Installation of an APT+kickstart server

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OVERVIEW

- The APT-Kickstart server is useful when you have a large number of computers to install.
- It install a node via kickstart using the PXE technology and manage a local APT repository for OS and middleware
- The services to configure are a DHCP server, a TFTP server and a HTTP server

COMPONENTS

The main server components required are:

- A DHCP server to provide network information about the nodes that will be installed;
- A TFTP server to provide the required files during the first phase of OS installation process;
- The pxelinux bootloader to select the installation type via PXE;
- Two files containing the initial kernel and ramdisk image;
- A kickstart file describing all the parameters needed to perform the OS installation;
- A web server containing the local repository of the operating system and all software needed.

Virtual Machine setup

- Run the GILDA_APT virtual machine on your PC
- Set ip address and hostname on your machine following this schema:
  - apt-kick151d.healthgrid.org --> 192.168.0.171
  - .....
  - .....
  - apt-kick161d.healthgrid.org --> 192.168.0.181
- reboot

INSTALLATION

- http://grid-it.cnaf.infn.it/apt/ig_sl3-i386/RPMS.utils/
- install the latest version of ig-installserver and ig-yam
- create these directories:
  - `cd /tftpboot/`
  - `mkdir slc306-i386`
  - `cd /var/rep`
  - `mkdir -p slc306-i386/localrpms/`
- download java and put it under slc306-i386/localrpms

SERVER CONFIGURATION

ig-installserver provides:

- **/etc/dhcpd.conf.example : ISC dhcpd 3.0 configuration example;**
- **/tftpboot/pxelinux.cfg/*.cfg : pxelinux configuration files;**
- **/usr/sbin/ig-bootselect : interactive tool to select the boot type;**
- **/var/www/cgi-bin/install_ack.cgi : CGI script to receive ack for end of installation;**
- **/var/www/cgi-bin/set_static_ip.cgi : CGI script to provide kickstart files with static IP configuration;**
- **/var/www/html/install/ks/*.ks : kickstart file examples.**
- **/var/www/html/install/ks/node-generic-slc304-static.ks : kickstart file example for node with one network interface;**

DHCP CONFIGURATION

/etc/dhcpd.conf example:

```
option domain-name "YOUR_DOMAIN";
option domain-name-servers YOUR_DNS_SERVERS;
not authoritative;
ddns-update-style none;
ignore unknown-clients;
allow bootp;
allow booting;
subnet YOUR_SUBNET netmask YOUR_NETMASK {
  filename "pxelinux.0";
  option routers YOUR_GATEWAY;
  option ntp-servers YOUR_NTP_SERVERS;
  host training150d {
    hardware ethernet 00:30:48:1A:00:00;
    fixed-address 192.168.0.150;
  }
}
```

```
/sbin/chkconfig dhcpd on
/sbin/service dhcpd restart
```

TFTP SERVER CONFIGURATION

The client, after the network configuration is provided by DHCP, needs to retrieve the bootable kernel and ramdisk Image. These files are uploaded using the TFTP protocol.

/etc/xinetd.d/tftp

Make sure that the directive "disable" is "no" and verify that the root directory of the tftp server is /tftpboot. This directory is very important since it contains the files transferred to the client during the PXE boot process. Once the tftp daemon is configured it can be accessed via xinetd with:

/sbin/chkconfig xinetd on
/sbin/service xinetd restart

OS LOADER

The bootloader used by the PXE installation is pxelinux.0; it is provided by the syslinux package:

syslinux-<version>.rpm

Copy the loader pxelinux.0 in /tftpboot:

```
cp /usr/lib/syslinux/pxelinux.0 /tftpboot/
chmod 644 /tftpboot/pxelinux.0
```

OS INSTALLATION

The kernel and the initrd have to be available via TFTP to start the installation via network. Create the directory for kernel and initrd and download them from the OS distribution mirror:

```
cd /tftpboot/slc306-i386 (created by ig-installserver)
wget http://linuxsoft.cern.ch/cern/slc306/i386/images/pxeboot/initrd.img
wget http://linuxsoft.cern.ch/cern/slc306/i386/images/pxeboot/vmlinuz
chmod 644 vmlinuz initrd.img
```

```
cd /var/www/html/rep/slc306-i386/base
wget -l1 -nd -c -r -R '*.html,*.gif' \
http://linuxsoft.cern.ch/cern/slc306/i386/SL/base/
```

```
cd /var/www/html/install
ln -s /var/www/html/rep/slc306-i386/ SL
```

This is required by the OS installer (Anaconda), it needs to find the base directory inside the SL

HTTP CONFIGURATION

It will be used to:

- distribuite OS and middleware packages via APT
- kickstart files
- provide the kickstart file adapted with the information about static IP address that has to be set on the currently installed machine
- receive the notification of the installation finished, necessary to automatically set the right pxelinux configuration file and avoid an OS reinstallation

/sbin/chkconfig httpd on

/sbin/service httpd restart

YAM

The package ig-yam provides a slightly customized version of YAM (http://dag.wieers.com/packages/yam). YAM is a tool which allows to maintain a local mirror of one or more apt rpm repositories.

YAM configuration is managed by /etc/yam.conf. It contains a "main" section, in which the path to the local archive, together with the web server root, and one or more "repository" sections for each mirrored object.

/etc/yam.conf (1/2)

```
[main]
srcdir      = /var/rep
wwwdir      = /var/www/html/rep
createrepo  = no
apt         = yes
yum         = no

[slc306]
name        = Scientific Linux CERN 3.0.6 (i386)
arch        = i386
os          = http://192.168.0.50/slc306-i386/RPMS.os/
updates     = http://192.168.0.50/slc306-i386/RPMS.updates/
extras      = http://192.168.0.50/slc306-i386/RPMS.extras/
```

/etc/yam.conf (2/2)

```
[glite_sl3]
name              = gLite middleware (i386)
arch              = i386
security          = http://192.168.0.50/glite_sl3-i386/RPMS.security/
3_0_0             = http://192.168.0.50/glite_sl3-i386/RPMS.3_0_0/
3_0_0_externals = http://192.168.0.50/glite_sl3-i386/RPMS.3_0_0_externals/
3_0_0_updates    = http://192.168.0.50/glite_sl3-i386/RPMS.3_0_0_updates/

[ig_sl3]
name              = INFN-GRID middleware (i386)
arch              = i386
utils             = http://192.168.0.50/ig_sl3-i386/RPMS.utils/
3_0_0             = http://192.168.0.50/ig_sl3-i386/RPMS.3_0_0/

[gilda_app]
name           = GILDA Applications Software (i386)
arch           = i386
3_0_0          = http://192.168.0.50/gilda_app-i386/RPMS.3_0_0/

# Copy here your additional packages
localrpms  = file:///var/rep/slc306-i386/localrpms/
```

YAM usage

You have to use three basic commands to synchronize the repository:

yam -uvv : to synchronize the os and updates modules;
yam -xvv : to synchronize modules different from os and updates (e.g. extras);
yam -gvv : to create the package lists (using the command "genbasedir" of the apt tool) and to create all the symbolic links in the webserver directory.
yam –guxvv: performs all the steps in one shot
yam –guxvv –d 'repository section-arch': performs all the steps for the given repository.

Ex. yam –guxvv –d 'gilda_app-i386'

KICKSTART FILE

The kickstart file contains all the information about the packages to be installed, the partitions to be prepared on the disks, the hardware settings, the network settings, etc..

An example is installed by ig-installserver under
/var/ww/html/install/ks/

You can set two possible network configurations:

- Dynamic: network -device eth0 -bootproto dhcp
- Static: network -device eth0 -bootproto static –ip \
<auto_retrieved_ip> -netmask <your_netmask> -gateway \
<your_gateway> -nameserver <your_dns1>,<your_dns2>

- In the %partition section the disks are prepared.
- The %package section contains information about the software to be installed.
- In the %post section some additional custom commands can be specified.

PXELINUX FILE

- pxelinux.0 will be executed and it will try to download a configuration file.
- An example of configuration file (/tftpboot/pxelinux.cfg/node-embrace-slc306.cfg):

```
default linux

label linux
kernel slc306-i386/vmlinuz
append \
ksdevice=eth0 ip=dhcp initrd=slc306-i386/initrd.img \
ks=http://<server>/install/ks/node-embrace-slc306.ks
```

CONFIGURATION CHECK LIST

- /etc/dhcpd.conf: configuration file of DHCP server;
- /etc/xinetd.d/tftp: configuration file of TFTP server;
- /tftpboot/pxelinux.0: PXE bootloader;
- /tftpboot/slc304-i386/vmlinuz: kernel loaded during OS installation;
- /tftpboot/slc304-i386/initrd.img: initial ramdisk loaded during OS installation;
- /tftpboot/pxelinux.cfg/node-generic-slc304-static.cfg: bootloader configuration files;
- /tftpboot/pxelinux.cfg/XXXXXXXX: symlinks to a bootloader configuration files (see final step);
- /var/www/html/install/ks/node-generic-slc304-static.ks: kickstart file;

NODE INSTALLATION (checklist)

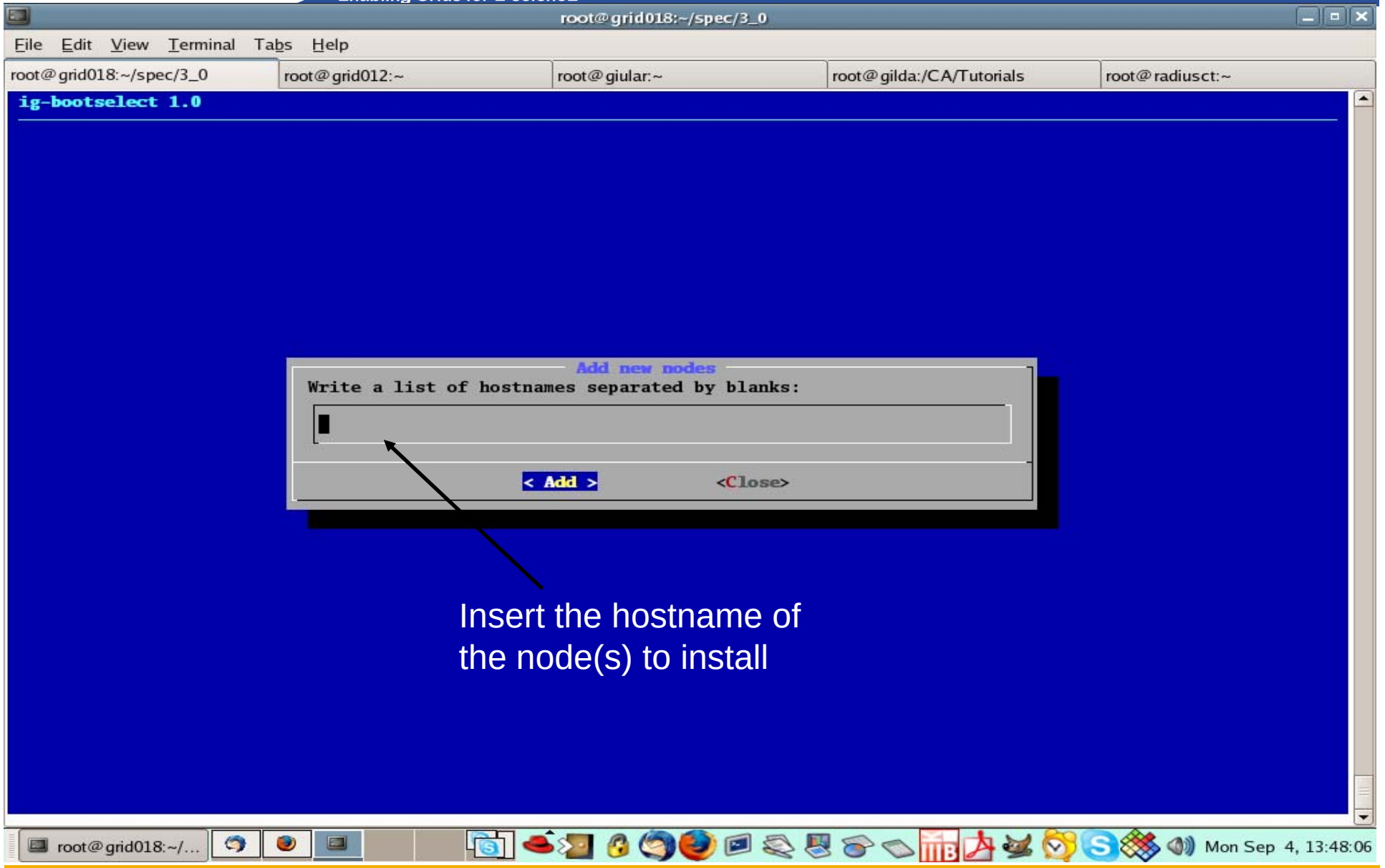
- Ensure in the BIOS that the boot sequence starts with the network card (PXE);
- Verify that it is correctly registered in the **DNS**;
- Verify that its **MAC address** is present in dhcpd.conf; if necessary restart the **DHCP** server to reload the new configuration (if you choose static network configuration this is needed only for installation);
- Check the customizations in **node-embrace-slc306-.cfg**: in this file you choose which kickstart file will be used
- Please note that if your rename or create a new copy of the kickstart file, the new name has to be written in a corresponding **.cfg pxelinux** configuration file.

NODE INSTALLATION

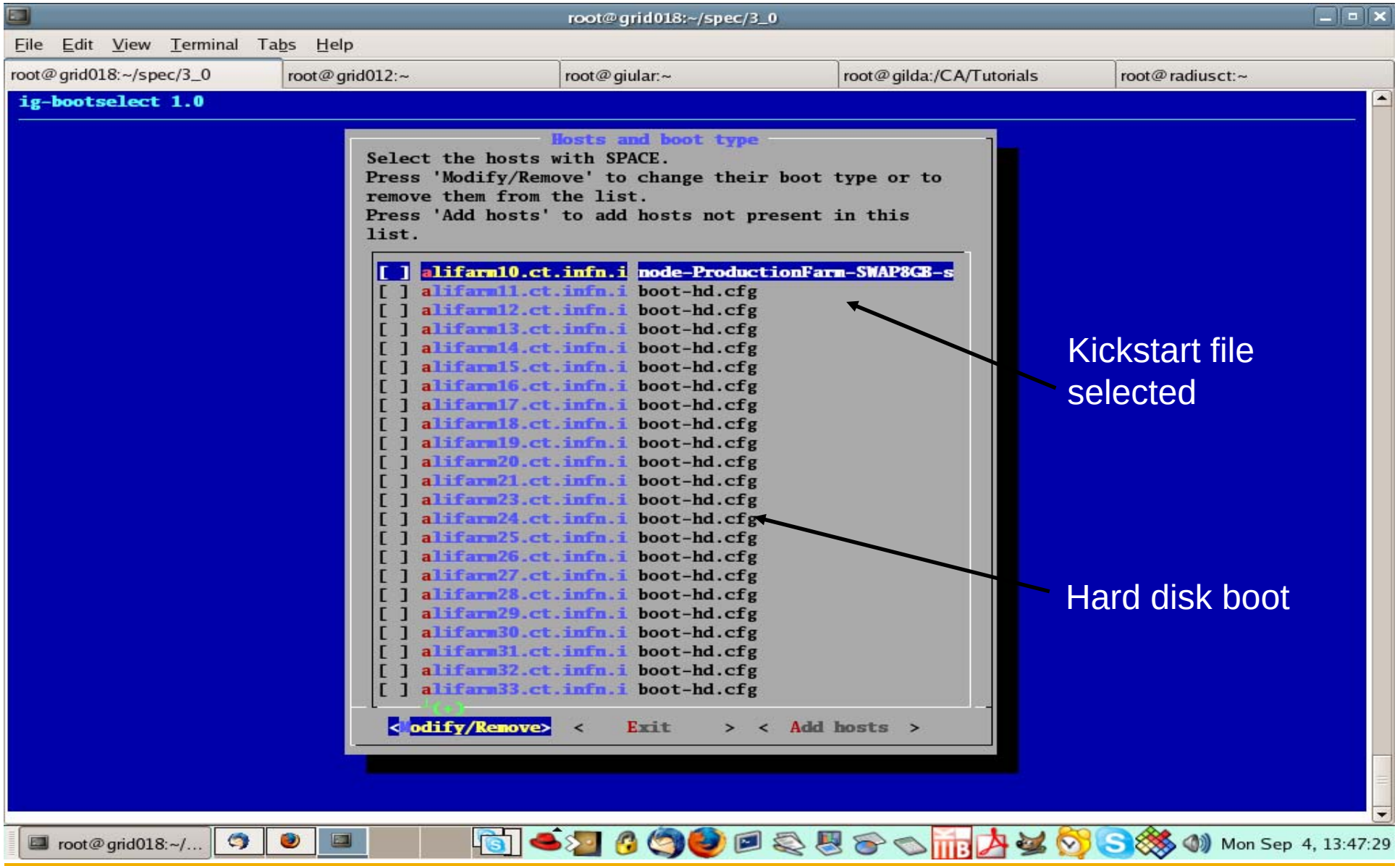
You have to run /usr/sbin/ig-bootselect:

- to provide one (or more) hostname to add. In case of errors check if your domain is present in /etc/resolv.conf;
- to change the pxelinux configuration to use.
- The symlink from the chosen configuration to the IP address in hex format will be created.

IG-BOOTSELECT



IG-BOOTSELECT



Node Installation

- Edit GILDA_node.vmx and put these lines:
  - `ethernet0.addressType = "static"`
  - `ethernet<number>.address = 00:50:56:1A:XX:FF`
- Start GILDA_node virtual machine
- Press F2 to enter the network adapter at the top of the boot order

USEFUL LINKS

- **APT+Kickstart server installation guide:**
  http://grid-it.cnaf.infn.it/fileadmin/sysadm/akserver/akserver.html
- **YAM home page:**
  http://dag.wieers.com/packages/yam
- **APT HOWTO:**
  http://www.debian.org/doc/manuals/apt-howto/index.en.html