

LINUX Install Fest, July 2000



Installing LINUX[®] for S/390[®] - July 28, 2000

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Install Fest Edition (July 2000)

This edition applies to the LINUX for S/390 kernel 2.2 patch and to all subsequent releases and modifications until otherwise indicated in new editions.

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Contents

About this document	vii
How to obtain the most recent version	vii
Who should read this document?	vii
Assumptions	vii
Prerequisites	vii

Part 1. IPL actions 1

1 Initial file system IPL	3
IPL from tape in a native/LPAR environment	3
IPL from tape using a VM guest	3
IPL from the VM reader	3
To continue...	3

Part 2. LPAR, FTP and Ethernet installation scenario 5

2 Kernel initialization	7
3 Network setup	9
4 Starting YaST	11
5 Setting up the link to the FTP server and getting the packages	17
6 Installing the packages from the FTP server	19
7 Configuring the system	25
Setting the network definitions	25
8 Unmount the file system	31
9 Re-IPL from DASD	33
10 Setting the root password	35
To continue...	36

Part 3. VM, NFS and Token Ring installation scenario 37

11 Kernel initialization	39
12 Network setup	41
13 Starting YaST	43
14 Installing the packages from the NFS server	49
15 Configuring the system	55
Setting the network definitions	55
16 Unmount the file system	61
17 Re-IPL from DASD	63

18 Setting the root password	65
To continue...	66
<hr/>	
Part 4. Administration actions	67
19 Testing Apache	69
20 Adding users	71
<hr/>	
Part 5. Additional information	73
21 Hints, tips, and troubleshooting	75
What are the corresponding device names to my DASD devnos?	75
Some devices are not detected by LINUX for S/390	75
The hardware console "hangs"	75
No messages on system console during IPL	75
Emulating 'Ctrl' character combinations	75
ESCON - CTC Connection OS/390 and LINUX	76
22 Known problems for the SuSE preliminary version, and circumventions 81	
Problems with Windows and OS/2 FTP and NFS servers	81
No NFS server available?	82
FTP server refuses connections after a while.	84
Telnet session requirement	84
Using AIX as a workstation for the telnet sessions	84
DASDFMT on VM.	84
Language restriction	84
Problems with Networking Device selection - 1	84
Problems with Networking Device selection - 2	85
Installation requirements for VM/ESA LINUX for S/390 guests connected via virtual CTC	85
Function keys do not give expected results	86
Unresolved packages	86
Unmount file systems	86
Setting the LINUX root password	86
Setting the MTU size.	86
Enabling XPRAM	86
Filesystem check producing too much output.	87
How to solve install problems related to the network adapter on a MP3000.	87
23 Building a parameter line file.	89
Building a parameter line file on OS/390	89
Building a parameter line using VM/ESA	89
Building a parameter line file on VSE/ESA (CREAVSAM)	89
Contents of the parameter line file.	90
24 Preparing your root file system for first IPL	93
25 Tools	95
silo	95
Usage	95
Parameters	95
Additional keywords	96
dasdfmt	97

Part 6. Appendixes.	99
Where to find more information	101
Notices	103
GNU General Public Licence, Version 2, June 1991	104
Preamble	104
GNU General Public Licence: Terms and conditions for copying, distribution and modification	105
Trademarks.	109
Index	111

About this document

This document is provided for use in the LINUX Install Fest, starting July 15 2000. Instructions in this document work only with the SuSE 6.4 LINUX for S/390 distribution. Ensure that you have the correct version of this document corresponding to the distribution you are using.

If you have questions about any of the material covered in this document, contact the LINUX for S/390 team at: contact_linux390@de.ibm.com

How to obtain the most recent version

As needed, this document will be updated with new and changed information. The latest document will be made available on the Install Fest website, <http://www.s390.ibm.com/linux/installfest/>. Check the website regularly to ensure that you have the newest documentation.

Who should read this document?

This document is provided as a help for customers participating in the Install Fest of LINUX for S/390, July 15 - 30, 2000. This document can be used by system programmers, security administrators, and others involved in setting up the hardware and software in preparation for LINUX.

Assumptions

The following general assumptions are made about your background knowledge:

- You have an understanding of LINUX and S/390 terminology.
- You have an understanding of basic computer architecture, operating systems, and programs.

Prerequisites

It is essential that you have read the *Preparing for Installing LINUX for S/390* document contained in the Install Fest package. Before starting the Install Fest, you must have:

- performed the tasks necessary to set up your S/390 system
- obtained the information requested (including APARs and MCFs)
- created an IPL tape and verified that it contains the correct files.

Part 1. IPL actions

1 Initial file system IPL	3
IPL from tape in a native/LPAR environment	3
IPL from tape using a VM guest	3
IPL from the VM reader	3
To continue...	3

1 Initial file system IPL

IPL from tape in a native/LPAR environment

To IPL from tape in a native/LPAR environment:

1. If it is not already connected, attach your IPL tape unit to your S/390 hardware system.
2. Mount the tape cartridge to the tape unit that you intend to IPL from.
3. Get access to the service element, select the image you want to IPL and perform a **load** from the device number of your IPL tape unit.

Your hardware console may "hang" if it receives too many messages. Use the **Delete** button to enable further output.

Check the operating system messages of your system, which should appear on your system console. Check that LINUX for S/390 boots properly. You will be prompted for your network information.

IPL from tape using a VM guest

To IPL from tape using a VM guest:

1. If it is not already connected, attach your IPL tape unit to your S/390 hardware system.
2. Mount the tape cartridge to the tape unit that you intend to IPL from.
3. Perform the command:

```
#CP IPL <devno>
```

Where *devno* is the device number of your IPL tape unit.

Check the operating system messages of your system, which - under VM - appear on your system console. Check that LINUX for S/390 boots properly. You will be prompted for your network information.

IPL from the VM reader

Enter **LIN** to run the LIN EXEC executable. This will use the CMS pun command to put the kernel, the boot parameter, and the initial root file system (RAMdisk) into the reader and then boot the kernel.

To continue...

The messages and screens you will see during the IPL and installation process vary depending on the operating environment, console, network type, etc. that you are using. We provide examples of two of these scenarios:

- "Part 2. LPAR, FTP and Ethernet installation scenario" on page 5
- "Part 3. VM, NFS and Token Ring installation scenario" on page 37

Part 2. LPAR, FTP and Ethernet installation scenario

2 Kernel initialization	7
3 Network setup	9
4 Starting YaST	11
5 Setting up the link to the FTP server and getting the packages	17
6 Installing the packages from the FTP server	19
7 Configuring the system	25
Setting the network definitions	25
8 Unmount the file system	31
9 Re-IPL from DASD	33
10 Setting the root password	35
To continue...	36

2 Kernel initialization

When you IPL from tape the kernel is loaded into memory. At initialization time the kernel prints messages to the system console.

First a lot of devices are autosensed and you will see a lot of messages like these:

```
SenseID : device 2848 reports: CU Type/Mod = 3990/EC, Dev Type/Mod = 3390/0A
SenseID : device 2849 reports: CU Type/Mod = 3990/EC, Dev Type/Mod = 3390/0A
...
...
```

Then the parameter file is parsed:

```
...
parse_options: line: ramdisk_size=32768 dasd=28d0-28df root=/dev/ram0 ro init=/b
...
```

All devices specified by the kernel parameter dasd= are displayed:

```
xpraminfo:initializing:
xpraminfo: number of devices (partitions): 1
xpraminfo: size of partition 0 to be set automatically
xpraminfo: hardsector size: 4096B
xpraminfo: 2097152 kB expanded memory found.
xpraminfo: automatically determined partition size: 2097152 kB
channel: no Channel devices recognized
```

The xpraminfo messages show information about expanded storage used with the xpram device driver.

3 Network setup

You will be prompted to read the license agreement before entering information about your network.

When LINUX is IPLed, all LINUX commands are entered through the HMC or SE using the **Send** command button. All the replies in the following examples were entered in this way:

1. Select your type of network. For example, for ethernet, select **2**:

```
INIT: version 2.78 booting
Welcome to SuSE Linux S/390
First, select the type of your network device:
0) no network
1) for osa token ring
2) for osa ethernet
3) for channel to channel
4) for escon channel
Enter your choice (1-4):
2
```

2. Answer **y** (one character, lower case) to see the license:

```
To set up the network, you have to read and confirm the license information
of the network device driver provided by IBM.
Do you want to see the license (Yes/No) ?
y
```

```
-----
International License Agreement for Non-Warranted Programs
General Terms
...
...
```

3. Answer **y** to agree to the license:

```
Do you agree with this license (Yes/No) ?
y
```

4. You will be prompted for your network configuration. Have your network data ready when you get to this part of the installation. First enter the device number of the network connection device. If there is only one dedicated network card, you can enter auto. In this example, the device number is f900:

```
Ok, now we can set up the network configuration.
Please enter the device number of the network device,
e.g. fc20 - please refer to the corresponding AWSMAP in
the Emulated I/O Configuration!
If there is only ONE network device attached to your machine,
you may type auto for automatic detection.
Network device number:
f900
```

5. Then enter the relative port. In this example the relative port is 0:

```
Please type in the relative port on device number f900
Relative port:
0
```

6. Then the LCS (lan channel station) driver module for OSA-card enablement is loaded. Note the line starting with insmod, this line gives you the parmline, which you might need later. Answer **y** if everything looks all right:

```
I'll try to start the lcs module now...
insmod lcs noauto=1 devno_portno_pairs=0xf900,0 :
Using /lib/modules/2.2.16/net/lcs.o
Symbol version prefix 'smp_'
Starting lcs
lcs: eth0 configured as follows read subchannel=7c write subchannel=7d
hw_address=00:04:AC:DE:67:CC rel_adapter_no=0
```

```

lcs configured to use sw statistics,
ip checksumming of received packets is off.
autodetection is on.
configured to detect
cu_model 0x01,15 rel_adapter(s)
cu_model 0x08,15 rel_adapter(s)
cu_model 0x60,1 rel_adapter(s)
cu_model 0x1F,15 rel_adapter(s)
lsmod now shows all loaded modules:
lcs                15080  0 (unused)
Was the loading successful (Yes/No) ?
y

```

Next you will be prompted for the network data. Here is an example from one of our systems:

```

Please enter your full host name (e.g. s390.suse.com):
pserver4.boeblingen.de.ibm.com
Please enter your IP address:
9.164.137.36
Please enter the net mask:
255.255.248.0
Please enter the broadcast address:
9.164.143.255
Please enter the gateway address:
9.164.136.1
Please enter the IP address of the DNS server:
9.164.178.1
Please enter the DNS search domain (e.g. suse.com):
boeblingen.de.ibm.com

```

7. Next you will be asked to confirm the configuration. Take care to check the configuration as problems will arise later in the installation if the network configuration is not correct!

```

Configuration will be:
LCS parameter      :
Full host name     : pserver4.boeblingen.de.ibm.com
IP address         : 9.164.137.36
Net mask           : 255.255.248.0
Broadcast address  : 9.164.143.255
Gateway address   : 9.164.136.1
DNS IP address     : 9.164.178.1
DNS search domain  : boeblingen.de.ibm.com
Is this correct (Yes/No) ?
yes

```

After the network configuration is done, the process switches to the INIT process. This is where you need to telnet in.

```

INIT: Entering runlevel: 1
bash-2.04#

```

8. Optionally, to verify the network connection, do a ping to your gateway:

```

ping -c 3 9.164.136.1
PING 9.164.136.1 (9.164.136.1): 56 data bytes
64 bytes from 9.164.136.1: icmp_seq=1 ttl=64 time=0.893 ms
64 bytes from 9.164.136.1: icmp_seq=2 ttl=64 time=0.863 ms
--- 9.164.136.1 ping statistics ---
3 packets transmitted, 2 packets received, 33% packet loss
round-trip min/avg/max = 0.863/0.878/0.893 ms
bash-2.03#

```

Now you can telnet in and start the installation program YaST.

4 Starting YaST

Telnet session requirement

The telnet session must be at least 80 x 25 lines. An OS/2 telnet session, for example, opens by default with only 24 lines.

To navigate on the telnet screen, use the arrow keys to navigate in selection lists, and the tab key to select actions.

Note: The function keys do not always map correctly in YaST. For example, F6 might be interpreted as F5. Use the numerical and punctuation keys (1–0) instead, for example, instead of **F1** use **1**.

1. When you see the bash-2.04# message, telnet in to the LINUX system:

```
pserver4.boeblingen.de.ibm.com - PuTTY
Welcome to SuSE Linux 6.4 (S/390) - Kernel 2.2.16 (ttyp0).

pserver4 login: root

>>> >>> >>> >>> >>> >>> SuSE Linux S/390 <<< <<< <<< <<< <<< <<<

1. Enter 'insmod dasd probeonly', then 'rmmod dasd'

2. Choose the device numbers you want to use for SuSE Linux S/390

    ??? BE CAREFUL WHEN SELECTING DASD's - ???
    ??? YOU MAY DESTROY DATA ON SHARED DEVICES ???

3. Enter 'insmod dasd dasd=<list of devices>'

    Remember to separate devices by colons (<dev_no>,<dev_no>),
    syntax for ranges is <from_dev_no>-<to_dev_no>
    like
        'insmod dasd dasd=FD00-FD0F,FD40-FD46'

4. Start installation with 'YaST'.

5. When YaST has finished, minor modifications of config files may
    be done manually - see documentation for further information.

/root # insmod dasd dasd=28de,28df
Using /lib/modules/2.2.16/block/dasd.o
/root #
```

Note: Do not enter the commands given in step 1, they will not work. (It does not do any harm if you do try to use them.)

2. Enter an insmod command to tell LINUX what the DASDs are that you will be using:

```
/root # insmod dasd dasd=28de,28df
```

You will then see DASD initialization messages on the console:

```
dasd:initializing...
dasd:Registered successfully to major no 94
dasd(eckd):ECKD discipline initializing
dasd:Registered ECKD discipline successfully
dasd(fba):FBA discipline initializing
dasd:Registered FBA discipline successfully
dasd(eckd):28DE on sch 669: 3390/0A(CU:3990/04) Cyl:3339 Head:15 Sec:224
dasd(eckd):28DE on sch 669: 3390/0A (CU: 3990/04): Configuration data read
...
...
dasd:initialization completed
```

3. Enter **yast** to start the installation program.
4. On the language selection panel, use the arrow keys to choose your language, and press **Enter**

Note: For the Install Fest please select "English" as other languages have not been tested.

:



5. On the panel asking you how to access the installation medium, select **FTP site**:



6. On the panel asking for installation mode, select **Install Linux from scratch**:

```
+-----TYPE OF INSTALLATION-----+
|                                     |
| Please select the installation mode |
|                                     |
| Install Linux from scratch      x |
| Update existing Linux system      |
| Installation using Expert mode    |
| Abort - no installation            |
|                                     |
+-----+-----+
|                                     |
+-----+-----+
```

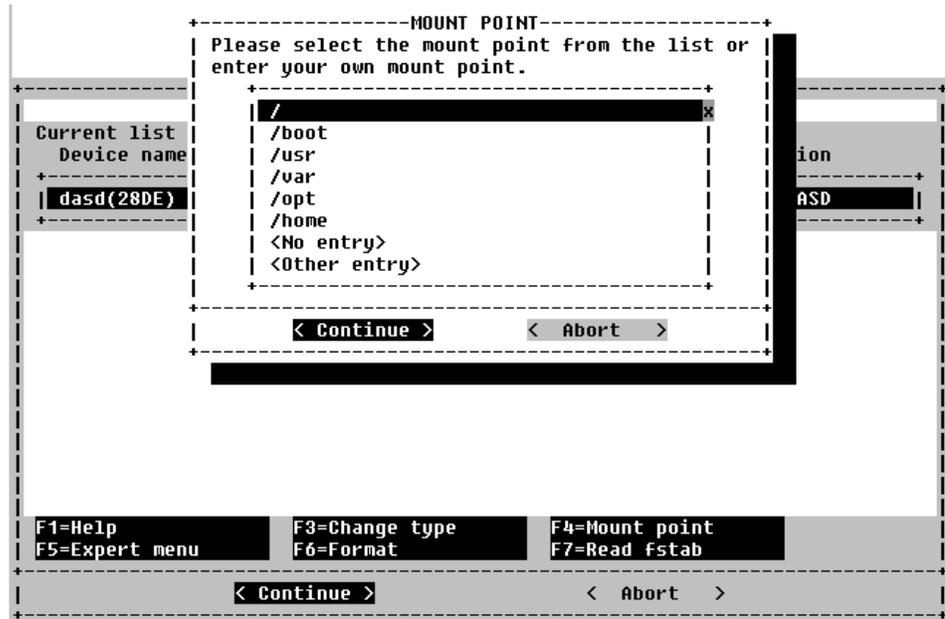
7. Select the DASD to use for the swap space. In the example some DASDs have already been formatted, yours might not have been formatted yet.

```
+-----SELECT SWAP PARTITION-----+
| The following devices were found on your system. |
| Please choose the one you want to use as swap. All |
| data on this device will be lost.                |
|                                                   |
| Device name  Blocks                             |
| +-----+-----+                               |
| dasd(28DE)  2404068                             |
| dasd(28DF)  2404068                             x |
| <no swap-partition>                             |
| +-----+-----+                               |
|                                                   |
| < Continue >                                     < Abort > |
|                                                   |
+-----+-----+
```

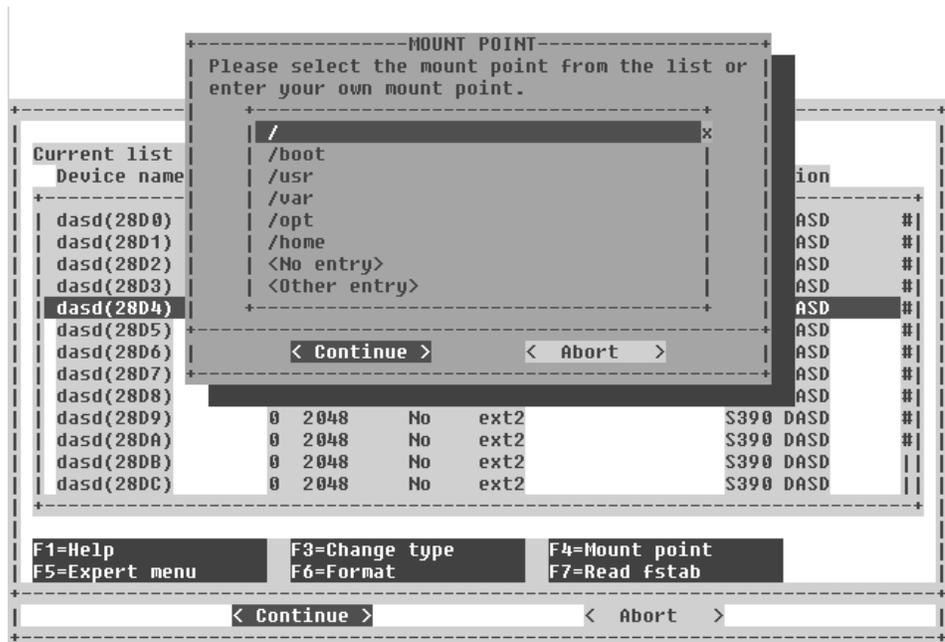
On the confirmation screen check the data and continue.

```
+-----CREATING FILESYSTEM-----+
| The following filesystems                    |
| /dev/dasdb1                                 |
| will now be created according to your       |
| selections. All data on the partitions will be |
| lost. The installation will exit if you do not |
| format now. Do you want to start creation of  |
| filesystems? █                               |
| +-----+-----+                               |
| < Yes >                                     < No > |
| +-----+-----+                               |
+-----+-----+
```

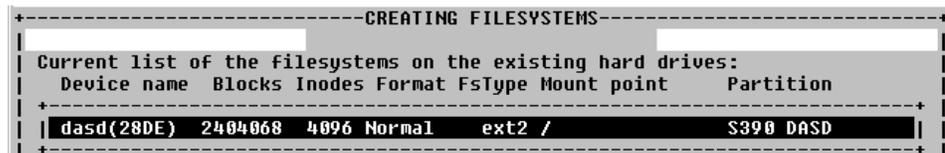
8. Create a file system. On the panel shown, select the DASD you want to use as a mountpoint, then press **F4**:



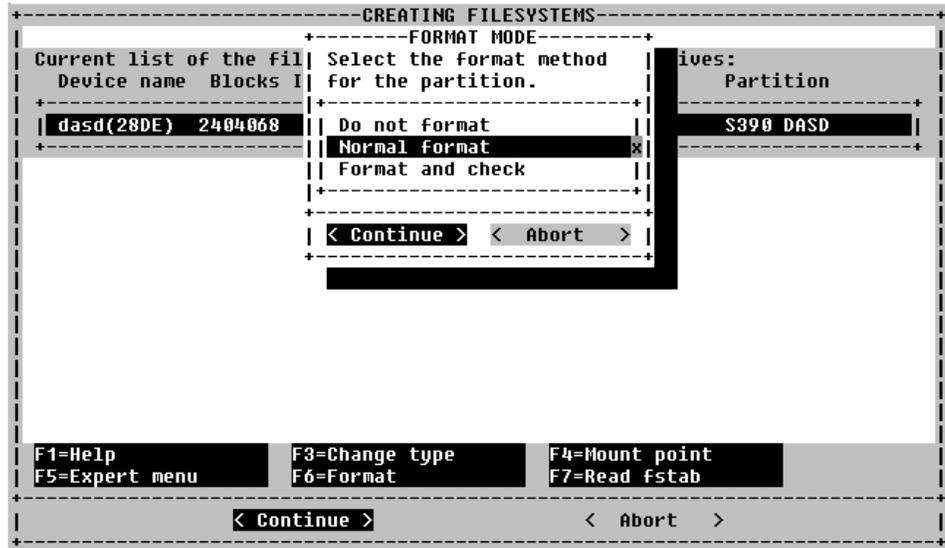
9. Select the root mountpoint from the list:



The result is shown in the list:



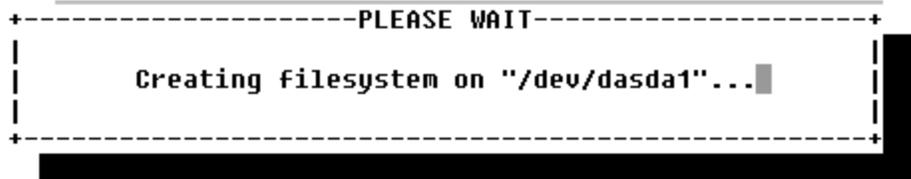
- Select the DASD you want to format by pressing **F6**, then select **Normal format** and **Continue**:



- Create the file system by pressing **F6**:



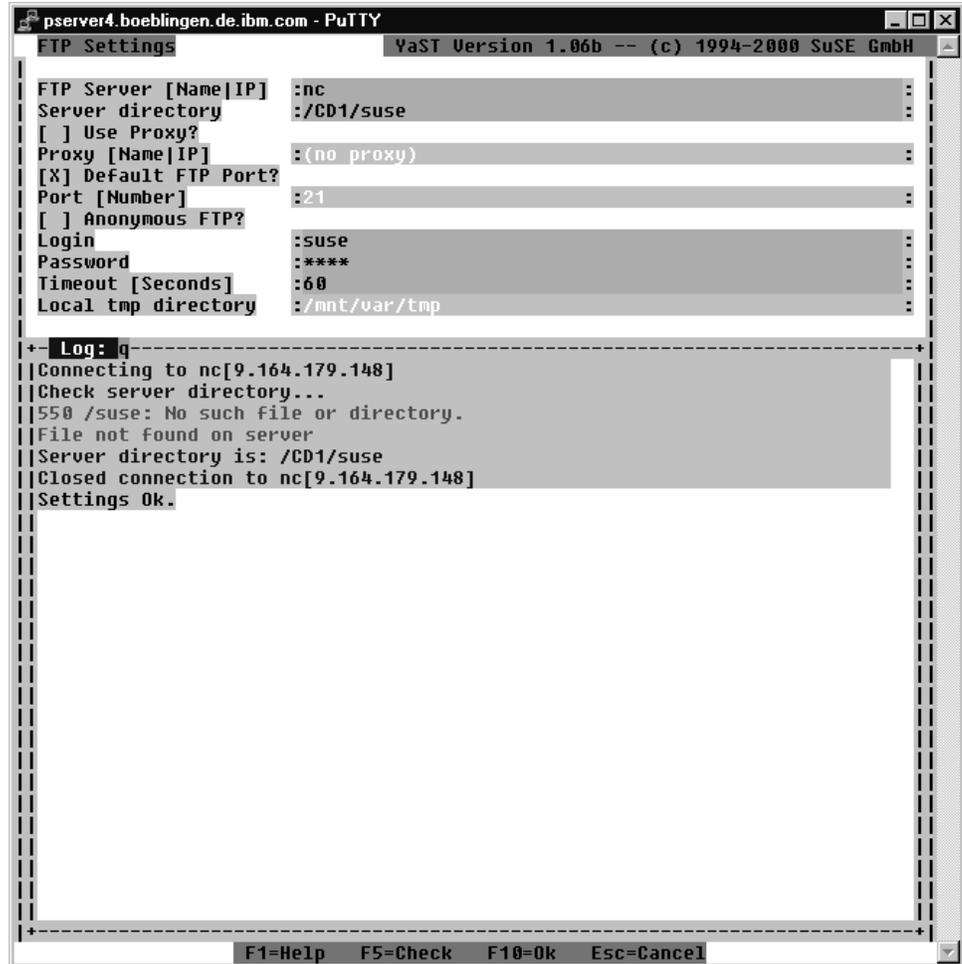
The file system is created:



The system can take quite a long time to create the file system. This is dependent on the size and type of disks you are using.

5 Setting up the link to the FTP server and getting the packages

1. Fill in the data for your FTP server and press **F5** to check the connection. Watch for the words **Settings OK** at the end of the messages:



```
pserver4.boeblingen.de.ibm.com - PuTTY
FTP Settings YaST Version 1.06b -- (c) 1994-2000 SuSE GmbH
FTP Server [Name|IP] :nc
Server directory :/CD1/suse
[ ] Use Proxy?
Proxy [Name|IP] :(no proxy)
[X] Default FTP Port?
Port [Number] :21
[ ] Anonymous FTP?
Login :suse
Password :****
Timeout [Seconds] :60
Local tmp directory :/mnt/var/tmp

+-- Log: q
|Connecting to nc[9.164.179.148]
|Check server directory...
|550 /suse: No such file or directory.
|File not found on server
|Server directory is: /CD1/suse
|Closed connection to nc[9.164.179.148]
|Settings Ok.

F1=Help F5=Check F10=Ok Esc=Cancel
```

- If the connection is OK, press **F10** to start loading files from the CD. You will see messages like these:

```
pserver4.boeblingen.de.ibm.com - PuTTY
FTP Settings  YaST Version 1.06b -- (c) 1994-2000 SuSE GmbH

FTP Server [Name|IP] :nc
Server directory    :/CD1/suse
[ ] Use Proxy?
Proxy [Name|IP]    :(no proxy)
[X] Default FTP Port?
Port [Number]      :21
[ ] Anonymous FTP?
Login              :suse
Password           :****
Timeout [Seconds]  :60
Local tmp directory:/mnt/var/tmp

+- Log: -----
|File not found on server
|Skip: /mnt/var/tmp/9.164.179.148/CD1/suse/images/alternate/*.inf
|check dir: /CD1/suse/setup
|250-Please read the file README
|250- it was last modified on Thu Sep  2 15:07:10 1999 - 299 days ago
|250 CWD command successful.
|200 Type set to A.
|227 Entering Passive Mode (9,164,179,148,229,115)
|150 Opening ASCII mode data connection for /bin/ls.
|226 Transfer complete.
|200 Type set to I.
|227 Entering Passive Mode (9,164,179,148,47,50)
|150 Opening BINARY mode data connection for /CD1/suse/setup/README (1816
|bytes).
|226 Transfer complete.
|227 Entering Passive Mode (9,164,179,148,114,229)
|150 Opening BINARY mode data connection for /CD1/suse/setup/LIESMICH (2103
|bytes).
|226 Transfer complete.
|221-You have transferred 728737 bytes in 21 files.
|221-Total traffic for this session was 769722 bytes in 25 transfers.
|221-Thank you for using the FTP service on nc.boeblingen.de.ibm.com.
|221 Goodbye.
|Closed connection to nc[9.164.179.148]
|Settings have been saved.

F1=Help  F5=Check  F10=Ok  Esc=Cancel
```

6 Installing the packages from the FTP server

1. On this screen, select **Load configuration**:



```
g5usr00.boeblingen.de.ibm.com - PuTTY
Installation YaST Version 1.06b -- (c) 1994-2000 SuSE GmbH
-----
+-- Logfile: /mnt/var/adm/inst-log/installation-20000703-0 -----+
|
|Reading description files...
|Base system: unknown
|Source media: SuSE-Linux-US-S390 6.4.0-0
|678 packages on installation medium...
|Analyzing dependencies of packages...
|Looking for already installed packages...
|0 packages are installed...
|Reading DU-files...
|
|New configuration: | Load configuration
| default (/var/adm | Save configuration
| language.english | Change/create configuration
| Added new configura | Check dependencies of packages
|                    | What if...
|                    | Start installation
|                    |
|                    | Index of all series and packages
|                    | Package information
|                    |
|                    | Install packages
|                    | Delete packages
|                    |
|                    | Main menu
|
+-----+
F1=Help TAB=Installation log window ESC=Main menu
```

2. On the Load Configuration screen, select **SuSE default system**:

```
-----Load configuration-----
+-----+
| [ ] SuSE Almost everything. ( 358 - 992.5 M) |
| [ ] SuSE Development system. (textmode and X libs/to ( 267 - 722.8 M) |
| [ ] SuSE SuSE DMZ base system ( 75 - 152.4 M) |
| [ ] * SuSE Minimum system. ( 66 - 117.3 M) |
| [ ] SuSE Network oriented system (many servers, Inte ( 270 - 578.7 M) |
| [ ] SuSE SuSE Office Server ( 144 - 312.2 M) |
| [X] * SuSE default system. ( 193 - 435.5 M) |
+-----+

+-----+
| < Add > < Replace > < Abort > |
+-----+
```

You can add additional packages at a later time (after completing the Install Fest installation).

3. Start the installation from the server by selecting **Start installation**:

```
pserver4.boeblingen.de.ibm.com - PuTTY
Installation [ *] YaST Version 1.06b -- (c) 1994-2000 SuSE GmbH
-----
+-----+
| Logfile: ----- |
+-----+

+-----+
| Load configuration |
| Save configuration |
| Change/create configuration |
| Check dependencies of packages |
| What if... |
| Start installation * |
| Index of all series and packages |
| Package information |
| Install packages |
| Delete packages |
| Main menu |
+-----+

+-----+
| F1=Help TAB=Installation log window ESC=Main menu |
+-----+
```

4. The installation program will check for interdependencies, and the following screen might come up:

```
9.164.155.54 - PuTTY
Installation YaST Version 1.06b -- (c) 1994-2000 SuSE GmbH
+-----Unsatisfied dependencies-----+
| Search for installed or ready to be installed packages whose dependencies
| are NOT given!...
+
| fetchmcf (n):
|   [AND]
|   pyinglib d
|
| -----
|
| Packages which will be selected by <AUTO>
|
|   pyinglib d
|
+-----+
| < Continue >      < AUTO >      < Abort >
+-----+
```

If it does, you can select **AUTO** to continue. If the packages cannot be selected by **AUTO**, the following screen might come up:

```
9.164.155.54 - PuTTY
Installation YaST Version 1.06b -- (c) 1994-2000 SuSE GmbH
+-----Unsatisfied dependencies-----+
| Search for installed or ready to be installed packages whose dependencies
| are NOT given!...
+
| pyinglib (d):
|   [EXCL]
|   *pyth_tk1 d
|
| pyth_tk1 (d):
|   [EXCL]
|   *pyinglib d
|
| -----
|
| There are no dependencies which could be resolved automatically.
|
+-----+
| < Continue >      < AUTO >      < Abort >
+-----+
```

This may be ignored. Use **Continue**.

- Preselected packages will be copied over. The status line at the top of the screen tells you how many packages remain to be copied:

```

pservers4.boeblingen.de.ibm.com - PuTTY
Installation [ * ] YaST Version 1.06b -- (c) 1994-2000 SuSE GmbH
-----
|Installing package 8: compress - 19.9 K - 161 packages remaining...
-----
+- Logfile:
|  Updating etc/group...unchanged
|  Updating etc/shadow...modified
|  Updating etc/gshadow...modified
|  Connecting to nc[9.164.179.148]
|  150 Opening BINARY mode data connection for /CD1/suse/a1/aaa_dir.rpm
| (20132 bytes).
|  Closed connection to nc[9.164.179.148]
|  aaa_dir #####
|  Connecting to nc[9.164.179.148]
|  150 Opening BINARY mode data connection for /CD1/suse/a1/aaa_skel.rpm
| (37905 bytes).
|  Closed connection to nc[9.164.179.148]
|  aaa_skel #####
|  Connecting to nc[9.164.179.148]
|  150 Opening BINARY mode data connection for /CD1/suse/a1/at.rpm (39236
| bytes).
|  Closed connection to nc[9.164.179.148]
|  at #####
|  Postinstall at...
|  Updating etc/rc.config...
|  Connecting to nc[9.164.179.148]
|  150 Opening BINARY mode data connection for /CD1/suse/a1/base.rpm (728232
| bytes).
|  Closed connection to nc[9.164.179.148]
|  base #####
|  Connecting to nc[9.164.179.148]
|  150 Opening BINARY mode data connection for /CD1/suse/a1/bash.rpm (870379
| bytes).
|  Closed connection to nc[9.164.179.148]
|  bash #####
|  Connecting to nc[9.164.179.148]
|  150 Opening BINARY mode data connection for /CD1/suse/a1/bash1.rpm (210142
| bytes).
|  Closed connection to nc[9.164.179.148]
|  bash1 #####
|  Connecting to nc[9.164.179.148]
-----
compress - Standard Un*x compression program

```

Note that if you encounter the FTP problem **Remote server has closed connection** and, for example, the message **Totally installed: 27 (3 needed for installation)**, then some of the packages have not been copied correctly. You must restart the installation process by selecting **Start installation**.

When you see the **installation complete** message tells you that the installation of the packages is now finished.

- Press the **ESC** key to get to the main menu, then select **Main menu**:

```

pservers4.boeblingen.de.ibm.com - PuTTY
Installation [ * ] YaST Version 1.06b -- (c) 1994-2000 SuSE GmbH
+-----+
| INSTALLATION COMPLETE. <TAB> brings you to the Installation log window. |
+-----+
+-- Logfile: -----+
| 150 Opening BINARY mode data connection for /CD1/suse/xdev1/qtdevel.rpm |
| (2815816 bytes). |
| Closed connection to nc[9.164.179.148] |
| qtdevel ##### |
| Connecting to nc[9.164.179.148] |
| 150 Opening BINARY mode data connection for /CD1/suse/xdev1/qtlib.rpm |
| (909876 bytes). |
| Closed connection to nc[9.164.179.148] |
| qtlib ##### |
| Connecting to nc[ |
| 150 Opening BINARY | Load configuration * | 3dpixm.rpm |
| (575701 bytes). | Save configuration | |
| Closed connection | Change/create configuration | |
| 3dpixm ## | Check dependencies of packages | ##### |
| Connecting to nc[ | What if... | |
| 150 Opening BINARY | Start installation | 3dpixms.rpm |
| (372522 bytes). | Index of all series and packages | |
| Closed connection | Package information | ##### |
| 3dpixms ## | | |
| Connecting to nc[ | Install packages | lxuser.rpm |
| 150 Opening BINARY | Delete packages | |
| (1687 bytes). | | |
| Closed connection | Main menu | ##### |
| lxuser ## | | |
| Connecting to nc[+ | | |
| 150 Opening BINARY | pixmaps.rpm |
| (511900 bytes). | |
| Closed connection to nc[9.164.179.148] |
| pixmaps ##### |
+-----+
| Totally installed: 169 |
+-----+
| Base system: SuSE-Linux-S390-pre 7.0.0-0 |
+-----+
| INSTALLATION COMPLETE. |
+-----+
+-----+
| F1=Help TAB=Installation log window ESC=Main menu |
+-----+

```

- Select the kernel to use. Select the **Default kernel for S/390**:

```

+-----+-----SELECT KERNEL-----+
| Please select the appropriate kernel to boot your system. |
| For additional information about the boot kernels use the help system |
| (F1). You may use F2 to change the destination path for the kernel. F3 |
| may be used to change the destination of the .config file. |
| Kernel destination: /boot |
| Destination of .config file: /usr/src/linux |
+-----+-----+
| | Default kernel for S/390 (with support for tape IPL) | * |
+-----+-----+
| < Continue > | < Abort > |
+-----+-----+

```

A message comes up confirming the installation of the kernel:

```

+-----+-----PLEASE WAIT-----+
| |
| | Installing the selected kernel |
| |
+-----+-----+

```

7 Configuring the system

In this section the following is described:

- Setting the timezone
 - Setting or changing the network definitions
 - Starting the INETD, portmapper, and other network services
1. Select the time zone:

```
-----TIME ZONE CONFIGURATION-----
Please select a timezone:
| GET | a |
| CST6CDT | # |
| Cuba | |
| EET | |
| EST | |
| EST5EDT | |
| Egypt | |
| Eire | |
| Factory | |
| GB | |
| GB-Eire | |
| GMT | |
| GMT+0 | |
| GMT-0 | |
| GMT0 | |
| Greenwich | |
| HST | |
| Hongkong | |
| Iceland | |
| Iran | |
| Israel | |
| Jamaica | |
| Japan | |
```

2. Normally, an S/390 machine is set in GMT plus or minus some hours to get the correct time:

```
-----ADJUSTMENT OF HARDWARE CLOCK-----
| Have you set the system time of your computer |
| to GMT (Greenwich Mean Time) or is it set to |
| local time? |
|
| < GMT > < Local time > |
```

Setting the network definitions

You have already set these parameters, but now is your chance to change them, for example, you might want to change the broadcast address. After you have set the parameters, LINUX will attempt to start several network services, including INETD and the portmapper.

Before you begin: Ensure that you have the network parameters handy. These include:

- Host name of the LINUX system
- IP address of the LINUX system
- The type of network you are using, Ethernet or Token Ring.

1. Enter the host name of the LINUX system:

```
+-----ENTER YOUR HOSTNAME-----+
| Here you can specify the name used to access your computer via the
| network. The name consists of the actual computer name and the
| domain name. A name component may contain letters, numbers and the
| '-' character. The domain name consists of a number of such parts,
| separated by a period.
|
|      Hostname :pserver4      :
|
|      Domain name :boeblingen.de.ibm.com :
|
+-----+
| < Continue >                < Abort > |
+-----+
```

2. Select **real network** on the screen asking about loopback or real network. Loopback means that only the local network (that is, only the machine itself) will be used. Since you need to telnet in from another machine, you need the real network.

```
+-----CONFIRMATION-----+
| If you want to use TCP/IP only in loopback
| mode (e.g. if you do not have a network card),
| your IP address will be 127.0.0.1 and we will
| skip most of the questions.
| Do you want to use TCP/IP in loopback mode
| only?
+-----+
| < Loopback only > < Real network > |
+-----+
```

3. Select **No** on the screen asking about DHCP. (Use No for setting up a server. If you are setting up many LINUX machines, and only have a limited number of IP addresses available, you may need to set up as DHCP):

```
+-----CONFIRMATION-----+
| You are capable of setting up the whole IP
| configuration via a DHCP server. If you want
| to enable this, just answer "Yes".
|
| Do you want to use the machine as DHCP client?
+-----+
| < Yes >                < No > |
+-----+
```

- Select the type of network you are using. You can choose between Ethernet (eth0) or Token Ring (tr0). You cannot use plip or arc0 on an S/390 system:

```

-----ENTER THE NETWORK ADDRESSES-----
| Please enter the data required for the configuration of your
| network. These are the IP address you want to give the machine
| currently being installed (e.g. 192.168.17.42) and the netmask of
| your network. The latter is 255.255.255.0 for most of the (smaller)
| networks, but you may wish to set it to a different value. If you
| need a gateway to access the NFS server, please enter the IP
| address of the gateway host.
|
|                                     +-----+
|                               Type of network: | eth0 | *
|                                     +-----+
| IP address of your machine: |          |
|                                     +-----+
| Netmask (usually 255.255.255.0): |          |
|                                     +-----+
| Default gateway address (if required): :9.164.136.1 :
| IP address of the Point-to-Point partner :          :
|
|-----+-----+
| < Continue > | < Abort > |
|-----+-----+

```

- Enter your network addresses, and select **Continue**:

```

-----ENTER THE NETWORK ADDRESSES-----
| Please enter the data required for the configuration of your
| network. These are the IP address you want to give the machine
| currently being installed (e.g. 192.168.17.42) and the netmask of
| your network. The latter is 255.255.255.0 for most of the (smaller)
| networks, but you may wish to set it to a different value. If you
| need a gateway to access the NFS server, please enter the IP
| address of the gateway host.
|
|                               Type of network: [eth0 ]
|
| IP address of your machine: :9.164.137.36 :
|
| Netmask (usually 255.255.255.0): :255.255.248.0 :
|
| Default gateway address (if required): :9.164.136.1 :
|
| IP address of the Point-to-Point partner :          :
|
|-----+-----+
| < Continue > | < Abort > |
|-----+-----+

```

- LINUX will now ask you whether to start some network services. Answer **Yes** to INETD:

```

-----START INETD?-----
| Starting inetd will enable "others" to connect
| to network services installed on your server
| (e.g telnet, finger, ftp). Inetd is also
| needed for printing, as well as formatting the
| man-pages in the SuSE help package.
| Do you wish inetd to be started at boot time?
|
|-----+-----+
| < Yes > | < No > |
|-----+-----+

```

7. Answer **Yes** to starting the Portmapper:

```
+-----START THE PORTMAPPER?-----+
| Should portmap be started at boot time?
| All services which use Remote Procedure Call
| (RPC) require this program to be running. The
| most common examples are if you plan to use
| your computer as an NFS server, or for NIS
| services ("yellow pages"), portmap has to be
| running on your system.
+-----+
| < Yes > < No >
+-----+
```

8. Optional. If you do not need the NFS server, select **No**:

```
+-----START NFS-SERVER?-----+
| If your computer will be used as an NFS
| server, a few extra programs will have to be
| started at boot time.
| Should your computer be started as an NFS
| server?
+-----+
| < Yes > < No >
+-----+
```

9. Enter the server address as the news address:

```
+-----ADJUST NEWS FROM-ADDRESS-----+
| Following text will be posted in the "from"
| line of your news system.
|
| :pserver4.boeblingen.de.ibm.com :
+-----+
| < Continue > < Abort >
+-----+
```

10. Answer **Yes** to the nameserver question:

```
+-----CONFIRMATION-----+
| Do you want to access a nameserver?
+-----+
| < Yes > < No >
+-----+
```

11. Enter the IP address of the nameserver:

```
-----NAMESEVER CONFIGURATION-----
| Please enter the IP address of your name server. You can add
| more domain name servers by modifying the file
| /etc/resolv.conf.
|
| IP-address list
| :9.164.178.1 :
|
| Domain list
| :boeblingen.de.ibm.com :
|
|-----
| < Continue > < Abort >
```

12. On the sendmail configuration screen, pick the **Host with permanent network connection (SMTP)** option:

```
-----SENDMAIL CONFIGURATION-----
| Sendmail needs an configuration file (/etc/sendmail.cf) .
| You will probably find one of the configurations below suits your
| needs.
| If you have special requirements that these do not cover, you may
| create you own. Please have a look at /usr/share/sendmail, one of
| the pre-existing configurations may well fit your requirements.
| ATTENTION: If you plan to install your own modified sendmail.cf
| you should select the last item in the list and install the file
| yourself. Otherwise, SuSEconfig will copy the selected file to
| sendmail.cf and your changes get lost.
|
|-----
| | Host with permanent network connection (SMTP). *
| | Single user machine without network connection
| | Host with temporarily network connection (Modem or ISDN).
| | Use UUCP to send mail
| | Expert mode for sendmail configuration
| | Do not install /etc/sendmail.cf
|
|-----
| < Continue > < Abort >
```

Select **Continue**.

13. SuSE start the Configuration tool. You will see messages like these:

```
-----OUTPUT of SuSEconfig-----
| Started the SuSE-Configuration Tool. #|
| Running in full featured mode. #|
| Reading /mnt/etc/rc.config and updating the system... #|
| Installing new /etc/HOSTNAME #|
| Installing new /etc/resolv.conf #|
| Installing new /etc/nntpserver #|
| Installing new /etc/inews_mail_gateway #|
| Installing new /var/lib/news/mailname #|
| Installing new /var/lib/news/whoami |||
| Installing new /etc/SuSEconfig/profile |||
| Installing new /etc/SuSEconfig/csh.cshrc |||
|
|-----
| < Continue >
```

8 Unmount the file system

Note: The installation over FTP does not unmount the file system. You need to do this yourself:

1. To check what is mounted, at the root prompt enter **mount**:

```
/root # mount
/dev/ram2 on / type minix (rw)
none on /proc type proc (rw)
/dev/dasda1 on /mnt type ext2 (rw)
/root #
```

2. If you see a response such as:

```
/dev/dasda1 on /mnt
```

you must perform an unmount command:

```
/root # umount /dev/dasda1
```


9 Re-IPL from DASD

Access the service element, and select the image you want to IPL and perform a **Load** from the device number of your DASD:

The screenshot displays the IBM service console interface. At the top, there is a 'Views' section with icons for Groups, Exceptions, Task List, and Console Actions. The main area is titled 'Load' and contains the following fields:

- CPC: P666S10C
- Image: L2
- Load Type: Normal Clear
- Store Status:
- Load Address: 28D2
- Load Parameter:
- Time-out value: 60 60 to 600 seconds

At the bottom of the dialog are 'Ok' and 'Cancel' buttons. On the right side of the console, there is a 'CPC Recovery' menu with the following options:

- Hardware Messages
- Operating System Messages
- Reset Normal
- PSW Restart
- Reset Clear
- Load
- Daily
- CPC Recovery
- CPC Operational Customization

Your hardware console may "hang" if it receives too many messages. Use the **Delete** button to enable further output.

10 Setting the root password

1. When you re-ipl from DASD, you will see a lot of messages on the console:

```
Linux NET4.0 for Linux 2.2
Based upon Swansea University Computer Society NET3.039
NET4: Unix domain sockets 1.0 for Linux NET4.0.
NET4: Linux TCP/IP 1.0 for NET4.0
IP Protocols: ICMP, UDP, TCP
TCP: Hash tables configured (ehash 524288 bhash 65536)
Starting kswapd v 1.5
pty: 256 Unix98 ptys configured
RAM disk driver initialized: 16 RAM disks of 32768K size
loop: registered device at major 7
md driver 0.36.6 MAX_MD_DEV=4, MAX_REAL=8
dasd:initializing...
```

2. A couple of screens of messages later, you will be asked to set the password for root.

```
done
```

```
-----
Welcome to SuSE Linux
-----
```

```
You should set a password for root first. If you don't want a
password for root, simply hit enter.
```

```
New password:
Re-enter new password:
Password changed
```

Note: The password is limited to eight (8) characters.

More messages follow, including some syntax errors that you can ignore.

```
Started the SuSE-Configuration Tool.
Running in full featured mode.
Reading /etc/rc.config and updating the system...
```

The processing of the index files can take up to 5 minutes on a G6 system - Note however, that this operation has to be performed only once. Finally you will see a message indicating that the installation program has finished setting up the system:

```
...
setting /etc/permissions.easy to root.root 644.
setting /etc/permissions.paranoid to root.root 644.
Finished.
```

3. Services are going to start, and you will be asked for the root password to log in:

```
-----
Now scripts have to be started. They will be started in one
minute. You can find a log file under /var/log/Config.bootup.
It will also be printed on console 9.
You can now already use your system. If you shut down the system
before the scripts are finished, they are executed again at the
next system startup.
```

```
Press to continue...
```

Have a lot of fun!

Your SuSE Team

```
INIT: Entering runlevel: 2
[80C[9D[1m2[mce Control: previous runlevel: N, switching to runlevel:
Setting up network device eth0
done
Setting up routing (using /etc/route.conf) done
Starting RPC portmap daemon done
Re-Starting syslog services
done
Starting NIS+ services: keyserv done
Initializing random number generator done
Starting service httpd
done
Starting service at daemon: done
Starting INET services (inetd) done
Starting CRON daemon done
Starting Name Service Cache Daemon done
[80C[9D[1mreached[mtrol: runlevel 2 has been
Give root password to login:
```

Installation is complete.

To continue...

When installation is complete, the next steps are to check that Apache is up and running and to add users. To do this, see

- “19 Testing Apache” on page 69
- “20 Adding users” on page 71

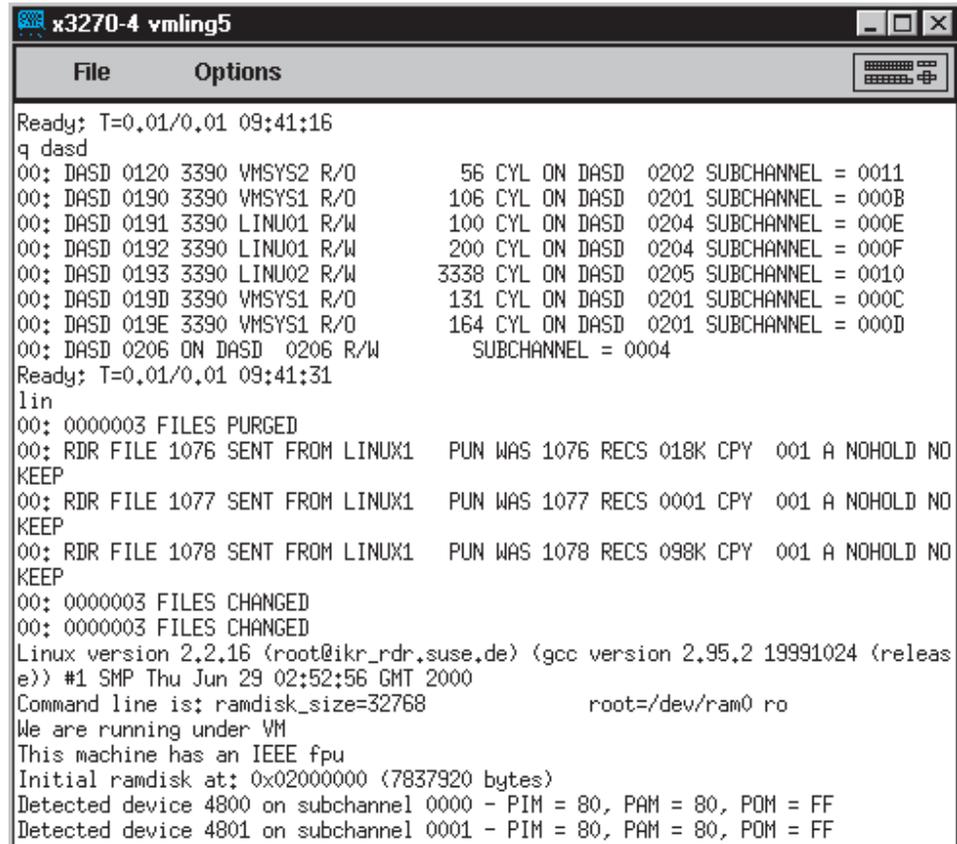
Part 3. VM, NFS and Token Ring installation scenario

11 Kernel initialization.	39
12 Network setup	41
13 Starting YaST	43
14 Installing the packages from the NFS server.	49
15 Configuring the system	55
Setting the network definitions	55
16 Unmount the file system	61
17 Re-IPL from DASD	63
18 Setting the root password	65
To continue...	66

11 Kernel initialization

When you IPL from the reader the kernel is loaded into memory. At initialization time the kernel prints messages to the system console.

1. Load the kernel into the reader and boot the kernel from the reader with the **lin** command:

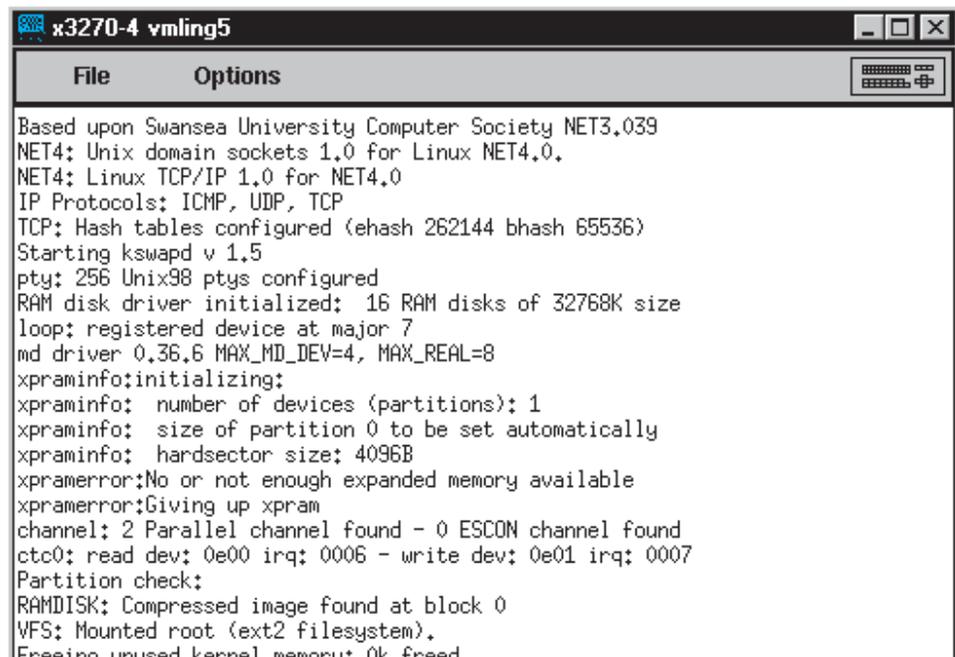


```
x3270-4 vmling5
File Options
Ready: T=0,01/0,01 09:41:16
q dasd
00: DASD 0120 3390 VMSYS2 R/O      56 CYL ON DASD 0202 SUBCHANNEL = 0011
00: DASD 0190 3390 VMSYS1 R/O      106 CYL ON DASD 0201 SUBCHANNEL = 000B
00: DASD 0191 3390 LINU01 R/W       100 CYL ON DASD 0204 SUBCHANNEL = 000E
00: DASD 0192 3390 LINU01 R/W       200 CYL ON DASD 0204 SUBCHANNEL = 000F
00: DASD 0193 3390 LINU02 R/W      3338 CYL ON DASD 0205 SUBCHANNEL = 0010
00: DASD 019D 3390 VMSYS1 R/O       131 CYL ON DASD 0201 SUBCHANNEL = 000C
00: DASD 019E 3390 VMSYS1 R/O       164 CYL ON DASD 0201 SUBCHANNEL = 000D
00: DASD 0206 ON DASD 0206 R/W      SUBCHANNEL = 0004
Ready: T=0,01/0,01 09:41:31
lin
00: 0000003 FILES PURGED
00: RDR FILE 1076 SENT FROM LINUX1  PUN WAS 1076 RECS 018K CPY 001 A NOHOLD NO
KEEP
00: RDR FILE 1077 SENT FROM LINUX1  PUN WAS 1077 RECS 0001 CPY 001 A NOHOLD NO
KEEP
00: RDR FILE 1078 SENT FROM LINUX1  PUN WAS 1078 RECS 098K CPY 001 A NOHOLD NO
KEEP
00: 0000003 FILES CHANGED
00: 0000003 FILES CHANGED
Linux version 2.2.16 (root@ikr_rdr.suse.de) (gcc version 2.95.2 19991024 (releas
e)) #1 SMP Thu Jun 29 02:52:56 GMT 2000
Command line is: ramdisk_size=32768          root=/dev/ram0 ro
We are running under VM
This machine has an IEEE fpu
Initial ramdisk at: 0x02000000 (7837920 bytes)
Detected device 4800 on subchannel 0000 - PIM = 80, PAM = 80, POM = FF
Detected device 4801 on subchannel 0001 - PIM = 80, PAM = 80, POM = FF
...
```

First a lot of devices are autosensed and you will see a lot of messages like these:

```
SenseID : device 4800 reports: Dev  Type/Mod = 3088/60
SenseID : device 4801 reports: Dev  Type/Mod = 3088/60
...
...
```

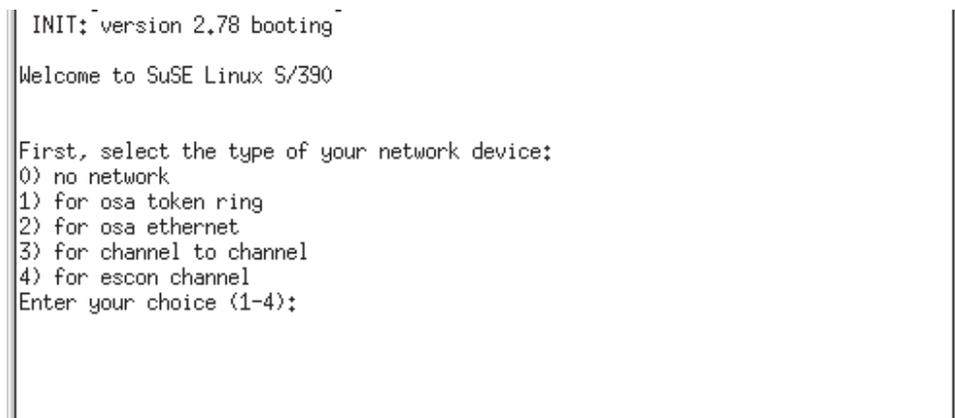
All devices specified by the kernel parameter `dasd=` are displayed:



```
x3270-4 vmling5
File Options
Based upon Swansea University Computer Society NET3.039
NET4: Unix domain sockets 1.0 for Linux NET4.0.
NET4: Linux TCP/IP 1.0 for NET4.0
IP Protocols: ICMP, UDP, TCP
TCP: Hash tables configured (ehash 262144 bhash 65536)
Starting kswapd v 1.5
pty: 256 Unix98 ptys configured
RAM disk driver initialized: 16 RAM disks of 32768K size
loop: registered device at major 7
md driver 0.36.6 MAX_MD_DEV=4, MAX_REAL=8
xpraminfo:initializing:
xpraminfo: number of devices (partitions): 1
xpraminfo: size of partition 0 to be set automatically
xpraminfo: hardsector size: 4096B
xpramerror:No or not enough expanded memory available
xpramerror:Giving up xpram
channel: 2 Parallel channel found - 0 ESCON channel found
ctc0: read dev: 0e00 irq: 0006 - write dev: 0e01 irq: 0007
Partition check:
RAMDISK: Compressed image found at block 0
VFS: Mounted root (ext2 filesystem).
Freeing unused kernel memory: 0k freed
```

The `xpraminfo` messages show information about expanded storage used with the XPRAM device driver. XPRAM may not work. See “21 Hints, tips, and troubleshooting” on page 75 for information on what to do.

Next the kernel boots, and you are prompted for network information:



```
INIT: `version 2.78 booting`
Welcome to SuSE Linux S/390

First, select the type of your network device:
0) no network
1) for osa token ring
2) for osa ethernet
3) for channel to channel
4) for escon channel
Enter your choice (1-4):
```

12 Network setup

1. You will be prompted for your network configuration. Have your network data ready when you get to this part of the installation.

First, select the type of your network device:

- 0) no network
- 1) for osa token ring
- 2) for osa ethernet
- 3) for channel to channel
- 4) for escon channel

Enter your choice (1-4):

For example, for OSA Token Ring you would enter **1**:

1

2. You will be prompted to read the license agreement before entering information about your network.

To set up the network, you have to read and confirm the license information of the network module provided by IBM.

Do you want to see the license (Yes/No) ?

Yes

International License Agreement for Non-Warranted Programs
General Terms

...

...

Do you agree with this license?

yes

3. You will be prompted for the device number of the network device. If there is only one card and it is dedicated to LINUX, you can enter auto:

Please enter the device number of the network device,
e.g. fc20 - please refer to the corresponding AWSMAP in
the Emulated I/O Configuration!

If there is only **_ONE_** network device attached to your machine,
you may type auto for automatic detection.

Network device number:

4800

4. Then enter the relative port:

Please type in the relative port on device number 4800

Relative port: **0**

5. Then the LCS (lan channel station) driver module for OSA-card enablement is loaded. Note the line starting with `insmod`, this line gives you the parmline, which you will need later. Answer **yes** if everything looks all right:

```
I'll try to start the lcs module now...
```

```
insmod lcs noauto=1 devno_portno pairs=0x4800,0 :
```

```
Using /lib/modules/2.2.16/net/lcs.o
```

```
Symbol version prefix 'smp_'
```

```
Starting lcs
```

```
lcs: tr0 configured as follows read subchannel=0 write subchannel=1
```

```
hw_address=00:04:AC:20:65:9E rel_adapter_no=0
```

```
lcs configured to use sw statistics,  
ip checksumming of received packets is off.  
autodetection is off.
```

```
configured to detect
```

```
cu_model 0x01,15 rel_adapter(s)
```

```
cu_model 0x08,15 rel_adapter(s)
```

```
cu_model 0x60,1 rel_adapter(s)
```

```
cu_model 0x1F,15 rel_adapter(s)
```

```
lsmmod now shows all loaded modules:
lcs                15080  0 (unused)
Was the loading successful (Yes/No) ?
yes
```

6. Next you will be prompted for the network data. Here is an example from one of our systems:

```
Please enter your full host name (e.g. s390.suse.com):
g5usr00.boeblingen.de.ibm.com
Please enter your IP address:
9.164.185.120
Please enter the net mask:
255.255.224.0
Please enter the broadcast address:
9.164.143.255
Please enter the gateway address:
9.164.181.1
Please enter the IP address of the DNS server:
9.164.178.1
Please enter the DNS search domain (e.g. suse.com):
boeblingen.de.ibm.com
```

7. Next you will be asked to confirm the configuration. Take care to check the configuration as problems will arise later in the installation if the network configuration is not correct!

```
Configuration will be:
LCS parameter      :
Full host name     : pserver4.boeblingen.de.ibm.com
IP address         : 9.164.137.36
Net mask           : 255.255.248.0
Broadcast address  : 9.164.143.255
Gateway address    : 9.164.136.1
DNS IP address     : 9.164.178.1
DNS search domain  : boeblingen.de.ibm.com
Is this correct (Yes/No) ?
yes
```

After the network configuration is done, the process switches to the INIT process.

```
Netsetup finished, running telnetd in the background:
INIT: Entering runlevel: 1
bash-2.04#
```

8. To verify the network connection, do a ping to your gateway:

```
ping -c 3 9.164.181.1
PING 9.164.181.1 (9.164.181.1): 56 data bytes
64 bytes from 9.164.181.1: icmp_seq=0 ttl=255 time=17.073 ms
64 bytes from 9.164.181.1: icmp_seq=2 ttl=255 time=5.712 ms
64 bytes from 9.164.181.1: icmp_seq=2 ttl=255 time=5.379 ms
--- 9.164.181.1 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max = 5.379/9.388/17.073 ms
bash-2.04#
```

Now you can telnet in and start the installation program YaST.

13 Starting YaST

Telnet session requirement

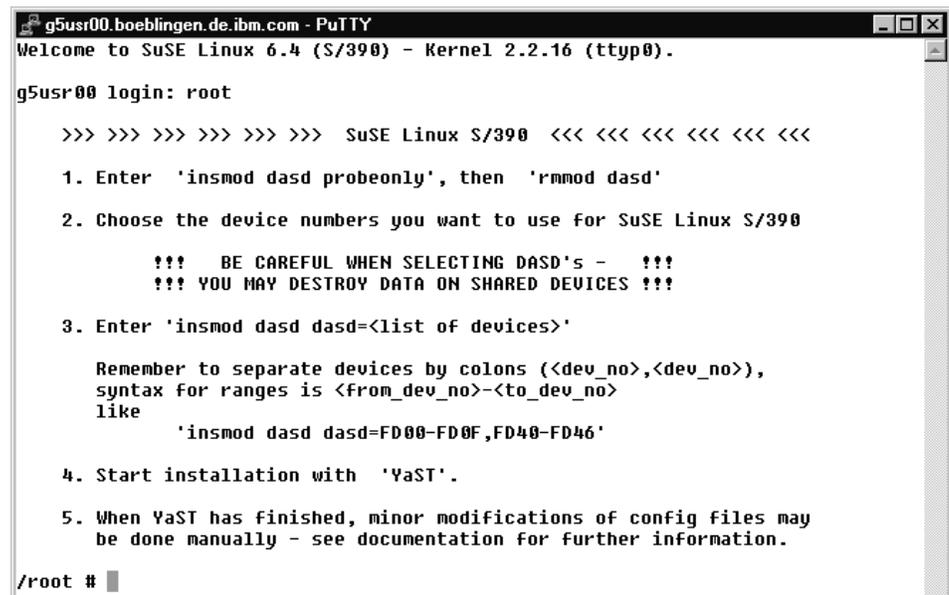
The telnet session must be at least 80 x 25 lines. An OS/2 telnet session, for example, opens by default with only 24 lines.

To navigate on the telnet screen, use the arrow keys to navigate in selection lists, and the tab key to select actions.

Note: The function keys do not always map correctly in YaST. For example, F6 might be interpreted as F5. Use the numerical and punctuation keys (1-0) instead, for example, instead of **F1** use **1**.

To navigate on the telnet screen, use the arrow keys to navigate in selection lists, and the tab key to select actions.

1. When you see the bash-2.04# message, telnet in to the LINUX system:



```
g5usr00.boeblingen.de.ibm.com - PuTTY
Welcome to SuSE Linux 6.4 (S/390) - Kernel 2.2.16 (tty0).

g5usr00 login: root

>>> >>> >>> >>> >>> >>> SuSE Linux S/390 <<< <<< <<< <<< <<< <<<

1. Enter 'insmod dasd probeonly', then 'rmmod dasd'

2. Choose the device numbers you want to use for SuSE Linux S/390

   !!! BE CAREFUL WHEN SELECTING DASD's - !!!
   !!! YOU MAY DESTROY DATA ON SHARED DEVICES !!!

3. Enter 'insmod dasd dasd=<list of devices>'

   Remember to separate devices by colons (<dev_no>,<dev_no>),
   syntax for ranges is <from_dev_no>-<to_dev_no>
   like
   'insmod dasd dasd=FD00-FD0F,FD40-FD46'

4. Start installation with 'YaST'.

5. When YaST has finished, minor modifications of config files may
   be done manually - see documentation for further information.

/root # █
```

Note: Do not enter the first command given, it will not work. (It does not do any harm if you do try to use them..)

2. Enter an insmod command to tell LINUX what the DASDs are that you will be using:

```
/root # insmod dasd dasd=192,206
```

You will then see DASD initialization messages on the console:

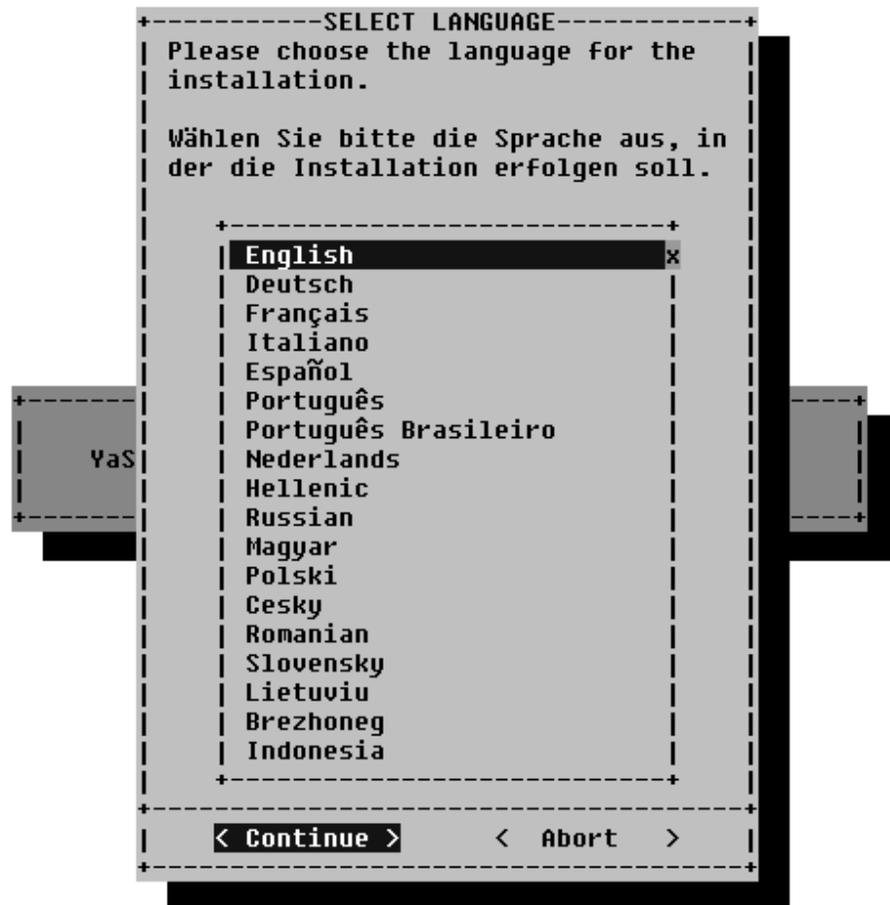
```
bash-2.04# dasd:initializing...
dasd:Registered successfully to major no 94
dasd(eckd):ECKD discipline initializing
dasd:Registered ECKD discipline successfully
dasd(fba):FBA discipline initializing
dasd:Registered FBA discipline successfully
dasd(eckd):0192 on sch 15: 3390/0A(CU:3990/04) Cyl:200 Head:15 Sec:224
dasd(eckd):0192 on sch 15: 3390/0A (CU: 3990/04): Configuration data read
dasd: devno 0x0192 on subchannel 15 (ECKD) is /dev/dasda (94:0)
dasd(eckd):0206 on sch 4: 3390/0A(CU:3990/04) Cyl:3339 Head:15 Sec:224
dasd(eckd):0206 on sch 4: 3390/0A (CU: 3990/04): Configuration data read
MORE... BOELING5
```

3. DASD format the disks. If you have not formatted the disks with LINUX before, you need to DASD format both dasda and dasdb:

```
dasdfmt -f /dev/dasda -b 4096
dasdfmt -f /dev/dasdb -b 4096
```

4. Enter **yast** to start the installation program.
5. On the language selection panel, use the arrow keys to choose your language, and press **Enter**:

Note: For the Install Fest please select "English" as other languages have not been tested.



6. On the panel asking you how to access the installation medium, select **NFS**:

```
-----SELECTION OF THE INSTALLATION MEDIUM-----
| Please choose the installation medium from the following
| list.
|-----+
| Installation from CD-ROM
| Installation via NFS x
| Installation from a reachable directory
| Installation from a hard drive partition
| Installation from an FTP site
|-----+
|
| < Continue >           < Abort >
|-----+-----
```

7. Enter the data of the NFS server:

```
-----ENTER THE DATA FOR THE NFS SERVER-----
| Please enter the information required to access the NFS server. You
| have to enter the IP address of the host the SuSE distribution is
| on. If you are already connected to this network, you can enter the
| hostname instead of the IP address. There must exist a directory
| containing a subdirectory with SuSE files for every floppy disk.
| The installation program needs the absolute pathname (starting with
| / ) of the directory on the NFS server which contains the
| subdirectories. If e.g. your A3-disk is in /suse/a3, you have to
| enter /suse.
|
| IP-address (or name) of the server :nc :
|
| SuSE directory on the server :/suse :
|
|-----+-----
| < Continue >           < Abort >
|-----+-----
```

In the example shown, the server is called nc, and the directory is /suse.

8. On the panel asking for installation mode, select **Install Linux from scratch**:

```
-----TYPE OF INSTALLATION-----
| Please select the installation mode
|-----+
| Install Linux from scratch x
| Update existing Linux system
| Installation using Expert mode
| Abort - no installation
|-----+-----
```

9. Select the DASD to use for the swap space.

Hint: It is a good idea to use the first DASD as the swap disk, because SuSE forces the swap disk to be called 'dasda'. It will be less confusing if your first disk is 'dasda' and the second one 'dasdb', and so on. In the example the

smaller DASD space is used for the swap disk:

```
+-----SELECT SWAP PARTITION-----+
| The following devices were found on your system.
| Please choose the one you want to use as swap. All
| data on this device will be lost.
|
| Device name  Blocks
|-----+-----+
| dasd(0192)  143988  x
| dasd(0206)  2404068
| <no swap-partition>
|-----+-----+
|
| < Continue >                < Abort >
|-----+-----+
```

On the confirmation screen check the data and continue.

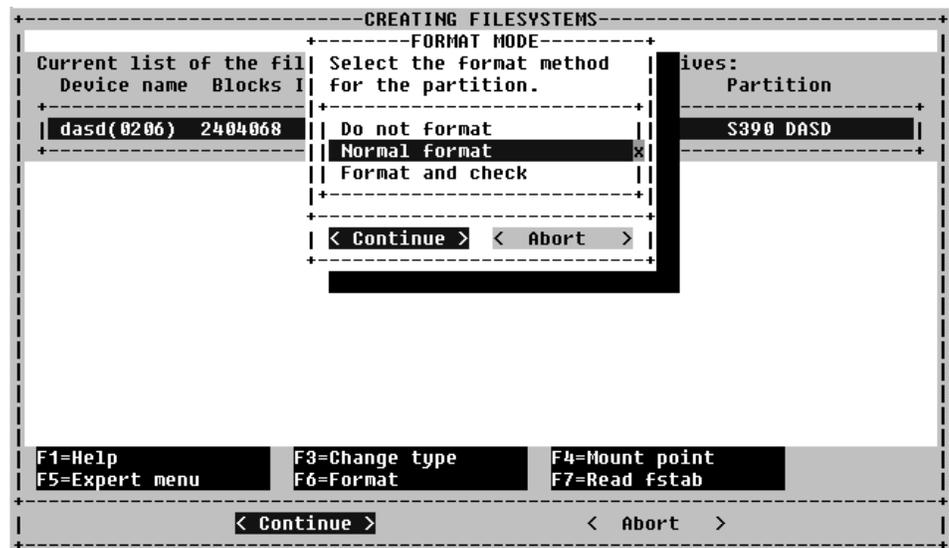
```
+-----CREATING FILESYSTEM-----+
| The following filesystems
|
| /dev/dasdb1
|
| will now be created according to your
| selections. All data on the partitions will be
| lost. The installation will exit if you do not
| format now. Do you want to start creation of
| filesystems?
|-----+-----+
|
| < Yes >                < No >
|-----+-----+
```

10. Create a file system. Select the DASD you want to use. In our example, this is the bigger DASD with the number 0206. Press F4 to define the mountpoint. On the panel shown, select the root mountpoint from the list (the first entry '/') and

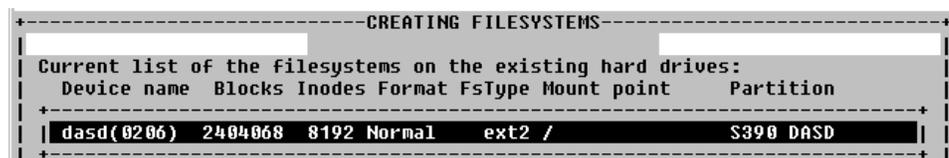
then select **Continue**:



11. Format the DASD by pressing **F6**, then select **Normal format** and **Continue**:



The DASD is marked as the root in the list:



12. Create the file system by pressing **F6**, and then selecting **Yes**:

```
-----CREATING FILESYSTEMS-----
Current list of the filesystems on the existing hard drives:
Device name  Blocks Inodes Format FsType Mount point  Partition
-----
dasd(0206)  2404068  8192 Normal  ext2 /          S390 DASD
-----
-----CREATING FILESYSTEM-----
The following filesystems
/dev/dasdb1
will now be created according to your
selections. All data on the partitions will be
lost. The installation will exit if you do not
format now. Do you want to start creation of
filesystems?
-----
          < Yes >          < No >
-----
F1=Help      F3=Change type  F4=Mount point
F5=Expert menu  F6=Format      F7=Read fstab
-----
          < Continue >          < Abort >
-----
```

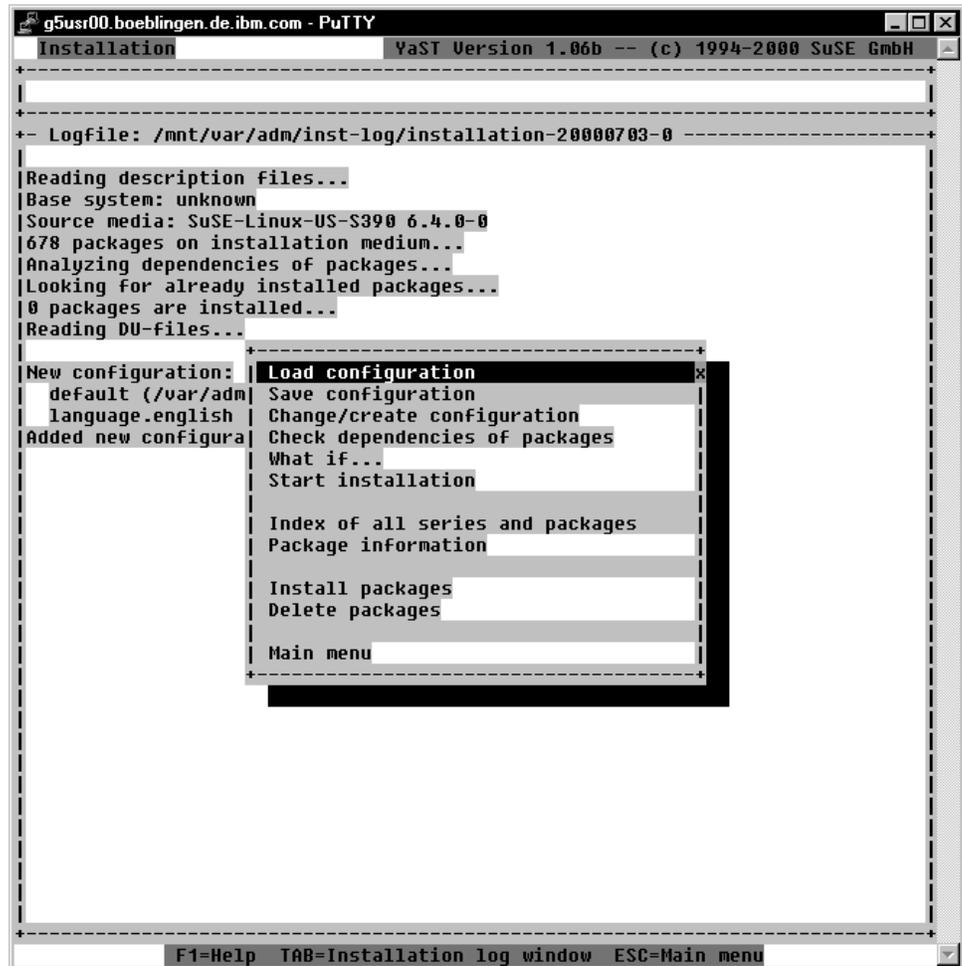
The file system is created:

```
-----PLEASE WAIT-----
          Creating filesystem on "/dev/dasdb1"...█
-----
```

The system can take quite a long time to create the file system. This is dependent on the size and type of disks you are using.

14 Installing the packages from the NFS server

1. On this screen, select **Load configuration**:



```
g5usr00.boeblingen.de.ibm.com - PuTTY
Installation YaST Version 1.06b -- (c) 1994-2000 SuSE GmbH
-----
+-- Logfile: /mnt/var/adm/inst-log/installation-20000703-0 -----
|
|Reading description files...
|Base system: unknown
|Source media: SuSE-Linux-US-S390 6.4.0-0
|678 packages on installation medium...
|Analyzing dependencies of packages...
|Looking for already installed packages...
|0 packages are installed...
|Reading DU-files...
|
|New configuration: | Load configuration
| default (/var/adm | Save configuration
| language.english | Change/create configuration
| Added new configura | Check dependencies of packages
|                    | What if...
|                    | Start installation
|                    |
|                    | Index of all series and packages
|                    | Package information
|                    |
|                    | Install packages
|                    | Delete packages
|                    |
|                    | Main menu
|
-----
F1=Help TAB=Installation log window ESC=Main menu
```


4. The installation program will check for interdependencies, and the following screen might come up:

```
9.164.155.54 - PuTTY
Installation YaST Version 1.06b -- (c) 1994-2000 SuSE GmbH
+-----Unsatisfied dependencies-----+
| Search for installed or ready to be installed packages whose dependencies
| are NOT given!...
+
| fetchmcf (n):
|   [AND]
|   pyinglib d
|
| -----
|
| Packages which will be selected by <AUTO>
|
|   pyinglib d
|
+-----+
| < Continue >      < AUTO >      < Abort >
+-----+
```

If it does, you can select **AUTO** to continue. If the packages cannot be selected by **AUTO**, the following screen might come up:

```
9.164.155.54 - PuTTY
Installation YaST Version 1.06b -- (c) 1994-2000 SuSE GmbH
+-----Unsatisfied dependencies-----+
| Search for installed or ready to be installed packages whose dependencies
| are NOT given!...
+
| pyinglib (d):
|   [EXCL]
|   *pyth_tk1 d
|
| pyth_tk1 (d):
|   [EXCL]
|   *pyinglib d
|
| -----
|
| There are no dependencies which could be resolved automatically.
|
+-----+
| < Continue >      < AUTO >      < Abort >
+-----+
```

This may be ignored. Use **Continue**.

5. Preselected packages will be copied over. The status line at the top of the screen tells you how many packages remain to be copied:

```

g5usr00.boeblingen.de.ibm.com - PuTTY
Installation YaST Version 1.06b -- (c) 1994-2000 SuSE GmbH
+-----+
|Installing package 27:      libz - 241.5 K - 167 packages remaining...|
+-----+
+- Logfile: /mnt/var/adm/inst-log/installation-20000703-0 -----+
|aaa_base#####|
|Postinstall aaa_base...|
|  Updating etc/rc.config...|
|  Updating etc/passwd...unchanged|
|  Updating etc/group...unchanged|
|  Updating etc/shadow...modified|
|  Updating etc/gshadow...modified|
|aaa_dir#####|
|aaa_skel#####|
|at#####|
|Postinstall at...|
|  Updating etc/rc.config...|
|base#####|
|bash#####|
|bash1#####|
|compress#####|
|cpio#####|
|cracklib#####|
|cron#####|
|deus#####|
|diff#####|
|eazy#####|
|elvis#####|
|ext2fs#####|
|file#####|
|fileutil#####|
|find#####|
|gawk#####|
|gdbm#####|
|gppshare#####|
|groff#####|
|Postinstall groff...|
|  Updating etc/rc.config...|
|gzip#####|
|lcs#####|
|less#####|
+-----+
libz - Data Compression Library

```

The **installation complete** message tells you that the installation of the packages is now finished:

```

|Totally installed: 194|
|Base system: SuSE-Linux-US-S390 6.4.0-0|
|INSTALLATION COMPLETE.|
+-----+

```

6. Press the ESC key to get the main menu, then select **Main menu**:

```

| hardsuse      #####
| ipchains      ##+-----+#####
| john          ##| Load configuration      #####
| scanlogd     ##| Save configuration          #####
| Postinstall  scanl| Change/create configuration
| Updating etc/rc| Check dependencies of packages
| snmtpd       ##| What if...                      #####
| tripwire     ##| Start installation              #####
| jade_dsl     ##|
| sgmtool      ##| Index of all series and packages  #####
| sp           ##| Package information              #####
| sp_libs      ##|
| tc1          ##| Install packages                 #####
| tix          ##| Delete packages                  #####
| tk           ##|
| blt          ##| Main menu                        #####
| itcl         ##+-----+#####
| pyth_tk      #####
| xaw3d        #####
| xpm          #####
| xshared      #####

|
| Totally installed: 194
|
| Base system: SuSE-Linux-US-S390 6.4.0-0
|
| INSTALLATION COMPLETE.
|
+-----+

```

7. Select the kernel to use. Select the **Default kernel for S/390**:

```

+-----SELECT KERNEL-----+
| Please select the appropriate kernel to boot your system.
| For additional information about the boot kernels use the help system
| (F1). You may use F2 to change the destination path for the kernel. F3
| may be used to change the destination of the .config file.
| Kernel destination: /boot
| Destination of .config file: /usr/src/linux
|
| Default kernel for S/390 (with support for tape IPL)
| k_um_rdr.rpm
|
+-----+
| < Continue > | < Abort > |
+-----+

```

A message comes up confirming the installation of the kernel:

```

+-----PLEASE WAIT-----+
|
| Installing the selected kernel
|
+-----+

```


1. Enter the host name of the LINUX system:

```
+-----ENTER YOUR HOSTNAME-----+
| Here you can specify the name used to access your computer via the
| network. The name consists of the actual computer name and the
| domain name. A name component may contain letters, numbers and the
| '-' character. The domain name consists of a number of such parts,
| separated by a period.
|
| Hostname :q5usr00 :
|
| Domain name :boeblingen.de.ibm.com :
|
+-----+
| < Continue > < Abort > |
+-----+
```

2. Select **real network** on the screen asking about loopback or real network. Loopback means that only the local network (that is, only the machine itself) will be used. Since you need to telnet in from another machine, you need the real network

```
+-----CONFIRMATION-----+
| If you want to use TCP/IP only in loopback
| mode (e.g. if you do not have a network card),
| your IP address will be 127.0.0.1 and we will
| skip most of the questions.
| Do you want to use TCP/IP in loopback mode
| only?
|
+-----+
| < Loopback only > < Real network > |
+-----+
```

3. Select **No** on the screen asking about DHCP. (Use No for setting up a server. If you are setting up many LINUX machines, and only have a limited number of IP addresses available, you may need to set up as DHCP).

```
+-----CONFIRMATION-----+
| You are capable of setting up the whole IP
| configuration via a DHCP server. If you want
| to enable this, just answer "Yes".
|
| Do you want to use the machine as DHCP client?
|
+-----+
| < Yes > < No > |
+-----+
```

4. Select the type of network you are using by pressing **PF3** to change the device, and then selecting from the list. You can choose between Ethernet (eth0) or Token Ring (tr0). You cannot use plip or arc0 on an S/390 system. In

this example we select **tr0** for Token Ring:

```
+-----ENTER THE NETWORK ADDRESSES-----+
| Please enter the data required for the configuration of your
| network. These are the IP address you want to give the machine
| currently being installed (e.g. 192.168.17.42) and the netmask of
| your network. The latter is 255.255.255.0 for most of the (smaller)
| networks, but you may wish to set it to a different value. If you
| need a gateway to access the NFS server, please enter the IP
| address of the gateway host.
|
|                                     +-----+
|                               Type of network: | eth0
|                                               | plip
| IP address of your machine: | tr0
|                                     | arc0
| Netmask (usually 255.255.255.0): +-----+
|                                     |
| Default gateway address (if required): :9.164.181.1 :
| IP address of the Point-to-Point partner : :
|
|                                     < Continue >
|                                     < Abort >
```

5. Enter your network addresses, and select **Continue**:

```
+-----ENTER THE NETWORK ADDRESSES-----+
| Please enter the data required for the configuration of your
| network. These are the IP address you want to give the machine
| currently being installed (e.g. 192.168.17.42) and the netmask of
| your network. The latter is 255.255.255.0 for most of the (smaller)
| networks, but you may wish to set it to a different value. If you
| need a gateway to access the NFS server, please enter the IP
| address of the gateway host.
|
|                               Type of network: [tr0 ]
| IP address of your machine: :9.164.185.120 :
| Netmask (usually 255.255.255.0): :255.255.224.0 :
| Default gateway address (if required): :9.164.181.1 :
| IP address of the Point-to-Point partner : :
|
|                               < Continue >
|                               < Abort >
```

6. LINUX will now ask you whether to start some network services. Answer **Yes** to INETD:

```
+-----START INETD?-----+
| Starting inetd will enable "others" to connect
| to network services installed on your server
| (e.g telnet, finger, ftp). Inetd is also
| needed for printing, as well as formatting the
| man-pages in the SuSE help package.
| Do you wish inetd to be started at boot time?
|
|                               < Yes >
|                               < No >
```

7. Answer **Yes** to starting the Portmapper:

```
+-----START THE PORTMAPPER?-----+
| Should portmap be started at boot time?
| All services which use Remote Procedure Call
| (RPC) require this program to be running. The
| most common examples are if you plan to use
| your computer as an NFS server, or for NIS
| services ("yellow pages"), portmap has to be
| running on your system.
+-----+
| < Yes > < No >
+-----+
```

8. Optional. If you do not need the NFS server, select **No**:

```
+-----START NFS-SERVER?-----+
| If your computer will be used as an NFS
| server, a few extra programs will have to be
| started at boot time.
| Should your computer be started as an NFS
| server?
+-----+
| < Yes > < No >
+-----+
```

9. Enter the server address as the news address:

```
+-----ADJUST NEWS FROM-ADDRESS-----+
|
| Following text will be posted in the "from"
| line of your news system.
|
| :q5usr00.boeblingen.de.ibm.com :
+-----+
| < Continue > < Abort >
+-----+
```

10. Answer **Yes** to the nameserver question:

```
+-----CONFIRMATION-----+
|
| Do you want to access a nameserver?
+-----+
| < Yes > < No >
+-----+
```

11. Enter the IP address of the nameserver:

```
-----NAMESEVER CONFIGURATION-----
| Please enter the IP address of your name server. You can add
| more domain name servers by modifying the file
| /etc/resolv.conf.
|
| IP-address list
| :9.164.178.1 :
|
| Domain list
| :boeblingen.de.ibm.com :
|
|-----
| < Continue > < Abort >
```

12. Enter the data for your network connection. Enter **tr0** for Token Ring, and select **IBM lcs module** for the device type. The module options should fill in automatically:

```
-----SELECTION OF NETWORKING DEVICE-----
| Here you may select your networking device.
| Your selections will be written to /etc/modules.conf
|
|
| Network type :tr0 :
| Networking device type [IBM lcs modul ]
|
| Module options
| :noauto=1 devno_portno_pairs=0x4800,0 :
|
| F3=Selecti
|-----
| < Continue > < Abort >
```

The "Selection of Networking Device" panel comes up with a network type of "eth0". This is wrong - the type should be "tr0".

Note: If you change this directly or using the F3 key the module options get lost. What you need to do is the following:

- Use the Tab key to get to the networking device type.
- Select IBM lcs module there.
- Use the tab key again (3 times) to get back to the Network type. Note that the module options appear
- Now change the Network type to tr0 and they won't vanish.

Hint: If the module options do not appear, fill it in manually. You can find the information in the parmline, see the lcs module start on page 5 on page 41.

13. On the sendmail configuration screen, pick the **Host with permanent network connection (SMTP)** option:

```
-----SENDMAIL CONFIGURATION-----
| Sendmail needs a configuration file (/etc/sendmail.cf) .
| You will probably find one of the configurations below suits your
| needs.
| If you have special requirements that these do not cover, you may
| create you own. Please have a look at /usr/share/sendmail, one of
| the pre-existing configurations may well fit your requirements.
| ATTENTION: If you plan to install your own modified sendmail.cf
| you should select the last item in the list and install the file
| yourself. Otherwise, SuSEconfig will copy the selected file to
| sendmail.cf and your changes get lost.
|
|-----+-----
| Host with permanent network connection (SMTP). *
| Single user machine without network connection
| Host with temporarily network connection (Modem or ISDN).
| Use UUCP to send mail
| Expert mode for sendmail configuration
| Do not install /etc/sendmail.cf
|-----+-----
|
|-----+-----
| < Continue >                                < Abort >
|-----+-----
```

Select **Continue**.

14. SuSE starts the Configuration tool. You will see messages like these:

```
-----OUTPUT of SuSEconfig-----
| Started the SuSE-Configuration Tool.                               #|
| Running in full featured mode.                                    #|
| Reading /mnt/etc/rc.config and updating the system...           #|
| Installing new /etc/HOSTNAME                                     #|
| Installing new /etc/resolv.conf                                 #|
| Installing new /etc/nntpserver                                  #|
| Installing new /etc/inews_mail_gateway                         #|
| Installing new /var/lib/news/mailname                          #|
| Installing new /var/lib/news/whoami                           ||
| Installing new /etc/SuSEconfig/profile                         ||
| Installing new /etc/SuSEconfig/csh.cshrc                      ||
|-----+-----
|
|-----+-----
| < Continue >
|-----+-----
```

16 Unmount the file system

You need to unmount all file systems except the one needed for IPL (all except /dev/ramx).

1. To check what is mounted, at the root prompt enter **mount**:

```
/root # mount
/dev/ram2 on / type minix (rw)
none on /proc type proc (rw)
/dev/dasda1 on /mnt type ext2 (rw)
/root #
```

2. If you see a response such as:

```
/dev/dasda1 on /mnt
```

you must perform an unmount command:

```
/root # umount /dev/dasda1
```

17 Re-IPL from DASD

Re-IPL from your newly generated DASD IPL using the following command on the console:

```
#CP IPL <devno> clear
```

Where *devno* is the device number of your DASD.

When you re-ipl from DASD, you will see these messages on the console:

```
00: CP IPL 206 CLEAR
Linux version 2.2.16 (root@Tape.suse.de) (gcc version 2.95.2 19991024 (release))
#1 SMP Thu Jun 29 01:48:54 GMT 2000
Command line is: dasd=0192,0206 root=/dev/dasdb1 noinitrd
ro

We are running under VM
This machine has an IEEE fpu
Initial ramdisk at: 0x02000000 (8388608 bytes)
Detected device 4800 on subchannel 0000 - PIM = 80, PAM = 80, POM = FF
Detected device 4801 on subchannel 0001 - PIM = 80, PAM = 80, POM = FF
Detected device F800 on subchannel 0002 - PIM = 80, PAM = 80, POM = FF
Detected device F801 on subchannel 0003 - PIM = 80, PAM = 80, POM = FF
Detected device 0206 on subchannel 0004 - PIM = F0, PAM = A0, POM = FF
Detected device 0009 on subchannel 0005 - PIM = 80, PAM = 80, POM = FF
Detected device 0E00 on subchannel 0006 - PIM = 80, PAM = 80, POM = FF
```


18 Setting the root password

1. A couple of screens of messages later, you will be asked to set the password for root. Note that the password will be displayed as you type:

```

      uuuuu
Enabling syn flood protection done
Disabling IP forwarding done
Starting syslog services done

-----

                        Welcome to SuSE Linux

-----

  You should set a password for root first. If you don't want a
  password for root, simply hit enter.

New password: passroot
Re-enter new password: passroot
█

                                                                MORE...  BOELING5
.....
```

Note: The password is limited to eight (8) characters.

More messages follow, including some syntax errors that you can ignore. The processing of the index files can take up to 5 minutes on a G6 system - Note however, that this operation has to be performed only once. Finally you will see a message indicating that the installation program has finished setting up the system:

```

setting /bin/umount to root,root 4755.
setting /usr/sbin/suexec to root,root 4755.
setting /etc/permissions to root,root 644.
setting /etc/permissions.secure to root,root 644.
setting /etc/permissions.easy to root,root 644.
setting /etc/permissions.paranoid to root,root 644.
Finished.
█

                                                                MORE...  BOELING5
-----
4 042/001
```

- Services are going to start, and you will be asked for the root password to log in:

```
x3270-4 vmling5
File Options

-----

Now scripts have to be started. They will be started in one
minute. You can find a log file under /var/log/Config.bootup.
It will also be printed on console 9.
You can now already use your system. If you shut down the system
before the scripts are finished, they are executed again at the
next system startup.

Press <RETURN> to continue...

Have a lot of fun!

Your SuSE Team

INIT: Entering runlevel: 2
Master Resource Control: previous runlevel: N, switching to runlevel: 2
Setting up network device tr0 done
Setting up routing (using /etc/route.conf) done
Starting RPC portmap daemon done
Re-Starting syslog services done
Starting NIS+ services: keyserver done
Initializing random number generator done
Starting service httpd done
Starting service at daemon: done
Starting INET services (inetd) done
Initializing SMTP port. (sendmail) done
Starting CRON daemon done
Starting Name Service Cache Daemon done
Master Resource Control: runlevel 2 has been reached
Give root password to login:

RUNNING BOELING5
042/001
```

Installation is complete.

To continue...

When installation is complete, the next steps are to check that Apache is up and running and to add users. To do this, see

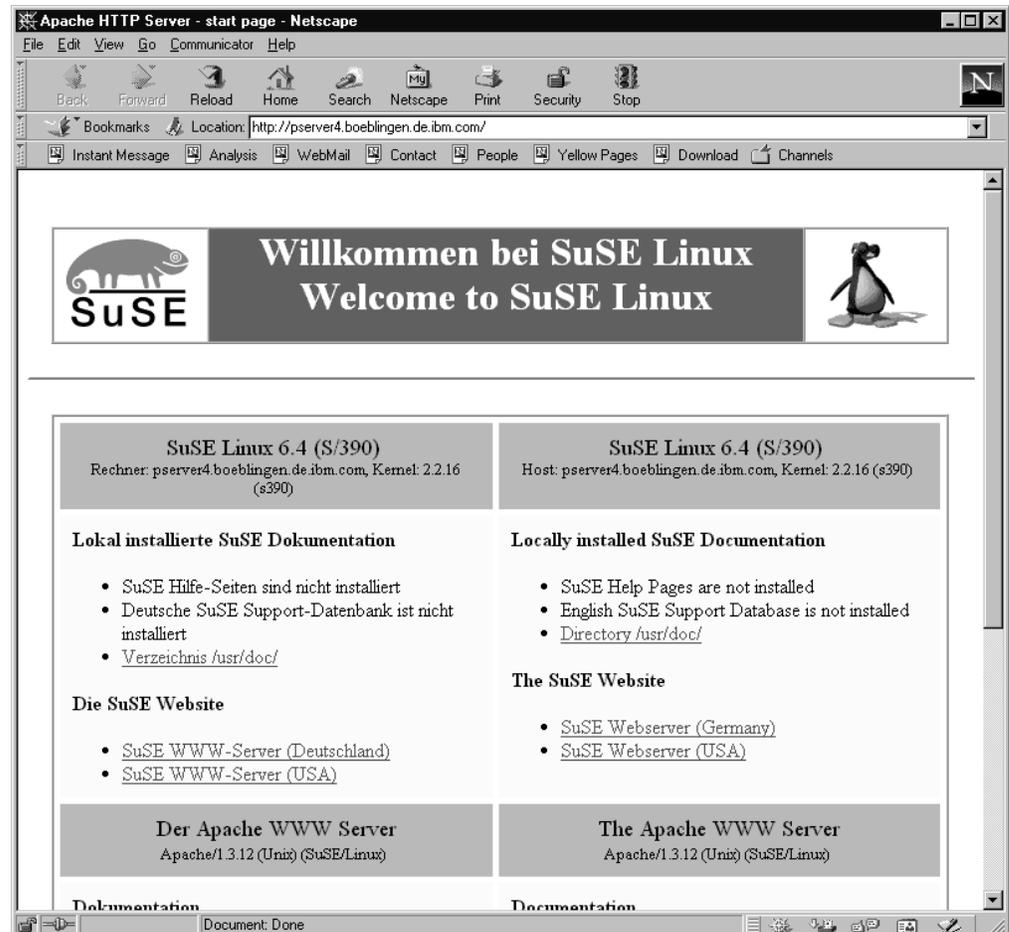
- “19 Testing Apache” on page 69
- “20 Adding users” on page 71

Part 4. Administration actions

19 Testing Apache	69
20 Adding users	71

19 Testing Apache

To see whether Apache is up and running: In a Netscape session, enter the name of your LINUX for S/390 system as shown:



The SuSe page should come up.

20 Adding users

To add users:

1. Telnet in and login as root.
2. Enter YaST.
3. On the main menu select **system administration**:

```
-----YaST - Yet another Setup Tool-----
| YaST Version 1.06b -- (c) 1994-2000 SuSE GmbH
|-----|
| Language:   English
| Media:     Network nc:/suse
| Root-Device: /dev/dasdb1
|-----|
| +-----+
| | General help for installation
| | Adjustments of installation          ->
| | Choose/Install packages
| | Update system
| | System administration             -> x
| | Show README file for installation media.
| | Copyright
| | Exit YaST
| +-----+
|-----|
```

4. Select **User administration**:

```
-----YaST - Yet another Setup Tool-----
| YaST Version 1.06b -- (c) 1994-2000 SuSE GmbH
|-----|
| Language:   English
| Media:     Network nc:/suse
| Root-Device: /dev/dasdb1
|-----|
| +-----+
| | General help fo| Integrate hardware into system  ->
| | Adjustments of| Kernel and boot configuration  ->
| | Choose/Install| Network configuration          ->
| | Update system  | Login configuration
| | System administ| User administration          x
| | Show README fil| Group administration
| | Copyright      | Create backups
| | Exit YaST     | Security settings              ->
| +-----+
| +-----+
| | Set the console font
| | Set time zone
| | Configure XFree86(TM)
| | Configure GPM
| | Change configuration file
| +-----+
|-----|
```

5. Fill in the data for the new user and press F4 to create:

```
-----USER ADMINISTRATION-----
| In this dialog you can get information about existing users, create new |
| users, and modify and delete existing users.                         |
|                                                                       |
| User name                    : johndoe                               |
| Numerical user ID           : 500                                   |
| Group (numeric or by name)  : users                               |
| Home directory              : /home/johndoe                       |
| Login shell                 : /bin/bash                          |
| Password                    : *****                             |
| Re-enter password          : *****                             |
| Access to modem permitted   : [ ]                                 |
|                                                                       |
| Detailed description of the user                                     |
| :                                                                    |
| F1=Help                    F3=Selection list                     F4=Create user |
| F5=Delete user              F6=Password times                    F10=Leave screen|
|                                                                       |
|-----|
```

6. Press **F10** to leave the screen.
7. Press **ESC**
8. Select **Exit YaST**.

Part 5. Additional information

21 Hints, tips, and troubleshooting	75
What are the corresponding device names to my DASD devnos?	75
Some devices are not detected by LINUX for S/390	75
The hardware console "hangs"	75
No messages on system console during IPL	75
Emulating 'Ctrl' character combinations	75
ESCON - CTC Connection OS/390 and LINUX	76
22 Known problems for the SuSE preliminary version, and circumventions	81
Problems with Windows and OS/2 FTP and NFS servers	81
No NFS server available?	82
FTP server refuses connections after a while	84
Telnet session requirement	84
Using AIX as a workstation for the telnet sessions	84
DASDFMT on VM	84
Language restriction	84
Problems with Networking Device selection - 1	84
Problems with Networking Device selection - 2	85
Installation requirements for VM/ESA LINUX for S/390 guests connected via virtual CTC	85
Function keys do not give expected results	86
Unresolved packages	86
Unmount file systems	86
Setting the LINUX root password	86
Setting the MTU size.	86
Enabling XPRAM	86
Filesystem check producing too much output	87
How to solve install problems related to the network adapter on a MP3000.	87
23 Building a parameter line file	89
Building a parameter line file on OS/390	89
Building a parameter line using VM/ESA	89
Building a parameter line file on VSE/ESA (CREAVSAM)	89
Contents of the parameter line file	90
24 Preparing your root file system for first IPL	93
25 Tools	95
silos	95
Usage	95
Parameters	95
Additional keywords	96
dasdfmt	97

21 Hints, tips, and troubleshooting

What are the corresponding device names to my DASD devnos?

When you issued the `dasd=. . . boot` parameter, the devices are sorted in order of the supplied ranges. The range component of `dasd=range` is a from-to pair of hexadecimal values that correspond to the device number of that DASD. The DASD with the lowest from-to value is the first device, `dasda`. If a configured device is not present, its device number is left blank.

If you do not include the parameter, the DASDs are not made available to LINUX for S/390 and a log message is written.

If you specify `dasd=autodetect`, all recognized DASD devices are ordered by subchannel number.

The device names start with `/dev/dasda` and continue with the last letter being incremented for each device.

You can also inspect the `/proc/dasd/devices` file to find out the DASD minor number (`dasd<letter>`).

Some devices are not detected by LINUX for S/390

Make sure the device types and models are known by LINUX for S/390.

The hardware console "hangs"

In the native or LPAR environment, the hardware console can sometimes "hang" because it receives too many messages. The solution is to use the **Delete** button of the GUI on the Service Element or Hardware Management Console to enable further output.

No messages on system console during IPL

In the native or LPAR environment, the IPL process can appear to "hang" with no messages displayed on the Service Element System Messages console. This does not always mean that there is a problem with your tape, or the files contained on it. At an early stage in the IPL process, the machine environment is checked and if there are any conflicts in device usage, or a device fails to respond due to it being hardware reserved, the IPL process can "hang". Other, similar, conflicts can occur and you should remember to ensure there are no problems with your environment, as well as checking the IPL tape and files, if the IPL process does not appear to talk to the terminal.

Emulating 'Ctrl' character combinations

The 3215 terminal does not have a Ctrl key. That makes it impossible to enter control characters directly. The character `^` in combination with certain other characters can emulate the Ctrl key:

- `^c` is interpreted as a Ctrl+C
- `^d` is interpreted as a Ctrl+D
- `^z` is interpreted as a Ctrl+Z

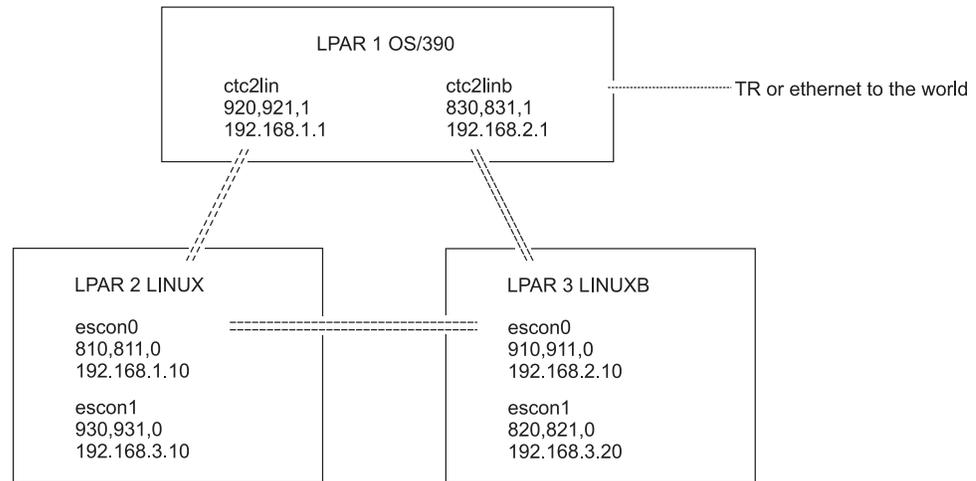
- ^n is used at the end of the input line (on the terminal) to prevent the generation of a new line character.

Refer to the 3215 device driver description for more information.

ESCON - CTC Connection OS/390 and LINUX

1. Overview:

The OS/390 TCP/IP acts as gateway for the LINUX images and will route all network traffic from and to the LINUX images.



2. IOCDs Definitions

```

ID      MSG1='iodf4011',MSG2='SYS1.IODF40 - 2000-05-23 15:59', *
        SYSTEM=(9672,6), *
        TOK=('PROC0LG6',0000000400D19672155932470100144F00000000*
        ,00000000,'00-05-23','15:59:32','SYS1','IODF40')
RESOURCE PARTITION=((LINUX,2),(LINUXB,3),(OS390,1),(OS390BAK,4*
))

CHPID  PATH=(87),SHARED, *
        PARTITION=((LINUX,LINUXB,OS390),(LINUX,LINUXB,OS390)), *
        TYPE=CNC

CHPID  PATH=(9F),SHARED, *
        PARTITION=((LINUX,LINUXB,OS390),(LINUX,LINUXB,OS390)), *
        TYPE=CTC

CNTLUNIT CUNUMBR=0810,PATH=(87),UNITADD=((00,004)),CUADD=1, *
        UNIT=SCTC
CNTLUNIT CUNUMBR=0820,PATH=(87),UNITADD=((00,004)),CUADD=2, *
        UNIT=SCTC
CNTLUNIT CUNUMBR=0830,PATH=(87),UNITADD=((00,004)),CUADD=3, *
        UNIT=SCTC
CNTLUNIT CUNUMBR=0910,PATH=(9F),UNITADD=((00,004)),CUADD=1, *
        UNIT=SCTC
CNTLUNIT CUNUMBR=0920,PATH=(9F),UNITADD=((00,004)),CUADD=2, *
        UNIT=SCTC
CNTLUNIT CUNUMBR=0930,PATH=(9F),UNITADD=((00,004)),CUADD=3, *
        UNIT=SCTC

IODEVICE ADDRESS=(810,004),UNITADD=00,CUNUMBR=(0810),STADET=Y,*
        PARTITION=(LINUX,LINUXB),UNIT=SCTC
IODEVICE ADDRESS=(820,004),UNITADD=00,CUNUMBR=(0820),STADET=Y,*
        PARTITION=(LINUXB,OS390),UNIT=SCTC
IODEVICE ADDRESS=(830,004),UNITADD=00,CUNUMBR=(0830),STADET=Y,*
        PARTITION=(LINUX,OS390),UNIT=SCTC
  
```

```

IODEVICE ADDRESS=(910,004),UNITADD=00,CUNUMBR=(0910),STADET=Y,*
PARTITION=(LINUX,LINUXB),UNIT=SCTC
IODEVICE ADDRESS=(920,004),UNITADD=00,CUNUMBR=(0920),STADET=Y,*
PARTITION=(LINUXB,OS390),UNIT=SCTC
IODEVICE ADDRESS=(930,004),UNITADD=00,CUNUMBR=(0930),STADET=Y,*
PARTITION=(LINUX,OS390),UNIT=SCTC

```

3. Network Setup

Make sure all your PCs and routers in the network know the routes to the **LINUX CTC** net or subnets.

In our example the routes to 192.168.1.0, 192.168.2.0 and 192.168.3.0 must be known to be reached through the OS/390 host (9.164.187.79).

If using dynamic routing with RIP in OS/390 check the configuration of the **routed** –

Notes:

- There must be a passive host entry in the **routed**'s etc.gateway and the CTC link must be defined in the **BSDROUTINGPARMS**.
- The **Routed** must be started with -h.

4. TCP/IP Definitions in OS/390

```

.....
IPCONFIG DATAGRAMFWD      ; OS/390 acts as gateway for the LINUX host
.....
; OS390   osa-2 token-ring to the rest of the network world
DEVICE  osatr  LCS   b02  AUTORESTART
LINK    losa   IBMTR 1  osatr
;
; OS390   ctc to linux1
DEVICE  ctc2lin CTC   920
LINK    ctc2lin CTC   1  ctc2lin
;
; OS390   ctc to linux2
DEVICE  ctc2linb CTC   830
LINK    ctc2linb CTC   1  ctc2linb
;
.....
HOME
9.164.187.79  osatr
192.168.1.1   ctc2lin
192.168.2.1   ctc2linb
.....
GATEWAY
9              =          osatr  2000  0.255.224.0  0.164.160.0
192.168.1.10  =          ctc2lin 8192  host
192.168.2.10  =          ctc2linb 8192  host
defaultnet 9.164.181.1  osatr  defaultsize 0
.....

```

5. Setup in LINUX

Kernelparameter in IPL tape parmfile and later in SILO parmline:

```

..... ctc=noauto ctc=0,0ddd,0xdd(+1),escon0

```

Example for LPAR LINUX:

```

..... ctc=noauto ctc=0,0x810,0x0811,escon0

```

NETSETUP questions and answers to start up the **ESCON** device during installation:

During the boot you should see messages for the ESCON0 devices

```

escon0: read dev: 0810 irq: .... - write dev: 0811 irq: ....

```

Check if the correct device addresses are reported.

Example of NETSETUP dialog:

```
Welcome to SuSE Linux S/390
```

```
First, select the type of your network device:
```

```
0) no network
1) for osa token ring
2) for osa ethernet
3) for channel to channel
4) for escon channel
```

```
Enter your choice (1-4):
====> 4
```

```
Please enter your full host name (e.g. s390.suse.com):
====> tmcc01.boeblingen.de.ibm.com
```

```
Please enter your IP address:
====> 192.168.2.10
```

```
Please enter the net mask:
====> 255.255.255.255
```

```
Please enter the IP address of your peer:
====> 192.168.2.1
```

```
Please enter the IP address of the DNS server:
====> 9.164.178.1
```

```
Please enter the DNS search domain (e.g. suse.com):
====> boeblingen.de.ibm.com
```

```
Configuration will be:
```

```
Full host name : tmcc01.boeblingen.de.ibm.com
```

```
IP address : 192.168.2.10
```

```
Net mask : 255.255.255.255
```

```
Peer IP address : 192.168.2.1
```

```
DNS IP address : 9.164.178.1
```

```
DNS search domain: boeblingen.de.ibm.com
```

```
Is this correct (Yes/No) ? y
```

```
escon0 Link encap:Serial Line IP
inet addr:192.168.2.10 P-t-P:192.168.2.1 Mask:255.255.255
UP POINTOPOINT RUNNING NOARP MTU:8192 Metric:1
RX packets:80 errors:3 dropped:0 overruns:0 frame:0
TX packets:59 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:100
```

```
lo Link encap:Local Loopback
inet addr:127.0.0.1 Mask:255.0.0.0
UP LOOPBACK RUNNING MTU:32768 Metric:1
RX packets:436 errors:0 dropped:0 overruns:0 frame:0
TX packets:436 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
```

To start or modify an ESCON interface in LINUX:

```
ifconfig escon0 x.x.x.x pointopoint y.y.y.y netmask 255.255.255.255 mtu mmmmm
where x.x.x.x is the IP address of the LINUX side,
y.y.y.y is the IP address of the remote partner OS/390
mmmmm is the MTU size which could be up to 32760 -
make sure the other side of the channel uses the same MTU size
```

The ESCON CTC device addresses are defined in the kernel boot parmfile:

```
..... ctc=noauto ctc=0,0ddd,0xddd(+1),escon0
```

6. Problem Determination

If the connection between OS/390 and LINUX does not work e.g. PING does not respond:

---> check the status of the devices on both sides of the channel, check the IP addresses:

```
OS/390 :      d tcpip,,netstat,de (on console)
           or  netstat de (in TS0)
LINUX  :      ifconfig escon0
```

---> check the routing table in both hosts, both sides should contain at least a host route entry with the ctc network addresses and the LINUX host should have a default route pointing to the OS/390,

```
OS/390 :      d tcpip,,route (on console)
           or  netstat route (in TS0)
LINUX  :      route -n
```

---> check if **IPFORWARDING** is active in the OS/390 host:

```
OS/390 :      netstat config (in TS0)
```

You should see

```
.....
EZZ2735I IP Configuration Table:
EZZ2736I Forwarding: Yes .....
```

or in older TCP/IPs

```
EZZ2735I IP Configuration Table:
EZZ2736I Forwarding: 00001 .....
```

---> check the MTU size on both sides, they should match, eventually try with a smaller MTU

```
OS/390 :      netstat gate (in TS0)
LINUX  :      ifconfig ESCON0
```

to change the MTU

```
OS/390 :      change the MTU in the GATEWAY statement and do an OBEYFILE
LINUX  :      ifconfig escon0 mtu ....
```

---> try to restart both sides

```
OS/390 :      v tcpip,,stop,ctc_devicename
               v tcpip,,start,ctc_devicename
LINUX  :      ifconfig escon0 down
               ifconfig escon0 up
```

---> check I/O configuration, check status of channel on HMC, make sure the correct device addresses are used on both sides

```
OS/390 :      d tcpip,,netstat,de (on console)
           or  netstat de (in TS0)
LINUX  :      hava a look at the boot messages, they should show
               escon0: read dev: 0810 irq: .... - write dev: 0811 irq: ....
```

If using dynamic routing with RIP in OS/390 check the configuration of the **routed** –

Notes:

- a. There must be a passive host entry in the **routed**'s etc.gateway and the CTC link must be defined in the **BSDROUTINGPARMS**.
- b. The **RouteD** must be started with -h.

22 Known problems for the SuSE preliminary version, and circumventions

This section lists known problems when using the SuSE preliminary version and circumventions to them.

Problems with Windows and OS/2 FTP and NFS servers

The CD, as it is, is not usable for installation from Windows and OS/2 systems, because long directory/folder names are truncated and transformed to upper case. There are four work-arounds for this (and see also "No NFS server available?" on page 82):

1. Use a UNIX NFS or FTP server.
2. Copy the CD image (cp -r <cdrom directory > <windows folder>) via Linux/Intel system to a FAT/FAT32 folder, that can be accessed by Windows or OS/2. Afterwards you can run the Windows or OS/2 FTP server from that folder and install the LINUX for S/390 system.
3. Copy the CD to a Windows filesystem (OS/2 has not been checked) that supports long filenames. After that you have to rename some of the directories and files. The following batch program does this for you. It should be started out of the directory that was just created:

```
rename FULL_NAM full-names
rename _S_U_S_E.200 .S.u.S.E-disk-001.2000062918
rename SUSE suse
cd suse
rename INDEX.ENG INDEX.english
rename INDEX.GER INDEX.german
rename SETUP setup
cd setup
rename DESCR descr
cd descr
rename *.SEL *.sel
rename *.PKD *.pkd
rename *.SER *.ser
rename *.PKD *.pkd
cd ..
cd ..
rename IMAGES images
cd images
ren *.IMG *.img
ren *.IKR *.ikr
ren *.RPM *.rpm
ren *.INF *.inf
ren IKR_RDR.rpm ikr_rdr.rpm
ren K_DEFLT.rpm k_deflt.rpm
ren IKR_TAPE.rpm ikr_tape.rpm
ren K_DEFLT.img k_deflt.img
ren K_DEFLT.inf k_deflt.inf
ren PARMLINE parmLine
cd ..
cd ..
```

4. Boot from CD-ROM.

Boot the Rescue System on the CD1 of the Intel Version and in the Rescue System mount the S/390 CD on /cdrom. Then do an NFS install from the PC:/cdrom.**Prerequisites:**

- a. An Intel PC with an Network card that is supported by the 6.4 Linuxrc on Intel. Most Ethernet or Token Ring cards, except some olicom cards should

work. Some IDE controllers or CDROM drives can also be problematic. The PC should have at least 64 MB RAM, must be reachable from LINUX-S/390, and must be dedicated for the duration of the installation.

- b. You need an useable IP address setup for the Intel Box that it can use to connect to the LINUX-S/390 installation.
- c. You should have the IP Address, Netmask and Gateway ready for the procedure.
- d. If your LINUX-S/390 installation is already IPLed, has its network properly setup, and has the Intel box running with the required IP-route setup, then you can test the connectivity before booting the LINUX Rescue System on that box.

Procedure:

- a. Take the 'SuSE 6.4 Package for Intel' sent out with the Installfest CD (or any SuSE package since 6.2) and insert CD 1 of the Intel Version into the CDROM drive.
- b. Reboot the Intel PC from the CD and enter "manual" at the SYSLINUX prompt.
- c. In Linuxrc, select the language etc, load the network driver for the card, and if the CDROM drive is SCSI load the SCSI driver .
- d. Start the rescue system on the PC and login as 'root'.
- e. Remove the Intel CD 1 and insert the S/390 Prerelease CD.
- f. Type "mount /cdrom" on the rescue System prompt. The CD in the CDROM drive may now be exported anywhere by NFS.
- g. IPL the LINUX-S/390 Installation, and at the point where you select 'Installation Type' in YaST, select 'Installation from NFS' and use the IP or name of the PC as 'Server Name' and '/cdrom' as 'Source Directory'.
- h. It should now be possible to start a Telnet session after the Network setup is complete on LINUX/S390. This may be done directly from the shell prompt of the rescue System on this PC, or from another terminal.

No NFS server available?

If there is no NFS server with a CD-ROM currently available on your network it will be necessary to configure a Windows PC as a NFS server. Commercial packages for this purpose are available for download from the Internet. Please check and comply with the terms and conditions in any package downloaded.

Requirements:

- PC running Windows. (NT 4 is recommended, but some NFS server software will run on Win9x.)
- Internet connectivity: Web access to get the NFS server package, and E-mail to receive a script to rename some of the files installed.
- A means of transferring the NFS server package to the PC which will be set up as the server. (This package file may be greater than 4MB in size and will not fit on a standard floppy disk).
- Enough free space on a single disk of the server to copy the entire LINUX for S/390 SuSE CD-ROM into the filesystem.
- Administrator privileges on the PC. (If this is necessary for software installation.)

To find NFS Server software on the Internet:

One route to find such software is as follows:

- Start the web-browser of your choice and access <http://www.winfiles.com>
- Select "Windows Shareware".
- Select "Windows NT Software".

(Or "Windows 95/98 Software" if the server PC does not run NT.)

- Select "Network and Internet Tools".
- Select "Server Tools".
- Select "Misc. Server Tools".

(The shortcut is <http://winfiles.cnet.com/apps/nt/servers-misc.html> or <http://winfiles.cnet.com/apps/98/net-misc.html>)

- Find a suitable NFS server from the list. Download the file by single-clicking the corresponding icon/name.

Servers which have been successfully used in testing and in the Install Fest so far include:

NT Servers:

- "NFS Maestro Server"© Version 6.2, by Hummingbird Communications Ltd.

95/98 Servers:

- n/a

- Transfer the downloaded file to the PC to be used as NFS server for the LINUX/390 installation.

To get the renaming script:

- This will be sent as e-mail. Send a request to: contact_linux390@de.ibm.com

Access the SuSE CD-ROM:

- Choose a partition with enough free space for a complete CD-ROM on the NFS server PC.
- **mkdir <name>** (use some name other than "SuSE") and copy the entire CD into <name> within the local filesystem.
- Start the renaming script within <name>.

Install the NFS server:

- Log in as a user with administrator privileges.
- Double-click on the downloaded file to start installing.
- Follow the instructions on the screen to complete the installation.

Configure the NFS server:

(This part is specific to the server installed. The example given is taken from an install of "NFS Maestro Server"© of Hummingbird Communications Ltd.™)

- Go to the control panel (start/settings/control panel) and select the new "HCL NFS Server".
- Select "Exported File Systems".
- In the "List of Exported File Systems" there is "c:\\" highlighted as a default. Click on "Remove".
- Below "Exported File System" enter the partition ("d:\") which holds the SuSE CD-ROM and click on "Insert".

- Click on "OK" to exit from the tool, or choose "Server Status" from the "Configure" screen to monitor ongoing NFS activities.

Using YaST:

- At the NFS-server configuration screen enter the ip-address of the NFS server and **"/d/cd"** as the "SuSE directory on the server" (assuming the CD has been stored in **"d:\cd\"**).

Hints:

- It may be necessary to adjust the settings in the "Configure" screen of the NFS server, for example if some kind of "permission denied" problem occurs.

FTP server refuses connections after a while

For every package that is being installed the SuSE tool YaST opens a new connection. Some FTP servers are configured in such a way that they will not allow enough connections. For the standard LINUX FTP server you have to change the FTP server line in **/etc/inetd.conf** and restart the **inetd** afterwards. You have to add the number after the **nowait** in the following line:

```
ftp      stream  tcp      nowait.1500    root    /usr/sbin/tcpd  in.ftpd  -l  -a
```

This tells the FTP server to allow up to 1500 connections per minute. For other FTP servers there might be a similar configuration parameter, e.g. in the Hummingbird FTP server for Windows NT the parameter is called "Maximum Servers".

Telnet session requirement

The telnet session must be at least 80 x 25 lines, for example, try 80 x 40 lines. An OS/2 telnet session, for example, opens by default with only 24 lines.

Using AIX as a workstation for the telnet sessions

Before starting YaST, issue the following command:

```
export TERM=vt220
```

DASDFMT on VM

Before starting YaST, the DASDs need to be formatted:

```
dasdfmt -f /dev/dasda -b 4096
dasdfmt -f /dev/dasdb -b 4096
```

Language restriction

Only the "English" language selection is known to work at present.

Problems with Networking Device selection - 1

The "Selection of Networking Device" panel comes up with a network type of "eth0". This is wrong - the type should be "tr0".

Note: If you change this directly or using the F3 key the module options get lost. What you need to do is the following:

- Use the Tab key to get to the networking device type.
- Select IBM lcs module there.

- Use the tab key again (3 times) to get back to the Network type. Note that the module options appear
- Now change the Network type to tr0 and they won't vanish.

Problems with Networking Device selection - 2

The "Selection of Networking Device" panel is not available for ethernet.

However for ethernet the networking device is set correctly. But you are not able to change the "Module options" using YaST. The work-around is to edit `/etc/conf.modules` and change the line starting with "options lcs".

Installation requirements for VM/ESA LINUX for S/390 guests connected via virtual CTC

Assumption: You already have the VM/ESA routing set up.

So far there is limited SuSE virtual CTC installation support. You should select the following options during installation (see a description of an example installation for VM in "Part 3. VM, NFS and Token Ring installation scenario" on page 37):

1. In YaST: Select **real network** instead of the loopback.
2. In YaST: Select **eth0**, when prompted for Type of Network.
3. You might need to mount your root file system to `/mnt`.
4. Change the routing table in `/mnt/etc/route.conf`, for example, using an editor (vi) or through `echo "default <peer IP address>" > /mnt/etc/route.conf`
5. Change in `/mnt/etc/rc.config`, for example, through the vi editor:

- a. Find

```
NETDEV_0="eth0"
```

and change it to

```
NETDEV_0="ctc0"
```

- b. Find

```
IFCONFIG_0="..."
```

Change it to

```
IFCONFIG_0="<home IP address> pointopoint <peer IP address> up"
```

6. Return to the mnt directory with

```
chroot /mnt
```

7. Now confirm the changes by entering the command:

```
/sbin/SuSEconfig
```

8. Leave the "change root" environment by the command

```
exit
```

9. Unmount your root file system:

```
cd /
umount /mnt
```

Now you can continue with DASD re-ipl, see "17 Re-IPL from DASD" on page 63.

For a routed ESCON connection replace `ctc0` by `escon0`.

Function keys do not give expected results

The function keys do not always map correctly in YaST. For example, F6 might be interpreted as F5. You can:

- Use the numeric/punctuation keys (1–0) instead, for example, instead of **F1** use **1**.
- Use the key combination **Ctrl + F** and then select the key *number*.

In either method F10 corresponds to the 0 key.

Unresolved packages

If the installation program finds unsatisfied interdependencies between packages the "AUTO" option may not resolve them. This may be ignored – select "CONTINUE".

Unmount file systems

Make sure that the file systems are unmounted before you re-IPL from DASD.

1. To check what is mounted, at the root prompt enter **mount**:

```
/root # mount
/dev/ram2 on / type minix (rw)
none on /proc type proc (rw)
/root #
```

2. If anything is mounted on **/mnt**, for example:

```
/dev/dasda1 on /mnt
```

you must perform an unmount command:

```
umount /mnt
```

Setting the LINUX root password

The password is limited to eight (8) characters.

If you enter more characters it will be truncated to eight.

Setting the MTU size

If your network uses a MTU size of 1492, you must change it to 1492 in LINUX as well. Do this with the following command:

```
ifconfig eth0 mtu 1492
```

Enabling XPRAM

To enable XPRAM on the file system, enter the following commands when logged in as root:

```
mknod /dev/s1ram0 b 35 0
mknod /dev/s1ram1 b 35 1
```

If your system has expanded memory available, you can now create a file system by using the commands:

```
mke2fs -b 4096 /dev/s1ram0
mount /dev/s1ram0 /mnt
```

Filesystem check producing too much output

You can turn off the completion messages of the file system check by changing the file `/sbin/init.d/boot`.

Remove the `-C` in the following lines:

```
line 90: fsck -C -a -t $ttype /  
line 157: fsck -C -A -a $FSCK_FORCE
```

How to solve install problems related to the network adapter on a MP3000

Open an OS/2 window on the SE (use **Desktop on call** if you are working on an HMC), enter **mpts**.

Press **configure** twice.

Write down the adapter number of the adapter with IBM IEEE 802.2 only.

Press **cancel - cancel - exit**.

Double click on **Emulated I/O Configuration** in the CPC configuration menu (use **Desktop on call** if you are working on an HMC).

Press **enter** and **F2** to view the active device map.

Write down the addresses of the 3088 devices (e.g. 20/21 or 22/23). (If you have to edit the device map, be sure that the device map number corresponds to the **IOCDS** number!!).

Press **ESC - F10 - F10** to leave without changing anything. (If you want to save your changes, press **ESC - F6 -F10**).

Double click on **Console Actions** and **Network Diagnostic Information**.

Lookup the above noted adapter number and its associated MAC address.

Write down this MAC address.

Double click on **Input/Output (I/O) Configuration** in the CPC configuration menu.

Open the source of the appropriate IOCDS. (The IOCDS number must correspond to the device map number!!).

Look up the line where the **UNITADD** is equal to the smaller address of the above noted 3088 device.

Write down the **CUNUMBR** of this line.

Lookup the line starting with **IODEVICE** and with the **CUNUMBR** as noted above. Write down the corresponding **ADDRESS**. (This is the address required for the **LCS** driver.)

After IPL:

When the **Network device number** is requested: enter the **IODEVICE ADDRESS** as noted above.

When the **Relative port** is requested: enter the adapter number (from MPTS).

Verify that the shown **hw_address** is the MAC address noted above.

In this case the network adapter is properly set up and should work correctly.

23 Building a parameter line file

In special cases, you need to modify your parameter line file.

The parameter line file can be built on OS/390, in VM or on VSE/ESA. Alternatively, you can run LINUX on another device (for example an Intel PC) and then transfer parm.line as a binary file to your current environment.

You can create the parameter file using your favorite editor on your favorite OS. It can be ASCII or EBCDIC; at boot time the kernel knows how to deal with both. In both cases, the contents of the file are the same.

Building a parameter line file on OS/390

To create a parameter line file on OS/390, allocate a 1 track sequential dataset, record format F, LRECL 1024. Then edit the file using ISPF edit.

Here is an example of data set information for a parameter line file:

```
Data Set Name . . . : LINUX390.PARM.LINE
General Data Current Allocation
Volume serial . . . : SP3010 Allocated tracks . : 1
Device type . . . . : 3390 Allocated extents . : 1
Organization . . . . : PS
Record format . . . . : F
Record length . . . . : 1024
Block size . . . . . : 1024 Current Utilization
1st extent tracks . : 1 Used tracks . . . . . : 1
Secondary tracks . : 1 Used extents . . . . . : 1
```

Building a parameter line using VM/ESA

The parameter line file may be built on VM/ESA using the XEDIT editor, eg

```
XEDIT PARM LINE A
```

. The file must be given the correct format before it is saved by using the commands

```
SET RECFM F
```

and

```
SET LRECL 1024
```

Building a parameter line file on VSE/ESA (CREAVSAM)

You can create LINUX.PARM.FILE (PARMLIN) and write IPL information into the file. For example, use the following job to create a parameter line file and write the IPL information in the file:

```
* $$ JOB JNM=LINUXVSA,CLASS=0,DISP=D,NTFY=YES
// JOB SYSA DEFINE FILE
// EXEC IDCAMS,SIZE=AUTO
DEFINE CLUSTER ( -
    NAME (LINUX.PARM.FILE) -
    CYLINDERS(2 2) -
    SHAREOPTIONS (3) -
    RECORDSIZE (1024 1024) -
```

```

        VOLUMES (DOSRES) -
        REUSE -
        NONINDEXED -
        FREESPACE (15 7) -
        NOCOMPRESSED -
        TO (99366) ) -
        DATA (NAME (LINUX.PARM.FILE.@D@) -
        CONTROLINTERVALSIZE (4096) ) -
        CATALOG (VSESP.USER.CATALOG)
    IF LASTCC NE 0 THEN CANCEL JOB
/*
// OPTION STDLABEL=ADD
// DLBL PARMLIN,'LINUX.PARM.FILE',,VSAM,                X
        CAT=VSESPUC
/*
// EXEC IESVCLUP,SIZE=AUTO
A LINUX.PARM.FILE                                PARMLIN VSESPUC
/*
// UPSI 1
// EXEC DITTO
$$DITTO CVS BLKFACTOR=1,FILEOUT=PARMLIN,CISIZE=1024
ANEXIT 'root=/dev/ram0 ro ipldelay=2m'
$$/*
$$DITTO EOJ
/*
/&
* $$ EOJ

```

Contents of the parameter line file

The contents of the parameter line file are:

```
root=/dev/ram0 ro ipldelay=xyz
```

Where:

- root=/dev/ram0 ro

This tells LINUX where to IPL from. This is a temporary RAMdisk (ram0) used only to get a mini-LINUX system running so that you can perform the rest of the IPL tasks. Use the root statement as given here when mounting the root file system from initrd.

- If you have problems with your OSA-2 card after the IPL, you might want to insert a delay to allow the card to settle down. The recommended delay time is two minutes. The following entry should be used in the parm.line file:

```
ipldelay=xyz
```

where xyz is the delay period. For example, 30s means a delay of thirty seconds between the IPL and the initialization of the OSA-2 card, 2m means a delay of two minutes. The value xyz must be a number followed by either s or m.

Here is an example of the content of a parameter line file:

```
root=/dev/ram0 ro ipldelay=2m
```

Notes:

1. When IPL-ing from tape using an ASCII encoded parameter file which you have generated on a UNIX or PC operating system, make sure that your parm line contains no special characters (for example, tabs or new lines). In particular your parameter file cannot span over more than one line and must not be larger than 1023 Byte.
- 2.

When IPL-ing from the virtual reader of VM/ESA, and your parameter file spans more than one line, make sure that a blank character precedes any kernel parameter. To avoid errors you should start on column 2 of the parameter line.

24 Preparing your root file system for first IPL

You might decide to modify the initial RAMdisk before using it in the installation process. Note however, that only the `initrd` file supplied on the CDROM or SuSE web site will be supported by IBM and SuSE. Modify the file at your own risk!

If you have access to a LINUX system you are able to customize the configuration files of the root file system before using it:

1. Make a backup copy of the downloaded file
2. Uncompress the downloaded file, for example `initrd` (note that there is no file extension shown for this file). A compressed file is required because of memory limitations, and because certain download methods can automatically uncompress a `.gz` file during transfer, the extension is removed. The uncompression stage has an additional step to get the names correct:

```
mv initrd initrd.gz
gunzip initrd.gz
```

3. Set up a loopback device on the downloaded file by issuing
`losetup /dev/loop<#> initrd`
4. Mount the loopback device by issuing
`mount -t ext2 /dev/loop<#> <mountpoint>`
5. Change your working directory to the mountpoint and edit the following files according to your requirements

- `etc/fstab`

Check that it contains at least the following two lines

```
/dev/ram0    /      ext2 defaults 0 1
none        /proc  proc  defaults 0 0
```

- The `initrd` comes with a network setup script that asks for your network configuration every time you boot. If you don't want to re-enter the network configuration every time then you have to delete the link `/etc/rc.d/rc3.d/S00netsetup` and setup the following files:

`etc/sysconfig/network` and `etc/resolv.conf`

Adapt them according to your network environment

`etc/sysconfig/network-scripts/ifcfg-<netdevice>`

Adapt it according to your network environment.

6. Unmount the loopback device by issuing
`umount /dev/loop<#>`
7. Detach the loopback device by issuing
`losetup -d /dev/loop<#>`
8. Compress the file, (`initrd`) and rename it:

```
gzip initrd
mv initrd.gz initrd
```

25 Tools

The following tools are used during installation.

silos

This tool is used to make DASDs (direct access storage devices) bootable. It takes a kernel image, a parameter file, a bootsector file, and the device node as input. Additionally, the file `/etc/silo.conf`, or the file specified by using the `-F` file name parameter, is parsed for additional options.

The parameter line in the parameter file should contain the following entries (note that you should avoid additional whitespace separating the entries, because the overall size of a kernel parameter line is limited):

- `dasd=from-to|devno[,...]`
- `root=/dev/...` (this has to match the DASD parameter)
- `ro`
- `noinitrd` (only necessary if the kernel was compiled with initial RAM disk support on).

From the config-file `/etc/silo.conf`, you can specify: `append= [any optional parameter]`, for example, `noinitrd ro`

Usage

```
silos -d ipldevice [-hV?] [-t[#]] [-v[#]]
      [-F config-file] [-b bootsector]
      [-f image] [-p parameterfile] [-B bootmap]
```

Parameters

Note that the defaults for these parameters can be overwritten by entering keywords in the config-file. The format used for each parameter keyword is shown in monospaced text in the following descriptions.

-d ipldevice

Set `ipldevice=devicenode` to set the IPL device to a specific device node. The device node specified must be the node of the 'full' device and not that of a partition.

-? Prints out a short usage message.

-h Prints out a short usage message.

-V Prints version number and exits silos.

-t[#] By default, silos runs with a `testlevel` of 2, which means that no modifications are made to the disk. A testing level of 1 means that a bootmap is generated with a temporary file name, but the IPL records of the disk are not modified. The disk is made IPL-able only with a testing level of 0 or below. Set `testlevel=level` to decrease the testing level from the default by the value of `level`. Use the short form `-t[#]` to decrease the testing level by one, or `#`, respectively.

-v[#] Sets `verbose=level` to value given (`#`), or increases verbosity if no value specified.

-F config-file

There are some defaults for the most common parameters compiled into

the binary. You can overwrite these defaults with your own values using `/etc/silo.conf` or with another config-file specified by `-F config-file`. All values set by defaults or the config-file can be overwritten using the command line options of `silo`.

-b bootsector

Set `bootsect=bootsect` to specify the name of the bootsector to be used as IPL record for that volume. The default name is `/boot/iplckd.boot`.

-f image

Set `image=image` to specify the name of the image that is going to be IPL-ed from that volume. The default name is `./image`.

-p parameterfile

Set `parmfile=parameter file` to specify the name of the parameter file holding the kernel parameters to be used during setup of the kernel. The default name is `./parmfile`.

-B bootmap

Set `map=bootmap` to specify the name of the bootmap used to hold the map information needed during IPL. The default name is `./boot.map`. In test-only mode this name is replaced by a temporary name.

Additional keywords

Some additional entries for the config-file:

ramdisk=*ramdisk image*

Optionally specifies the name of a ramdisk image to be used as an initial ramdisk.

root=*device node*

Specifies the device holding the root device of the IPL-ed system.

readonly

Sets the flag to mount the device holding the root device of the IPL-ed system. The device is mounted in read only mode before the final mount is done by `/etc/fstab`.

append= [list of parameters]

Used in the config-file to set additional parameters to be added to the parameter file. These parameters are added to any parameter file specified on the command line. The old parameter file is preserved and a new one is created with a temporary name.

For example, if you have problems with your OSA-2 card during IPL (usually this happens only in native ESA/390 Single Image mode), you might want to insert a delay to allow the card to reset. Inserting the following entry in the `append` command will then cause it to be added to the temporary `parm.line` file:

```
ipldelay=xyz
```

where `xyz` is the delay period. For example, `30s` means a delay of thirty seconds immediately after the IPL and before initializing the OSA-2 card, `2m` means a delay of two minutes. The value `xyz` must be a number followed by either `s` or `m`. A value of `2m` is recommended as a minimum. This setting is not DASD specific.

dasdfmt

This tool is used to low-level format direct access storage devices (DASD). Note that `dasdfmt` is only able to format DASDs that have already been formatted using another disk formatting utility. If you have unformatted DASD in your system, use a device support facility such as ICKDSF to initially format the DASD.

`dasdfmt` uses an `ioctl` call to the DASD driver to format tracks. A start and end track for formatting can be specified, as well as a blocksize (hard sector size). Remember that the formatting process can take quite a long time. The syntax of the utility is as follows:

```
dasdfmt [-tvy] [-s start_track] [-e end_track] [-b blocksize] -f dev_filename
        | -n 390_devno
```

`dasdfmt -help` prints out an overview of the syntax.

The parameters are:

- `-f` specifies the device node in the file system. This must be the whole device, not a partition.
- `-n` specifies the device number of the disk to format.

Exactly one of the parameters `-f` and `-n` must be specified.

The following parameters are necessary, however, if you do not specify their values, you are prompted for them. You can use the default values by pressing the <enter> key:

- `-s` specifies the start track of the formatting. A value of 0 (first track of disk) is the default value.
- `-e` specifies the last track of the formatting. A value of -1 means the last track on the disk and is the default value.
- `-b` specifies the blocksize. Default value is blocksize of 4096.

The following parameters are optional:

- `-v` prints out more messages.
- `-y` omits the security prompt and formats the disk directly (for batch use by daring people!).
- `-t` switches to a test mode, the DASD will not be formatted.

Part 6. Appendixes

Where to find more information

This section lists books that can be of help to you.

Table 1. *LINUX for S/390 books*

Book name	Number
<i>LINUX for S/390 Installation, Configuration and Use</i>	N/A (This document can be downloaded from http://linux390.marist.edu/)
<i>LINUX for S/390 LCS Device Driver</i>	N/A (This document can be downloaded from http://linux390.marist.edu/)
<i>LINUX for S/390</i>	SG24-4987 (at the time of writing, this was available as a redpiece on the redbooks website)

IBM Systems Center publications (redbooks) are available in softcopy at this website: <http://www.redbooks.ibm.com/>.

Table 2. *Multiprise books (redbooks)*

Book name	Number
<i>Multiprise 3000 Technical Introduction</i>	SG24-5633
<i>Multiprise 3000 Basic Emulated I/O Definitions</i>	SG24-5669

Table 3. *IOCDs related books*

Book name	Number
<i>IOCP User's Guide and ESCON Channel-to-Channel Reference</i>	GC38-0401
<i>HCD User's Guide</i>	SC28-1848

Table 4. *Network connection books*

Book name	Number
<i>OSA Planning</i>	GC23-3870
<i>OS/390 OSA/SF User's Guide</i>	SC28-1855
<i>VM/ESA OSA/SF User's Guide</i>	SC28-1992
<i>VSE/390 OSA/SF User's Guide</i>	SC28-1946
<i>OSA Express Customer Guide and Reference</i>	SA22-7403

Other useful homepages include:

- <http://www-4.ibm.com/software/is/mp/linux/> - The IBM LINUX home page.
- <http://tune.linux.com> - General tuning information for LINUX

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Index

Special Characters

[^]c 75
[^]d 75
[^]n 76
[^]z 75

Numerics

3215, emulating ctrl key on 75

A

Adding users 71
administration actions 67
AIX workstation, using 84
Apache, testing 69

B

bibliography 101
building a parameter line file 89

C

configuring the system 25, 55
CTC
 ESCON connection 76
ctrl key
 emulating on 3215 75

D

dasd 95, 97
 device numbers 75
 format 11, 43
 formatting 84
 re-ipl from 33, 63
DASDFMT 84, 97
device names 75
devices detected 75

E

emulating 'Ctrl' 75
enabling xpram 86
ESCON
 CTC connection 76
ethernet
 installation scenario 5

F

file system
 creating 15, 48
 root 90
 unmount 31, 61, 86
filesystem
 check 87

formatting dasd 84
FTP 12
 installation scenario 5
 installing packages from server 17
FTP servers
 installation consideration 81
function keys
 YaST 11, 43, 86

H

hang 75
hardware console 75

I

ICKDSF 97
INETD 25, 55
initialization of kernel 7, 39
installation considerations, FTP servers 81
installation scenario
 ethernet 5
 FTP 5
 LPAR 5
 NFS 37
 token ring 37
 VM 37
installing packages from FTP server 17
installing packages from NFS server 49
IPL 90
 from tape 7
 from tape in a LPAR 3
 from tape native 3
 from tape using VM guest 3
 from VM reader 3
 messages 3, 75
 preparing root file system for 93
 reader 39
 screens 3
ipling 5, 37
ISPF 89

K

kernel, initialization 7, 39
known problems 81

L

language selection 12, 44
LPAR
 installation scenario 5
 IPL from tape 3

M

messages during IPL 3, 75
MP3000
 network adapter problems 87

MTU size
 setting 86

N

native
 IPL from tape 3
Netscape 69
network
 data 10, 42
 definitions 25, 55
 device number 9, 41
 port number 9, 41
 services 28, 58
 setup 9, 41
network adapter problems
 MP3000 87
network configuration prompt 93
network environment 93
NFS 45
 installing packages from server 49
NFS installation scenario 37
NFS servers
 obtaining 82

O

OS/390, building parameter line file on 89
OSA-2 card 90, 96

P

packages
 installing from FTP server 17
 installing from NFS server 49
 unresolved 86
parameter file 7
parameter line file
 building 89
 building on OS/390 89
 building on VM/ESA 89
 building on VSE/ESA 89
 contents 90
parm line
 restrictions — ASCII 90
 restrictions — VM 90
password, root, setting 86
portmapper 28, 58
preparing root file system for IPL 93

R

RAMdisk 90, 95
 modifying 93
re-IPL from dasd 33, 63
reader, IPL from 39
root file system 90
 preparing for IPL 93
root password
 setting 86
root password, setting 35, 65

S

screens during IPL 3
session requirement, telnet 84
setting root password 35, 65
silo 95
 config file 95
 config file, additional entries 96
 parameters 95
 usage 95
size requirement, telnet 84
SuSE 81
system configuration 25, 55
system console
 LPAR 3
 native 3
 VM 3

T

tape, IPL from 7
tape unit 3
telnet 11, 43, 71
 session size requirement 84
testing Apache 69
timezone 25, 55
token ring installation scenario 37
tools 95
 dasd 95
 DASDFMT 97
 silo 95

U

unmount file systems 86
Unresolved packages 86
users, adding 71

V

virtual CTC 85
VM/ESA, building parameter line file on 89
VM guest, IPL from tape 3
VM installation scenario 37
VM reader, IPL from 3
VSE/ESA, building parameter line file on 89

X

XEDIT 89
xpram 7, 40
 enabling 86

Y

YaST 11, 43, 71
 function keys 11, 43, 86

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