Fully Automatic Installation in the Hirmu Cluster

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The Hirmu Cluster

- A small cluster for testing experimental cluster applications
- Currently a front end and 10 nodes with dual AMD Athlon XP processors
- 100 Mbit and gigabit ethernet
- Operating system Debian GNU/Linux, a few nodes running Red Hat Linux
- This presentation will concentrate on Fully Automatic Installation for Debian, the node installation system used in the cluster
Installation System Requirements

- Fast unattended reinstallation of any node when needed
- Remote management and reinstallations
- Possibility to divide nodes in several groups and install a different software configuration for each group
- Minimize manual work when adding new nodes or creating new configurations
FAI Characteristics

- Centralized installation server containing all configuration files in a single directory tree
- Class hierarchy: most configuration files shared between all installations and only specific parts separate as needed
- Based on scripts and plain text configuration files, Unix administration skills needed
- Does not make the configuration of one single computer any easier but helps duplicating it to others
Client Installation Process Overview

1. Boot and get an IP address and hostname from the server using BOOTP or DHCP
2. Mount a basic root file system from the server over the network using NFS
3. Run the first FAI script which defines which classes the client belongs to (based on the hostname)
4. Run the rest of the scripts (partition hard disks, install software, configure) using the class information
5. Reboot from the local hard disk

Reinstalling one node on Hirmu takes about 5 minutes.
Class Structure Example

All cluster nodes belong to the class NODE

Some nodes need a big local swap partition and belong to the class NODE_BIGSWAP

Disk partitioning done using the settings in file NODE_BIGSWAP (higher priority class) while most other tasks can be shared using the class NODE
Updating the Configuration

1. Make the changes (install software, modify configuration files) on one node
2. Copy the modifications to the FAI configuration tree
3. Test automatic installation with new configuration on another node
4. Invoke reinstallation of other nodes or push the configuration changes in them on the fly without reboot using cfengine (FAI is only for installations, it is not a cluster management tool)
Red Hat Installation Hack

FAI installation process is divided in tasks most of which are distribution independent. To be able to run Red Hat in some nodes we created a REDHAT class:

- Use FAI for booting, partitioning hard disks etc.
- Skip the software installation task and uncompress a pre-made Red Hat tar package instead
- Finish the installation using the common configuration tree

Note: This is just a way to have a mixed setup. If Red Hat is wanted for all nodes then some other installer is a better choice.
Debian FAI vs. Red Hat Kickstart

I have no personal experience with Kickstart but this is my impression after reading the documentation:

- Kickstart easier to get started with
- FAI more flexible
- Red Hat more widely used, Debian has some other advantages
- Cluster installation and administration a hot topic in general — new projects popping up frequently
More Information

- FAI homepage:
  http://www.informatik.uni-koeln.de/fai/

- Our cluster pages:
  http://wikihip.cern.ch/twiki/bin/view/Cluster/