Considerations for the
BSD Professional Certification Exam
Lab Design

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BSDP Lab Design

Topics

- Intro (Who/What/Why)

- Creating an Exam

- BSDP Exam Design

- BSDP Lab Design

- Discussion

BSDP Lab Design

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.

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$$$?

- 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%)**
    - **2009: Income: $9,255 : Expenses: $13,632 (Psych: 67%)**

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

- But it's only one way you can help!

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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

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.

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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

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BSDP JTA Results

- Participation by over 30 countries

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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)

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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

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- BSDCG 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.

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BSDP 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 Design

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.

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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 Design

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.

BSDP Lab Design

BSDP Lab Ideas Pile

Exam Server

Internet

- 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 Design
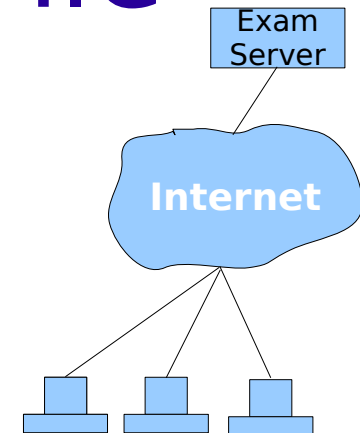
BSDP Lab Ideas Pile

- 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.

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BSDP Lab Ideas Pile

Exam Server

- Single Server, Multiple X-sessions

  - Very attractive,
    but Nixes Req 3 (low cost),
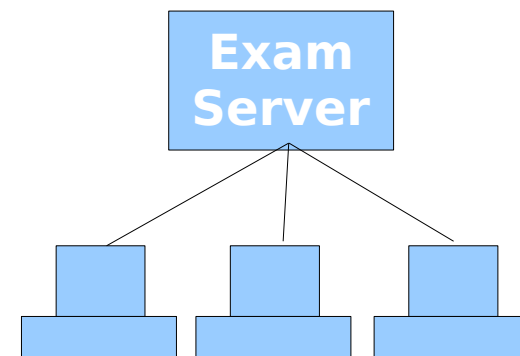
    Req 4 (min. baggage), and Req 6 (SpoF) if
    stolen, inoperable or delayed in transit

  - Hardware required for 10 users is
    substantial.

  - Hardware required makes it a tempting
   target for theft

BSDP Lab Design

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

BSDP Lab Design

BSDP Lab Ideas Pile

- 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

BSDP Lab Design
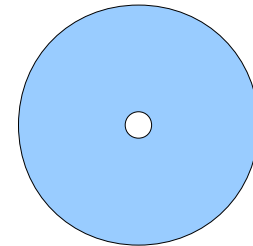
BSDP Lab Ideas Pile

- 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

BSDP Lab Design

BSDP Lab Ideas Pile

- 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)

BSDP Lab Design

BSDP Considerations

- 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?

BSDP Lab Design

BSDP 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?

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BSDP Lab Prototype

- 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 Design

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 specifification. This server also provides DNS.

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BSDP Lab Prototype

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

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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)

BSDP Lab Prototype

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.

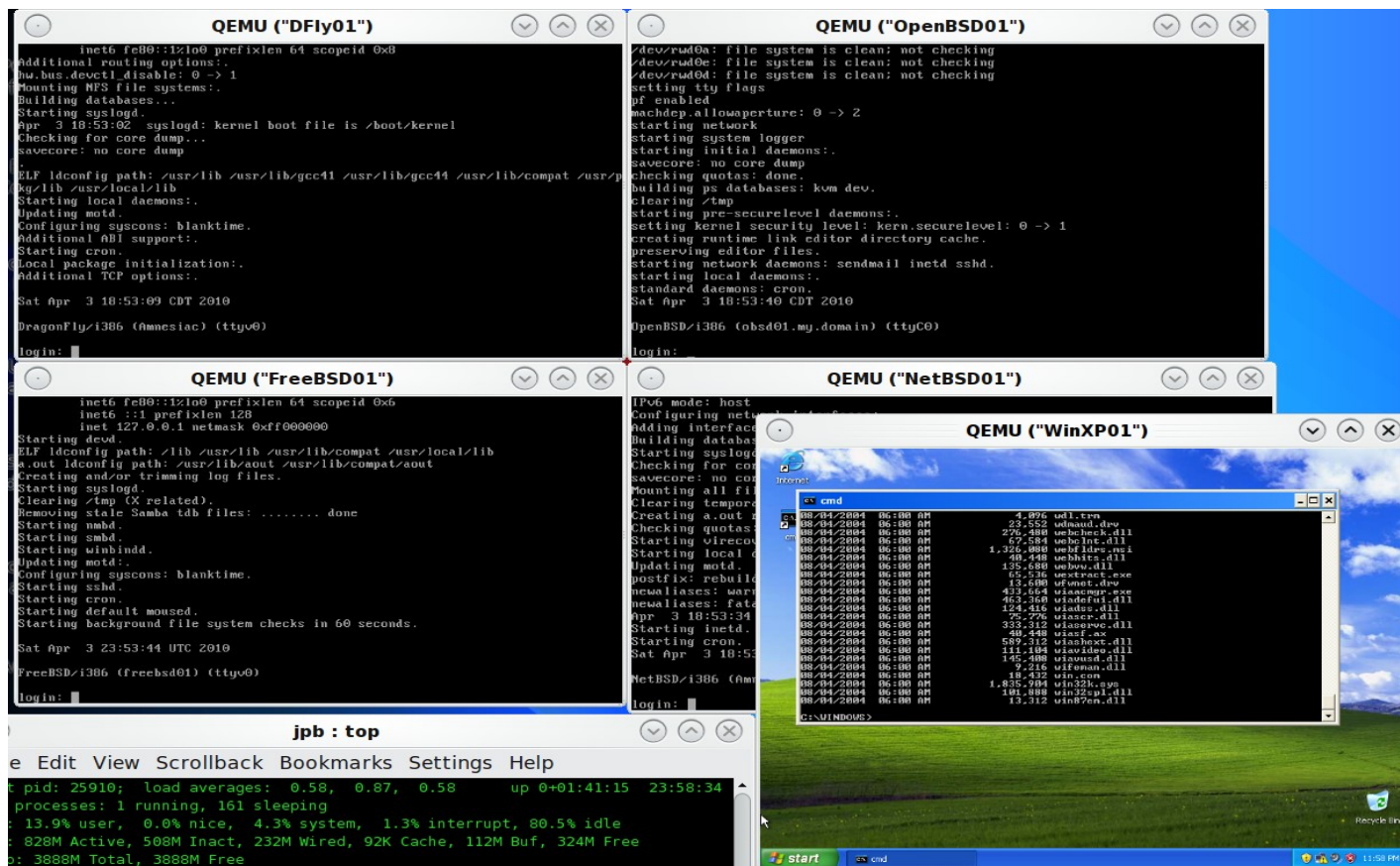- Synchronize devel.example.net user directories to /usr/backup/develusers on backup server.

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BSDP Lab Demo

Example Platform

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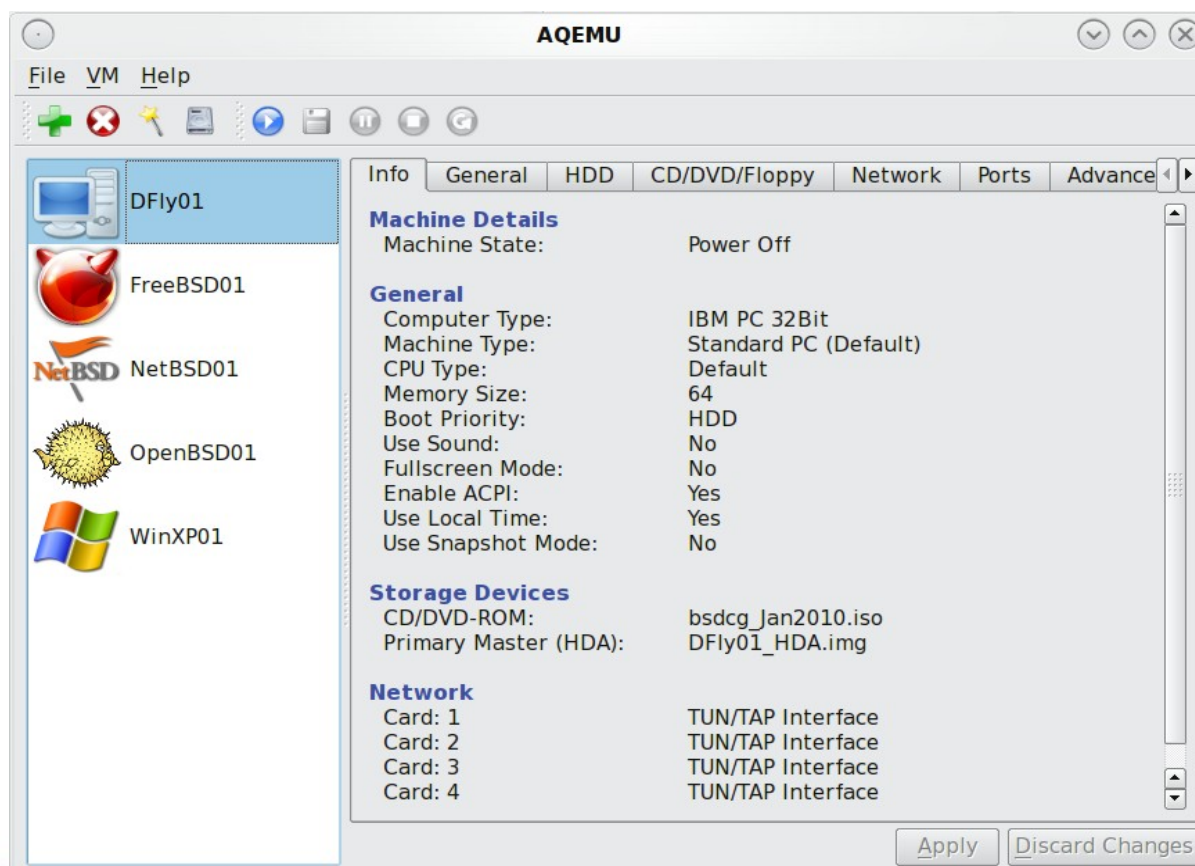
BSDP Lab Demo

Resizable

- PC-BSD host can resize VM windows – even WinXP window
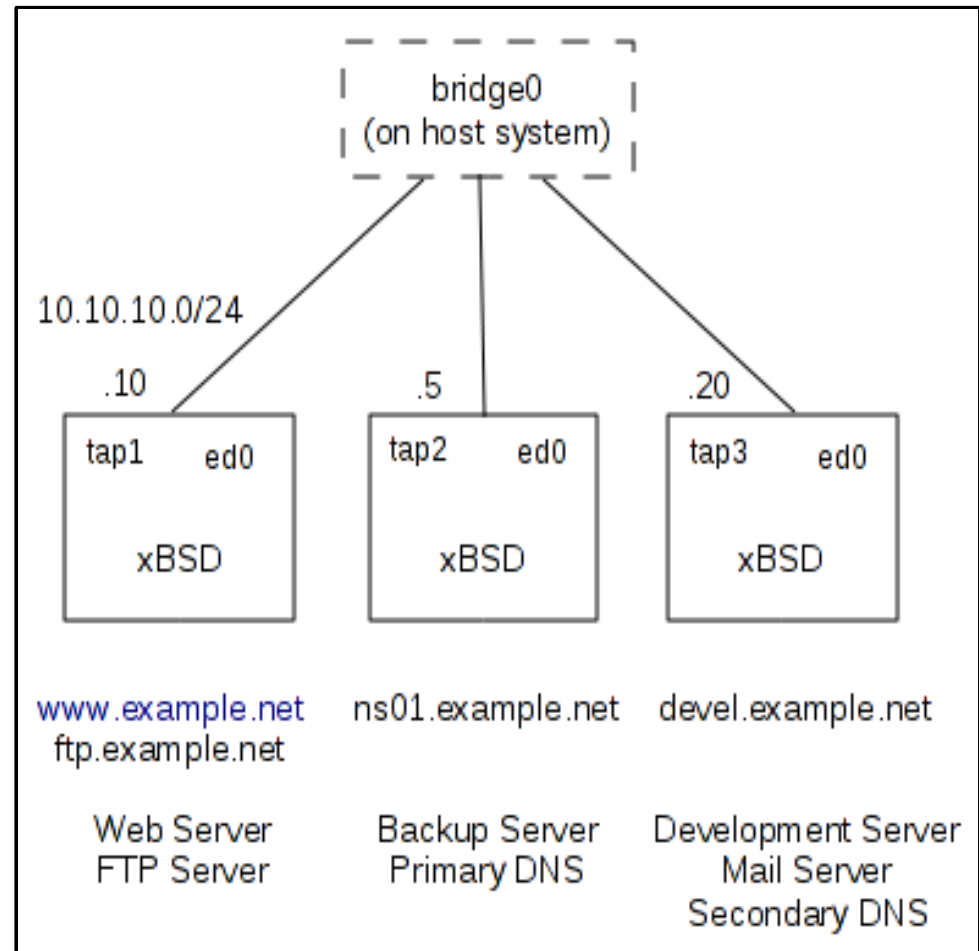
BSDP Lab Demo

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.
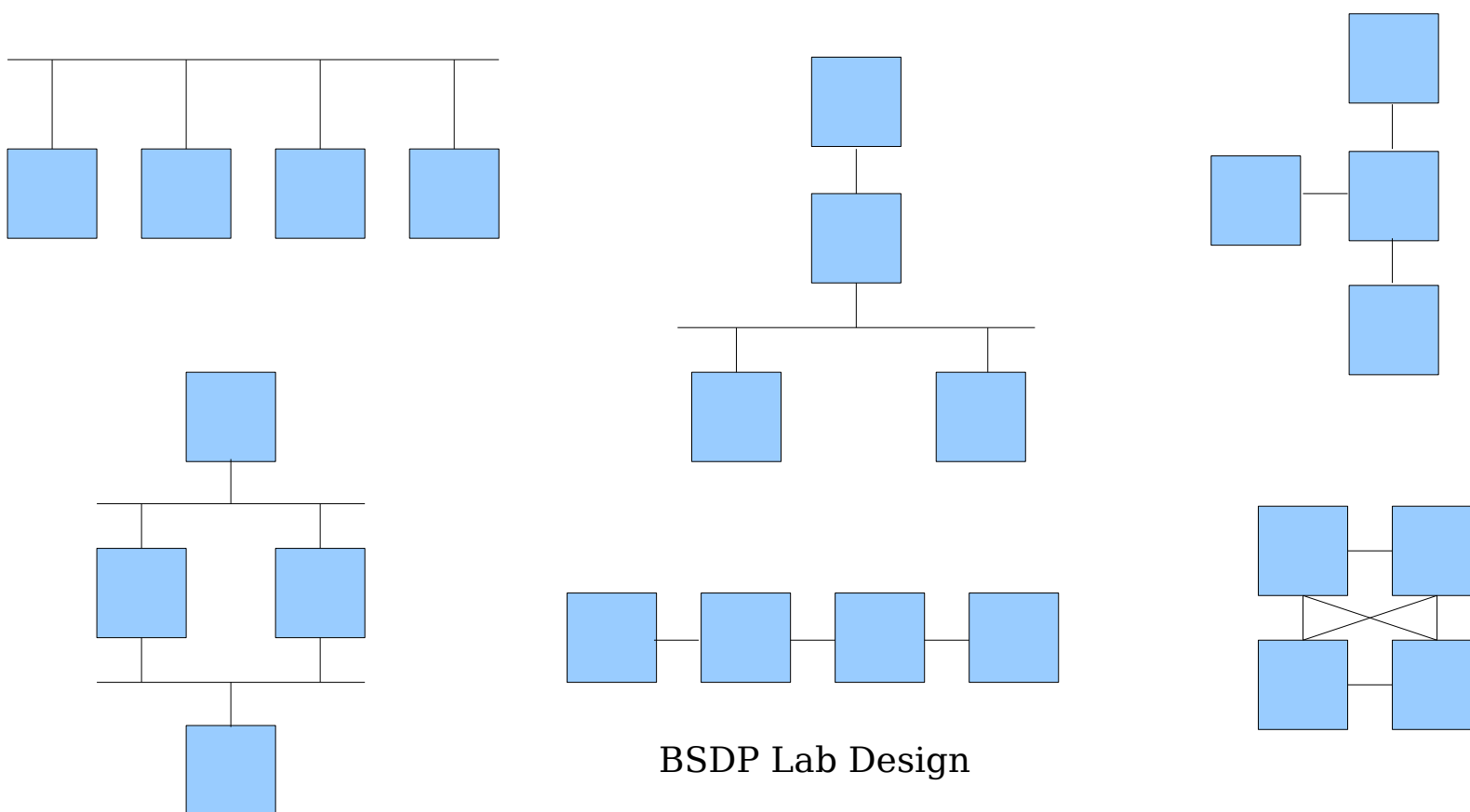
BSDP Lab Design
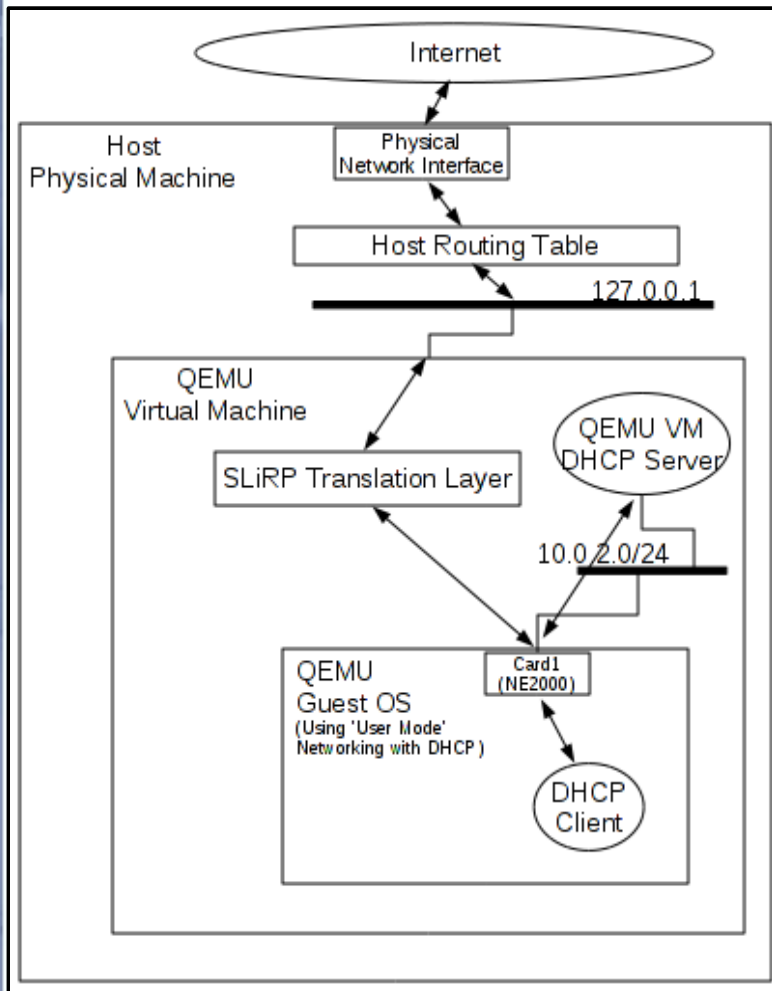
BSDP Lab Demo

QEMU User mode networking

QEMU TUN/TAP mode networking

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BSDP Lab Possibilities

- 4 virtual machines offers many interesting networking and administration possibilities:

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BSDP Lab Conclusions

- 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.

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Comments/Questions

Comments

and

Questions?

Contact:

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Thank You!

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