MAGAZINE

BSD

FOR NOVICE AND ADVANCED USERS

Development Tools on FreeBSD

Experimenting with XEN

Model View Whatever - Origins

Introduction to NetBSD

10 Things Your CIO Should Know About TrueNAS

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EDITORS' WORD

Dear Readers,

I know that many of you don't celebrate Christmas, but I hope that for all of you, December and the end of the year will be a wonderful time, no matter where you come from, which language you speak or what your beliefs are.

I also know that you have been waiting for more FreeBSD related articles. So, here they are.

Great as always, David Carlier will introduce you to Development Tools on FreeBSD. If you would like to switch from Linux to FreeBSD, this article is definitely for you.

The next article is an introduction to NetBSD. Siju Oommen George wrote a guide that is another must read for all beginners, but I hope that professionals and old timers will like it as well.

After BSD articles, it is time for something new. Say "Hi" to Damian Czernous and the origins of Model View Whatever. Not really related to Open Source? Maybe it will be useful for some of you anyway and will broaden your horizons.

Roger Pau Monné will introduce you to Xen and how to have a little fun with it. If you would like to know how to prepare the host, install Xen and create Guests, dive in right now!

Hope you will enjoy our interviews with Valerie Heatley and Michael Boelem. Valerie is a super nice Recruiter in Speerhead - The Global Leader in DevOps Recruitment. Read what is hot on DevOps recruitment market at the moment. Michael is a young entrepreneur, who established CISOfy. The company focuses on auditing, hardening and compliance of information security of Linux and Unix systems. Linux enthusiasts, "security is not a one-time event, but a continuous stream of small improvements (and adjustments)."

The last two pieces are our columns:

Mark VonFange from iXsystems will tell you 10 Things Your CIO Should Know About TrueNAS. Have you heard about all of them?

And last crumb, our great Rob Somerville and his thoughts about the recent attacks in Paris and evolution of the IT world. Has something gone wrong?

Enjoy your reading! And have a beautiful December, with snow or rain, sun or clouds, let's spend it with our families, communities and the dearest ones. Don't forget to share this issue with your favorite open source community ;)

Marta & BSD Team

MAGAZINE BSD

Editor in Chief:

Marta Ziemianowicz

marta.ziemianowicz@software.com.pl

Contributing:

David Carlier, Siju Oommen, Damian Czernous, Michael Boelem, Valerie Heatley, Mark VonFange, Roger Pau Monne and Rob Somerville.

Top Betatesters & Proofreaders:

Annie Zhang, Denise Ebery, Eric Geissinger, Luca Ferrari, Imad Soltani, Olaoluwa Omokanwaye, Radjis Mahangoe, Mani Kanth, Ben Milman, Mark VonFange and David Carlier

Special Thanks:

Annie Zhang

Denise Ebery

DTP:

Marta Ziemianowicz

Senior Consultant/Publisher:

Paweł Marciniak

pawel@software.com.pl

CEO:

Joanna Kretowicz

joanna.kretowicz@software.com.pl

Publisher:

Hakin9 Media SK 02-676 Warsaw, Poland Postepu 17D Poland worldwide publishing editors@bsdmag.org www.bsdmag.org

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BSD Certification

The BSD Certification Group Inc. (BSDCG) is a non-profit organization committed to creating and maintaining a global certification standard for system administration on BSD based operating systems.

WHAT CERTIFICATIONS ARE AVAILABLE?

BSDA: Entry-level certification suited for candidates with a general Unix background and at least six months of experience with BSD systems.

BSDP: Advanced certification for senior system administrators with at least three years of experience on BSD systems. Successful BSDP candidates are able to demonstrate strong to expert skills in BSD Unix system administration.

WHERE CAN I GET CERTIFIED?

We're pleased to announce that after 7 months of negotiations and the work required to make the exam available in a computer based format, that the BSDA exam is now available at several hundred testing centers around the world. Paper based BSDA exams cost $75 USD. Computer based BSDA exams cost $150 USD. The price of the BSDP exams are yet to be determined.

Payments are made through our registration website:
https://register.bsdcertification.org//register/payment

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http://www.bsdcertification.org

Registration for upcoming exam events is available at our registration website:
https://register.bsdcertification.org//register/get-a-bsdcg-id

Open source OpenWRT router has automatic updates

CZ.NIC, a non-profit organization that runs the .CZ top level domain of the Czech Republic, released its first open source hardware and software router design called Turris in 2014, offering systems to interested hackers on an invitation-only basis. Now, it is expanding to a larger base via Indiegogo with a new Turris Omnia design touted for its high performance, security, automatic updates, and multiple servers.

The Omnia design moves from the 1.2GHz, PowerPC-based Freescale P2020 that powers the current Turris design to a 1.6GHz dual-core ARM SoC: Marvell's Armada-385. The Armada-385 is a member of Marvell's recently announced, 28nm-fabricated Armada 38x family of networking SoCs. The SoC is accompanied here with a cryptography chip that offers secure random number generation.

http://linuxgizmos.com/open-source-openwrt-router-has-automatic-updates/

PoWiFi: Now Your Router Will Transmit Both Internet and Energy

This new Wi-Fi technology is being hailed as one of the best technological innovations happening this year. The Power Over WiFi(PoWiFi) system uses a WiFi router and its WiFi signals to power the devices.

According to the team of engineers at the University of Washington, who are behind the PoWiFi, for the first time, it's possible to use WiFi devices to power the sensors and other devices.

The Internet of Things is becoming a much bigger phenomenon with each passing day, and this PoWiFi tech could make IoT more relevant in the upcoming future years. Using PoWiFi, one could harvest the energy in WiFi signals and meet the needs of low-power sensors in devices like cameras, wearables, etc.

Microsoft makes Raspberry Pi its preferred IoT dev board

Chipzilla's Raspberry Pi-like Galileo was anointed as able-to-run-Windows in August 2014, courtesy of the 1.0.2 firmware update for the Gen1 device. In the same month, Intel launched the Gen2 board (which got its stripped-down Windows 8 version in October 2014).

Microsoft was also handing out Galileo devices free to developers joining its Internet of Things program.

Alas, there's no weight-loss program good enough to fit Windows 10 IoT Core into the Galileo, so Redmond has set November 30 as end-of-life for the development boards.

Raspberry Pi is the officially designated migration target: "Wiring support is now available on Windows 10 IoT Core running on Raspberry Pi 2. This allows you to migrate your existing Galileo projects to Windows 10 IoT Core", the company notes.

http://www.theregister.co.uk/2015/11/19/redmond_expels_galileo/

The Linux 4.4 Kernel

Linux 4.4 is currently around 20.8 million lines or an increase of about 200 thousand lines of code/documentation and a few hundred new files after Linus accepted around 12,000 commits for this merge window.

Graphics

- AMD Stoney support..

- There are numerous AMDGPU additions for those with an AMD Carrizo, Tonga, or Fiji graphics processor. That includes enabling the AMDGPU scheduler by default, new AtomBIOS opcodes, and various fixes.

- There's a Raspberry Pi KMS driver that's landed. Unfortunately for Linux 4.4, this Raspberry Pi kernel graphics driver is just for kernel mode-setting and doesn't yet handle 3D hardware acceleration or power management.

- It has the VirtIO VirGL DRM code! This is used in conjunction with the VirtIO VirGL code in Mesa's Gallium3D along with changes in QEMU 2.5 for providing OpenGL acceleration support to guest virtual machines over QEMU+KVM with VirtIO. VMWare and VirtualBox have long offered 3D acceleration to guest VMs and it finally supports on a fully open-source virtualization stack.

- Nouveau has some re-clocking improvements, better stability, and other enhancements but nothing too jaw-dropping. There's still no hardware acceleration for the modern GeForce GTX 900 series as NVIDIA hasn't yet supplied the developers with the needed signed firmware images.

- Freedreno's MSM driver has added Snapdragon 820 support as Qualcomm's newest SoC.

- The Intel DRM code in Linux 4.4 is primarily about fixes and other low-level improvements. The primary benefactors of Intel's latest work continues to be Skylake and Broxton graphics hardware.

- Core DRM code includes more atomic mode-setting work and other changes.

ARM

- Several 64-bit ARM updates.

- More UEFI 2.5 additions that include improvements for EFI on ARM64 / AArch64.

- ARM SoC and platform updates.

Networking

- New Realtek rtl8xxxu WiFi driver, support for non-root eBPF programs, support for persistent maps/programs with eBPF, Very High Throughput MESH support in the ath10k driver, VRF support in the IPv6 stack, and other changes.

http://www.phoronix.com/scan.php?page=article&item=linux-44-features&num=1

Purism's Librem 13 Linux Laptop Is Sleek, Private and Secure

The combination of custom-made hardware paired with a tweaked Linux OS makes the Librem laptop lineup a unique offering with several innovative security features not offered in any other computer.

The Librem line is a work in progress. The operating system just reached version 2.0 and comes preinstalled on the hardware built with the modified Linux kernel in mind.

LinuxInsider received one of the first available Librem 13-inch units for testing and review. Our hands-on testing shows the hardware/software combo is an impressive display of the power and finesse of Linux.

That homegrown refined Linux OS, dubbed PureOS, is designed to address user concerns about identity theft, Internet privacy, security and digital rights. It is the first high-end Linux laptop built on tailor-made hardware to ensure privacy and compliance with the Free Software Foundation's endorsement, according to Todd Weaver, CEO of Purism Computer.

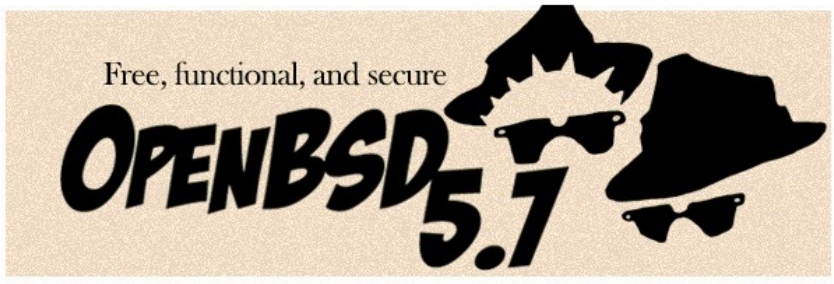
PureOS runs the Cinnamon desktop. No other desktop flavors are available.

The Librem 13 is powered by a fifth-generation, 2.2-GHz dual-core Intel Processor. The standard specs list 4 GB DDR3L of RAM, expandable to 16 GB. The review unit, however, was loaded with 8 GB of RAM.

Storage capacity is provided by a 477.8-GB, 2.5-inch SATA hard drive. Battery performance consistently provided me with six to eight hours of unplugged service. I let the laptop run on my side desk throughout each testing day.

http://www.linuxinsider.com/story/82722.html

OpenBSD's native hypervisor emerges



The native OpenBSD hypervisor promised in September has emerged.

Kernel dev Mike Larkin has posted news of the hypervisor, but hosed down expectations along the way.

Larkin nonetheless reckons "there is enough there for people to start playing with running OpenBSD VMs."

http://www.theregister.co.uk/2015/11/23/openbsds_native_hypervisor_emerges/

Amazon now renting physical servers you can cuddle and love

Amazon Web Services has flicked the switch on “EC2 Dedicated Hosts” - a new cloud service that offers “physical servers fully dedicated for your use.”

The new service applies to over 30 variations of the instance types in the M4, C3, C4, G2, R3, D2, and I2 instance types and can run RHEL, Suse, Amazon Linux, Ubuntu or Windows Server. The servers only run in AWS's US East zone for now.

Servers currently rent by the hour, but AWS is promising it will soon offer “reservations” that will “... provide up to a 70% discount compared to the On-Demand price.”

A general purpose M4 instance on a dedicated host costs US$3.049 an hour in on-demand mode.

The base configuration for an M4 instances packs a 2.4 GHz Intel Xeon E5-2676 v3, a pair of vCPUs and 8GB of RAM. At that price, you'd pay $26,079 a year for a dedicated instance, almost certainly well above the price of acquiring a server plus a year's feeding and tending in your own bit barn. “Reservations'” deep discounting therefore seems eminently sensible, if not necessary to make Dedicated Hosts viable.

http://www.theregister.co.uk/2015/11/24/amazon_web_services_dedicated_hosts/

iXsystems TrueNAS Arrays Improve Scalability to Almost 5PB per Rack

Adding a TrueNAS E60 to a TrueNAS Z35 enables scaling to 3.84PB, a 150% improvement in addressable capacity, and does so in only 35U of rack space, less than half the rack space of other enterprise storage vendors. A density of over 100TB per rack unit allows for a deployment of almost 5PB in a 48U rack. Unlike legacy and flash-only storage architectures and systems that are deployed to support individual applications, scaling to almost 4PB enables users to reduce storage dedicated to an individual application by centralizing their storage on a single TrueNAS Z35. A fully-populated TrueNAS Z35 is priced at less than half of other storage vendors' solutions, like EMC and NetApp, while other storage vendors, like Dell, Nimble Storage and Tintri, can't achieve the same scale. TrueNAS also delivers this impressive capacity while consuming 40% less data center floor space than the competition.

USRA Chooses iXsystems TrueNAS for 1PB NASA Infrared Astronomy Project

Universities Space Research Association (USRA) selected TrueNAS unified storage to keep their ever-growing scientific and engineering data online. The TrueNAS array will be used by the USRA to support the data generated by the NASA Stratospheric Observatory for the Infrared Astronomy project. TrueNAS gives the USRA a scalable storage system that can grow to 4PB using 40% of the rack space and costing 50% less than competitive storage solutions.

Combining the TrueNAS TCO with its wide variety of services and protocols, an easy to manage file system, and robust data protection options meant TrueNAS solved all of USRA's storage needs in one array, ensuring the Stratospheric Observatory's data stays pristine and secure for posterity.

www.iXsystems.com/TrueNAS

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Development tools on FreeBSD

by David Carlier

If you're usually programming on Linux and you consider a potential switch to FreeBSD, this article will give you an overview of the possibilities.

1. How to install the dependencies

FreeBSD comes with either applications from binary packages or compiled from sources (ports). They are arranged by software types (programming languages mainly in lang (or java specifically for Java), libraries in devel, web servers in www ...) and the main tool for modern FreeBSD versions is pkg, similar to Debian apt tools suite. Hence, most of the time if you are looking for a spe

without necessarily knowing the fully qualified name of the package, it is somehow sufficient.

For example

```
specific application/library, simply

pkg search <name>
```

pkg search php5

will display php5 itself and the modules, furthermore php56 specific version and so on ...

The main difference is, you are not forced to either choose the binary or the port but can have both if it suits your need, but keep in mind that compiling from source can take a certain amount of time to achieve, if that is an important point for you. If the ports tree is not already present on your server, portsnap fetch extract will fetch the ports tree for you by default in /usr/ports. Then related to the software type described above, you just need to go to the related folder, for example, for installing php5:

```
cd /usr/ports/lang/php5

make config-recursive

make install clean
```

The second command, depending which options you are going to choose, will display all the options available for each dependency (for example, if gd support is enabled, the options for graphics/gd library will appear).

However, most of the time, the binary packages are sufficient to cover most of the needs.

2. Web development

This is basically the easiest area to migrate to ... most Web languages do not use particular specific platform features, so most of the time, your existing projects might just be “drop-in” use cases.

If your language of choice is PHP, luckily this scripting language is workable in various operating systems, most of the Unixes and Windows. In the case of FreeBSD, you even have many different ports or binary package versions (5.4 to 5.6). In this particular case, you might need some specific PHP modules enabled, luckily they are available atomically or if the port is the way you chose, it is via the www/php5-extensions's one.

Figure 1: PHP port and modules

Of course, developing with Apache (both 2.2 and 2.4 series are available, respectively www/apache22 and www/apache24 packages) or even better with Nginx (the last stable or the last development versions could be used, respectively www/nginx and www/nginx-devel packages) via php-fpm is possible.

Outside of PHP, the same apply for Python / Django (www/py-django) and Ruby on Rails (www/rubygen-rails), Python 2.7 and 3.5 (lang/python<version>) are available as Ruby until 2.2 (lang/ruby<version>).

In term of databases, we have the regular RDMBS like MySQL and PostgreSQL (client and server are distinct packages) ... databases/(mysql/portgresql)<version>-client and databases/(mysql/postgresql)<version>-server) and the more modern concept of NoSQL with CouchDB, for example (databases/couchdb), MongoDB (databases/mogodb), Cassandra (databases/cassandra) to name a few.

Also, if you need to perform efficient Map / Reduce for Big Data work, you have the well known Apache Hadoop and Apache Spark (respectively devel/hadoop and devel/spark) ... And last, if you ever need a search engine, Apache Solr/Lucene (textproc/apache-(solr/lucene)), Xapian (databases/xapian) and their various language bindings are available.

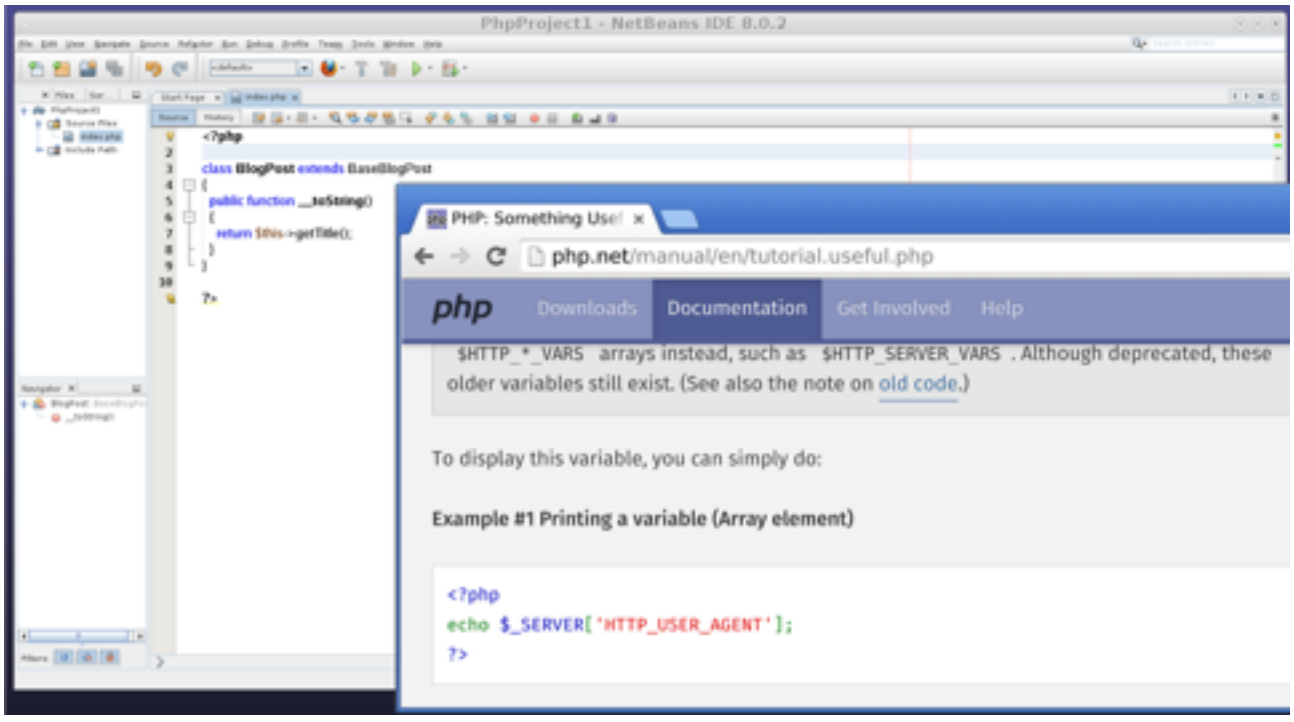

Figure 2: PHP development under Netbeans

Is it rather Java Web or any language based on the Java VM platform? In FreeBSD, you even have Java 8 (either java/openjdk8 and java/linux-oracle-jdk18), various popular frameworks and J2EE servers or servlet engines, like Spring (java/springframework),

Jboss (java/jboos<version>), Tomcat (www/tomcat<version>), Jetty (www/jetty)... Even the more modern languages like Scala (lang/scala), Groovy (lang/groovy) can be found.

Two languages described above, Python and Ruby, have their Java VM counterparts, Jython (lang/jython) and Jruby (lang/jruby), available as well.

In terms of Integrated Development Environment, there are still several choices. The venerable Netbeans (java/netbeans or java/netbeans-devel), Eclipse (java/eclipse ... side note, FreeBSD needs to have Kerberos support enabled, NO_KERBEROS is /etc/make.conf or /etc/src.conf presence needs to be checked) with their numerous popular plugins.

3. Low level development

The BSD are shipped with a C and C++ compilers in base. In the case of FreeBSD 10.2, it is clang 3.4.1 (in x86 architectures) otherwise modern versions of gcc, for developing with C++11, for example, are of course available too (lang/gcc<version> ... until gcc 5.2).

Numerous libraries for various topics are also present, web services SOAP with gsoap through User Interfaces with GTK (x11-toolkits/gtk<version>), QT4 or QT 5 (devel/qt<version>), malware libraries with Yara (security/yara) ...

In terms of IDEs, Eclipse and Netbeans described above allow both C/C++ development, Anjuta and Qtcreator are also available for important projects. If you prefer, FreeBSD has in base vi and Vi Improved can be found in ports / packages (editors/vim or editors/vim-lite without X11 support).

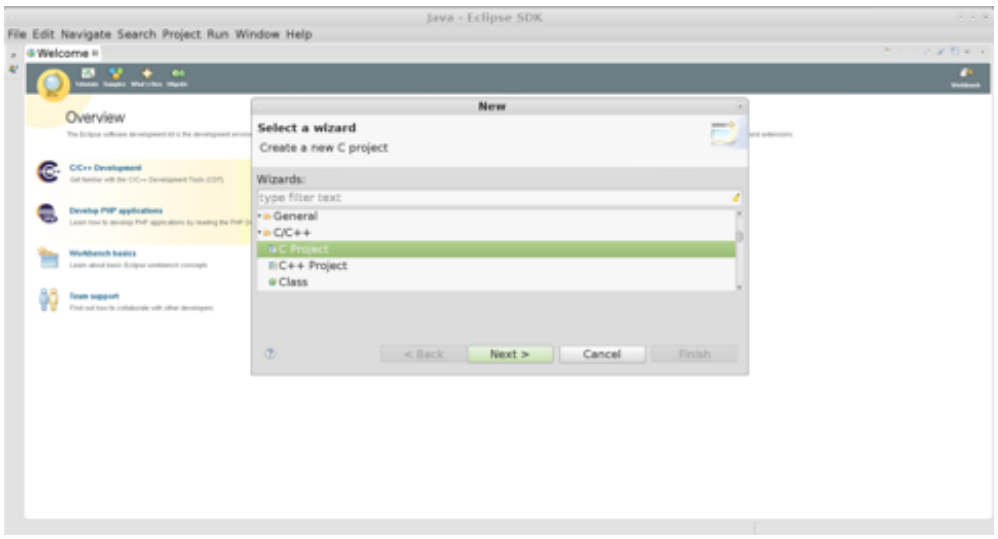

Figure3. PHP development under Java Eclipse SDK.

FreeBSD is a POSIX system, hence porting C/C++ code to this platform depends on the degree of portability of your projects, so the usage of specific “linuxisms” and such.

In case more information is needed about porting software in FreeBSD and its specific tools, I would recommend reading BSDMag issue numbers 66 and 68.

4. Android / Mobile development

In order to be able to do Android development, to a certain degree, the Linux compatibility layer (aka linuxulator) needs to be enabled. Also x11-toolkits/swt and linux-f10-gtk2 port/package need to be installed (note that libswt-gtk-3550.so and libswt-pi-gtk-3550.so are needed, the current package is versioned as 3557, can be solved with symlinks). In worst case, remember that bhyve (or Virtualbox) are available and can run any Linux distribution smoothly ...

Figure 4: SDK Manager under FreeBSD

5. Source Control Management

FreeBSD comes in base with a version of subversion, as FreeBSD source is in a subversion repository, prefixed svnlite, though, to avoid conflicts with the package/port.

In addition, Git is present but via the package/port system with various options (with or without a user interface, subversion support).

6. Conclusion

FreeBSD has made tremendous improvements over the years to fill the gap with Linux whereas it still keeps its own interesting specificities, hence there won't be too many blockers if your projects are reasonably sized to consider a migration to FreeBSD.

About the author:

David Carlier is a developer since 2001, mainly C/C++, living and working in Ireland mainly since 2012. He contributes to some open source projects and uses in a daily basis various operating systems mainly BSD flavours.

NetBSD Introduction

by Siju Oommen George

The objective of this article is to introduce the NetBSD operating system to people who are new to BSDs. The NetBSD project began as a result of frustration within the 386BSD developer community with the pace and direction of the operating system's development.

The four founders of the NetBSD project, Chris Demetriou, Theo de Raadt, Adam Glass, and Charles Hannum, felt that a more open development model would benefit the project: one centered on portable, clean and correct code. They aimed to produce a unified, multi-platform, production-quality, BSD-based operating system. The name "NetBSD" was suggested by de Raadt, based on the importance and growth of networks, such as the Internet at that time, the distributed and collaborative nature of its development.

Software Management

pkgsrc (package source) is a package management system for NetBSD. It was forked from the FreeBSD ports collection in 1997 as the primary package management system for NetBSD. Since then, it has evolved independently: in 1999, support for Solaris was added, later followed by support for other operating systems. DragonFlyBSD, from release 1.4 to 3.4, used pkgsrc as its official packaging system, now it uses its own native “dports”. MINIX 3 and the Dracolinux distribution both include pkgsrc in their main releases. Over 23 operating systems use pkgsrc as their package management system. “Portage” of Gentoo Linux & “Arch Build System” of Arch linux are examples of other package management systems akin to pkgsrc.

Portability

As the project's motto ("Of course it runs NetBSD") suggests, NetBSD has been ported to a large number of 32- and 64-bit architectures. These range from VAX minicomputers

Figure 1. VAX 11/785

to Pocket PC PDAs,

Figure 2. NetBSD/hpcmips 5.1 on CASSIOPEIA Palm-size PC

to toasters.

Figure 3. NetBSD Toaster with the TS-7200 ARM9 SBC

As of now, NetBSD supports 57 hardware platforms including IA-32, Alpha, PowerPC,SPARC, Raspberry pi 2, SPARC64 and Zaurus. The kernel and userland for all these platforms are built from a central unified source-code tree managed by CVS.

Embedded Applications

Being one of the most portable OSs in the world (with Debian), many of the supported hardware platforms are suited for embedded applications. Among the more popular processor families for embedded systems are MIPS, PowerPC, ARM, Xscale and Super-H

SMP

NetBSD has supported SMP since the NetBSD 2.0 release in 2004. A scalable M2 thread scheduler was implemented, though the old 4.4BSD scheduler still remains the default but was modified to scale with SMP. Threaded software interrupts were implemented to improve synchronization. The virtual memory system, memory allocator and trap handling were made MP safe. The file system framework, including the VFS and major file systems were modified to be MP safe. Since April 2008, the only subsystems running with a giant lock are the network protocols and most device drivers.

Security

NetBSD source tree is periodically analyzed by two separate code scanners to maintain and improve code quality: Coverity - a commercial code scanner, and Brainy - a private code scanner developed by a NetBSD developer.

Several security features are available in NetBSD, including IPsec - for both IPv4 and IPv6, a file integrity system (Veriexec), a kernel authorization framework (kauth(9)), exploit mitigation features (PaX), disk encryption (CGD), and a variety of other internal kernel bug detection features such as KMEM_REDZONE and KMEM_SIZE.

The NetBSD pkgsrc Security Team and package maintainers keep a list of known security vulnerabilities in packages which are (or have been) included in pkgsrc. The list is available from the NetBSD FTP site at:

http://ftp.NetBSD.org/pub/NetBSD/packages/vulns/pkg-vulnerabilities

Through audit-packages, this list can be downloaded automatically, and a security audit of all packages installed on a system can take place.

NetBSD comes with its own firewall NPF. NPF was primarily written by Mindaugas Rasiukevicius. NPF first appeared in the NetBSD 6.0 release in 2012. NPF is designed for high performance on SMP systems and for easy extensibility. It supports various forms of Network Address Translation (NAT), stateful packet inspection, tree and hash tables for IP sets, bytecode (BPF or n-code) for custom filter rules and other features. NPF has extension framework for supporting custom modules. Features such as packet logging, traffic normalization, random blocking are provided as NPF extensions.

Virtualization

The Xen virtual-machine monitor has been supported in NetBSD since release 3.0. Any number of "guest OSes" (DomU) virtualized computers, with or without specific Xen/DomU support, can be run in parallel with the appropriate hardware resources. NetBSD 6 as a Dom0 has been benchmarked comparably to Linux, with better performance than Linux in some tests.

User-space virtualization such as VirtualBox and QEMU are also supported on NetBSD.

NetBSD 5.0 introduced the rump kernel, an architecture to run drivers in user-space by emulating kernel-space calls. This anykernel architecture allows adding support of NetBSD drivers to other kernel architectures, ranging from exokernels to monolithic kernels

Storage

NetBSD includes many enterprise features, like iSCSI, a journaling filesystem, logical volume management and the ZFS filesystem. The WAPBL journaling filesystem, an extension of the BSD FFS filesystem, was contributed by Wasabi Systems in 2008. It also includes CHFS Flash memory filesystem, the first open source Flash-specific file system written for NetBSD. A variety of "foreign" disk filesystem formats are also supported in NetBSD, including FAT, NTFS, Linux ext2fs, Mac OS X UFS, RISC OS FileCore/ADFS, AmigaOS Fast File System, IRIX EFS and many more through FUSE.

Licensing

All of the NetBSD kernel and most of the core userland source code is released under the terms of the BSD License (two, three, and four-clause variants). This essentially allows everyone to use, modify, redistribute or sell it as they wish, as long as they do not remove the copyright notice and license text (the four-clause variants also include terms relating to publicity material). Thus, the development of products based on NetBSD is possible without having to make modifications to the source code public. In contrast, the GPL, which does not apply to NetBSD, stipulates that changes to source code of a product must be released to the product recipient when products derived from those changes are released.

As for packages, the installed software licenses may be controlled by modifying the list of allowed licenses in the pkgsrc configuration file.

Research Usage

NASA Lewis Research Center - Satellite Networks and Architectures Branch use NetBSD almost exclusively in their investigation of TCP for use in satellite networks.

KAME project - A research group for implementing IPv6, IPsec and other recent TCP/IP related technologies into BSD UNIX kernels, under BSD license.

NEC Europe Ltd. established the Network Laboratories in Heidelberg, Germany in 1997, as NEC's third research facility in Europe. The Heidelberg labs focus on software-oriented research and development for the next generation Internet.

SAMS-II Project - Space Acceleration Measurement System II. NASA will be measuring the microgravity environment on the International Space Station using a distributed system, consisting of NetBSD.

Who uses NetBSD?

Arcapos point-of-sale terminals are known for their excellent user friendliness and extreme robustness. The (commercial) arcapos applications (point-of-sale, infokiosks) are 100 percent made in Switzerland. NetBSD is not only used as the operating system of choice for arcapos, but also has been extended by the arcapos team to be the best open-source platform available for point-of-sale and related applications.

CentreCOM WR54-ID by Allied Telesys, Co is a wavelan router based on NetBSD.

The Champaign-Urbana Community Wireless Network releases an open source wireless system based on NetBSD.

NetBSD

fdgw is a one floppy version of NetBSD/i386. It can run on old machines without HDD. You can use it as a small router, natbox or ADSL router. It is a minimal operating system.

g4u is a NetBSD-based boot floppy/CD-ROM that allows easy cloning of PC hard disks to deploy a common setup on a number of PCs using FTP.

Precedence Technologies (a UK-based company) offers thin-client software (ThinIT) and accompanying hardware based on NetBSD. ThinIT provides access to Microsoft RDP, Citrix ICA, web-browsing, DVD playback, video streaming, ssh and VNC hardware all in a centrally-managed way with a tiny footprint. NetManager is a general-purpose modular firewall, email, web, VPN and proxy server based on NetBSD with easy-to-use web-based management. It also offers web-based central management of ThinIT.

The Operating System made by **QNX Software Systems Ltd.** uses several components of the NetBSD System.

Dynarc makes a series of routers for optical IP networks. The base for their software is NetBSD (mostly kernel).

endgadget's palm-sized NEC UNIVERGE WNX Server measures only 3.79 x 2.57 x 2 inches (96.4 x 65.4 x 50.7mm), and can easily be considered palm-sized. It runs NetBSD, features video in/out, audio in/out, 100Base-TX ethernet, two CF card slots, and offers a battery life of three hours. NEC intends the server to be used as a sort of mobile gateway for connecting your phone to video cameras in an office, for example.

BMF CORPORATION produces EZF-1500E, a development kit for embedded finger print systems. The kit includes an ARM9 based board and a development environment based on NetBSD 1.6. Also, source code of the finger print sensor driver, a finger print matching engine library and sample programs, and circuit diagrams are available.

Dell Networking OS 9 is powered by NetBSD. The NetBSD kernel provides a stable operating system and performs efficient resource management via the HAL architecture, allowing it to deliver superior levels of concurrency, memory allocation and process scheduling. All other applications run as independent and modular processes in their own protected memory space.

There are many more to all the lists but are not included due to possible space constraint.

If you would like to try this Operating System you can start reading the documentation from

http://www.netbsd.org/docs/guide/en/netbsd.html

Support for the Operating System can be requested from netbsd-users and pkgsrc-users. Directions to join the mailing lists are provided in the pages

http://www.netbsd.org/mailinglists/

http://www.netbsd.org/mailinglists/#descriptions-of-mailing-lists

For mailing list archives you may go to http://marc.info/

About the Author:

Siju Oommen George, CISO&CE,

BroadTech IT Solutions

LinkedIn group: AllSec Group https://www.linkedin.com/groups/8244677

Webpage: BroadTech http://www.broadtech-innovations.com/

Model View Whatever - origins

by Damian Czernous

This is the first paper in a series about the evolution of GUI related strategies named Model View Whatever. As an engineer, I find myself confident in the software engineering field due to the passion for context (history). This series of short papers, divided by major influences that happened through tens of years, delivers context and sometimes organises the mess around these little letters: M, V and W.

Preface

The way we use computers these days varies from years ago in the '60s. The nice and personal graphical user interfaces (GUI) welcomes us just after turning on our desktops, laptops, mobiles, tablet,, etc. In most cases, we don’t even think about how many little things had to be source coded so they can look and behave in the way we know them. For some time, intuitive interaction and easy to read UI became a must. Currently, UI designers are challenged to create emotional bounds with the app users, but in the '60s, engineers didn’t think too much about this stuff. In fact, the idea of controlling a computer with the mouse was just laboratory fun.

Complement.

In the early '60s, Douglas Engelbert, inspired by Vannevar Bush's work, constructs the first mouse called „X-Y Position Indicator”. In the late '60s, he creates „a windowed GUI” oNLine System (NLS) equipped in video teleconferencing to attract attention. In NLS, the cursor pointer can be moved using the mouse. In 1963, Ivan Sutherland shows a program called „Sketchpad”, which directly manipulated objects on a Cathode Ray Tube (CRT) screen using a light pen. That was the first graphical user interface.

The idea of a GUI derives from cognitive psychology. The human brain works more efficiently with graphics and direct manipulation of drawings on a screen is essential for the human - machine communication.

Recently, however, a different trend starts to be visible; apps without a UI or a very informative one. After years of telling computers what to do, people are ready to move a part of their decision powers to the machines, e.g. „Text editor: please dictate, I am ready to note.”; „House: I am reducing the temperature.”; „Heart: please, sit down, you will have a heart attack shortly. The ambulance is on the way.”.

Amazing people

The first ship („Praise of the Two Lands”) recorded by name appears in 2613 BC. In 1864, Louis Pasteur proposes a theory where all earthly life comes from the Universe. In 1871, Charles Darwin, however, puts forward a hypothesis where all life got started in a warm little pond. In 1963, Norwegian scientist Trygve Reenskaug completes production ready solution for computer aided design of ships. Autokon for next 30 years helps shipyard engineers realise their fantasies. Later on Trygve formulates the industry standard pattern for UI building. Water, an ultimate source of life, inspiration and UI patterns.

In the '60s, Trygve completes Computer-Aided Design/Computer-Aided Manufacturing (CAD/CAM) solution called Autokon. This type of program includes vector-based graphics or raster graphics to present designed objects. The user interface, however, is nothing like graphical. It couldn’t be. The first GUI shows up in „Sketchpad” app in the same year of realising Autokon.

Trygve’s lessons learned set a great foundation for his future work, which is visible in Autokon related papers, e.g. „Administrative control in the shipyards” published on International Conference on Computer Applications in Shipbuilding (ICCAS) conference in August of 1973 in Japan.

It is the year 1978, Trygve Reenskaug, during his one year stay at Xerox PARC in Palo Alto in California, creates an early implementation of the object-oriented programming language called Smalltalk. He also creates structure called Model-View-Editor that was published in May of 1979. The final name, Model-View-Controller, pops up in December of the same year, thanks to **Adele Goldberg** (lead of original Smalltalk development). The MVC design pattern was born.

„The essential purpose of MVC is to bridge the gap between the human user's mental model and the digital model that exists in the computer. The ideal MVC solution supports the user illusion of seeing and manipulating the domain information directly.” (Trygve M.H. Reenskaug)

After his stay at Xerox PARC, Jim Althoff codes a version of MVC for the Smalltalk-80. Jim understands controlling part duties somewhat differently from the original one.

The MVC

The MVC is a great step forward, but before people become ready for it, its potential needs to remain dormant. In the late '70s, evolution around GUI begins. In the '80s, the first versions of the widget toolkits show up, such as X Toolkit Intrinsics (Xt), but the MVC stays somehow unused. Even later toolkits prefer to keep as one the view and the controller.

„(…) Every widget belongs to exactly one widget class (…) Logically, a widget class is the procedures and data associated with all widgets belonging to that class. These procedures and data can be inherited by subclasses. Physically, a widget class is a pointer to a structure.”

(X Toolkit Intrinsics - C Language interface, chapter 1.4. Widgets)

It is difficult to find thoughts about MVC for the next nine years (since discovered). Even in Smalltalk-80 tech notes. Finally, in late Summer 1988, Glenn Krasner together with Stephen Pope publish issue „A Cookbook for Using the Model-View-Controller User Interface Paradigm in Smalltalk-80” of the Journal Of Object Oriented Programming (JOOP).

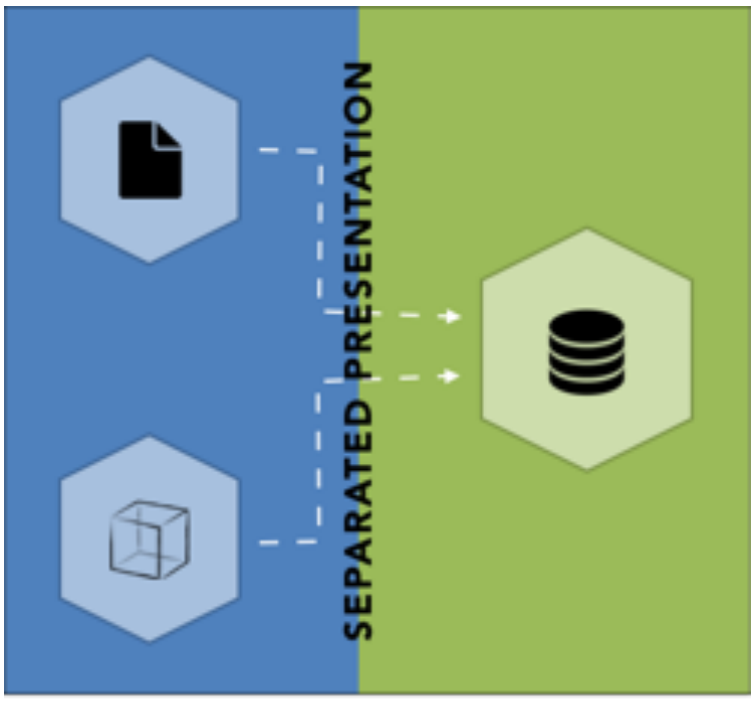

Figure 1: Separated Presentation dependencies

The highest value

The biggest achievement of MVC is separation of data (Model) from its presentation (View and Controller together). It might be obvious these days, but it wasn’t at that moment. Every next generation pattern benefits entirely from extracted data outside the data rendering code. In practice, even later developed UI frameworks, in many cases, use just these fundamental dependencies for widget modeling.

In next paper

The original structure of the MVC has Model and View related flaws. Historically, engineers deal with the Model related flaws first. In the late '80s, another way of building UI interfaces gains popularity. Its traces are visible in the structure of next generation Model-View-Presenter (MVP) design pattern. In the '90s, engineers concentrate on the View related flaws. Later on, the Model-View-ViewModel (MVVM) design pattern enters the stage. The next article, Model View Whatever - MVC's model evolution, focuses on identifying flaws of the MVC and model evolution.

About the author:

Damian Czernous

Reasoning about software architecture fascinates me for 10 years now.

Lead Engineering Coach at Nokia.

www.sanecoders.com, @DamianCzernous

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Experimenting with Xen

by Roger Pau Monné

Xen is a hypervisor using a microkernel design, providing services that allow multiple computer operating systems to execute on the same computer hardware concurrently.

Hypervisors can be divided into two categories: type 1 - those that run directly on bare metal and are in direct control of the hardware, and type 2 - hypervisors that are part of an operating system. The Xen microkernel is considered a type 1 hypervisor, since it runs directly on the hardware without the need of any OS, and, in fact, Xen is OS-agnostic, allowing several different OSes to act as control domains.

[include xen_arch.pdf]	[include kvm_arch.pdf]
Xen architecture	Type 2 hypervisor architecture

It's important to notice some differences between type 1 and type 2 hypervisors. With type 2, the hypervisor itself is integrated into a general OS kernel, while on type 1, there's a clear separation between the hypervisor and the host OS. On type 1 hypervisors, like Xen, the control domain is just a guest with special privileges. It's also important to notice that on type 2 hypervisors, virtual machines compete with other tasks running on the host in order to get resources (CPU time, memory…); this doesn't happen on type 1 since the hypervisor only schedules guests.

Initial Xen support for FreeBSD on x86 as a guest was introduced in version 8 and ARM support is currently being worked on. Support for using FreeBSD as a Xen host (also called Control Domain or Dom0) has been added in FreeBSD HEAD, and it requires Xen 4.5 or any later version.

Supported guest types

When Xen was designed in the late 90s, there were only two options in order to use virtualization on x86, both with very high overhead — full software emulation or binary translation. To overcome this, Xen took a new approach. We made the guest aware that it was running inside of a virtualized environment and provided a whole new interface that removed the extra overhead; this lead to what is known today as ParaVirtualization (PV to shorten it). With the introduction of hardware virtualization extensions in x86 in 2005, Xen gained the ability to run unmodified guests in Hardware Virtual Machine (HVM) mode. This was a very important step because it allowed Xen to run guests without any PV-aware interfaces.

While this separation between PV and HVM guests make a clear cut, there have been several PV specific improvements made available to HVM guests in order to obtain better performance. HVM guests can make use of PV disks and NICs to boost IO throughput and when a guest makes use of those interfaces inside of an HVM container, it is known as HVM with PV drivers in the Xen argot. But it doesn't stop here, since Xen 4.1 a HVM guest can also use PV timers and PV IPIs to reduce even more emulation overhead. When a guest runs in this mode, it's known as PVHVM.

In general, HVM guests have better performance, especially regarding page table manipulation operations. The software page table manipulation used in PV guests is one of the main performance problems of pure PV guests. In order to improve this, a new mode has been recently introduced that allows it to run PV guests inside of HVM containers. This new mode is called PVH, and makes use of the hardware virtualization extensions for the CPU and MMU, while using PV interfaces for the rest.

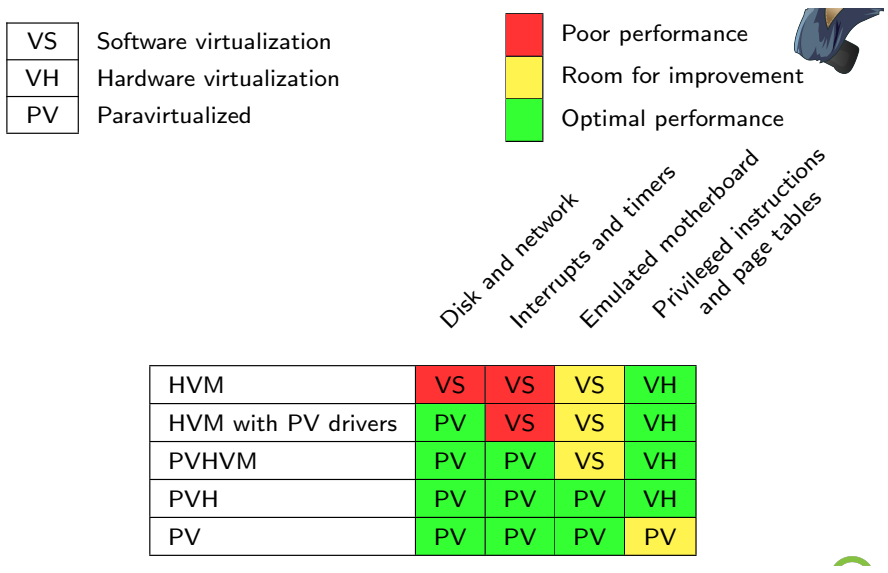

Figure 1. Guests

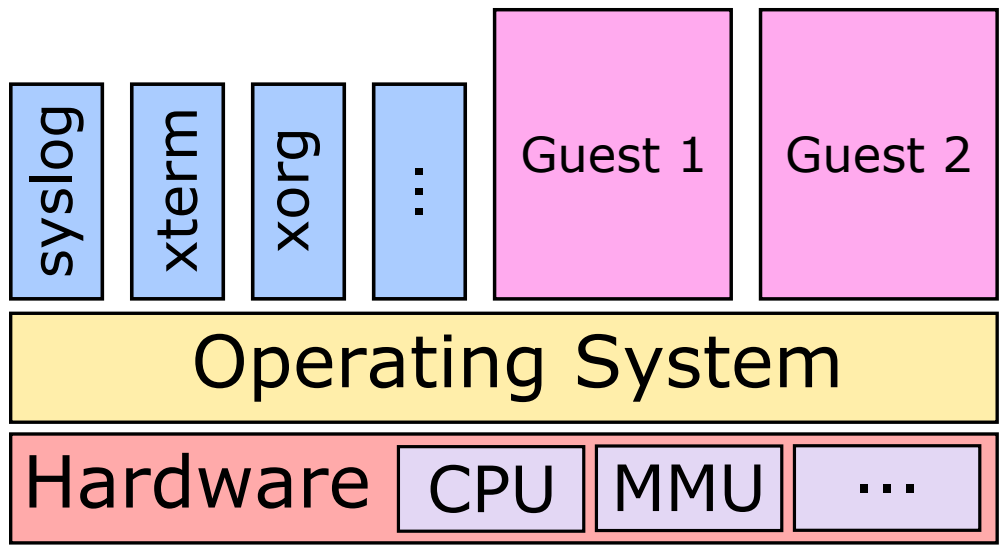

Figure 2. Xen Arch Operating system

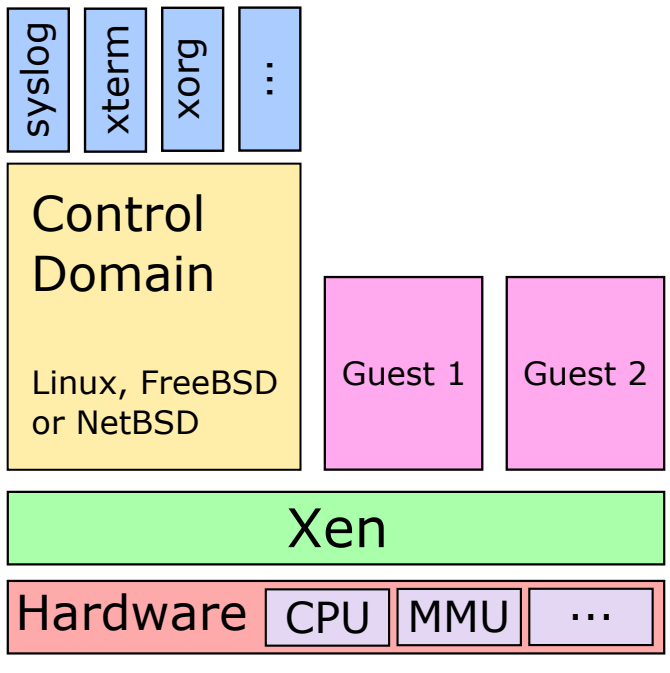

Figure 3. Xen arch control domain.

Preparing the host

In order to setup a Xen host, an AMD64 HEAD install of FreeBSD is needed. There's no Dom0 support on any stable FreeBSD branch, so it's still quite experimental and not recommended for production usage. At the moment, Xen requires Intel hardware with VT-d support in order to run a FreeBSD Dom0 (because it uses the new PVH mode), but AMD support is in the pipeline and is planned to land soon. Since Xen can use both block devices and plain files as disks for guests, it's interesting to setup ZFS in order to make use of it's advanced features, like snapshotting.

Having that said, we will start by setting up the serial console, which is important if things go wrong while using Xen. First of all, we need to modify /boot/loader.conf and add the following lines that will enable output on both the serial and VGA consoles (footnote https://www.freebsd.org/doc/handbook/serialconsole-setup.html):

```
boot_multicons="YES"

boot_serial="YES"

comconsole_speed="115200"

console="comconsole,vidconsole"
```

```
ttyu0   "/usr/libexec/getty std.115200"   dialup  onifconsole secure
```

We are also going to enable a login prompt on the serial tty by making sure the following line is present in /etc/ttys:

Install Xen

After a reboot, you should be able to get the bootloader and the kernel output on the serial console and we can proceed with the installation of Xen. For this tutorial, we are going to use the Xen binary packages provided by pkg(8):

```
# pkg install xen
```

After the installation has finished, we need to configure a couple of things in order to reboot into our newly installed Xen host. First of all, we are going to remove the limit on the amount of wired memory an application can use. This is needed because the Xen tools make heavy usage of wired memory in order to interact with the hypervisor. So the following needs to be added to /etc/sysctl.conf:

```
vm.max_wired=-1
```

Then we also need to enable the serial terminal in order to get a login prompt, this is very similar to what we did in order to enable the serial login prompt, so open up /etc/ttys and add the following line:

```
xc0     "/usr/libexec/getty Pc"         xterm   onifconsole  secure
```

Now we need to tell the FreeBSD loader to boot into Xen, in order to do that we are going to add the following lines to /boot/loader.conf:

```
xen_kernel="/boot/xen"

xen_cmdline="dom0_mem=2048M dom0_max_vcpus=4 dom0pvh=1
com1=115200,8n1 console=vga,com1 guest_loglvl=all loglvl=all"
```

The xen_kernel option tells the loader where to find the Xen kernel, while the second line contains the options that are passed to Xen. Let's examine them in detail (footnote http://xenbits.xenproject.org/docs/unstable/misc/xen-command-line.html):

• dom0_mem: tells Xen how much memory to assign to the control domain.

• dom0_max_vcpus: tells Xen how many CPUs will be assigned to the control domain.

• dom0pvh: enables PVH mode for the control domain. This is the only mode FreeBSD can use, so this option is mandatory on FreeBSD.

• com1: configuration of the serial line.

• console: specify which console(s) Xen should use, in our example Xen will send it's output to both the VGA and the serial line.

• guest_loglvl, loglvl: enable all possible log messages. This should only be used for development or testing purposes.

For commodity, it's also recommended to load if_tap during startup (it's used by Qemu). In order to do it, we just need to add the following line to /etc/rc.conf. While there, we are also going to create a bridge with the physical interface em0 that we can use in order to provide network access to guests:

```
kld_list="if_tap"

cloned_interfaces="bridge0"

ifconfig_bridge0="addm em0 SYNCDHCP"

ifconfig_em0="up"
```

And finally, we also have to add the following line to /boot/menu.rc.local, this is not strictly required but gives us a better loader menu when using Xen:

```
try-include /boot/xen.4th
```

A new option will show up on the boot options list (item 6 in the loader menu) that allows the user to switch the usage of Xen on or off from the menu itself.

Creating guests

FreeBSD PVHVM guest

We can setup a FreeBSD guest using two different methods; we can either use the pre-build VM images, or we can perform a normal install using the ISOs. In this example, we are going to use the ISOs so the install process resembles a bare metal FreeBSD install. The first step consists of downloading the install disk and creating a ZVOL to use as disk:

```
# fetch
ftp://ftp.freebsd.org/pub/FreeBSD/releases/ISO-IMAGES/10.2/FreeBSD-10
.2-RELEASE-amd64-bootonly.iso

# zfs create -V 20g tank/freebsd
```

Then we need to create the guest configuration file:

```
# This configures a HVM rather than PV guest

builder = "hvm"

# Guest name

name = "freebsd"

# Initial memory allocation (MB)

memory = 1024

# Number of VCPUS

vcpus = 2

# Network devices

vif = [ 'bridge=bridge0' ]

# Disk Devices

disk =  [  '/dev/zvol/tank/freebsd,raw,hda,rw',

'/root/freebsd/FreeBSD-10.2-RELEASE-amd64-bootonly.iso,raw,hdc:cdrom,
r'  ]
```

```
vnc = 1

vnclisten = "0.0.0.0"

serial = "pty"
```

Now we can create the guest:

```
# xl create freebsd.cfg
```

And attach to the vnc console in order to perform the install:

Once the install has finished, we can remove the ISO image from the guest configuration file and

```
# vncviewer <host>
```

boot into it. We are going to configure the guest to use the serial console so we can get the boot

```
boot_multicons="YES"# vncviewer <host>

boot_serial="YES"

comconsole_speed="115200"

console="comconsole,vidconsole"

ttyu0   "/usr/libexec/getty std.115200" dialup  on  secure
```

output and a login prompt on the command line. In order to do so, we need to modify /boot/loader.conf and /etc/ttys like we did on the control domain:

```
# xl shutdown -w freebsd

# xl create -c freebsd.cfg
```

Now we can reboot the guest and see how it boots from the serial console using the xl toolstack:

Debian PV guest

In order to setup a pure Linux PV guest, we are going to use Debian. Debian already provides a kernel and initramfs that can be used to setup a PV guest, and a config file that can be used with Xen. First we need to fetch all those parts:

```
# fetch
http://ftp.debian.org/debian/dists/jessie/main/installer-amd64/curren
t/images/netboot/xen/initrd.gz

# fetch
http://ftp.debian.org/debian/dists/jessie/main/installer-amd64/curren
t/images/netboot/xen/vmlinuz

# fetch
http://ftp.debian.org/debian/dists/jessie/main/installer-amd64/curren
t/images/netboot/xen/debian.cfg
```

We are also going to create a ZVOL in order to provide a hard drive to the guest:

```
# zfs create -V 20g tank/debian
```

And finally we need to edit the config file debian.cfg in order to set the correct paths:

```
#================================================================
========

# AT INSTALLATION TIME

#================================================================
========

=
```

```
kernel = "vmlinuz"

ramdisk = "initrd.gz"

#=================================================================
========

# TO BOOT INSTALLED SYSTEM

#

# Comment all of the above installation options and uncomment the

# below instead

#=================================================================
========

#bootloader="pygrub"

#=================================================================
========

# STANDARD OPTIONS

#=================================================================
========

#

# The following options are common to both installation time and nor-
mal booting.

#

# Only a subset of the available options are included below.

# See /usr/share/doc/xen-utils-common/examples for full examples.

#-----------------------------------------------------------------
--------
```

```
# A name for your domain. All domains must have different names.

name = "debian"

# Number of Virtual CPUS to use, default is 1

vcpus = 2

#--------------------------------------------------------------------
--------

# Define network interfaces.

vif = ['bridge=bridge0']

#--------------------------------------------------------------------
--------

# Define disks
```

This guest has been configured to use 2 vCPUs and 1GB of RAM. The virtual network card will be added to the bridge0 automatically by the Xen toolstack. Now we can create the guest and proceed with the installation:

```
# xl create -c debian.cfg
```

Once the install process has finished we will need to tweak the guest config file so it boots from the hard drive. This will require changing the top of the config file so it looks like:

```
#====================================================================
========

# TO BOOT INSTALLED SYSTEM

#
```

```
# Comment all of the above installation options and uncomment the

# below instead

#================================================================
========

bootloader="pygrub"

[...]
```

Now we can boot into the installed system:

```
# xl create -c debian.cfg
```

Live-migration of guests

Performing live migration of guests on Xen is fairly easy, the only requirements are that the disk image(s) are shared between both hosts (NFS for example) and at the same place in the filesystem hierarchy. The bridge to which to attach the virtual network interface(s) also needs to have the same name. Finally, you also need sshd running on the control domain.

For this example, we are going to use a FreeBSD guest named freebsd running on the current host, and we want to migrate it to hostb.example.com:

```
# xl migrate freebsd hostb.example.com
```

If you don't have a pair of hosts running Xen, you can also perform a local-migration in order to test it (although it's not as astonishing):

```
# xl migrate freebsd localhost
```

Finally, you can also perform saves and restores of guests:

```
# xl save freebsd /path/where/to/save

# xl restore /path/where/to/save

# xl restore /path/where/to/save
```

Take into account that the save command only saves the guest memory and device status, the disk status needs to be saved manually by the user, for example by taking a ZFS snapshot:

```
# xl save freebsd /path/where/to/save

# zfs snapshot tank/freebsd@checkpoint1

# xl restore /path/where/to/save
```

About the author:

Roger Pau Monné is a Software Engineer at Citrix and a FreeBSD developer. He contributes to Xen Project and the FreeBSD/Xen port and right now is mainly focused into getting stable PVH support in both projects. royger@FreeBSD.org

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https://www.freebsd.org/doc/handbook/serialconsole-setup.html

Security is not a one-time event, but a continuous stream of small improvements.

Michael Boelen from CISOfy

by Marta Ziemianowicz & Marta Strzelec

[BSD Magazine]: Hello Michael, how have you been doing? Can you tell our readers about yourself and CISOfy?

[Michael Boelen]: Doing great, thanks. Born and living in The Netherlands, I'm 33 years old and founded the company CISOfy. Some readers might already be familiar with some of my personal open source security tools: Rootkit Hunter (or rkhunter) and Lynis. The first tool helps administrators find malicious software on their systems. Lynis is my current project. It is more generic and helps with performing in-depth security scans. Besides security research and development, I like to read and watch TV. When I have time left, I love to blog and share my work on the Linux security blog linux-audit.com.

In 2013, I founded the company CISOfy. We focus on Linux and UNIX security only. One of our goals was to leverage the open source tool Lynis and build a commercial solution around it. This way we could make a living, and ensure the open source tool got a higher level of development (more updates, higher quality). The name "CISOfy" highlights the focus to make security available to all layers of personnel, from the UNIX system administrator, up to the CISO (Chief Information Security Officer).

[BSD Mag]: Tell us something about your solution, Lynis Enterprise Suite.

[MB]: Lynis is a great standalone tool to perform security scans. The downside is that the results are limited to that particular system only. So to make it scalable for your whole environment, we created a central hub to store all Lynis scans, named Lynis Enterprise. It also comes with additional plugins, so that Lynis can gather even more information. So both the community and paying customers run actually the same tool.

Here is how it works: Lynis runs on the system and collects all kind of data, like the boot loader you are using, or any vulnerable packages it found. It checks configuration files, from varying services like SSH, nginx, or even Docker. When it is done, it uploads the data to the central node. There the data is parsed, stored and presented in different ways. There is a dashboard, different types of reports, and an overview of each system with all related details. Lynis Enterprise also helps you to prioritize all findings. So this way you have a starting point for your system hardening efforts. For example, sorted by quick wins or systems with the highest risk. The solution wants to do as much automation as possible, to make your life easier. It provides you with related code snippets (shell, Ansible, Chef, Puppet etc), to solve discovered findings.

[BSD Mag]: Why Linux/Unix-based systems? Are they less secure than the others?

[MB]: We have seen that most companies run a combination of operating systems, or have a high specialization in just one of them. Where most security software companies provide generic tools, we want to provide a specialized solution, focused on your favorite platform. Most competitors don't even support *BSD, and we do. This is one of our reasons to ignore Windows and mobile devices. Also, my background is in systems running Linux, BSD and Mac OS X. Personally, I think all operating systems have their own flaws, which makes it hard to state if one is more secure than the other. I do think, however, that you always have to do system hardening, to ensure a system has the proper security defenses, in line with your personal or business risks.

[BSD Mag]: There have been many news stories about Linux and its security recently. It looks like it's not the most stable and safe system. What do you think about it?

[MB]: There is definitely a lot going on around that subject. I think the Linux community is getting better at it, but we are still not there yet. What still surprises me is that most people don't even implement basic hardening, or actually weaken the system, like disabling iptables and SELinux by default. This is something I like with the BSDs, as they are commonly secure by default, with a minimal installation. Fortunately, more Linux distributions are applying that same principle now as well.

[BSD Mag]: Would you say that Linux users were, in general, more aware of security issues than the average user?

[MB]: I think they are, as the average user has a different goal, which is just doing the thing they like. This might vary from playing games to surfing the web. Usually Linux users are not afraid to learn new skills, or improve things themselves. This includes improving security. Privacy-tailored Linux distributions are a good example of that. The average user and usually a Linux user, have different goals of using a computer. That might change slowly, as more non-technical people are starting to use Linux-based systems.

[BSD Mag]: What is your mission and where does it comes from? Do you have any story or philosophy behind your company?

[MB]: Our mission is to help others with gaining security insights, by providing our auditing solution. In other words, let them know how well they are doing, then tell them what the next step might be. Sharing this “next step” is one of our three main pillars, so people improve in small steps. After all, security is not a one-time event, but a continuous stream of small improvements (and adjustments). The other two pillars are “simplicity” and “first impression”. For simplicity, we try to avoid jargon as much as possible. It also shows in our user interface and website, which is clean and quick. With the first impression, we want to show you this simplicity at different areas, from running the open source Lynis tool, to the first time you are uploading a new system to the central node.

CISOfy was founded to solve a very basic problem: it is hard to know for sure how well a system is hardened, and what else can be done. Besides providing technical details for a system administrator, we also want to help them explain to their manager what they are doing. Too often technical people can’t convey the message to their manager, like why they need a new security solution, or how secure the systems really are. This is something we try to solve, together with the administrator, auditor or security professional. For example, our solution has by default three dashboards, each focused on a different audience (business owner, IT manager, system administrator).

[BSD Mag]: Which needs to happen more: CISOs learning how to communicate well with managers or managers brushing up on their cyber security skills to understand their CISOs better?

[MB]: For maximum benefit of the company, both would have to improve (at the same time). Security policies are a way of communication. They need to be guided from all the way at the top, down to all employees. The CISO/CSO has a challenging job, as we humans prefer taking the easy path, circumventing security controls. This way of thinking is a risk to the protection of valuable company assets (people, information, customers, etc). Now middle managers have a similar challenge as the CISO, which is keeping up with all the ongoing developments in information security. Since it finally comes down to money, the company will get a big better impact if the CISO is a good communicator. Then the managers will follow.

[BSD Mag]: I’m in the process of finding new article authors and companies to cooperate with. I find many people from Netherlands, who are interested or have skills in Linux/Unix, openBSD, etc. Do you think there is any reason for Netherlands being a “hub” of people passionate about it?

[MB]: We have a lot of skilled people in The Netherlands, including knowledge around open source. Our connectivity to the internet is one of the best around the world.

So that provides easy access to knowledge. Then there are several communities around open source, including user groups and nowadays Meetups.
Our country is known for their trading skills during the last centuries, and we might have inherited that way of thinking. We are actually “cheap”. So instead of paying for a Windows license, we don’t mind having to tinker a bit, and get a system with a cheaper alternative. I also see this in countries like Belgium, France, Spain, and Germany. They also have a high amount of open source usage. There is only a small difference between all these countries and ours, which is that we usually use English (instead of Dutch) as our primary language when sharing knowledge and building projects.

[BSD Mag]: Do you think European market differs a lot from American one? Would it be better for you to be based in USA? And do you think that Europe has to face a different cyber attack, or it’s basically the same as USA?

[MB]: There is definitely a big difference in both markets. For example, compliance is something which drives American companies more than in in Europe. The way money is spent is different as well. Americans usually quickly understand the value of a product and then decide to pay for it, while European people want to discuss and compare things. When it comes to attacks, the stakes might be similar. Every country has critical infrastructure and companies doing international business. An interesting fact is that individual systems in The Netherlands are an interesting target, due to our good connectivity. When it comes to our location, The Netherlands is actually a very good place to be. There is a lot going on with information security during the last years. The Hague Security Delta, as an example, which means the government, companies, and universities, are now working together and creating their own ecosystem. This way we can get more students trained and deployed in our field. For us The Netherlands is a good place to be, as we have a lot of skilled people in the area. From here we can continue providing our services, while at the same time being close to new developments.

[BSD Mag]: Is there a difference in response to attacks as well?

[MB]: I don’t think there is a lot of differences on how each country respond to attacks. In the end this is depending on regulations, but more importantly on the affected company itself.

[BSD Mag]: OpenBSD has its own amazing community. Do you think Linux/Unix enthusiasts create such community as well?

[MB]: There are definitely such communities as well in the Linux space. The difference is that they have more specific interests, like a specific Linux distribution. One great example is that even systemd has its own conference (systemd.conf).

[BSD Mag]: What are the current trends you're seeing in cybercrime?

[MB]: Last year's "ransomware" is becoming a hot topic. The attacker will encrypt all your files. Then money is asked in exchange for decrypting your data back to its original form. It now is also available for Linux systems and my guess is that it won't take long that it becomes more popular. In 2003 when I created rkhunter, the use of rootkits was commonly seen. While it has been silent around that topic for some years, sometimes new ones are showing up again. After all, sometimes attackers want to maintain control as long as possible over hijacked machines.

[BSD Mag]: What are your biggest challenges today and how are you working to solve them?

[MB]: One of the challenges we face is actually how people perceive security tools. Often people compare Lynis as a vulnerability scanning tool. There is a fine line between performing a security audit, and searching for known issues. While our solution also may pick up weaknesses, its primary goal is different. We help to measure your defenses and propose the implementation of new ones. Or when applicable, enhancing existing implementations. This is different to searching for known vulnerabilities and then telling you to fix them. We try to solve this issue by educating people, during presentations and by writing about the subject.

[BSD Mag]: What are the company's plans for the future?

[MB]: Currently, we have a high focus on compliance and automation. For example, companies who process payment transactions are required to be in compliance with PCI DSS. The specific details in the standard change on a regular basis, which is challenging for most companies. So that is something we focus on, to make this process easier for them. Then when the auditor comes in, the number of findings will be very small, simplifying the certification process. Another thing is automation and something we will further improve upon, like introducing the API (Application Programming Interface) we are working on. This enables customers to compare systems from their CMDB (Configuration Management Database) with the ones discovered during the security scans. A great way to discover so-called "shadow IT", like systems running under desks. After this work is done, we have actually some plans to make things more real-time, like detecting changes to the system when they happen, and properly reporting on it.

[BSD Mag]: Is there is anything you would like to tell/advise our readers?

[MB]: There are definitely some things I wish I knew when I started in the information security field. They might seem like basic tips, but it is easy to get trapped into other beliefs. Especially with security vendors and security researchers throwing all kind of threats and risks at us.

So here are my three main tips I would like to share:

1. Keep security simple

Too often we complicate things, like using technical jargon too much (especially abbreviations!). If we want people to embrace our security policies, make it simple for them to understand and apply. This applies also to simplify security products, make reports easier to read and better explain risks.

2. Get involved in open source projects

If you want to learn security, or help making the world a safer place, start with open source projects. Use them, send them suggestions, or provide actual code. It is a great way to build up your CV, get to know people in the field and to contribute. Most security people are contributors and like others who are similar.

3. Use the right tool

It is still common to see people just wanting to do vulnerability scanning, while they actually want to know how safe they are with their existing defenses. If you want to add value for your company and customers, know the subtle differences between technology and types of security assessments. Also, learn to understand your customer and their skill set, so the right tool can be applied. When speaking about tools, there is more than just technical software solutions. Tools like the right processes, good communication, and providing structure.

About Michael:

Michael Boelen specializes in the field of Linux/Unix security. In the last years, he worked as a consultant for several big companies, including T-Systems, Philips, and ASML. In 2013, he founded security firm CISOfy, to support companies with their auditing, hardening and compliance needs. Michael is the author of several open source security tools, like Rootkit Hunter (rkhunter) and Lynis. Both very popular, and used in the toolkit of system administrators and security professionals. Other work includes supporting the CIS benchmarks and writing articles. He is a regular contributor to the Linux Audit blog, covering Linux/Unix security.

Twitter: @mboelen

You wouldn’t want to build a team who are all the exactly the same.

Valerie Heatley from Speerhead

by Marta Ziemianowicz & Marta Sienicka

[BSD Magazine]: Hello Valerie, how have you been doing? Can you tell our readers something about yourself?

[Valerie Heatley]: Hey there- I’m great, this is my favourite time of year. Autumn seems to always bring about change and new beginnings. I was recently asked at a panel discussion- what’s not on your LinkedIn profile? My first business outing was selling second class strawberries for jam making, with my sister when I was 8. It may have lasted only one summer, but it set us up to be aspiring entrepreneurs. Especially when we saw how many more sweets we could buy if we earned the money ourselves.

[BSD Mag]: What is Speerhead?

[VH]: Speerhead is a boutique recruitment agency specialising solely in DevOps. Backed by over 25 years of both technical and recruitment experience, Speerhead has developed a disruptive method for technical recruiting.

[BSD]: Could you tell us more about this disruptive method for technical recruiting?

[VH]: It’s about getting into the minds of these DevOps professionals. Understanding what gets them excited and helping companies discover what exactly it is about their opportunity that will secure these professionals. Gathering all of this information and marketing it in the appropriate way to a select group of hand selected people.

[BSD Mag]: What are the trends in DevOps recruitment? Who is the most needed and valuable?

[VH]: Automation, automation, automation- still, it's the absolute pillar of DevOps. The most valuable professionals can do and advise on the most appropriate method to satisfy business goals, as they have multiple languages and tools. They also have a diverse background (yet stable) that allows them as an engineer to see a much wider picture, while still being able to get down to the nuts and bolts. We are seeing specific technology not being important, as companies become more and more polyglot and reactive to an ever evolving ecosystem of technologies.

A massive trend we're seeing is that the power is with the candidate. Companies looking to secure talent need to ensure they discover what is truly unique about their project, sell it, and then snap them up as quickly as they can.

[BSD Mag]: Tell us something about the training academy that you are building at the moment.

[VH]: The main issue in DevOps is that the area is top heavy. Speerhead plans to tackle this by feeding the industry from the bottom. Taking really clever graduates and teaching them the fundamentals of DevOps- automation, monitoring, soft skills, etc., that way lowering the entry point for junior engineers.

[BSD]: Why did you decided to start this project?

[VH]: As I was saying, the market is top heavy. There are lots of really senior people who can spearhead DevOps adoption. There is a growing need for the market to be supported by fresh talent who have been given the tools to approach the delivery software in a modern way. Thus helping to stabilise the current imbalance.

[BSD Mag]: What are you looking for in the candidates? Passion, good education, skills? Maybe something else?

[VH]: Culture fit! I used to think it was just a bit of a buzz word, until you start to get really close to some of these companies and you can see the nuances of their culture that have lead to their success. From the candidate side, it's the same- engineers are valuing day to day happiness over all else.

I always look for home projects. That's when you discover a lot about an engineer. Do they clock out at 5:30 and forget about technology? Here you see the passion, and the eagerness to learn and discover more.

[BSD Mag]: You are passionate about women in IT industry. Do we need more of them? There has been always one stereotype that it's not a female industry...

[VH]: Yes, of course! It's just about diversity full stop- every team, organisation and industry needs it. The studies have been done, and the results show massive benefits for companies and for society. The stereotype comes from a lack of role models. I'm sad to say that I wanted to be an engineer when I was in school, being good at maths I was looking for a way to use that, but I heard somewhere that it was a job for boys. There's the stereotype that has been there since I was a child. It's great to be living through a massive shift, though- we are seeing tech companies making a stand and children (boys and girls) coding from an early age. Time is the biggest catalyst for change.

[BSD]: Do you think that women working in IT industry are mistreated?

[VH]: I haven't experienced mistreatment, per se- I think that needs to be defined as to what you mean by mistreatment. I believe there are some barriers, but mistreatment seems a little harsh.

[BSD Mag]: What are the strong sides of having a female software developer? Or generally of women in this industry? What are they weak at and what is the hardest thing they have to deal with?

[VH]: It's a fact- people who come from different backgrounds think a little differently. You wouldn't want to build a team who are all the exact same. Women aren't necessarily better or worse at anything they're just different- as we all are. The hardest thing women have to deal with in this space is dependent on so many factors- company they work for, the team they're on, etc. Self belief and limiting beliefs is the biggest I've seen. Again, this can often come down to role models- if it's not visible that someone has done what you're looking to do in the past, it can be difficult to believe that you can.

[BSD Mag]: What have you experienced yourself as a woman in this industry?

[VH]: As a woman in this industry, my experience has not been defined by being a woman. Particularly as a business woman, I think it's been easier to be part of this world- I don't have to learn golf to get face time, I just need to pop along to a meetup! As a woman in this industry in Ireland- I see so much change and focus on tackling this issue. People are talking about it, leaders are promoting it and companies are trying to do something about it. It's a wonderful time, but with a long journey ahead.

[BSD Mag]: You have bachelor of arts, am I right? Where does the interest in technology come from?

[VH]: To be honest, I fell face first into this world, I hadn't a clue, everything was new and strange- but I quickly fell madly in love! As I said, I had always wanted to be some sort of an engineer- and I just 'got it'. Having indepthly studied societal influences to change in my BA, I quickly realised that nothing has changed the world so exponentially as technology, and it will continue to do so. You're either in it or you're going to be left behind.

[BSD Mag]: Is there is anything you would like to tell our readers? Any advice?

[VH]: Children today will drive the real change in fixing this gender gap. In the western world anyway, girls and boys live in a world where there is no difference. It is our responsibility to ensure that there is a clear road for them and people they can look up to. If you are a senior woman in technology, let everyone know, go out of your way to be visible. If you are just starting out, don't hold yourself back, to quote Sheryl Sandberg- A career is no longer like a ladder; it's like a jungle gym- take your time to find an organisation where you can comfortably excel.

About Valerie:

Valerie is a technology enthusiast and entrepreneur. Relatively new to the industry she spotted the potential in DevOps, and has gained a unique knowledge as the sole specialist in Ireland. With this knowledge she can successfully spot the DevOps requirement, provide a valued solution and accelerate business. After her successful spell with global leader Computer Futures, becoming Dublin rookie of the year, she decided to join Speerhead to approach the DevOps community from a local level. Having spoken to 100s of people and attended industry and user events, her strong personal links have enabled her to position Speerhead Ireland at the heart of Dublin's tech scene. Valerie is also passionate about Women in IT and Women in Business, actively working to promote more female leaders in Ireland.

#MISSIONCOMPLETE

“CryptoLocker is a joke with ZFS”

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10 Things Your CIO Should Know About TrueNAS

by Mark VanFange

We could write volumes about all the benefits of TrueNAS and why it should be in your workplace. For the sake of brevity, however, we've narrowed it down to ten things your CIO should know about TrueNAS before deciding on a storage solution.

1. It's Both a SAN and a NAS

TrueNAS Unified Storage is hybrid or all-flash storage built on a modular, state-of-the-art hardware platform. TrueNAS is an enterprise storage array with the availability, performance, and features needed by your business applications. It unifies SAN and NAS in one appliance and provides a wide variety of services and protocols on top of a best-in-breed file system that guarantees data integrity at every step.

2. It's Award Winning

Analysts say that TrueNAS is a winner. DCIG, a leader in storage analysis and a go-to resource for evaluating storage systems, rated TrueNAS as "Excellent" and gave it a "Best-In-Class" rating for hardware. This is higher than storage arrays from Dell, EMC, Fujitsu, Hitachi and Nimble. DCIG shows that you can acquire the majority of the enterprise features as these big names for much less.

3. It's Fast

TrueNAS gives you the performance you need with a cache-first design approach that delivers blistering performance from flash memory for your most frequently and recently accessed SAN and NAS data. TrueCache™ combines RAM and nonvolatile flash with high-density spinning disks to give you the performance of an all-flash array with the capacity of an all-HDD one. It will save you money when you need to increase capacity or performance.

4. It's Safe

TrueNAS ensures you retrieve the same data that you wrote. It checksums your data whenever it is written and verifies those checksums when data is read. It even checksums the metadata that describes the file system and allows you to periodically verify all checksums to determine if infrequently used data or backups are suffering from silent data corruption.

5. It's Economical

Some storage vendors lead with lower-cost to get your business, but then require more money to unlock features or to increase capacity. TrueNAS offers a full suite of enterprise features right out of the gate. You can acquire a TrueNAS hybrid storage array with 120TB capacity for under $25,000. Other vendors, like Nexenta-based solutions can run you closer to $120,000 and EMC and NetApp can be over a quarter of a million dollars. There's no question that TrueNAS is hands-down the best value in Hybrid Storage.

6. It's The World's Most Actively Developed Storage Array

TrueNAS is the most actively developed commercial storage software on the planet, made possible by the contributions of the vivacious FreeNAS community, but hardened and tuned for the uncompromising stability and performance that businesses require. FreeNAS makes many of the features available on TrueNAS available in an Open Source platform to users who wish to design, deploy, and administer advanced storage systems on their own. This gives the FreeNAS, and therefore TrueNAS, codebase a larger pool of users and use case implementations than any major storage vendor. iXsystems allows these features to mature in the FreeNAS community before the development team implements them in TrueNAS, bringing more overall stability to TrueNAS and a quicker path to new features.

7. It Saves on Physical Storage

TrueNAS Adaptive Compression (TAC) works with the TrueNAS file system to analyze a file and automatically determine whether the file is compressible, without any noticeable performance reduction. In fact, because TAC uses the CPU to compress data before writing data to the hard disks, it actually speeds up performance. TrueNAS also includes thin provisioning, which combined with the TAC means you have to purchase less physical storage for your critical business applications. You can build a configuration that holds nearly 4PB, which can grow to nearly 10PB after storage optimization.

8. It's Enterprise Ready

Expanding TrueNAS storage is simple and non-disruptive.

Every TrueNAS model supports data corruption protection, replication, file and block protocols, inline storage optimization, thin and thick provisioning, online capacity expansion, storage controller redundancy, hot spares, and redundant power and cooling. When drives are inserted, their capacity becomes available for use, allowing for seamless capacity expansion without service interruption. To add or increase cache, just insert a cache device, and it is available for use. To upgrade any model to high availability, you simply add a second storage controller. If you need to move between models to increase performance, it's as easy as replacing storage controllers, and network controllers can be added for additional network connectivity. TrueCache™ ensures cache coherency for High Availability systems.

9. It Comes With White Glove Support

TrueNAS is more than just an storage array – it also includes iXsystems Professional Support. Opening a support ticket is easy, you don't even have to leave the TrueNAS GUI. If you need help with TrueNAS, you will speak with a team of dedicated support engineers located at iXsystems headquarters in Silicon Valley, CA. The support team has direct access to the people who design and build TrueNAS, whom they can quickly call on if the situation warrants.

10. It's Certified by Leading Hypervisor Vendors

TrueNAS integrates with all major virtual machine environments, enabling you to deploy VMs and virtual desktops (VDI) in minutes and run more operating environments on a single host from a single, hassle-free array.

TrueNAS has been developed to meet Citrix, Microsoft and VMware standards and has been through each vendor's certification process. TrueNAS supports their hypervisors and is integrated with VMware VAAI as well as Microsoft CSV, ODX, and VSS. TrueNAS provides instant and crash-consistent snapshots of any VMware VM, allowing you to replicate a VM and restart it. This makes TrueNAS ideal for any virtualized infrastructure.

Conclusion

In addition to this list, iXsystems combines almost 20 years of enterprise server production expertise and a dedicated Open Source software development team to bring customers TrueNAS enterprise storage systems. It is important to realize that every hardware component has been selected, designed, and tested to meet the requirements of mission critical storage applications. Our expert staff works closely with your team to ensure that your TrueNAS system is exactly what you need. This makes TrueNAS more desirable than strictly software-defined storage solutions that force customers to make hardware decisions on their own and to work with vendors that do not have software expertise. These are just some of the things that should make TrueNAS the clear choice for your storage infrastructure.

Rob's COLUMN

Presidential hopeful Hillary Clinton has joined an ever increasing vocal group to argue for the weakening of data encryption. In light of the horrific and inhuman terrorist attacks in Paris this month, what are the implications of such ideology but more importantly how, as technologists, should we address such a moral quagmire?

by Rob Somerville

And so, after such atrocities as the recent Paris attacks, the inevitable knee-jerk reactions and slamming of stable doors begins. Politicians, lawyers, media commentators et al have immediately switched into the mode "We haven't got a clue how to solve this but have got to be seen to be doing something". I'll be the first to admit that other than finding a global and long term diplomatic, moral and political solution to the current crisis, the only way forward would appear to favour carrying on as a species shooting and bombing each other ad nauseum. So business as usual then. Other than that, I am at a complete and total loss as to how we can reconcile the irreconcilable. Whether the war takes the form of traditional armaments or is based at the digital level, until we can isolate the bad guys to the point that we can justly deal with them, we will always be on the back foot. Of course, the other side will be saying the same thing, but statistically they have the edge. To quote the Rand Corporation blog, "Terrorists have to be lucky once; targets, every time". So it is no surprise then that the political reaction is the counter intuitive response, "Weaken our defences so that we may become stronger". To the political mindset, this makes perfect sense.

What we are facing is one of the results of the law of unintended consequences. Thirty years ago, IT was dominated by specialists and professionals, and while there have always been bad guys in every barrel, it was fairly clear who the perpetrators were, but more importantly, the threat was manageable. Then came the age of the democratisation of technology, and every man and his dog has become an IT guru. Moreover, the footprint of the black hats (be they hackers, criminals or terrorists) has correspondingly increased. The domain, previously occupied by professionals, corporations, governments and a few specialist hobbyists, is now littered with "cut and paste" script kiddies, anarchists, political agitators and various other malcontents, trolls and troublemakers. Thankfully, only 46% of the world is currently online according to internetworldstats.com.

Rob's COLUMN

The natural response to the development of technology and any major advance in society has always been regulation and law. And often that enacted law has teeth. Interfering with the Royal Mail is a treasonable offence, and until a few generation ago, carried a potential death sentence.

Hence, the lengthy deterrent sentence passed to the great train robbers in the UK. Some would argue this sentence was unjust, as many murderers served less time. But what can our moral guardians do when the evidence of the crime (or potential crime) is hidden, obfuscated, or indeed encrypted? In the hands of a good defence lawyer, circumstantial evidence can always be relegated to weak evidence. After all, with the exception of parts of Europe, in law, the body of evidence needs to be beyond all reasonable doubt. And while the perverse and naturally unjust mentality exists that the perpetrator would rather die than face a jury of their peers, it is no surprise the focus has shifted from proof in court to the suspicion of all, with the polished rider "If you have nothing to hide you have nothing to fear".

But we all have something to hide. Affairs of the heart, embarrassing photos, our financial state of affairs, the condition of our bodies, commercial secrets. These, and many more data sets besides, are quite rightly confidential. Sadly though, the tranche and body of law and resources that protects governments, corporations and other established bodies is not always available to the common man. The storm of righteous indignation by multinational organisations when their dirty washing is exposed for all to see by hackers is inevitably met, if not always by the full weight of the law, at least by a thorough witch hunt in the media. If I am hacked, on the other hand, I will just become another statistic. Sure, on paper I have the legal right to pursue the perpetrators, but like most of the general populace, I don't have the financial resources to do so. So as a priority, while lots of noise is made about rights and responsibilities, I am at a major disadvantage. And let's be honest here, even with a fully patched system, we are in the perilous state that anyone who really wants access to our data can gain access by zero day exploits, etc. With the Internet of Things rapidly increasing its footprint, the number of attack vectors will increase exponentially. Adequate encryption is one of the few tools as an individual I have in my arsenal. And these risks exclude what the men in long dark trench coats may think of my browsing history, social circle, or political opinions.

But data security isn't just about remote access, the ability to view information either by legal means in terms of government or illegal means by the black hat, as Hillary Clinton has found out to her cost. Wiping documents (or indeed for that matter a personal email server) does not always guarantee confidentiality. Data can be recovered. Our personal footprint may be entirely innocent, but in the hands of a skilled forensic investigator, much circumstantial evidence can be resurrected.

Be that from physical media, or the breadcrumb trail left on the Internet. In the hands of a good propagandist, even the most innocent swathe of evidence can be turned against you. It all depends on trust. As always, like a giant Ponzi scheme, it all comes back to who watches the watchers - Quis custodiet ipsos custodes?

The ethical imperative and necessity for secure communications has been more than adequately demonstrated through history. Breaking the seal on a confidential document to the king would result in dire punishment; in time of war, even more so. Today, millions of people depend on this protocol, from business to banking to just browsing. The implications of lowering our defenses not only plays straight into the hands of our enemies, but flies in the face of one of the major growth areas in IT today – Data and Information security. As always in these spirals of descent, the solution to the bigger mouse is to build a bigger mousetrap, rather than breeding bigger cats. The mice, however, inevitability evolve. Like the examples in the dark ages of decapitated heads on poles, the lesson is soon learned and the opposition changes its tactics. Law enforcement and the security services are slow to change, are often underfunded and so they loose the momentum. More draconian laws are implemented, the pendulum swings the other way (often due to circumstances in spite of, rather than because of, the law) and the cycle repeats itself. Little thought is given to the fact that the lawbreaker cares naught about what the law says or thinks, other than to use it to his or her advantage. A bit like technology really. There has been a recent uptake in the use of drones to deliver contraband to prisoners incarcerated in UK prisons. Rather than securing the prisons, I bet that there will be some legislation or licensing emerge to counter this threat. And will the criminals care?

Yes, we should allow the security services to view our meta-data and traffic, should we appear on their radar, but this right should only be granted provided there is sufficient unequivocal hard evidence against us of criminality. And that right must only be granted by an impartial qualified judge, but preferably by a jury of our peers. Not just granted carte blanche to anyone with access or technical ability. We would all feel violated if somebody picked the locks of our house and spent a day wandering around. Even more so with our relationships, attitudes and transactions.

Rob's COLUMN

No, implementing such a knee-jerk policy as weakening encryption will not only threaten national security, commerce, and individual rights, but will send a clear message to the bad guys – we really think you are stupid. Even if we blacklisted huge swathes of the Internet, there are more than enough techniques available to communicate – be it smoke signals, flashing torches, pigeons or dead letter boxes. As the West and the Stazi found out during the cold war, such methods are time and manpower intensive to police. And this all apart from the increasing the threat from criminal and foreign state level. After all, the black market drug economy has sufficient illegal money floating around to purchase a Cray supercomputer or two. As technologists and professionals, we need to remind those in power of the historical ramifications of such idiocy. After all, much has been said about the large part that Bletchly Park played in winning World War Two. Without the capture and reverse engineering of the Enigma boxes, we may not have won the war. But this argument cuts both ways. Goodness knows how we communicated during the war, but we were not as arrogant as to place all our eggs in one basket and think we were invincible. We may have been so impoverished to have guns carved out of balsa wood and cardboard tanks in the desert, but at least we made a token effort at pretending there was some defense in place.