



Standardizing & Automating Enterprise Deployments of Debian GNU/Linux

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Federico Sevilla III

GNU/Linux Specialist – Q Software Research Corp.

Information Technology Director – The Leather Collection, Inc.



What is Debian?

- Debian as a Universal Operating System
 - 15,490 precompiled software with Sarge (3.1)
 - 12 officially supported architectures
 - IA-32, IA-64, AMD64, PowerPC, Alpha, SPARC
 - ARM, m68k, MIPS (mips and mipsel), HP PA-RISC, S/390
 - GNU/Linux, GNU/Hurd, GNU/NetBSD, GNU/kFreeBSD



What is Debian?

- Debian as a Mother Distribution
 - Base for a number of popular distributions
 - Ubuntu, Knoppix, Libranet
 - Base for internal custom distributions
 - Debian Jr., Debian-Med, Debian-Edu, Debian Desktop, Debian-Lex, Debian-NP, Debian Accessibility, Debian Enterprise, Demudi

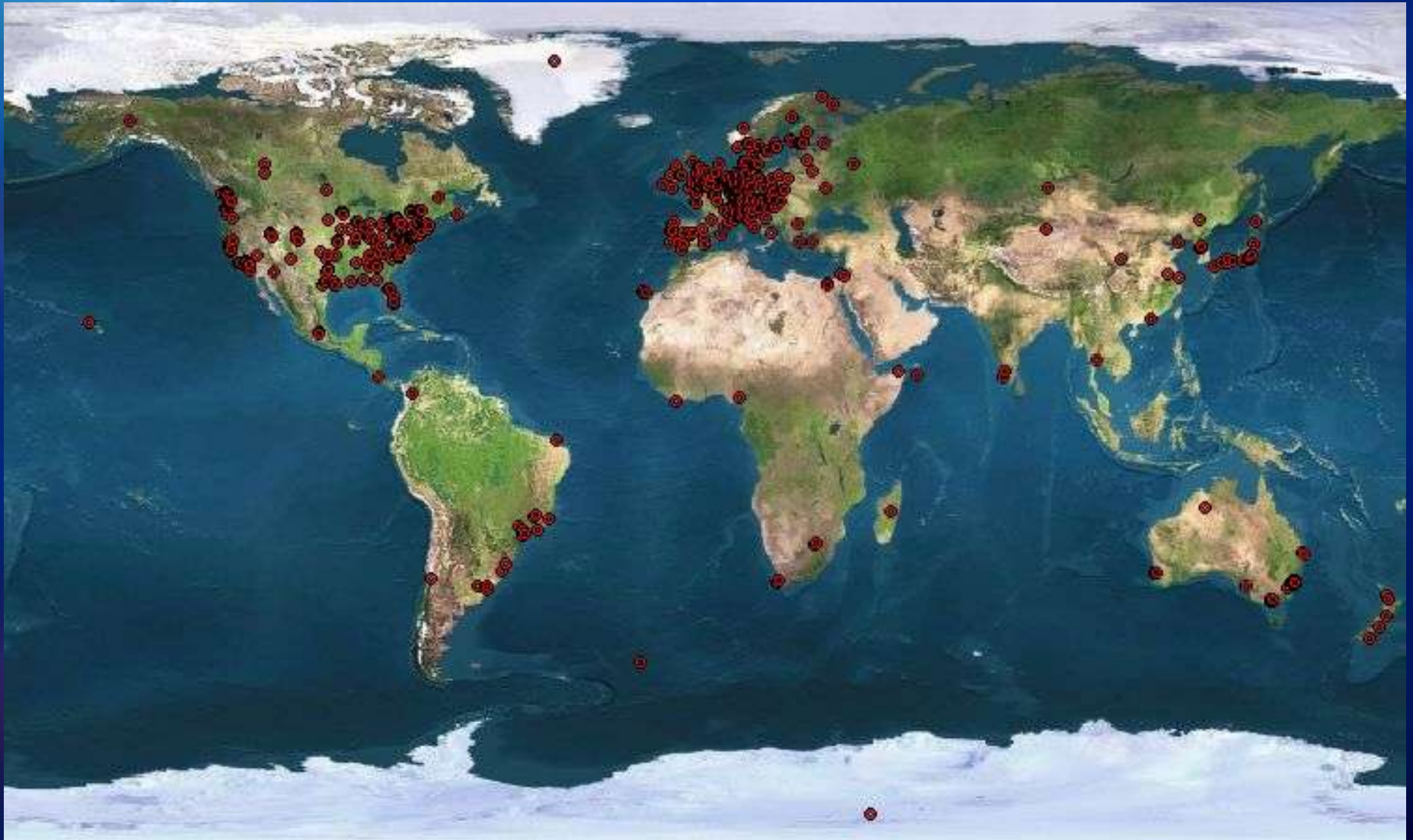


What is Debian?

- Debian as a Community
 - 1,682 project participants
 - 1,618 independent package maintainers
 - 64 package maintenance teams
 - Collaboration through mailing lists and IRC
 - 28,588 subscribers of debian-announce
 - 4,772 subscribers of debian-devel-announce
 - Developers all over the world (see map)



Debian Developers All Over The World





Why Debian?

- Debian as a Community-Driven Effort
 - Proven by time: 12 years and counting
 - “For the community, by the community.”
 - Largely unaffected by the dot-com burst and corporate agenda driven restructuring
 - Guided by Debian’s Social Contract with the Free Software Community



Social Contract with the Free Software Community

- Debian will remain 100% free.
- We will give back to the free software community.
- We will not hide problems.
- Our priorities are our users and free software.
- [We will make provisions for] Works that do not meet our free software standards.



Why Debian?

- Debian means Quality Assurance
 - Strict policy guidelines for Debian packages
 - Strict adherence to the Debian Free Software Guidelines (DFSG)
 - Peer review and “fraternal correction” within the Debian Developer community



Why Debian?

- Tried and Tested Approach
 - History of major Debian releases
 - 06/17/1996 – 1.1 “Buzz”
 - 12/12/1996 – 1.2 “Rex”
 - 06/02/1997 – 1.3 “Bo”
 - 07/24/1998 – 2.0 “Hamm”
 - 03/09/1999 – 2.1 “Slink”
 - 08/15/2000 – 2.2 “Potato”
 - 07/19/2002 – 3.0 “Woody”
 - 06/06/2005 – 3.1 “Sarge”
- Minor releases in between



Why Debian?

- Tried and Tested Approach
 - Timely security updates
 - Managed by the Debian Security Team
 - 48-hour turnaround time for security updates
 - Support for the old stable distribution up to one year from the release of the next stable distribution, except when another stable distribution is released within the year



Why Debian?

- Robust Package Management System
 - dpkg for low-level package management
 - apt for higher-level dependency and repository management
 - Well-tested and documented upgrade path between stable distribution releases
 - Just Works™ upgradability for security updates for a stable distribution



What is FAI?

- Fully Automatic Installation System for Debian GNU/Linux
- Part of the Debian stable distribution
- Uses standard Debian and GNU tools
 - dpkg, apt-get, aptitude
 - shell, Perl, expect, cfengine



Why FAI?

- Class-based configuration
 - Share common configuration details
 - Define custom classes by IP address, host/domain name, or menu-driven user input
 - Support multiple hardware and software installation profiles
 - “Self-document” the standardization of the installation profiles



Why FAI?

- Fully customizable
 - Default behavior can be modified through hooks
- Provides a central repository for all standardized configuration information
- Scales to hundreds of installation clients
- Network- and CD-based installation



Why FAI?

- Central network-wide monitoring of installation progress and status
- Central storage of detailed installation logs
- Remote access of installation clients during installation process via SSH
- Support for soft updates – updating an existing setup instead of overwriting it



Why FAI?

- Supports the 2.4 and 2.6 Linux kernels
- Supports multiple architectures
 - IA-32, IA-64, AMD64
 - PowerPC, Alpha, SPARC
- Flexible disk configuration engine
 - Supports dynamic partition sizing
 - Supports ext2, ext3, ReiserFS and XFS



How? FAI Basics.

- Prerequisite network services
 - Debian apt repository
 - Improve performance using a local mirror
 - Use a local apt repository for in-house applications
 - Serve packages via HTTP, FTP or NFS
 - NFS Server
 - DHCP or BOOTP Server
 - TFTP Server



How? FAI Basics.

- Planning your installation
 - Network
 - Collecting and recording MAC addresses
 - Naming and IP addressing schemes for clients
 - Network bandwidth requirement during installation
 - Physical LAN topology
 - Installation server



How? FAI Basics.

- Planning your installation
 - Target hardware
 - Support for PXE network booting
 - Hard drive sizes
 - RAM sizes
 - Unique kernel requirements
 - Uniformity or non-uniformity of hardware



How? FAI Basics.

- Planning your installation
 - Target configurations
 - Hard drive partitioning
 - Filesystems to be preserved during updates
 - Remote filesystems to be mounted automatically
 - Software to be installed
 - Configuration requirements of software
 - Authentication policies – central or local



How? Configuration.

- /etc/fai/
 - fai.conf
 - make-fai-nfsroot.conf
 - sources.list
- FAI boot kernel
- NFS root directory



How? Configuration.

- Configuration space
 - `class/`
 - Definition of variables
 - Encrypted root password
 - Timezone settings
 - Console font and keyboard settings
 - Installation monitor server address
 - Definition of installation classes
 - Use `$HOSTNAME`, `$DOMAIN`, `dialog`, et al



How? Configuration.

```
#!/bin/sh
case $HOSTNAME in
    demohost)
        echo "FAIBASE DHCPC DEMO" ;;
    gnomehost)
        echo "FAIBASE DHCPC DEMO XFREE GNOME" ;;
    *)
        echo "FAIBASE DHCPC" ;;
esac
exit 0
```



How? Configuration.

- Configuration space
 - `disk_config/`
 - Handles partitioning, filesystem creation and filesystem preservation
 - Follows defined classes
 - Can be overridden using a custom hook – useful for configuring software RAID or LVM



How? Configuration.

```
# generic disk configuration for one small disk
# disk size from 500Mb up to what you can buy today
#
# <type> <mp>    <size>    [mount opt][;extra options]

disk_config disk1
primary /          70-200    rw        ; -c xfs
logical swap        40-500    rw
logical /var       90-1000   rw        ; xfs
logical /tmp       50-1000   rw        ; xfs
logical /usr       200-4000  rw        ; xfs
logical /home      preserve9 rw,nosuid ; xfs lazyformat
```



How? Configuration.

- Configuration space
 - `package_config/`
 - Packages to be installed, using *apt* commands
 - *hold* to not upgrade a package
 - *install* to install using apt
 - *remove* to remove using apt
 - *taskinst* to install packages belonging to a task
 - *aptitude* to install using aptitude
 - *aptitude-r* to install with recommended packages
 - *dselect-upgrade* to use package selections



How? Configuration.

```
PACKAGES install I386
```

```
memtest86+ kernel-image-2.4-386
```

```
PACKAGES aptitude DHCPD
```

```
dhcp3-client
```

```
PACKAGES aptitude GRUB
```

```
grub lilo-
```

```
PACKAGES aptitude LILO
```

```
lilo grub-
```

```
PACKAGES aptitude-r GERMAN
```

```
german
```

```
PACKAGES aptitude-r FAISERVER
```

```
fai fai-kernels mknbi dhcp3-server tftpd-hpa
```

```
rsh-server wget syslinux debmirror tcpdump
```



How? Configuration.

- Configuration space
 - `files/`
 - Files to be copied over to installation targets using *fcopy*
 - Parent directories and file are directories which contain files named using class names
 - `scripts/`
 - Scripts to copy files and configure applications
 - Directories and scripts named using class names



How? Configuration.

```
#!/bin/sh
if ifclass FAISERVER
then
    fcopy -M /boot/fai/pxelinux.cfg/default
    fcopy -m root,root,0600 /etc/default/dhcp3-server
    fcopy -M /etc/default/tftpd-hpa
    fcopy -M /etc/dhcp3/dhcpd.conf
    fcopy -M /etc/exports
    fcopy -M -r /etc/fai
    $ROOTCMD mkdir /opt/fai
    $ROOTCMD rsync rsync://faiserver/fai/ /opt/fai
fi
```



How? Configuration.

- Configuration space
 - **debconf/**
 - Stores data for *debconf*
 - Uses the format used by *debconf-set-selections*
 - **hooks/**
 - Scripts to override default tasks



We Want More!

- Custom Debian Packages
 - Must read: Debian New Maintainers' Guide
 - Step 1: Debianize with *dh_make*
 - `dh_make -e you@dom.ain -f ../app-0.99.tar.gz`
 - Step 2: Modify contents of *debian/* directory
 - Step 3: Build your new package
 - `debian/rules build && debian/rules binary`



We Want More!

- Custom apt Repositories
 - Must read: Debian Repository HOWTO
 - Managing trivial repositories:
 - `dpkg-scanpackages binary /dev/null | gzip > binary/Packages.gz`
 - `dpkg-scansources source /dev/null | gzip > source/Sources.gz`



We Want More!

- Local apt mirrors with *apt-mirror*
 - Configuration format similar to apt's sources
 - Can mirror any apt source
 - Never produces an inconsistent mirror
 - Downloads all packages before updating the associated control files
 - Uses apt's control files to know which packages need to be downloaded



Online Resources

- Debian Website – <http://www.debian.org>
- Debian New Maintainers' Guide –
<http://www.debian.org/doc/manuals/maint-guide>
- Debian Repository HOWTO –
<http://www.debian.org/doc/manuals/repository-howto>
- FAI Website – <http://www.informatik.uni-koeln.de/fai/>
- FAI Wiki – <http://faiwiki.informatik.uni-koeln.de>
- Apt-Mirror – <http://apt-mirror.sourceforge.net>



FAI in the Philippines

- Shopwise – Rustan Supercenters, Inc.
 - Araneta Center, Cubao, Quezon City
 - Festival Supermall, Alabang, Muntinlupa City
 - Harrison Plaza, Pasay City
 - Antipolo City
- Goldilocks Bakeshop, Inc.



Contact Information

Federico Sevilla III

GNU/Linux Specialist

Q Software Research Corp.

Tel: +63 (2) 747-3994

Fax: +63 (2) 747-9032

Email: jijo@qsr.com.ph

YM: JijoSevilla

Website: <http://jijo.free.net.ph>

<http://www.qsr.com.ph>