Considerations for the BSD Professional Certification Exam Lab Design

Jim Brown
BSDCG
jimbyg@gmail.com
jpbug@sixshooter.v6.thrupoint.net

BSDP Lab Design
Topics

- Intro (Who/What/Why)
- Creating an Exam
- BSDP Exam Design
- BSDP Lab Design
- Discussion
Who/What/Why

• The BSD Certification Group exists to provide psychometrically valid exams for BSD system administrators.

• Incorporated in 2006, NJ, USA. Formal IRS status-501(c)6 a.k.a. “Business League”. Contributions are not tax deductible. We really, really tried... :-(

• BSDCG began in 2005; BSD Associate Exam released in 2008.

• BSD Professional Exam development finally (!) getting started in 2010.

• Other exams under consideration: pf, embedded systems, global enterprise.
The “Why” - Sorry, we're not in it for the money :-)

The BSD Certification Group survives on public donations, purchases of our custom DVDs, corporate sponsorships, and individual goodwill.

By The Numbers:

- 2007: Income: $5,996 : Expenses: $9,046 (Psych: 82%)
- 2008: Income: $9,425 : Expenses: $12,267 (Psych: 70%)

Fortunately, every year we have been able to meet our psychometric expenses.

But it's only one way you can help!

BSDP Lab Design
BSDA Exam Design

- Psychometrician- Dr. Sandra Dolan
- Job Task Analysis for BSD SysAdmins
- Created Exam Objectives
- Created Exam Questions (SMEs for all BSDs)
- Exam Beta Period
- Anghoff Session – figuring percentages
- Set the Passing Score
- Launched!
- Ongoing Tracking and Modifications of the Exam

BSDP Lab Design
Why Psychometrics?

- A psychometrically valid exam represents the highest level of exam design excellence.
- Psychometric exam design is the right choice for professional settings and credentials.
- Future directions for BSDCG require psychometric exam design, and structured business design (ITIL, CoBIT).
- These are required for program accreditation by ANSI, ISO, and other standards bodies.
Creating the BSDP Exam

- A “Job Task Analysis” starts the process
- JTA attempts to determine what the job practitioner actually does
- A survey is used to identify “Frequently Performed” tasks and “Important Tasks”
- BSDP JTA completed in Nov. 2009, results published in Mar. 2010
- Psychometric Analysis is currently underway
BSDP JTA Results

- Participation by over 30 countries
BSDP JTA Results

- BSDP JTA Responder Demographics
  - Mostly male, 21-45
  - Employed with direct hands-on experience (over 70%)
  - Heavy users of BSD (88%) and quite familiar with BSD (86%)
  - Preferred a combination written and hands-on lab by 2 to 1 (65%)

- Many Good Comments (and some funny ones)
**BSDP Exam Next Steps**

- Create BSDP Exam Objectives Document
  - Effort already underway on wiki at: bsdwiki.reedmedia.net/wiki
  - Please join us!
- Review with psychometrician
- Begin question development for written and activity development for lab
- Finalize with psychometrician

BSDP Lab Design
BSDPG has been considering a “hands-on lab” for some time.

Ideas have been drawn from several sources, notably CCIE.

Everyone is encouraged to submit ideas and get involved.

Not all ideas are workable for BSDCG, since we are a non-profit organization with limited resources.
BSDL Lab Design

- General idea is based on a lab booklet that outlines a set of real-world scenarios.
- Each scenario has one or more activities.
- Each activity has a point value.
- To pass, candidate must accumulate points.
BSDP Lab Requirements

• 1 – Lab must match the exam objectives.
• 2 – Lab must be proctored.
• 3 – Lab must be “low cost” to BSDCG, candidates, and proctors.
• 4 – Lab must be simple to set up, take down, and administer. Minimal baggage.
BSDP Lab Requirements

- 5 – Lab must focus on “services” not “software products”.
- 6 – Lab must be reliable. No SPoF at test time.
- 7 – Lab must be secure- before, during and after the exam.
BSDP Lab Requirements

- 8 – Lab must be easy to score (i.e. scoring should be automated, similar to vulab).
- 9 – Lab must be doable anywhere- Internet access must not be required.
- 10 – Lab must not be predictable. (Can't preload test results or services.)
- 11 – Lab must be as close to real world requirements as possible.
Online “Virtual Lab” (proctored)
- Nixes Req 6 (SPoF), Req 9 (doable anywhere)
- While these are not a deal breaker, they are significant concerns.
- If candidates pay money for exam and travel, it must work.
- An online lab is subject to DDoS or network failure
- Pearson/Vue nixes Req 3 (low cost)
BSDP Lab Ideas Pile

- BSDCG Owned Physical Lab Centers
  - Nixes Reqs 3 (low cost), 9 (doable anywhere)
  - BSDCG is not Cisco. We operate on a much lower budget.
  - Lab Centers are capital intensive, and only used for labs
  - Insurance alone might break this deal.

BSDP Lab Design
BSDP Lab Ideas Pile

- BSDCG Leased Physical Lab Centers (ex. University)
  - Possible Solution!
  - Insurance, Proctoring, NDAs, and Test Material Security could be worked out.
  - Clashes with Reqs 3 (low cost), 9 (doable anywhere), but might be acceptable to the BSD community.
• Single Server, Multiple X-sessions
  – Very attractive, but Nixes Req 3 (low cost), Req 4 (min. baggage), and Req 6 (SpoF) if stolen, inoperable or delayed in transit
  – Hardware required for 10 users is substantial.
  – Hardware required makes it a tempting target for theft
BSDP Lab Ideas Pile

- BSDCG Provided Laptops/Hardware
  - Nixes Req 3 (low cost), Req 4 (minimal baggage)
  - 10 laptops requires minimum 2 large cases with cables, power
  - Tempting targets for theft
  - Candidate may be used to foreign keyboard layouts
• Live CD/DVD with the exam virtual environment
  - Live CDs don't use hard disks, but virtual machines require disk storage- this would come out of system memory, limiting size.
  - Limits the available kinds of activities that can be designed into exam
  - Can be slow
  - BIOS incompatibilities
Candidate provides laptop and uses BSDCG supplied USB hard drives containing a virtualized environment

- Possible solution! Does not nix any requirement- USB hard drives are not too expensive or bulky.
- Concerns about booting unknown USB hard drives give pause to candidates
- BIOS incompatibilities may jinx the actual lab
Candidate provides laptop containing a pristine virtualized environment

- Possible solution! Does not nix any requirement.
- Concerns about preinstalled solutions (req. 10)
- Concerns about test security (wireless)
- Concerns about security of results (local copy)
Current Questions:

- Should we require a BSDP candidate to provide a laptop for the test?
- Can we trust what is already on the laptop not to interfere with the exam?
- How can we keep the exam results secure?
- What about wireless during exam?
- Should Internet access be permitted or denied during the exam?
BSDL Lab Design

BSDLP Considerations

- Current Questions:
  - If there is both a written exam and a lab, how does the candidate score if they pass the lab, but not the written?
  - Is passing the written a pre-requisite for taking the lab? What about where there is only a 'once-a-year' opportunity to take the exam?
Example Scenario:

“You've just been hired as the senior system administrator for Example Corporation. There has been a major systems disaster and your boss, Mr. Big, demands that you immediately set up 3 new BSD systems and get the company back into operation as soon as possible.”
BSDP Lab Prototype

Mr. Big wants you to perform the following:

1. Install a new BSD development server according to a detailed specification for disk layout and user accounts

2. Install a second new BSD server, recreate the lost services (Web and FTP) according to further detailed specifications

3. Setup a third new BSD backup system with data synchronization for FTP, Web data, and development server directories according to a third specification. This server also provides DNS.
1. Filesystem Layout for all Servers
   - / = 500M
   - /opt = 300M
   - /tmp = 1G,
   - /var = 300M,
   - /usr (remaining)

1.5 User Accounts
   - 30 accounts as “usernnn”
   - users 0-15 in “staff” group, rest in “devel” group
   - users 0-3 also in wheel group
BSDP Lab Prototype

2.0 DNS Setup

• www.example.net 10.10.10.10
• ns01.example.net 10.10.10.5
• devel.example.net 10.10.10.20
• alias ftp to www
• Make devel.example.net mail server (priority 20)
• DNS is authoritative forward and reverse
• ns01 is master, devel is slave

2.1 Web Server Setup

• Document Root in /usr/local/www

2.2 FTP Setup

• Based in /usr/local/ftp (chroot not required)
3.0 Synchronize servers to backup server every 5 minutes.

- Synchronize www.example.net /usr/local/www to /usr/backup/www on backup server.
- Synchronize ftp.example.net /usr/local/ftp to /usr/backup/ftp on backup server.
- Synchronize devel.example.net user directories to /usr/backup/develusers on backup server.
BSDP Lab Demo

Example Platform

- AQEMU with pre-loaded BSDs and one Windows XP host (properly licensed)
BSDP Lab Demo

Resizable

- PC-BSD host can resize VM windows – even WinXP window
QEMU Networking

- Default “user mode” networking gets a DHCP address from an *internal* DHCP server and routes packets through the host external interface. Note that ICMP to external addresses does not work in this mode.

- “TUN/TAP” mode uses BSD tap interface for opening a network connection through the host. Combined with if_bridge(4), packets can be routed between virtual machines. ICMP works between VMs and to/from the Internet.
BSDP Lab Demo

QEMU User mode networking

QEMU TUN/TAP mode networking

BSDP Lab Design
BSDP Lab Possibilities

- 4 virtual machines offers many interesting networking and administration possibilities:
There is nothing like “hands-on experience”, especially when the chips are down.

The BSDP Lab is intended to validate “hands-on experience”.

Virtualization is an attractive possibility for the BSDP Lab.

High quality Open Source virtualization tools are now available, enabling the BSDCG to offer the Lab at substantial cost saving.

A lot of work remains to be done.
Comments/Questions

Comments and Questions?

Contact:

jimbyg@gmail.com

info@bsdcertification.org

BSDP Lab Design
Thank You!

BSDP Lab Design