 | 1.3 |
| **90** | | parted | 1.4 | 1.3 |
| **91** | | mkfs | 1.4 | 1.3 |
| **92** | | iostat | 1.4 | 1.3 |
| **93** | | df | 1.4 | 1.3 |
| **94** | | du | 1.4 | 1.3 |
| **95** | | mount | 1.4 | 1.3 |
| **96** | | umount | 1.4 | 1.3 |
| **97** | | lsblk | 1.4 | 1.3 |
| **98** | | blkid | 1.4 | 1.3 |

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| **99** | | dumpe2fs | 1.4 | 1.3 |
| **100** | | resize2fs | 1.4 | 1.3 |
| **101** | | fsck | 1.4 | x |
| **102** | | tune2fs | 1.4 | 1.3 |
| **103** | | e2label | 1.4 | 1.3 |
| **104** | | /etc/fstab | 1.4 | 1.3 |
| **105** | | /etc/crypttab | 1.4 | 1.3 |
| **106** | | /dev/ | 1.4 | 1.1 |
| **107** | | block, character devices | x | 1.1 |
| **108** | | /dev/null, /dev/urandom, /dev/zero | 2.3 | 1.1 |
| **109** | | /dev/mapper | 1.4 | x |
| **110** | | /dev/disk/by-id | 1.4 | x |
| **111** | | /dev/disk/by-uuid | 1.4 | x |
| **112** | | /dev/disk/by-path | 1.4 | x |
| **113** | | /dev/disk/by-multipath | 1.4 | x |
| **114** | | /etc/mtab | 1.4 | x |
| **115** | | /sys/block | 1.4 | x |
| **116** | | /proc/partitions | 1.4 | 1.3 |
| **117** | | /proc/mounts | 1.4 | 1.3 |
| **118** | | EXT3 | 1.4 | 1.3 |
| **119** | | EXT4 | 1.4 | 1.3 |
| **120** | | XFS | 1.4 | 1.3 |
| **121** | | NFS | 1.4 | 1.3 |
| **122** | | SMB | 1.4 | 1.3 |
| **123** | | CIFS | 1.4 | 1.3 |
| **124** | | NTFS | 1.4 | 1.3 |
| **125** | **Compare and contrast cloud and virtualization concepts and technologies** | | 1.5 | |
| **126** | | VM templates | 1.5 | x |
| **127** | | OVA | 1.5 | x |
| **128** | | OVF | 1.5 | x |
| **129** | | JSON | 1.5 | 3.4 |
| **130** | | YAML | 1.5 | 3.4 |
| **131** | | Container images | 1.5 | 3.2 |
| **132** | | Bootstrapping | 1.5 | 3.5 |
| **133** | | Cloud-init | 1.5 | 3.5 |
| **134** | | Anaconda | 1.5 | x |
| **135** | | Kickstart | 1.5 | x |
| **136** | | Thick vs thin provisioned storage | 1.5 | x |
| **137** | | Persistent volumes | 1.5 | 3.5 |
| **138** | | Blob | 1.5 | x |
| **139** | | Block | 1.5 | x |
| **140** | | Network considerations | 1.5 | 3.5 |
| **141** | | Bridging | 1.5 | 3.5 |
| **142** | | Overlay networks | 1.5 | 3.5 |
| **143** | | NAT | 1.5 | 3.5 |
| **144** | | Local | 1.5 | 3.5 |
| **145** | | Dual-homed | 1.5 | 3.5 |
| **146** | | Types of hypervisors | 1.5 | x |
| **147** | | libvirt | 1.5 | x |
| **148** | | virsh | 1.5 | x |

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| **149** | | vmm | 1.5 | x |
| **150** | **Given a scenario, configure localization options.** | | 1.6 | 1.7 |
| **151** | | /etc/timezone | 1.6 | 1.7 |
| **152** | | /usr/share/zoneinfo | 1.6 | 1.7 |
| **153** | | localectl | 1.6 | 1.7 |
| **154** | | timedatectl | 1.6 | 1.7 |
| **155** | | date | 1.6 | 1.7 |
| **156** | | hwclock | 1.6 | 1.7 |
| **157** | | LC_* | 1.6 | 1.7 |
| **158** | | LC_ALL | 1.6 | 1.7 |
| **159** | | LANG | 1.6 | 1.7 |
| **160** | | TZ | 1.6 | 1.7 |
| **161** | | UTF-8 | 1.6 | 1.7 |
| **162** | | ASCII | 1.6 | 1.7 |
| **163** | | Unicode | 1.6 | 1.7 |
| **164** | **Systems Operation and Maintenance** | | 2.0 | |
| **165** | **Given a scenario, conduct software installations, configurations, updates, and removals** | | 2.1 | |
| **166** | | Kernel updates | x | 1.6 |
| **167** | | Package updates | x | 1.6 |
| **168** | | Package types | 2.1 | 1.6 |
| **169** | | .rpm | 2.1 | 1.6 |
| **170** | | .rpmnew | x | 1.7 |
| **171** | | .rpmsave | x | 1.7 |
| **172** | | .deb | 2.1 | 1.6 |
| **173** | | .tar | 2.1 | 1.6 |
| **174** | | .tgz | 2.1 | 1.6 |
| **175** | | .gz | 2.1 | 1.6 |
| **176** | | Installation tools | 2.1 | 1.6 |
| **177** | | RPM | 2.1 | 1.6 |
| **178** | | Dpkg | 2.1 | 1.6 |
| **179** | | APT | 2.1 | 1.6 |
| **180** | | Yum | 2.1 | 1.6 |
| **181** | | DNF | 2.1 | 1.6 |
| **182** | | Zypper | 2.1 | 1.6 |
| **183** | | Flatpack | x | 1.6 |
| **184** | | snapd | x | 1.6 |
| **185** | | AppImage | x | 1.6 |
| **186** | | build tools | 2.1 | 1.1 |
| **187** | | make | 2.1 | 1.1 |
| **188** | | make install | 2.1 | 1.1 |
| **189** | | ldd | 2.1 | 1.1 |
| **190** | | compilers | 2.1 | 1.1 |
| **191** | | shared libraries | 2.1 | 1.1 |
| **192** | | Repositories | 2.1 | 1.7 |
| **193** | | configuration | 2.1 | 1.7 |
| **194** | | /etc/apt.conf | 2.1 | 1.7 |
| **195** | | /etc/yum.conf | 2.1 | 1.7 |
| **196** | | /etc/dnf/dnf.conf | 2.1 | 1.7 |
| **197** | | /etc/yum.repos.d | 2.1 | 1.7 |
| **198** | | /etc/apt/sources.list.d | 2.1 | 1.7 |

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| **199** | | creation | 2.1 | 1.7 |
| **200** | | syncing | 2.1 | 1.7 |
| **201** | | locations | 2.1 | 1.7 |
| **202** | | Acquisition commands | 2.1 | 1.5 |
| **203** | | wget | 2.1 | 1.5 |
| **204** | | curl | 2.1 | 1.5 |
| **205** | **Given a scenario, manage users and groups** | | 2.2 | |
| **206** | | useradd | 2.2 | 2.2 |
| **207** | | groupadd | 2.2 | 2.2 |
| **208** | | usermod | 2.2 | 2.2 |
| **209** | | groupmod | 2.2 | 2.2 |
| **210** | | passwd | 2.2 | 2.2 |
| **211** | | chage | 2.2 | 2.2 |
| **212** | | userdel | 2.2 | 2.2 |
| **213** | | groupdel | 2.2 | 2.2 |
| **214** | | id | 2.2 | 2.2 |
| **215** | | whoami | 2.2 | 2.2 |
| **216** | | who | 2.2 | 2.2 |
| **217** | | w | 2.2 | 2.2 |
| **218** | | last | 2.2 | 2.2 |
| **219** | | user quota | 2.2 | 4.4 |
| **220** | | group quota | 2.2 | 4.4 |
| **221** | | Profiles | 2.2 | 2.2 |
| **222** | | .bashrc | 2.2 | 2.2 |
| **223** | | .bash_profile | 2.2 | 2.2 |
| **224** | | .profile | 2.2 | 2.2 |
| **225** | | /etc/bashrc | 2.2 | 2.2 |
| **226** | | /etc/profile.d | 2.2 | 2.2 |
| **227** | | /etc/skel | 2.2 | 2.2 |
| **228** | | /etc/profile | 2.2 | 2.2 |
| **229** | | /etc/passwd | 2.2 | 2.2 |
| **230** | | /etc/group | 2.2 | 2.2 |
| **231** | | /etc/shadow | 2.2 | 2.2 |
| **232** | | /etc/login.defs | x | 2.2 |
| **233** | **Given a scenario, create, modify, and redirect files.** | | 2.3 | |
| **234** | | nano | 2.3 | 1.2 |
| **235** | | vi | 2.3 | 1.2 |
| **236** | | stat, file | x | 1.2 |
| **237** | | grep | 2.3 | 3.1 |
| **238** | | egrep | 2.3 | 3.1 |
| **239** | | cat | 2.3 | 3.1 |
| **240** | | tail | 2.3 | 3.1 |
| **241** | | head | 2.3 | 3.1 |
| **242** | | less | 2.3 | 3.1 |
| **243** | | more | 2.3 | 3.1 |
| **244** | | read | 2.3 | 3.1 |
| **245** | | echo | 2.3 | 3.1 |
| **246** | | source | 2.3 | 3.1 |
| **247** | | < | 2.3 | 3.1 |
| **248** | | > | 2.3 | 3.1 |

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| **249** | | \| | 2.3 | 3.1 |
| **250** | | \|\| | 2.3 | 3.1 |
| **251** | | && | 2.3 | 3.1 |
| **252** | | << | 2.3 | 3.1 |
| **253** | | >> | 2.3 | 3.1 |
| **254** | | 2> | 2.3 | 3.1 |
| **255** | | &> | 2.3 | 3.1 |
| **256** | | stdin | 2.3 | 3.1 |
| **257** | | stdout | 2.3 | 3.1 |
| **258** | | stderr | 2.3 | 3.1 |
| **259** | | /dev/null | 2.3 | 3.1 |
| **260** | | /dev/tty | 2.3 | 3.1 |
| **261** | | xargs | 2.3 | 3.1 |
| **262** | | tee | 2.3 | 3.1 |
| **263** | | HEREDOC | 2.3 | 3.1 |
| **264** | | grep | 2.3 | 3.1 |
| **265** | | tr | 2.3 | 3.1 |
| **266** | | echo | 2.3 | 3.1 |
| **267** | | sort | 2.3 | 1.2 |
| **268** | | awk | 2.3 | 1.2 |
| **269** | | sed | 2.3 | 1.2 |
| **270** | | cut | 2.3 | 1.2 |
| **271** | | printf | 2.3 | 1.2 |
| **272** | | egrep | 2.3 | 3.1 |
| **273** | | wc | 2.3 | 3.1 |
| **274** | | paste | 2.3 | x |
| **275** | | touch | 2.3 | 1.2 |
| **276** | | mv | 2.3 | 1.2 |
| **277** | | cp | 2.3 | 1.2 |
| **278** | | rm | 2.3 | 1.2 |
| **279** | | scp | 2.3 | 1.2 |
| **280** | | ls | 2.3 | 1.2 |
| **281** | | rsync | 2.3 | 1.2 |
| **282** | | mkdir | 2.3 | 1.2 |
| **283** | | rmdir | 2.3 | 1.2 |
| **284** | | ln | 2.3 | 1.2 |
| **285** | | symbolic link | 2.3 | 1.2 |
| **286** | | hard link | 2.3 | 1.2 |
| **287** | | unlink | 2.3 | 1.2 |
| **288** | | inodes | 2.3 | x |
| **289** | | find | 2.3 | 3.1 |
| **290** | | locate | 2.3 | x |
| **291** | | grep | 2.3 | 3.1 |
| **292** | | which | 2.3 | x |
| **293** | | whereis | 2.3 | x |
| **294** | | diff | 2.3 | x |
| **295** | | updatedb | 2.3 | x |
| **296** | **Given a scenario, manage services.** | | 2.4 | |
| **297** | | systemctl | 2.4 | 1.4 |
| **298** | | systemd-analyze blame | 2.4 | 4.5 |

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| **299** | | Unit files | 2.4 | 4.5 |
| **300** | | hostnamectl | 2.4 | 1.5 |
| **301** | | resolvectl | x | 1.5 |
| **302** | | automount | 2.4 | x |
| **303** | | systemctl targets | 2.4 | 4.5 |
| **304** | | SysVinit | 2.4 | x |
| **305** | | chkconfig | 2.4 | x |
| **306** | | runlevels | 2.4 | x |
| **307** | | /etc/init.d | 2.4 | x |
| **308** | | /etc/rc.d | 2.4 | x |
| **309** | | /etc/rc.local | 2.4 | x |
| **310** | | /etc/inittab | 2.4 | x |
| **311** | | telinit | 2.4 | x |
| **312** | | runlevel | 2.4 | x |
| **313** | | service (command) | 2.4 | x |
| **314** | **Summarize and explain server roles.** | | 2.5 | |
| **315** | | Syslog configuration | 3.4 | 1.7 |
| **316** | | NTP configuration | x | 1.7 |
| **317** | | Chrony configuration | x | 1.7 |
| **318** | | SSH configuration | x | 1.7 |
| **319** | | NTP | 2.5 | x |
| **320** | | SSH | 2.5 | x |
| **321** | | Web | 2.5 | x |
| **322** | | Certificate authority | 2.5 | x |
| **323** | | Name server | 2.5 | x |
| **324** | | DHCP | 2.5 | x |
| **325** | | File servers | 2.5 | x |
| **326** | | Authentication | 2.5 | x |
| **327** | | Proxy | 2.5 | x |
| **328** | | Logging | 2.5 | x |
| **329** | | Containers | 2.5 | 3.2 |
| **330** | | VPN | 2.5 | x |
| **331** | | Monitoring | 2.5 | x |
| **332** | | Database | 2.5 | x |
| **333** | | Print server | 2.5 | x |
| **334** | | Mail | 2.5 | x |
| **335** | | Load balancer | 2.5 | x |
| **336** | | Clustering | 2.5 | x |
| **337** | **Given a scenario, automate and schedule jobs** | | 2.6 | |
| **338** | | cron | 2.6 | 1.4 |
| **339** | | at | 2.6 | 1.4 |
| **340** | | crontab | 2.6 | 1.4 |
| **341** | | fg | 2.6 | 1.4 |
| **342** | | bg | 2.6 | 1.4 |
| **343** | | & | 2.6 | 1.4 |
| **344** | | kill | 2.6 | 1.4 |
| **345** | | ctrl c | 2.6 | 1.4 |
| **346** | | ctrl z | 2.6 | 1.4 |
| **347** | | nohup | 2.6 | 1.4 |
| **348** | **Explain the use and operation of Linux devices.** | | 2.7 | |

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| **349** | | Types of devices | 2.7 | x |
| **350** | | Bluetooth | 2.7 | x |
| **351** | | wifi | 2.7 | x |
| **352** | | USB | 2.7 | x |
| **353** | | monitors | 2.7 | x |
| **354** | | GPIO | 2.7 | x |
| **355** | | network adapters | 2.7 | x |
| **356** | | PCI | 2.7 | x |
| **357** | | HBA | 2.7 | x |
| **358** | | SATA | 2.7 | x |
| **359** | | SCSI | 2.7 | x |
| **360** | | Printers | 2.7 | x |
| **361** | | video | 2.7 | x |
| **362** | | audio | 2.7 | x |
| **363** | | lsdev | 2.7 | 1.1 |
| **364** | | lsusb | 2.7 | 1.1 |
| **365** | | lspci | 2.7 | 1.1 |
| **366** | | lsblk | 2.7 | 1.3 |
| **367** | | lsscsi | x | 1.3 |
| **368** | | fcstat | x | 1.3 |
| **369** | | dmesg | 2.7 | x |
| **370** | | lpr | 2.7 | x |
| **371** | | lpq | 2.7 | x |
| **372** | | abrt | 2.7 | x |
| **373** | | CUPS | 2.7 | x |
| **374** | | udevadm | 2.7 | x |
| **375** | | /proc | 2.7 | 1.1 |
| **376** | | /sys | 2.7 | 1.1 |
| **377** | | /dev/ | 2.7 | 1.1 |
| **378** | | /dev/mapper | 2.7 | x |
| **379** | | /etc/X11 | 2.7 | x |
| **380** | | Hot pluggable devices | 2.7 | x |
| **381** | | /usr/lib/udev/rules.d | 2.7 | x |
| **382** | | /run/udev/rules.d | 2.7 | x |
| **383** | | /etc/udev/rules.d | 2.7 | x |
| **384** | **Compare and contrast Linux graphical user interfaces.** | | 2.8 | x |
| **385** | | Wayland | 2.8 | x |
| **386** | | X11 | 2.8 | x |
| **387** | | Gnome | 2.8 | x |
| **388** | | Unity | 2.8 | x |
| **389** | | Cinnamon | 2.8 | x |
| **390** | | MATE | 2.8 | x |
| **391** | | KDE | 2.8 | x |
| **392** | | VNC | 2.8 | x |
| **393** | | XRDP | 2.8 | x |
| **394** | | NX | 2.8 | x |
| **395** | | Spice | 2.8 | x |
| **396** | | SSH X11 portforwarding | 2.8 | x |
| **397** | | Accessibility | 2.8 | x |
| **398** | **Security** | | 3.0 | |

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| **399** | **Given a scenario, apply or acquire the appropriate user and/or group permissions and ownership** | | 3.1 | |
| **400** | | File and directory permissions | 3.1 | 2.5 |
| **401** | | Read, Write, Execute | 3.1 | 2.5 |
| **402** | | User, Group, Other | 3.1 | 2.5 |
| **403** | | SUID | 3.1 | 2.5 |
| **404** | | Octal notation | 3.1 | 2.5 |
| **405** | | umask | 3.1 | 2.5 |
| **406** | | sticky bit | 3.1 | 2.5 |
| **407** | | SGID | 3.1 | 2.5 |
| **408** | | Inheritance | 3.1 | x |
| **409** | | chmod | 3.1 | 2.5 |
| **410** | | chown | 3.1 | 2.5 |
| **411** | | chgrp | 3.1 | 2.5 |
| **412** | | getfacl | 3.1 | 2.5 |
| **413** | | setfacl | 3.1 | 2.5 |
| **414** | | ls | 3.1 | 2.5 |
| **415** | | ulimit | 3.1 | x |
| **416** | | chage | 3.1 | 2.2 |
| **417** | | Context-based permission | 3.1 | 2.5 |
| **418** | | SELinux configuration | 3.1 | 2.5 |
| **419** | | SELinux policies | 3.1 | 2.5 |
| **420** | | SELinux tools | 3.1 | 2.5 |
| **421** | | setenforce | 3.1 | 2.5 |
| **422** | | getenforce | 3.1 | 2.5 |
| **423** | | sestatus | 3.1 | 2.5 |
| **424** | | setsebool | 3.1 | 2.5 |
| **425** | | getsebool | 3.1 | 2.5 |
| **426** | | semanage | x | 2.5 |
| **427** | | audit2allow | x | 2.5 |
| **428** | | chcon | 3.1 | 2.5 |
| **429** | | restorecon | 3.1 | 2.5 |
| **430** | | ls -Z | 3.1 | 2.5 |
| **431** | | ps -Z | 3.1 | 2.5 |
| **432** | | AppArmor | 3.1 | 2.5 |
| **433** | | aa-disable | 3.1 | 2.5 |
| **434** | | aa-complain | 3.1 | 2.5 |
| **435** | | aa-unconfined | 3.1 | 2.5 |
| **436** | | /etc/apparmor.d/ | 3.1 | 2.5 |
| **437** | | /etc/apparmor.d/tunables | 3.1 | 2.5 |
| **438** | | Privilege escalation | 3.1 | 2.4 |
| **439** | | PolicyKit rules | x | 2.4 |
| **440** | | pkexec | x | 2.4 |
| **441** | | su | 3.1 | 2.4 |
| **442** | | sudo | 3.1 | 2.4 |
| **443** | | wheel | 3.1 | x |
| **444** | | visudo | 3.1 | 2.4 |
| **445** | | sudoedit | 3.1 | x |
| **446** | | User types | 3.1 | x |
| **447** | | root | 3.1 | x |
| **448** | | standard user | 3.1 | x |

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| 449 | | service user | 3.1 | x |
| 450 | **Given a scenario, configure and implement appropriate access and authentication methods** | | 3.2 | |
| 451 | | PAM | 3.2 | 2.1 |
| 452 | | password policies | 3.2 | 2.1 |
| 453 | | LDAP integration | 3.2 | 2.1 |
| 454 | | user lockout | 3.2 | 2.1 |
| 455 | | Required, optional, sufficient | 3.2 | 2.1 |
| 456 | | /etc/pam.d | 3.2 | 2.1 |
| 457 | | pam_tally2 | 3.2 | 2.2 |
| 458 | | faillock | 3.2 | 2.2 |
| 459 | | SSH | 3.2 | 2.4 |
| 460 | | Port forwarding | x | 2.4 |
| 461 | | Dynamic forwarding | x | 2.4 |
| 462 | | X11 forwarding | x | 2.4 |
| 463 | | ~/.ssh/ | 3.2 | 2.4 |
| 464 | | known_hosts | 3.2 | 2.4 |
| 465 | | authorized_keys | 3.2 | 2.4 |
| 466 | | config | 3.2 | 2.4 |
| 467 | | id_rsa | 3.2 | 2.4 |
| 468 | | id_rsa.pub | 3.2 | 2.4 |
| 469 | | User-specific access | 3.2 | 2.4 |
| 470 | | TCP wrappers | 3.2 | x |
| 471 | | /etc/ssh | 3.2 | 2.4 |
| 472 | | ssh_config | 3.2 | 2.4 |
| 473 | | sshd_config | 3.2 | 2.4 |
| 474 | | ssh-copy-id | 3.2 | 2.4 |
| 475 | | ssh-keygen | 3.2 | 2.4 |
| 476 | | ssh-add | 3.2 | 2.4 |
| 477 | | TTY | 3.2 | x |
| 478 | | /etc/securetty | 3.2 | x |
| 479 | | /dev/tty# | 3.2 | x |
| 480 | | PTY | 3.2 | x |
| 481 | | PKI | 3.2 | 2.1 |
| 482 | | self-signed | 3.2 | 2.1 |
| 483 | | private keys | 3.2 | 2.1 |
| 484 | | public keys | 3.2 | 2.1 |
| 485 | | hashing | 3.2 | 2.1 |
| 486 | | digital signatures | 3.2 | 2.1 |
| 487 | | Message digest | 3.2 | 2.1 |
| 488 | | Wildcard certificates | x | 2.1 |
| 489 | | Certificate authority | x | 2.1 |
| 490 | | Certificate use cases | x | 2.1 |
| 491 | | SSL/TLS, authentication, encryption | x | 2.1 |
| 492 | | VPN as a client | 3.2 | x |
| 493 | | SSL/TLS | 3.2 | x |
| 494 | | transport mode | 3.2 | x |
| 495 | | tunnel mode | 3.2 | x |
| 496 | | IPSec | 3.2 | x |
| 497 | | DTLS | 3.2 | x |
| 498 | **Summarize security best practices in a Linux environment** | | 3.3 | |

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|---|---|---|---|---|
| **499** | | Boot security | 3.3 | 2.1 |
| **500** | | boot loader password | 3.3 | 2.1 |
| **501** | | UEFI/BIOS password | 3.3 | 2.1 |
| **502** | | Additional authentication methods | 3.3 | 2.1 |
| **503** | | multifactor authentication | 3.3 | 2.1 |
| **504** | | SSSD | x | 2.1 |
| **505** | | SSO | x | 2.1 |
| **506** | | tokens | 3.3 | 2.1 |
| **507** | | OTP | 3.3 | 2.1 |
| **508** | | biometrics | 3.3 | x |
| **509** | | RADIUS | 3.3 | x |
| **510** | | TACACS+ | 3.3 | x |
| **511** | | LDAP | 3.3 | 2.1 |
| **512** | | Kerberos | 3.3 | x |
| **513** | | kinit | 3.3 | x |
| **514** | | klist | 3.3 | x |
| **515** | | Disabling root SSH | 3.3 | 2.1 |
| **516** | | Passwordless login | 3.3 | x |
| **517** | | chroot jail services | 3.3 | x |
| **518** | | no shared IDs | 3.3 | x |
| **519** | | Importance of denying hosts | 3.3 | 2.1 |
| **520** | | Configure host firewall | x | 2.1 |
| **521** | | Separate OS and application data | 3.3 | x |
| **522** | | Change default ports | 3.3 | x |
| **523** | | Uinstall or disable unused services | 3.3 | 2.1 |
| **524** | | FTP | 3.3 | x |
| **525** | | Telnet | 3.3 | x |
| **526** | | Finger | 3.3 | x |
| **527** | | Sendmail | 3.3 | x |
| **528** | | Postfix | 3.3 | x |
| **529** | | Enabling SSL/TLS | 3.3 | 2.1 |
| **530** | | Enabling auditd | 3.3 | 2.1 |
| **531** | | CVE monitoring | 3.3 | 2.1 |
| **532** | | Discourage use of USB devices | 3.3 | x |
| **533** | | Disk encryption | 3.3 | x |
| **534** | | LUKS | 3.3 | 1.3 |
| **535** | | Restrict cron access | 3.3 | x |
| **536** | | Disable ctrl+alt+del | 3.3 | x |
| **537** | | Add banner | 3.3 | x |
| **538** | | MOTD | 3.3 | x |
| **539** | | Enforce password strength | x | 2.1 |
| **540** | **Given a scenario, implement logging services.** | | 3.4 | |
| **541** | | /var/log/secure | 3.4 | x |
| **542** | | /var/log/messages | 3.4 | x |
| **543** | | /var/log/[application] | 3.4 | x |
| **544** | | /var/log/kern.log | 3.4 | x |
| **545** | | Log management | 3.4 | 2.1 |
| **546** | | logging agents | 3.4 | x |
| **547** | | logrotate | 3.4 | x |
| **548** | | /etc/rsyslog.conf | 3.4 | 1.7 |

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| 549 | | journald | 3.4 | 4.5 |
| 550 | | journalctl | 3.4 | 4.5 |
| 551 | | lastb | 3.4 | x |
| 552 | **Given a scenario, implement and configure Linux firewalls** | | 3.5 | |
| 553 | | Access control lists | 3.5 | 2.3 |
| 554 | | source address | 3.5 | 2.3 |
| 555 | | destination address | 3.5 | 2.3 |
| 556 | | ports | 3.5 | 2.3 |
| 557 | | protocol | 3.5 | 2.3 |
| 558 | | logging | 3.5 | 2.3 |
| 559 | | stateful vs stateless | 3.5 | 2.3 |
| 560 | | accept, reject, drop, log | 3.5 | 2.3 |
| 561 | | firewalld | 3.5 | 2.3 |
| 562 | | zones | 3.5 | 2.3 |
| 563 | | iptables | 3.5 | 2.3 |
| 564 | | chains | 3.5 | 2.3 |
| 565 | | persistance | 3.5 | 2.3 |
| 566 | | UFW | 3.5 | 2.3 |
| 567 | | /etc/default/ufw | 3.5 | 2.3 |
| 568 | | /etc/ufw | 3.5 | 2.3 |
| 569 | | netfilter | 3.5 | 2.3 |
| 570 | | IP forwarding | 3.5 | 2.3 |
| 571 | | /proc/sys/net/ipv4/ip_forward | 3.5 | 2.3 |
| 572 | | /proc/sys/net/ipv6/conf/all/forwarding | 3.5 | 2.3 |
| 573 | | Dynamic rule sets | 3.5 | x |
| 574 | | denyhosts | 3.5 | x |
| 575 | | fail2ban | 3.5 | x |
| 576 | | ipset | 3.5 | x |
| 577 | | /etc/services | 3.5 | x |
| 578 | | privileged ports | 3.5 | x |
| 579 | **Given a scenario, backup, restore, and compress files.** | | 3.6 | |
| 580 | | tar | 3.6 | 1.2 |
| 581 | | cpio | 3.6 | 1.2 |
| 582 | | dd | 3.6 | 1.2 |
| 583 | | gzip | 3.6 | 1.2 |
| 584 | | dz | 3.6 | 1.2 |
| 585 | | bzip2 | 3.6 | 1.2 |
| 586 | | zip | 3.6 | 1.2 |
| 587 | | Backup types | 3.6 | x |
| 588 | | incremental, full, snapshot clones, differential, image | 3.6 | x |
| 589 | | Off-site / off-system | 3.6 | x |
| 590 | | SFTP | 3.6 | 1.2, 1.5 |
| 591 | | SCP | 3.6 | 1.2, 1.5 |
| 592 | | rsync | 3.6 | 1.2, 1.5 |
| 593 | | nc | x | 1.2, 1.5 |
| 594 | | Integrity checks | 3.6 | x |
| 595 | | MD5, SHA | 3.6 | x |
| 596 | **Linux Troubleshooting and Diagnostics** | | 4.0 | |
| 597 | **Given a scenario, analyze system properties and remediate accordingly** | | 4.1 | |
| 598 | | Network monitoring and configuration | 4.1 | 4.2 |

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| **599** | | openssl s_client | x | 4.2 |
| **600** | | latency | 4.1 | 4.2 |
| **601** | | bandwidth | 4.1 | 4.2 |
| **602** | | throughput | 4.1 | 4.2 |
| **603** | | routing | 4.1 | 4.2 |
| **604** | | saturation | 4.1 | 4.2 |
| **605** | | packet drop | 4.1 | 4.2 |
| **606** | | timeouts | 4.1 | 4.2 |
| **607** | | name resolution | 4.1 | 4.2 |
| **608** | | localhost vs Unix sockets | 4.1 | x |
| **609** | | network adapters | 4.1 | x |
| **610** | | RDMA drivers | 4.1 | x |
| **611** | | interface configuration | 4.1 | x |
| **612** | | nmap | 4.1 | 1.5, 4.2 |
| **613** | | netstat | 4.1 | 1.5 |
| **614** | | iftop | 4.1 | 1.5 |
| **615** | | route | 4.1 | 1.5 |
| **616** | | iperf | 4.1 | 1.5 |
| **617** | | tcpdump | 4.1 | 1.5 |
| **618** | | ipset | 4.1 | 1.5 |
| **619** | | wireshark | 4.1 | 1.5 |
| **620** | | tshark | 4.1 | 1.5 |
| **621** | | netcat | 4.1 | 1.5 |
| **622** | | traceroute | 4.1 | 1.5 |
| **623** | | mtr | 4.1 | 1.5 |
| **624** | | arp | 4.1 | 1.5 |
| **625** | | nslookup | 4.1 | 1.5 |
| **626** | | dig | 4.1 | 1.5 |
| **627** | | host | 4.1 | 1.5 |
| **628** | | whois | 4.1 | 1.5 |
| **629** | | ping | 4.1 | 1.5 |
| **630** | | nmcli | 4.1 | 1.5 |
| **631** | | ip | 4.1 | 1.5 |
| **632** | | tracepath | 4.1 | 1.5 |
| **633** | | Storage monitoring and configuration | 4.1 | 4.1 |
| **634** | | iostat | 4.1 | 4.1 |
| **635** | | ioping | 4.1 | 4.1 |
| **636** | | IO scheduling | 4.1 | 4.1 |
| **637** | | cfq, noop, deadline | 4.1 | 4.1 |
| **638** | | du | 4.1 | 4.1 |
| **639** | | df | 4.1 | 4.1 |
| **640** | | LVM | 4.1 | 4.1 |
| **641** | | fsck | 4.1 | 4.1 |
| **642** | | partprobe | 4.1 | 1.3 |
| **643** | | CPU monitoring and configuration | 4.1 | 4.3 |
| **644** | | Runaway process | x | 4.3 |
| **645** | | Zombie process | x | 4.3 |
| **646** | | High CPU, high load, high run queue | x | 4.3 |
| **647** | | CPU times: steal, user, system, idle, iowait | x | 4.3 |
| **648** | | CPU process priority | x | 4.3 |

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| **649** | | /proc/cpuinfo | 4.1 | 4.3 |
| **650** | | uptime | 4.1 | x |
| **651** | | loadaverage | 4.1 | 4.3 |
| **652** | | sar | 4.1 | x |
| **653** | | sysctl | 4.1 | 1.7 |
| **654** | | Memory monitoring and configuration | 4.1 | 4.3 |
| **655** | | swapon | 4.1 | 4.3 |
| **656** | | swapoff | 4.1 | 4.3 |
| **657** | | mkswap | 4.1 | 4.3 |
| **658** | | vmstat | 4.1 | 4.3 |
| **659** | | out of memory killer | 4.1 | 4.3 |
| **660** | | memory leak, process killer | x | 4.3 |
| **661** | | free | 4.1 | 4.3 |
| **662** | | /proc/meminfo | 4.1 | 4.3 |
| **663** | | buffer cache output | 4.1 | 4.3 |
| **664** | | Lost root password | 4.1 | x |
| **665** | | single user mode | 4.1 | x |
| **666** | **Given a scenario, analyze system processes in order to optimize performance** | | 4.2 | 1.4 |
| **667** | | Process management | 4.2 | 1.4 |
| **668** | | Process states | 4.2 | 1.4 |
| **669** | | zombie, uninterruptible sleep, interruptible sleep, running | 4.2 | 1.4 |
| **670** | | Priorities | 4.2 | 1.4 |
| **671** | | kill signals | 4.2 | 1.4 |
| **672** | | nice | 4.2 | 1.4, 4.3 |
| **673** | | renice | 4.2 | 1.4, 4.3 |
| **674** | | top | 4.2 | 1.4 |
| **675** | | time | 4.2 | 1.4 |
| **676** | | ps | 4.2 | 1.4 |
| **677** | | lsof | 4.2 | 1.4 |
| **678** | | pgrep | 4.2 | 1.4 |
| **679** | | pkill | 4.2 | 1.4 |
| **680** | | PIDs | 4.2 | 1.4 |
| **681** | **Given a scenario, analyze and troubleshoot user issues.** | | 4.3 | |
| **682** | | File and directory permissions | 4.3 | 4.4 |
| **683** | | group, permissions, ACL | 4.3 | 4.4 |
| **684** | | Context, attributes | 4.3 | 4.4 |
| **685** | | policy/non-policy | 4.3 | 4.4 |
| **686** | | Local and remote access | 4.3 | 4.4 |
| **687** | | Password issues | 4.3 | 4.4 |
| **688** | | Authentication | 4.3 | 4.4 |
| **689** | | Local, external, policy violations | 4.3 | 4.4 |
| **690** | | quotas | 4.3 | 4.4 |
| **691** | | storage | 4.3 | 4.1 |
| **692** | | inode exhaustion | 4.3 | 4.1 |
| **693** | | immutable files | 4.3 | 4.4 |
| **694** | | Insufficient privileges for authorization | 4.3 | x |
| **695** | | SELinux violations | 4.3 | x |
| **696** | | Environment and shell issues | 4.3 | 3.1 |
| **697** | **Given a scenario, analyze and troubleshoot application and hardware issues** | | 4.4 | |
| **698** | | SELinux violations | 4.4 | 2.5 |

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| **699** | | degraded storage | 4.4 | 4.1 |
| **700** | | missing devices | 4.4 | 4.1 |
| **701** | | missing volumes | 4.4 | 4.1 |
| **702** | | missing mount point | 4.4 | 4.1 |
| **703** | | performance issues | 4.4 | 4.1 |
| **704** | | resource exhaustion | 4.4 | 4.1 |
| **705** | | storage adapters | 4.4 | 4.1 |
| **706** | | SCSI, RAID, SATA, HBA | 4.4 | 4.1 |
| **707** | | /sys/class/scsi_host/host#/scan | 4.4 | x |
| **708** | | storage integrity | 4.4 | 4.1 |
| **709** | | bad blocks | 4.4 | x |
| **710** | | Firewall issues | 4.4 | 4.2 |
| **711** | | restrictive ACLs | 4.4 | 4.2 |
| **712** | | blocked ports, protocols | 4.4 | 4.2 |
| **713** | | File permissions | 4.4 | 4.4 |
| **714** | | ownership, executable, inheritance, service accounts | 4.4 | 4.4 |
| **715** | | Dependencies | 4.4 | x |
| **716** | | patching | 4.4 | x |
| **717** | | update issues | 4.4 | x |
| **718** | | versioning | 4.4 | x |
| **719** | | libraries | 4.4 | x |
| **720** | | environment variables | 4.4 | 3.1 |
| **721** | | GCC compatibility | 4.4 | x |
| **722** | | Repositories | 4.4 | x |
| **723** | | Additional hardware issues | 4.4 | x |
| **724** | | memory | 4.4 | x |
| **725** | | printers | 4.4 | x |
| **726** | | video | 4.4 | x |
| **727** | | communications ports | 4.4 | x |
| **728** | | USB | 4.4 | x |
| **729** | | keyboard mapping | 4.4 | x |
| **730** | | hardware or software | 4.4 | x |
| **731** | | dmidecode | 4.4 | 1.1 |
| **732** | | lshw | 4.4 | 1.1 |
| **733** | **Automation and Scripting** | | 5.0 | |
| **734** | **Given a scenario, deploy and execute basic BASH scripts** | | 5.1 | |
| **735** | | Shell environments and shell variables | 5.1 | 3.1 |
| **736** | | PATH | 5.1 | 3.1 |
| **737** | | global | 5.1 | 3.1 |
| **738** | | local | 5.1 | 3.1 |
| **739** | | export | 5.1 | 3.1 |
| **740** | | env | 5.1 | 3.1 |
| **741** | | set | 5.1 | 3.1 |
| **742** | | printenv | 5.1 | 3.1 |
| **743** | | echo | 5.1 | 3.1 |
| **744** | | #!/bin/bash | 5.1 | 3.1 |
| **745** | | sourcing scripts | 5.1 | 3.1 |
| **746** | | File and directory permissions | 5.1 | 2.5 |
| **747** | | chmod | 5.1 | 2.5 |
| **748** | | extensions | 5.1 | x |

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| 749 | | commenting | 5.1 | 3.1 |
| 750 | | file globbing | 5.1 | 3.1 |
| 751 | | shell expansion | 5.1 | 3.1 |
| 752 | | ${}, $(), ``  | 5.1 | 3.1 |
| 753 | | Redirection and piping | 5.1 | 3.1 |
| 754 | | exit codes | 5.1 | 3.1 |
| 755 | | stderr | 5.1 | 3.1 |
| 756 | | stdin | 5.1 | 3.1 |
| 757 | | stdout | 5.1 | 3.1 |
| 758 | | metacharacters | 5.1 | x |
| 759 | | positional parameters | 5.1 | x |
| 760 | | looping constructs | 5.1 | 3.1 |
| 761 | | while, for, until | 5.1 | 3.1 |
| 762 | | conditional statements | 5.1 | 3.1 |
| 763 | | if, case | 5.1 | 3.1 |
| 764 | | escaping characters | 5.1 | 3.1 |
| 765 | | Comparison operators | x | 3.1 |
| 766 | | Arithmetic, string boolean | x | 3.1 |
| 767 | **Given a scenario, carry out version control using Git.** | | 5.2 | 3.3 |
| 768 | | clone | 5.2 | 3.3 |
| 769 | | push | 5.2 | 3.3 |
| 770 | | pull | 5.2 | 3.3 |
| 771 | | commit | 5.2 | 3.3 |
| 772 | | merge | 5.2 | 3.3 |
| 773 | | branch | 5.2 | 3.3 |
| 774 | | log | 5.2 | 3.3 |
| 775 | | init | 5.2 | 3.3 |
| 776 | | config | 5.2 | 3.3 |
| 777 | | .gitignore | 5.2 | 3.3 |
| 778 | | .git/ | 5.2 | 3.3 |
| 779 | **Summarize orchestration processes and concepts.** | | 5.3 | 3.4 |
| 780 | | agent, agentless | 5.3 | 3.4 |
| 781 | | procedures | 5.3 | 3.4 |
| 782 | | attributes | 5.3 | 3.4 |
| 783 | | infrastructure automation | 5.3 | 3.4 |
| 784 | | infrastructure as code | 5.3 | 3.4 |
| 785 | | inventory | 5.3 | 3.4 |
| 786 | | automated configuration management | 5.3 | 3.4 |
| 787 | | build automation | 5.3 | 3.4 |
| 788 | | Ansible | x | 3.4 |
| 789 | | Puppet | x | 3.4 |
| 790 | | Chef | x | 3.4 |
| 791 | | SaltStack | x | 3.4 |
| 792 | | Terraform | x | 3.4 |
| 793 | | Continuous Integration / Continuous Deployment CI/CD | x | 3.4 |
| 794 | | Advanced Git topics | x | 3.4 |
| 795 | | Git merge, pull request, rebase | x | 3.4 |
| 796 | **Given a scenario, perform basic container operations** | | x | 3.2 |
| 797 | | Container management | x | 3.2 |
| 798 | | Starting/stopping | x | 3.2 |

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| 799 | | Inspecting | x | 3.2 |
| 800 | | Listing | x | 3.2 |
| 801 | | Deploying existing images - Connecting to containers - Logging | x | 3.2 |
| 802 | | Exposing ports | x | 3.2 |
| 803 | | Container image operations | x | 3.2 |
| 804 | | build | x | 3.2 |
| 805 | | push | x | 3.2 |
| 806 | | pull | x | 3.2 |
| 807 | | list | x | 3.2 |
| 808 | | rmi | x | 3.2 |
| 809 | **Summarize container, cloud, and orchestration concepts** | | x | 3.5 |
| 810 | | Kubernetes benefits and application use cases | x | 3.5 |
| 811 | | Pods | x | 3.5 |
| 812 | | Sidecars | x | 3.5 |
| 813 | | Ambassador containers | x | 3.5 |
| 814 | | Single-node, multicontainer use cases | x | 3.5 |
| 815 | | Compose | x | 3.5 |
| 816 | | Container persistent storage | x | 3.5 |
| 817 | | Container networks | x | 3.5 |
| 818 | | Overlay networks | x | 3.5 |
| 819 | | Bridging | x | 3.5 |
| 820 | | Network address translation (NAT) | x | 3.5 |
| 821 | | Host-only | x | 3.5 |
| 822 | | Service mesh | x | 3.5 |
| 823 | | Bootstrapping | x | 3.5 |
| 824 | | Cloud-init | x | 3.5 |
| 825 | | Container registries | x | 3.5 |
| 826 | **Given a scenario, use systemd to diagnose and resolve common problems with a Linux system** | | x | 4.5 |
| 827 | | Unit files | 2.4 | 4.5 |
| 828 | | TYPE: Service | 2.4 | 4.5 |
| 829 | | Networking services | x | 4.5 |
| 830 | | ExecStart/ExecStop | x | 4.5 |
| 831 | | Before/after | x | 4.5 |
| 832 | | Type | x | 4.5 |
| 833 | | User | x | 4.5 |
| 834 | | Requires/wants | x | 4.5 |
| 835 | | TYPE: Timer | x | 4.5 |
| 836 | | OnCalendar | x | 4.5 |
| 837 | | OnBootSec | x | 4.5 |
| 838 | | Unit | x | 4.5 |
| 839 | | Time expressions | x | 4.5 |
| 840 | | TYPE: Mount | x | 4.5 |
| 841 | | Naming conventions | x | 4.5 |
| 842 | | What | x | 4.5 |
| 843 | | Where | x | 4.5 |
| 844 | | Type | x | 4.5 |
| 845 | | Options | x | 4.5 |
| 846 | | TYPE: Target | 2.4 | 4.5 |
| 847 | | Default | x | 4.5 |
| 848 | | Multiuser | x | 4.5 |

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|---|---|---|---|---|
| **849** | | Network-online | x | 4.5 |
| **850** | | Graphical | x | 4.5 |
| **851** | | Common problems | x | 4.5 |
| **852** | | Name resolution failure | x | 4.5 |
| **853** | | Application crash | x | 4.5 |
| **854** | | Time-zone configuration | x | 4.5 |
| **855** | | Boot issues | x | 4.5 |
| **856** | | Journal issues | x | 4.5 |
| **857** | | Services not starting on time | x | 4.5 |
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