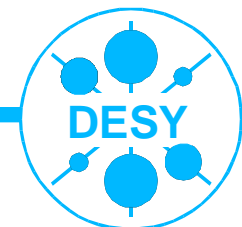# Automated Installation of Operating System and Control System

Gerhard Grygiel
doocs tutorial 26.06.2003
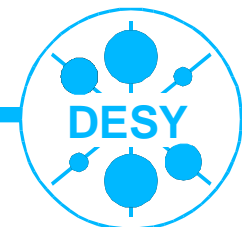
To give an overview what we have realized to make the installation of operating system and control system fully automatic.

DESY

Automated Installation of Operating System and Control System

Table of Contents

- Motivation

- Automated doocs installation

- Key elements

- Requirements

- Sequence of installation

- Upgrade, service and extention

- System exchange

# Automated Installation of Operating System and Control System

Motivation

- To be able to install hundreds or thousands of control system computers

- Automated installation guarantees identical installations on all computers

- Central repository of all configurations and logs

- Solve automatically software dependencies

- Decrease down times (quick re installation after breaks)

- Group computers in classes for easy management

- **It is terribly boring to do the same installation again and again**
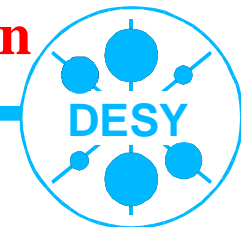
Automated doocs installation

- Initial installation of the operating and control system.

- Upgrade, service and extension

- In case of failure:
  System exchange without loss of configurations and data.

- **This is realized with Debian GNU/Linux operating system and the doocs control system**
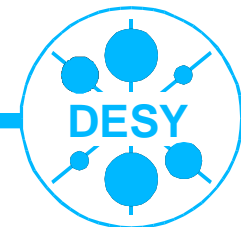
Key elements

- **The debian package manager and handling utilities:**
  To resolve package dependencies automatically during installation.
  To upgrade or downgrade the system at runtime.

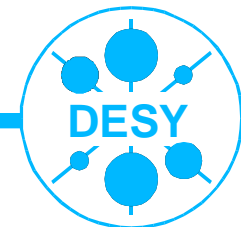- **Debian source package tools:**
  To build debian packages.
  To define library dependencies.
  Debian packages for all doocs programs are available.

- **Script to execute commands on a CLASS of computers:**
  This script allows to e.g. start a debian upgrade on all front end
  computers at the same time in parallel.

Automated DOOCS Installation

Requirements

- A install server with Debian GNU/Linux and the following packages
  - fai (fully automatic installation)
  - bootp or dhcp (bootp = internet boot protocol)
  - tftpd (trivial file transfer protocol)
  - nfs-server (network file system)
- A local debian mirror to decrease the installation time.
- All control system programs as debian packages.
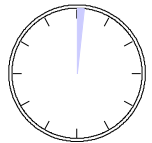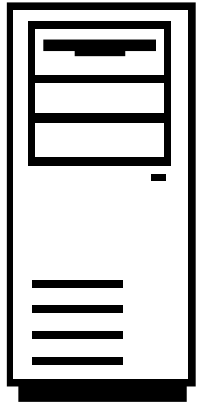- The client computers must be able to boot from the network.
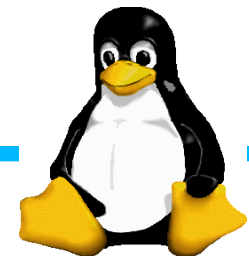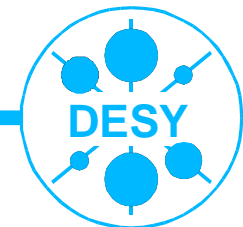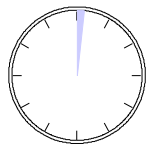
Automated Installation, the Principle

Sequence of Installation

Installation Server
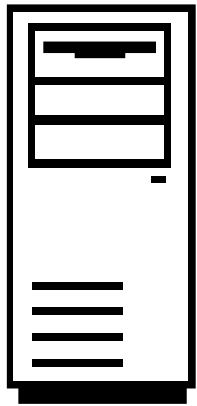
Configure: MAC, IP, Name

~1 minute for configuration

DESY

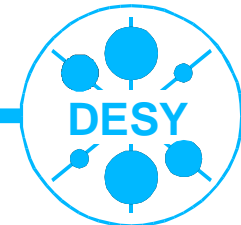# Automated Installation, the Principle

Sequence of Installation
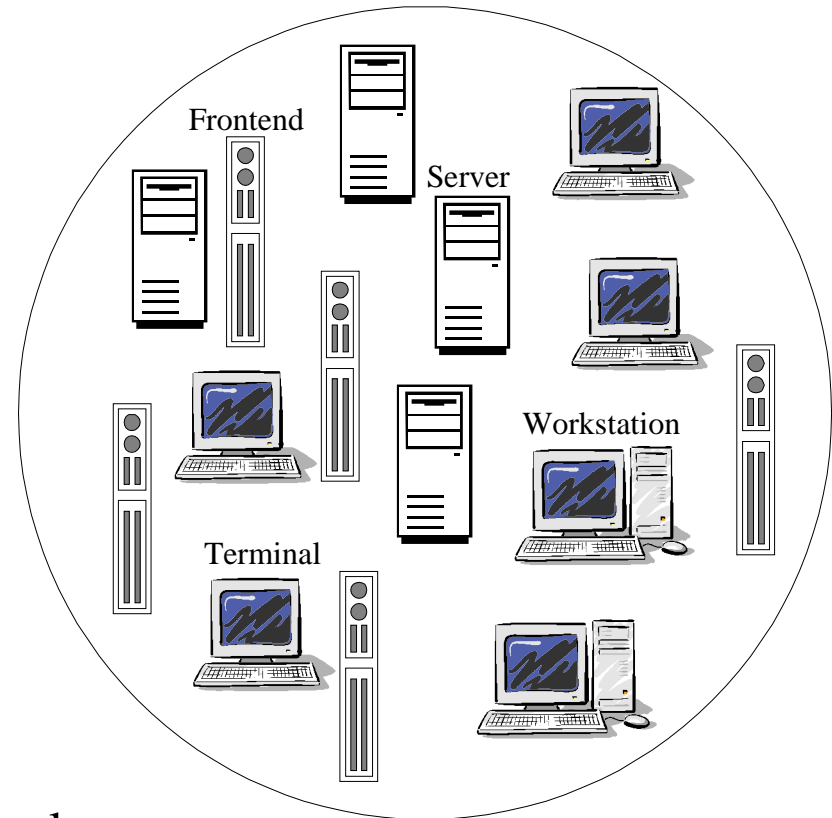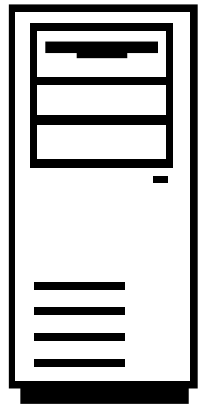
Installation Server

Configure: MAC, IP, Name, Class

Control System

Frontend

Server

Workstation

Terminal

~1 minute for defining the computer class

DESY

Automated Installation, the Principle
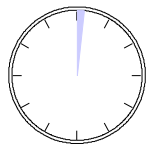
Sequence of Installation

Installation Server

Control System

Configure: MAC, IP, Name, Class

TFTP for booting, BOOTP or DHCP
for network configuration

Frontend

Server

Workstation

Terminal

< 1 minute for booting

DESY

Automated Installation, the Principle

Sequence of Installation

Installation Server
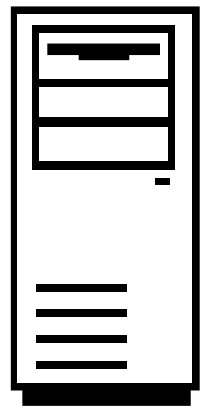
Control System

Configure: MAC, IP, Name, Class

TFTP for booting, BOOTP or DHCP
for network configuration

Frontend

Server

Get Filesystem over NFS

Workstation

Terminal

DESY

Automated Installation, the Principle

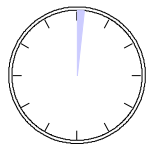## Sequence of Installation

Control System

Installation Server

Configure: MAC, IP, Name, Class

TFTP for booting, BOOTP or DHCP
for network configuration

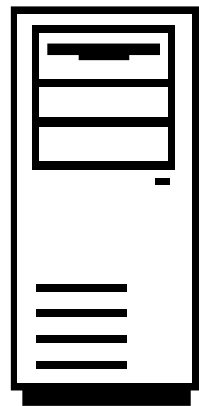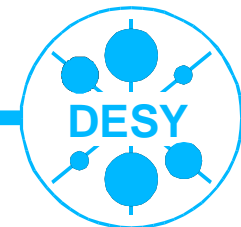Frontend

Server

Get Filesystem over NFS

Workstation

Configure and install packages

Terminal
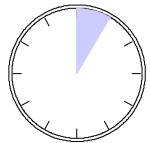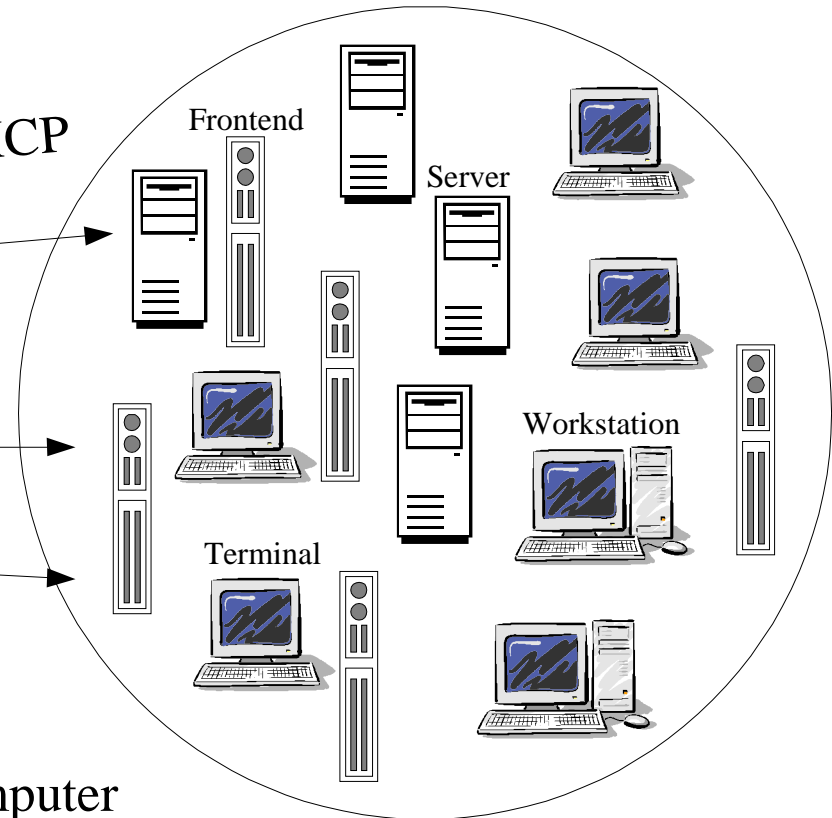
~5 minutes to install an frontend computer

DESY

Automated DOOCS Installation

Upgrade, Service and Extension

- For upgrading a debian system to the newest version of all intalled software packages, you just need two commands to execute.
  $ apt-get update; apt-get upgrade

- For upgrade, service and extention of our systems we have developed a script which executes the required commands on all computers.
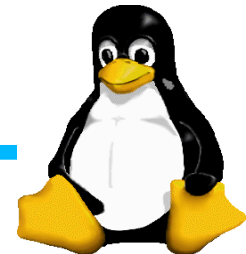 $ debian_update -B -TFILESERVER
  This script produces a detailed log which we can analyze later
  $ grep -i error /tmp/rcmd.20975
  $ grep -i offline /tmp/rcmd.20975

- For service and extensions we use the same technics

Automated DOOCS Installation

System Exchange

In case of a hardware failure enter a spare computer into the config table.

- Switch off the defect computer.

- Enter the spare computer into the config file of the bootp server.

- Start the normal installation procedure .

- At the end of the normal installation procedure the last doocs server configurations and archives are installed from the backup.(the loss on data is minimal)

- **After reboot the system looks like before**.