

Automatic System Installations And Change Management

with

FAI

Speaker

**Henning
Sprang**



**OpenSource
consultant,
developer,
author**

Interests

Systems management
Software development
QA and testing
Virtualization

FAI Team member

The background consists of a wall of decorative tiles. At the top and bottom are horizontal bands of dark tiles with a repeating gold-colored floral or vine pattern. The central area is filled with larger square tiles, each featuring a complex, interlocking gold-colored geometric pattern on a dark background. A semi-transparent white rectangular box is centered over the middle of the image, containing the text.

About system installations

Do You...

...use FAI already?

**Another auto-installer or
config management
tool?**

**wonder how to
rebuilt/restore
configurations?**

**manually tinkered
and tweaked over
long time**

Exactly, really

quick



Disk images

**Create templates from
“proper” installations**

**Copy when needed and adjust
them as needed**

Pros

low learning cost

Simple and fast implementation: cp/rsync/tar/dd

Cons

Inflexible - the smallest change requires rebuilding the image

Still manual work needed to get a installed system

Storage cost linear to number of different configurations

A kitchen sink area with a chrome faucet. On the wall, there is a white colander, a metal strainer, a grater, and a brush. On the counter, there are three wine glasses, a bottle of red liquid, and a small white container. The background is a tiled wall.

**Configuration
with shell scripts**

**Manual work
replaced by shell scripts**

Pros

Much lower storage cost

Higher flexibility

Tailor made

Cons

**Full-blown development project
(you'll realize after a while)**

**You solve every problem on your own, instead of
reusing work of others**



**Use available
Auto-Installer**

Anaconda / Kickstart: Fedora-based

Autoyast: SuSE-based

**Nlite/Unattend:
Windows in many flavours**

FAI:

Debian-based,

Fedora-based,

SuSE-based,

Windows experimental,

Solaris possible

Others:

Solaris Jumpstart

RedHat Cobbler/Koan

About FAI



Why FAI?

Shellscript-based

Simple, Flexible, easy to extend

**Community support by
seasoned "Installers"**

Diverse client- and server- distributions

Multiple installation types and system updates

**Can be used for real hardware
and virtualization systems**

One-Step-Install

bare metal

to

fully working system

Easily integrate other tools

CFEngine

Puppet

Custom scripts

History

**Started 1999 by Thomas Lange
at the University of cologne**

Base idea:

**structured and planned
installation**

**Plan your installation, and FAI
installs your plan**

Part of the Debian Distribution

**Today about 10 active
developers, small but nice
community**

**Since 2005 softupdates from
Henning Glawe included**

**Who
is using it
for what?**

**EDF uses FAI (with GOSA) for
some research clusters**

LiMux in Munich:

installs/updates 400(to be 14000)

clients/servers

Multiple top 500 High Performance Clusters

Small home networks starting from 2 systems

**GRML admin live CD
built with FAI**

Functionality



Overview

FAI classes

**A class
defines system properties
and actions to be taken**

**Class-assignment with
simple textfile,
database,
or scripts**

**Systems can be assigned to
multiple classes
combined at will**

Server-distribution:

Debian-based

Dependencies:

Perl, NFS, TFTP, debootstrap

So, easy to port!

Target-distributions:

Debian, Redhat, Ubuntu, Suse, Mandriva

**Different installation types
(networked, CD/USB, chroot)**

Integrated versioning with subversion, CVS, git

System updates

Installation types

Network installation with central install server

Client/Server architecture

Directly calling „dirinstall“ for chroots

(Can be easy integrated into xen-tools, ganeti, ...)

**With grml-live:
Live-CD generation!**

The installation/update process

Most important FAI "tasks" (steps of installation)

defclass:

**Class definition(assignment)
for the target system**

**partition:
guess what?! :)**

extrbase:

Unpack a minimal base image

debconf:
apply Debconf preseedings

instsoft:

Software package installation

Configure:
Run configuration scripts

**savelog:
Push logfiles on
the install Server**



Usage details

Considerations and Planning

Installation

**Decide the matching install type
(net/cd/dirinstall)**

Plan your installation

Use cases

Network and environment

Software-packages

Additional files and config adjustments

Access control, Identity Management, ...

Using mirrors of Internet software repositories

Updates

**How and when
should
which patches
be applied?**

Testing processes

how do I know the effect of a patch/update?

Mirrors of security update repositories?

**Automatic
(scheduled, timebased)
or
manually
started?**

Setup and configuration



Installation on Debian:

apt-get install fai-quickstart

**Adjust install server setup
in /etc/fai**

fai.conf:

LOGUSER=fai, LOGPROTO=ssh
(for Logging via ssh)

apt/sources.list:

use local mirror if available

make-fai-nfsroot.conf:

local mirror for debootstrap

FAl server is configured!

Now create NFSroot:

fai-setup / make-fai-nfsroot

For PXE-Boot:

fai-chboot

to set boot-kernel, -options

**Without PXE / Installation
from CD:**

fai-cd

Infrastructure services for network install



DNS entry for server and clients

DHCP config:

Host/IP/MAC as usual

some FAI-specific stuff:

```
option root-path "/srv/fai/nfsroot ..."  
server-name "faiserver"; # boot-server  
next-server 172.20.2.64; # tftp server: kernel  
filename "pxelinux.0";
```

System configurations



**Configurations for
installation
are stored in
FAI „configspace“**

Simple text files and scripts

**requirements from
installation plan
are reflected here**

**Example included in
/usr/share/doc/fai/examples/simple**

Default location: /srv/fai/config

Contents of configspace

class
disk_config
basefiles
debconf
package_config
scripts
files
hooks



Adjust configspace: class

class contains

class- and variable definitions/assignments

**Simplest way:
assign classes based on hostnames**

Some sample classes:

FAISERVER, GNOME, DEMO, XORG

Any script can be used to assign classes

E.G.:
check specific hardware,
MAC or IP,
disk size, . . .



Adjust configspace: basefiles

Minimal base images for non-Debian distributions and special uses

**Task "extrbase"
checks this directory for
matching images**

Images named by classes

**You could also
put an image here
and skip the rest :)**



Adjust configspace: disk_config

**detailed control over
partitions and mounting**

new tool includes lvm and raid setups

hard sizes or ranges

```
# example of new config file for setup-storage
#
# <type> <mountpoint> <size> <fs type> <mount options> <misc
options>
```

```
disk_config disk1 disklabel:msdos
```

```
primary / 250 ext3 rw,errors=remount-ro
logical swap 200-1000 swap rw
logical /var 600-1300 ext3 rw createopts="-m 5" \
    tuneopts="-c 0 -i 0"
logical /tmp 100-1G ext3 rw createopts="-m 0" \
    tuneopts="-c 0 -i 0"
logical /usr 1G-8G ext3 rw
logical /home 100-50% ext3 rw,nosuid createopts="-m 1" \
    tuneopts="-c 0 -i 0"
```

A young boy in a purple t-shirt and blue shorts sits on a wooden pier over water. He is looking down at something in his hands. The pier is made of wooden planks and has several fishing nets and blue buoys attached to it. The water is dark and rippled. In the background, there are more wooden structures and a larger pier.

**Adjust
configspace:
debconf**

Presets for package install scripts

Only for dpkg-based distributions

Works analog to Debian Installer



**Adjust configspace:
package_config**

Contents:

files named by class names

Purpose:

Define packages to be installed

**Supports many
installation methods:**

install (apt-get)

aptitude

taskinst (Debian tasks=Package collections)

urpmi (mandriva)

yumi (Fedora)

y2i (SuSE y2pms)

yast (SuSE yast -i)

Example package_config/DEMO from simple examples:

```
PACKAGES aptitude  
fortune-mod fortunes  
rstat-client #rstatd  
rusers rusersd
```

```
# only when also class XORG is defined  
PACKAGES aptitude XORG  
bb frozen-bubble xpenguins
```

Adjust Configspace:

scripts

#!/bin/bash

#!/bin/perl

#!/usr/bin/cfagent

**scripts to be executed
after package installation**

Usually shell-, Perl- and cfengine-scripts

Need for others?

just install Interpreter in the NFS-Root

Naming scheme:

<CLASSNAME>/<NUMBER>-<SCRIPTNAME>

Number defines order of execution

SCRIPTNAME arbitrary just for readability

scripts example:

```
.
| -- AMD64
| `-- 99-discover-bug
| -- DEMO
| | -- 10-misc
| | `-- 30-demo
| -- FAIBASE
| | -- 10-misc
| | -- 30-interface
| | `-- 40-misc
| -- FAISERVER
| | -- 10-conffiles
| | `-- 20-copy-mirror
| -- GRUB
| `-- 10-setup
`-- LAST
  `-- 50-misc
```

Adjust configspace: files



Structure of a filesystem, starting with /

classbased copy/unpack

For usage with `fcopy/ftar`

Copy single files explicitly, or recursive from /

ftar unpacks an archive

Target file=directory

actually copied source file=CLASSNAME

sample:

```
'-- etc
|-- X11
|  '-- xorg.conf
|  |-- ATI
|  '-- NVIDIA
|-- apache2
|  '-- conf.d
|  '-- debian-mirror.conf
|  '-- FAISERVER
'-- fai
   '-- fai.conf
   |-- FAISERVER
   '-- FAI_SOFTUPDATE_CLIENT
```



Adjust configspace: hooks

Naming scheme:

<TASKNAME>.<CLASSNAME>[.source]

Execution before the according task

Examples:

partition.XENU
instsoft.FAIBASE
savelog.LAST.source

Do the installation



**Depending on
chosen install type**

Boot via

PXE

Bootfloppy

install-CD

USB Stick

fai dirinstall <TARGETDIR>

into mounted blockdevice

**Call dirinstall from
xen-tools, Ganeti, . . .**

Run grml-live

Depending on number of packages it takes 3-30 minutes

**(automatic) Restart with
production configuration**

Functionality tests

Advanced stuff Outlook



**Support stuff for more
distributions: fai-distributions**

GOSA as LDAP and FAI GUI

Automatic Tests of the installed systems

**hooks/scripts could check
files and configurations**

Crucible Test Framework

No LDAP?

**Management-Tool/lightweight GUI
without GOSA**

better configspace layout

Comparison

A photograph showing two fish, likely salmon, lying in a metal tray. The fish are positioned horizontally, one above the other. The fish in the foreground has its mouth open, revealing its teeth and gills. The background is a metallic surface, possibly a sink or a tray, with some blood visible on the surface. The lighting is bright, highlighting the scales of the fish.

with Puppets

LIMITED VALIDITY

**I Only scratched Puppet's
surface yet!**

But I try to be unbiased

**I actually
like puppet
quite well**

The Points

**Puppet has data encryption
functionality!**

can distribute secrets!

**FAI has a simpler
file copying structure**

**Could be „emulated“ with some
code in puppet.**

Puppet: only "configuration"

**FAI: also partition and base
install**

FAI has multiple specific logs

Puppet logs into syslog

FAI: config files + scripts

Puppet: everything is a script
(most „config-filish“ - found some strange syntax skimming through)

**Puppet:
advanced client/server
config push**

**FAI: (scripted) ssh into
amanged host, additional tool**

**FAI is a bit more mature - no
youth problems**

**Puppet has some more
advanced distribution
abstractions**

**FAI is still lacking a nice Logo
and website :)**

BOTH:

cool tools

that you should use!



**Can work together
well and easy**

Conclusions

A photograph of a cityscape at sunset. The sky is filled with soft, pink and orange clouds. In the foreground, a dark roller coaster track is visible. To the left, a tall building with many lit windows stands against the darkening sky. The overall scene is a mix of urban architecture and recreational elements.

**FAI is
a powerful tool
for**

Automatic installation

System-Change-Management

**Structured
approach
required**

**Expect some learning
curve on the way**

The Big Reward:

**less worries
about...**

getting a config cloned

setting up new machines

restoring after a crash

changing configs on multiple systems

Further information:

<http://www.informatik.uni-koeln.de/fai/>

<http://faiwiki.informatik.uni-koeln.de/>

IRC-Channel #fai at OFTC-Network

linux-fai-users and linux-fai-devel mailing list

Commercial Support: multiple companies and freelancers

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to

learn more

or

implement

CALL ME! :)

Contact

henning@sprang.de

<http://www.sprang.de/>



**THANKS FOR
LISTENING!**

QUESTIONS?