LINUX for S/390

Installing SuSE LINUX for S/390® – April 5, 2001

LNUX-1002-01

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Note

Before using this document, be sure to read the information in “Notices” on page 143.

Second Edition — (8 December 2000)

This edition applies to SuSE 7.0 LINUX for S/390 (October 2000).

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Summary of changes

This revision contains changes to support the LINUX for S/390 kernel loadable module for the LINUX kernel version 2.2.16. Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

Edition 2 changes

Changed Information

- 'Network setup' and 'Starting YAST' screen updates.

This revision also includes maintenance and editorial changes.

April 5, 2001 update

New Information

- Included a reference on where to find more information about the parameter line file.

About this document

This document is provided for use when installing the SuSE 7.0 shipment of LINUX. Instructions in this document work only with the SuSE 7.0 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 LINUX for S/390 website. Go to **http://www.ibm.com/s390/linux/** and click **Library** to get to the documentation. Check the website regularly to ensure that you have the newest documentation.

Who should read this document?

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.

Installation process overview

This section gives a quick overview of the installation methods you can use and the installation process.

Installation methods

You can install in three different ways:

- Install in an LPAR
- Install natively
- Install as a guest under VM/ESA

Installation mediums

You can use one of the following installation media:

- Tape (created under OS/390, VM/ESA or VSE/ESA)
- VM reader (files are obtained through the network)
- CD-ROM (emulated tape on Multiprise 3000)

Differences between installation methods

IPL from tape is identical for all platforms. The only difference is the console:

- Under VM/ESA: 3270 screen
- All other methods: Hardware console (directly or via HMC)

Installation process

If installing from tape	If installing from VM reader	If installing from CD-ROM
Prepare the IPL tape	Get the installation files into the VM reader	Use the **Load from CD-ROM or Server** option on the HMC or SE
IPL from tape to load mini-system into RAM	IPL from VM reader to load mini-system into RAM	IPL from the CD-ROM
Start the SuSE installation program YaST	Start the SuSE installation program YaST	Start the SuSE installation program YaST
YaST will install LINUX on DASD	YaST will install LINUX on DASD	YaST will install LINUX on DASD
IPL from DASD	IPL from DASD	IPL from DASD

What to read in this document

If you are installing on...	IPLing using...	Then read this
G5 or G6		
as a VM/ESA guest	Tape	• "2 IPL from tape using a VM guest" on page 5 • "Part 3. VM, Ethernet and NFS installation scenario" on page 51
	Server or CD-ROM	• "Performing a load from CD-ROM on a G5 or G6 system" on page 9 • "Part 3. VM, Ethernet and NFS installation scenario" on page 51
	VM reader	• "3 IPL from the VM reader" on page 7 • "Part 3. VM, Ethernet and NFS installation scenario" on page 51
on an LPAR or natively	Tape	• "1 IPL from tape in a native/LPAR environment" on page 3 • "Part 2. LPAR, Token Ring and FTP installation scenario" on page 21
	Server or CD-ROM	• "Performing a load from CD-ROM on a G5 or G6 system" on page 9 • "Part 2. LPAR, Token Ring and FTP installation scenario" on page 21
Multiprise 3000		
as a VM/ESA guest	Tape	• "2 IPL from tape using a VM guest" on page 5 • "Part 3. VM, Ethernet and NFS installation scenario" on page 51
	Server or CD-ROM	• "Performing a boot from CD-ROM on a Multiprise 3000" on page 17 • "Part 3. VM, Ethernet and NFS installation scenario" on page 51
	VM reader	• "3 IPL from the VM reader" on page 7 • "Part 3. VM, Ethernet and NFS installation scenario" on page 51
on an LPAR or natively	Tape	• "Part 2. LPAR, Token Ring and FTP installation scenario" on page 21 • "Preparing a Multiprise 3000 LPAR" on page 136
	Server or CD-ROM	• "Performing a boot from CD-ROM on a Multiprise 3000" on page 17 • "Part 2. LPAR, Token Ring and FTP installation scenario" on page 21

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1 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.

2 IPL from tape using a VM guest

To IPL from tape using a VM guest:

1. If it is not already connected, attach the tape unit to your S/390 hardware system and the VM/ESA guest.
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.

3 IPL from the VM reader

Enter **LIN** from CMS to run the `LIN EXEC` that you created (see *Preparing for Installing LINUX for S/390*). This will use the CMS `punch` command to put the kernel, the boot parameter, and the initial root file system (RAMdisk) into the reader and then boot the kernel.

4 Load from CD-ROM

This chapter describes how to do a load from CD-ROM on a Multiprise 3000, G5, or G6 system. A G5 or G6 system is delivered with an internal SE (a ThinkPad without a CD-ROM drive) and an HMC (with a CD-ROM drive). A Multiprise 3000 has an integrated CD-ROM drive and an integrated SE. The boot is slightly different on a Multiprise 3000 to that on a G5 or G6 system.

Before you begin:

- All required microcode fixes must be installed on the SE and the HMC.

Performing a load from CD-ROM on a G5 or G6 system

1. On the HMC, select **Single object operation** on the machine you want to work with, as shown in Figure 1.

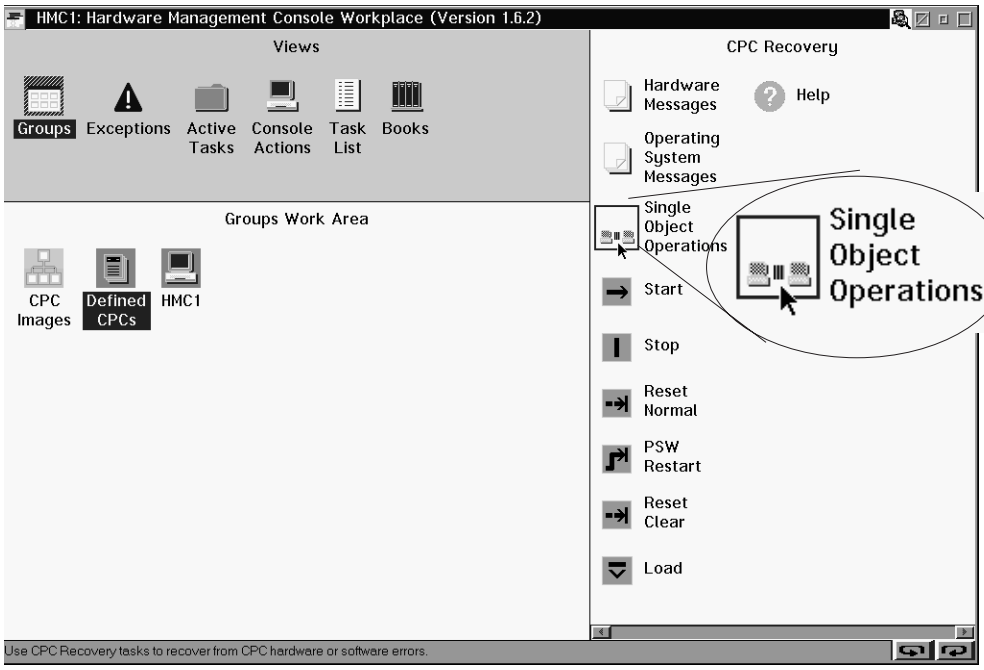

Figure 1. The HMC with the CPC Recovery window

2. Select the image in which you want to IPL, as shown in Figure 2.

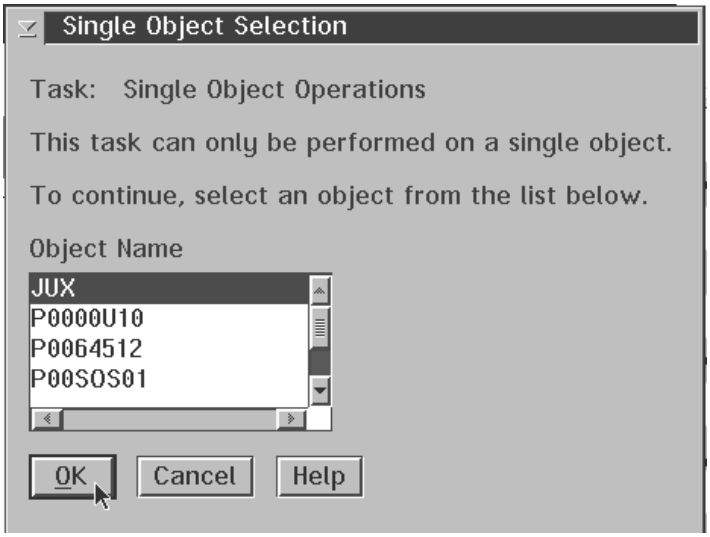

Figure 2. Selecting the image

3. From CPC Recovery, select the **Load from CD-ROM or server** icon as shown in Figure 3

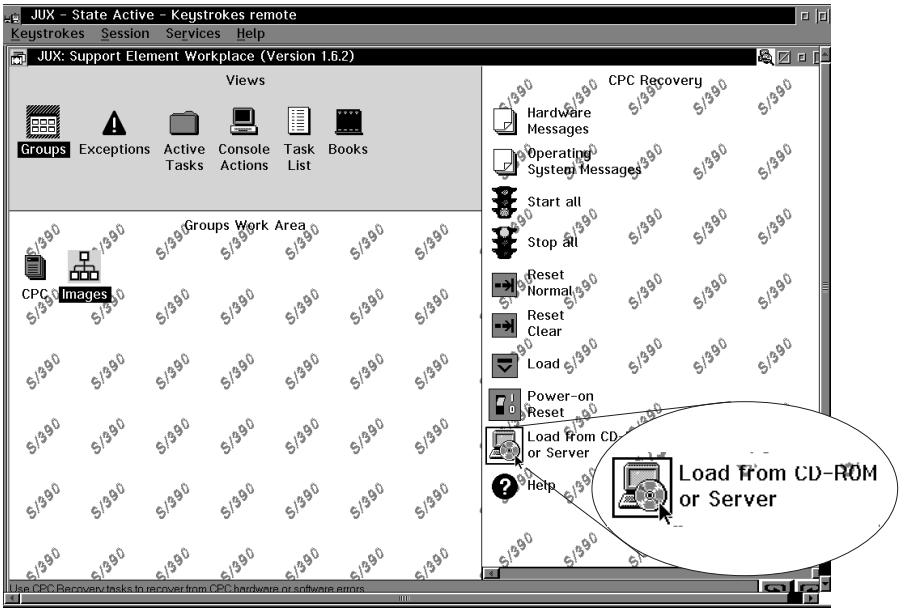

Figure 3. CPC Recovery window

4. Select the object you want to load on as shown in Figure 4

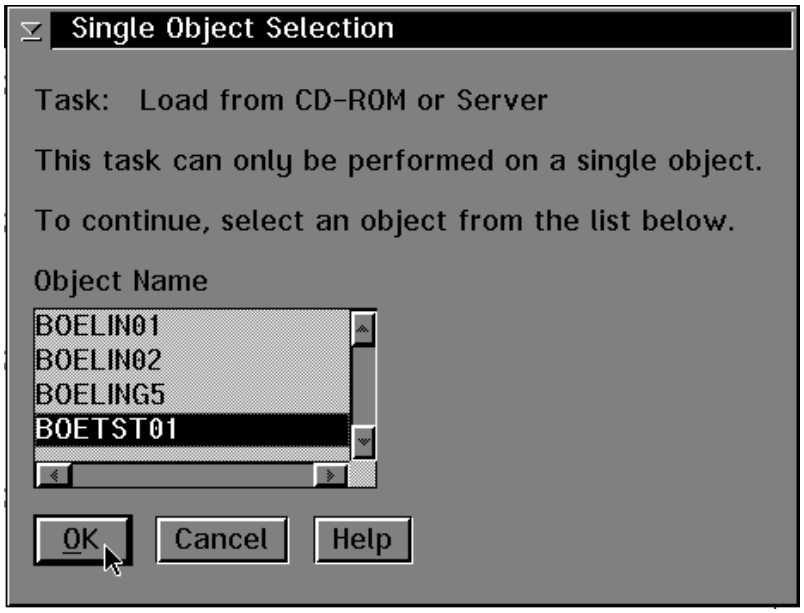

Figure 4. Selecting the image

5. On the task confirmation panel, select **Yes** as shown in Figure 5

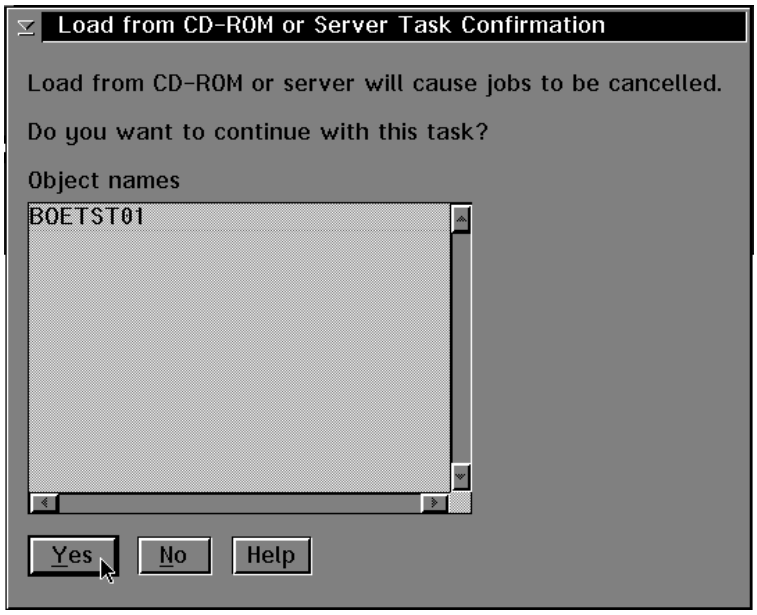

Figure 5. Confirming the action

6. Select the **Hardware Management Console CD-ROM** radiobutton for the source for IPL, as shown in Figure 6. This is because the CD that you are loading from is integrated with the HMC. On a Multiprise 3000 system, the CD-ROM drive is local. An alternative would be to have the CD-ROM or the CD image on a PC in the network. Then you would choose **FTP source** here.

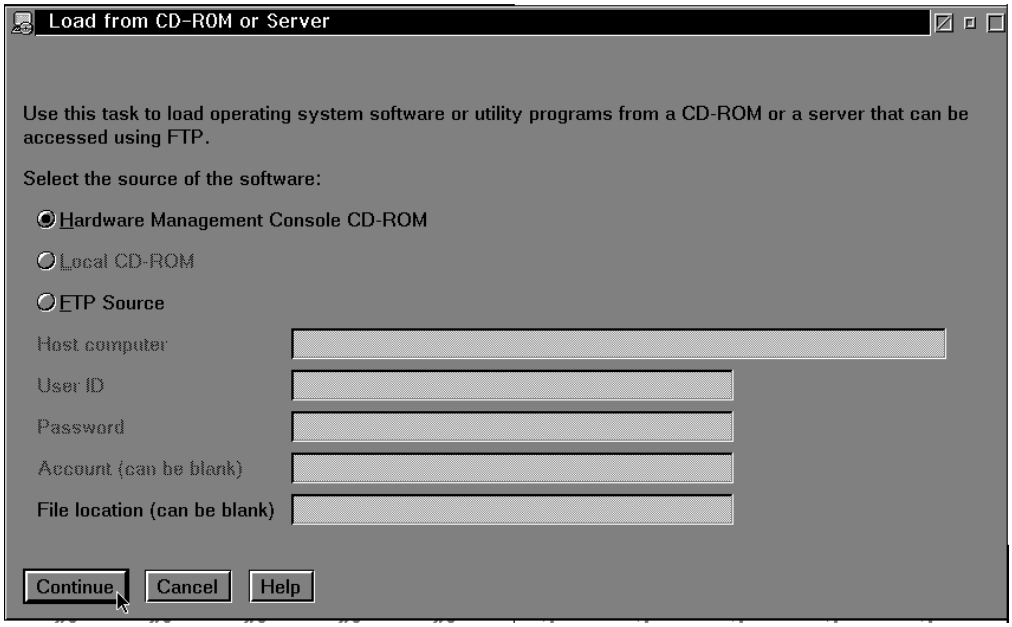

Figure 6. Selecting the source of the software

7. From the list of files on the CD, select the SuSE installation file (`SuSE.INS`), as shown in Figure 7. (If you have your own `ins` files on a server, you could choose one of them here.)

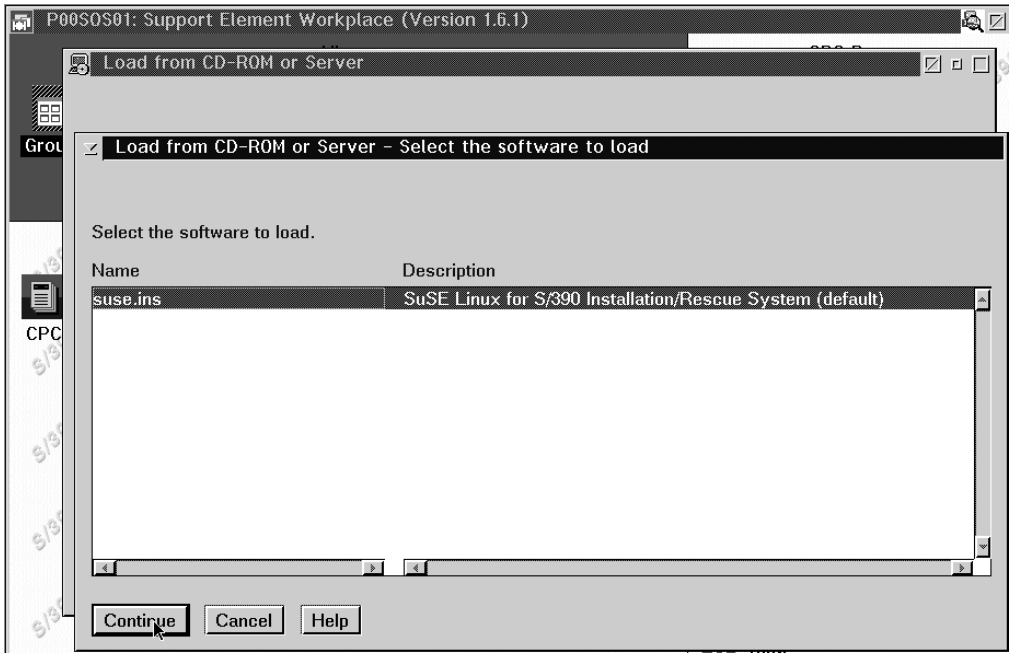

Figure 7. Selecting the software

8. Deactivate all channels of devices that are not supported, for example, coupling facility channels.
9. Confirm the action by selecting **Yes**, as shown in Figure 8.

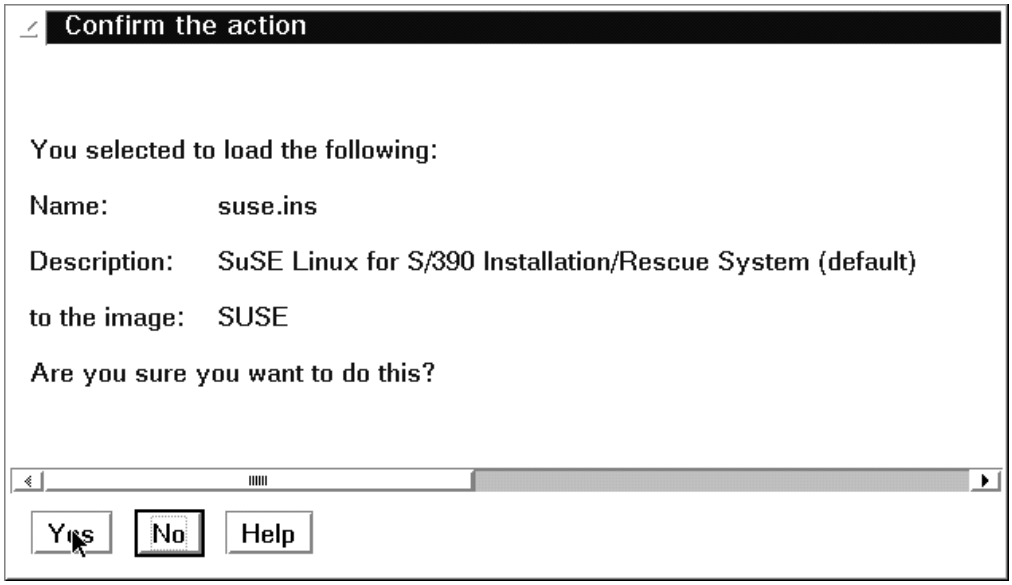

Figure 8. Confirm the action

First the software is loaded from the CD-ROM. A progress windows will appear as shown in Figure 9

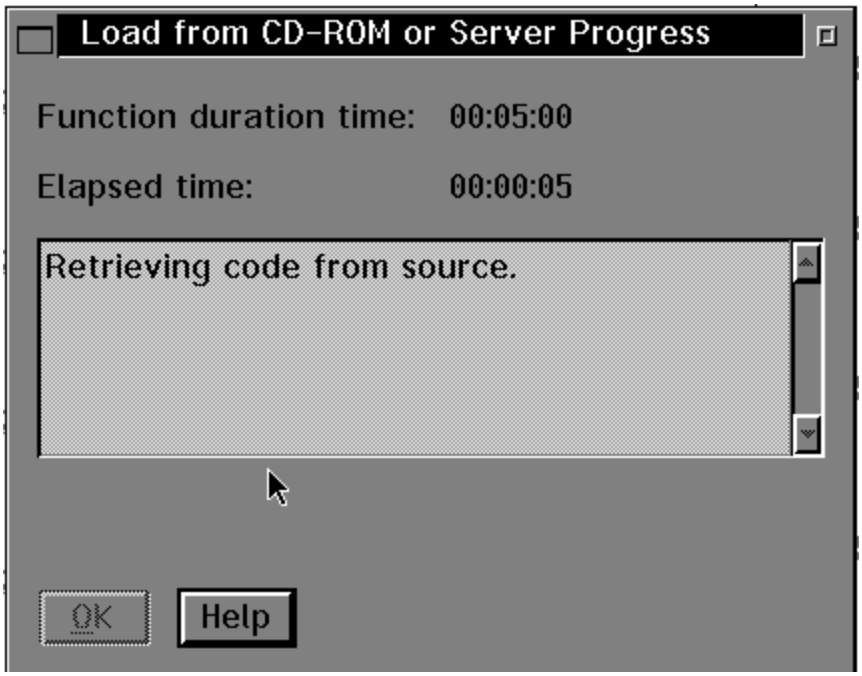

Figure 9. Retrieving code from CD-ROM progress

Next, the software will be loaded into the system, as indicated by the progress window shown in Figure 10

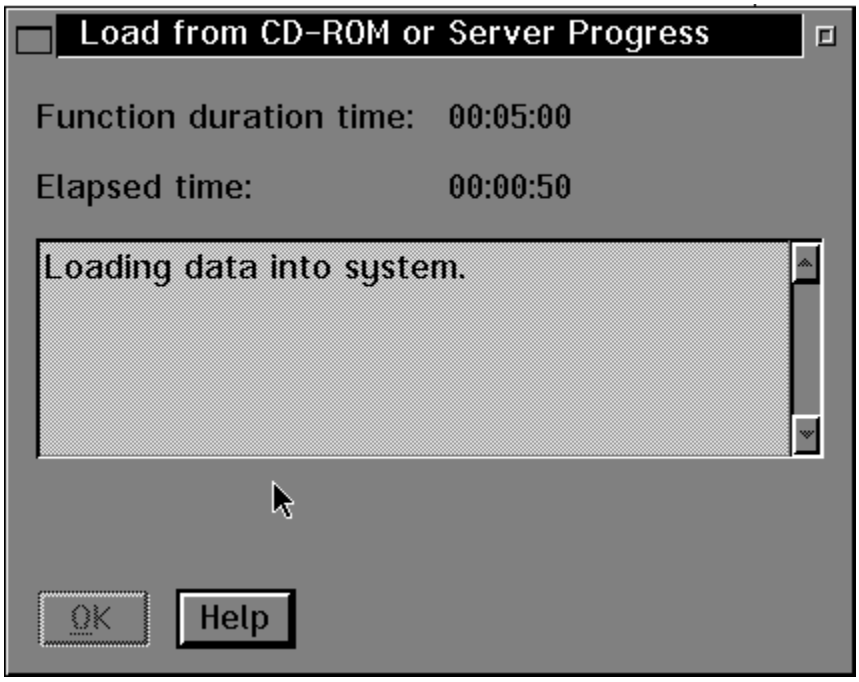

Figure 10. Loading the software into the system

Successful completion of the load will be reported by a message shown in Figure 11

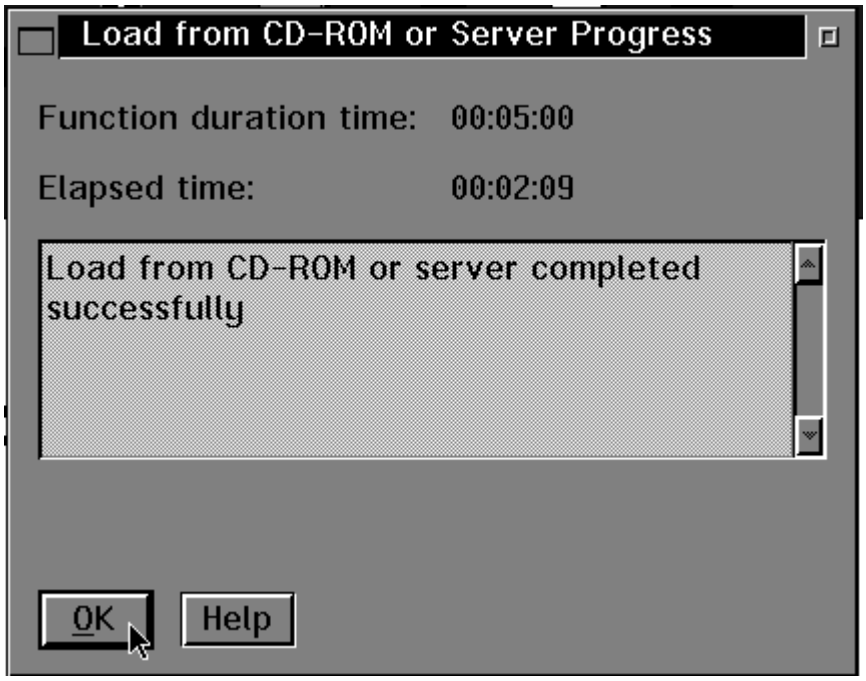

Figure 11. Completion message

10. You can then look at the operating system messages by selecting the icon as shown in Figure 12.
    Now the installation proper will begin. You will be prompted for information.

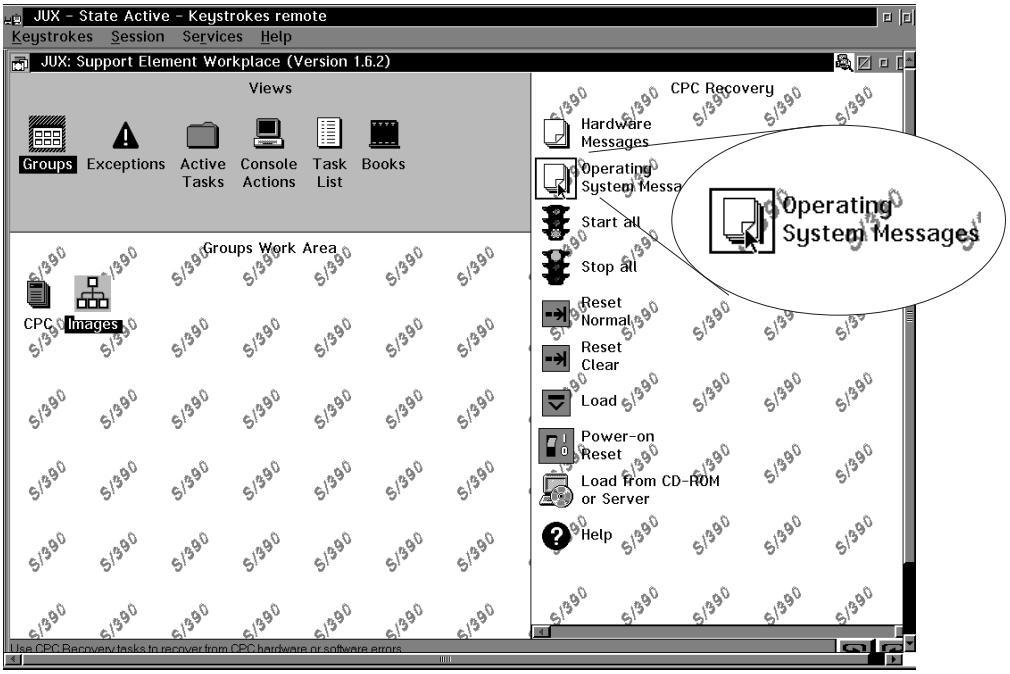

Figure 12. Selecting the Operating System Messages icon

Performing a boot from CD-ROM on a Multiprise 3000

1. On the integrated SE, log on and wait for the license agreement to finish diplaying.
2. Insert the CD-ROM in the CD-ROM drive.

   On the CD, you will see several files. Find the file SuSE-6-4.INS. Every installation (INS) file contains references to an image, an initrd, and a parameter line file and their hex addresses. You can make your own installation file for your own installation configuration. You can add comments to an installation file by starting the line with an asterisk and a blank.
3. Select the image in which you want to IPL.
4. On the CPC Recovery window, select **Load from CD-ROM or server**
5. Select the **Local CD-ROM** radiobutton
6. Enter the path to the SuSE data as shown in Figure 13:

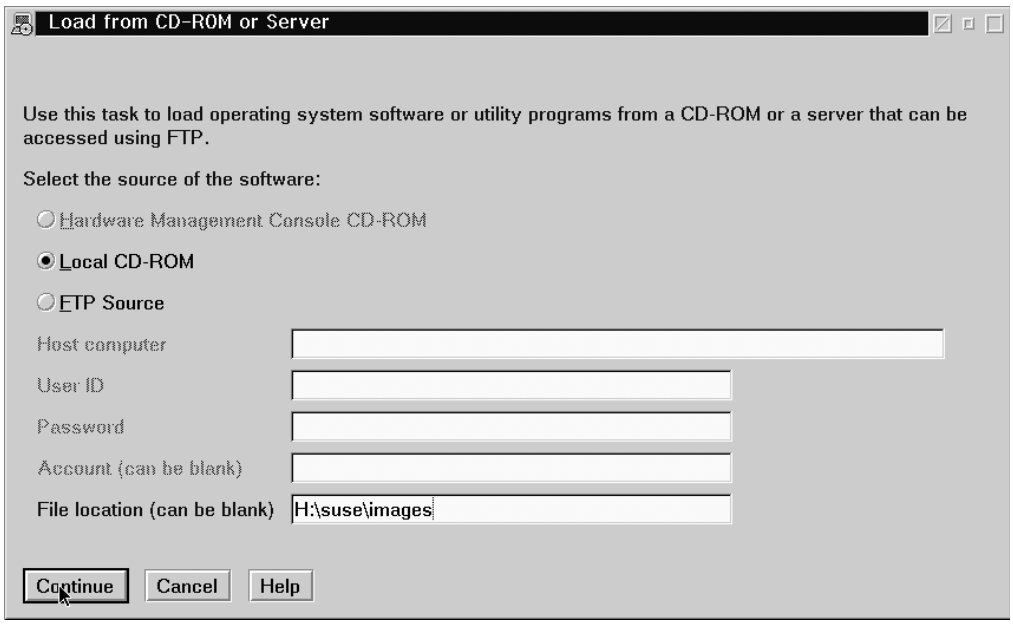

Figure 13. File location

7. Select **Continue**.
8. On the File to load window, confirm that the SuSE.INS file is selected.
9. Confirm the action.

   Next the SuSE boot messages will appear on the Console message window.

5 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, Token Ring and FTP installation scenario” on page 21
- “Part 3. VM, Ethernet and NFS installation scenario” on page 51

Part 2. LPAR, Token Ring and FTP installation scenario

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6 Kernel initialization

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

```
Linux version 2.2.16 (root@ikr_tape.suse.de) (gcc version 2.95.2 19991024 (relea
se)) #1 SMP Thu Oct 19 10:16:44 GMT 2000
Command line is: ramdisk_size=32768 root=/dev/ram0 ro
We are running native
This machine has an IEEE fpu
Initial ramdisk at: 0x02000000 (16777216 bytes)
```

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

```
Detected device FD00 on subchannel 010A - PIM = 80, PAM = 80, POM = FF
Detected device FD01 on subchannel 010B - PIM = 80, PAM = 80, POM = FF
...
...
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
...
...
```

At the end a partition check is done:

```
Partition check:
RAMDISK: Compressed image found at block 0
VFS: Mounted root (ext2 filesystem).
This is SuSE Instsys Version 2000.10.20 Rel. 0
Build date: Fri Oct 20 18:43:12 GMT 2000
Creating /var/log/boot.msg
Oct 25 15:41:48 suse syslogd 1.3-3: restart.
```

Finally you are welcomed to the system:

```
=                                                                      =
==-                Welcome to SuSE Linux 7.0 for IBM S/390            -==
=                                                                      =
```

Then you can set up the network.

7 Network setup

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

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 Token Ring, select **1**:

```
First, select the type of your network device:
0) no network
1) OSA Token Ring
2) OSA Ethernet
3) OSA-Express Gigabit Ethernet (experimental)
4) Channel To Channel
5) Escon
6) IUCV (experimental)
Enter your choice (1-6):
1
```

2. You will be prompted to read the license agreement before entering information about your network. Answer **yes** as the installation will not continue otherwise:

```
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
...
...
```

3. After reading the license agreement, to continue with the installation, enter **yes**

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

4. 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 `fc20`:

```
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:
fc20
```

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

```
Please type in the relative port on device number fc20
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 **yes** if everything looks all right:

```
Unloading LCS module if active...
rmmod: module lcs is not loaded
Trying to start the LCS module now...
insmod -v lcs noauto=1 devno_portno_pairs=0xfc20,0 :
Using /lib/modules/2.2.16/net/lcs.o
Symbol version prefix 'smp_'
Starting lcs
lcs: tr0 configured as follows read subchannel=126 write subchannel=127
read_devno=fc20 write_devno=fc21
hw_address=00:60:94:44:DF:87 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)
lsmod now shows all loaded modules:
lcs                    14888   0 (unused)
Was the loading of "lcs" successful (Yes/No) ?
yes
```

7. Next you will be prompted for the network data. Note that the MTU size needs to be the same on both the network and on your LINUX for S/390 system. Here is an example from one of our systems:

```
Please enter your full host name (e.g. s390.suse.com):
boeaet32.boeblingen.de.ibm.com
Please enter your IP address:
9.164.188.101
Please enter the net mask:
255.255.224.0
Please enter the broadcast address:
9.164.191.255
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
Please enter the MTU (Maximum Transfer Unit),
leave blank for default [1492]:
```

8. 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 for tr0 will be:
Full host name   : boeaet32.boeblingen.de.ibm.com
IP address       : 9.164.188.101
Net mask         : 255.255.224.0
Broadcast address: 9.164.191.255
Gateway address  : 9.164.181.1
DNS IP address   : 9.164.178.1
DNS search domain: boeblingen.de.ibm.com
MTU size         : 1492
Is this correct (Yes/No) ?
yes
```

9. Set a temporary root password:

```
For security reasons you have to set an temporary installation
system password for the user "root".
You'll be asked for it only when you telnet in to this installation
system to limit the access to it and it will be cleared as soon
as you shut down or reset the installation system.

Please enter the temporary installation password:
pas4root
Temporary installation password set.
```

You will see messages about the network setup:

```
restarting syslogd:
Oct 25 15:48:45 boeaet32 syslogd 1.3-3: restart.
ifconfig tr0 9.164.188.101 netmask 255.255.224.0 broadcast 9.164.191.255 mtu 149
2
/sbin/ifconfig tr0 :
tr0       Link encap:16/4 Mbps Token Ring  HWaddr 00:60:94:44:DF:87
          inet addr:9.164.188.101  Bcast:9.164.191.255  Mask:255.255.224.0
          UP BROADCAST RUNNING MULTICAST  MTU:2000  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:100
```

SuSE LINUX will then ping the IP address, the gateway, and the DNS server automatically to verify the network connection:

```
Trying to ping my IP address:
PING 9.164.188.101 (9.164.188.101): 56 data bytes
64 bytes from 9.164.188.101: icmp_seq=0 ttl=255 time=0.157 ms
64 bytes from 9.164.188.101: icmp_seq=1 ttl=255 time=0.112 ms
64 bytes from 9.164.188.101: icmp_seq=2 ttl=255 time=0.136 ms
--- 9.164.188.101 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max = 0.112/0.135/0.157 ms
Trying to ping the IP address of the Gateway:
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=7.540 ms
64 bytes from 9.164.181.1: icmp_seq=1 ttl=255 time=2.456 ms
64 bytes from 9.164.181.1: icmp_seq=2 ttl=255 time=9.870 ms
--- 9.164.181.1 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max = 2.456/6.622/9.870 ms
Gateway seems to respond to our pings, continuing.
Trying to ping the IP address of the DNS Server:
PING 9.164.178.1 (9.164.178.1): 56 data bytes
64 bytes from 9.164.178.1: icmp_seq=0 ttl=255 time=9.676 ms
64 bytes from 9.164.178.1: icmp_seq=1 ttl=255 time=3.050 ms
64 bytes from 9.164.178.1: icmp_seq=2 ttl=255 time=2.372 ms
--- 9.164.178.1 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max = 2.372/5.032/9.676 ms
```

10. When all is set up you will see the system prompt:

```
Network Setup finished, running inetd...
[SuSE Instsys] boeaet32:/ #
```

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

8 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** and instead of **F10** use **0**. (The cursor must be on a non-input field for this to work.)

1. When you telnet in to the LINUX system you must login as **root**; the password is the temporary password:

```
boeaet32 login: root
Password: pas4root
```

2. The following screen appears:

```
>>> >>> >>> >>> >>> >>>  SuSE Linux S/390 7.0  <<< <<< <<< <<< <<< <<<

    1. If you want to check which devices the dasd driver can see,
       run 'insmod dasd probeonly' and check
       the output of 'cat /proc/dasd/devices'.
       Remove the dasd driver with 'rmmod dasd' afterwards.

    2. Choose the device numbers you want to use for SuSE Linux S/390
            !!!    BE CAREFUL WHEN SELECTING DASDs -   !!!
            !!! YOU MAY DESTROY DATA ON SHARED DEVICES !!!

    3. Enter 'insmod dasd dasd=<list of devices>'
       Remember to separate devices by commas (<dev_no>,<dev_no>),
       syntax for ranges is <from_dev_no>-<to_dev_no>
       like
              'insmod dasd dasd=FD00-FD0F,FD40,FD42,FD80-FD86'

       Note: When updating, you have to load the dasd driver with the
       same DASD order as in the installed system  - see documentation
       for further information.

    4. Start installation or update with  'YaST'.

[SuSE Instsys] boeaet32:/root #
```

3. Enter an `insmod` command to tell LINUX which DASDs you will be using:

```
[SuSE Instsys] boeaet32:/root # insmod dasd dasd=fd00-fd03
```

4. Format the disks. (This can take a while.) If you have not formatted the disks with LINUX before, you need to format dasda, dasdb and any other disks you have defined:

```
[SuSE Instsys] lnxsrv01:/root # dasdfmt -f /dev/dasda -b 4096
```

or

```
[SuSE Instsys] lnxsrv01:/root # dasdfmt -n fd00 -b 4096
```

Confirmation messages will appear after each format command:

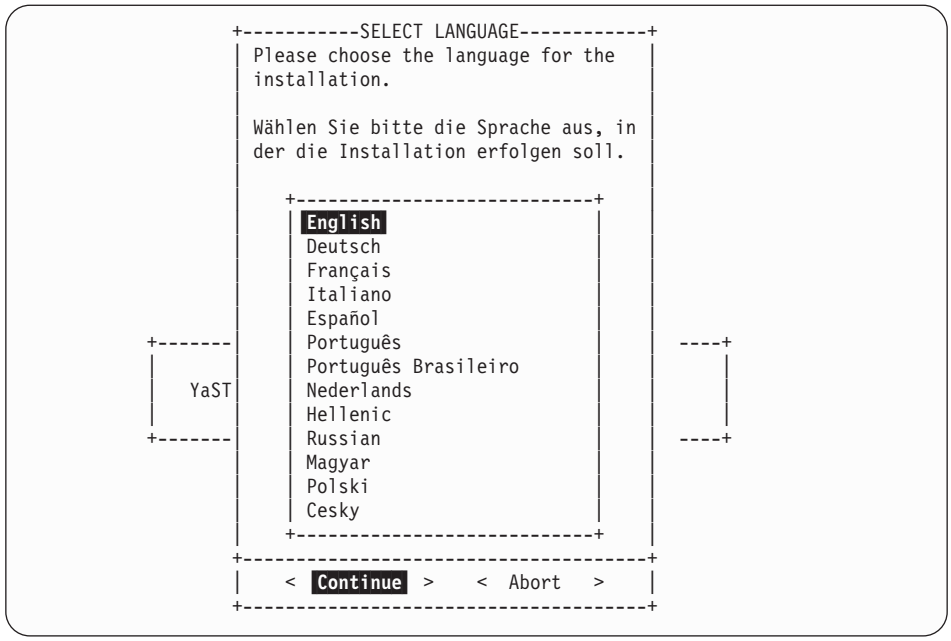
```
I am going to format the device /dev/dasda in the following way:
   Device number of device : 0xfd00
   Major number of device  : 94
   Minor number of device  : 0
   Labelling device        : yes
   Disk label              : LNX1 x80405228
   Blocksize               : 4096

--->> ATTENTION! <<---
All data in the specified range of that device will be lost.
Type "yes" to continue, no will leave the disk untouched: yes
Formatting the device. This may take a while (get yourself a coffee).
Finished formatting the device.
Rereading the partition table... done.
```

Repeat this step for each disk defined.

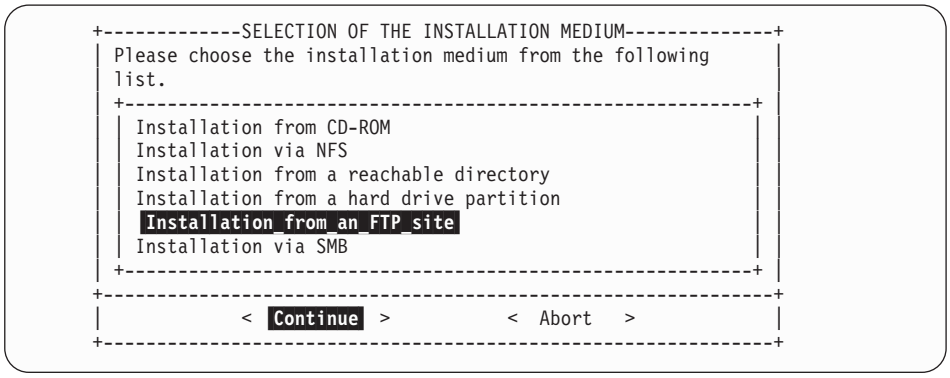
5. Enter **yast** to start the installation program:

```
[SuSE Instsys] boeaet32:/root # yast
```

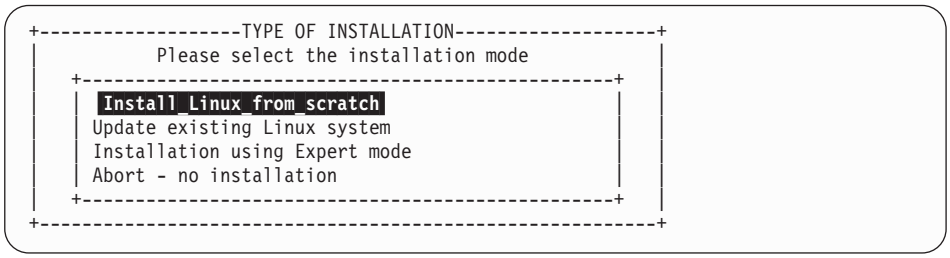
6. On the language selection panel, use the arrow keys to choose a language, for example English or Deutsch (German) , and select **Continue**:



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

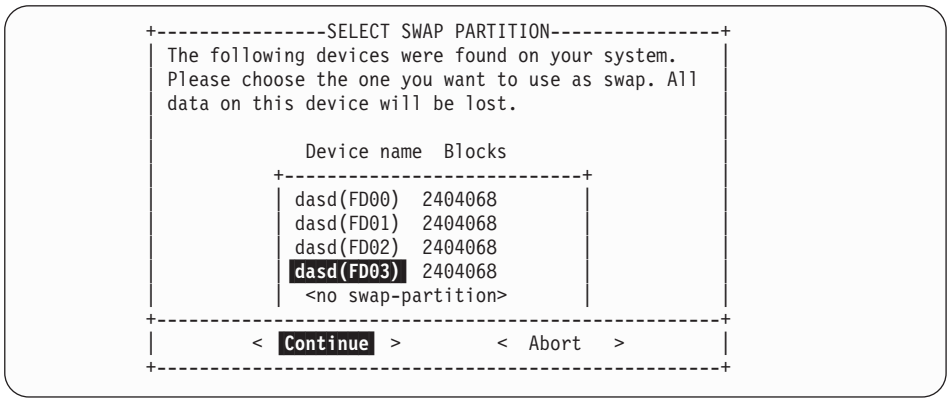


8. On the panel asking for installation mode, select **Install Linux from scratch**:

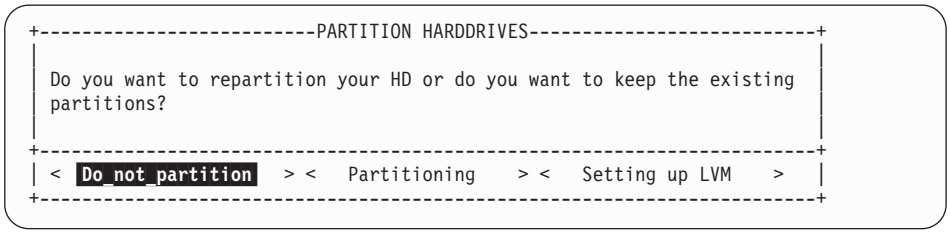


9. Select the DASD to use for the swap space.

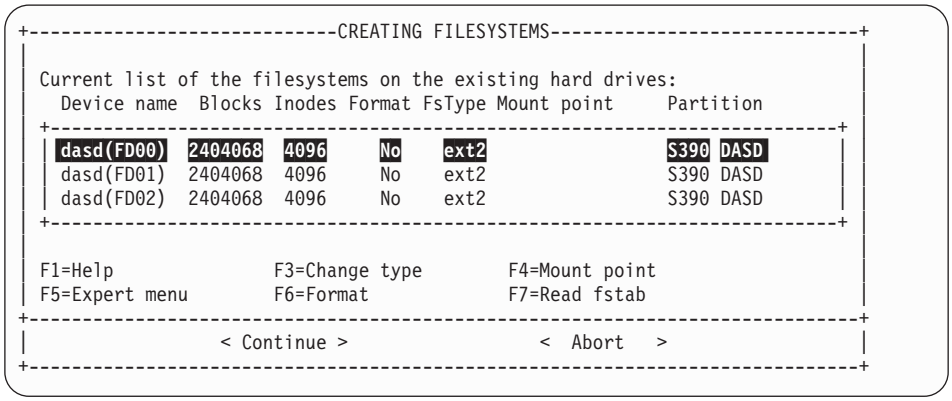
   Hint: It is a good idea to use the first DASD as the swap disk, because SuSE forces the swap disk to be called 'dasda'. It will be less confusing if your first disk is 'dasda' and the second one 'dasdb', and so on. In the example, this will be **fd03**. Then select **Continue**:



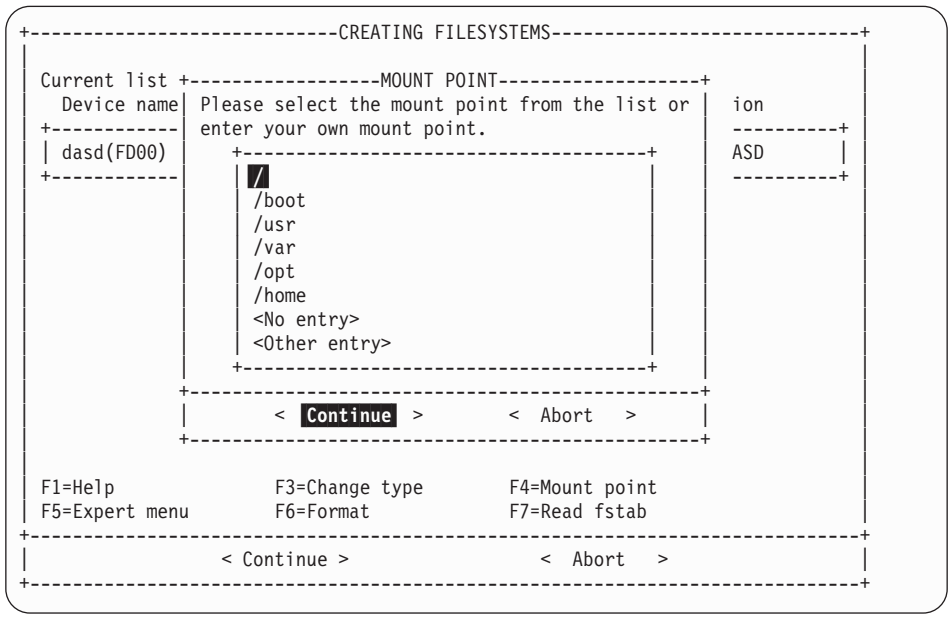
10. Select **Do not partition** on the partitioning screen:



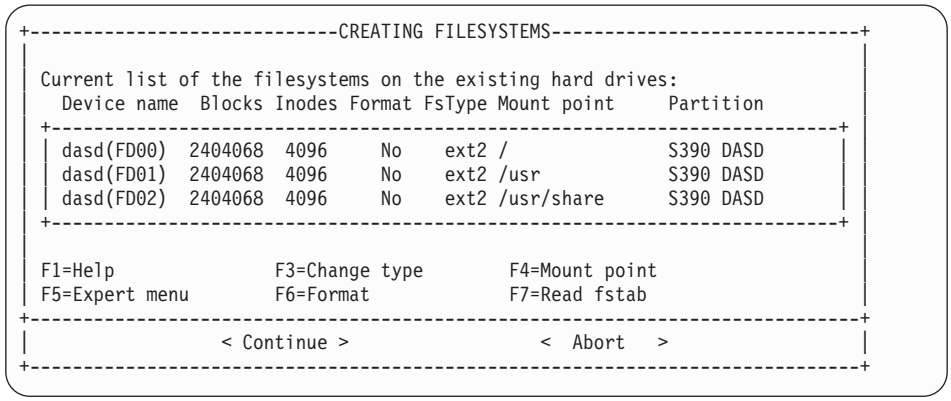
11. Create a file system. Select the DASD you want to use. Press **F4** to define the mountpoint.



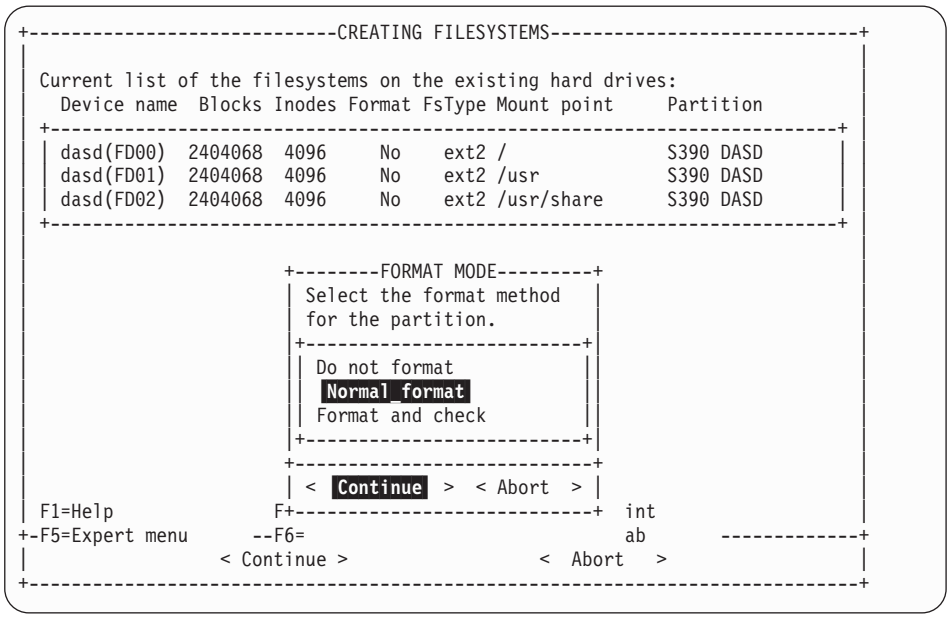
12. On the panel shown, select the root mountpoint from the list (the first entry '/') and then select **Continue**:



13. Repeat the last two steps if necessary to select other mount points for each of your DASD.

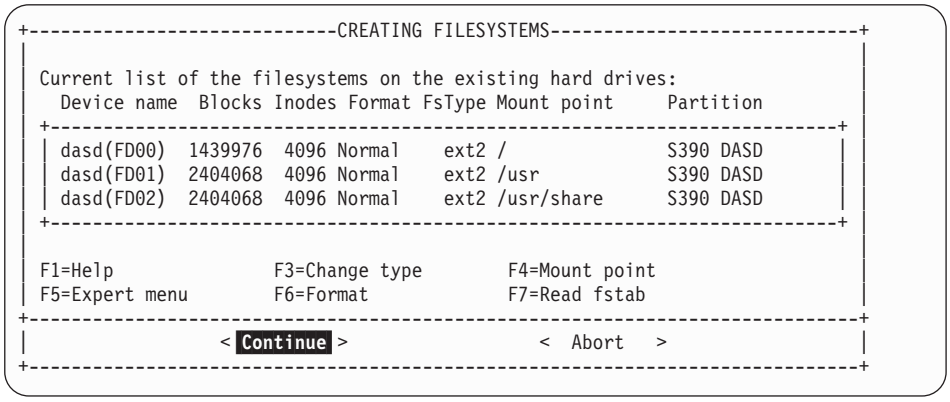


14. Format the DASD by pressing **F6**, then select **Normal format** and **Continue**:

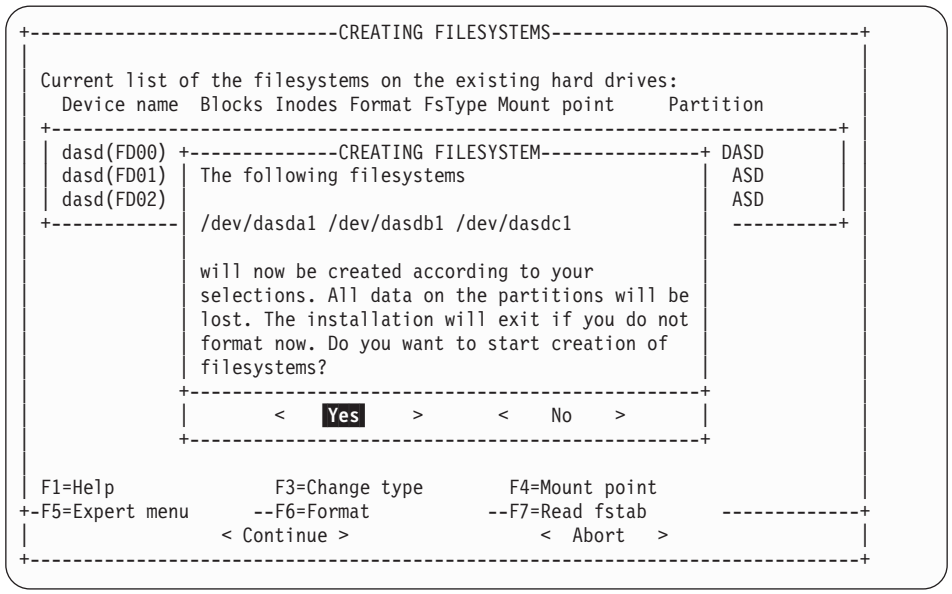


Repeat this for each DASD.

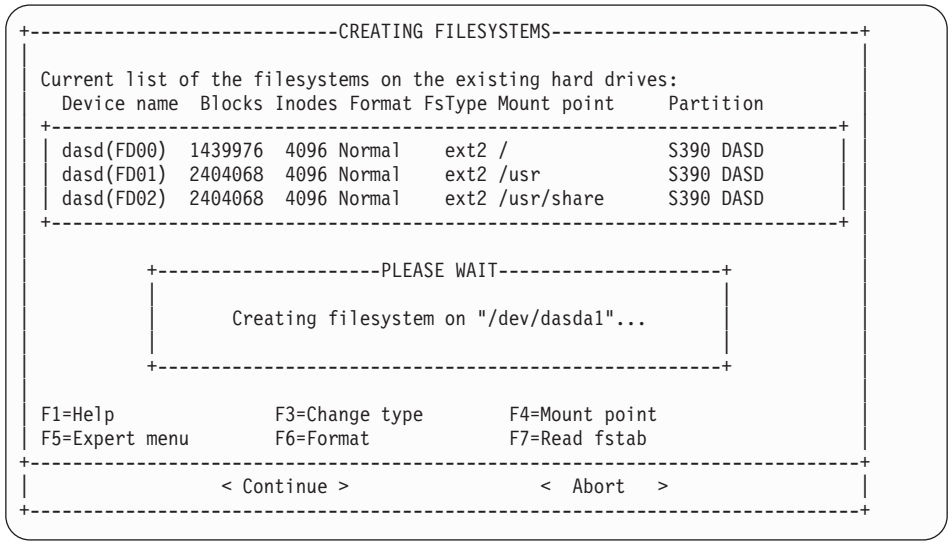
15. The format type of the DASD will change to 'Normal'. Select **Continue** to begin formatting:



16. On the confirmation screen check the data and select **Yes**:



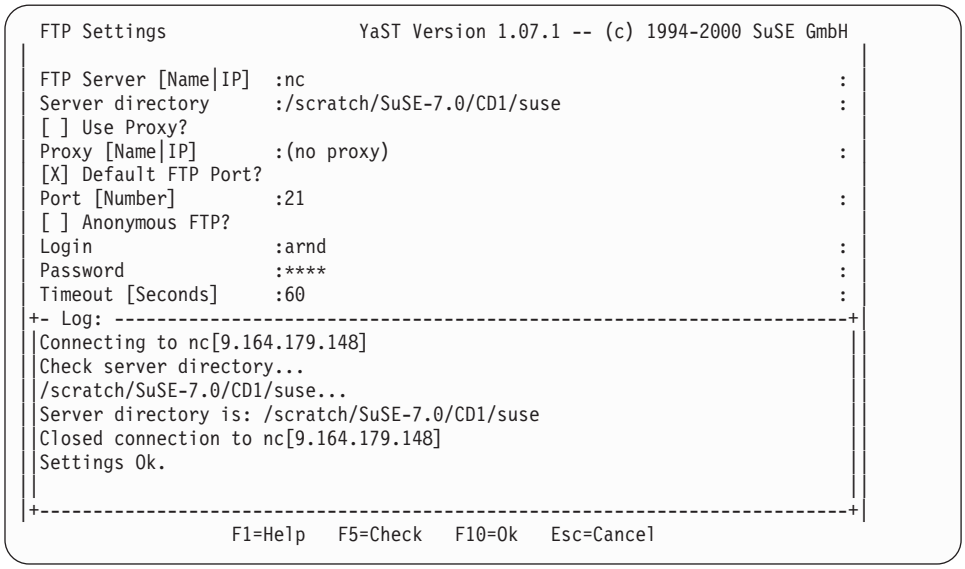
17. The file system is created:



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

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

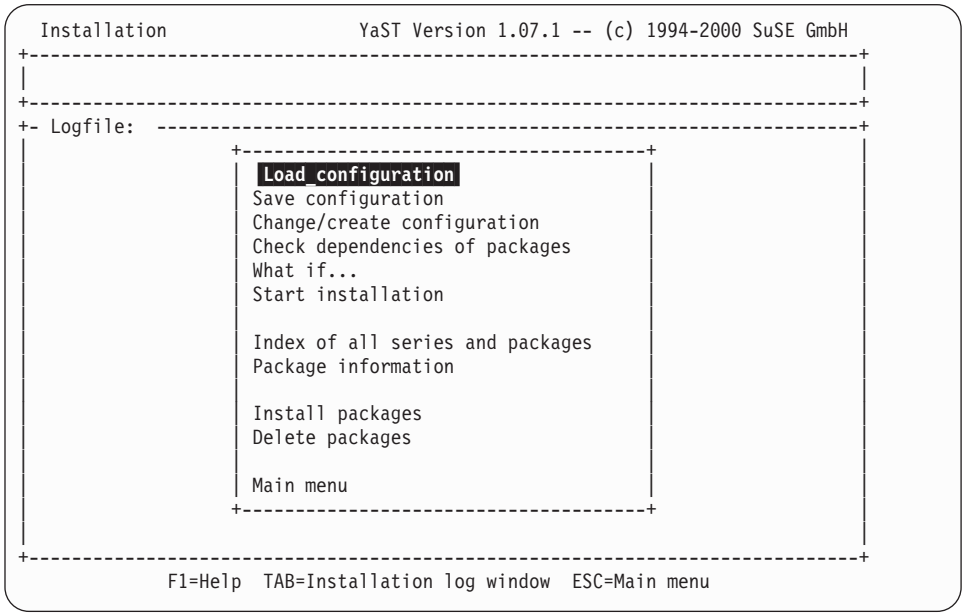
1. Fill in the data for your FTP server and press **F5** to check the connection. Watch for the words **Settings OK** at the end of the messages:



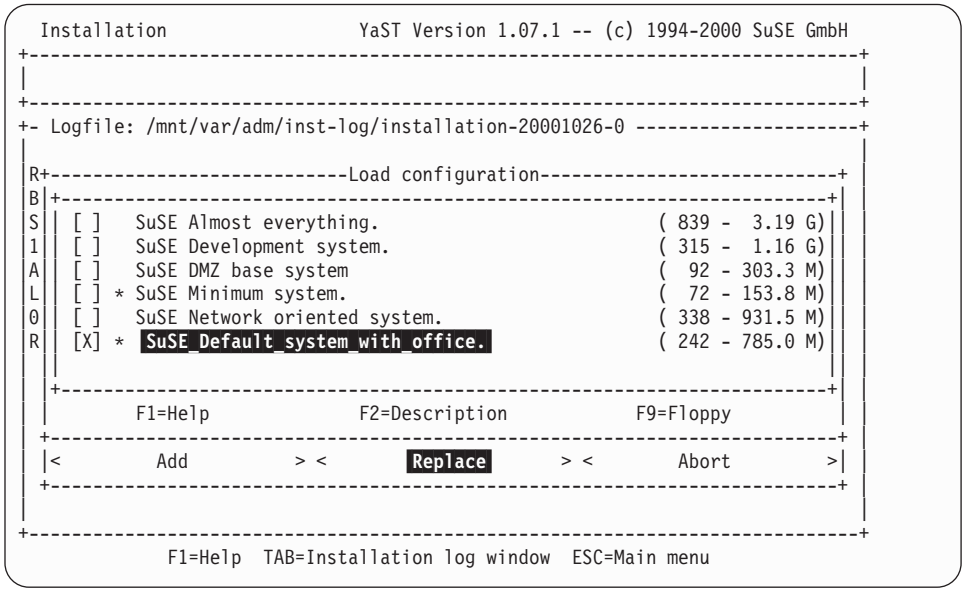
2. If the connection is OK, press **F10** to start loading packages from the CD on the FTP server.

10 Installing the packages from the FTP server

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

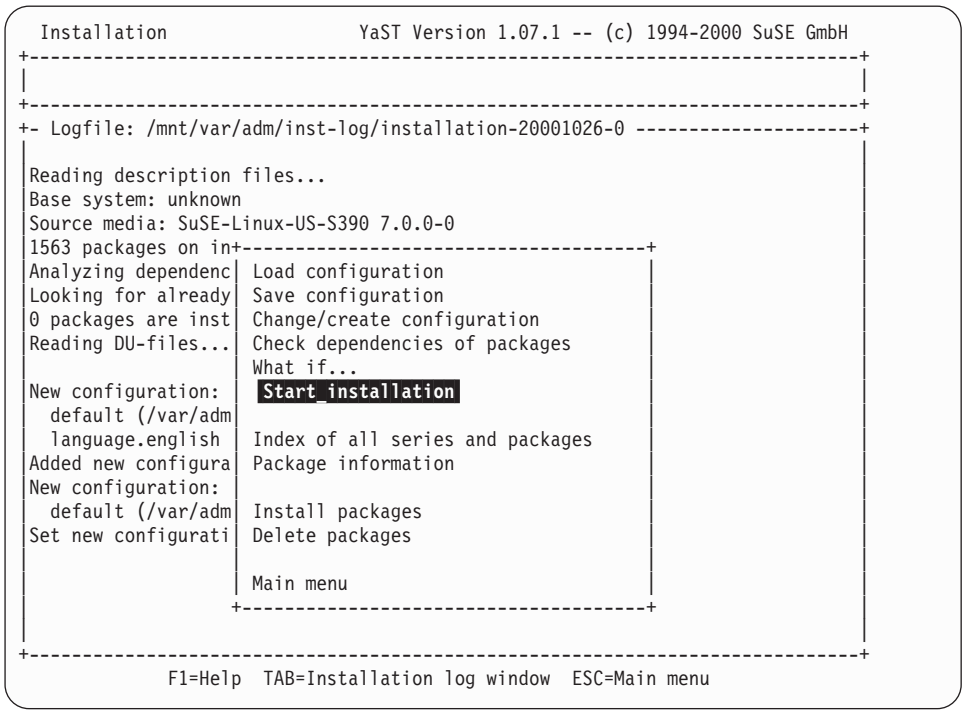


2. On the Load configuration screen, select **SuSE default system with office** and **Replace**:

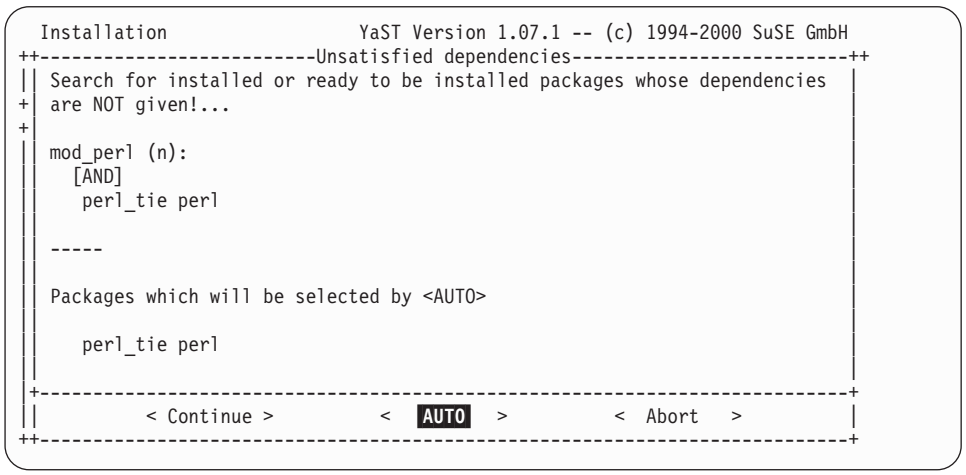


You can add additional packages at a later time (after completing the installation).

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



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



If it does, you can select **AUTO** to 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:

```
  Installation [  *]            YaST Version 1.07.1 -- (c) 1994-2000 SuSE GmbH
+------------------------------------------------------------------------------+
|Installing package  28:      man -   3.9 M - 215 packages remaining...        |
+------------------------------------------------------------------------------+
+- Logfile:  ----------------------------------------------------------------+
|7.0/CD1/suse/a1/gzip.rpm (67511 bytes).                                       ||
|  gzip           ################################################            ||
|  150 Opening BINARY mode data connection for /scratch/SuSE-                  ||
|7.0/CD1/suse/a1/lcs.rpm (59320 bytes).                                        ||
|  lcs            ################################################            ||
|  150 Opening BINARY mode data connection for /scratch/SuSE-                  ||
|7.0/CD1/suse/a1/less.rpm (104731 bytes).                                      ||
|  less           ################################################            ||
|  150 Opening BINARY mode data connection for /scratch/SuSE-                  ||
|7.0/CD1/suse/a1/libz.rpm (96800 bytes).                                       ||
|  libz           ################################################            ||
|  150 Opening BINARY mode data connection for /scratch/SuSE-                  ||
|7.0/CD1/suse/a1/lvm.rpm (265728 bytes).                                       ||
|  lvm            ################################################            ||
|  150 Opening BINARY mode data connection for /scratch/SuSE-                  ||
|7.0/CD1/suse/a1/man.rpm (325950 bytes).                                       ||
|                                                                              ||
+------------------------------------------------------------------------------+
```

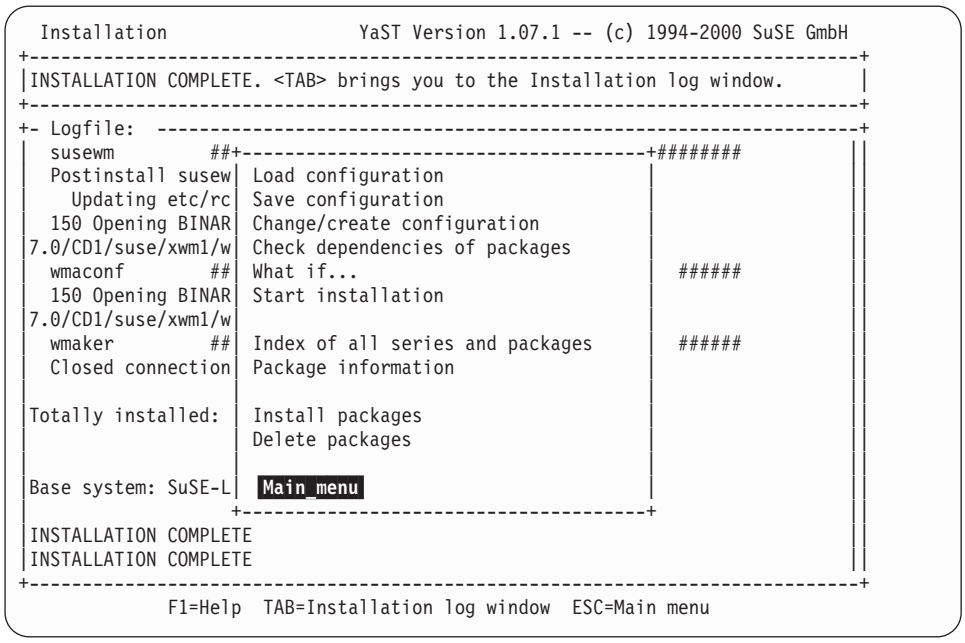
The **installation complete** message tells you that the installation of the packages is now finished:

```
|Base system: SuSE-Linux-US-S390 7.0.0-0                                       ||
|                                                                              ||
|INSTALLATION COMPLETE.                                                        ||
+------------------------------------------------------------------------------+
```

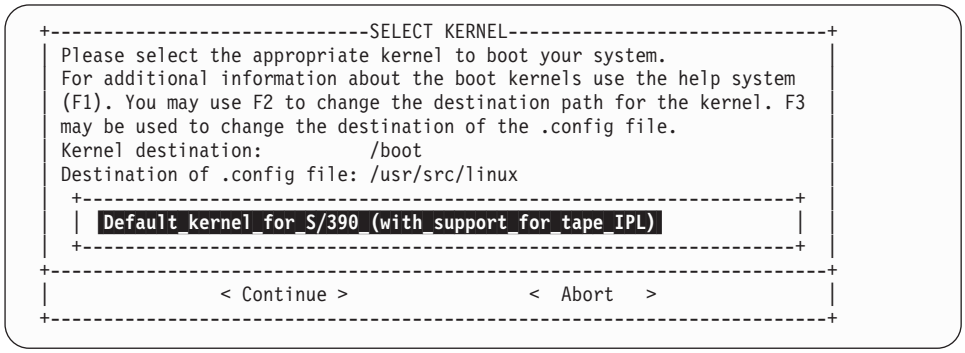
6. To ensure no unsatisfied dependancies remain we recommend that you repeat steps 3 to 5 until there are two **installation complete** messages at the bottom of the screen:

```
|Base system: SuSE-Linux-US-S390 7.0.0-0                                       ||
|                                                                              ||
|INSTALLATION COMPLETE.                                                        ||
|INSTALLATION COMPLETE.                                                        ||
+------------------------------------------------------------------------------+
```

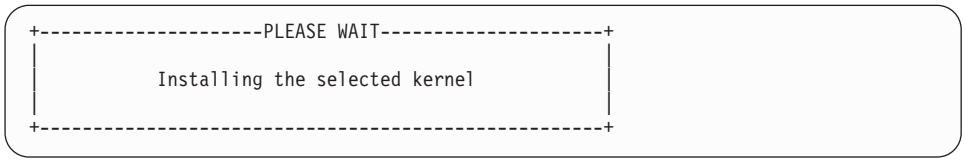
7. Press the ESC key to get the main menu, then select **Main menu**:



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



A message comes up confirming the installation of the kernel:

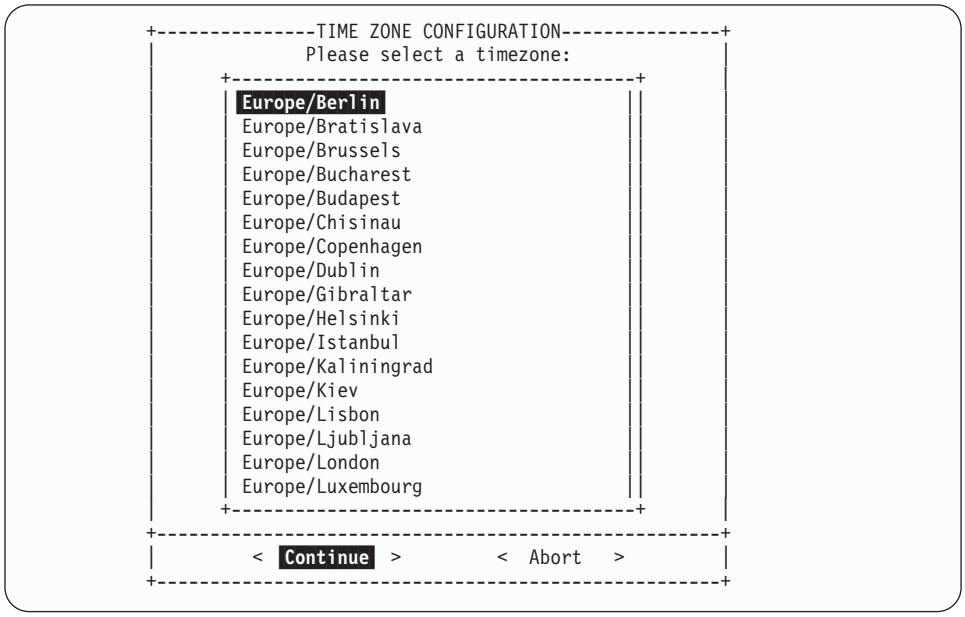


11 Configuring the system

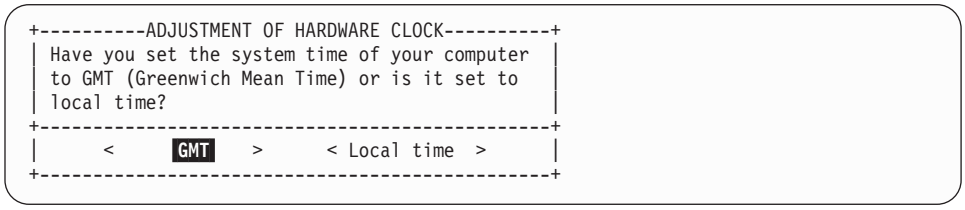
In this section the following is described:

- Setting the timezone
- Setting or changing the network definitions
- Starting the INETD, portmapper, and other network services

1. Select the time zone:



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



Next you will be prompted for the network definitions.

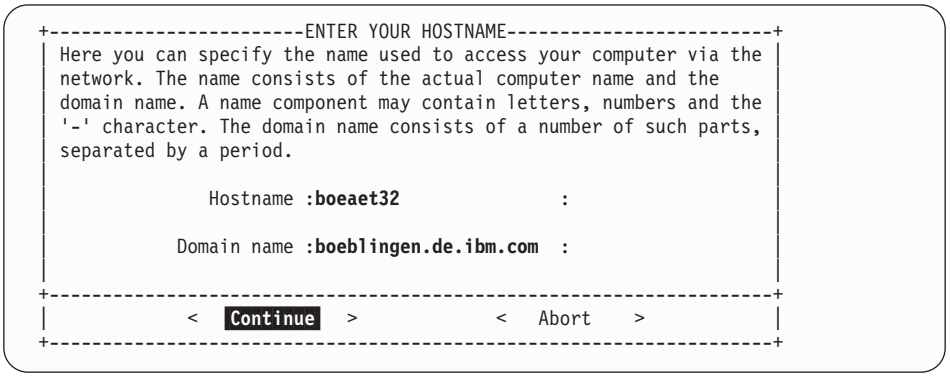
Setting the network definitions

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.

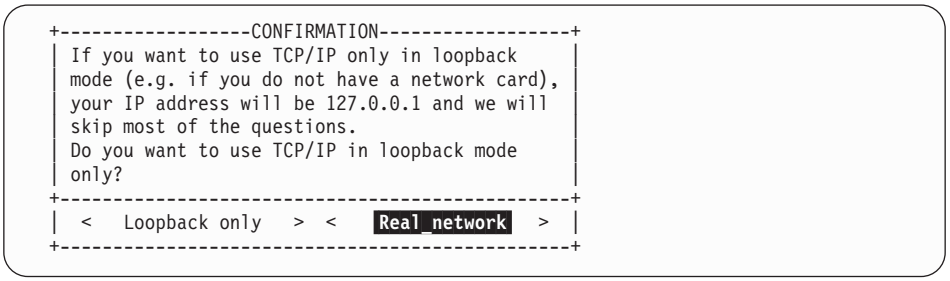
Before you begin: Ensure that you have the network parameters handy. These include:

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

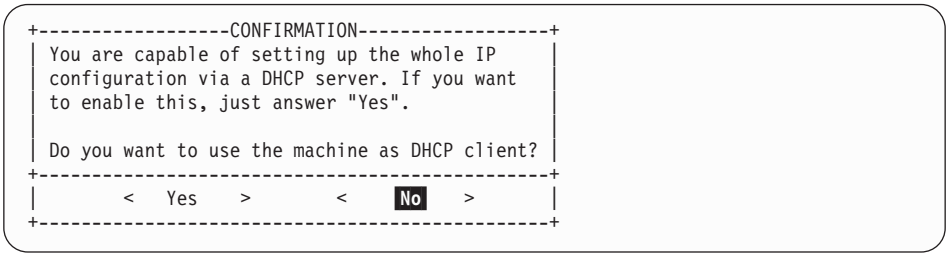
1. Enter the host name of the LINUX system:



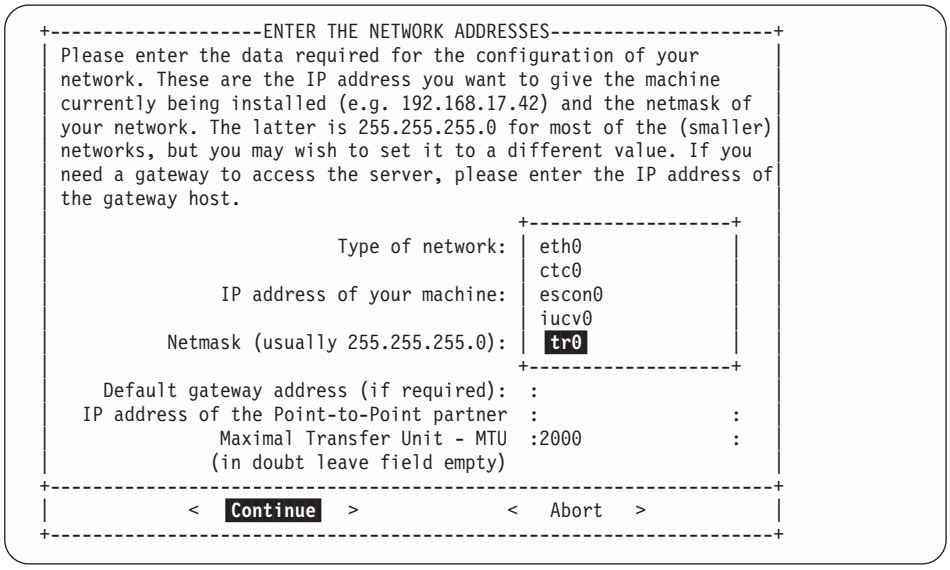
2. Select **real network** on the screen asking about loopback or real network. Loopback means that only the local network (that is, only the machine itself) will be used. Since you need to telnet in from another machine, you need the real network.



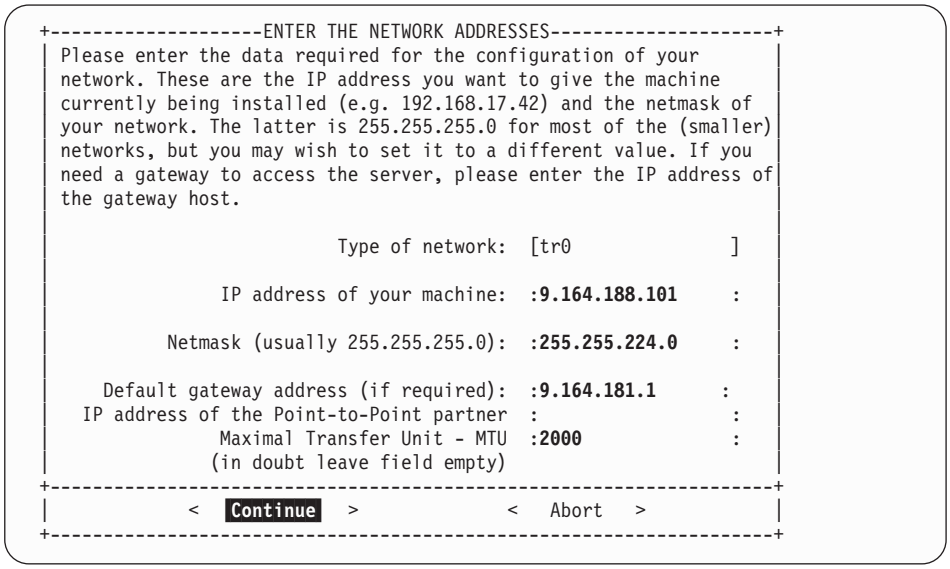
3. Select **No** on the screen asking about DHCP. (Use No for setting up a server. If you are setting up many LINUX machines, and only have a limited number of IP addresses available, you may need to set up as DHCP):



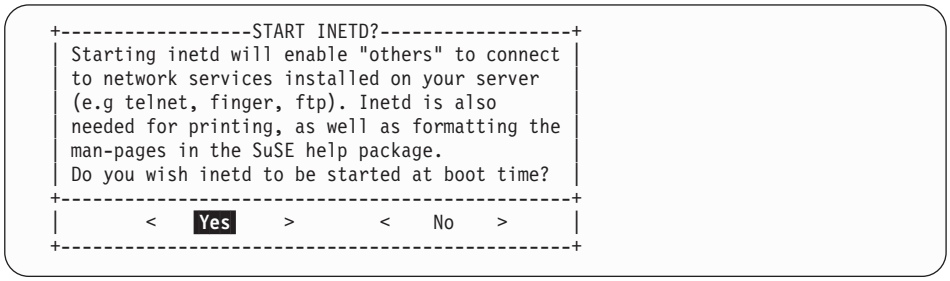
4. Select the type of network you are using. You can choose between Ethernet (eth0) or Token Ring (tr0). You cannot use plip or arc0 on an S/390 system:



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



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



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.                      |
|                                                |
|                                                |
|    :boeaet32.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 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 >                             |
+---------------------------------------------------------------------+
```

Then the file system will be automatically unmounted:

```
Unmounting /mnt...
umount: /mnt: not mounted
YaST finished.
[SuSE Instsys] lnxsrv01:/root #
```

Checking that the file system was unmounted

All file systems except the one needed for IPL (all except /dev/ramx) need to be unmounted. The installation program normally does this automatically.

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:

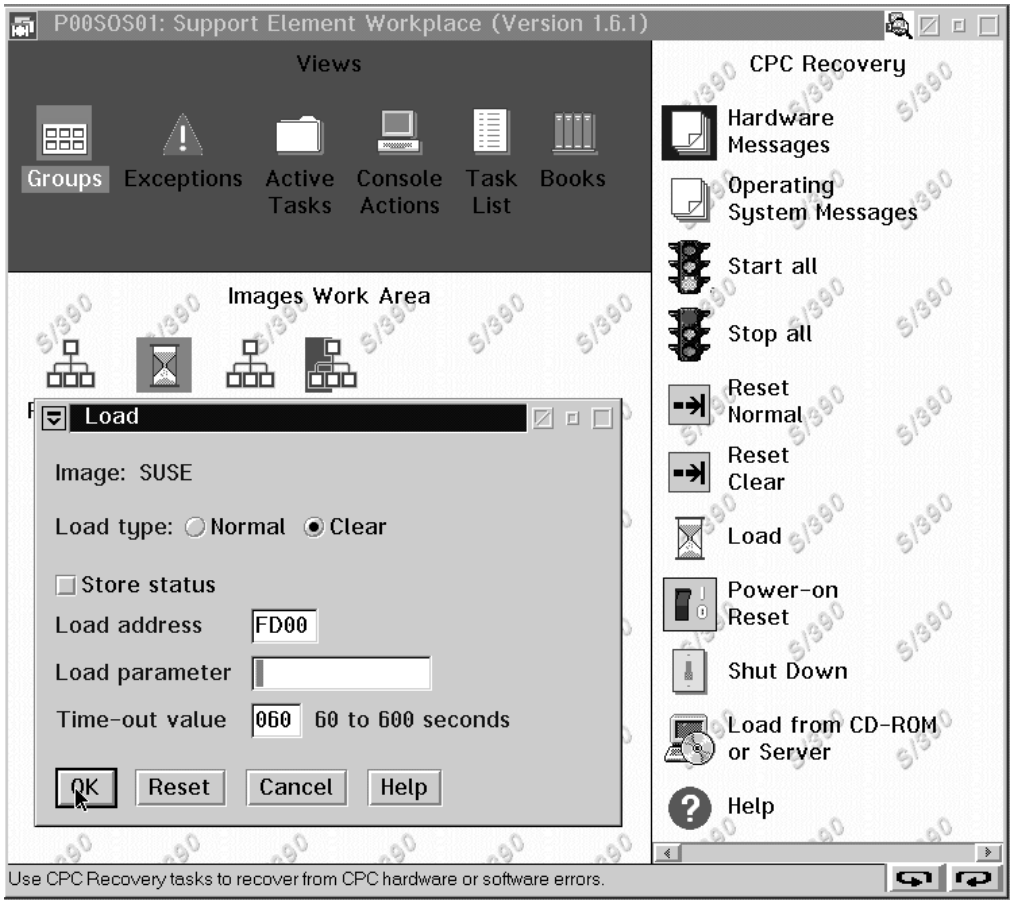
   ```
   /dev/dasda1 on /mnt
   ```

   you must perform an unmount command:

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

12 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:



13 Setting the root password

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

```
Linux version 2.2.16 (root@pserver2) (gcc version 2.95.2 19991024 (release)) #2
SMP Fri Oct 27 09:50:39 CEST 2000
Command line is: dasd=FD00,FD01,FD02,FD03 root=/dev/dasda1 noinitrd
 ro

We are running native
This machine has an IEEE fpu
Initial ramdisk at: 0x02000000 (16777216 bytes)
Detected device FD00 on subchannel 010A - PIM = 80, PAM = 80, POM = FF
Detected device FD01 on subchannel 010B - PIM = 80, PAM = 80, POM = FF
...
...
Checking file systems...
Parallelizing fsck version 1.18a (11-Nov-1999)
/dev/dasda1: clean, 45071/90048 files, 152375/179997 blocks
Checking file systems
  done
Setting up /lib/modules/2.2.16  done
Mounting local file systems...
proc on /proc type proc (rw)
not mounted anything
Mounting local file systems
  done
Mounting /dev/pts.  done
Starting ldconfig (setting up /etc/ld.so.cache)  done
Setting up timezone data  done
Setting up loopback device  done
Setting up hostname  done
Setting up the CMOS clockCannot access the Hardware Clock via any known method.

Use the --debug option to see the details of our search for an access method.
Cannot access the Hardware Clock via any known method.
Use the --debug option to see the details of our search for an access method.
  done
Running /sbin/init.d/boot.local
  done
Creating /var/log/boot.msg

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

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

```
--------------------------------------------------------------------------------

                        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: rootpw
Re-enter new password: rootpw

Password changed
```

Note: The password will be truncated 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 <RETURN> to continue...


            Have a lot of fun!


                                Your SuSE Team


 INIT: Entering runlevel: 2
Master Resource Control: previous runlevel: N, switching to runlevel:   [80C [9D
 [1m2 [m
Setting up network device tr0
...
...
Starting CRON daemon  done
Starting Name Service Cache Daemon  done
Master Resource Control: runlevel 2 has been   [80C [9D [1mreached [m
Give root password to login:
```

Installation is complete.

To continue...

When installation is complete, the next steps are to check that the LINUX for S/390 system is running, for example, that Apache is up and running, and that you can add users. To do this, see

- “28 Testing Apache” on page 115
- “29 Adding users” on page 117

Part 3. VM, Ethernet and NFS installation scenario

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To continue... 80

14 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:

```
Ready; T=0.01/0.01 15:23:43
lin
```

You should see three files being transferred:

```
00: RDR FILE 0419 SENT FROM LINUX1   PUN WAS 0419 RECS 019K CPY  001 A NOHOLD NO
KEEP
00: RDR FILE 0420 SENT FROM LINUX1   PUN WAS 0420 RECS 0002 CPY  001 A NOHOLD NO
KEEP
00: RDR FILE 0421 SENT FROM LINUX1   PUN WAS 0421 RECS 123K CPY  001 A NOHOLD NO
KEEP
00: 0000003 FILES CHANGED
00: 0000003 FILES CHANGED
```

Then the kernel is booted. Devices are autosensed and you will see messages similar to these:

```
Linux version 2.2.16 (root@ikr_rdr.suse.de) (gcc version 2.95.2 19991024 (releas
e)) #1 SMP Thu Oct 19 10:16:47 GMT 2000
Command line is: ramdisk_size=32768 root=/dev/ram0 ro
We are running under VM
This machine has no IEEE fpu
Initial ramdisk at: 0x02000000 (9843600 bytes)
Detected device 0622 on subchannel 0000 - PIM = 80, PAM = 80, POM = FF
Detected device 0623 on subchannel 0001 - PIM = 80, PAM = 80, POM = FF
...
...
SenseID : device 0622 reports: Dev  Type/Mod = 3088/60
SenseID : device 0623 reports: Dev  Type/Mod = 3088/60
...
...
```

A partition check is done:

```
Partition check:
RAMDISK: Compressed image found at block 0
VFS: Mounted root (ext2 filesystem).
This is SuSE Instsys Version 2000.10.20 Rel. 0
Build date: Fri Oct 20 18:43:12 GMT 2000
Creating /var/log/boot.msg
Oct 25 13:54:01 suse syslogd 1.3-3: restart.
```

Next the kernel boots, and the SuSE LINUX welcome screen appears:

```
=                                                                      =
==-                Welcome to SuSE Linux 7.0 for IBM S/390            -==
=                                                                      =
```

Next you can set up the network.

15 Network setup

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

1. Select your type of network. For example, for OSA Ethernet you would enter **2**:

```
First, select the type of your network device:
0) no network
1) OSA Token Ring
2) OSA Ethernet
3) OSA-Express Gigabit Ethernet (experimental)
4) Channel To Channel
5) Escon
6) IUCV (experimental)
Enter your choice (1-6):2
```

2. You will be prompted to read the license agreement before entering information about your network. Answer **yes** as the installation will not continue otherwise:

```
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
...
...
```

3. After reading the license agreement, to continue with the installation, enter **yes**

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

4. 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 `622`:

```
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:
622
```

5. Then enter the relative port. In this example the relative port is 1:

```
Please type in the relative port on device number 622
Relative port:
1
```

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 will need later. Answer **yes** if everything looks all right:

```
Unloading LCS module if active...
rmmod: module lcs is not loaded
Trying to start the LCS module now...
insmod -v lcs noauto=1 devno_portno_pairs=0x622,1 :
Using /lib/modules/2.2.16/net/lcs.o
Symbol version prefix 'smp_'
Starting lcs

lcs: eth0 configured as follows read subchannel=0 write subchannel=1
read_devno=0622 write_devno=0623
hw_address=00:20:35:04:51:8C rel_adapter_no=1

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)

lsmod now shows all loaded modules:
lcs                    14888   0 (unused)

Was the loading of "lcs" successful (Yes/No) ?
yes
```

7. Next you will be prompted for the network data. Note that the MTU size needs to be the same on both the network and on your LINUX for S/390 system. Here is an example from one of our systems:

```
Please enter your full host name (e.g. s390.suse.com):
lnxsrv01.boeblingen.de.ibm.com
Please enter your IP address:
9.164.137.114
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
Please enter the MTU (Maximum Transfer Unit,
leave blank for default) [1492]:
```

8. 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 for eth0 will be:
Full host name   : lnxsrv01.boeblingen.de.ibm.com
IP address       : 9.164.137.114
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
MTU size         : 1492
Is this correct (Yes/No) ?
yes
```

9. Set a temporary root password:

```
For security reasons you have to set an temporary installation
system password for the user "root".
You'll be asked for it only when you telnet in to this installation
system to limit the access to it and it will be cleared as soon
as you shut down or reset the installation system.

Please enter the temporary installation password:
pas4root
Temporary installation password set.
```

You will see messages about the network setup:

```
restarting syslogd:
Oct 25 14:58:54 lnxsrv01 syslogd 1.3-3: restart.
ifconfig eth0 9.164.137.114 netmask 255.255.248.0 broadcast 9.164.143.255 mtu 14
92
/sbin/ifconfig eth0 :
eth0      Link encap:Ethernet  HWaddr 00:20:35:04:51:8C
          inet addr:9.164.137.114  Bcast:9.164.143.255  Mask:255.255.248.0
          UP BROADCAST RUNNING MULTICAST  MTU:1492  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:100
```

SuSE LINUX will then ping the IP address, the gateway, and the DNS server automatically to verify the network connection:

```
Trying to ping my IP address:
PING 9.164.137.114 (9.164.137.114): 56 data bytes
64 bytes from 9.164.137.114: icmp_seq=0 ttl=255 time=0.536 ms
64 bytes from 9.164.137.114: icmp_seq=1 ttl=255 time=0.333 ms
64 bytes from 9.164.137.114: icmp_seq=2 ttl=255 time=0.393 ms
 --- 9.164.137.114 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max = 0.333/0.420/0.536 ms
Trying to ping the IP address of the Gateway:
PING 9.164.136.1 (9.164.136.1): 56 data bytes
64 bytes from 9.164.136.1: icmp_seq=0 ttl=64 time=10.006 ms
64 bytes from 9.164.136.1: icmp_seq=1 ttl=64 time=6.355 ms
64 bytes from 9.164.136.1: icmp_seq=2 ttl=64 time=6.187 ms
 --- 9.164.136.1 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max = 6.187/7.516/10.006 ms
Gateway seems to respond to our pings, continuing.
Trying to ping the IP address of the DNS Server:
PING 9.164.178.1 (9.164.178.1): 56 data bytes
64 bytes from 9.164.178.1: icmp_seq=0 ttl=253 time=9.860 ms
64 bytes from 9.164.178.1: icmp_seq=1 ttl=253 time=8.501 ms
64 bytes from 9.164.178.1: icmp_seq=2 ttl=253 time=7.355 ms
 --- 9.164.178.1 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max = 7.355/8.572/9.860 ms
```

10. When all is set up you will see the system prompt:

```
Network Setup finished, running inetd...
[SuSE Instsys] lnxsrv01:/ #
```

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

16 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** and instead of **F10** use **0**.(The cursor must be on a non-input field for this to work.)

1. When you telnet in to the LINUX system you must login as **root**, the password is the temporary password:

```
lnxsrv01 login: root
Password: pas4root
```

2. The following screen appears:

```
>>> >>> >>> >>> >>> >>>  SuSE Linux S/390 7.0  <<< <<< <<< <<< <<< <<<

    1. If you want to check which devices the dasd driver can see,
       run 'insmod dasd probeonly' and check
       the output of 'cat /proc/dasd/devices'.
       Remove the dasd driver with 'rmmod dasd' afterwards.

    2. Choose the device numbers you want to use for SuSE Linux S/390
            !!!    BE CAREFUL WHEN SELECTING DASDs -   !!!
            !!! YOU MAY DESTROY DATA ON SHARED DEVICES !!!

    3. Enter 'insmod dasd dasd=<list of devices>'
       Remember to separate devices by commas (<dev_no>,<dev_no>),
       syntax for ranges is <from_dev_no>-<to_dev_no>
       like
              'insmod dasd dasd=FD00-FD0F,FD40,FD42,FD80-FD86'

       Note: When updating, you have to load the dasd driver with the
       same DASD order as in the installed system  - see documentation
       for further information.

    4. Start installation or update with  'YaST'.

[SuSE Instsys] lnxsrv01:/root #
```

3. Enter an `insmod` command to tell LINUX which DASDs you will be using:

```
[SuSE Instsys] lnxsrv01:/root # insmod dasd dasd=292,293
```

4. Format the disks. (This can take a while.) If you have not formatted the disks with LINUX before, you need to format dasda, dasdb and any other disks you have defined:

```
[SuSE Instsys] lnxsrv01:/root # dasdfmt -f /dev/dasda -b 4096
```

or

```
[SuSE Instsys] lnxsrv01:/root # dasdfmt -n 292 -b 4096
```

Confirmation messages will appear after each format command:

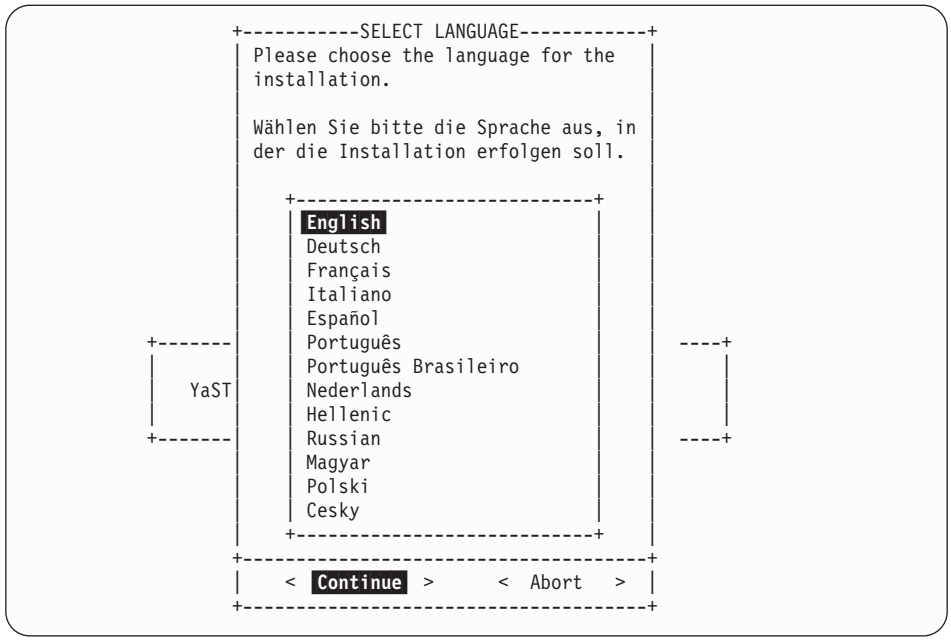
```
I am going to format the device /dev/dasda in the following way:
   Device number of device : 0x292
   Major number of device  : 94
   Minor number of device  : 0
   Labelling device        : yes
   Disk label              : LNX1 x80405228
   Blocksize               : 4096

--->> ATTENTION! <<---
All data in the specified range of that device will be lost.
Type "yes" to continue, no will leave the disk untouched: yes
Formatting the device. This may take a while (get yourself a coffee).
Finished formatting the device.
Rereading the partition table... done.
```

Repeat this step for each disk defined.

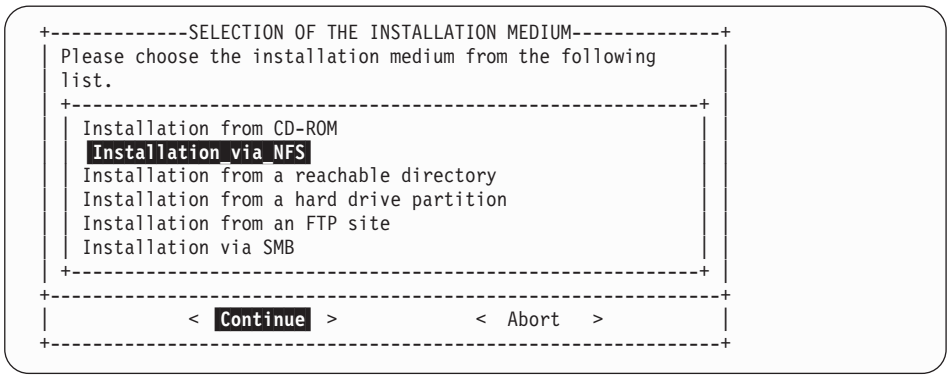
5. Enter **yast** to start the installation program:

```
[SuSE Instsys] lnxsrv01:/root # yast
```

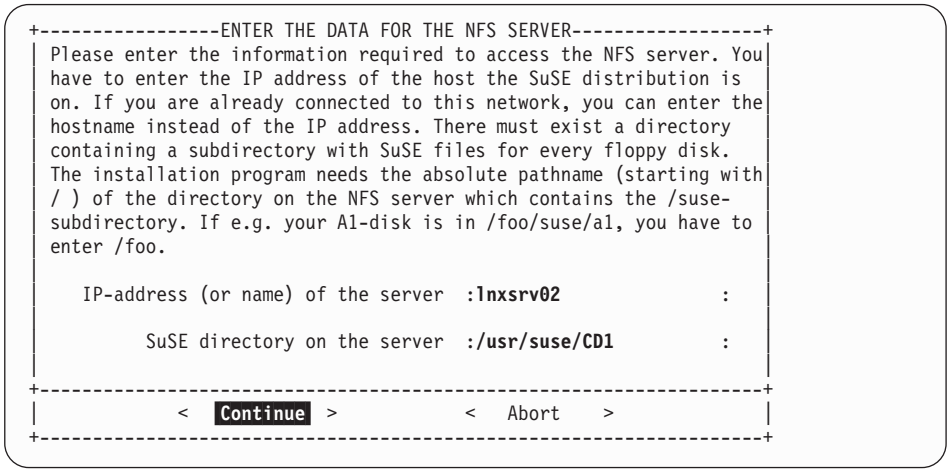
6. On the language selection panel, use the arrow keys to choose a language, for example English or Deutsch (German) and select **Continue**:



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

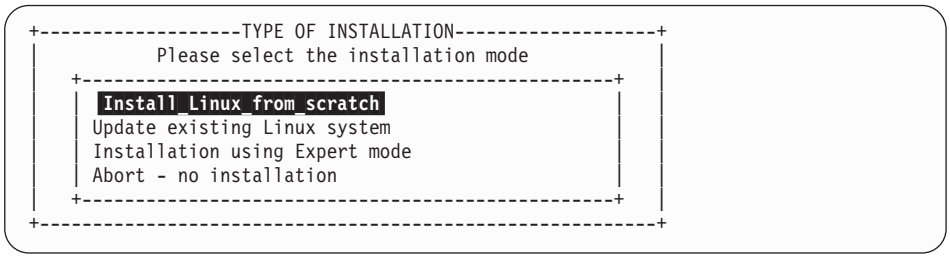


8. Enter the data of the NFS server:



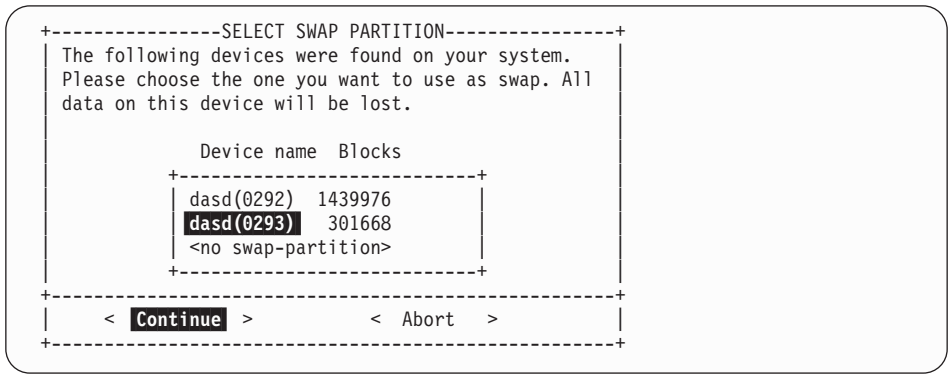
In the example shown, the server is called `lnxsrv02`, and the directory is `/usr/suse/CD1`.

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

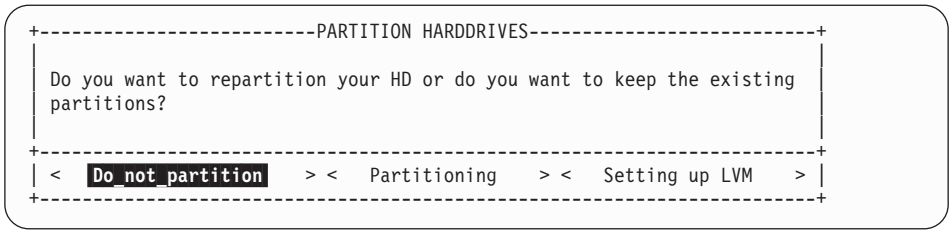


10. Select the DASD to use for the swap space.

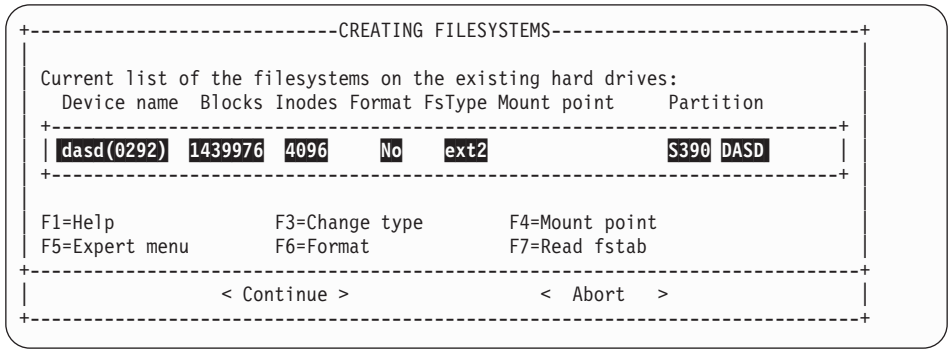
    Hint: It is a good idea to use the first DASD as the swap disk, because SuSE forces the swap disk to be called 'dasda'. It will be less confusing if your first disk is 'dasda' and the second one 'dasdb', and so on. In the example the smaller DASD space is used for the swap disk. Then select **Continue**:



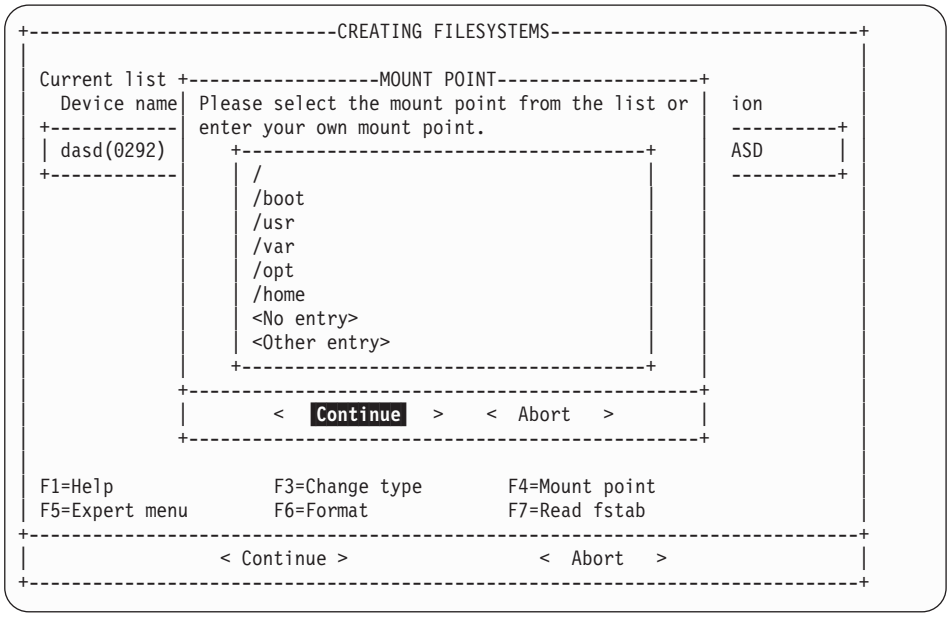
11. Select **Do not partition** on the partitioning screen:



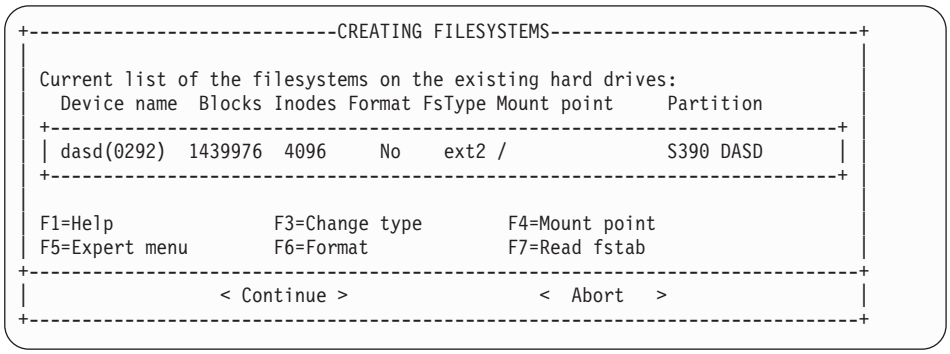
12. Create a file system. Select the DASD you want to use. In our example, this is the bigger DASD with the number 0292. Press **F4** to define the mountpoint.



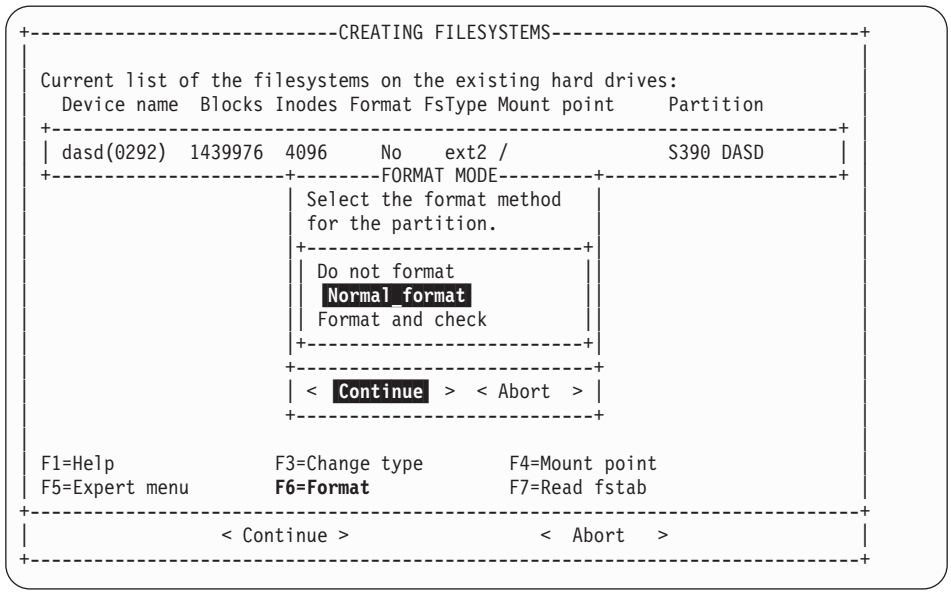
13. On the panel shown, select the root mountpoint from the list (the first entry '/') and then select **Continue**:



14. Repeat the last two steps if necessary to select other mount points for each of your DASD.

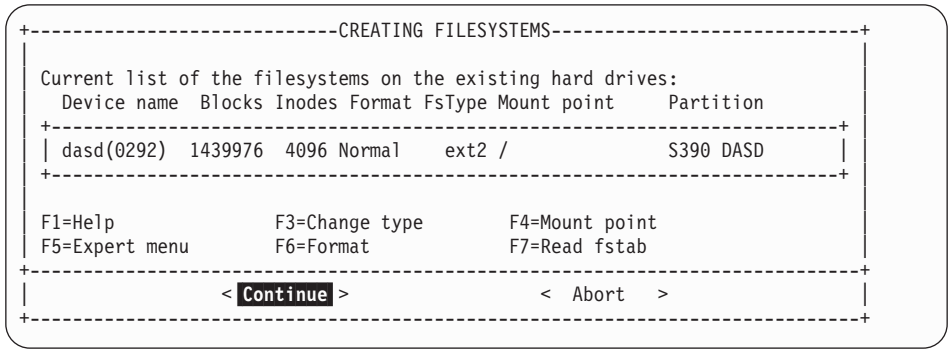


15. Format the DASD by pressing **F6**, then select **Normal format** and **Continue**:

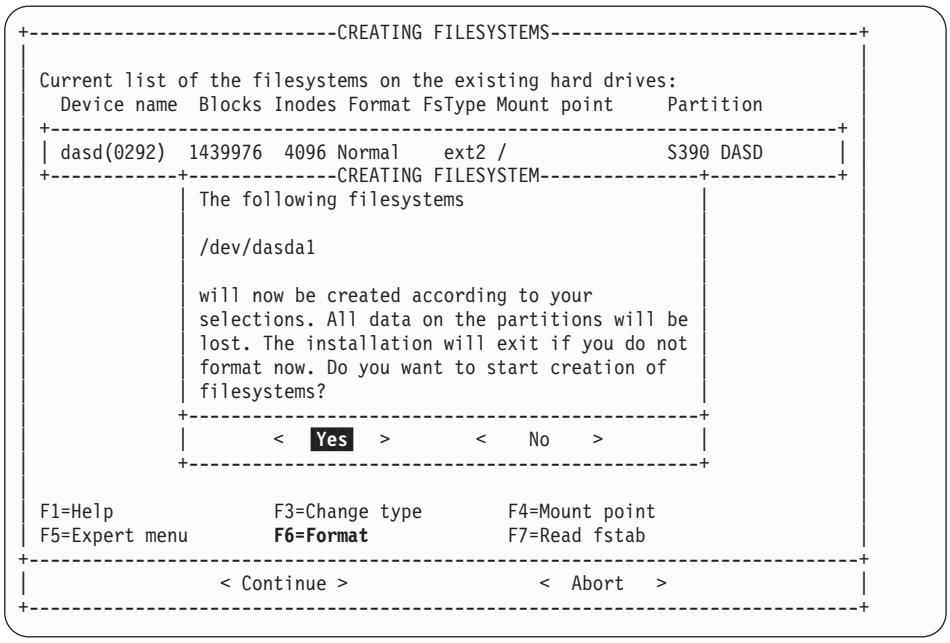


Repeat this for each DASD.

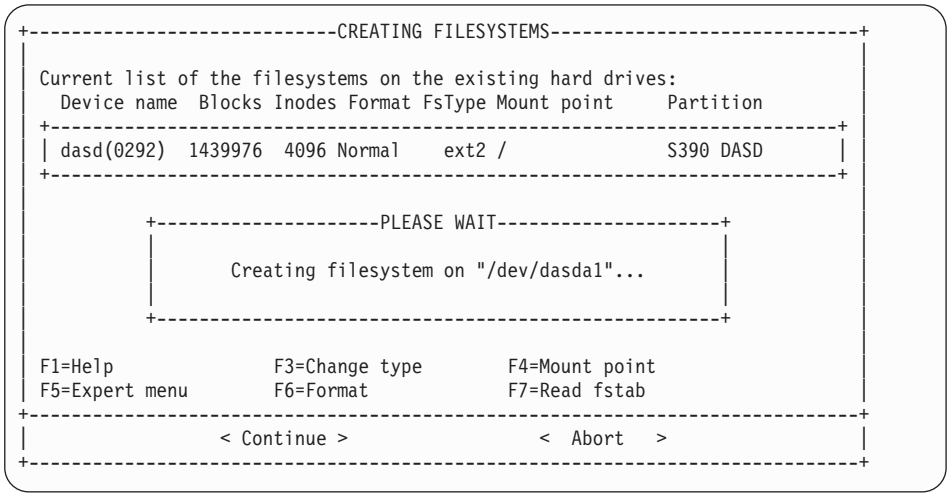
16. The format type of the DASD will change to 'Normal'. Select **Continue** to begin formatting:



17. On the confirmation screen check the data and select **Yes**:



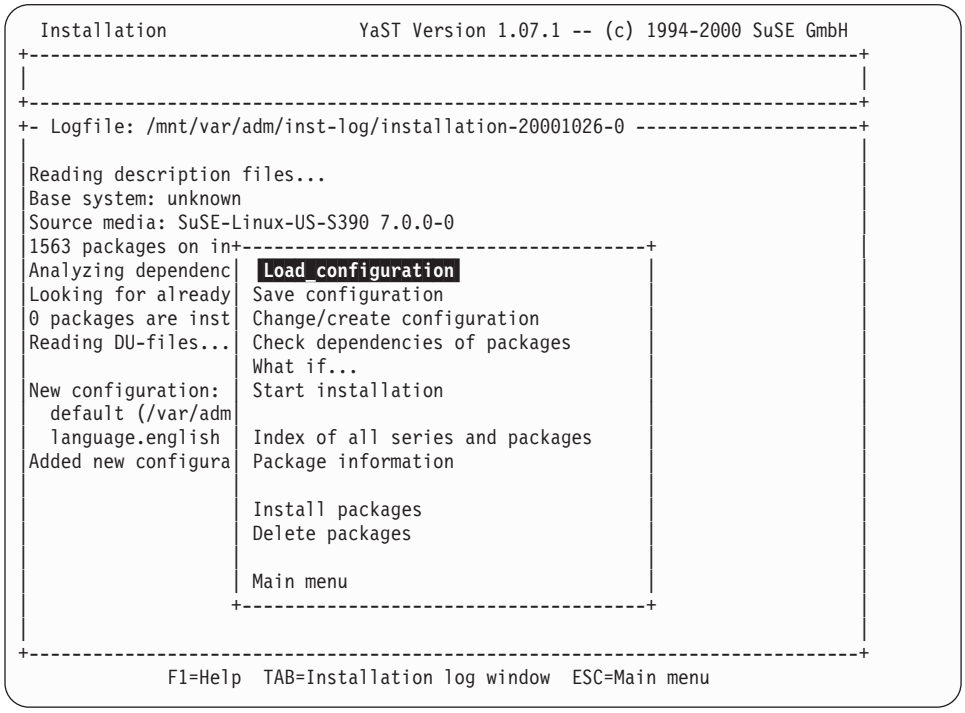
The file system is created:



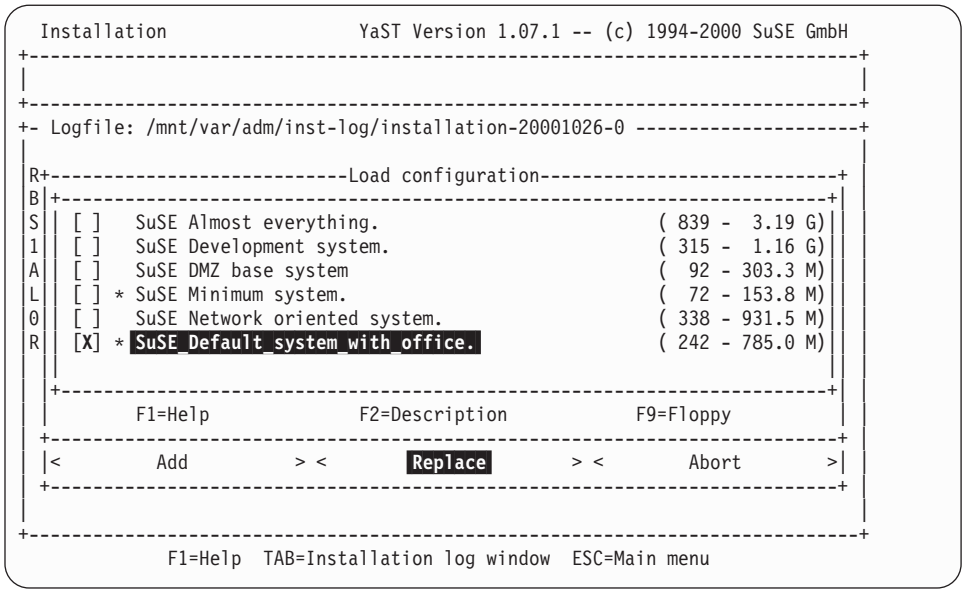
The system can take quite a long time to create the file system. This time is dependent on the size and type of disks you are using.

17 Installing the packages from the NFS server

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

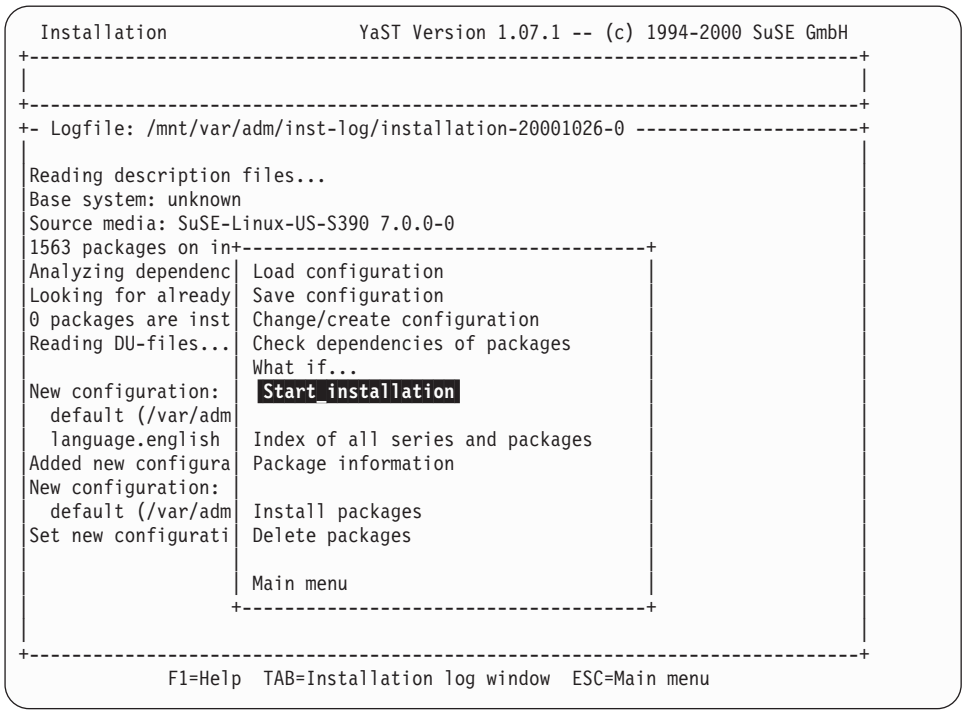


2. On the Load configuration screen, select **SuSE default system with office** and **Replace**:

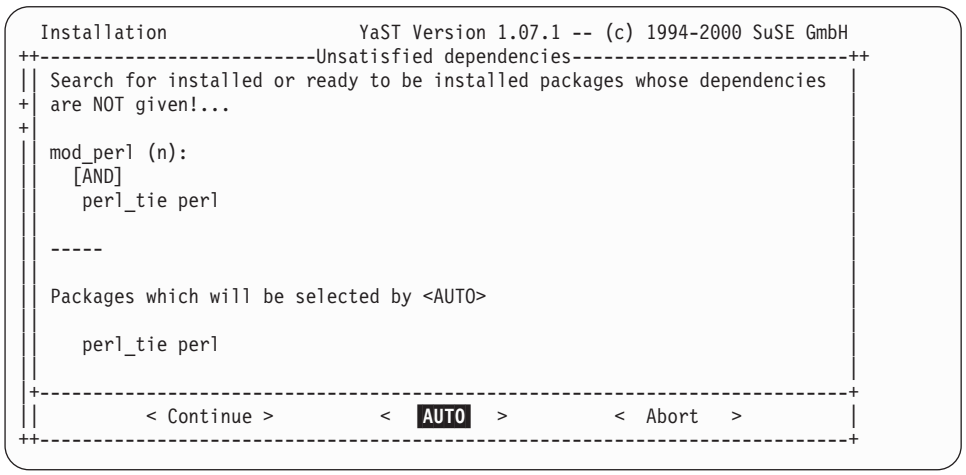


You can add additional packages at a later time (after completing the installation).

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



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



If it does, you can select **AUTO** to 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:

```
  Installation [  *]            YaST Version 1.07.1 -- (c) 1994-2000 SuSE GmbH
+-------------------------------------------------------------------------------+
|Installing package  13:     diff - 178.1 K - 199 packages remaining...         |
+-------------------------------------------------------------------------------+
+- Logfile: /mnt/var/adm/inst-log/installation-20001026-0 ---------------------+
|                                                                               |
|CD 1:                                                                          |
|  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           ##############################################                |
|  compress       ##############################################                |
|  cpio           ##############################################                |
|  cracklib       ##############################################                |
|  cron           ##############################################                |
|  ddrescue       ##############################################                |
|  devs           ##############################################                |
|                                                                               |
+-------------------------------------------------------------------------------+
```

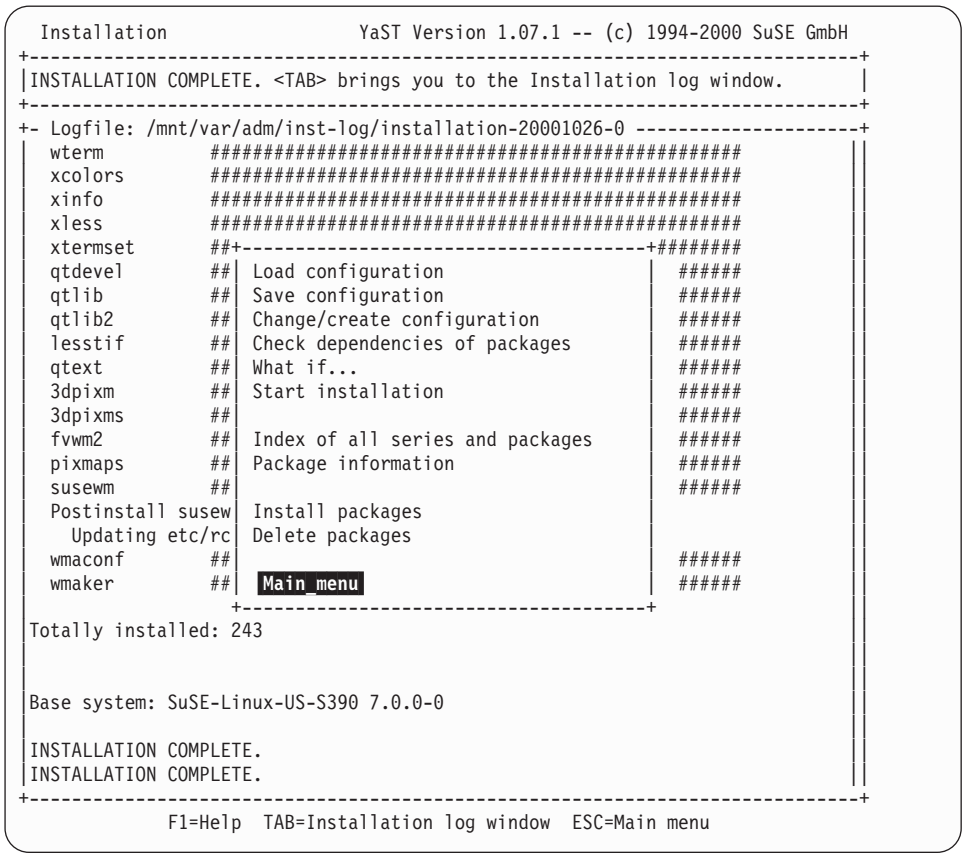
The **installation complete** message tells you that the installation of the packages is now finished:

```
|Base system: SuSE-Linux-US-S390 7.0.0-0                                        ||
|                                                                               ||
|INSTALLATION COMPLETE.                                                         ||
+-------------------------------------------------------------------------------+
```

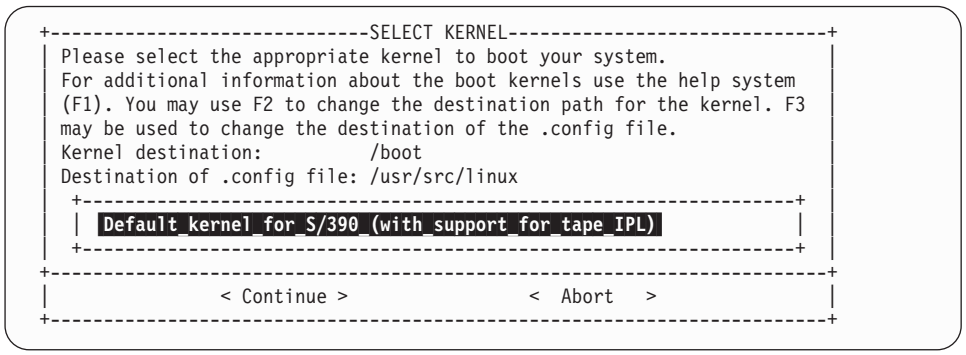
6. To ensure no unsatisfied dependancies remain we recommend that you repeat steps 3 to 5 until there are two **installation complete** messages at the bottom of the screen:

```
|Base system: SuSE-Linux-US-S390 7.0.0-0                                        ||
|                                                                               ||
|INSTALLATION COMPLETE.                                                         ||
|INSTALLATION COMPLETE.                                                         ||
+-------------------------------------------------------------------------------+
```

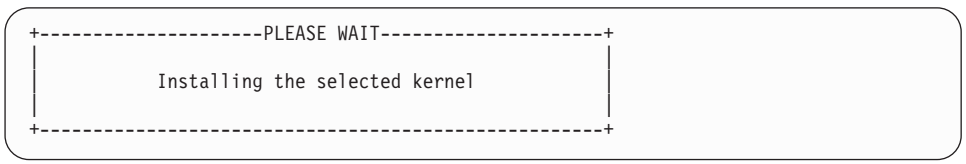
7. Press the ESC key to get the main menu, then select **Main menu**:



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



A message comes up confirming the installation of the kernel:

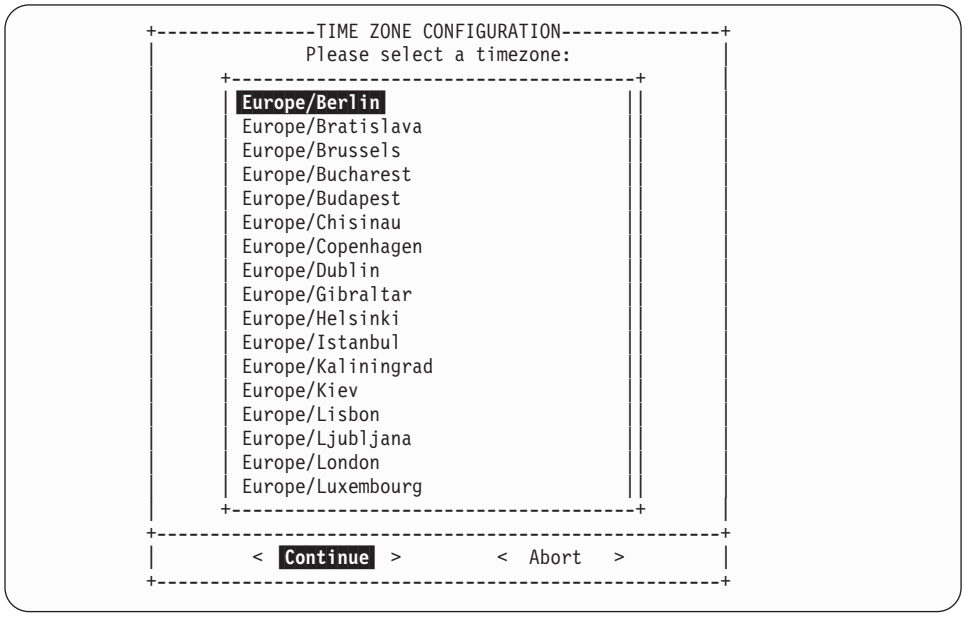


18 Configuring the system

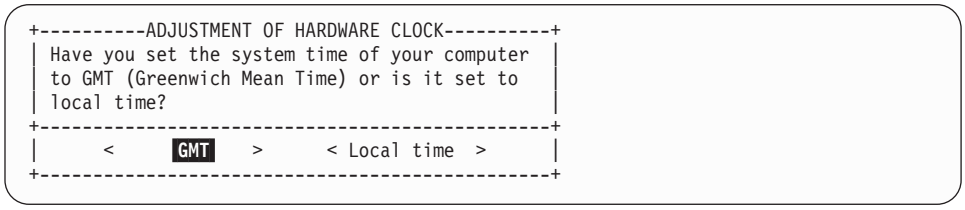
In this section the following is described:

- Setting the timezone
- Setting or changing the network definitions
- Starting the INETD, portmapper, and other network services

1. Select the time zone and select **Continue**:



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



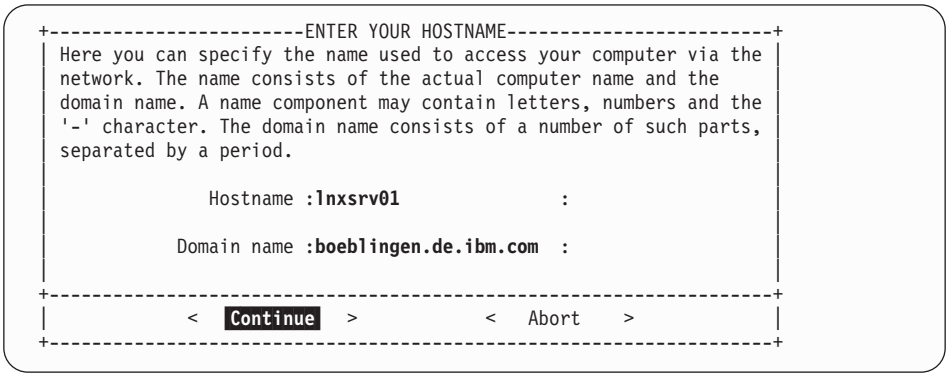
Setting the network definitions

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.

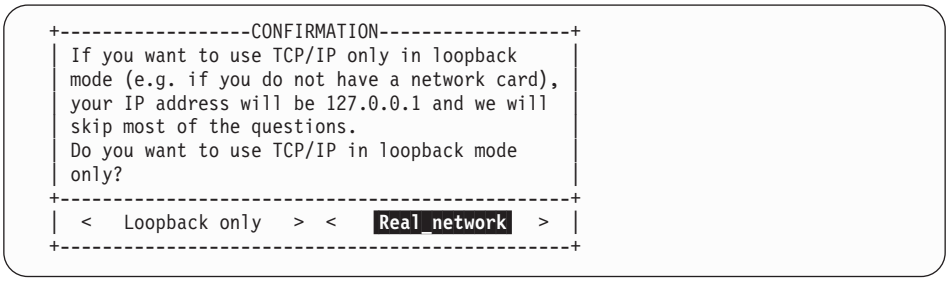
Before you begin: Ensure that you have the network parameters handy. These include:

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

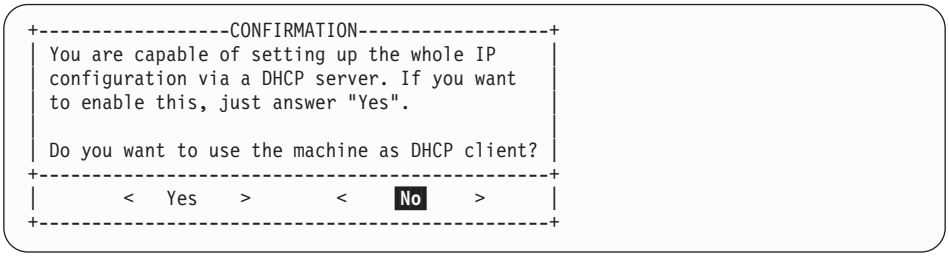
1. Enter the host name of the LINUX system:



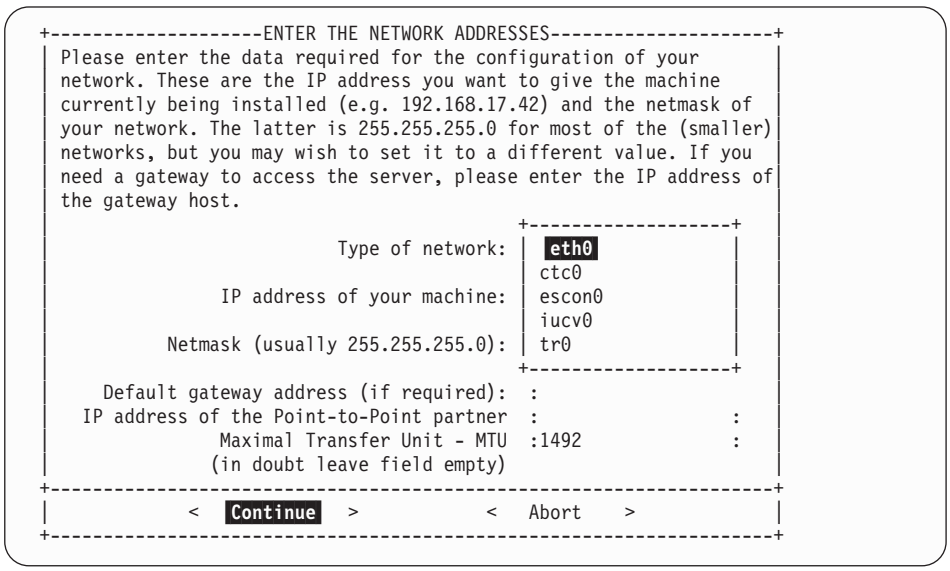
2. Select **real network** on the screen asking about loopback or real network. Loopback means that only the local network (that is, only the machine itself) will be used. Since you need to telnet in from another machine, you need the real network



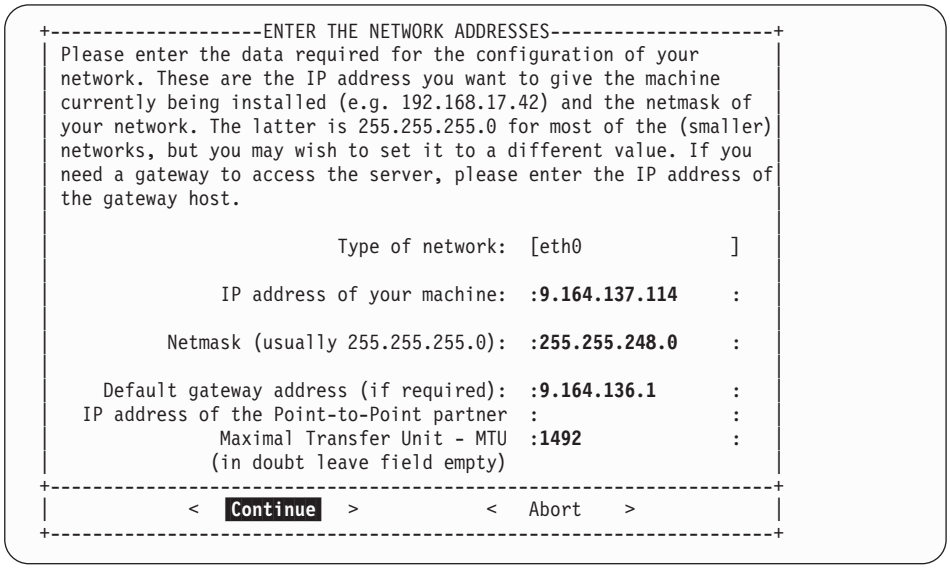
3. Select **No** on the screen asking about DHCP. (Use No for setting up a server. If you are setting up many LINUX machines, and only have a limited number of IP addresses available, you may need to set up as DHCP).



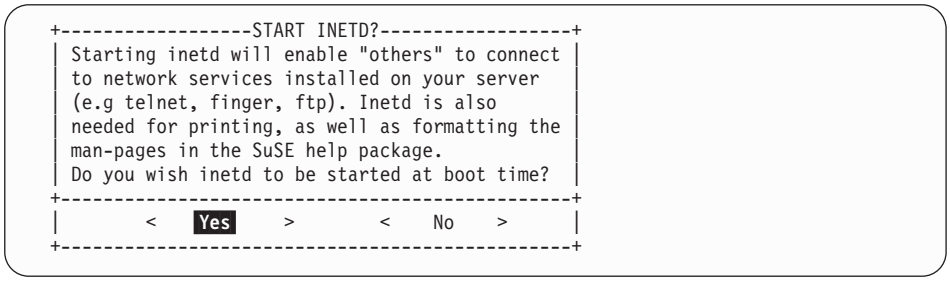
4. Select the type of network you are using by pressing **PF3** to change the device, and then selecting from the list. You can choose between Ethernet (eth0) or Token Ring (tr0). You cannot use plip or arc0 on an S/390 system. In this example we select **eth0** for Ethernet:



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



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



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**, otherwise select **Yes**:

```
+---------------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.                      |
|                                                |
|                                                |
|    :lnxsrv01.boeblingen.de.ibm.com        :    |
|                                                |
+------------------------------------------------+
|     <  Continue  >      <   Abort    >         |
+------------------------------------------------+
```

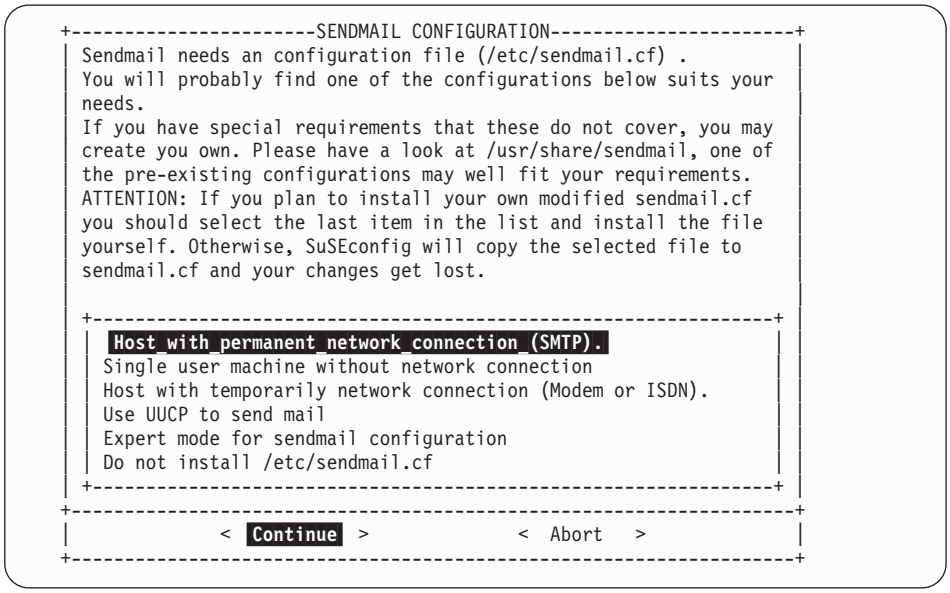
10. Answer **Yes** to the nameserver question:

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

11. Enter the IP address of the nameserver:

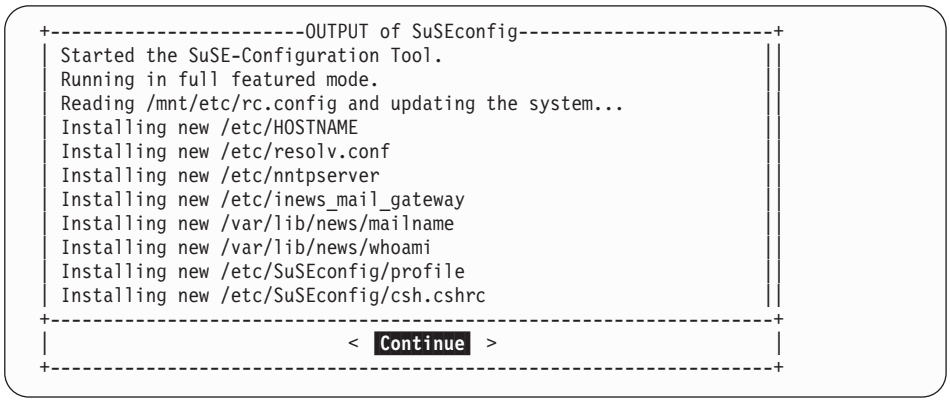
```
+--------------------NAMESEVER CONFIGURATION---------------------+
| Please enter the IP address of your name server. You can add   |
| more domain name servers by modifying the file                 |
| /etc/resolv.conf.                                              |
|                                                                |
| 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:



Select **Continue**.

13. SuSE starts the configuration tool. You will see messages like these:



Then the file system will be automatically unmounted:

```
Unmounting /mnt...
umount: /mnt: not mounted
YaST finished.
[SuSE Instsys] lnxsrv01:/root #
```

Checking that the file system was unmounted

All file systems except the one needed for IPL (all except /dev/ramx) need to be unmounted. The installation program normally does this automatically.

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

   ```
   [SuSE Instsys] lnxsrv01:/root # mount
   /dev/ram2 on / type minix (rw)
   none on /proc type proc (rw)
   /dev/dasda1 on /mnt type ext2 (rw)
   [SuSE Instsys] lnxsrv01:/root #
   ```

2. If you see a response such as:

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

   you must perform an unmount command:

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

19 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:

```
Ready; T=0.01/0.01 11:47:34
00:
00: CP I 292 CL
Linux version 2.2.16 (root@Tape.suse.de) (gcc version 2.95.2 19991024 (release))
 #1 SMP Fri Oct 20 18:09:31 GMT 2000
Command line is: dasd=0292 root=/dev/dasda1 noinitrd ro

We are running under VM
This machine has an IEEE fpu
Initial ramdisk at: 0x02000000 (16777216 bytes)
Detected device 0622 on subchannel 0000 - PIM = 80, PAM = 80, POM = FF
Detected device 0623 on subchannel 0001 - PIM = 80, PAM = 80, POM = FF
...
...
SenseID : device 0622 reports: Dev Type/Mod = 3088/60
SenseID : device 0623 reports: Dev Type/Mod = 3088/60
...
...
early initialization of device iucv0 is deferred
Calibrating delay loop... 550.50 BogoMIPS
Memory: 111000k/131072k available (1132k kernel code, 0k reserved, 2556k data, 0
k init)
Dentry hash table entries: 16384 (order 5, 128k)
Buffer cache hash table entries: 131072 (order 7, 512k)
Page cache hash table entries: 32768 (order 5, 128k)
debug: 16 areas reserved for debugging information
debug: reserved 4 areas of 4 pages for debugging ccwcache
VFS: Diskquotas version dquot_6.4.0 initialized
POSIX conformance testing by UNIFIX
Detected 4 CPU's
```

20 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:

```
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: rootpw
Re-enter new password: rootpw

Password changed
```

Note: The password is truncated 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.
```

2. 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 <RETURN> to continue...


            Have a lot of fun!


                                Your SuSE Team


 INIT: Entering runlevel: 2
Master Resource Control: previous runlevel: N, switching to runlevel:   [80C [9D
 [1m2 [m
Setting up network device eth0
...
...
Starting CRON daemon  done
Starting Name Service Cache Daemon  done
Master Resource Control: runlevel 2 has been   [80C [9D [1mreached [m
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

- “28 Testing Apache” on page 115
- “29 Adding users” on page 117

Part 4. LPAR, Token Ring and SMB installation scenario

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24 Installing the packages from the SMB server 97

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Checking that the file system was unmounted 108

26 Re-IPL from DASD 109

27 Setting the root password 111
To continue... 112

21 Kernel initialization

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

```
Linux version 2.2.16 (root@ikr_tape.suse.de) (gcc version 2.95.2 19991024 (relea
se)) #1 SMP Thu Oct 19 10:16:44 GMT 2000
Command line is: ramdisk_size=32768 root=/dev/ram0 ro
We are running native
This machine has an IEEE fpu
Initial ramdisk at: 0x02000000 (16777216 bytes)
```

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

```
Detected device FD00 on subchannel 010A - PIM = 80, PAM = 80, POM = FF
Detected device FD01 on subchannel 010B - PIM = 80, PAM = 80, POM = FF
...
...
SenseID : device FD00 reports: CU  Type/Mod = 3990/EC, Dev Type/Mod = 3390/0A
SenseID : device FD01 reports: CU  Type/Mod = 3990/EC, Dev Type/Mod = 3390/0A
...
...
```

At the end a partition check is done:

```
Partition check:
RAMDISK: Compressed image found at block 0
VFS: Mounted root (ext2 filesystem).
This is SuSE Instsys Version 2000.10.20 Rel. 0
Build date: Fri Oct 20 18:43:12 GMT 2000
Creating /var/log/boot.msg
Oct 25 15:41:48 suse syslogd 1.3-3: restart.
```

Finally you are welcomed to the system:

```
=                                                                      =
==-                Welcome to SuSE Linux 7.0 for IBM S/390            -==
=                                                                      =
```

Then you can set up the network.

22 Network setup

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

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 Token Ring, select **1**:

```
First, select the type of your network device:
0) no network
1) OSA Token Ring
2) OSA Ethernet
3) OSA-Express Gigabit Ethernet (experimental)
4) Channel To Channel
5) Escon
6) IUCV (experimental)
Enter your choice (1-6):
1
```

2. You will be prompted to read the license agreement before entering information about your network. Answer **yes** as the installation will not continue otherwise:

```
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
...
...
```

3. After reading the license agreement, to continue with the installation, enter **yes**

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

4. 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 `fc20`:

```
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:
fc20
```

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

```
Please type in the relative port on device number fc20
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 **yes** if everything looks all right:

```
Unloading LCS module if active...
rmmod: module lcs is not loaded
Trying to start the LCS module now...
insmod -v lcs noauto=1 devno_portno_pairs=0xfc20,0 :
Using /lib/modules/2.2.16/net/lcs.o
Symbol version prefix 'smp_'
Starting lcs
lcs: tr0 configured as follows read subchannel=126 write subchannel=127
read_devno=fc20 write_devno=fc21
hw_address=00:60:94:44:DF:87 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)
lsmod now shows all loaded modules:
lcs                    14888   0 (unused)
Was the loading of "lcs" successful (Yes/No) ?
yes
```

7. Next you will be prompted for the network data. Note that the MTU size needs to be the same on both the network and on your LINUX for S/390 system. Here is an example from one of our systems:

```
Please enter your full host name (e.g. s390.suse.com):
boeaet32.boeblingen.de.ibm.com
Please enter your IP address:
9.164.188.101
Please enter the net mask:
255.255.224.0
Please enter the broadcast address:
9.164.191.255
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
Please enter the MTU (Maximum Transfer Unit),
leave blank for default [1492]:
```

8. 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 for tr0 will be:
Full host name   : boeaet32.boeblingen.de.ibm.com
IP address       : 9.164.188.101
Net mask         : 255.255.224.0
Broadcast address: 9.164.191.255
Gateway address  : 9.164.181.1
DNS IP address   : 9.164.178.1
DNS search domain: boeblingen.de.ibm.com
MTU size         : 2000
Is this correct (Yes/No) ?
yes
```

9. Set a temporary root password:

```
For security reasons you have to set an temporary installation
system password for the user "root".
You'll be asked for it only when you telnet in to this installation
system to limit the access to itand it will be cleared as soon
as you shut down or reset the installation system.

Please enter the temporary installation password:
pas4root
Temporary installation password set.
```

You will see messages about the network setup:

```
restarting syslogd:
Oct 25 15:48:45 boeaet32 syslogd 1.3-3: restart.
ifconfig tr0 9.164.188.101 netmask 255.255.224.0 broadcast 9.164.191.255 mtu 149
2
/sbin/ifconfig tr0 :
tr0       Link encap:16/4 Mbps Token Ring  HWaddr 00:60:94:44:DF:87
          inet addr:9.164.188.101  Bcast:9.164.191.255  Mask:255.255.224.0
          UP BROADCAST RUNNING MULTICAST  MTU:2000  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:100
```

SuSE LINUX will then ping the IP address, the gateway, and the DNS server automatically to verify the network connection:

```
Trying to ping my IP address:
PING 9.164.188.101 (9.164.188.101): 56 data bytes
64 bytes from 9.164.188.101: icmp_seq=0 ttl=255 time=0.157 ms
64 bytes from 9.164.188.101: icmp_seq=1 ttl=255 time=0.112 ms
64 bytes from 9.164.188.101: icmp_seq=2 ttl=255 time=0.136 ms
--- 9.164.188.101 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max = 0.112/0.135/0.157 ms
Trying to ping the IP address of the Gateway:
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=7.540 ms
64 bytes from 9.164.181.1: icmp_seq=1 ttl=255 time=2.456 ms
64 bytes from 9.164.181.1: icmp_seq=2 ttl=255 time=9.870 ms
--- 9.164.181.1 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max = 2.456/6.622/9.870 ms
Gateway seems to respond to our pings, continuing.
Trying to ping the IP address of the DNS Server:
PING 9.164.178.1 (9.164.178.1): 56 data bytes
64 bytes from 9.164.178.1: icmp_seq=0 ttl=255 time=9.676 ms
64 bytes from 9.164.178.1: icmp_seq=1 ttl=255 time=3.050 ms
64 bytes from 9.164.178.1: icmp_seq=2 ttl=255 time=2.372 ms
--- 9.164.178.1 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max = 2.372/5.032/9.676 ms
```

10. When all is set up you will see the system prompt:

```
Network Setup finished, running inetd...
[SuSE Instsys] boeaet32:/ #
```

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

23 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** and instead of **F10** use **0**. (The cursor must be on a non-input field for this to work.)

1. When you telnet in to the LINUX system you must login as **root**; the password is the temporary password:

```
boeaet32 login: root
Password: pas4root
```

2. The following screen appears:

```
>>> >>> >>> >>> >>> >>>  SuSE Linux S/390 7.0  <<< <<< <<< <<< <<< <<<

    1. If you want to check which devices the dasd driver can see,
       run 'insmod dasd probeonly' and check
       the output of 'cat /proc/dasd/devices'.
       Remove the dasd driver with 'rmmod dasd' afterwards.

    2. Choose the device numbers you want to use for SuSE Linux S/390
            !!!    BE CAREFUL WHEN SELECTING DASDs -   !!!
            !!! YOU MAY DESTROY DATA ON SHARED DEVICES !!!

    3. Enter 'insmod dasd dasd=<list of devices>'
       Remember to separate devices by commas (<dev_no>,<dev_no>),
       syntax for ranges is <from_dev_no>-<to_dev_no>
       like
              'insmod dasd dasd=FD00-FD0F,FD40,FD42,FD80-FD86'

       Note: When updating, you have to load the dasd driver with the
       same DASD order as in the installed system  - see documentation
       for further information.

    4. Start installation or update with  'YaST'.

[SuSE Instsys] boeaet32:/root #
```

3. Enter an `insmod` command to tell LINUX which DASDs you will be using:

```
[SuSE Instsys] boeaet32:/root # insmod dasd dasd=fd00-fd03
```

4. Format the disks. (This can take a while.) If you have not formatted the disks with LINUX before, you need to format dasda, dasdb and any other disks you have defined:

```
[SuSE Instsys] lnxsrv01:/root # dasdfmt -f /dev/dasda -b 4096
```

or

```
[SuSE Instsys] lnxsrv01:/root # dasdfmt -n fd00 -b 4096
```

Confirmation messages will appear after each format command:

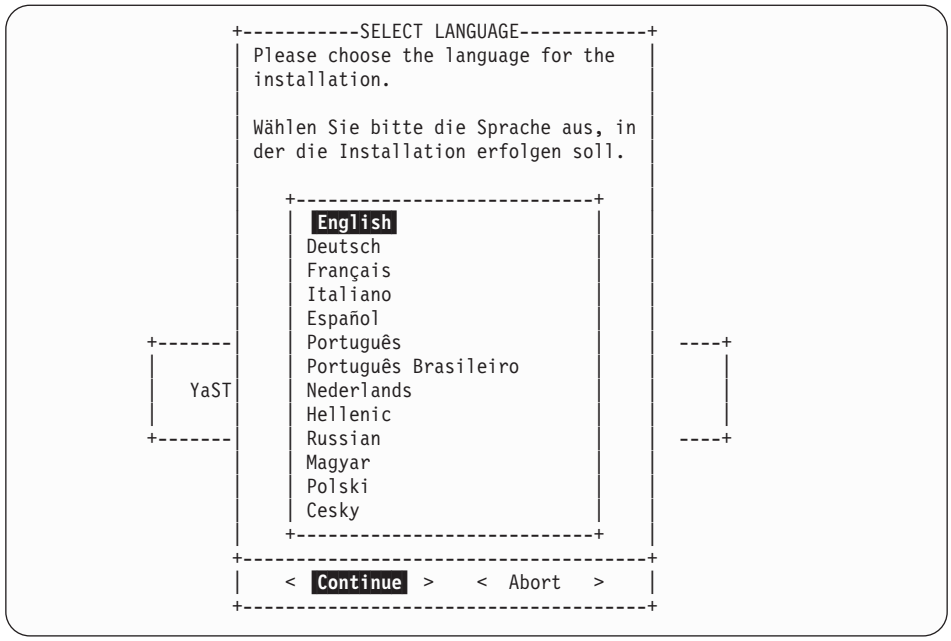
```
I am going to format the device /dev/dasda in the following way:
   Device number of device : 0xfd00
   Major number of device  : 94
   Minor number of device  : 0
   Labelling device        : yes
   Disk label              : LNX1 x80405228
   Blocksize               : 4096

--->> ATTENTION! <<---
All data in the specified range of that device will be lost.
Type "yes" to continue, no will leave the disk untouched: yes
Formatting the device. This may take a while (get yourself a coffee).
Finished formatting the device.
Rereading the partition table... done.
```

Repeat this step for each disk defined.

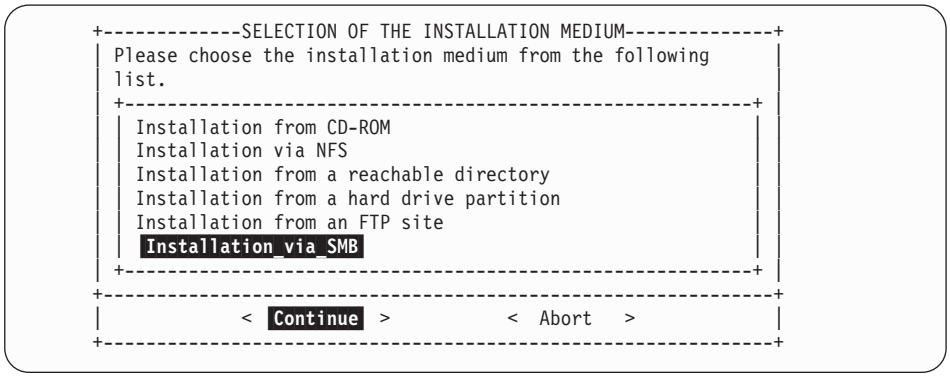
5. Enter **yast** to start the installation program.

```
[SuSE Instsys] boeaet32:/root # yast
```

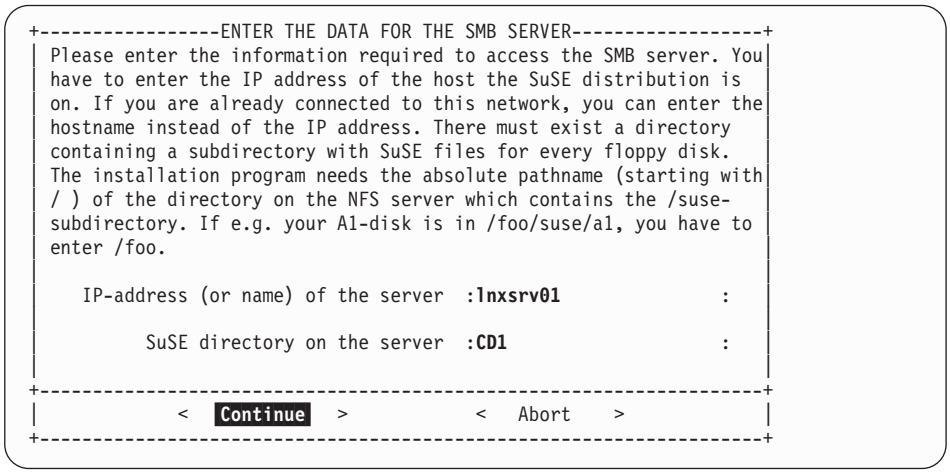
6. On the language selection panel, use the arrow keys to choose your language, for example English or Deutsch (German) , and select **Continue**:



7. On the panel asking you how to access the installation medium, select **via SMB**:

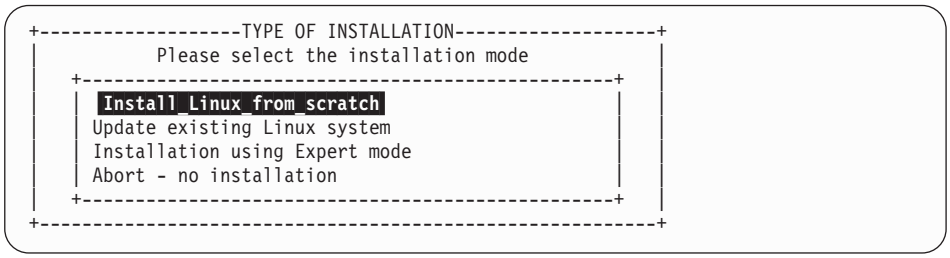


8. Enter the data of the SMB server and select **Continue**:



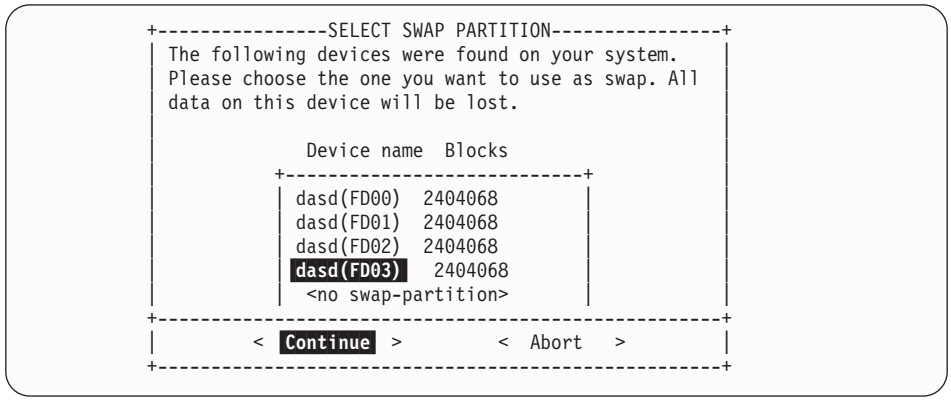
In the example shown, the server is called `lnxsrv01`, and the directory is `CD1`.

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

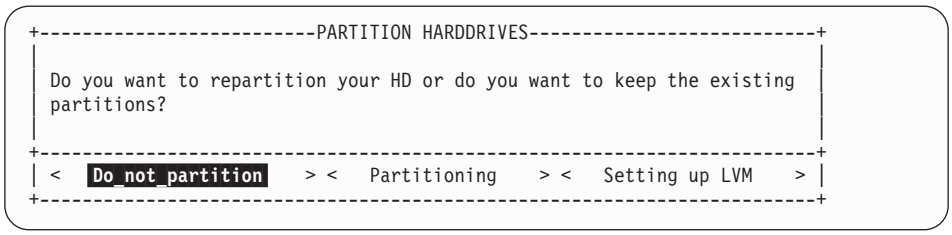


10. Select the DASD to use for the swap space.

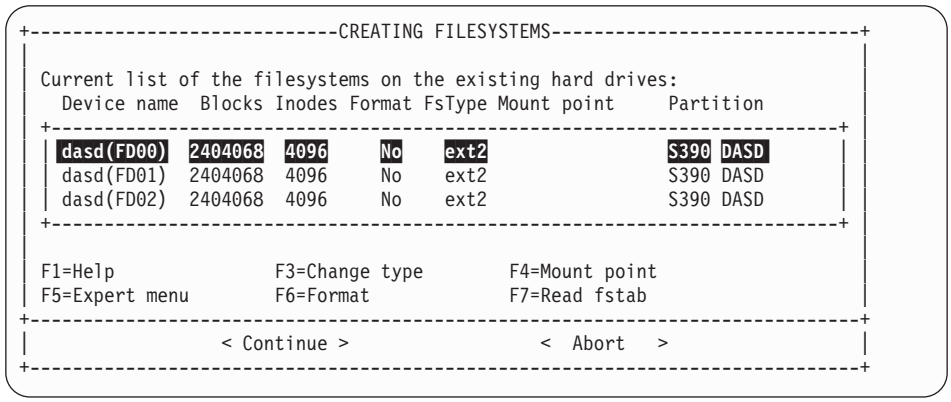
    Hint: It is a good idea to use the first DASD as the swap disk, because SuSE forces the swap disk to be called 'dasda'. It will be less confusing if your first disk is 'dasda' and the second one 'dasdb', and so on.In the example, this will be **fd03**. Then select **Continue**:



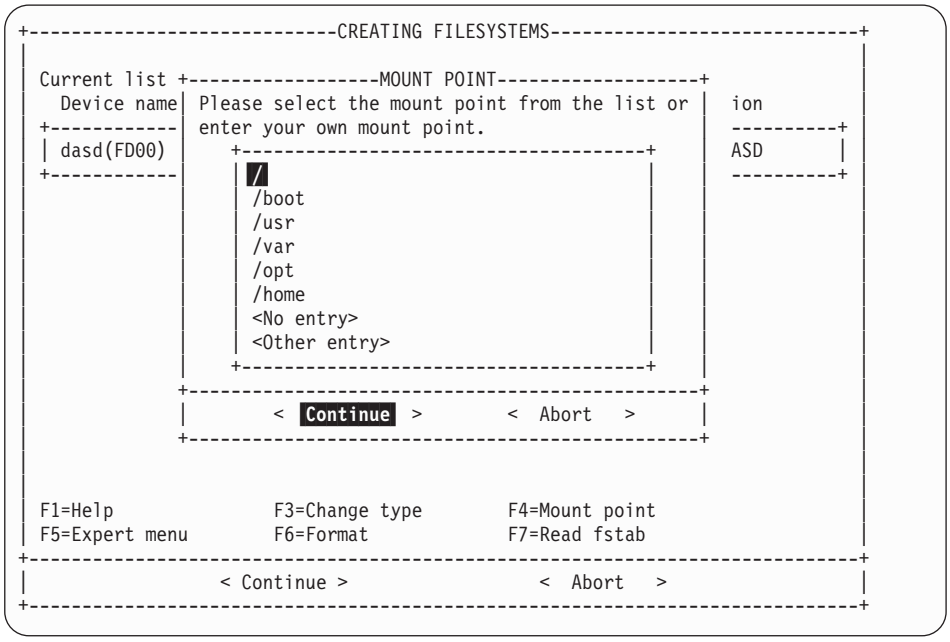
11. Select **Do not partition** on the partitioning screen:



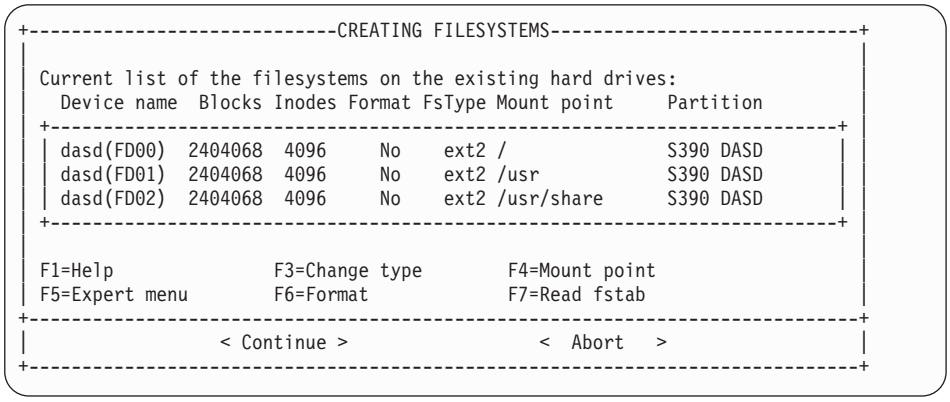
12. Create a file system. Select the DASD you want to use. Press **F4** to define the mountpoint.



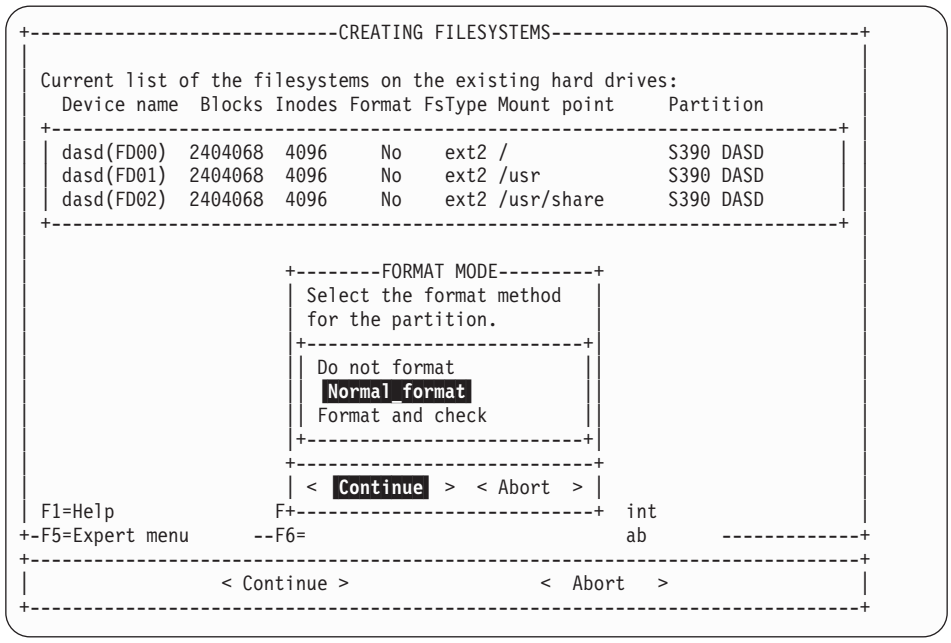
13. On the panel shown, select the root mountpoint from the list (the first entry '/') and then select **Continue**:



14. Repeat the last two steps if necessary to select other mount points for each of your DASD.

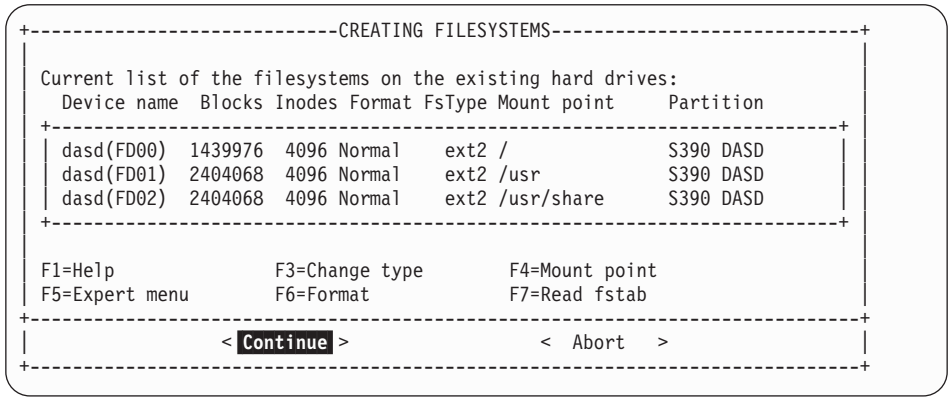


15. Format the DASD by pressing **F6**, then select **Normal format** and **Continue**:

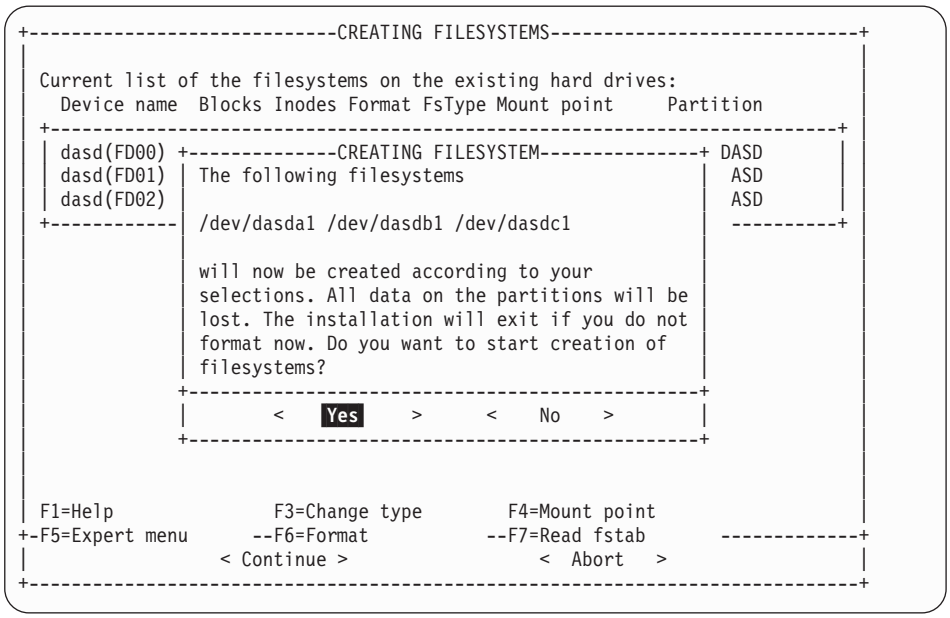


Repeat this for each DASD.

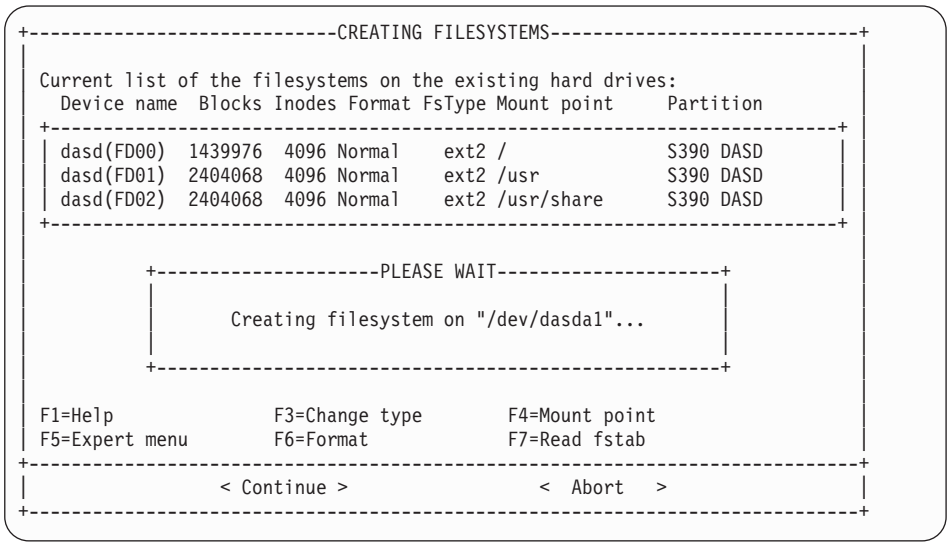
16. The format type of the DASD will change to 'Normal'. Select **Continue** to begin formatting:



17. On the confirmation screen check the data and select **Yes**:

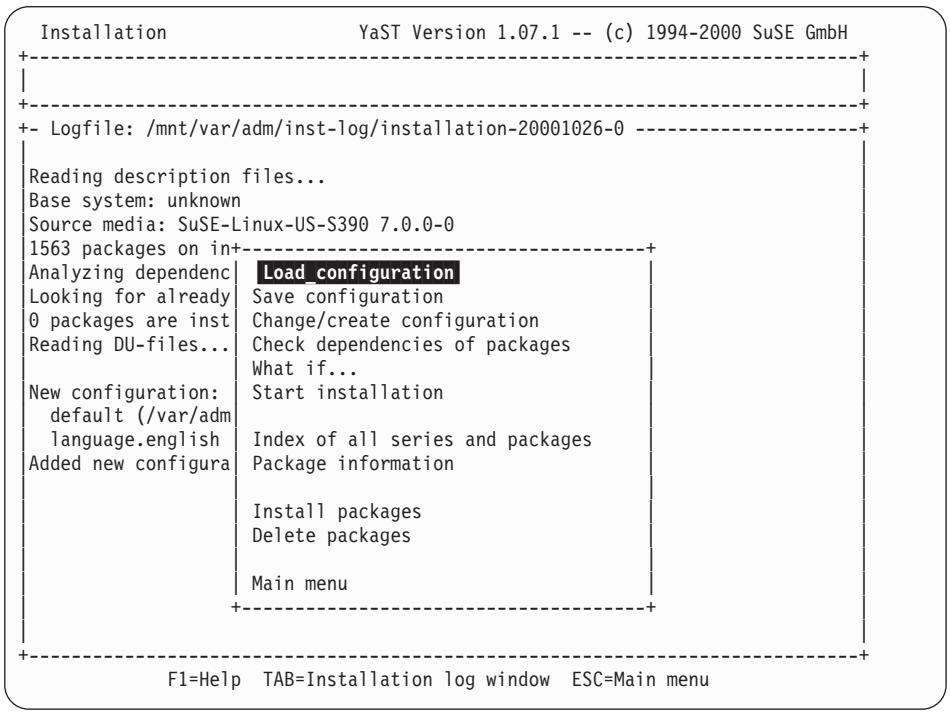


18. The file system is created:

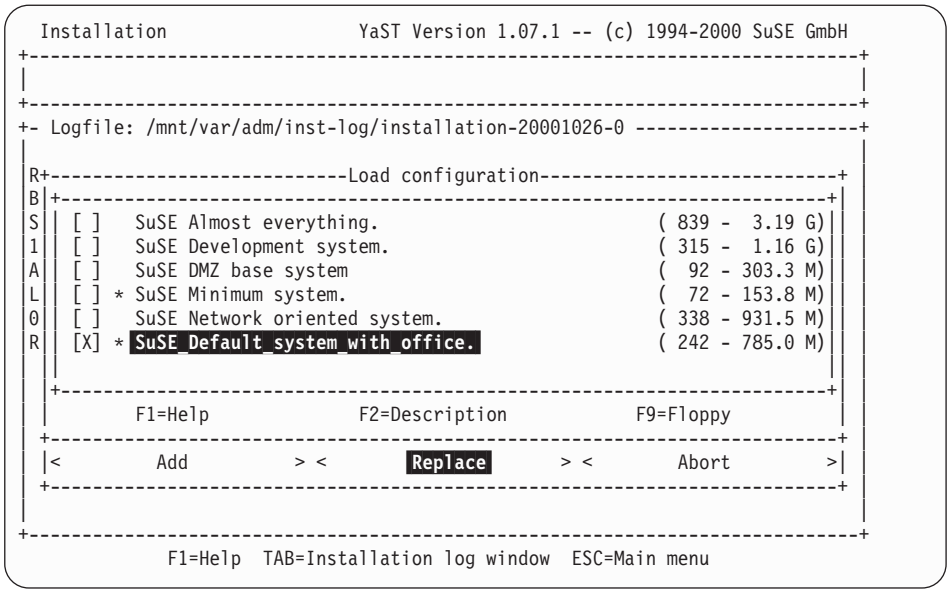


The system can take quite a long time to create the file system. This time is dependent on the size and type of disks you are using.

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



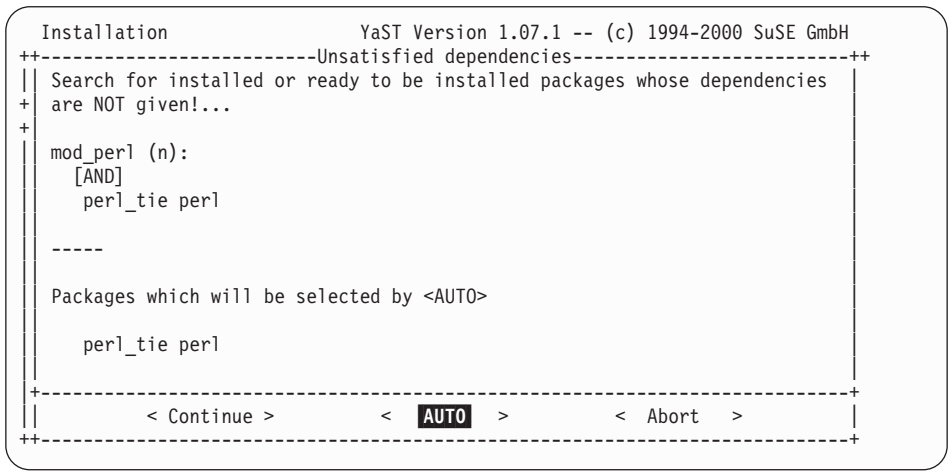
2. On the Load configuration screen, select **SuSE default system with office** and **Replace**:



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

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

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



If it does, you can select **AUTO** to 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:

```
  Installation [  *]            YaST Version 1.07.1 -- (c) 1994-2000 SuSE GmbH
+-------------------------------------------------------------------------------+
|Installing package  13:     diff - 178.1 K - 199 packages remaining...          |
+-------------------------------------------------------------------------------+
+- Logfile: /mnt/var/adm/inst-log/installation-20001026-0 ---------------------+
|                                                                               |
|                                                                               |
|CD 1:                                                                          |
|  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           ##############################################                |
|  compress       ##############################################                |
|  cpio           ##############################################                |
|  cracklib       ##############################################                |
|  cron           ##############################################                |
|  ddrescue       ##############################################                |
|  devs           ##############################################                |
|                                                                               |
+-------------------------------------------------------------------------------+
```

6. When the first CD has finished installing, enter the directory of the second CD, and then the third in the same way:

```
  +-------------CHANGE SMB DIRECTORY----------------+
  | Now you can enter the directory on the SMB      |
  | server which contains CD number 2. You may      |
  | also change the CD on the server and enter the  |
  | same directory.                                 |
  |                                                 |
  |              :CD2          :                    |
  +-------------------------------------------------+
  |  <   Continue   >     <   Abort    >            |
  +-------------------------------------------------+
```

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

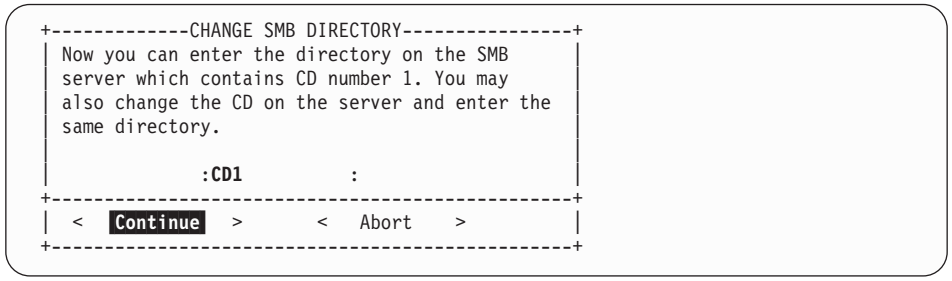
```
|Base system: SuSE-Linux-US-S390 7.0.0-0                                        ||
|                                                                               ||
|INSTALLATION COMPLETE.                                                         ||
+-------------------------------------------------------------------------------+
```

7. To ensure no unsatisfied dependancies remain we recommend that you repeat steps 3 to 6 until there are two **installation complete** messages at the bottom of the screen:

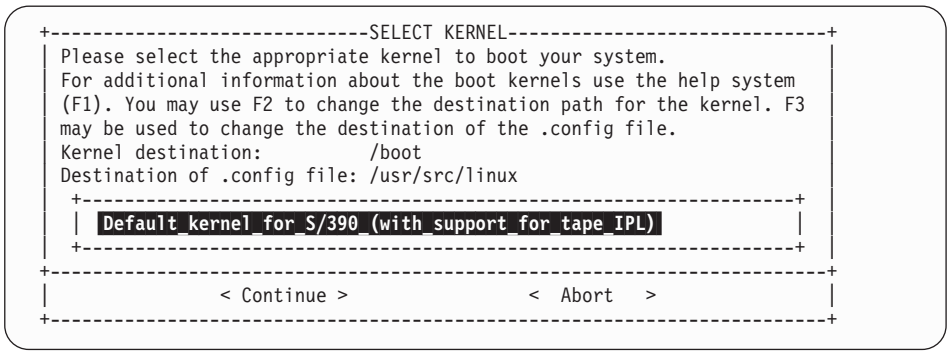
```
|Base system: SuSE-Linux-US-S390 7.0.0-0                                        ||
|                                                                               ||
|INSTALLATION COMPLETE.                                                         ||
|INSTALLATION COMPLETE.                                                         ||
+-------------------------------------------------------------------------------+
```

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

9. Return to the first CD for the next step:



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



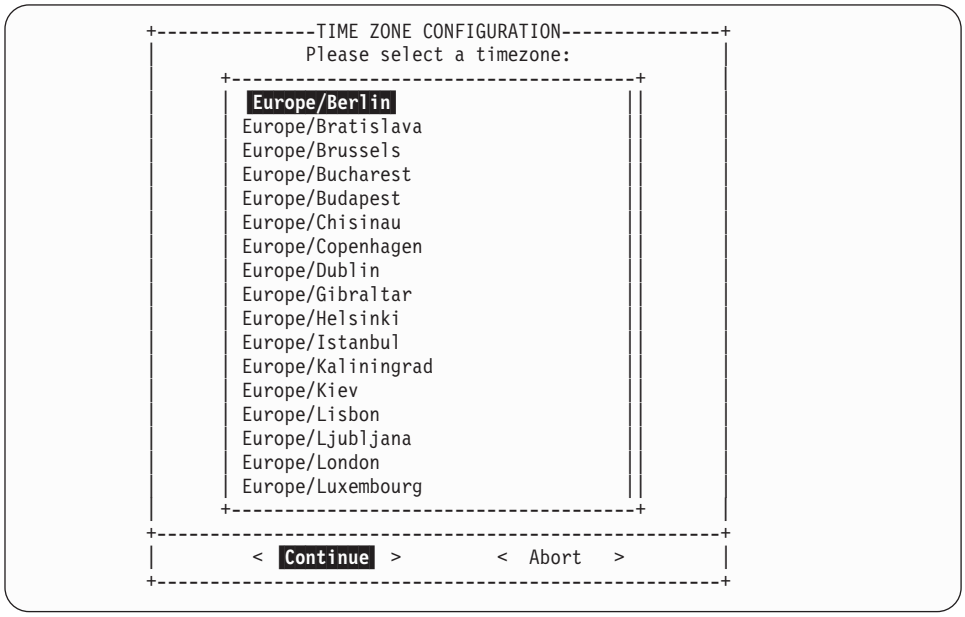
A message comes up confirming the installation of the kernel:

25 Configuring the system

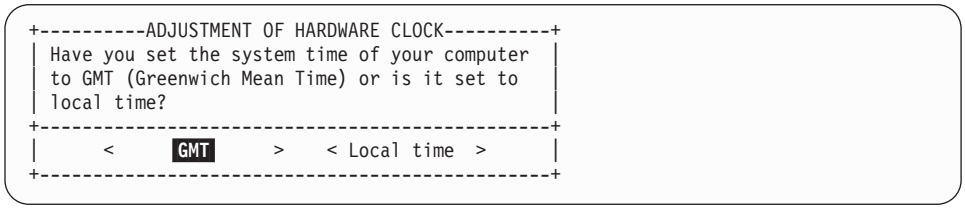
In this section the following is described:

- Setting the timezone
- Setting or changing the network definitions
- Starting the INETD, portmapper, and other network services

1. Select the time zone:



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



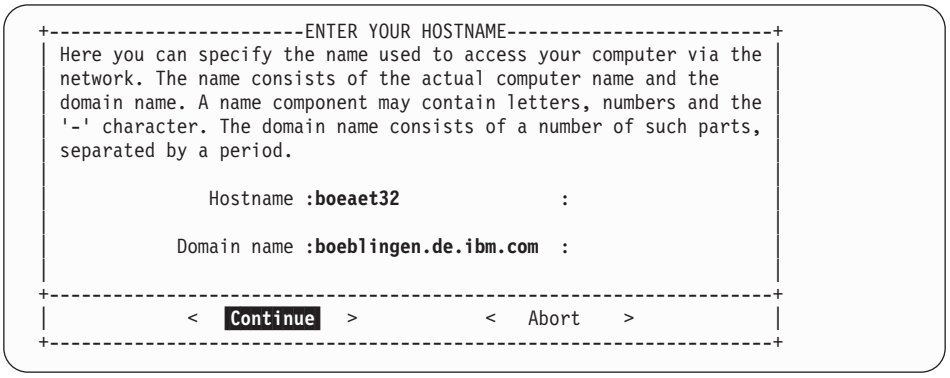
Setting the network definitions

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.

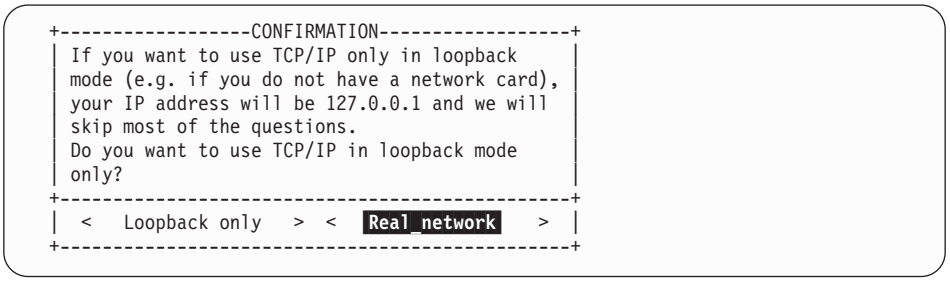
Before you begin: Ensure that you have the network parameters handy. These include:

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

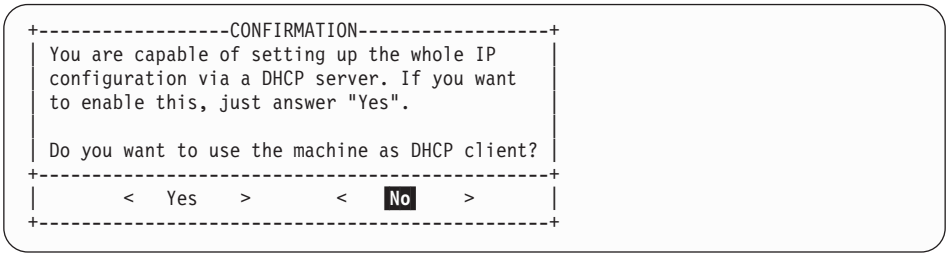
1. Enter the host name of the LINUX system:



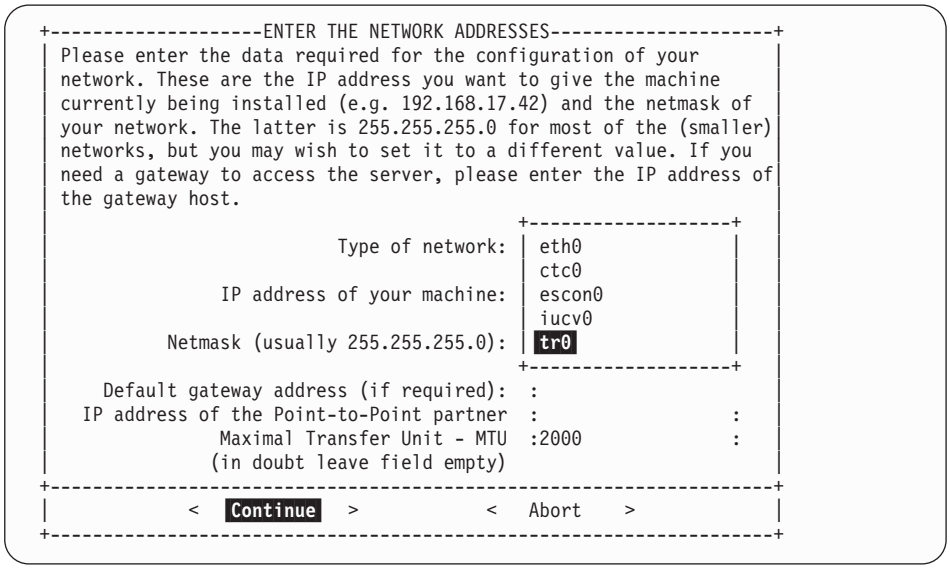
2. Select **real network** on the screen asking about loopback or real network. Loopback means that only the local network (that is, only the machine itself) will be used. Since you need to telnet in from another machine, you need the real network.



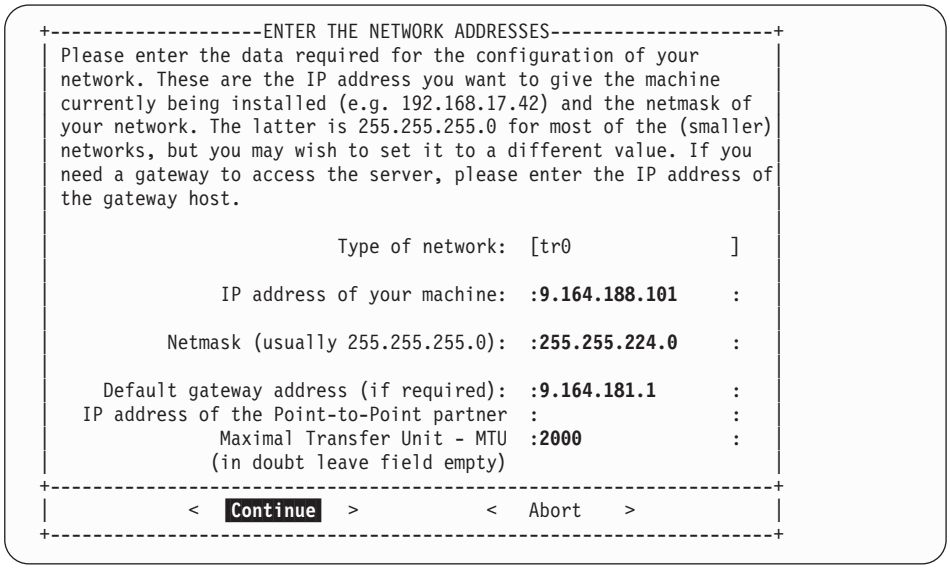
3. Select **No** on the screen asking about DHCP. (Use No for setting up a server. If you are setting up many LINUX machines, and only have a limited number of IP addresses available, you may need to set up as DHCP):



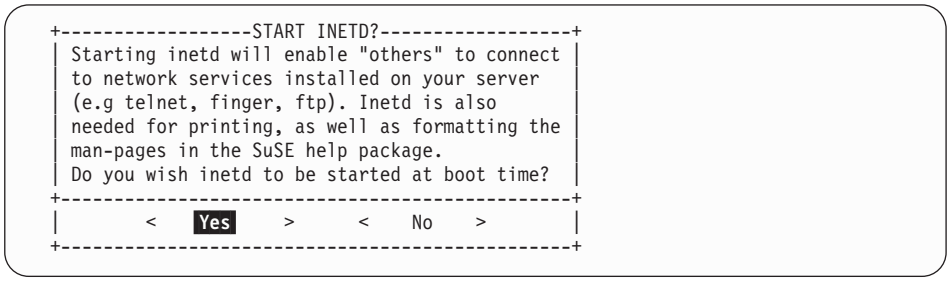
4. Select the type of network you are using. You can choose between Ethernet (eth0) or Token Ring (tr0):



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



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



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.                      |
|                                                |
|                                                |
|    :boeaet32.boeblingen.de.ibm.com        :    |
|                                                |
+------------------------------------------------+
|     <  Continue  >      <   Abort    >         |
+------------------------------------------------+
```

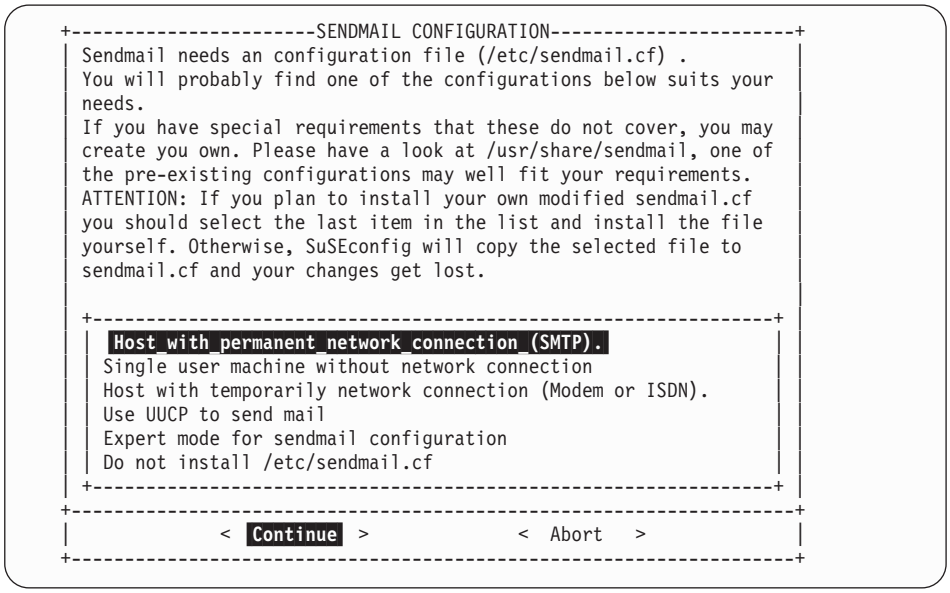
10. Answer **Yes** to the nameserver question:

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

11. Enter the IP address of the nameserver:

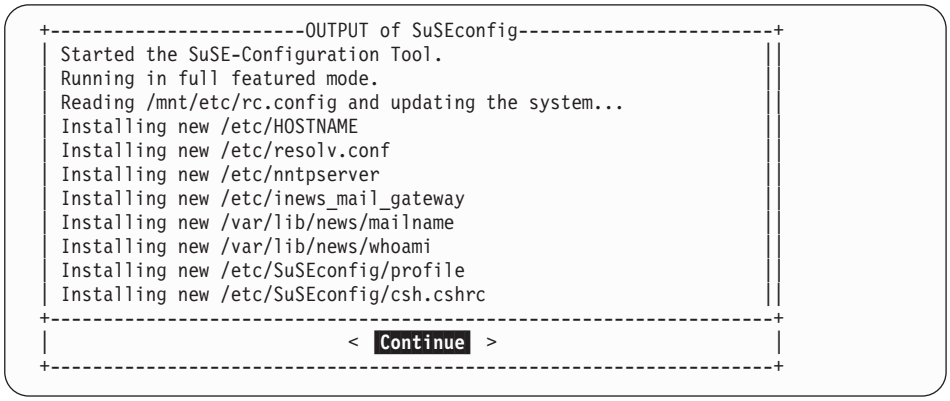
```
+--------------------NAMESEVER CONFIGURATION---------------------+
| Please enter the IP address of your name server. You can add   |
| more domain name servers by modifying the file                 |
| /etc/resolv.conf.                                              |
|                                                                |
| 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:



Select **Continue**.

13. SuSE starts the configuration tool. You will see messages like these:



Then the file system will be automatically unmounted:

```
Unmounting /mnt...
umount: /mnt: not mounted
YaST finished.
[SuSE Instsys] lnxsrv01:/root #
```

Checking that the file system was unmounted

All file systems except the one needed for IPL (all except /dev/ramx) need to be unmounted. The installation program normally does this automatically.

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:

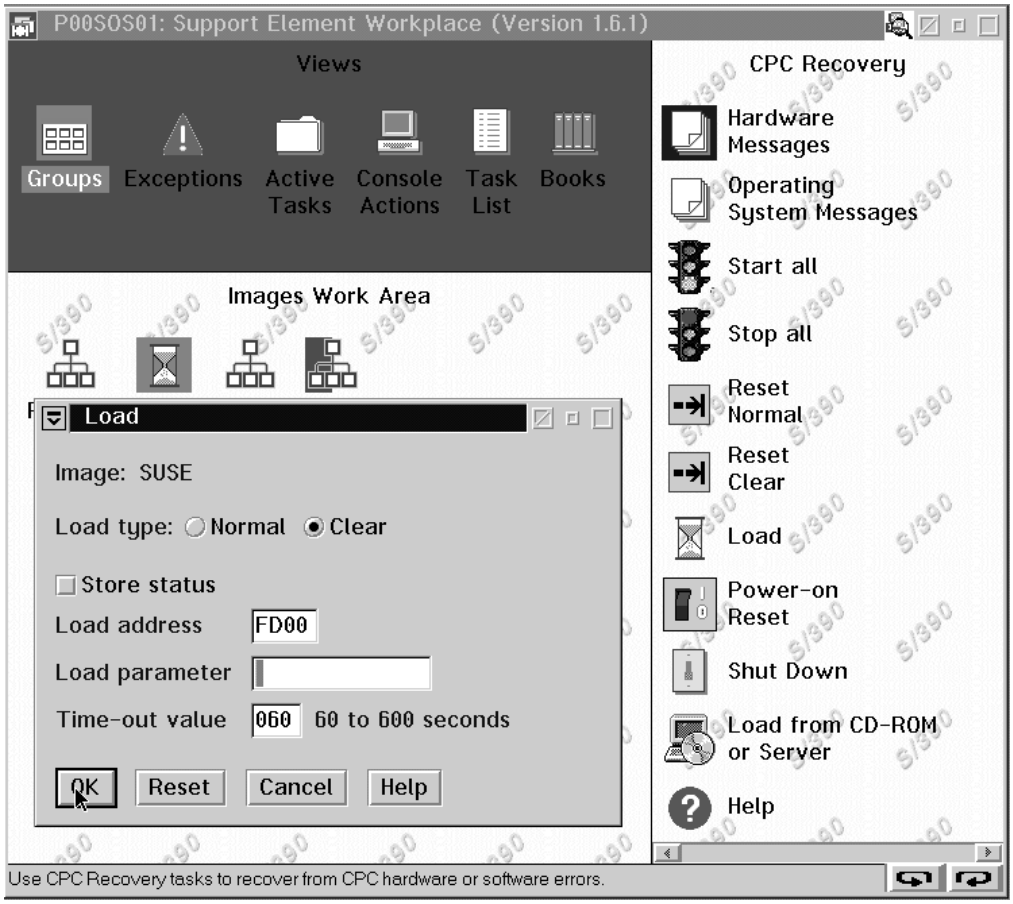
   ```
   /dev/dasda1 on /mnt
   ```

   you must perform an unmount command:

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

26 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:



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

27 Setting the root password

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

```
Linux version 2.2.16 (root@pserver2) (gcc version 2.95.2 19991024 (release)) #2
SMP Fri Oct 27 09:50:39 CEST 2000
Command line is: dasd=FD00,FD01,FD02,FD03 root=/dev/dasda1 noinitrd
 ro

We are running native
This machine has an IEEE fpu
Initial ramdisk at: 0x02000000 (16777216 bytes)
Detected device FD00 on subchannel 010A - PIM = 80, PAM = 80, POM = FF
Detected device FD01 on subchannel 010B - PIM = 80, PAM = 80, POM = FF
...
...
Checking file systems...
Parallelizing fsck version 1.18a (11-Nov-1999)
/dev/dasda1: clean, 45071/90048 files, 152375/179997 blocks
Checking file systems
  done
Setting up /lib/modules/2.2.16  done
Mounting local file systems...
proc on /proc type proc (rw)
not mounted anything
Mounting local file systems
  done
Mounting /dev/pts.  done
Starting ldconfig (setting up /etc/ld.so.cache)  done
Setting up timezone data  done
Setting up loopback device  done
Setting up hostname  done
Setting up the CMOS clockCannot access the Hardware Clock via any known method.

Use the --debug option to see the details of our search for an access method.
Cannot access the Hardware Clock via any known method.
Use the --debug option to see the details of our search for an access method.
  done
Running /sbin/init.d/boot.local
  done
Creating /var/log/boot.msg

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

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

```
--------------------------------------------------------------------------------

                        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: rootpw
Re-enter new password: rootpw

Password changed
```

Note: The password is truncated 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 <RETURN> to continue...


            Have a lot of fun!


                                Your SuSE Team


 INIT: Entering runlevel: 2
Master Resource Control: previous runlevel: N, switching to runlevel:   [80C [9D
 [1m2 [m
Setting up network device tr0
...
...
Starting CRON daemon  done
Starting Name Service Cache Daemon  done
Master Resource Control: runlevel 2 has been   [80C [9D [1mreached [m
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

- “28 Testing Apache” on page 115
- “29 Adding users” on page 117

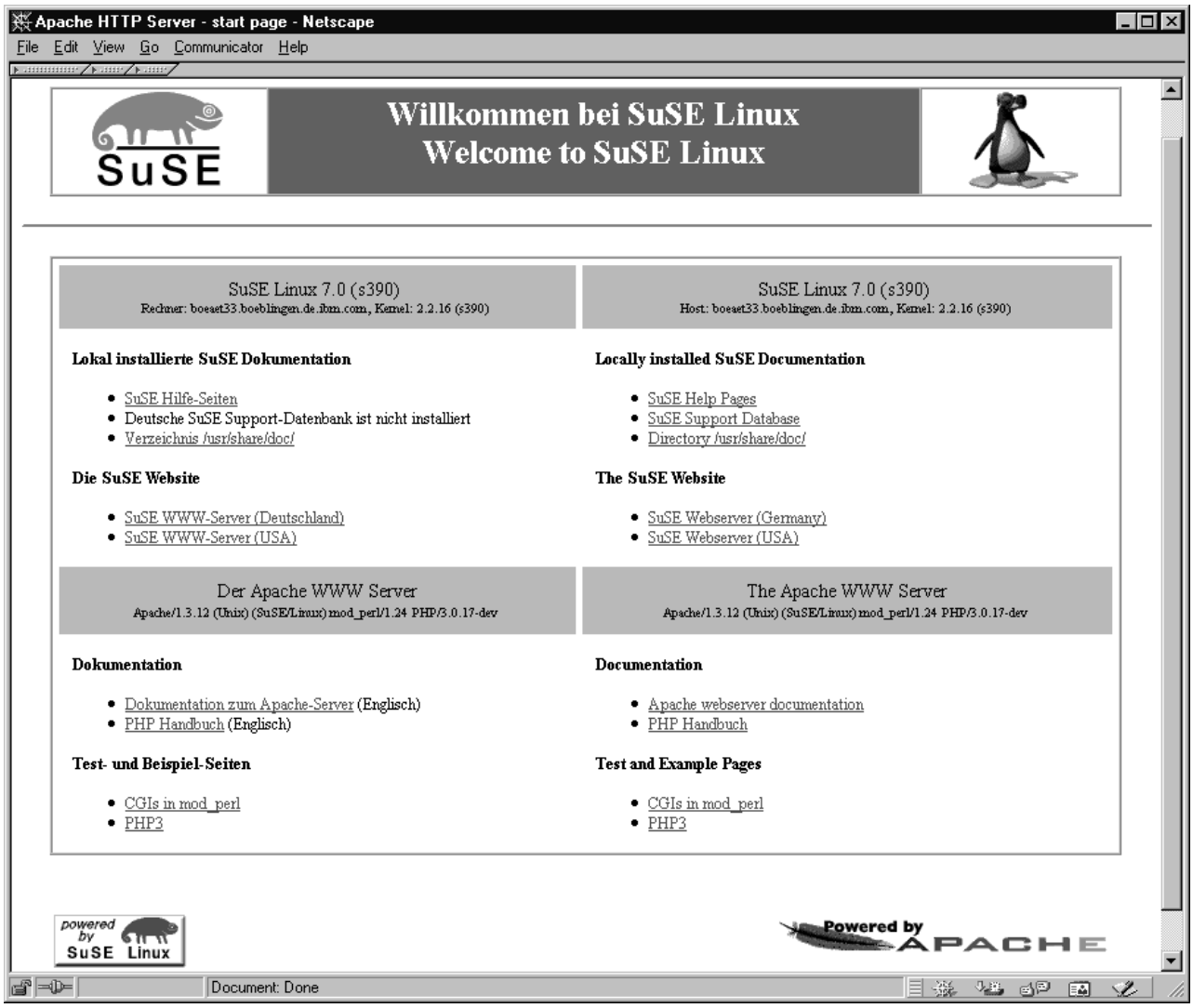
Part 5. Administration actions

28 Testing Apache 115

29 Adding users 117

28 Testing Apache

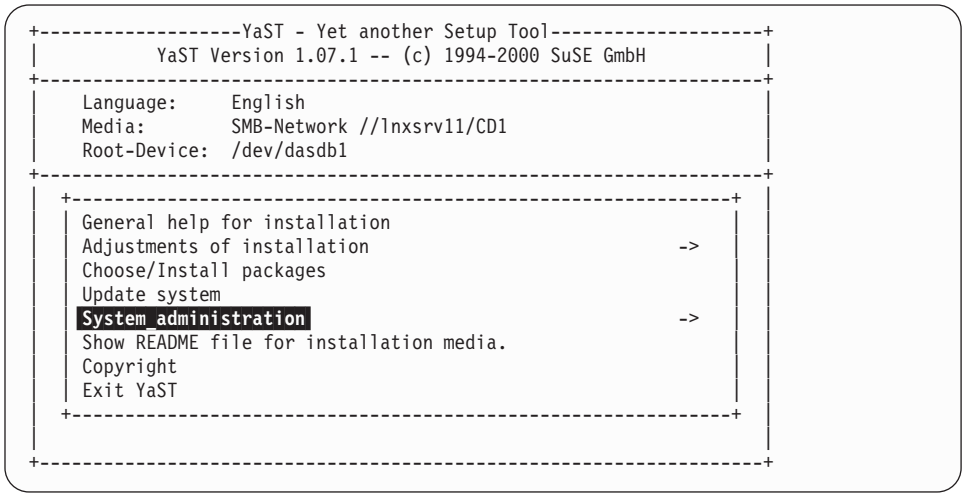
To see whether Apache is up and running, in a Netscape session on another machine in the network, enter the name of your LINUX for S/390 system in the Location field. The SuSE page should come up as shown.



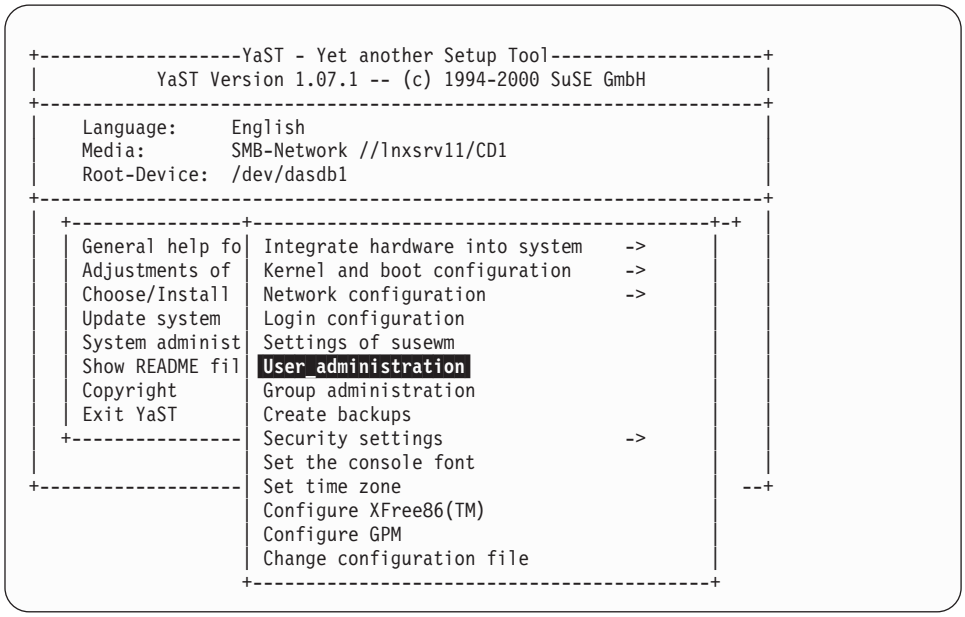
29 Adding users

To add users:

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



4. Select **User administration**:



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                                :williamg    :                   |
|                                                                           |
| Numerical user ID                        :502         :                   |
|                                                                           |
| Group (numeric or by name)               :users       :                   |
|                                                                           |
| Home directory                           :/home/williamg             :   |
|                                                                           |
| 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**.

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30 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

Check that the device is supported in *LINUX for S/390 Device Drivers and Installation Commands*.

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.

XPRAM

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

```
mknod /dev/slram0 b 35 0
mknod /dev/slram1 b 35 1
```

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

```
insmod xpram
mke2fs -b 4096 /dev/slram0
mount /dev/slram0 /mnt
```

MTU size in Ethernet

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
```

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

Before starting YaST, the DASDs need to be formatted, for example:

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

Refer to *LINUX for S/390 Device Drivers and Installation Commands* for more information about the DASFMT command.

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, Ethernet and NFS installation scenario” on page 51):

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 “19 Re-IPL from DASD” on page 77.

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**.(The cursor must be on a non-input field for this to work.)
- 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
```

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 $type /
line 157: fsck -C -A -a $FSCK_FORCE
```

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

1. Open an OS/2 window on the SE (use **Desktop on call** if you are working on an HMC), enter **mpts**.
2. Press configure twice.
3. Write down the number of the adapter (IBM IEEE 802.2 only).
4. Press **cancel** - **cancel** - **exit**.
5. Double click on **Emulated I/O Configuration** in the CPC configuration menu (use **Desktop on call** if you are working on an HMC).
6. Press **enter** and **F2** to view the active device map.
7. Write down the addresses of the 3088 devices (for example 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.)
8. Press **ESC** - **F10** - **F10** to leave without changing anything. (If you want to save your changes, press **ESC** - **F6** - **F10**.)
9. Double click on **Console Actions** and **Network Diagnostic Information**.
10. Look up the adapter number (recorded above) and its associated **MAC** address.
11. Write down this **MAC** address.
12. Double click on **Input/Output (I/O) Configuration** in the CPC configuration menu.
13. Open the source of the appropriate **IOCDS**. (The **IOCDS** number must correspond to the device map number.)
14. Look for the line where the **UNITADD** is equal to the smaller address of the 3088 device recorded above.
15. Write down the **CUNUMBR** of this line.
16. Look for 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:

1. When the **Network device number** is requested: enter the **IODEVICE ADDRESS** as noted above.
2. When the **Relative port** is requested: enter the adapter number (from MPTS).
3. Verify that the shown **hw_address** is the **MAC** address noted above.

The network adapter should now be properly set up and work correctly.

31 Building a parameter line file

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

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
```

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
```

Note that 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. For more information about the parameter line, see ″Overview of the parameter line file″ in *Device Drivers and Installation Commands*, LNUX-1003.

Building a parameter line using VM/ESA

The parameter line file `parm.line` can be built in VM. 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.

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
```

Note that 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. For more information about the parameter line, see ″Overview of the parameter line file″ in *Device Drivers and Installation Commands*, LNUX-1003.

Creating 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:

```
* $$ JOB JNM=LINUXVSA,CLASS=0,DISP=D,NTFY=YES
// JOB  SYSA  DEFINE FILE
// EXEC IDCAMS,SIZE=AUTO
 DEFINE CLUSTER( -
           NAME (LINUX.PARM.FILE) -
           CYLINDERS (2 2) -
           SHAREOPTIONS (3) -
           RECORDSIZE (1024 1024) -
           VOLUMES (DOSRES) -
           REUSE -
           NONINDEXED -
           FREESPACE (15 7) -
           NOCOMPRESSED -
           TO (99366) ) -
         DATA (NAME (LINUX.PARM.FILE.@D@) -
             CONTROLINTERVALSIZE (4096) ) -
         CATALOG (VSESP.USER.CATALOG)
  IF LASTCC NE 0 THEN CANCEL JOB
/*
// OPTION STDLABEL=ADD
// DLBL PARMLIN,'LINUX.PARM.FILE',,VSAM,CAT=VSESPUC
/*
// EXEC IESVCLUP,SIZE=AUTO
A LINUX.PARM.FILE                              PARMLIN VSESPUC
/*
// UPSI 1
// EXEC DITTO
$$DITTO CVS BLKFACTOR=1,FILEOUT=PARMLIN,CISIZE=1024
ANEXIT 'root=/dev/ram0 ro ipldelay=2m'
$$/*
$$DITTO EOJ
/*
/&
* $$ EOJ
```

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
```

Note that 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. For more information about the parameter line, see ″Overview of the parameter line file″ in *Device Drivers and Installation Commands*, LNUX-1003.

Creating a parameter line file for the VM reader

Create a VM file with the name **LINUX PARM** on minidisk A. Enter the following commands in the file:

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

Where:

root=/dev/ram0 ro
: The root file system is mounted on a RAMdisk in the directory `/dev/ram0` and is defined as a read-only file system by using the command `ro`

ipldelay=xyz
: 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. `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`.

When IPL-ing from the vitual 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. For more information about the parameter line, see ″Overview of the parameter line file″ in *Device Drivers and Installation Commands*, LNUX-1003.

32 Preparing your root file system for initial 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 CD 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 you 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
   ```

Part 7. Appendixes

Appendix. Multiprise 3000 considerations

There are some important differences in the area of network connections and I/O device driver setup, and these differences are described in example format in this chapter.

Before installing LINUX for S/390 on a Multiprise 3000, you should be familiar with the technical architecture of the machine. Two ITSO Redbooks are available:

- *Multiprise 3000 Technical Introduction: SG24-5633*
- *Multiprise 3000 Basic Emulated I/O Definitions: SG24-5669*

Required fix

The microcode fix EC Stream F34643 MCL048 is required on the system. It solves certain types of problem that occur during IPL. For example, the LCS device can fail to start up after you have successfully performed an IPL from tape on a LPAR, stopped LINUX, and then re-IPLed the system.

Preparing the IOCDS

The following examples assume that two Token Ring adapters are being used, where the MPTS Logical Adapter number `0` is used for OS/2® exclusively and MPTS Logical Adapter number `1` is used by LINUX for S/390.

PCI adapter for OS/2

The following shows the definition within MPTS in OS/2 which will be used in the Support Element TCP/IP settings:

```
IBM PCI Token Ring Family Adapter (IBMTRP.OS2)
0 - IEEE802.2
0 - IBM OS/2 NETBIOS
0 - TCP/IP
```

Now you have to define the TCP/IP settings in the Support Element:

1. Log-on to the Support Element as
   - user `ACDADMIN`
   - default password is `PASSWORD`
2. Select the **View** window and click **Console Actions**
3. Open **Support Element Settings** and select the **Enable LAN Connection** check box.
4. You will be asked to provide the Adapter Number.
   - Enter `0` for the Logical Adapter number specified within MPTS in OS/2
   - Click **Apply**.

Also see the redbook *Multiprise 3000 Basic Emulated I/O Definitions SG24–5669* Chapter 4.

Note: You cannot use the same LAN adapter with OS/2 TCP/IP and LINUX for S/390 TCP/IP.

PCI adapter for LINUX for S/390

You will need at least one second adapter to be used by LINUX for S/390. This adapter should be defined within MPTS in OS/2 as follows:

```
IBM PCI Token Ring Family Adapter (IBMTRP.OS2)
1 - IBM IEEE802.2
```

Note: The Token Ring adapter which is used by LINUX for S/390 must be defined **without** the TCP/IP protocol driver.

You will need the logical adapter number later in order to configure the LINUX for S/390 TCP/IP definitions. You have to configure the appropriate IOCDS definitions for read and write channels:

```
...
...
CHPID PATH=FC,TYPE=EIO,SHARED
...
...
CNTLUNIT CUNUMBR=FC20,PATH=(FC),UNIT=3088,UNITADD=((20,1))
CNTLUNIT CUNUMBR=FC21,PATH=(FC),UNIT=3088,UNITADD=((21,1))
...
...
IODEVICE ADDRESS=(FC20),CUNUMBR=(FC20),UNIT=3088,PARTITION=Z1
IODEVICE ADDRESS=(FC21),CUNUMBR=(FC21),UNIT=3088,PARTITION=Z1
...
...
```

You have to enter the definitions in the emulated I/O DEVMAP where the addresses refer to your settings in the IOCDS. In this example, Device Driver Manager 9 is LCS3172, but it can be another number depending on your configuration.

```
Adr   Device   Label   Atype   Size   Mgr   FN/P
22    3088                            9
23    3088                            9
```

This means that the LCS device driver uses device number `0xe22` for the read channel and the write channel device number is implicitly `0xe23` (read channel device number + 1).

The Logical Adapter number `1` is defined within MPTS for OS/2.

Preparing a Multiprise 3000 LPAR

The following procedure describes how to set up a Multiprise 3000 to perform an IPL from a SuSE LINUX CD-ROM using emulated I/O into one or more LPARs.

Preparing the S/390 Service Element

You need to be logged on as user ACDADMIN, which allows you to:

1. Shut down all running LPARs (if any) by using the **OS messages** icon on the selected LPAR.
2. To prevent you from loading a formerly installed system accidentally when performing a power-on-reset (POR), switch off automatic load for each existing LPAR. To do this:
   a. Double click **Groups** in the upper left window and mark **CPC** in the window underneath

b. Select **CPC Operational Customization** in the right window and double click **Customize / Delete Activation Profiles**.

c. Select the **Default** profile and click on **Customize**

d. For each LPAR select the corresponding register card and go to the sheet named **Load**, where you deselect the **Load during activation** item.

e. Close all windows.

3. Enable automatic activation of LPARs. After each POR the system, and therefore all LPARs currently set up, are in an undefined state. To prepare the LPARs for an IPL, they must be activated. To activate LPARs automatically after a POR:

   a. In CPC Operational Customization double click **Automatic Activation**.

   b. Mark the displayed entry and go to **Options** where you select **Enable automatic activation**

   c. Close all windows.

4. Choose an LPAR profile and create an IOCDS prepared for Emulated I/O. To install SuSE LINUX into an LPAR, you must tell the system to start in LPAR mode with a defined number of LPARs each connected to devices of choice.

   a. If the S/390 is actually running in ESA mode, double click **Groups** in the upper left window and mark **CPC** in the window underneath.

      If the S/390 is actually running in LPAR mode, double click **Groups** in the upper left window and mark **Images** in the window underneath.

   b. Select **CPC Configuration** in the right window and double click **Input/Output (I/O) Configuration**; you will see entries for four user IOCDS and one IOCDS for diagnostics.

   c. Select a free, non-active (column Data Set Status) LPAR (for example, A3) and click **Option**s, then **Disable write protection**.

   d. Select the active LPAR (for example A1) and click **Options—>Copy configuration**.

   e. In the Target field select the chosen LPAR and click **OK**.

   f. Now mark the chosen LPAR and go to Options, then Open source file.

   g. The second line of the IOCDS file opened in the editor should contain the number and names of LPARS you want to set up. An example IOCDS is shown on page Figure 14 on page 138.

      In the first (resource) section, make sure there is at least a line

      ```
      CHPID PATH=FC,TYPE=EIO,SHARED
      ```

      The FC path is responsible for emulated I/O.

      Furthermore, we need a connection to DASDs in the next line with path FD. The second (DASD) section defines the access to the two DASDs (a root and a swap). Here the DASDs have the addresses FD00 and FD01.

```
ID    MSG1='SUSELP01',SYSTEM=(7060,1)
            RESOURCE PARTITION=((Z1,1))
          ************************************************************************
                 CHPID PATH=FC,TYPE=EIO,SHARED
                 CHPID PATH=FD,TYPE=DSD,SHARED
          ************************************************************************
          **  DASD                                                              **
          ************************************************************************
                CNTLUNIT CUNUMBR=FD00,PATH=FD,UNITADD=((00,256)),UNIT=3990-2
                IODEVICE ADDRESS=(FD00,2),CUNUMBR=FD00,UNIT=3390,PART=Z1
          ************************************************************************
          **  EMULATED DEVICES                                                  **
          ************************************************************************
          ** CDROM (will point to H:\SUSE\IMAGES\AWSOMA1.TDF)
                CNTLUNIT CUNUMBR=FC80,PATH=FC,UNIT=3422,UNITADD=((80,1))
                IODEVICE ADDRESS=FC80,CUNUMBR=FC80,UNIT=3422,PART=Z1
          ** LCS (Networkadapters, emulated)
                CNTLUNIT CUNUMBR=FC20,PATH=FC,UNIT=3088,UNITADD=((20,1))
                CNTLUNIT CUNUMBR=FC21,PATH=FC,UNIT=3088,UNITADD=((21,1))
                IODEVICE ADDRESS=(FC20,1),CUNUMBR=FC20,UNIT=3088,PART=Z1
                IODEVICE ADDRESS=(FC21,1),CUNUMBR=FC21,UNIT=3088,PART=Z1
```

Figure 14. Example of an IODCS

The third (Emulated devices) section contains information about two important emulated I/O devices: the CD-ROM and the network device. The CD-ROM is emulated as an 3422 tape bound to LPAR Z1 at FC80, the network device is a 3088 for LPAR Z1 at FC20 and FC21.

h. After inserting the lines above, save and exit the editor with **[F2]—>[F3]**.

i. To build the IOCD from the new IOCDS, go to **Options**, **Build data set ...** and then **Build Configuration** where the checkbox **Build the IOCDS for logically partitioned mode** must be activated.

   The IOCDS build might fail with the following error:

   ```
   *IZP  IZP101I OPERATION FIELD NOT FOUND
   ```

   If this happens, edit the IOCDS again and remove any trailing blanks in the changed lines, and any blank lines.

j. After a successful IOCDS build, click on **Options**, then **Enable write protection** and exit.

5. Configure Emulated I/O profile for the FC path. Until now the system knows of one or more devices as tape emulated devices, but where to get the data when these devices are accessed has not been declared yet. The corresponding table for this is the DEVMAP, which we will configure as follows:

   a. In CPC Configuration double click **Emulated I/O Configuration**; a textmode window titled ″Configurator DEVMAPS″ will pop up.

   b. **Important:**Move the cursor to a device map number that corresponds to the IOCDS number you have chosen in step 4 (for example, AWSMAPA3 for IOCDS A3) and press **[ENTER]**, then **[F2]**. If you need help, press **[F1]**.

   c. Insert a line for the emulated network device (1st line in the following example) and a line with the address, device, type of emulation and path of the TDF (Tape Descriptor File) to be read when this device is accessed. In our example, this is FC80 as the device address, (3422) for the tape device, the driver (H=AWSOMA) and the path to a TDF on CD:

```
U P D A T E   S Y S T E M   D E V I C E S          Mode = ESA

        /- Active Devices:16  -------- Available disk space in Gbytes: 4.186958 -------\
        |  Addr Device  Label  Atype  Size     Mgr  FN/P   PATH:>G:\                  <|
        |-------------------------------------------------------------------------------|
        |   >   >      >       >     >         >  >                                    |
        |    20  3088                           9                                      |
        |    21  3088                           9                                      |
        |    "    "                             "                                      |
        |    "    "                             "                                      |
        |    "    "                             "                                      |
        |    80  3422                           H  H:\SUSE\IMAGES\AWSOMA1.TDF          |
        |    "    "                             "                                      |
        |    "    "                             "                                      |
        |    "    "                             "                                      |
        \-------------------------------------------------------------------------------/
         Mgr Codes: 1=AWSFBA   2=AWSCKD   3=AWS3274  4=LAN3274  5=AWS3215  6=AWS2821
         7=AWS2540  8=LAN3172  9=LCS3172  A=MGR3172  B=WAN3172  C=AWSICA   D=AWSTAPE
         E=AWS34X0  F=AWS34X1  G=AWS34X2  H=AWSOMA   I=AWSPCSRV
        ---------------------------------------------------------------------------
          F1 Help  ALT+F1 Key Definitions  F10 Main Menu  ESC Cancel Input   | cnsysdev
```

To delete an entry, press **[F9]**, to insert an entry, simply type the values in the row with the ″>″ chars. To get help for an item, move the cursor to the item in question, and press **[F1]** (for example, to get information on AWSOMA, move the cursor under H=AWSOMA and press **[F1]**).

d. When done, press **[F10]** to exit the editor, **[F6]** to save configuration data and then **[F10]** twice to leave Emulated I/O Configuration.

6. Perform a POR as follows:
   a. Double click **Groups** in the upper left window and mark **CPC** in the window underneath
   b. Select **CPC Recovery** in the right window and click on **Power-on Reset**.

Hints and Tips for the Multiprise 3000

Unlocking the OS/2 desktop on the Multiprise 3000 SE

To unlock the desktop:

1. Log onto the SE as user ACSADMIN. The default password is PASSWORD.
2. Click **Console Actions**
3. Click **User Profiles**
4. Disable the Secure Desktop function

You should now be able to use the OS/2 icons.

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
LINUX for S/390 Device Drivers and Installation Commands	LNUX-1003-00 This document can be downloaded from http://www.ibm.com/s390/linux/press.html
Preparing for Installing SuSE LINUX for S/390	LNUX-1001-00 This document can be downloaded from http://www.ibm.com/s390/linux/press.html
LINUX for S/390 Redbook	SG24-4987 This document is available at the IBM Systems Center redbooks website: http://www.ibm.com/redbooks/

Table 2. Multiprise books (redbooks)

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

Table 3. IOCDS related books

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

Table 4. Network connection books

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

Useful websites

These websites can be of use to you.

IBM websites:

- http://www.ibm.com/linux/ - Overall LINUX at IBM website
- http://www.ibm.com/s390/linux/ - LINUX for S/390 website
- http://www.ibm.com/s390/vm/linux/ - VM/ESA and LINUX resources

Other websites:

- http://SuSE.com/ - The SuSE website
- http://linux.s390.org/ - LINUX for S/390 applications website hosted by Millenux.
- http://tune.linux.com - General tuning information for LINUX

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