FAI.me
A Build Service for Installation and Cloud Images

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finger Mrfai@localhost

▶ whoami

▶ Sysadmin for more than two and a half decades
▶ Debian developer since 2000
▶ Diploma in computer science, University of Bonn, Germany
▶ SunOS 4.1.1 on SPARC hardware, then Solaris Jumpstart
▶ Started FAI in 1999 for my first cluster (16 × Dual PII 400 MHz)
▶ Several talks and tutorials:
  Linux Kongress, Linuztag, DebConf, SANE, LCA, FOSDEM, CeBit, OSDC, UKUUG, FrOSCon, Chemnitzer Linushtag
▶ FAI trainings
Motivation

- Debian installer is not that easy for beginners
- Also FAI is not for beginners
- How to make FAI usable for beginners?
The idea

- An installer should cover the most usual installations
- Ignore the special cases
- Do only ask the really important questions
- Ask everything at the beginning
- Create a customized installation media
- Boot this installation media and get yourself a coffee
- Ready!
FAI = Fully Automatic Installation
FAI is a tool for experienced sysadmins
You have to adjust the config files to your local needs
How to make FAI usable for beginners?

FAI.me
FAI.me. Build your own installation media

This installation image will automatically install the OS and applications onto the computer. No network connection is needed, since all packages are on the installation media. You can burn this image onto a CD/DVD or write it to an USB stick.

All data on the first disk will be overridden without any further confirmation.

Root password: [ ] If not set, sudo will be configured for the user account

SSH key for the root account: [ ] Browse... [ ] No file selected. Upload id.pub file for login without a password

User name: [ ] debian [ ] Not the full name

User password: [ ] If not set, a password will be generated

- English US [ ] Language and keyboard layout
- One partition [ ] Disk partitioning scheme
- Debian 9 stable (stretch) [ ] Select a distribution [ ] Enable backports including newer kernel
- GNOME desktop [ ] Which desktop to install

- Debian developer tools [ ] OpenSSH server
- Web server [ ] Standard system tools
- Print server [ ] Non-free Linux firmware

Additional packages to be installed:

Separate with spaces, multiple names on one line are fine

Email (optional): [ ] You will be informed when the image generation is finished

- For the keyboard layout we assume Generic 105-key PC
- To change the keyboard layout call dpkg-reconfigure keyboard-configuration
- The timezone will be set to UTC. To change the timezone call dpkg-reconfigure tzdata
- You should change the user and root password after installation

Create installation image

Any feedback is welcome. Send an email to FAI.me =at= fai-project.org
Easy creation of the installation media (CD/USB stick)
Customizations are easy to do (clicks on a web page)
Language, user name and pw, root pw
Select one of the common desktops
Additional packages
Distributions: stable, stable+backports, testing
Some more advanced features

- Different disk partitioning schemes
- SSH key for root login
- Use your github account (ssh pub key) for the root login
- Add one public available repository
FAl.me for the cloud

- **Cloud Images**
- Get your customized cloud image by just a few clicks
- Disk size
- Disk image format (raw.xz, raw.zst, qcow2, vmdk,...)
- Hostname
FAI.me more ideas

- Make web page dynamic: easy mode **Thanks Juri!**
- Images for non-amd64
- Other distributions (e.g. Ubuntu, CentOS)
- Ready-to-go cloud images for GCE, EC2,....
- A generic FAI.me media, without packages
- Live images
- If you want more customization, set up your own FAI server
How does FAI.me work

- Web server ≠ build server
- A Perl CGI validates the input and writes a config and a meta file
- Each job has its own subdirectory
- The status is written to status.html (waiting, processing, done, error)
- Shell script on the build server deals with new jobs
- Misc: parse logs for errors, new nfsroot, monitoring, cleanup of old images
FAI.me architecture

- `/etc/fai-{stretch,stretch-bpo,buster}`
- A different nfsroot for each distribution
- The config space is shared between all
- Read config of new job (NFS)
- Make copy of CS, customize it mostly via classes (ssh key, lang, packages, user, root pw)
  - Make package mirror, make installation ISO
  - Create disk image
- Update status on web page, write log file, send email
- Copy ISO or disk image to web server (NFS)
- All temporary files are stored in RAM (tmpfs)
FAI.me architecture

- FAI nfsroot (only installation ISO)
- FAI config space
- FAI classes
- AMD64 DEBIAN STRETCH HOME_LVM BACKPORTS SSH_SERVER NONFREE GNOME FAIME
- For installation images
  - `fai-mirror -c$classes /tmp/mirror`
  - `fai-cd -m /tmp/mirror ABC123.iso`
- Cloud images
  - `fai-diskimage -S5G -c$classes AB12.raw.zst`
FAI architecture

install server

nfsroot

config space
./hooks
./class
./disk_config
./package_config
./scripts
./files

Debian mirror

mounted by kernel
NFS, svn, git, HTTP

install client

/local hard disk

provided via HTTP, FTP or NFS

.../fai/config/
/target/
/target/usr
/target/var
Disk partitioning

Example: `.../disk_config/HOME_LVM`:

```
# entire disk with LVM, separate /home
disk_config disk1 fstabkey:uuid align-at:1M

primary /boot 200 ext2 rw,noatime
primary - 4G- - -
```

```
disk_config lvm
vg vg1 disk1.2
gv1-root / 3G-50G ext4 noatime,rw
vg1-swap swap 200-4G swap sw
vg1-home /home 600- ext4 noatime,nosuid,nodev,rw
```

- File systems: ext[2,3,4], vfat, xfs, ReiserFS, NTFS, btrfs
Example: .../package_config/DEBIAN:

PACKAGES install-norec
apt-transport-https # is only needed for stretch
sudo debconf-utils
file less linuxlogo rsync openssh-client
time procinfo
nullmailer
console-setup kbd pciutils usbutils
unattended-upgrades

PACKAGES install NONFREE
firmware-bnx2 firmware-bnx2x firmware-realtek
firmware-linux-nonfree

PACKAGES install AMD64
linux-image-amd64
memtest86+
FAI references
FAI users

- Anonymous, financial industry, 32,000 hosts
- LVM insurance, 10,000 hosts
- City of Munich, 16,000 hosts
- Albert Einstein Institute, 1,725 hosts
- Mobile.de, ~600 hosts
- StayFriends, 700+ hosts
- XING AG, 300-400 hosts
- Opera Software, ~300 hosts
- Stanford University, 450 hosts
- MIT Computer science research lab, 200 hosts
- The Welcome Trust Sanger Institute, 540 hosts
- Deutsches Elekronen-Synchrotron, 273 hosts
- Archive.org, 200+ hosts
- Electricité de France (EDF), 1,500 hosts
- BUF, digital visual effects company, 1,000 hosts
- Zivit, 260 hosts on two IBM z10 EC mainframes
- ETH Zurich, systems group, ~300 hosts
- Grml, creating eight different ISOs, daily builds
FAI - Fully Automatic Installation

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