BSD Professional Certification

Job Task Analysis Survey Results

March 21, 2010

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Executive Summary

In October, 2009, the BSD Certification Group (BSDCG) initiated a survey to determine the most important and most frequent job tasks that senior level BSD system administrators perform. The intent of the survey was to gather data to guide the direction of the "BSD Professional Certification Exam". The results of that survey are included in this report, "BSD Professional Job Task Analysis Survey Results".

The report highlights several interesting facts. Overall, the responders:

- Represented over 30 countries, notably the USA, Russian Federation, and Brazil; although Canada, most of Europe, the Middle East, Southeast Asia, Australia and New Zealand, Africa, and other parts of Middle and South America were included
- Were male, 21-45 years of age, used BSD extensively, and were employed with direct hands-on experience as system administrators, developers, consultants, or "other"
- Held by majority that the BSDP exam should be composed of both a multiple-choice exam and a hands-on lab
- Commented liberally on many topics throughout the survey

The remaining additional detail on job tasks provides extensive guidance on preparing the knowledge domains for the exam. This work continues and progress will be announced by the BSD Certification Group as it moves forward.

Introduction

This document describes the results from the BSD Certification Group Job Task Analysis (JTA) survey for the BSD Professional (BSDP) certification. The JTA describes the tasks that a senior level BSD system administrator regularly performs. The JTA is the first step in exam creation that is based on psychometrics (see box)[1].

This is the second exam created by the BSD Certification Group (BSDCG) to help employers, managers, and others assess the skill profile of BSD system administrators. In 2006, the BSDCG created the first psychometrically valid exam for BSD administrators, the BSD Associate Exam (BSDA).

> **What is Psychometrics?**
>
> **Psychometrics** is the field of study concerned with the theory and technique of psychological measurement, which includes the measurement of knowledge, abilities, attitudes and personality traits.
>
> Psychometrics is applied widely in a variety of testing areas including educational, intelligence, psychomotor and personality assessments.
>
> A **psychometrician** is one who applies psychometric techniques to the creation and maintenance of tests and examinations.

Purpose

This report is intended to help determine the tasks that should be assessed by the BSDP exam. This exam is a more in-depth exam than the BSD Associate exam, and is intended to cover more advanced topics. The typical BSD Professional is experienced in using one or more versions of BSD such as NetBSD, FreeBSD, OpenBSD, DragonFly, or other BSD system for several years; may be employed as a senior BSD administrator; and typically has a well developed knowledge of shell scripting, user administration, file and filesystem maintenance, kernel tuning, and many other technical tasks.

Methodology

Similar to the previous BSDA Job Task Analysis Survey, this survey was constructed using the PHP Easy Survey Package (phpESP – phpesp.sourceforge.net). The survey was composed of over 190 technical questions covering twelve different knowledge domains. The survey intended to determine the "Importance" and "Frequency" of each item. Further explanation for Importance and Frequency is found below.

The survey was activated in October 2009 and ran until the end of November. Once the survey ended, a detailed analysis began. The results for each question were examined, along with the comments for that section. The results, along with the comments, form the basis for this survey report.

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1 For more information about psychometrics, see the document "The Importance of Psychometrics" at
   http://www.bsdcertification.org/downloads/psychometric.pdf

Notes on Survey Accuracy

As in the previous survey, the survey was open to anyone who wanted to complete the survey. Thus, there was no formal target audience or control group. There was also no attempt to prevent responses from any group, country, or other criteria.

The only requirement was that the survey be completed in its entirety. The phpESP survey engine itself tracked those responders that started but did not finish the entire survey. Those responders that did not finish the survey are not represented within these results.

BSDP JTA Survey Results

Before launching into the details of each question category, it is helpful to review the parameters for the survey. Survey responders were asked to evaluate each item for its "Importance" and its "Frequency" as follows:

- **Importance** - Rate the task importance. Scale ranges from 'not important for a BSDP to know' (Very Low) to 'very important for a BSDP to know' (Very High).
- **Frequency** - Rate the task frequency. Scale ranges from 'less than once per month' (Less Than 1X/Month) to 'more than once per day' (Multiple X/Day).

Table 1 shows the key for interpreting the numerical results for the survey graphs.

KEY					
	Very Low	Low	Medium	High	Very High
Importance	1	2	3	4	5
	Less Than 1X/ Month	Monthly	Weekly	Daily	Multiple X/ Day
Frequency	1	2	3	4	5

Table 1: Key for Job Task Analysis Results

Many responders pointed out that there are some tasks that are generally only done once in the life of the system, such as formatting the root file system, or performing an initial installation. These were generally assumed to be Frequency "Less Than 1X per Month".

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Comments

The BSDP JTA Survey included a "Comments" section at the end of each category, and an "Additional Comments" section toward the end of the survey. These sections allowed the survey responders to voice their opinions on the items in category, or the survey itself. All comments are included in this report.

Each comment starts with the "➤" symbol. The comments themselves are displayed in alphabetical order by first word. This is a function of the survey engine used, and does not reflect any value of importance used in ordering the comments. The comments have been lightly edited for readability, but are otherwise untouched. Finally, the comments are the views of the survey responder only, and do not represent the views of the BSD Certification Group.

As in the results for the BSDA JTA survey, a number of the responders from the BSD community hold strong opinions on various topics. A summary of each section follows.

INSTALLATION and SETUP

A number of comments voiced concerns about the installation process itself, and that BSD systems tend to focus on standard CD/DVD interactive installations instead of PXE boot environments with scripted installations which are much more common in large enterprises. Others noted that technical prowess in this area needs to include interactive, network, and virtual installations; as well as after-installation activities such as package installation.

Several comments noted that installations tend to be 'one-shot' activities, i.e. "Less than 1X/Month" and should not carry that much weight. The lack of a "good installer" is a recurring theme.

SECURITY

The security category included the most highly rated response for Importance ('Applying security patches' – See Table 2) and was the highest rated category overall. Comments voiced strong concerns about the lack of capabilities to enable security in a corporate context during the initial install (through automatic assignment of user profiles through Windows AD for example) and lack of frameworks to manage and enforce security policy. Additional comments about specific application security settings (sendmail, ipfw, PAM, pf, etc.) were balanced by the view that the BSD Professional should be able to quickly assess problems and solve them with commonly available resources, such as manual pages and Internet access.

FILESYSTEMS and FILES

A variety of comments were spread across several topics- RAID, drive arrays, SCSI, encrypted files and filesystems, and specific commands with various options. There was no general consensus in this area, but ZFS was of interest to more than one responder.

USERS

The continuing theme of being able to pre-configure users according to Windows requirements was balanced by the desired ability to add/change/delete users via common scripting tools.

GENERAL ADMINISTRATION

Many of the items in this category were noted to be typical "on-the-job training" activities that seasoned administrators have learned over the years. Performance tuning and applying updates, whether from source or downloaded from repositories, were Important to most responders.

COMMON SERVICES

The configuration of basic services- DHCP, DNS, email and web services- ranked high in Importance for most responders. This is not surprising- BSD systems have provided these services and more for decades. The main issue raised by the responders was "Which email server / web server / DNS server? There are multiple products surrounding each service, and it does not make sense to cover every single one." One responder noted that "... knowing the basics is important, but for more complex situations it's much better to find the manual."

GENERAL NETWORKING

While there were not that many comments in this section, the survey responses highlighted the fact that understanding all facets of networking BSD systems is highly Important to BSD administrators.

BACKUP and RESTORE

Responders again mentioned various products, but all agreed that Backup and Restore was Important. It's interesting to note that this section had higher than normal Frequency responses indicating that how often these items are performed is also important (see Table 3).

VIRTUALIZATION

Virtualization, like Backup and Restore, was highly Important, though less Frequent. This implies that virtualization environments are typically 'set and forget', and managed just like any other system. The survey itself did not mention any products, but the responders mentioned several including QEMU, Virtual Box, VmWare, Xen, and FreeBSD jails.

LOGGING and MONITORING

Responders rated Logging and Monitoring very high in Importance. Both setup and use were rated

highly, especially configuring log rotation and monitoring logs for abuses.

PRINTING

Printing, as a category, was held to be less Important, noting that larger organizations have dedicated print servers. There is less need to configure printing directly on the server in these environments.

HIGH AVAILABILITY / HIGH PERFORMANCE

High performance TCP and high availability firewalls were rated highest in Importance. Some responders noted that changes to the default BSD scheduler were not advisable and may not even be necessary.

ADDITIONAL COMMENTS

The Additional Comments section allowed the responders to voice their opinions on anything and everything. Several comments had to do with the concept of Frequency, noting that many items are 'set and forget' one time, and should not really be considered even "Less than 1X/Month". Daily system administration doesn't really include these items- it is usually about monitoring, troubleshooting and reporting.

One comment focused on the problem of preventing 'scope creep' – i.e. bundling "FreeBSD+MySQL+ Apache+PHP+Postfix+Courier IMAP+SpamAssassin+Clam+...etc..." into the exam. Another pointed out the notion of the exam being too "generic" (i.e. "something that a Linux user would be able to successfully accomplish") and might actually be insulting to actual BSD system administrators.

A couple of responders noted that it would have been useful to enumerate what kind of environment the responders actually work in- embedded systems, hosting services, ISP, specialized server farms, etc. as all have different needs and their requirements for system administration professionals will differ.

There were also several "Thank You" comments which are always genuinely appreciated.

Demographic Insights

The "Demographic Information" section highlights several interesting facts about the responders. Overall, the responders were:

- **Male** (91.8% Male to 0.8% Female, with 3.3% who chose not to say).
- **Mostly 21-45 years of age** (77.9% of all responders). There was also an interesting bump

between 46-60 years (14%), indicating older users are also represented.

- **Heavy users of BSD** (88.5% included "All the time", "A lot", and "A fair amount").
- **Quite familiar with BSD** (86.1% included "Expert", "Very knowledgeable", and "Fairly knowledgeable").
- **Employed with direct hands-on experience in system administration** (52.5%) or closely related fields (21.3% included "Consultants" and "Developers"). An additional 12.3% classified themselves as "Other" which may or may not include hands-on experience.
- **International –** with over 30 countries represented. The USA had the most responders (23.8%) followed by the Russian Federation and Brazil (both 10.7%). A fair percentage of responders were from Europe and the Middle East.

Finally, regarding the direction of the BSDP Exam, the majority (65.6%) held that the BSDP should consist of both a multiple choice exam and a hands-on lab.

The following sections contain the actual data from the survey – the knowledge domains, the questions, and the response details.

INSTALLATION and SETUP

1. Build and install system from source code.

Build and install system from source code.
Average rank

	1	2	3	4	5	
Importance						(3.6)
Frequency						(1.7)
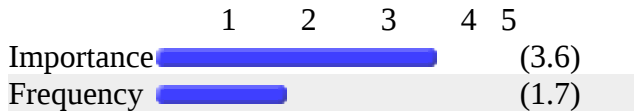
2. Use bsdlabel or disklabel to modify or create partitions.

Use bsdlabel or disklabel to modify or create partitions.
Average rank

	1	2	3	4	5	
Importance						(3.5)
Frequency						(1.4)

3. Use fdisk tool to modify or create partitions.

Use fdisk tool to modify or create partitions.
Average rank

	1	2	3	4	5	
Importance						(3.3)
Frequency						(1.5)
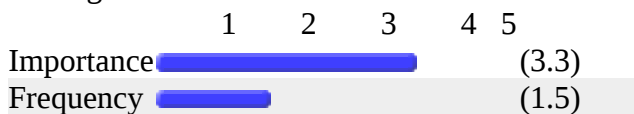
4. Change Partition IDs to other BSD or non-BSD IDs.

Change Partition IDs to other BSD or non-BSD IDs.
Average rank

	1	2	3	4	5	
Importance						(2.5)
Frequency						(1.2)

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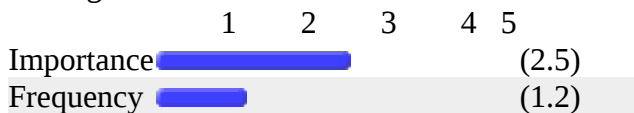
5. Create FAT32, NTFS, or other non-BSD partitions.

Create FAT32, NTFS, or other non-BSD partitions.
Average rank

	1	2	3	4	5	
Importance						(2.5)
Frequency						(1.3)
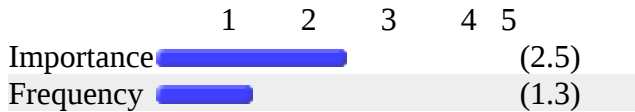
6. Create or edit the device.hints or loader.conf file.

Create or edit the device.hints or loader.conf file.
Average rank

	1	2	3	4	5	
Importance						(3.2)
Frequency						(1.4)
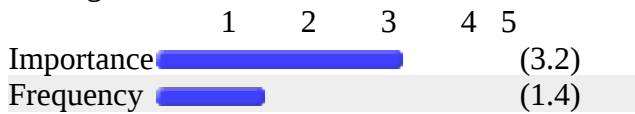
7. Perform a 'headless' install using serial console.

Perform a 'headless' install using serial console.
Average rank

	1	2	3	4	5	
Importance						(2.8)
Frequency						(1.4)
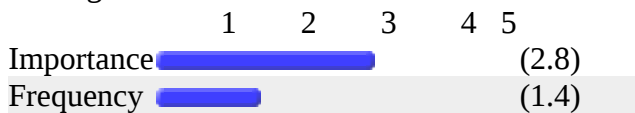
8. Create install script or configuration for unattended installation.

Create install script or configuration for unattended installation.
Average rank

	1	2	3	4	5	
Importance						(3.2)
Frequency						(1.4)

9. Create an ISO installation image.

Create an ISO installation image.
Average rank

	1	2	3	4	5	
Importance						(2.8)
Frequency						(1.4)
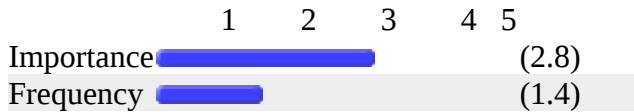
10. Create an emergency repair disk.

Create an emergency repair disk.
Average rank

	1	2	3	4	5	
Importance						(3.1)
Frequency						(1.3)
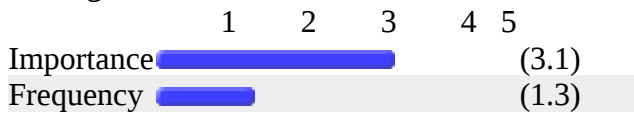
11. Display the order of startup steps/scripts to be run at boot time.

Display the order of startup steps/scripts to be run at boot time.
Average rank

	1	2	3	4	5	
Importance						(3.3)
Frequency						(1.9)
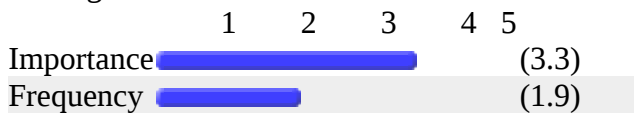
12. Install a boot manager.

Install a boot manager.
Average rank

	1	2	3	4	5	
Importance						(3.3)
Frequency						(1.5)
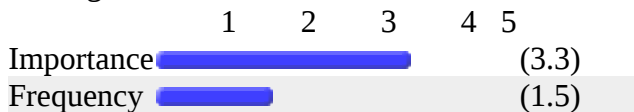
13. Restore a corrupted boot sector.

Restore a corrupted boot sector.
Average rank

	1	2	3	4	5	
Importance						(3.6)
Frequency						(1.3)
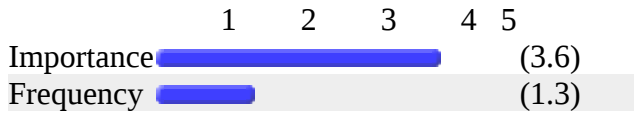
14. Boot via the serial console.

Boot via the serial console.
Average rank

	1	2	3	4	5	
Importance						(2.9)
Frequency						(1.6)
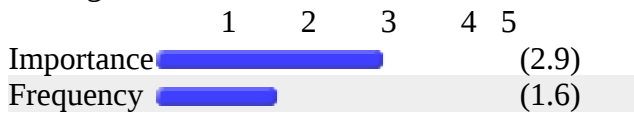
15. Configure a splash screen at boot.

Configure a splash screen at boot.
Average rank

	1	2	3	4	5	
Importance						(1.6)
Frequency						(1.1)
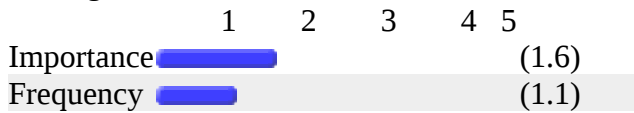
16. Configure custom kernel tunables to be enabled at boot time.

Configure custom kernel tunables to be enabled at boot time.
Average rank

	1	2	3	4	5	
Importance						(4.0)
Frequency						(1.9)
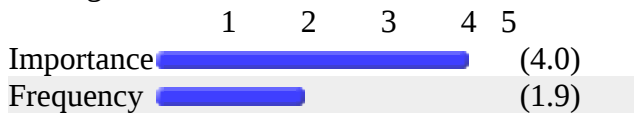
17. Password protect single user mode.

Password protect single user mode.
Average rank

	1	2	3	4	5	
Importance						(3.5)
Frequency						(1.4)
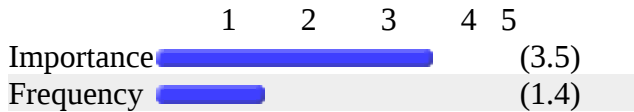
18. Configure BSD system for PXE booting.

Configure BSD system for PXE booting.
Average rank

	1	2	3	4	5	
Importance						(3.1)
Frequency						(1.6)
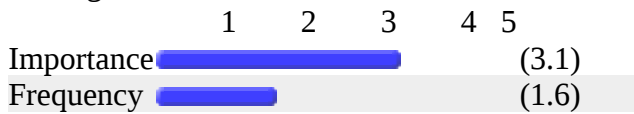
19. Configure system to mount remote network filesystems at boot.

Configure system to mount remote network filesystems at boot.
Average rank

	1	2	3	4	5	
Importance						(3.7)
Frequency						(2.2)
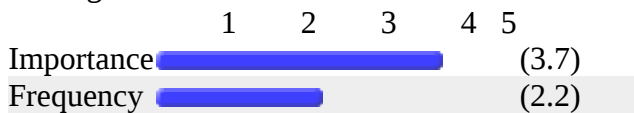
20. Create and install a jail.

Create and install a jail.
Average rank

	1	2	3	4	5	
Importance						(3.8)
Frequency						(2.2)
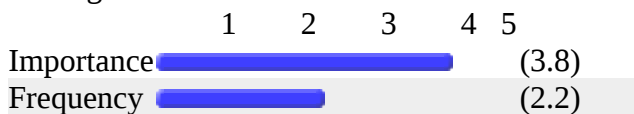
21. Prepare a host system for jails.

Prepare a host system for jails.
Average rank

	1	2	3	4	5	
Importance						(3.8)
Frequency						(2.0)
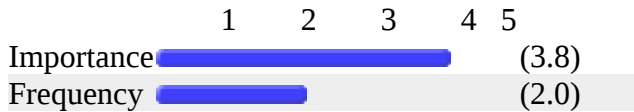
22. Start or shutdown a jail.

Start or shutdown a jail.
Average rank

	1	2	3	4	5	
Importance						(3.8)
Frequency						(2.5)
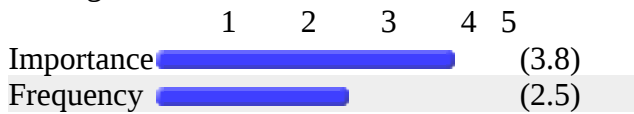
23. Create an internal package repository.

Create an internal package repository.
Average rank

	1	2	3	4	5	
Importance						(3.3)
Frequency						(1.7)
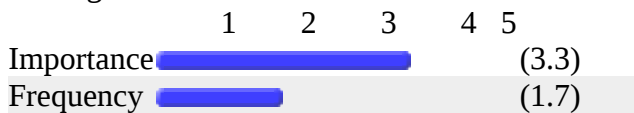
24. Compile a customized binary using ports, packages, or pkgsrc.

Compile a customized binary using ports, packages, or pkgsrc.
Average rank

	1	2	3	4	5	
Importance						(4.2)
Frequency						(3.0)
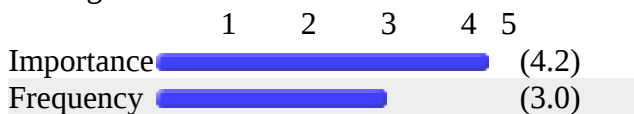
25. Compress a kernel.

Compress a kernel.
Average rank

	1	2	3	4	5	
Importance	███████████					(2.5)
Frequency	████					(1.4)
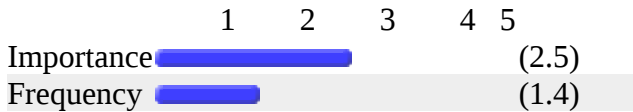
26. Perform cross-platform building, such as using build.sh or 'make universe'.

Perform cross-platform building, such as using build.sh or 'make universe'.
Average rank

	1	2	3	4	5	
Importance	███████████					(2.4)
Frequency	████					(1.2)
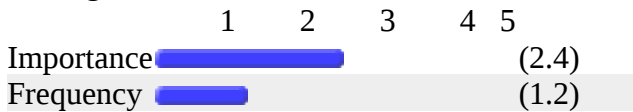
Comments on "Installation and Setup"

➢ Backing up/copying a file system.

➢ Booting custom kernel (nextboot -k …), using ezjail for creating jails, using make.conf to strip unneded ports parts, using src.conf to strip unneded base system parts.

➢ Considering: diversity of BIOS firmware in the installed base; diversity of hardware age in the installed base; dominance of single OS systems using Microsoft anything or Apple Mac OSX; 10 bit, 1024 block BIOS disk addressing at boot time; the interest in partition IDs and boot managers is more about technical prowess then job task needs. The renewed interest in virtual operating systems and their analogs favor task knowledge about jails and about the various timeshare/cloud requirements for loading and configuring a BSD on those vendors that are not language centric, like Google.

➢ Creating a USB install using "bare" methods like fdisk, label, newfs, mounting, tarring stuff and setting up fstab and boot manager on the stick is something every BSDP should be able to do. I'll rate it MEDIUM / MONTHLY.

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➢ For clustering (HPC) the PXE Boot configuration is a task that is becoming more and more frequent in Universities that deploy a HPC Cluster for math calculations.

➢ Here are some things I think should be covered: Software RAID with Gmirror, Volume / Device Labels with glabel, and tunefs.

➢ I miss networking skills.

➢ I think that the entire BSD community is missing the understanding of what a corporate environment does when it comes to installs. We don't like to do it from CD very often. We want to pxe boot a machine, get a menu of scripts, and choose one. We have a ton of employees, especially in help desk and server and system management, that are only knowledgeable in Windows. These Windows help desk employees cannot spend time figuring out the BSD installer. When someone says in a post that the installer sucks I laugh. But then I remember the first time I used the installer, I took me two days to figure it out. After the first two days, I learned it well enough to now think that it is fast and easy to use the CD. The installer is antiquated and it is far too difficult to create an automated installation script. I spent weeks trying to get a scripted installation right and never succeeded in getting everything I wanted completed. Without an absurd amount of time and studying, and sometimes even with an absurd amount of time, creating a scripted installation is difficult. I hate to pull the Windows card, but look at how the corporate environment creates and deploys Windows servers and desktops. They use scripted installs, imaging, and they make it easy to do so. 100% of installs should be installation scripts. What do I mean you might ask? What about installing from CD? I mean that there should be an installer designed so that you are asked all the questions. You answer them and an installation script is created based on your answers. Then once everything is answered, the install runs based on the script. The script should also support masses of functions outside what the GUI installer allows.

➢ I've considered just a simple server/desktop installation. Those options linked to FAT and NTFS are justified by using pendrives and stuffs like this. Well, what about "Restore a entire system", using bootonly disk or floppies? It's pretty important to do so (freq. less than 1x/m).

➢ Installation and configuration changes shouldn't happen often, so frequency will depend upon the number of BSD machines supported.

➢ Installing X Windows and configuring a successful graphical UI install, Log sanitarization, Log Rotation and Syslog Analisys.

➢ Many of the tasks above are essentially "one shot" -- It is important that an admin be able to perform them and be familiar with the process, but it isn't somethng that is done frequently. For example - my patch cycle involves a make world and upgrading of ports/packages quarterly. It is critical that an admin be able to handle this task without a babysitter, but the frequency is less than 1X/month.

➢ Need to cover set up from CD's, DVD's, custom built DVD's and Network installs. (FTP or SSH).

➢ Nothing.

➢ Periodic internals - high, less than 1x/month btx loader internals, boot variances/diagnostics - very high, less than 1x/month.

➢ Please don't include too many exotic topics. Furthermore, too many questions seem to focus on FreeBSD (this is also a problem of the BSDA certification).

➢ Post-Installation: Configuration Setup X-Org.

➢ Q26 make universe is a developer thing; make ... TARGET=<arch> is for world/kernel cross builds.

➢ Questions is not important.

➢ There's a large split between server, desktop and embedded systems, my current responsibilities are limited by server and embedded systems, thus I have to know more about build process and creation of customized packages and kernels, we don't need jails or need them to much lesser extent though they are useful. Serial interfaces are almost gone today, though we do use them, only not to control loading. Interoperability at file system level is useless to us. We are to start desktop/corporate project in near future, this will require to change usage pattern.

➢ Troubleshoot hardware that won't boot or fails to install correctly/completely. Importance: Very High Freq: Monthly. Configure a system to use a serial console. Imp: Very High Freq: Monthly.

➢ Upgrade OS Backup management Monitoring activity (snmp, file system full...) Trouble shooting (performances, Problem report,...)

➢ When I did not answer about the frenquecy, it means I never had to do such a task in my 10 years of administrating FreeBSD. But I have only servers under FreeBSD. Most of the tasks, I do them once for good, so the frequency remains very low. We work in an environment that does not need very much security as it hold no sensitive data.

➢ You should add, about packages, : "building a package without the needs to buils 200 unused extra dependencies"... (FATFREE option ?) Thanks.

➢ ZFS/gmirror/vinum installation and booting.

SECURITY

28. Raise or lower security level.

Raise or lower security level.
Average rank

	1	2	3	4	5	
Importance						(3.7)
Frequency						(1.9)
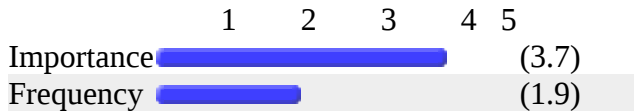
29. Configure system to deny root logins.

Configure system to deny root logins.
Average rank

	1	2	3	4	5	
Importance						(4.1)
Frequency						(2.0)
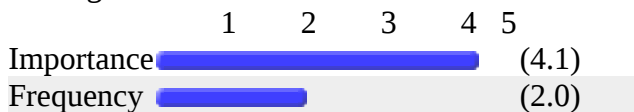
30. Configure PAM to support an alternative authentication mechanism.

Configure PAM to support an alternative authentication mechanism.
Average rank

	1	2	3	4	5	
Importance						(3.5)
Frequency						(1.8)
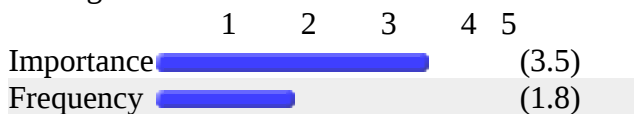
31. Configure ACLs to augment traditional Unix permissions.

Configure ACLs to augment traditional Unix permissions.
Average rank

	1	2	3	4	5	
Importance						(3.4)
Frequency						(2.0)
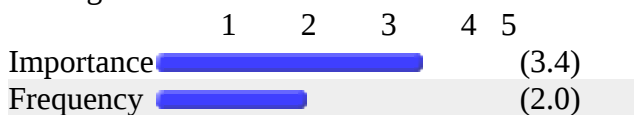
32. Change the flags on sensitive files.

Change the flags on sensitive files.
Average rank

	1	2	3	4	5	
Importance						(3.9)
Frequency						(2.3)
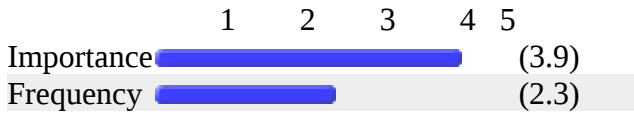
33. Configure SSH to restrict logins.

Configure SSH to restrict logins.
Average rank

	1	2	3	4	5	
Importance						(4.3)
Frequency						(2.4)
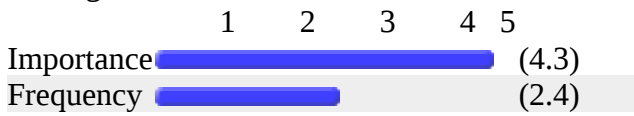
34. Configure a Network Intrusion Detection System.

Configure a Network Intrusion Detection System.
Average rank

	1	2	3	4	5	
Importance						(3.7)
Frequency						(1.8)
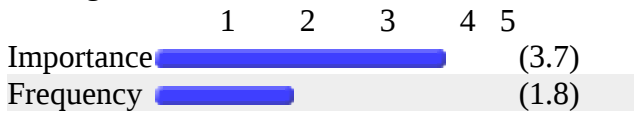
35. Install (if needed), configure, and use sudo.

Install (if needed), configure, and use sudo.
Average rank

	1	2	3	4	5	
Importance						(4.0)
Frequency						(2.8)
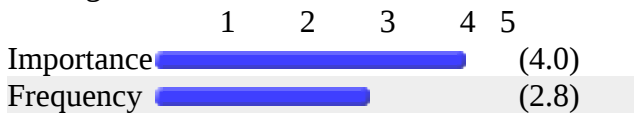
36. Apply security patches.

Apply security patches.
Average rank

	1	2	3	4	5	
Importance						(4.7)
Frequency						(3.1)
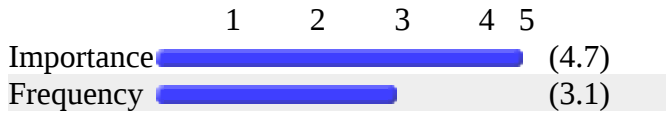
37. Scan a network to review open ports.

Scan a network to review open ports.
Average rank

	1	2	3	4	5	
Importance						(4.0)
Frequency						(2.8)
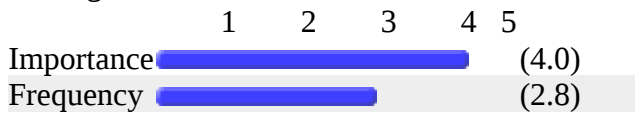
38. Generate self-signed certificates.

Generate self-signed certificates.
Average rank

	1	2	3	4	5	
Importance						(3.7)
Frequency						(1.9)
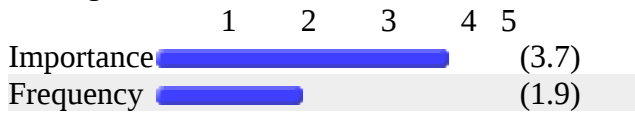
39. Scan a password file for weak passwords.

Scan a password file for weak passwords.
Average rank

	1	2	3	4	5	
Importance						(3.6)
Frequency						(2.2)

www.bsdcertification.org
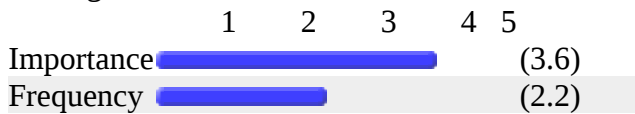
40. Configure kernel to prevent ability to perform network sniffing.

Configure kernel to prevent ability to perform network sniffing.
Average rank

	1	2	3	4	5	
Importance						(3.4)
Frequency						(1.5)
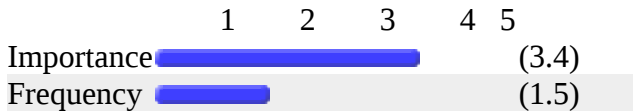
41. Configure a firewall to act as an authentication gateway.

Configure a firewall to act as an authentication gateway.
Average rank

	1	2	3	4	5	
Importance						(3.5)
Frequency						(1.6)
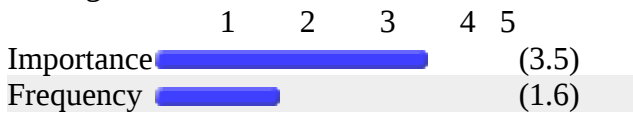
42. Configure a firewall for greylisting or blacklisting.

Configure a firewall for greylisting or blacklisting.
Average rank

	1	2	3	4	5	
Importance						(3.7)
Frequency						(2.1)
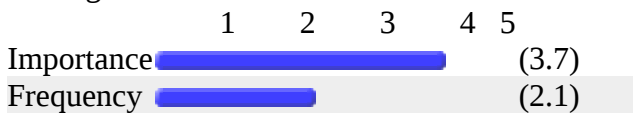
43. Configure a firewall to disable multiple connection attempts from an attacker.

Configure a firewall to disable multiple connection attempts from an attacker.
Average rank

	1	2	3	4	5	
Importance						(4.0)
Frequency						(2.4)
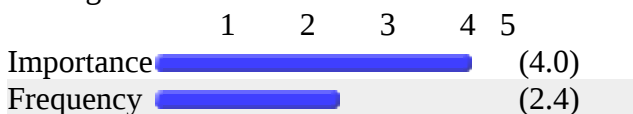
44. Configure a firewall with custom packet filtering rules.

Configure a firewall with custom packet filtering rules.
Average rank

	1	2	3	4	5	
Importance						(4.3)
Frequency						(2.7)
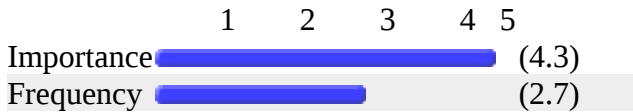
45. Configure TCP wrappers.

Configure TCP wrappers.
Average rank

	1	2	3	4	5	
Importance						(3.4)
Frequency						(1.9)
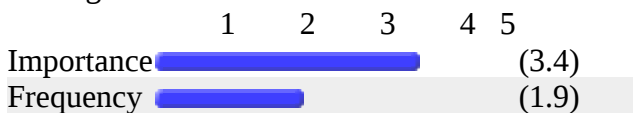
46. Configure a file integrity checking utility.

Configure a file integrity checking utility.
Average rank

	1	2	3	4	5	
Importance						(3.5)
Frequency						(2.0)
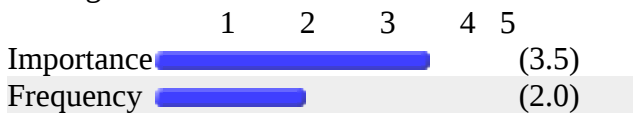
47. Configure One-Time Passwords (OTP).

Configure One-Time Passwords (OTP).
Average rank

	1	2	3	4	5	
Importance						(3.0)
Frequency						(1.5)

www.bsdcertification.org
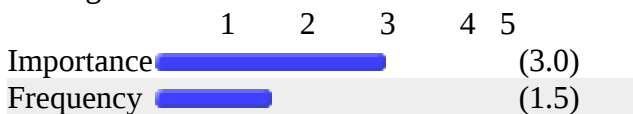
48. Configure login.conf or PAM for improving new password security.

Configure login.conf or PAM for improving new password security.
Average rank

	1	2	3	4	5	
Importance						(3.5)
Frequency						(1.6)
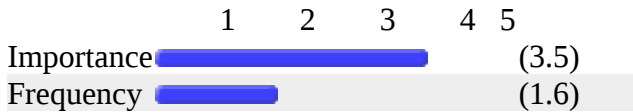
49. Monitor system for common security threats.

Monitor system for common security threats.
Average rank

	1	2	3	4	5	
Importance						(4.3)
Frequency						(3.3)
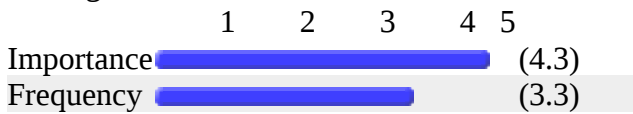
50. Install and configure a Kerberos server.

Install and configure a Kerberos server.
Average rank

	1	2	3	4	5	
Importance						(2.7)
Frequency						(1.2)
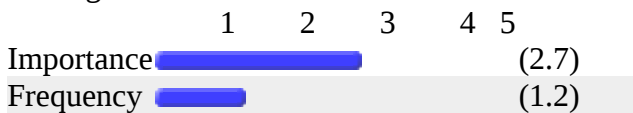
51. Configure an IPSec VPN.

Configure an IPSec VPN.
Average rank

	1	2	3	4	5	
Importance						(3.3)
Frequency						(1.6)

www.bsdcertification.org
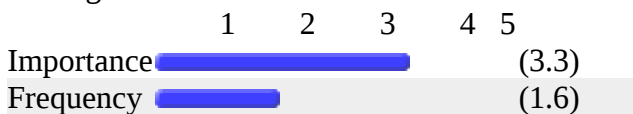
52. Configure security event auditing.

Configure security event auditing.
Average rank

```
           1     2     3     4  5
Importance ████████████████████    (3.9)
Frequency  ████████                (2.2)
```
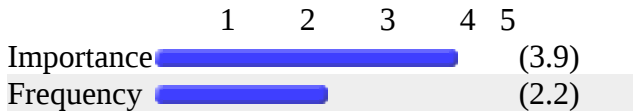
Comments on "Security"

➢ Again, embedded specifics.

➢ Again, the installer is the problem. The corporate world is currently running mostly Active Directory (AD) environments. I should be able to click a single option during install to use Active Directory, enter my AD info and add a group(s) from AD and users in AD can login. I would expect there to be no other local account but root. I don't want to spend days figuring out how to configure this, I just want it to work. My security guy can spend days figuring out to further secure it.

➢ All good, but sometimes not buy BSD.

➢ As above, many of these tasks are "one-shot" configurations with very infrequent updates. In the realm of #46 and #49, these should take the form of a cron job. Questions on #46 should not be tied to any specific tool - there are many ways to accomplish integrity scanning. Familiarity with PAM is critical. Familiarity with login.conf is important. pf is the dominant firewall, but ipfw is still around at some sites. Firewall questions should provide equivalent answers or be weighted appropriately - IMO bias should be toward pf.

➢ Configure sendmail for security. Imp: Very High Freq: Monthly. Configure secure IMAP. Imp: High Freq: Less than 1x/Month.

➢ I've done most of these tasks at least once in my life (I've been using BSDs for about 7 years now). However, I would not be able to describe detailed procedures for these tasks on ALL BSD variants -- nevertheless, I think I would be able to help myself by using man pages and online resources. I think the key ability of a BSDP is to be able to SOLVE problems -- it's not about knowing everything, it's about knowing where to look. I propose to test BSDPs in practical exams by letting them solve real problems on real BSD systems. The BSDP should NOT be awarded to people who solely score high in multiple choice tests because they memorized the relevant man pages. Instead, there should be an evaluation of practical skills (knowing how to help yourself) in real-world scenarios.

➢ IPS and IDS, bruteforce blockers.

➢ Keep up to date (portaudit...) Retrieve monitored security event (by mail, SMS,...) Common best pratices (only install mandatory service, limit root access, strong password...)

➢ Network security/tuning with sysctls. Prevent DoS. IMP VeryHigh and FREQ Monthly. VLans, for ex., are a good point to consider. IMP VeryHigh and FREQ LessThan1X/M.

➢ Not sure what was meant by "security event auditing".

➢ Q41,42 a firewall is neither an AAA server nor a mail gateway; fix the question.

➢ Same comments as before.

➢ Security is very important, and checking for weak passwords is a must.

➢ Using "frameworks", aka macros or templates, that enshrine organizational policy goes a long way to reduce this to set and forget category. The watcher is always burdened so filtering events to identify exceptions in the pattern of events is a more scalable approach. A list of tools with differences to achieve watching without being hypnotized by similar repeating patterns is a good idea.

➢ Using chflags special mount options for security (noexec etc)

FILESYSTEMS and FILES

54. Format a new filesystem according to a set of specifications.

Format a new filesystem according to a set of specifications.
Average rank

	1	2	3	4	5	
Importance						(3.9)
Frequency						(2.0)
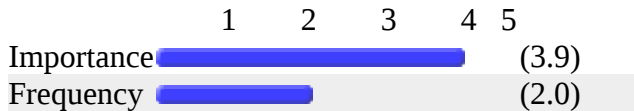
55. Manually run file system checker and repair tool.

Manually run file system checker and repair tool.
Average rank

	1	2	3	4	5	
Importance						(4.1)
Frequency						(2.1)
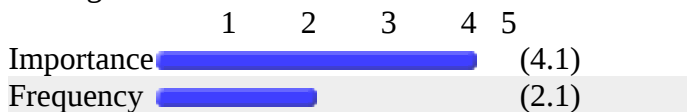
56. Mount a /proc file system.

Mount a /proc file system.
Average rank

	1	2	3	4	5	
Importance						(3.0)
Frequency						(1.6)
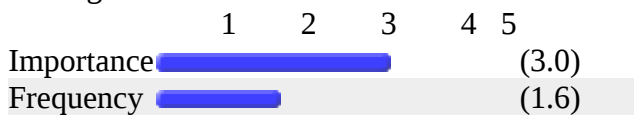
57. Restore system files from single user mode.

Restore system files from single user mode.
Average rank

	1	2	3	4	5	
Importance						(4.1)
Frequency						(1.5)

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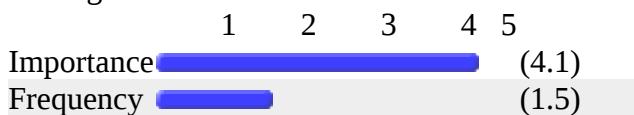
58. Resolve full filesystem issues.

Resolve full filesystem issues.
Average rank

	1	2	3	4	5	
Importance						(4.2)
Frequency						(1.8)
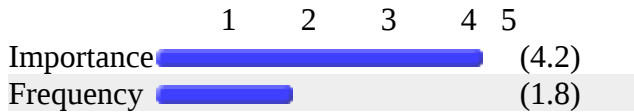
59. Set up filesystem quotas for users.

Set up filesystem quotas for users.
Average rank

	1	2	3	4	5	
Importance						(3.4)
Frequency						(1.7)
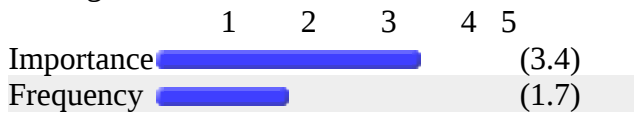
60. Dynamically increase the size of a filesystem.

Dynamically increase the size of a filesystem.
Average rank

	1	2	3	4	5	
Importance						(3.4)
Frequency						(1.5)
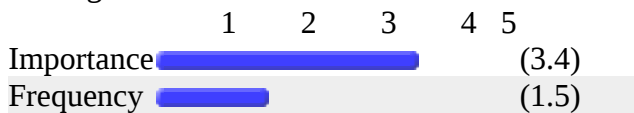
61. Enable or disable a mounted filesystem write status.

Enable or disable a mounted filesystem write status.
Average rank

	1	2	3	4	5	
Importance						(3.5)
Frequency						(1.8)
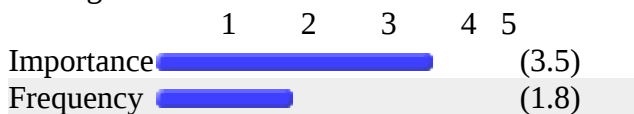
62. Configure software RAID.

Configure software RAID.
Average rank

	1	2	3	4	5	
Importance						(3.8)
Frequency						(1.6)
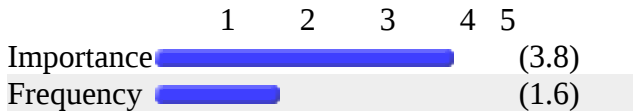
63. Configure hardware RAID.

Configure hardware RAID.
Average rank

	1	2	3	4	5	
Importance						(4.0)
Frequency						(1.6)
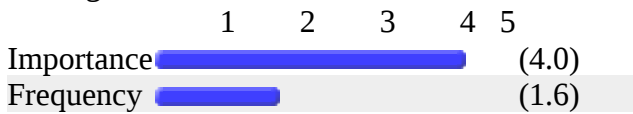
64. Encrypt a file.

Encrypt a file.
Average rank

	1	2	3	4	5	
Importance						(3.7)
Frequency						(2.5)
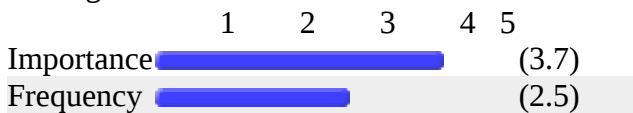
65. Configure an encrypted filesystem.

Configure an encrypted filesystem.
Average rank

	1	2	3	4	5	
Importance						(3.5)
Frequency						(1.7)
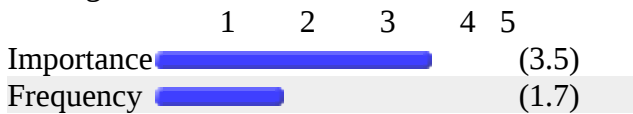
66. Create a file system snapshot.

Create a file system snapshot.
Average rank

	1	2	3	4	5	
Importance						(3.8)
Frequency						(2.5)
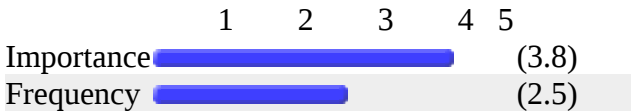
67. Configure a logging and/or journaling file system.

Configure a logging and/or journaling file system.
Average rank

	1	2	3	4	5	
Importance						(3.8)
Frequency						(1.9)
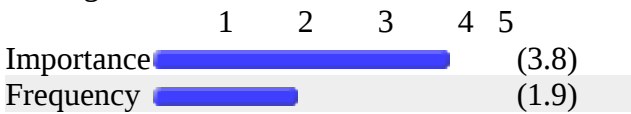
Comments on "Filesystems and Files"

➢ noatime mount option for performance (not always should be used); noexec mount option (security); create encrypted SWAP; add SWAP space/file; large option for msdosfs; all things related to ZFS filesystem; specify diffrent disk/filesystem to boot from on system startup

➢ Again numerous one-shot items in the "Configure X for Y" family. Re: #59, quotas tend to be a special case in my experience but familiarity with them is important. Setting up and maintaining quotas is a good mark of experience. Re: #63, This is better replaced by generic questions about RAID levels and their features. Hardware RAID configurations vary across controllers and seem out of scope for a "BSD" exam Re: #62, there are a few ways to do this on FreeBSD. I imagine there are differences across the BSD family as well.

➢ Better File Systems Tools documentation.

➢ I specify SCSI so a lot of skills acquired with fsck over the years has rotted since SCSI disks are either working, with some infant mortality or they are dead which is why disk2disk copies, cloning, incrementals and other annotated snapshots are useful for the once every 2-3 year disk catastrophe. Power failures seem more often so UPS software configuration and battery monitoring is the more frequent failure. Web browser and site incompatibility is the most frequent cause for loss of user data. Software RAID is a good idea that seems to have been passed by the hardware reliability of SCSI disk in the late 90s. Hardware RAID is a pain and only present if a former decision maker

brought it it or a higher purchasing authority with unmodified opinions is still around.

➢ In the server world all this happens on install. When a drive array is full, it is nice to get a bigger drive array to replace it. So I have to configure the new array and format it and move the data over without filesystem permissions or directories being altered.

➢ Mentioning a more specific filesystem like zfs could be interesting.

➢ Perform file system backups, critical, daily.

➢ Same.

➢ See earlier comment.

USERS

69. Customize the login class capability database.

Customize the login class capability database.
Average rank

	1	2	3	4 5	
Importance					(3.3)
Frequency					(1.6)
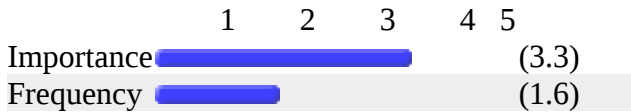
70. Script the creation/deletion/ modification of multiple user accounts.

Script the creation/deletion/ modification of multiple user accounts.
Average rank

	1	2	3	4 5	
Importance					(3.3)
Frequency					(1.8)
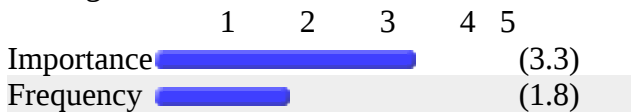
71. Prevent regular users from viewing who is logged on and what others are doing.

Prevent regular users from viewing who is logged on and what others are doing.
Average rank

	1	2	3	4 5	
Importance					(3.5)
Frequency					(1.8)
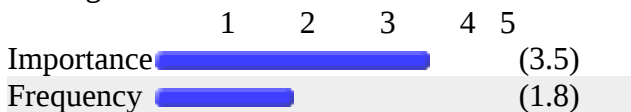
72. Configure a user to use a restricted shell.

Configure a user to use a restricted shell.
Average rank

	1	2	3	4 5	
Importance					(3.7)
Frequency					(1.9)
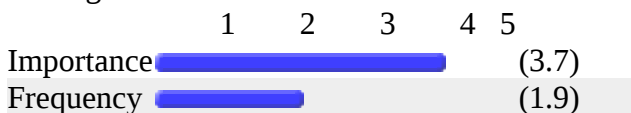
73. Create or modify skeleton files for new user's home directories.

Create or modify skeleton files for new user's home directories.
Average rank

	1	2	3	4	5	
Importance						(3.5)
Frequency						(1.7)
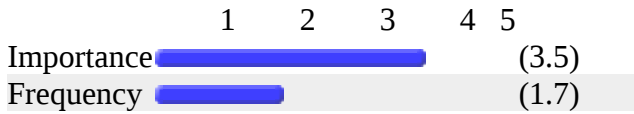
74. Force an active user off the system.

Force an active user off the system.
Average rank

	1	2	3	4	5	
Importance						(3.6)
Frequency						(1.8)
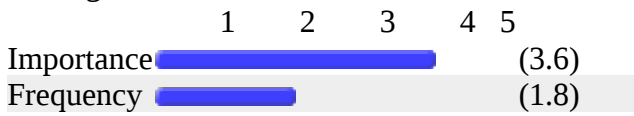
75. Set shell limits.

Set shell limits.
Average rank

	1	2	3	4	5	
Importance						(3.6)
Frequency						(1.9)
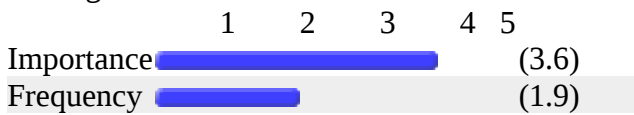
76. Tune per-user resource limits.

Tune per-user resource limits.
Average rank

	1	2	3	4	5	
Importance						(3.5)
Frequency						(1.8)
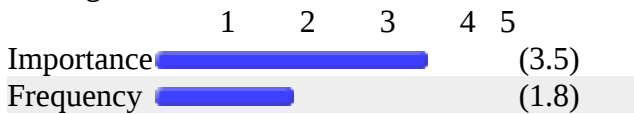
77. Generate a key and configure the system to use it for SSH authentication.

Generate a key and configure the system to use it for SSH authentication.
Average rank

	1	2	3	4	5	
Importance						(4.3)
Frequency						(2.4)
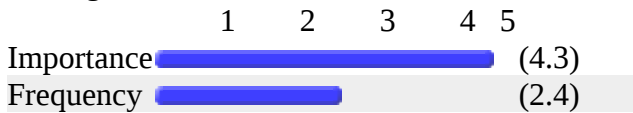
78. Configure users to auto-logout after period of inactivity.

Configure users to auto-logout after period of inactivity.
Average rank

	1	2	3	4	5	
Importance						(3.3)
Frequency						(1.7)
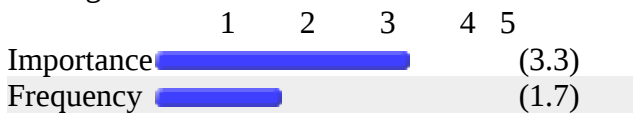
79. Configure a shell to log all activity.

Configure a shell to log all activity.
Average rank

	1	2	3	4	5	
Importance						(3.3)
Frequency						(1.7)
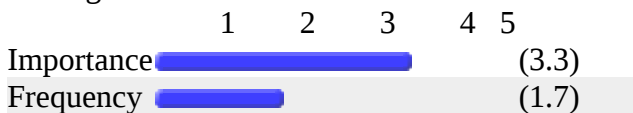
80. Configure a user account to expire on a specified date.

Configure a user account to expire on a specified date.
Average rank

	1	2	3	4	5	
Importance						(3.2)
Frequency						(1.7)
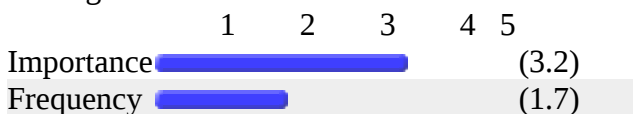
81. Create a system account.

Create a system account.
Average rank

	1	2	3	4	5

Importance ████████████████ (3.8)
Frequency ████████ (2.2)
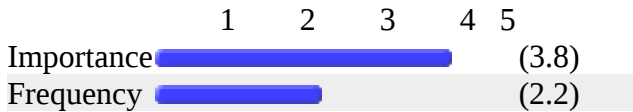
Comments on "Users"

➢ generete random passwords for new users; add/remove large number of users to group.

➢ Again, not even a mention of not even having a local user and logging in using an Active Directory or LDAP user. On our Windows servers there is one local account with a powerful and long password that only a select few know. The other users are all active directory users. I want their same user account in AD to log onto BSD. And the only local account on BSD be root, which root may even be disabled.

➢ Configure and using of graphical user Tools.

➢ Don't understand shell limit versus resource limit.

➢ Lots of 1-shots (again). Areas to concentrate on: Create/Delete multiple users (configured per #80,78,76,), Kicking off abusive users (#74).

➢ Question 70 sort of obviates many later task questions, unless a skill inventory of what properties should be in the user account create/read/update/delete toolkit.

➢ Same.

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GENERAL ADMINISTRATION

83. Configure shared library cache.

Configure shared library cache.
Average rank

	1	2	3	4	5	
Importance						(3.0)
Frequency						(1.5)
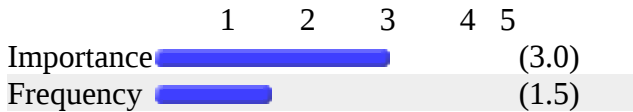
84. Enable or disable virtual consoles.

Enable or disable virtual consoles.
Average rank

	1	2	3	4	5	
Importance						(3.0)
Frequency						(1.5)
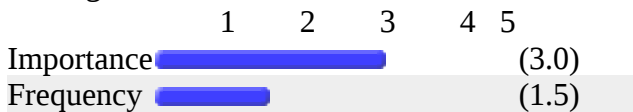
85. Enable process accounting.

Enable process accounting.
Average rank

	1	2	3	4	5	
Importance						(3.2)
Frequency						(1.7)
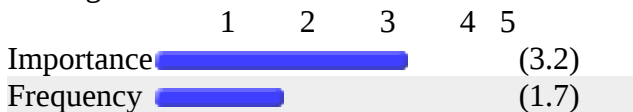
86. Create new device instances.

Create new device instances.
Average rank

	1	2	3	4	5	
Importance						(2.9)
Frequency						(1.6)

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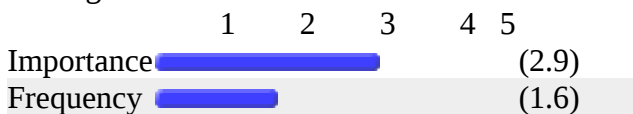
87. Recover from lost root password.

Recover from lost root password.
Average rank

	1	2	3	4	5	
Importance						(4.2)
Frequency						(1.3)
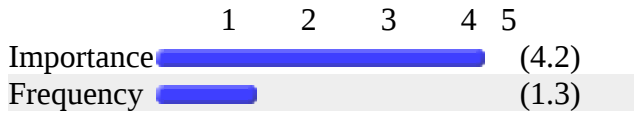
88. Configure and recompile kernel.

Configure and recompile kernel.
Average rank

	1	2	3	4	5	
Importance						(4.4)
Frequency						(2.0)
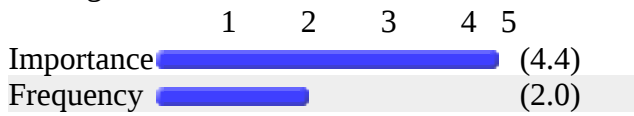
89. Boot an alternate kernel.

Boot an alternate kernel.
Average rank

	1	2	3	4	5	
Importance						(4.3)
Frequency						(1.8)
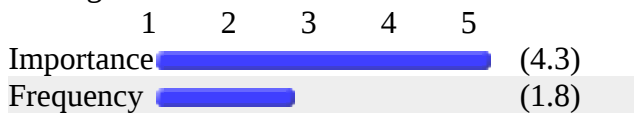
90. Use a kernel debugger.

Use a kernel debugger.
Average rank

	1	2	3	4	5	
Importance						(3.0)
Frequency						(1.4)
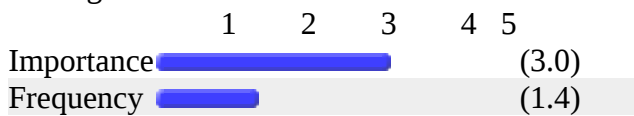
91. Load and unload kernel modules.

Load and unload kernel modules.
Average rank

	1	2	3	4	5	
Importance						(4.0)
Frequency						(2.3)
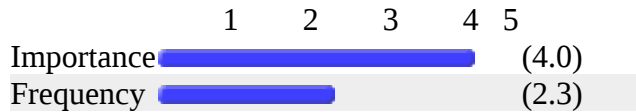
92. Install perl modules.

Install perl modules.
Average rank

	1	2	3	4	5	
Importance						(3.5)
Frequency						(2.1)
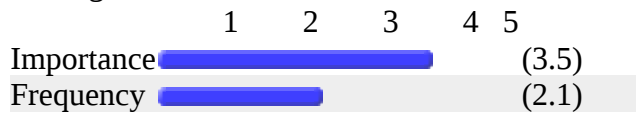
93. Retrieve updates from a code repository.

Retrieve updates from a code repository.
Average rank

	1	2	3	4	5	
Importance						(4.1)
Frequency						(2.7)
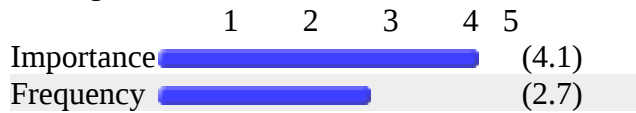
94. Use ktrace to troubleshoot software issues.

Use ktrace to troubleshoot software issues.
Average rank

	1	2	3	4	5	
Importance						(3.4)
Frequency						(2.0)
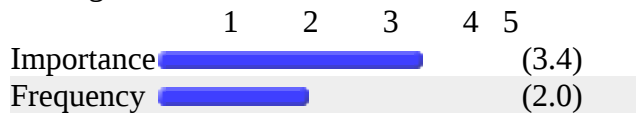
95. Use mergemaster, etcupdate, or etcmerge to update configurations.

Use mergemaster, etcupdate, or etcmerge to update configurations.
Average rank

	1	2	3	4	5	
Importance						(4.0)
Frequency						(2.1)
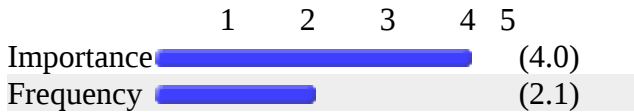
96. Tune the operating system.

Tune the operating system.
Average rank

	1	2	3	4	5	
Importance						(4.3)
Frequency						(2.4)
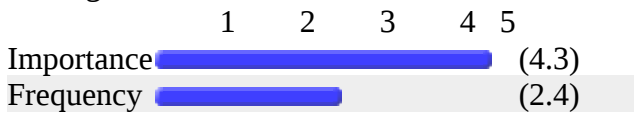
97. View interrupt rate.

View interrupt rate.
Average rank

	1	2	3	4	5	
Importance						(3.3)
Frequency						(2.2)
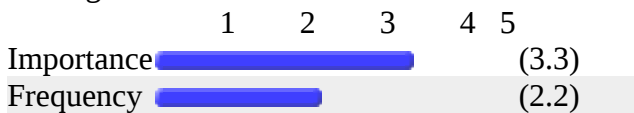
98. Use an rc script to send a process a signal.

Use an rc script to send a process a signal.
Average rank

	1	2	3	4	5	
Importance						(3.6)
Frequency						(2.7)
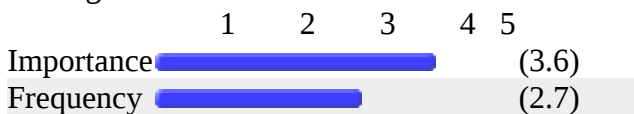
99. Enable logins on serial console.

Enable logins on serial console.
Average rank

	1	2	3	4	5	
Importance	████████████████					(3.2)
Frequency	██████					(1.6)
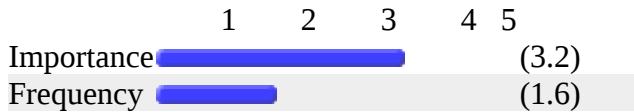
100. Add additional swap space partition or file.

Add additional swap space partition or file.
Average rank

	1	2	3	4	5	
Importance	█████████████████					(3.4)
Frequency	██████					(1.5)
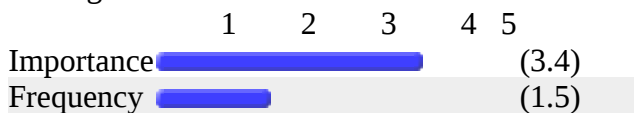
101. Insert entries in the system log.

Insert entries in the system log.
Average rank

	1	2	3	4	5	
Importance	████████████████					(3.2)
Frequency	████████					(2.0)
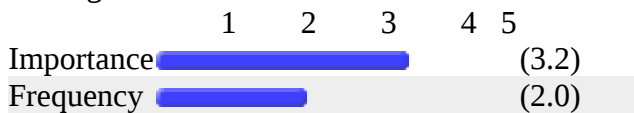
102. Configure verified exec in-kernel fingerprint table.

Configure verified exec in-kernel fingerprint table.
Average rank

	1	2	3	4	5	
Importance	█████████████					(2.7)
Frequency	█████					(1.4)
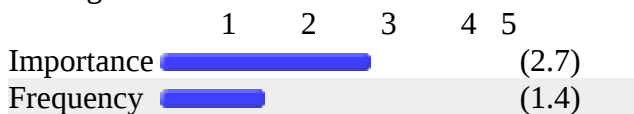
103. Configure the system for binary compatability.

Configure the system for binary compatability.
Average rank

	1	2	3	4	5	
Importance						(3.2)
Frequency						(1.6)
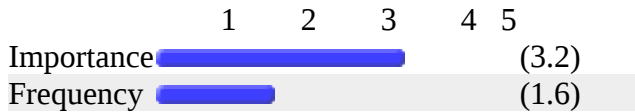
104. Backup and restore an RDBMS.

Backup and restore an RDBMS.
Average rank

	1	2	3	4	5	
Importance						(3.7)
Frequency						(2.5)
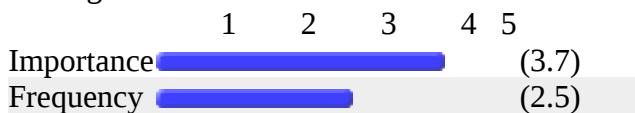
105. Configure a network service to use a 'sandbox' environment.

Configure a network service to use a 'sandbox' environment.
Average rank

	1	2	3	4	5	
Importance						(3.5)
Frequency						(1.8)
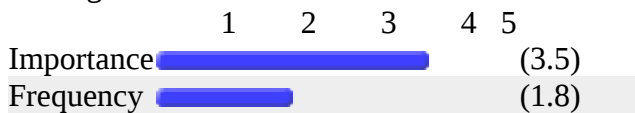
106. Download and apply kernel patches.

Download and apply kernel patches.
Average rank

	1	2	3	4	5	
Importance						(4.4)
Frequency						(2.4)
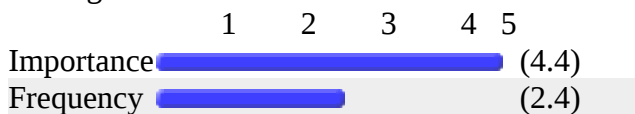
107. Setup on-going software or package vulnerability audit reports.

Setup on-going software or package vulnerability audit reports.
Average rank

	1	2	3	4	5
Importance					(4.0)
Frequency					(2.5)
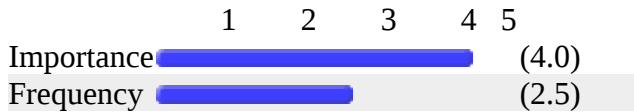
108. Capture performance data using standard tools.

Capture performance data using standard tools.
Average rank

	1	2	3	4	5
Importance					(4.1)
Frequency					(3.2)
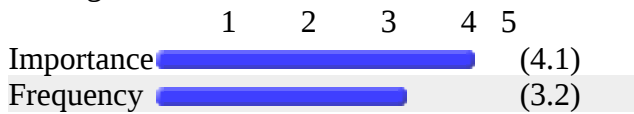
109. Localize a server for another language.

Localize a server for another language.
Average rank

	1	2	3	4	5
Importance					(2.5)
Frequency					(1.4)
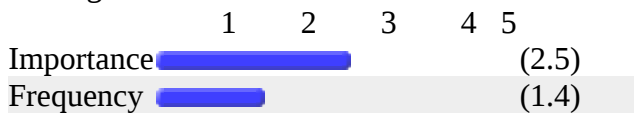
110. Troubleshoot X Window startup problems.

Troubleshoot X Window startup problems.
Average rank

	1	2	3	4	5
Importance					(2.7)
Frequency					(1.6)

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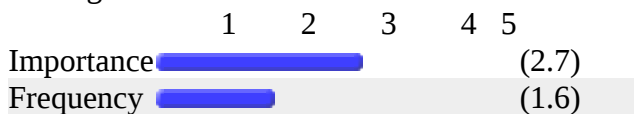
111. Configure an audio (sound) device.

Configure an audio (sound) device.
Average rank

	1	2	3	4	5	
Importance						(2.2)
Frequency						(1.4)
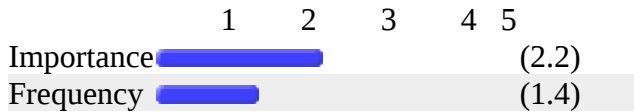
112. Configure events for power and/or sensors.

Configure events for power and/or sensors.
Average rank

	1	2	3	4	5	
Importance						(3.2)
Frequency						(1.9)
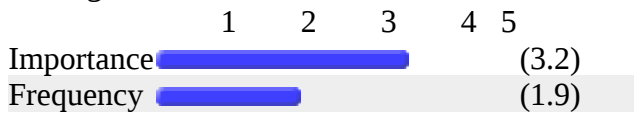
Comments on "General Administration"

➢ "105. Configure a network service to use a 'sandbox' environment." is vague.

➢ #86 partially obsoleted by devfs (FreeBSD, others?) #87-90 are critical: Admins without these skills aren't very useful. #91 should include loading modules from the boot loader as well as from the command line (misconfigured kernels e.g. missing disk/network drivers can often be rescued by loading the missing module) #92: 2 ways (Ports, CPAN) #93: Multiple ways (CVS, CVSup, SVN, git?) #95: Important skill, part of routine maintenance/patching #96: Performed with the assistance of an "engineer" level tech #100: Infrequent but important #101: Infrequent but important #104: Critical task, but DB specific. Out of scope. #110/#111: Desktop-related - I'm more concerned with server-related items...

➢ monitor temperatures of cpus/motherboard; monitor disks (SMART); enable CPU frequency scaling.

➢ DBMS backup is very important, but it's specific to the DBMS and not part of BSD.

➢ Many of these are set it and forget. So there are multiple groups of IT guys: 1. Hardware setup guy - They spec hardware, buy the hardware, deliver the hardware to the right place. Put it in rack, hook it up, etc. Does both servers and desktops. 2. Install/Configure guy - He doesn't know much. He basically knows how to put in a CD and do a basic install or more likely he pxe boots and chooses a

script and he is done. He does this for Windows and servers. There is no way we would let him login into BSD but it would be nice if our scripted installs of BSD were easier. 3. Help desk - That take calls from the users who use desktops mostly. Not many BSD desktops in the corporate world. They know nothing about BSD. Despite PC-BSDs improvements to the desktop world in BSD, it is not ready for corporate yet, though I hope they keep up the good work, because it might be. 4. Systems Administrator guy - makes sure the system is up and running, responds to server down events or other events and also user complaints, such as that the server is slow. He needs to understand a bit more. 5. Systems Expert guy - he needs to be the master of the system he supports. So we almost need a separate BSD Systems Expert to even use BSD, because they have to know everything. 6. Developer guy - they do the coding for internal applications and usually don't have a deep knowledge of different platforms or hardware, they only code. There should be different exams for each level of employee. That would make training more available as they would only need to do a small training on their portion. It also makes introducing them to a small portion of the BSD world easier.

➢ Same.

➢ Sorry but 600 questions are toooooo much.

➢ The questions 83 to 113 is where the trick questions are mixed with the on-the-job-training application tuning. The vulnerability question should be in security. I have already learned about some new things, thanks. Some issues can be observed with questions about interrupt rate or kernel traces, often times keeping an eye on the ethernet hub or disk LED is more than enough. Swap space monitoring solved a problem with gimp(1) and the art department and that was very deadline driven. Otherwise, is the keyboard non-responsive or the screen black, blue, jumbled or an ASCII tty style when it was supposed to be X11. Most work is with servers, appliances and desktops. Few people actually run as root writing or testing device drivers except for the fine and very necessary people of the BSD contributor teams.

➢ Use of graphical interface.

➢ What mean "tune"? don't know but it's needed :)

COMMON SERVICES

114. Configure and enable a DHCP server according to a set of specifications.

Configure and enable a DHCP server according to a set of specifications.
Average rank

	1	2	3	4	5	
Importance						(3.8)
Frequency						(1.9)
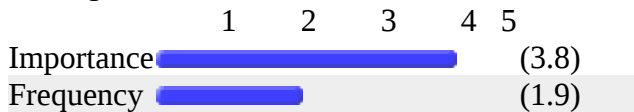
115. Override settings a DHCP client receives from a DHCP server.

Override settings a DHCP client receives from a DHCP server.
Average rank

	1	2	3	4	5	
Importance						(3.4)
Frequency						(1.9)
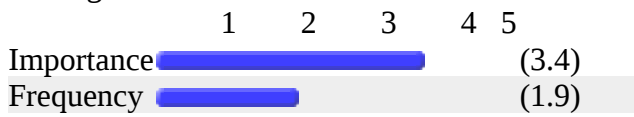
116. Enable a DNS caching server.

Enable a DNS caching server.
Average rank

	1	2	3	4	5	
Importance						(3.9)
Frequency						(2.0)
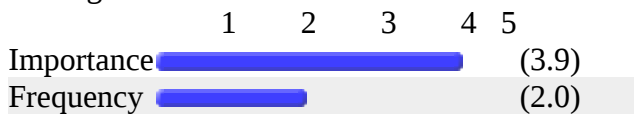
117. Configure a DNS server for providing primary master zones.

Configure a DNS server for providing primary master zones.
Average rank

	1	2	3	4	5	
Importance						(4.0)
Frequency						(2.0)

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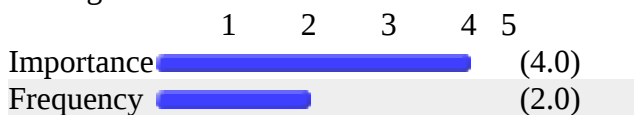
118. Configure a DNS server for providing secondary slave zones.

Configure a DNS server for providing secondary slave zones.
Average rank

	1	2	3	4	5	
Importance						(3.8)
Frequency						(1.9)
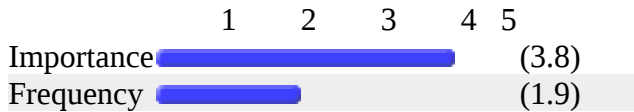
119. Determine which DNS servers are authoritative for a specified hostname.

Determine which DNS servers are authoritative for a specified hostname.
Average rank

	1	2	3	4	5	
Importance						(4.0)
Frequency						(2.5)
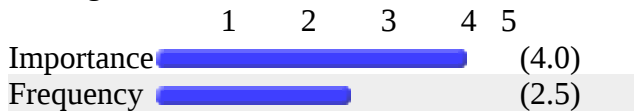
120. Configure a DNS server to permit or deny zone transfers.

Configure a DNS server to permit or deny zone transfers.
Average rank

	1	2	3	4	5	
Importance						(3.9)
Frequency						(1.8)
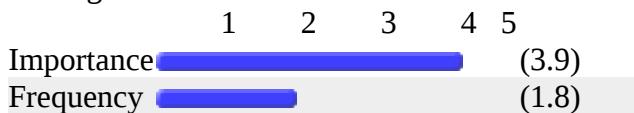
121. Configure a DNS server to provide reverse lookups.

Configure a DNS server to provide reverse lookups.
Average rank

	1	2	3	4	5	
Importance						(3.9)
Frequency						(2.0)

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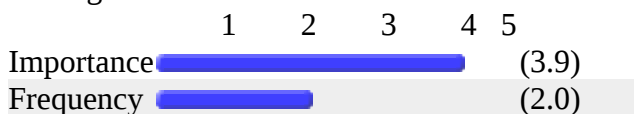
122. Configure a DNS server to act as a standalone root server.

Configure a DNS server to act as a standalone root server.
Average rank

	1	2	3	4	5	
Importance						(3.0)
Frequency						(1.4)
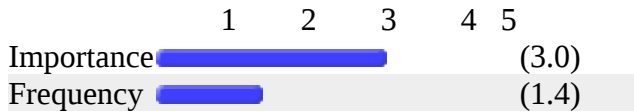
123. Change the order of name resolution.

Change the order of name resolution.
Average rank

	1	2	3	4	5	
Importance						(3.5)
Frequency						(1.7)
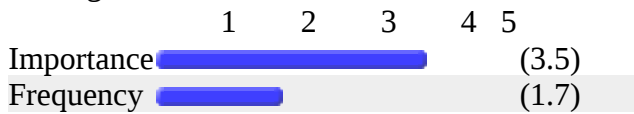
124. Configure an NTP stratum 1 time server.

Configure an NTP stratum 1 time server.
Average rank
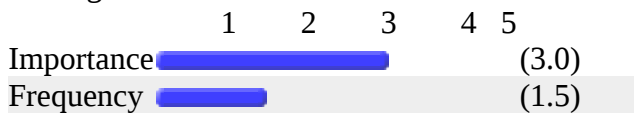
	1	2	3	4	5	
Importance						(3.0)
Frequency						(1.5)

125. Install and configure an FTP server according to a set of specifications.

Install and configure an FTP server according to a set of specifications.
Average rank

	1	2	3	4	5	
Importance						(3.6)
Frequency						(1.8)

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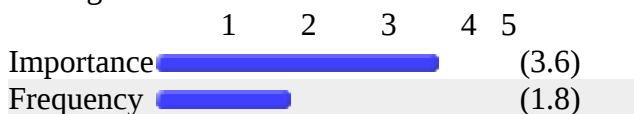
126. Configure Anonymous FTP.

Configure Anonymous FTP.
Average rank
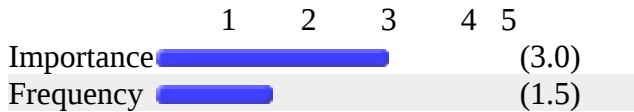
	1	2	3	4	5	
Importance						(3.0)
Frequency						(1.5)

127. Configure a Mail Transfer Agent (MTA) according to a set of specifications.

Configure a Mail Transfer Agent (MTA) according to a set of specifications.
Average rank

	1	2	3	4	5	
Importance						(4.1)
Frequency						(2.0)
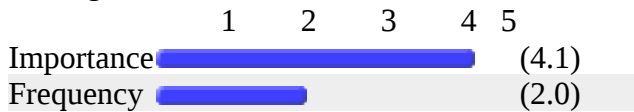
128. Manually send an email using SMTP protocol.

Manually send an email using SMTP protocol.
Average rank

	1	2	3	4	5	
Importance						(3.8)
Frequency						(2.4)
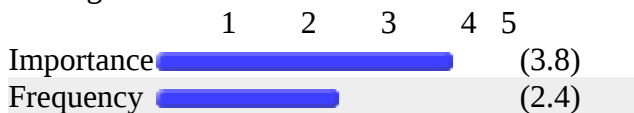
129. Configure MTA for outgoing mail only.

Configure MTA for outgoing mail only.
Average rank

	1	2	3	4	5	
Importance						(3.7)
Frequency						(1.9)
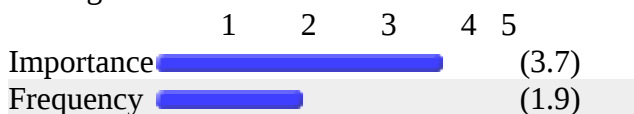
130. Configure MTA to use SASL.

Configure MTA to use SASL.
Average rank

	1	2	3	4	5	
Importance						(3.4)
Frequency						(1.7)
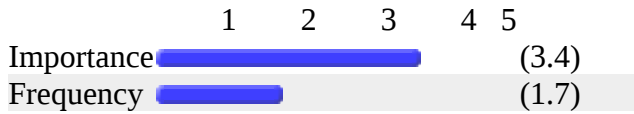
131. Configure MTA to use TLS.

Configure MTA to use TLS.
Average rank

	1	2	3	4	5	
Importance						(3.5)
Frequency						(1.7)
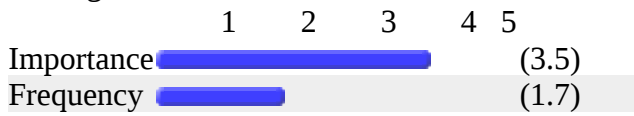
132. Configure MTA to filter SPAM.

Configure MTA to filter SPAM.
Average rank

	1	2	3	4	5	
Importance						(4.0)
Frequency						(2.2)
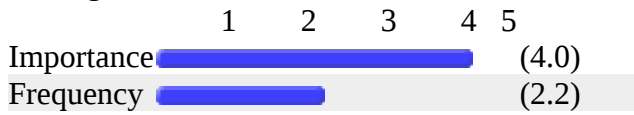
133. Configure MTA to use a virus scanner.

Configure MTA to use a virus scanner.
Average rank

	1	2	3	4	5	
Importance						(3.8)
Frequency						(2.0)
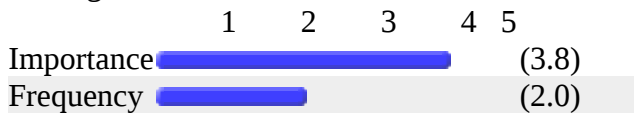
134. Install and configure an IMAP server.

Install and configure an IMAP server.
Average rank

	1	2	3	4	5	
Importance						(3.7)
Frequency						(1.8)
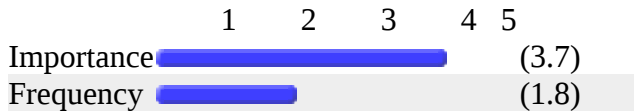
135. Install and configure a POP3 server.

Install and configure a POP3 server.
Average rank

	1	2	3	4	5	
Importance						(3.6)
Frequency						(1.8)
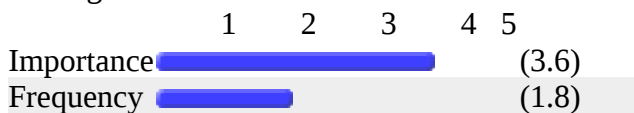
136. Configure an email client to send encrypted emails.

Configure an email client to send encrypted emails.
Average rank
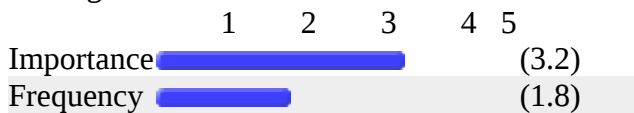
	1	2	3	4	5	
Importance						(3.2)
Frequency						(1.8)

137. Install and configure a webmail server according to a set of specifications.

Install and configure a webmail server according to a set of specifications.
Average rank

	1	2	3	4	5	
Importance						(3.4)
Frequency						(1.6)

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138. Install and configure a webserver according to a set of specifications.

Install and configure a webserver according to a set of specifications.
Average rank

	1	2	3	4	5	
Importance						(4.1)
Frequency						(2.2)
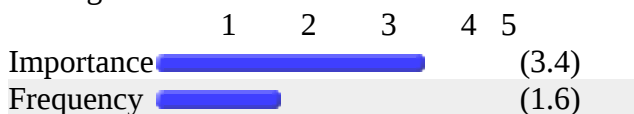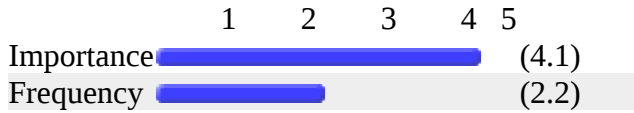
139. Configure webserver for HTTPS / SSL.

Configure webserver for HTTPS / SSL.
Average rank

	1	2	3	4	5	
Importance						(4.2)
Frequency						(2.1)
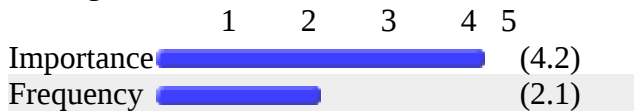
140. Install and configure a RADIUS server.

Install and configure a RADIUS server.
Average rank

	1	2	3	4	5	
Importance						(2.9)
Frequency						(1.5)
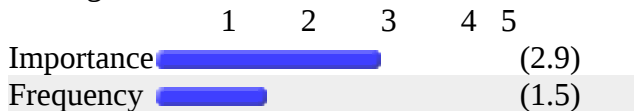
141. Enable NFS server and share a local directory for network usage.

Enable NFS server and share a local directory for network usage.
Average rank

	1	2	3	4	5	
Importance						(3.8)
Frequency						(2.1)

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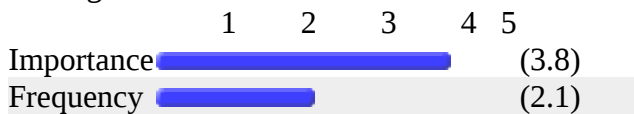
142. Enable and configure NIS service.

Enable and configure NIS service.
Average rank
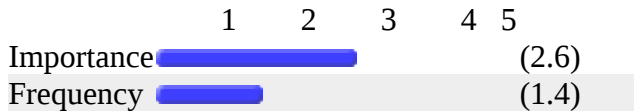
	1	2	3	4	5
Importance					(2.6)
Frequency					(1.4)

143. Install and configure an RDBMS according to a set of specifications.

Install and configure an RDBMS according to a set of specifications.
Average rank

	1	2	3	4	5
Importance					(3.6)
Frequency					(1.9)
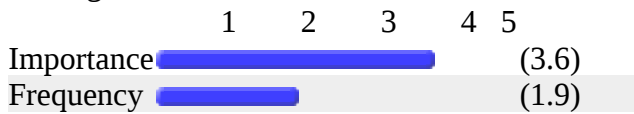
144. Configure an RDBMS to allow specific logins.

Configure an RDBMS to allow specific logins.
Average rank

	1	2	3	4	5
Importance					(3.6)
Frequency					(1.9)
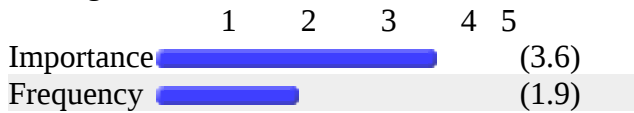
Comments on "Common Services"

➢ php/django/ruby webserver setup; apache tomcat server setup; sshd server options; ssh tunels (local/remote) (also automatic with keys)

➢ Integration and use of Webmin.

➢ Lots of "More than one answer" cases -- #124: Configuring Stratum 2/3 servers is the more common case. Familiarity with NTP is important #125/126: FTP is banished from my environment. SFTP questions would be nice to see. (FTP Questions should stay around b/c of the hosting universe) #127, 129-133: Which MTA? Which spam filter? Which virus scanner? (My shop: sendmail/spamassassin/clamd, my personal box: sendmail/dspam/clamd, My friend's server:

postfix/spamassassin+dspam/clamd). Many possibilities... #128: Important benchmark of experience/skill #134,135: Which IMAP/POP server? #136: Which client (Thunderbird, Outlook, Apple Mail, PINE...) - Desktop support question... #137: Which webmail server? (Standalone? Running under a web server (presumably apache)?) #138/#139: Assuming Apache is probably safe in a large majority of cases. #142: Phasing out in favor of PAM-LDAP. Still a good benchmark of experience #143/144: Which RDBMS (I use Postgres, lots of people use MySQL, there are other less popular ones).

➢ Maybe you could talk about ldap logins and nss.

➢ Much better selection.

➢ Not BSD questions.

➢ One should at least know where to find information for configuration. Of course knowing the basics is important, but for more complex situations it's much better to find the manual.

➢ Same. Question 124, why stratum 1? In my case I configured a stratum 4 to be used by all the systems internally.

➢ We can not get firefox and konqueror to get the same permit/deny behavior from mail.google.com and login.yahoo.com so Internet mail has much more broken with it than worrying about encryption that ends using a telephone to confirm the recipient has seen the encrypted message.

GENERAL NETWORKING

146. Configure networking with PPP or PPPoE.

Configure networking with PPP or PPPoE.
Average rank

	1	2	3	4	5	
Importance						(2.9)
Frequency						(1.5)
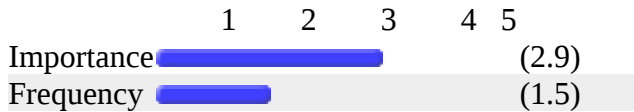
147. Configure BSD system to be a router.

Configure BSD system to be a router.
Average rank

	1	2	3	4	5	
Importance						(4.1)
Frequency						(2.0)
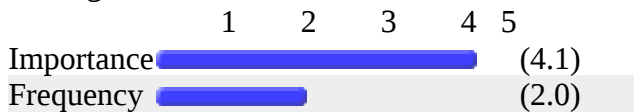
148. Configure BSD system to act as a traffic shaper.

Configure BSD system to act as a traffic shaper.
Average rank

	1	2	3	4	5	
Importance						(3.7)
Frequency						(1.9)
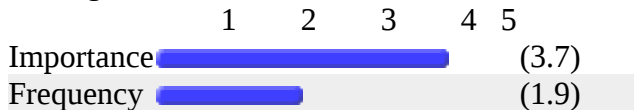
149. Configure BSD system to act as a bridge.

Configure BSD system to act as a bridge.
Average rank

	1	2	3	4	5	
Importance						(3.4)
Frequency						(1.7)
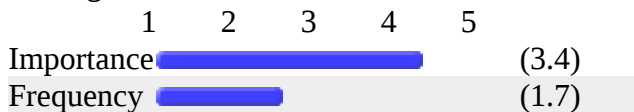
150. Install and configure an H.323 gateway.

Install and configure an H.323 gateway.
Average rank

	1	2	3	4	5	
Importance	███████████					(2.3)
Frequency	█████					(1.3)
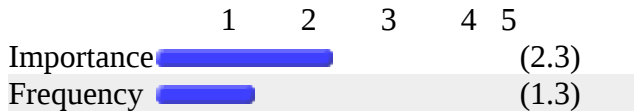
151. Configure BSD system to act as a Wireless Access Point.

Configure BSD system to act as a Wireless Access Point.
Average rank

	1	2	3	4	5	
Importance	██████████████					(3.1)
Frequency	██████					(1.5)
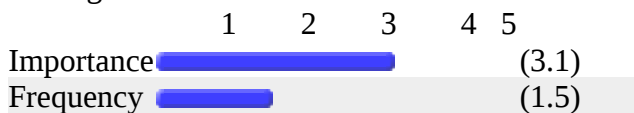
152. Determine which IP address is abusing the network.

Determine which IP address is abusing the network.
Average rank

	1	2	3	4	5	
Importance	██████████████████					(4.5)
Frequency	█████████████					(3.1)
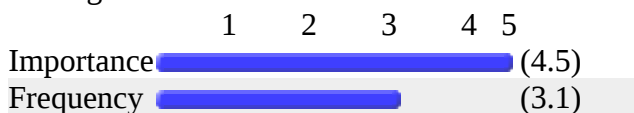
153. Partition an IP address space for new subnets.

Partition an IP address space for new subnets.
Average rank

	1	2	3	4	5	
Importance	████████████████					(4.1)
Frequency	██████████					(2.3)
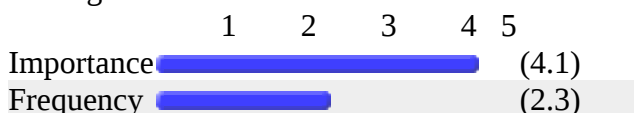
154. Enable network interface IP aliases.

Enable network interface IP aliases.
Average rank

	1	2	3	4	5	
Importance						(4.2)
Frequency						(2.5)
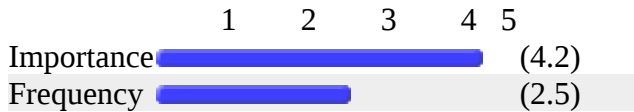
155. Troubleshoot network traffic issues using a sniffer program.

Troubleshoot network traffic issues using a sniffer program.
Average rank

	1	2	3	4	5	
Importance						(4.4)
Frequency						(3.2)
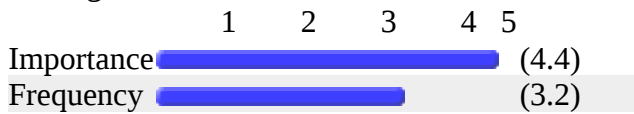
156. View network protocol statistics.

View network protocol statistics.
Average rank

	1	2	3	4	5	
Importance						(4.2)
Frequency						(3.2)
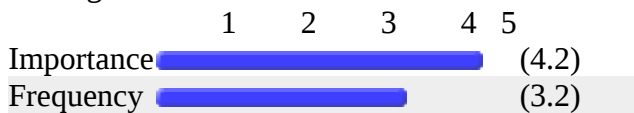
157. Change TCP/IP parameters such as TTL and MTU.

Change TCP/IP parameters such as TTL and MTU.
Average rank

	1	2	3	4	5	
Importance						(3.6)
Frequency						(1.9)
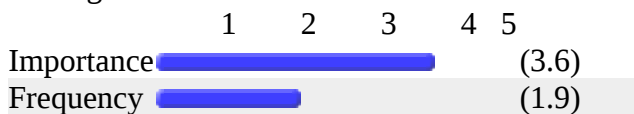
158. Configure interface for special options or media types.

Configure interface for special options or media types.
Average rank

	1	2	3	4	5	
Importance						(3.4)
Frequency						(1.8)
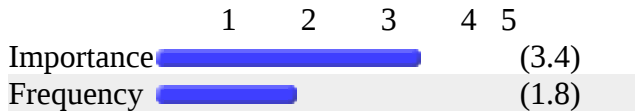
159. Join the system to an IPv6 network.

Join the system to an IPv6 network.
Average rank

	1	2	3	4	5	
Importance						(3.3)
Frequency						(1.8)
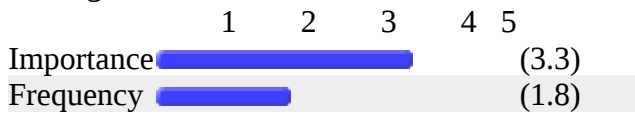
160. Configure network interface for multiple VLANs

Configure network interface for multiple VLANs
Average rank

	1	2	3	4	5	
Importance						(3.7)
Frequency						(2.1)
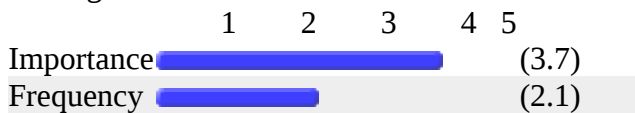
161. Configure the system to deny ICMP responses.

Configure the system to deny ICMP responses.
Average rank

	1	2	3	4	5	
Importance						(3.3)
Frequency						(1.8)
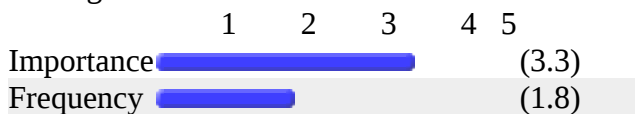
162. Configure access to data hosted on Microsoft systems.

Configure access to data hosted on Microsoft systems.
Average rank

	1	2	3	4	5	
Importance						(3.2)
Frequency						(1.9)
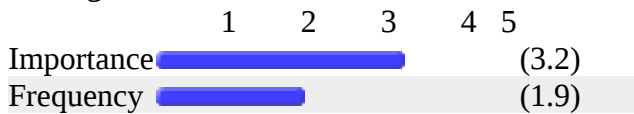
Comments on "General Networking"

➢ Using "dynamic" user accounts from postgresql/mysql database; transfer configuration from one server to another (migration to new hardware); upgrade procedure for minor/major version (binary/source).

➢ 161. Configure the system to deny ICMP responses. This should not be done according to some RFC, if I remember correctly. At least that's what is teached on CCNA course.

➢ Again mainly one-shot configuration items. All relatively important for a skilled admin.

➢ Configuration of Samba with Graphical tools (KDE, GNOME, QT, Webmin).

➢ Denying ICMP is often causing troubles, especially when one forgets about it.

➢ Same.

➢ Wow, it only took you 162 questions to acknowledge that Microsoft exists. You need to make this more of a focus. In fact, you can have an entire exam or two on interacting with Windows environments.

BACKUP and RESTORE

164. Perform a backup according to a set of specifications.

Perform a backup according to a set of specifications.
Average rank

	1	2	3	4	5
Importance					(4.6)
Frequency					(3.4)
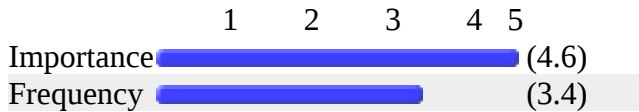
165. Restore the specified portion of a system from a backup.

Restore the specified portion of a system from a backup.
Average rank

	1	2	3	4	5
Importance					(4.6)
Frequency					(2.3)
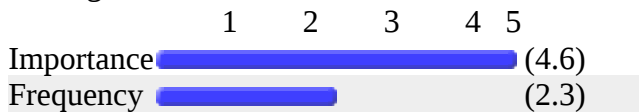
166. Maintain synchronized files on two or more systems.

Maintain synchronized files on two or more systems.
Average rank

	1	2	3	4	5
Importance					(4.3)
Frequency					(3.2)
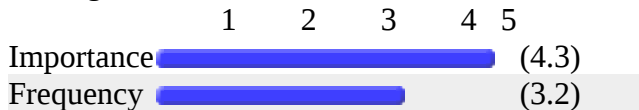
167. Perform an encrypted backup over the network.

Perform an encrypted backup over the network.
Average rank

	1	2	3	4	5
Importance					(4.1)
Frequency					(2.8)

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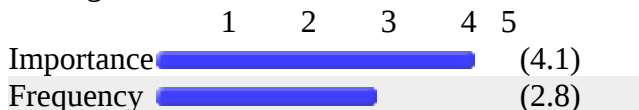
168. Perform a distributed backup on multiple systems.

Perform a distributed backup on multiple systems.
Average rank

	1	2	3	4	5	
Importance						(3.7)
Frequency						(2.5)
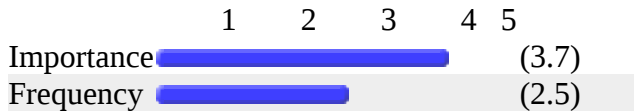
169. Backup Windows shares to a BSD system.

Backup Windows shares to a BSD system.
Average rank

	1	2	3	4	5	
Importance						(3.1)
Frequency						(2.4)
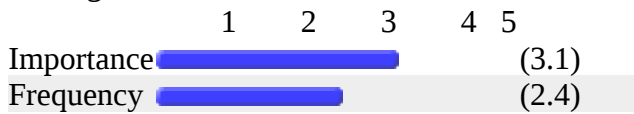
Comments on "Backup and Restore"

➢ #164,165,167: With tar / with dump. Specific backup applications (e.g. Bacula) probably out of scope #166: More than one way to do this...

➢ backups and archives types (like in IBM TSM); fast restore of files (easy restore focus backup); disaster recovery backups; creating disaster recovery plans.

➢ Amanda seems better than Bacula, and Amanda has added a native W32 client that supports "Shadow Copies".

➢ Backup Files to a Windows Share.

➢ Frequency of less 1X/Month means never or also less than 1X/month. So if I do never or every other month, I have same choice.

➢ Imagine Internet storefront data, the encrypted "backup" is all the time; otherwise daily incremental unless using unreliable system at the end node.

➢ Same.

VIRTUALIZATION

171. Troubleshoot a jail.

Troubleshoot a jail.
Average rank

	1	2	3	4	5	
Importance						(3.7)
Frequency						(2.1)
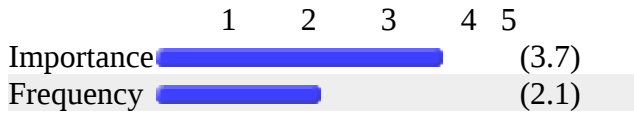
172. Clone a jail.

Clone a jail.
Average rank

	1	2	3	4	5	
Importance						(3.5)
Frequency						(1.9)
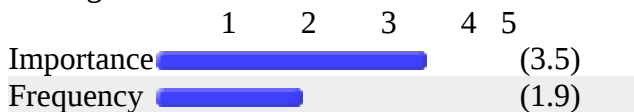
173. Upgrade a host system that contains jails.

Upgrade a host system that contains jails.
Average rank

	1	2	3	4	5	
Importance						(3.7)
Frequency						(1.8)
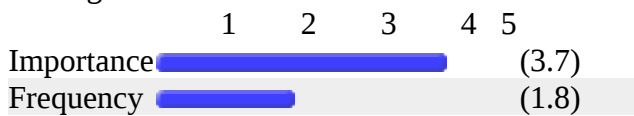
174. Configure a BSD system to host virtualized environments.

Configure a BSD system to host virtualized environments.
Average rank

	1	2	3	4	5	
Importance						(3.6)
Frequency						(1.8)
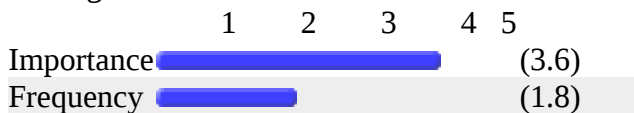
175. Install BSD into a virtualized environment.

Install BSD into a virtualized environment.
Average rank

	1	2	3	4	5	
Importance						(3.6)
Frequency						(1.9)
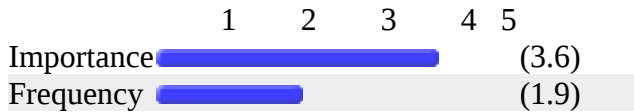
Comments on "Virtualization"

➢ #173: Critical skill - Breaking jailed services on upgrade is a Bad Thing. #174: Virtualized -> Jails; Less critical: qemu, etc. #175: VMWare hosts.

➢ using virtualbox/qemu on FreeBSD as host; using dosbox/dosemu/wine for other systems binaries

➢ Limit or visualized environment the use of QEMU y VirtualBox (icl. from Packages for faster work)

➢ Nothing about Xen? dom0/domU. It has High IMP and FREQ less than 1x/M to do so. Question 175; related to Virtualbox and VMWare too, for example, I suppose. Nice.

➢ Same.

LOGGING and MONITORING

177. Configure a log server according to a set of specifications.

Configure a log server according to a set of specifications.
Average rank

	1	2	3	4	5	
Importance						(3.9)
Frequency						(1.9)
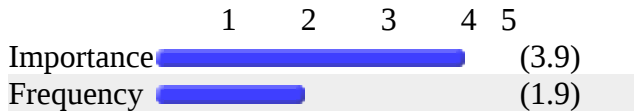
178. Configure automatic rotation of log files.

Configure automatic rotation of log files.
Average rank

	1	2	3	4	5	
Importance						(4.2)
Frequency						(2.1)
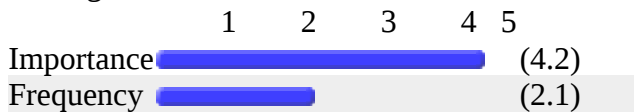
179. Search for patterns in logfiles using regular expressions.

Search for patterns in logfiles using regular expressions.
Average rank

	1	2	3	4	5	
Importance						(4.1)
Frequency						(3.3)
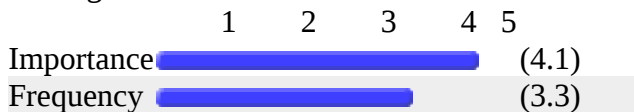
180. Monitor system for login abuses.

Monitor system for login abuses.
Average rank

	1	2	3	4	5	
Importance						(4.3)
Frequency						(3.5)

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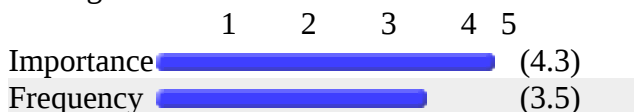
Comments on "Logging and Monitoring"

➢ #177: Concentrating on standard syslog. Syslog-NG should be an optional/extra item, strongly preferred on centralized loghosts. #178: More than one way to accomplish it; Suggest concentrating on newsyslog. #179: Critical skill #180: Cron job; "Knowing what to look for" questions should be used here.

➢ Monitoring services.

➢ Same.

➢ Very good.

PRINTING

182. Enable (or install) and configure a printing service according to a set of specifications.

Enable (or install) and configure a printing service according to a set of specifications.
Average rank

	1	2	3	4	5	
Importance						(3.0)
Frequency						(1.5)
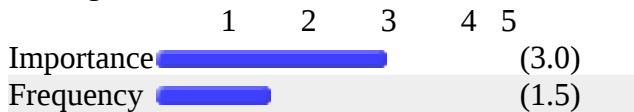
183. Configure printer accounting.

Configure printer accounting.
Average rank

	1	2	3	4	5	
Importance						(2.6)
Frequency						(1.4)
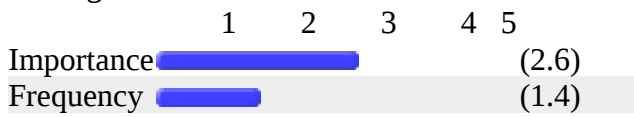
184. Troubleshoot a printer configuration file.

Troubleshoot a printer configuration file.
Average rank

	1	2	3	4	5	
Importance						(2.9)
Frequency						(1.5)
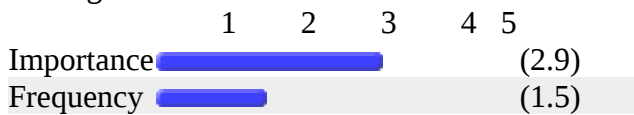
185. Troubleshoot common printer problems.

Troubleshoot common printer problems.
Average rank

	1	2	3	4	5	
Importance						(2.9)
Frequency						(1.6)
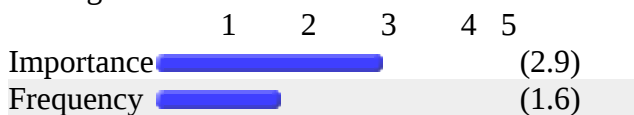
186. Configure IPP printing.

Configure IPP printing.
Average rank

	1	2	3	4	5	
Importance						(2.5)
Frequency						(1.4)
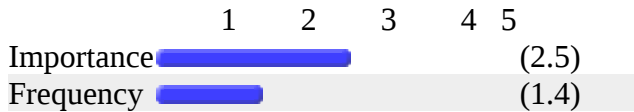
Comments on "Printing"

➢ Config. of graphical tools to the printing subsystem.

➢ Embedded specifics.

➢ IPP is less important than tools to translate Adobe newest effort at obsoleting the installed base of PostScript firmware in printers that are outlasting the Adobe revenue model. The increasing spread of PDF with malformed or backward obsolescence has motivated a more than daily use of a local released tools that use: 'fetch(1), xpdf(1), pdftops -level1 docname.pdf docname.ps' instead of what firefox and konqueror have as defaults. Thank you port team for ports/graphics/xpdf/.

➢ My shop doesn't print from the servers - to me these are all low importance, however they are a good benchmark for experience/skill.

➢ Same.

➢ Sorry, corporations have lots of printers that are large and manage themselves and have their own print servers.

HIGH AVAILABILITY / HIGH PERFORMANCE

188. Configure high availability routing.

Configure high availability routing.
Average rank

	1	2	3	4	5	
Importance						(3.6)
Frequency						(1.8)
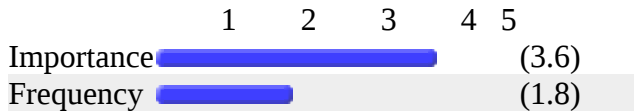
189. Tune OS for high performance TCP.

Tune OS for high performance TCP.
Average rank

	1	2	3	4	5	
Importance						(3.8)
Frequency						(1.9)
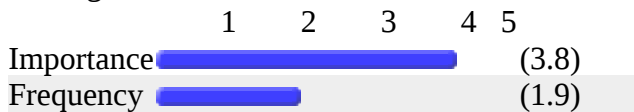
190. Change the default scheduler to a high performance scheduler.

Change the default scheduler to a high performance scheduler.
Average rank

	1	2	3	4	5	
Importance						(3.3)
Frequency						(1.6)
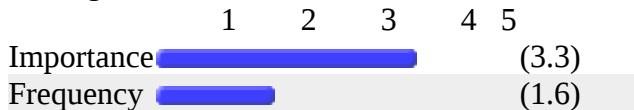
191. Configure a firewall for high availability.

Configure a firewall for high availability.
Average rank

	1	2	3	4	5	
Importance						(3.9)
Frequency						(1.9)
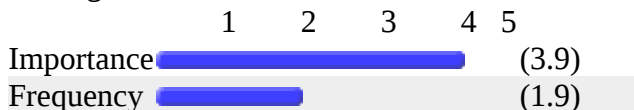
Comments on "High Availability / High Performance"

➢ creating simple two node cluster

➢ 190 may be interesting only for historical reasons.

➢ All extremely important, all should be extremely infrequent (do it once and leave it alone). Admins who constantly fiddle with these settings frighten me.

➢ Load balancing web services and rdbms.

➢ Same.

➢ Since the default BSD seems fast, I would like to know how to do 188-191 beyond any tricks known in 1987 about physical memory, disk layout, choice of physical bus purchase.

ADDITIONAL COMMENTS

The comments in this section are about the survey itself, the BSD Professional Exam, or any related topic of interest.

➤ "Frequency" is not fully understandable - some operations have correlating frequency, some needed at install-only time... Maybe it is better "logicaly cooperate" operations to meta-operation with basic "frequency" and for operations make "none - as basic - more frequency - much more frequency".

➤ A lot of tasks present in the servey represent work that is usually done once and for all, so it is difficult to answer the frequency question. Monitoring, debugging, post mortem analysis, tuning, and keeping things up-to-date are the key skills for a BSD professional.

➤ Focus on common tasks, expose feature and how get and properly read the manual to use it. Explicit good pratices to avoid common mistakes which lead to unmanagable systems.

➤ Good survey generally, nothing to add this time.

➤ I didn't even know you could do some of these, I've never seen anything in the FreeBSD Handbook or any how-tos or articles in the trade rags about the topic. There's a lot of these things that you setup once, and rarely have to touch again, until an upgrade forces you to. I understand that some sites change all the time, but a lot of places don't. I think it's more important to know where you'd find the information on HOW to do a lot of this than to have all the steps memorized. There's a huge difference between things you do daily or weekly and therefore have memorized, and things you do once a year or so.

➤ I listed the tasks that I see important for administration of my network. i.e, we do not do virtualised machine, so I am not really concerned.

➤ I may be mistaken about the scope of this test, but, based on these questions, it is more of a generic sysadmin test than a BSD-specific one. Someone who has only used Linux would be able to successfully accomplish the majority of the tasks on this questionnaire. This isn't a bad thing at the core, but labeling it as a "BSD Professional" test would be an insult to those who actually administer *BSD*, not MySQL, Postfix, or the other topics asked about in this survey.

➤ Include the graphical managers.

➤ Just want to thank you guys. Great job. Congrats, BSDCG!

➤ Needs more userland administration, like: "Update userland ports/pkgsrc, installation and setup of a

complex application (like PHP or GNOME) from one major revision to another."

➢ Nice.

➢ Thank you for the work on BSD certification.

➢ The survey should request information about the environment the survey taking is working in - For example, I manage 80+ BSD servers in a high availability/high reliability database server environment. Most of my time is spent monitoring and reporting. When I ran a hosting company, I installed FreeBSD several times a day. Someone that does office integration would find printers and printing far more important that I do.

➢ Well assembled and very complete -- Beware of scope creep in the certification however. A certification that is geared toward a full stack of "FreeBSD+MySQL+Apache+PHP+Postfix+ Courier IMAP+SpamAssassin+Clam+...etc..." is IMHO less valuable than one that tests the candidate's ability to handle a *BSD system and asks general knowledge questions. Employers should handle "Experience with program X" type screening -- What I'm looking for in a BSDP-level applicant is someone who can supervise BSDAs, solve some of the more hairy general system problems and knows enough to give me helpful information when my phone has to ring.

➢ You have a lot of questions about "one-time-tasks" that you are doing once to a system, a farm, a cluster, ... but then again not for a long time, or that you setup once and then either copy or forget again. The daily business is a lot more monitoring (for operations) and even more troubleshooting (for administration). There is a lot of more either system/kernel or application troubleshooting there. Simple top, vmstat, ps, dmesg, *trace, tcpdump, netstat -rn, netsta -an, .. is still used mostly. On the other hand I have seen either special application skills like firewall only or radius only or web stuff only or on the other hand the developer kind of professional. Not sure a hands on lab is great but even having done things for 7 years and letting do now mostly, half of the question didn't sound like daily business.

➢ You should describe target group more specifically, because there exist several usage patterns: server, desktop, and embedded. And several quite different environments: corporate (server and desktop), personal (server and desktop) and embedded (embedded system and supporting servers). Having worked with all three setups, my opinion is that requirements differ much. Since I work mostly with embedded systems, my opinion may and most probably do represent quite a minority.

Demographic Information

This section provided an opportunity for the survey community to identify their own demographic. The items in this section were entirely optional, but many responders chose to supply the information which yielded valuable insights.

194. I think the BSD Professional Certification should:

I think the BSD Professional Certification should:

Consist of a multiple choice exam only	18.9%	(23)
Consist of a hands-on lab only	4.9%	(6)
Consist of both a multiple choice exam and a hands-on lab	65.6%	(80)
I prefer not to say	5.7%	(7)
TOTAL	**95.1%**	**116** **(122)**
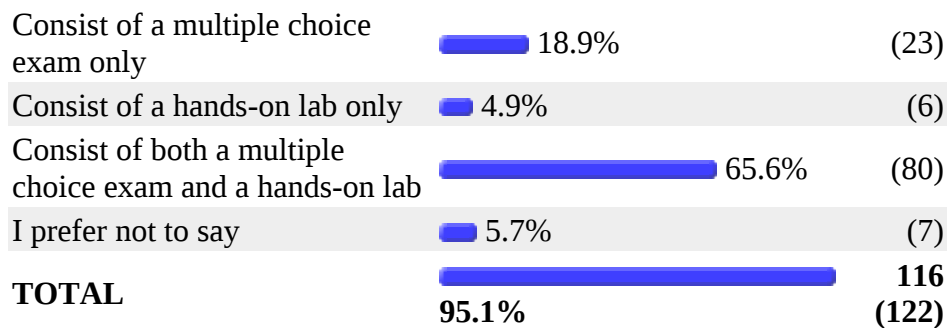
195. In my day-to-day life, I use BSD:

In my day-to-day life, I use BSD:

All the time	48.4%	(59)
A lot	26.2%	(32)
A fair amount	13.9%	(17)
Some	4.1%	(5)
Not very much	2.5%	(3)
Not at all	0.8%	(1)
I prefer not to say		(0)
TOTAL	**95.9%**	**117** **(122)**

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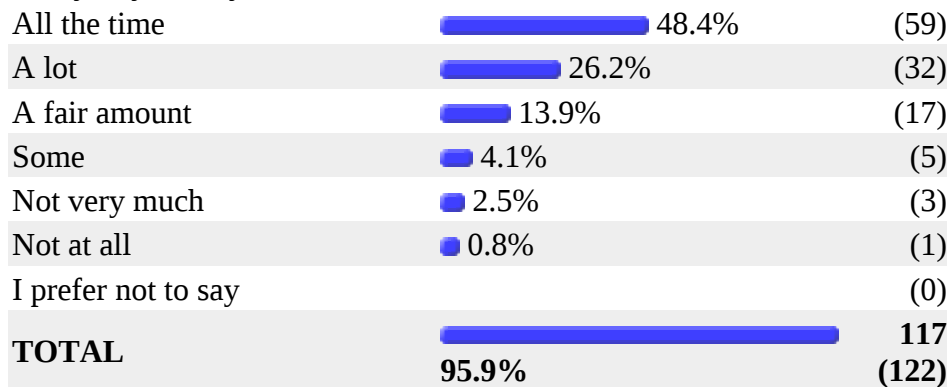
196. I consider myself a BSD:

I consider myself a BSD:

Expert	11.5%	(14)
Very knowledgable person	36.9%	(45)
Fairly knowledgeable person	37.7%	(46)
Not very knowledgeable person	8.2%	(10)
Novice or beginner		(0)
I prefer not to say	1.6%	(2)
TOTAL	**95.9%**	**117** **(122)**

197. In years of age, I am:

In years of age, I am:

15-20	3.3%	(4)
21-25	14.8%	(18)
26-30	27.9%	(34)
31-35	21.3%	(26)
36-40	8.2%	(10)
41-45	5.7%	(7)
46-50	7.4%	(9)
51-55	3.3%	(4)
56-60	3.3%	(4)
60+	0.8%	(1)
I prefer not to say	0.8%	(1)
TOTAL	**96.7%**	**118** **(122)**

198. I am:

I am:

female	0.8%	(1)
male	91.8%	(112)
I prefer not to say	3.3%	(4)
TOTAL	**95.9%**	**117 (122)**

199. My job title is currently:

My job title is currently:

Junior Level Admin	6.6%	(8)
Senior Level Admin	45.9%	(56)
Consultant	12.3%	(15)
Student	2.5%	(3)
Instructor	1.6%	(2)
Developer	9.0%	(11)
Other	12.3%	(15)
Not presently employed	1.6%	(2)
I prefer not to say	3.3%	(4)
TOTAL	**95.1%**	**116 (122)**

200. I live in:

I live in:

Afghanistan	0.8%	(1)
Argentina	1.6%	(2)
Australia	1.6%	(2)
Austria	1.6%	(2)
Azerbaijan	0.8%	(1)
Belarus	0.8%	(1)
Bosnia and Herzegovina	0.8%	(1)
Brazil	10.7%	(13)
Bulgaria	0.8%	(1)
Canada	2.5%	(3)
Chile	0.8%	(1)
Croatia	0.8%	(1)
Denmark	1.6%	(2)
Dominican Republic	0.8%	(1)
France	4.9%	(6)
Germany	4.9%	(6)
India	1.6%	(2)
Malaysia	0.8%	(1)
Mexico	0.8%	(1)
New Zealand	0.8%	(1)
Philippines	0.8%	(1)
Poland	4.1%	(5)
Portugal	0.8%	(1)
Republic of Moldova	0.8%	(1)
Romania	0.8%	(1)
Russian Federation	10.7%	(13)
Slovenia	0.8%	(1)
South Africa	0.8%	(1)
Switzerland	0.8%	(1)
Thailand	0.8%	(1)
Ukraine	3.3%	(4)

United Kingdom of Great Britain and Northern Ireland	4.1%	(5)
United States of America	23.8%	(29)
I prefer not to say	2.5%	-3
TOTAL	95.1%	**116** (122)
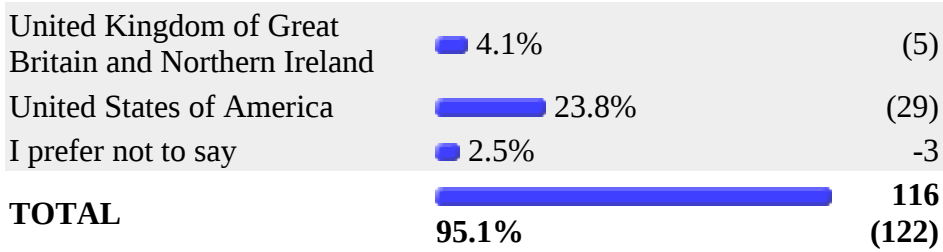
The countries represented above are shown on the map in Illustration 1:

Illustration 1: BSDP JTA responders by Country

Additional Analysis

Ordered List of JTA Responses by Importance/Frequency

The following table contains the ordered list, from most important to least important, of all items in the JTA. Note that the items toward the top of the table are those that the BSD community considers more important.

Item Number and Text	Import.	Freq.
36. Apply security patches.	4.7	3.1
164. Perform a backup according to a set of specifications.	4.6	3.4
165. Restore the specified portion of a system from a backup.	4.6	2.3
152. Determine which IP address is abusing the network.	4.5	3.1
155. Troubleshoot network traffic issues using a sniffer program.	4.4	3.2
106. Download and apply kernel patches.	4.4	2.4
88. Configure and recompile kernel.	4.4	2
180. Monitor system for login abuses.	4.3	3.5
49. Monitor system for common security threats.	4.3	3.3
166. Maintain synchronized files on two or more systems.	4.3	3.2
44. Configure a firewall with custom packet filtering rules.	4.3	2.7
77. Generate a key and configure the system to use it for SSH authentication.	4.3	2.4
33. Configure SSH to restrict logins.	4.3	2.4
96. Tune the operating system.	4.3	2.4
89. Boot an alternate kernel.	4.3	1.8
156. View network protocol statistics.	4.2	3.2
24. Compile a customized binary using ports, packages, or pkgsrc.	4.2	3
154. Enable network interface IP aliases.	4.2	2.5
178. Configure automatic rotation of log files.	4.2	2.1
139. Configure webserver for HTTPS / SSL.	4.2	2.1
58. Resolve full filesystem issues.	4.2	1.8
87. Recover from lost root password.	4.2	1.3
179. Search for patterns in logfiles using regular expressions.	4.1	3.3
108. Capture performance data using standard tools.	4.1	3.2
167. Perform an encrypted backup over the network.	4.1	2.8
93. Retrieve updates from a code repository.	4.1	2.7
153. Partition an IP address space for new subnets.	4.1	2.3
138. Install and configure a webserver according to a set of specifications.	4.1	2.2
55. Manually run file system checker and repair tool.	4.1	2.1
29. Configure system to deny root logins.	4.1	2
147. Configure BSD system to be a router.	4.1	2
127. Configure a Mail Transfer Agent (MTA) according to a set of specifications.	4.1	2
57. Restore system files from single user mode.	4.1	1.5
37. Scan a network to review open ports.	4	2.8
35. Install (if needed), configure, and use sudo.	4	2.8
119. Determine which DNS servers are authoritative for a specified hostname.	4	2.5
107. Setup on-going software or package vulnerability audit reports.	4	2.5
43. Configure a firewall to disable multiple connection attempts from an attacker.	4	2.4
91. Load and unload kernel modules.	4	2.3
132. Configure MTA to filter SPAM.	4	2.2
95. Use mergemaster, etcupdate, or etcmerge to update configurations.	4	2.1

Item Number and Text	Import.	Freq.
117. Configure a DNS server for providing primary master zones.	4	2
16. Configure custom kernel tunables to be enabled at boot time.	4	1.9
63. Configure hardware RAID.	4	1.6
32. Change the flags on sensitive files.	3.9	2.3
52. Configure security event auditing.	3.9	2.2
54. Format a new filesystem according to a set of specifications.	3.9	2
121. Configure a DNS server to provide reverse lookups.	3.9	2
116. Enable a DNS caching server.	3.9	2
191. Configure a firewall for high availability.	3.9	1.9
177. Configure a log server according to a set of specifications.	3.9	1.9
120. Configure a DNS server to permit or deny zone transfers.	3.9	1.8
22. Start or shutdown a jail.	3.8	2.5
66. Create a file system snapshot.	3.8	2.5
128. Manually send an email using SMTP protocol.	3.8	2.4
20. Create and install a jail.	3.8	2.2
81. Create a system account.	3.8	2.2
141. Enable NFS server and share a local directory for network usage.	3.8	2.1
21. Prepare a host system for jails.	3.8	2
133. Configure MTA to use a virus scanner.	3.8	2
67. Configure a logging and/or journaling file system.	3.8	1.9
114. Configure and enable a DHCP server according to a set of specifications.	3.8	1.9
118. Configure a DNS server for providing secondary slave zones.	3.8	1.9
189. Tune OS for high performance TCP.	3.8	1.9
62. Configure software RAID.	3.8	1.6
168. Perform a distributed backup on multiple systems.	3.7	2.5
64. Encrypt a file.	3.7	2.5
104. Backup and restore an RDBMS.	3.7	2.5
19. Configure system to mount remote network filesystems at boot.	3.7	2.2
42. Configure a firewall for greylisting or blacklisting.	3.7	2.1
160. Configure network interface for multiple VLANs.	3.7	2.1
171. Troubleshoot a jail.	3.7	2.1
129. Configure MTA for outgoing mail only.	3.7	1.9
72. Configure a user to use a restricted shell.	3.7	1.9
38. Generate self-signed certificates.	3.7	1.9
28. Raise or lower security level.	3.7	1.9
148. Configure BSD system to act as a traffic shaper.	3.7	1.9
173. Upgrade a host system that contains jails.	3.7	1.8
34. Configure a Network Intrusion Detection System.	3.7	1.8
134. Install and configure an IMAP server.	3.7	1.8
98. Use an rc script to send a process a signal.	3.6	2.7
39. Scan a password file for weak passwords.	3.6	2.2

Item Number and Text	Import.	Freq.
143. Install and configure an RDBMS according to a set of specifications.	3.6	1.9
144. Configure an RDBMS to allow specific logins.	3.6	1.9
157. Change TCP/IP parameters such as TTL and MTU.	3.6	1.9
175. Install BSD into a virtualized environment.	3.6	1.9
75. Set shell limits.	3.6	1.9
188. Configure high availability routing.	3.6	1.8
174. Configure a BSD system to host virtualized environments.	3.6	1.8
125. Install and configure an FTP server according to a set of specifications.	3.6	1.8
74. Force an active user off the system.	3.6	1.8
135. Install and configure a POP3 server.	3.6	1.8
1. Build and install system from source code.	3.6	1.7
13. Restore a corrupted boot sector.	3.6	1.3
92. Install perl modules.	3.5	2.1
46. Configure a file integrity checking utility.	3.5	2
172. Clone a jail.	3.5	1.9
71. Prevent regular users from viewing who is logged on and what others are doing.	3.5	1.8
105. Configure a network service to use a 'sandbox' environment.	3.5	1.8
30. Configure PAM to support an alternative authentication mechanism.	3.5	1.8
61. Enable or disable a mounted filesystem write status.	3.5	1.8
76. Tune per-user resource limits.	3.5	1.8
123. Change the order of name resolution.	3.5	1.7
131. Configure MTA to use TLS.	3.5	1.7
65. Configure an encrypted filesystem.	3.5	1.7
73. Create or modify skeleton files for new user's home directories.	3.5	1.7
41. Configure a firewall to act as an authentication gateway.	3.5	1.6
48. Configure login.conf or PAM for improving new password security.	3.5	1.6
2. Use bsdlabel or disklabel to modify or create partitions.	3.5	1.4
17. Password protect single user mode.	3.5	1.4
94. Use ktrace to troubleshoot software issues.	3.4	2
31. Configure ACLs to augment traditional Unix permissions.	3.4	2
45. Configure TCP wrappers.	3.4	1.9
115. Override settings a DHCP client receives from a DHCP server.	3.4	1.9
158. Configure interface for special options or media types.	3.4	1.8
149. Configure BSD system to act as a bridge.	3.4	1.7
130. Configure MTA to use SASL.	3.4	1.7
59. Set up filesystem quotas for users.	3.4	1.7
137. Install and configure a webmail server according to a set of specifications.	3.4	1.6
40. Configure kernel to prevent ability to perform network sniffing.	3.4	1.5
100. Add additional swap space partition or file.	3.4	1.5
60. Dynamically increase the size of a filesystem.	3.4	1.5

Item Number and Text	Import.	Freq.
97. View interrupt rate.	3.3	2.2
11. Display the order of startup steps/scripts to be run at boot time.	3.3	1.9
70. Script the creation/deletion/ modification of multiple user accounts.	3.3	1.8
159. Join the system to an IPv6 network.	3.3	1.8
161. Configure the system to deny ICMP responses.	3.3	1.8
23. Create an internal package repository.	3.3	1.7
78. Configure users to auto-logout after period of inactivity.	3.3	1.7
79. Configure a shell to log all activity.	3.3	1.7
69. Customize the login class capability database.	3.3	1.6
190. Change the default scheduler to a high performance scheduler.	3.3	1.6
12. Install a boot manager.	3.3	1.5
3. Use fdisk tool to modify or create partitions.	3.3	1.5
51. Configure an IPSec VPN.	3.3	1.2
101. Insert entries in the system log.	3.2	2
112. Configure events for power and/or sensors.	3.2	1.9
162. Configure access to data hosted on Microsoft systems.	3.2	1.9
136. Configure an email client to send encrypted emails.	3.2	1.8
80. Configure a user account to expire on a specified date.	3.2	1.7
85. Enable process accounting.	3.2	1.7
99. Enable logins on serial console.	3.2	1.6
103. Configure the system for binary compatability.	3.2	1.6
8. Create install script or configuration for unattended installation.	3.2	1.4
6. Create or edit the device.hints or loader.conf file.	3.2	1.4
169. Backup Windows shares to a BSD system.	3.1	2.4
18. Configure BSD system for PXE booting.	3.1	1.6
151. Configure BSD system to act as a Wireless Access Point.	3.1	1.5
10. Create an emergency repair disk.	3.1	1.3
56. Mount a /proc file system.	3	1.6
47. Configure One-Time Passwords (OTP).	3	1.5
126. Configure Anonymous FTP.	3	1.5
182. Enable (or install) and configure a printing service according to a set of specifications.	3	1.5
124. Configure an NTP stratum 1 time server.	3	1.5
84. Enable or disable virtual consoles.	3	1.5
83. Configure shared library cache.	3	1.5
122. Configure a DNS server to act as a standalone root server.	3	1.4
90. Use a kernel debugger.	3	1.4
86. Create new device instances.	2.9	1.6
185. Troubleshoot common printer problems.	2.9	1.6
14. Boot via the serial console.	2.9	1.6
146. Configure networking with PPP or PPPoE.	2.9	1.5

Item Number and Text	Import.	Freq.
140. Install and configure a RADIUS server.	2.9	1.5
184. Troubleshoot a printer configuration file.	2.9	1.5
7. Perform a 'headless' install using serial console.	2.8	1.4
9. Create an ISO installation image.	2.8	1.4
110. Troubleshoot X Window startup problems.	2.7	1.6
102. Configure verified exec in-kernel fingerprint table.	2.7	1.4
50. Install and configure a Kerberos server.	2.7	1.2
183. Configure printer accounting.	2.6	1.4
142. Enable and configure NIS service.	2.6	1.4
25. Compress a kernel.	2.5	1.4
186. Configure IPP printing.	2.5	1.4
109. Localize a server for another language.	2.5	1.4
5. Create FAT32, NTFS, or other non-BSD partitions.	2.5	1.3
4. Change Partition IDs to other BSD or non-BSD Ids.	2.5	1.2
26. Perform cross-platform building, such as using build.sh or 'make universe'.	2.4	1.2
150. Install and configure an H.323 gateway.	2.3	1.3
111. Configure an audio (sound) device.	2.2	1.4
15. Configure a splash screen at boot.	1.6	1.1

Table 2: Ordered List of JTA Items by Importance/Frequency

Ordered List of JTA Responses by Frequency/Importance

The following table contains the ordered list, from most frequent to least frequent, of all items in the JTA. Note that the items toward the top of the table are those that the BSD community considers more frequently performed by a typical BSDP.

Item Number and Text	Import.	Freq.
180. Monitor system for login abuses.	4.3	3.5
164. Perform a backup according to a set of specifications.	4.6	3.4
49. Monitor system for common security threats.	4.3	3.3
179. Search for patterns in logfiles using regular expressions.	4.1	3.3
155. Troubleshoot network traffic issues using a sniffer program.	4.4	3.2
166. Maintain synchronized files on two or more systems.	4.3	3.2
156. View network protocol statistics.	4.2	3.2
108. Capture performance data using standard tools.	4.1	3.2
36. Apply security patches.	4.7	3.1
152. Determine which IP address is abusing the network.	4.5	3.1
24. Compile a customized binary using ports, packages, or pkgsrc.	4.2	3
167. Perform an encrypted backup over the network.	4.1	2.8
35. Install (if needed), configure, and use sudo.	4	2.8
37. Scan a network to review open ports.	4	2.8
44. Configure a firewall with custom packet filtering rules.	4.3	2.7
93. Retrieve updates from a code repository.	4.1	2.7
98. Use an rc script to send a process a signal.	3.6	2.7
154. Enable network interface IP aliases.	4.2	2.5
119. Determine which DNS servers are authoritative for a specified hostname.	4	2.5
107. Setup on-going software or package vulnerability audit reports.	4	2.5
66. Create a file system snapshot.	3.8	2.5
22. Start or shutdown a jail.	3.8	2.5
104. Backup and restore an RDBMS.	3.7	2.5
168. Perform a distributed backup on multiple systems.	3.7	2.5
64. Encrypt a file.	3.7	2.5
106. Download and apply kernel patches.	4.4	2.4
33. Configure SSH to restrict logins.	4.3	2.4
77. Generate a key and configure the system to use it for SSH authentication.	4.3	2.4
96. Tune the operating system.	4.3	2.4
43. Configure a firewall to disable multiple connection attempts from an attacker.	4	2.4
128. Manually send an email using SMTP protocol.	3.8	2.4
169. Backup Windows shares to a BSD system.	3.1	2.4
165. Restore the specified portion of a system from a backup.	4.6	2.3
153. Partition an IP address space for new subnets.	4.1	2.3
91. Load and unload kernel modules.	4	2.3
32. Change the flags on sensitive files.	3.9	2.3
138. Install and configure a webserver according to a set of specifications.	4.1	2.2
132. Configure MTA to filter SPAM.	4	2.2
52. Configure security event auditing.	3.9	2.2

Item Number and Text	Import.	Freq.
81. Create a system account.	3.8	2.2
20. Create and install a jail.	3.8	2.2
19. Configure system to mount remote network filesystems at boot.	3.7	2.2
39. Scan a password file for weak passwords.	3.6	2.2
97. View interrupt rate.	3.3	2.2
178. Configure automatic rotation of log files.	4.2	2.1
139. Configure webserver for HTTPS / SSL.	4.2	2.1
55. Manually run file system checker and repair tool.	4.1	2.1
95. Use mergemaster, etcupdate, or etcmerge to update configurations.	4	2.1
141. Enable NFS server and share a local directory for network usage.	3.8	2.1
171. Troubleshoot a jail.	3.7	2.1
42. Configure a firewall for greylisting or blacklisting.	3.7	2.1
160. Configure network interface for multiple VLANs.	3.7	2.1
92. Install perl modules.	3.5	2.1
88. Configure and recompile kernel.	4.4	2
127. Configure a Mail Transfer Agent (MTA) according to a set of specifications.	4.1	2
147. Configure BSD system to be a router.	4.1	2
29. Configure system to deny root logins.	4.1	2
117. Configure a DNS server for providing primary master zones.	4	2
116. Enable a DNS caching server.	3.9	2
54. Format a new filesystem according to a set of specifications.	3.9	2
121. Configure a DNS server to provide reverse lookups.	3.9	2
21. Prepare a host system for jails.	3.8	2
133. Configure MTA to use a virus scanner.	3.8	2
46. Configure a file integrity checking utility.	3.5	2
94. Use ktrace to troubleshoot software issues.	3.4	2
31. Configure ACLs to augment traditional Unix permissions.	3.4	2
101. Insert entries in the system log.	3.2	2
16. Configure custom kernel tunables to be enabled at boot time.	4	1.9
191. Configure a firewall for high availability.	3.9	1.9
177. Configure a log server according to a set of specifications.	3.9	1.9
189. Tune OS for high performance TCP.	3.8	1.9
118. Configure a DNS server for providing secondary slave zones.	3.8	1.9
114. Configure and enable a DHCP server according to a set of specifications.	3.8	1.9
67. Configure a logging and/or journaling file system.	3.8	1.9
129. Configure MTA for outgoing mail only.	3.7	1.9
72. Configure a user to use a restricted shell.	3.7	1.9
148. Configure BSD system to act as a traffic shaper.	3.7	1.9
28. Raise or lower security level.	3.7	1.9

Item Number and Text	Import.	Freq.
38. Generate self-signed certificates.	3.7	1.9
143. Install and configure an RDBMS according to a set of specifications.	3.6	1.9
144. Configure an RDBMS to allow specific logins.	3.6	1.9
157. Change TCP/IP parameters such as TTL and MTU.	3.6	1.9
75. Set shell limits.	3.6	1.9
175. Install BSD into a virtualized environment.	3.6	1.9
172. Clone a jail.	3.5	1.9
45. Configure TCP wrappers.	3.4	1.9
115. Override settings a DHCP client receives from a DHCP server.	3.4	1.9
11. Display the order of startup steps/scripts to be run at boot time.	3.3	1.9
112. Configure events for power and/or sensors.	3.2	1.9
162. Configure access to data hosted on Microsoft systems.	3.2	1.9
89. Boot an alternate kernel.	4.3	1.8
58. Resolve full filesystem issues.	4.2	1.8
120. Configure a DNS server to permit or deny zone transfers.	3.9	1.8
134. Install and configure an IMAP server.	3.7	1.8
34. Configure a Network Intrusion Detection System.	3.7	1.8
173. Upgrade a host system that contains jails.	3.7	1.8
125. Install and configure an FTP server according to a set of specifications.	3.6	1.8
174. Configure a BSD system to host virtualized environments.	3.6	1.8
188. Configure high availability routing.	3.6	1.8
135. Install and configure a POP3 server.	3.6	1.8
74. Force an active user off the system.	3.6	1.8
105. Configure a network service to use a 'sandbox' environment.	3.5	1.8
71. Prevent regular users from viewing who is logged on and what others are doing.	3.5	1.8
61. Enable or disable a mounted filesystem write status.	3.5	1.8
76. Tune per-user resource limits.	3.5	1.8
30. Configure PAM to support an alternative authentication mechanism.	3.5	1.8
158. Configure interface for special options or media types.	3.4	1.8
161. Configure the system to deny ICMP responses.	3.3	1.8
159. Join the system to an IPv6 network.	3.3	1.8
70. Script the creation/deletion/ modification of multiple user accounts.	3.3	1.8
136. Configure an email client to send encrypted emails.	3.2	1.8
1. Build and install system from source code.	3.6	1.7
123. Change the order of name resolution.	3.5	1.7
73. Create or modify skeleton files for new user's home directories.	3.5	1.7
131. Configure MTA to use TLS.	3.5	1.7
65. Configure an encrypted filesystem.	3.5	1.7

Item Number and Text	Import.	Freq.
149. Configure BSD system to act as a bridge.	3.4	1.7
59. Set up filesystem quotas for users.	3.4	1.7
130. Configure MTA to use SASL.	3.4	1.7
79. Configure a shell to log all activity.	3.3	1.7
78. Configure users to auto-logout after period of inactivity.	3.3	1.7
23. Create an internal package repository.	3.3	1.7
80. Configure a user account to expire on a specified date.	3.2	1.7
85. Enable process accounting.	3.2	1.7
63. Configure hardware RAID.	4	1.6
62. Configure software RAID.	3.8	1.6
41. Configure a firewall to act as an authentication gateway.	3.5	1.6
48. Configure login.conf or PAM for improving new password security.	3.5	1.6
137. Install and configure a webmail server according to a set of specifications.	3.4	1.6
190. Change the default scheduler to a high performance scheduler.	3.3	1.6
69. Customize the login class capability database.	3.3	1.6
103. Configure the system for binary compatability.	3.2	1.6
99. Enable logins on serial console.	3.2	1.6
18. Configure BSD system for PXE booting.	3.1	1.6
56. Mount a /proc file system.	3	1.6
185. Troubleshoot common printer problems.	2.9	1.6
86. Create new device instances.	2.9	1.6
14. Boot via the serial console.	2.9	1.6
110. Troubleshoot X Window startup problems.	2.7	1.6
57. Restore system files from single user mode.	4.1	1.5
60. Dynamically increase the size of a filesystem.	3.4	1.5
40. Configure kernel to prevent ability to perform network sniffing.	3.4	1.5
100. Add additional swap space partition or file.	3.4	1.5
3. Use fdisk tool to modify or create partitions.	3.3	1.5
12. Install a boot manager.	3.3	1.5
151. Configure BSD system to act as a Wireless Access Point.	3.1	1.5
126. Configure Anonymous FTP.	3	1.5
83. Configure shared library cache.	3	1.5
182. Enable (or install) and configure a printing service according to a set of specifications.	3	1.5
124. Configure an NTP stratum 1 time server.	3	1.5
84. Enable or disable virtual consoles.	3	1.5
47. Configure One-Time Passwords (OTP).	3	1.5
140. Install and configure a RADIUS server.	2.9	1.5
146. Configure networking with PPP or PPPoE.	2.9	1.5

Item Number and Text	Import.	Freq.
184. Troubleshoot a printer configuration file.	2.9	1.5
2. Use bsdlabel or disklabel to modify or create partitions.	3.5	1.4
17. Password protect single user mode.	3.5	1.4
6. Create or edit the device.hints or loader.conf file.	3.2	1.4
8. Create install script or configuration for unattended installation.	3.2	1.4
122. Configure a DNS server to act as a standalone root server.	3	1.4
90. Use a kernel debugger.	3	1.4
9. Create an ISO installation image.	2.8	1.4
7. Perform a 'headless' install using serial console.	2.8	1.4
102. Configure verified exec in-kernel fingerprint table.	2.7	1.4
142. Enable and configure NIS service.	2.6	1.4
183. Configure printer accounting.	2.6	1.4
109. Localize a server for another language.	2.5	1.4
25. Compress a kernel.	2.5	1.4
186. Configure IPP printing.	2.5	1.4
111. Configure an audio (sound) device.	2.2	1.4
87. Recover from lost root password.	4.2	1.3
13. Restore a corrupted boot sector.	3.6	1.3
10. Create an emergency repair disk.	3.1	1.3
5. Create FAT32, NTFS, or other non-BSD partitions.	2.5	1.3
150. Install and configure an H.323 gateway.	2.3	1.3
51. Configure an IPSec VPN.	3.3	1.2
50. Install and configure a Kerberos server.	2.7	1.2
4. Change Partition IDs to other BSD or non-BSD Ids.	2.5	1.2
26. Perform cross-platform building, such as using build.sh or 'make universe'.	2.4	1.2
15. Configure a splash screen at boot.	1.6	1.1

Table 3: Ordered List of JTA Items by Frequency/Importance

Summary

The BSD Professional Certification seeks to identify those individuals who posses advanced skills in maintaining BSD systems. The ratings in this Job Task Analysis survey give significant insight into the specific skills that the BSD community considers important in day-to-day system administration.

The next step in the certification process is to create a BSDP Exam Objectives Document. This document will identify and explain the knowledge domains that will be included on the exam. It also will identify the specific items that will be included, and provide an explanation of the item, along with any BSD project specific details.

Candidates seeking futher information on exam specifics should study the BSDP Exam Objectives document for additional information once it becomes available. Visit the BSD Certification Group website periodically to check for an announcement concerning the BSDP Exam Objectives document.