Installing
LINUX® for S/390® - July 28, 2000
Installing
LINUX® for S/390® - July 28, 2000
Install Fest Edition (July 2000)

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

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About this document

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

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

How to obtain the most recent version

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

Who should read this document?

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

Assumptions

The following general assumptions are made about your background knowledge:
  • You have an understanding of LINUX and S/390 terminology.
  • You have an understanding of basic computer architecture, operating systems, and programs.

Prerequisites

It is essential that you have read the Preparing for Installing LINUX for S/390 document contained in the Install Fest package. Before starting the Install Fest, you must have:
  • performed the tasks necessary to set up your S/390 system
  • obtained the information requested (including APARs and MCFs)
  • created an IPL tape and verified that it contains the correct files.
Part 1. IPL actions

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1 Initial file system IPL

IPL from tape in a native/LPAR environment

To IPL from tape in a native/LPAR environment:

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

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

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

IPL from tape using a VM guest

To IPL from tape using a VM guest:

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

   #CP IPL <devno>

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

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

IPL from the VM reader

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

To continue...

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

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

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2 Kernel initialization

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

First a lot of devices are autosensed and you will see a lot of messages like these:
SenseID : device 2848 reports: CU Type/Mod = 3990/EC, Dev Type/Mod = 3390/0A
SenseID : device 2849 reports: CU Type/Mod = 3990/EC, Dev Type/Mod = 3390/0A
...

Then the parameter file is parsed:
...
parse_options: line: ramdisk_size=32768 dasd=28d0-28df root=/dev/ram0 ro init=/b
...

All devices specified by the kernel parameter dasd= are displayed:
xpraminfo:initializing:
xpraminfo: number of devices (partitions): 1
xpraminfo: size of partition 0 to be set automatically
xpraminfo: hardsector size: 4096B
xpraminfo: 2097152 kB expanded memory found.
xpraminfo: automatically determined partition size: 2097152 kB
channel: no Channel devices recognized

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

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

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

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

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

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

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

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

3. Answer y to agree to the license:

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

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

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

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

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

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

   I'll try to start the lcs module now...
   insmod lcs noauto=1 devno_portno_pairs=0xf900,0 :
   Using /lib/modules/2.2.16/net/lcs.o
   Symbol version prefix 'smp_'
   Starting lcs
   lcs: eth0 configured as follows read subchannel=7c write subchannel=7d
   hw_address=00:04:AC:DE:67:CC rel_adapter_no=0
lcs configured to use sw statistics, ip checksumming of received packets is off.
autodetection is on.
cu_model 0x01,15 rel_adapter(s)
cu_model 0x08,15 rel_adapter(s)
cu_model 0x60,1 rel_adapter(s)
cu_model 0xF,15 rel_adapter(s)
lsmod now shows all loaded modules:
  lcs               15080 0 (unused)
Was the loading successful (Yes/No) ? y

Next you will be prompted for the network data. Here is an example from one of our systems:
Please enter your full host name (e.g. s390.suse.com): pserv4.boeblingen.de.ibm.com
Please enter your IP address: 9.164.137.36
Please enter the net mask: 255.255.248.0
Please enter the broadcast address: 9.164.143.255
Please enter the gateway address: 9.164.136.1
Please enter the IP address of the DNS server: 9.164.178.1
Please enter the DNS search domain (e.g. suse.com): boeblingen.de.ibm.com

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

Configuration will be:
LCS parameter :
Full host name : pserv4.boeblingen.de.ibm.com
IP address : 9.164.137.36
Net mask : 255.255.248.0
Broadcast address: 9.164.143.255
Gateway address : 9.164.136.1
DNS IP address : 9.164.178.1
DNS search domain: boeblingen.de.ibm.com
Is this correct (Yes/No) ? yes

After the network configuration is done, the process switches to the INIT process. This is where you need to telnet in.
INIT: Entering runlevel: 1
bash-2.04#

8. Optionally, to verify the network connection, do a ping to your gateway:
ping -c 3 9.164.136.1
64 bytes from 9.164.136.1: icmp_seq=1 ttl=64 time=0.893 ms
64 bytes from 9.164.136.1: icmp_seq=2 ttl=64 time=0.863 ms
--- 9.164.136.1 ping statistics ---
3 packets transmitted, 2 packets received, 33% packet loss
round-trip min/avg/max = 0.863/0.878/0.893 ms
bash-2.03#

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

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

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

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

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

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

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

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

You will then see DASD initialization messages on the console:

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

... 
dasd:initialization completed
3. Enter `yast` to start the installation program.
4. On the language selection panel, use the arrow keys to choose your language, and press `Enter`.

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

5. On the panel asking you how to access the installation medium, select `FTP` site:
6. On the panel asking for installation mode, select **Install Linux from scratch**:

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

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

![Mount Point Panel](image)

9. Select the root mountpoint from the list:

![Mount Point Panel](image)

The result is shown in the list:

![Creating Filesystems Panel](image)
10. Select the DASD you want to format by pressing F6, then select Normal format and Continue:

![Creating Filesystems Interface](image1.png)

11. Create the file system by pressing F6:

![Creating Filesystem Interface](image2.png)

The file system is created:

```
+-----------------+-----------------+------------------+
| PLEASE WAIT     |                 |                  |
|                 | Creating filesystem on "/dev/dasd1"... |                  |
+-----------------+-----------------+------------------+
```

The system can take quite a long time to create the file system. This is dependent on the size and type of disks you are using.
5 Setting up the link to the FTP server and getting the packages

1. Fill in the data for your FTP server and press F5 to check the connection. Watch for the words Settings OK at the end of the messages:
2. If the connection is OK, press **F10** to start loading files from the CD. You will see messages like these:
6 Installing the packages from the FTP server

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

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

3. Start the installation from the server by selecting **Start installation**:
4. The installation program will check for interdependencies, and the following screen might come up:

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

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

![Logfile: 
- Updating etc/group...unchanged
- Updating etc/shadow...modified
- Updating etc/gshadow...modified
- Connecting to nc[9.164.179.148]
- 150 Opening BINARY mode data connection for /CDI/suse/at/aaa_dir.rpm (20132 bytes).
- Closed connection to nc[9.164.179.148]
- Connecting to nc[9.164.179.148]
- 150 Opening BINARY mode data connection for /CDI/suse/at/aaa_skel.rpm (32795 bytes).
- Closed connection to nc[9.164.179.148]
- aaa_skel
- Connecting to nc[9.164.179.148]
- 150 Opening BINARY mode data connection for /CDI/suse/at/at.rpm (39236 bytes).
- Closed connection to nc[9.164.179.148]
- at
- Postinstall at...
- Updating etc/rc.config...
- Connecting to nc[9.164.179.148]
- 150 Opening BINARY mode data connection for /CDI/suse/at/base.rpm (728932 bytes).
- Closed connection to nc[9.164.179.148]
- base
- Connecting to nc[9.164.179.148]
- 150 Opening BINARY mode data connection for /CDI/suse/at/bash.rpm (870379 bytes).
- Closed connection to nc[9.164.179.148]
- bash
- Connecting to nc[9.164.179.148]
- 150 Opening BINARY mode data connection for /CDI/suse/at/bash1.rpm (210142 bytes).
- Closed connection to nc[9.164.179.148]
- bash1
- Connecting to nc[9.164.179.148]

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

When you see the installation complete message tells you that the installation of the packages is now finished.
6. Press the **ESC** key to get to the main menu, then select **Main menu**:

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

A message comes up confirming the installation of the kernel:
7 Configuring the system

In this section the following is described:

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

1. Select the time zone:

![TIME ZONE CONFIGURATION]

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

![ADJUSTMENT OF HARDWARE CLOCK]

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:

   ![Hostname dialog box](image1.png)

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

   ![Confirmation dialog box](image2.png)

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

   ![Confirmation dialog box](image3.png)
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.                                                 |
| :pserver4.boeblingen.de.ibm.com                              |
| <  Continue  >  <  Abort  >                                 |
```

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

```
+------------------------CONFIRMATION-----------------------------+
| Do you want to access  |
| a nameserver?         |
| <  Yes  >  <  No  >                                           |
```
11. Enter the IP address of the nameserver:

```
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
29.164.178.1

Domain list
@boeblingen.de.ibm.com
```

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

```
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 UNIX to send mail
[ ] Expert mode for sendmail configuration
[ ] Do not install /etc/sendmail.cf
```

Select Continue.

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

```
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/netserver
Installing new /etc/inet/news/mail_gateway
Installing new /var/lib/news/mailname
Installing new /var/lib/news/whomni
Installing new /etc/SuSEconfig/profile
Installing new /etc/SuSEconfig/csh.cshrc
```

```
8 Unmount the file system

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

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

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

2. If you see a response such as:

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

   you must perform an unmount command:

   ```
   /root # umount /dev/dasda1
   ```
9 Re-IPL from DASD

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

Your hardware console may “hang” if it receives too many messages. Use the Delete button to enable further output.
10 Setting the root password

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

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

   Welcome to SuSE Linux

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

   New password:
   Re-enter new password:
   Password changed

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

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

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

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

   ... /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:

   Press to continue...
Have a lot of fun!

Your SuSE Team

INIT: Entering runlevel: 2
[80C][90][1m2[me Control: previous runlevel: N, switching to runlevel:
Setting up network device eth0
done
Setting up routing (using /etc/route.conf) done
Starting RPC portmap daemon  done
Re-Starting syslog services
done
Starting NIS+ services: keyserv done
Initializing random number generator done
Starting service httpd
done
Starting service at daemon: done
Starting INET services (inetd) done
Starting CRON daemon done
Starting Name Service Cache Daemon done
[80C][90][1mreached[mtrol: runlevel 2 has been
Give root password to login:

Installation is complete.

To continue...

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

- "19 Testing Apache" on page 69
- "20 Adding users" on page 71
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11 Kernel initialization

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

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

```
lin
```

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

```
SenseID : device 4800 reports: Dev Type/Mod = 3088/60
SenseID : device 4801 reports: Dev Type/Mod = 3088/60
... ...
```
All devices specified by the kernel parameter `dasd=` are displayed:

```
Based upon Swansea University Computer Society NET3.039
NET4: Unix domain sockets 1.0 for Linux NET4.0.
NET4: Linux TCP/IP 1.0 for NET4.0
IP Protocols: TCP, UDP, ICMP, TOTP
TTY: Hash tables configured (hash 262144 bhash 65536)
Starting kswapd v 1.5
ptty: 256 Unix38 pty's configured
PHU disk driver initialized; 16 PHU disks of 32768K size
loop: registered device at major 7
md driver 0.36.6 MAX_MD_DEV=4, MAX_REAL=0
xpraminfo:initializing;
xpraminfo: number of devices (partitions): 1
xpraminfo: size of partition 0 to be set automatically
xpraminfo: hardsector size: 40968
xpramerror: No or not enough expanded memory available
xpramerror: Giving up xpram
channel: 2 Parallel channel found - 0 ESCON channel found
ctscd: read dev 0e00 irq 0006 - write dev 0e01 irq 0007
Partition check:
RAIDISK: Compressed image found at block 0
VF3: Mounted root (ext2 filesystem).
```

The `xpraminfo` messages show information about expanded storage used with the XPRAM device driver. XPRAM may not work. See "21 Hints, tips, and troubleshooting" on page 73 for information on what to do.

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

```
INIT: "version 2.78 booting"
Welcome to SuSE Linux S/330

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

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

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

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

   1

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

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

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

   Yes

   International License Agreement for Non-Warranted Programs
   General Terms
   ...
   ...
   Do you agree with this license?

   yes

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

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

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

   Network device number: 4800

4. Then enter the relative port:

   Please type in the relative port on device number 4800

   Relative port: 0

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

   I'll try to start the lcs module now...
   insmod lcs noauto=1 devno_portno_pairs=0x4800,0 :
   Using /lib/modules/2.2.16/net/lcs.o
   Symbol version prefix 'smp_
   Starting lcs
   lcs: tr0 configured as follows read subchannel=0 write subchannel=1
   hw_address=00:04:AC:20:65:9E rel_adapter_no=0

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

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

Please enter your full host name (e.g. s390.suse.com):
gsusr00.boeblingen.de.ibm.com
Please enter your IP address:
9.164.185.120
Please enter the net mask:
255.255.224.0
Please enter the broadcast address:
9.164.143.255
Please enter the gateway address:
9.164.181.1
Please enter the IP address of the DNS server:
9.164.178.1
Please enter the DNS search domain (e.g. suse.com):
boeblingen.de.ibm.com

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

Configuration will be:
LCS parameter : 
Full host name : gsusr00.boeblingen.de.ibm.com
IP address : 9.164.137.36
Net mask : 255.255.248.0
Broadcast address: 9.164.143.255
Gateway address : 9.164.136.1
DNS IP address : 9.164.178.1
DNS search domain: boeblingen.de.ibm.com
Is this correct (Yes/No) ?
yes

After the network configuration is done, the process switches to the INIT process.
Netsetup finished, running telnetd in the background:
INIT: Entering runlevel: 1
bash-2.04#

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

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

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

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

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

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

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

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

   ```
   g5usr00 login: root
   >>> >>> >>> >>> >>> SuSE Linux 5.99 >>> >>> >>> >>>
   1. Enter ‘insmod dasd probeonly’, then ‘rmmod dasd’
   2. Choose the device numbers you want to use for SuSE LINUX 5/99

   !!! BE CAREFUL WHEN SELECTING DASD’S – !!!
   !!! YOU MAY DESTROY DATA ON SHARED DEVICES !!!

   3. Enter ‘insmod dasd dasd=<list of devices>’

   Remember to separate devices by colons (<dev_no>,<dev_no>),
   syntax for ranges is <from_dev_no>–<to_dev_no>
   like
   ‘insmod dasd dasd=FD00–FD4F,FD48–FD46’

   4. Start installation with ‘YaST’.

   5. When YaST has finished, minor modifications of config files may
   be done manually – see documentation for further information.
   
   /root #
   ```

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

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

   `/root # insmod dasd dasd=192,206`
You will then see DASD initialization messages on the console:

```
bash-2.04# dsk:initializing...
dsk:Registered successfully to major no 94
dsk(cek):ECKD discipline initializing

dsk:Registered ECKD discipline successfully
dsk(fba):FBA discipline initializing

dsk:Registered FBA discipline successfully
dsk(cek):0:03 on sch 15: 3350/9ACU:3930/04) Cyl:200 Head:15 Sec:224

dsk(cek):0:03 on sch 15: 3350/0A (CU: 3930/04): Configuration data read
dsk: devno 0x0192 on subchannel 15 (ECKD) is /dev/dasda (94:0)

dsk(cek):0:026 on sch 4: 3350/0A(CU:3930/04) Cyl:3333 Head:15 Sec:224

dsk(cek):0:026 on sch 4: 3350/0A (CU: 3930/04): Configuration data read
```

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

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

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

4. Enter `yast` to start the installation program.

5. On the language selection panel, use the arrow keys to choose your language, and press Enter:

Note: For the Install Fest please select "English" as other languages have not been tested.
6. On the panel asking you how to access the installation medium, select **NFS**:

![Selection of the installation medium](image)

7. Enter the data of the NFS server:

![Enter data for the NFS server](image)

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

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

![Type of installation](image)

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

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

--- SELECT SWAP PARTITION ---

The following devices were found on your system. Please choose the one you want to use as swap. All data on this device will be lost.

<table>
<thead>
<tr>
<th>Device name</th>
<th>Blocks</th>
</tr>
</thead>
<tbody>
<tr>
<td>dasd(012)</td>
<td>143998</td>
</tr>
<tr>
<td>dasd(0206)</td>
<td>2484068</td>
</tr>
<tr>
<td>&lt;no swap-partition&gt;</td>
<td></td>
</tr>
</tbody>
</table>

< Continue > < Abort >

On the confirmation screen check the data and continue.

--- CREATING FILESYSTEM ---

The following filesystems

/dev/dasdb1

will now be created according to your selections. All data on the partitions will be lost. The installation will exit if you do not format now. Do you want to start creation of filesystems?

< Yes > < No >

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

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

The DASD is marked as the root in the list:
12. Create the file system by pressing **F6**, and then selecting **Yes**:

The file system is created:

```
Creating filesystem on "/dev/dasd1"...
```

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

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

![Screenshot of the installation process](image-url)
2. On the Load Configuration screen, select **SuSE default system**:

![Load configuration screenshot]

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

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

![Installation logfile screenshot]

---

Reading description files...

Base system: unknown

Source media: SuSE-linux-US-S390 6.4.0-0

678 packages on installation medium...

Analyzing dependencies of packages...

Looking for already installed packages...

0 packages are installed...

Reading D4-files...

---

New configuration:

default [/var/adm]

language:english

Added new configuration:

New configuration:

default [/var/adm]

Start Installation

---

Load configuration

Change/create configuration

Check dependencies of packages

What if...

Index of all series and packages

Package information

Install packages

Delete packages

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

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

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

The `installation complete` message tells you that the installation of the packages is now finished:
6. Press the ESC key to get the main menu, then select **Main menu**:

```
nameuse
ipchains
john
scandbg
Postinstall scaml
Updating etc/rc
smnpd
tripwire
jade_dsl
sgmltool
sp
sp_libs
tcl
tlx delete packages
tk
bitx
ltcl
python
xaudd
xpng
xshad

Totally installed: 194

Base system: SuSE-Linux-US-S390 6.4.0-0

INSTALLATION COMPLETE.
```

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

```
Please select the appropriate kernel to boot your system.
For additional information about the boot kernels use the help system
(F1). You may use F2 to change the destination path for the kernel. F3
may be used to change the destination of the .config file.
Kernel destination: /boot
Destination of .config file: /usr/src/linux

Default kernel for S/390 (with support for tape IPL)
RVM_rdr.rpm

< Continue >  < Abort >
```

A message comes up confirming the installation of the kernel:

```
----------------------------------
Installing the selected kernel
```

14 Installing the packages from the NFS server 53
15 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:

```
Europe/Berlin
Europe/Bratislava
Europe/Brussels
Europe/Bucharest
Europe/Budapest
Europe/Chisinau
Europe/Copenhagen
Europe/Dublin
Europe/Gibraltar
Europe/Helsinki
Europe/Istanbul
Europe/Kaliningrad
Europe/Kiev
Europe/Lisbon
Europe/Ljubljana
Europe/London
```

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

```
Have you set the system time of your computer to GMT (Greenwich Mean Time) or is it set to local time?

< GMT  >  < Local time  >
```

Setting the network definitions

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

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

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

```
Here you can specify the name used to access your computer via the network. The name consists of the actual computer name and the domain name. A name component may contain letters, numbers and the '-' character. The domain name consists of a number of such parts, separated by a period.

    Hostname: spusr00
    Domain name: boeblingen.de.ibm.com

< Continue >  < Abort >
```

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

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

< Loopback only >  < Real network >
```

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

```
You are capable of setting up the whole IP configuration via a DHCP server. If you want to enable this, just answer "Yes".
Do you want to use the machine as DHCP client?

< Yes >  < No >
```

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

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

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

   *Starting inetd will enable "others" to connect to network services installed on your server (e.g. telnet, finger, ftp). Inetd is also needed for printing, as well as formatting the man-pages in the SuSE help package.*

   **Do you wish inetd to be started at boot time?**

   -- enter answer here --
7. Answer **Yes** to starting 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.

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

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?

9. Enter the server address as the news address:

Following text will be posted in the "From" line of your news system.

```
q5usr00.boeblingen.de.ibm.com
```

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

Do you want to access a nameserver?
11. Enter the IP address of the nameserver:

```
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
20.164.178.1

Domain list
@boeblingen.de.ibm.com
```

```
< Continue >  < Abort >
```

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

```
Here you may select your networking device. Your selections will be written to /etc/modules.conf
```

```
Network type       : tr0
Networking device type  [IBM lcs module ]
Module options :
```

```
< Continue >  < Abort >
```

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

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

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

**Hint:** If the module options do not appear, fill it in manually. You can find the information in the parmline, see the lcs module start on page 5 on page 41.
13. On the sendmail configuration screen, pick the **Host with permanent network connection (SMTP)** option:

```
---------SENDMAIL CONFIGURATION---------
Sendmail needs 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 your 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) [X]
Single user machine without network connection
Host with temporarily network connection (Modem or ISDN).
Use UUCP to send mail
Expert mode for sendmail configuration
Do not install /etc/sendmail.cf

< Continue >  < Abort >
```

Select **Continue**.

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

```
---------OUTPUT of SuSEconfig---------
Started the SuSE-Configuration Tool.
Running in full featured mode.
Reading /mnt/etc/rc.config and updating the system...
Installing new /etc/HOSTNAME
Installing new /etc/resolve.conf
Installing new /etc/nntpserver
Installing new /etc/news_mail_gateway
Installing new /var/lib/news/mailname
Installing new /var/lib/news/newsname
Installing new /etc/SuSEconfig/profile
Installing new /etc/SuSEconfig/csh.cshrc

< Continue >
```

16 Unmount the file system

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

1. To check what is mounted, at the root prompt enter `mount`:
   ```
   /root # mount
   /dev/ram2 on / type minix (rw)
   none on /proc type proc (rw)
   /dev/dasdsal on /mnt type ext2 (rw)
   /root #
   ```

2. If you see a response such as:
   ```
   /dev/dasdsal on /mnt
   ```
   you must perform an unmount command:
   ```
   /root # umount /dev/dasdsal
Re-IPL from your newly generated DASD IPL using the following command on the console:

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

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

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

```
00: CP IPL 206 CLEAR
Linux version 2.2.16 (root@Tape.suse.de) (gcc version 2.95.2 19991024 (release))
#1 SMP Thu Jun 29 01:48:54 GMT 2000
Command line is: dasd=0192.0206 root=/dev/dasdb1 nointrl
We are running under VM
This machine has an IEEE fpu
Initial ramdisk at: 0x02000000 (8388608 bytes)
Detected device 4800 on subchannel 0000 - PIM = 80, PAM = 80, POM = FF
Detected device 4801 on subchannel 0001 - PIM = 80, PAM = 80, POM = FF
Detected device F800 on subchannel 0002 - PIM = 80, PAM = 80, POM = FF
Detected device F801 on subchannel 0003 - PIM = 80, PAM = 80, POM = FF
Detected device 0206 on subchannel 0004 - PIM = F0, PAM = A0, POM = FF
Detected device 0009 on subchannel 0005 - PIM = 80, PAM = 80, POM = FF
Detected device 0E00 on subchannel 0006 - PIM = 80, PAM = 80, POM = FF
```
18 Setting the root password

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

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

Welcome to SuSE Linux

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

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

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

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

```
setting /bin/umount to root.root 4755.
setting /usr/bin/suexec to root.root 4755.
setting /etc/permissions to root.root 644.
setting /etc/permissions_secure to root.root 644.
setting /etc/permissions_easy to root.root 644.
setting /etc/permissions_paranoid to root.root 644.
Finished.
```
2. Services are going to start, and you will be asked for the root password to log in:

```
Running boelings
9:1
```

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: Y80C Y9D Y1m2 Ym
Setting up network device tr
  done
Setting up routing (using /etc/route.conf) done
Starting RPC portmap daemon done
Re-Starting syslog services done
Starting NIS+ services: keyserver done
Initializing random number generator done
Starting service httpd done
Starting service at daemon done
Starting INET services (inetd) done
Initializing SMTP port, (sendmail) done
Starting CRON daemon done
Starting Name Service Cache Daemon done
Master Resource Control: runlevel 2 has been Y80C Y9D Yimreached Ym
Give root password to login;

Installation is complete.

To continue...

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

- "19 Testing Apache" on page 69
- "20 Adding users" on page 71
Part 4. Administration actions

19 Testing Apache .................................. 69
20 Adding users .................................... 71
To see whether Apache is up and running: In a Netscape session, enter the name of your LINUX for S/390 system as shown:

The SuSe page should come up.
20 Adding users

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

4. Select **User administration**:
5. Fill in the data for the new user and press F4 to create:

<table>
<thead>
<tr>
<th>User name</th>
<th>:john doe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numerical user ID</td>
<td>:500</td>
</tr>
<tr>
<td>Group (numeric or by name)</td>
<td>:users</td>
</tr>
<tr>
<td>Home directory</td>
<td>:/home/john doe</td>
</tr>
<tr>
<td>Login shell</td>
<td>:/bin/bash</td>
</tr>
<tr>
<td>Password</td>
<td>*********</td>
</tr>
<tr>
<td>Re-enter password</td>
<td>*********</td>
</tr>
<tr>
<td>Access to modem permitted</td>
<td>[ ]</td>
</tr>
</tbody>
</table>

6. Press **F10** to leave the screen.
7. Press **ESC**
8. Select **Exit YaST**.
## Part 5. Additional information

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### 24 Preparing your root file system for first IPL

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What are the corresponding device names to my DASD devnos?

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

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

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

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

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

Some devices are not detected by LINUX for S/390

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

The hardware console “hangs”

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

No messages on system console during IPL

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

Emulating ‘Ctrl’ character combinations

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

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

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

Refer to the 3215 device driver description for more information.

ESCON - CTC Connection OS/390 and LINUX

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

2. IOCDS Definitions

   ID  MSG1=’iodf4018’,MSG2=’SYS1.IODF40 - 2000-05-23 15:59’, *
   SYSTEM=’(9672,6), *
   TOK=('PROC0LG6',000000040619672155932470100144F00000000*
   ,00000000,'00-05-23','15:59:32','SYS1',''IODF40'')
   RESOURCE PARTITION=((LINUX,2),(LINUXB,3),(OS390,1),(OS390BAK,4*
   ))

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

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

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

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

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

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

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

Notes:

a. There must be a passive host entry in the routed’s etc.gateway and the CTC link must be defined in the BSDROUTINGPARMS.

b. The RouteD must be started with -h.

4. TCP/IP Definitions in OS/390

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

5. Setup in LINUX

Kernel parameter in IPL tape parmfile and later in SILO parmline:

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

Example for LPAR LINUX:

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

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

During the boot you should see messages for the ESCON0 devices

escon0: read dev: 0810 irq: ..... - write dev: 0811 irq: ..... 404 Hints, tips, and troubleshooting
Check if the correct device addresses are reported.

Example of NETSETUP dialog:

```
Welcome to SuSE Linux S/390

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

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

Please enter your IP address:
    ==> 192.168.2.10

Please enter the net mask:
    ==> 255.255.255.255

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

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

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

Configuration will be:
Full host name : tmcc01.boeblingen.de.ibm.com
IP address : 192.168.2.10
Net mask : 255.255.255.255
Peer IP address : 192.168.2.1
DNS IP address : 9.164.178.1
DNS search domain: boeblingen.de.ibm.com
Is this correct (Yes/No) ? y
```

To start or modify an ESCON interface in LINUX:
```
ifconfig escon0 x.x.x.x pointopoint y.y.y.y netmask 255.255.255.255 mtu mmmmm
```
where x.x.x.x is the IP address of the LINUX side,
y.y.y.y is the IPaddress of the remote partner OS/390
and mmmmm is the MTU size which could be up to 32760 -
make sure the other side of the channel uses the same MTU size
The ESCON CTC device addresses are defined in the kernel boot parmfile:

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

6. **Problem Determination**

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

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

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

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

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

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

OS/390 : netstat config (in TSO)

You should see

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

or in older TCP/IPs

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

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

OS/390 : netstat gate (in TSO)
LINUX : ifconfg ESCON0

to change the MTU

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

--- try to restart both sides

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

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

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

If using dynamic routing with RIP in OS/390 check the configuration of the routeD –
Notes:

a. There must be a passive host entry in the `routed`'s `etc.gateway` and the CTC link must be defined in the `BSDROUTINGPARMS`.

b. The `RouteD` must be started with `-h`. 
22 Known problems for the SuSE preliminary version, and circumventions

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

Problems with Windows and OS/2 FTP and NFS servers

The CD, as it is, is not usable for installation from Windows and OS/2 systems, because long directory/folder names are truncated and transformed to upper case.

There are four work-arounds for this (and see also "No NFS server available?" on page 82):

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

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

4. Boot from CD-ROM.

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

   a. An Intel PC with an Network card that is supported by the 6.4 Linuxrc on Intel. Most Ethernet or Token Ring cards, except some olicom cards should
work. Some IDE controllers or CDROM drives can also be problematic. The PC should have at least 64 MB RAM, must be reachable from LINUX-S/390, and must be dedicated for the duration of the installation.

b. You need an useable IP address setup for the Intel Box that it can use to connect to the LINUX-S/390 installation.

c. You should have the IP Address, Netmask and Gateway ready for the procedure.

d. If your LINUX-S/390 installation is already IPLed, has its network properly setup, and has the Intel box running with the required IP-route setup, then you can test the connectivity before booting the LINUX Rescue System on that box.

Procedure:

a. Take the ‘SuSE 6.4 Package for Intel’ sent out with the Installfest CD (or any SuSE package since 6.2) and insert CD 1 of the Intel Version into the CDROM drive.

b. Reboot the Intel PC from the CD and enter “manual” at the SYSLINUX prompt.

c. In Linuxrc, select the language etc, load the network driver for the card, and if the CDROM drive is SCSI load the SCSI driver.

d. Start the rescue system on the PC and login as ‘root’.

e. Remove the Intel CD 1 and insert the S/390 Prerelease CD.

f. Type “mount /cdrom” on the rescue System prompt. The CD in the CDROM drive may now be exported anywhere by NFS.

g. IPL the LINUX-S/390 Installation, and at the point where you select ‘Installation Type’ in YaST, select ‘Installation from NFS’ and use the IP or name of the PC as ‘Server Name’ and ‘/cdrom’ as ‘Source Directory’.

h. It should now be possible to start a Telnet session after the Network setup is complete on LINUX/S390. This may be done directly from the shell prompt of the rescue System on this PC, or from another terminal.

---

No NFS server available?

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

Requirements:

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

To find NFS Server software on the Internet:
One route to find such software is as follows:

- Start the web-browser of your choice and access http://www.winfiles.com
- Select “Windows Shareware”.
- Select “Windows NT Software”.
  (Or “Windows 95/98 Software” if the server PC does not run NT.)
- Select “Network and Internet Tools”.
- Select “Server Tools”.
- Select “Misc. Server Tools”.
  (The shortcut is http://winfiles.cnet.com/apps/nt/servers-misc.html
   or http://winfiles.cnet.com/apps/98/net-misc.html)
- Find a suitable NFS server from the list. Download the file by single-clicking the corresponding icon/name.

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

**NT Servers:**
- “NFS Maestro Server”© Version 6.2, by Hummingbird Communications Ltd.

**95/98 Servers:**
- n/a
- Transfer the downloaded file to the PC to be used as NFS server for the LINUX/390 installation.

**To get the renaming script:**
- This will be sent as e-mail. Send a request to: contact_linux390@de.ibm.com

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

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

**Configure the NFS server:**

(This part is specific to the server installed. The example given is taken from an install of “NFS Maestro Server”© of Hummingbird Communications Ltd.)
- Go to the control panel (start/settings/control panel) and select the new “HCL NFS Server”.
- Select “Exported File Systems”.
- In the “List of Exported File Systems” there is “c:\” highlighted as a default. Click on “Remove”.
- Below “Exported File System” enter the partition (“d:\”) which holds the SuSE CD-ROM and click on “Insert”.

22 Known problems for the SuSE preliminary version, and circumventions
• Click on "OK" to exit from the tool, or choose "Server Status" from the "Configure" screen to monitor ongoing NFS activities.

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

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

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

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

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

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

Using AIX as a workstation for the telnet sessions
Before starting YaST, issue the following command:

```
export TERM=vt220
```

DASDFMT on VM
Before starting YaST, the DASDs need to be formatted:

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

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

Problems with Networking Device selection - 1
The "Selection of Networking Device" panel comes up with a network type of "eth0". This is wrong - the type should be "tr0".

**Note:** If you change this directly or using the F3 key the module options get lost. What you need to do is the following:
• Use the Tab key to get to the networking device type.
• Select IBM lcs module there.
Use the tab key again (3 times) to get back to the Network type. Note that the module options appear
Now change the Network type to tr0 and they won’t vanish.

Problems with Networking Device selection - 2

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

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

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

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

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

1. In YaST: Select real network instead of the loopback.
2. In YaST: Select eth0, when prompted for Type of Network.
3. You might need to mount your root file system to /mnt.
4. Change the routing table in /mnt/etc/route.conf, for example, using an editor (vi) or through echo "default <peer IP address>" > /mnt/etc/route.conf
5. Change in /mnt/etc/rc.config, for example, through the vi editor:
   a. Find
      NETDEV_0="eth0"
      and change it to
      NETDEV_0="ctc0"
   b. Find
      IFCONFIG_0="...."
      Change it to
      IFCONFIG_0="<home IP address> pointopoint <peer IP address> up"
6. Return to the mnt directory with
   chroot /mnt
7. Now confirm the changes by entering the command:
   /sbin/SuSEconfig
8. Leave the “change root” environment by the command
   exit
9. Unmount your root file system:
   cd /
   umount /mnt

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

For a routed ESCON connection replace ctc0 by escon0.
Function keys do not give expected results

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

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

In either method F10 corresponds to the 0 key.

Unresolved packages

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

Unmount file systems

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

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

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

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

   /dev/dasda1 on /mnt

   you must perform an unmount command:

   umount /mnt

Setting the LINUX root password

The password is limited to eight (8) characters.

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

Setting the MTU size

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

   ifconfig eth0 mtu 1492

Enabling XPRAM

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

   mknod /dev/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:

   mke2fs -b 4096 /dev/slram0
   mount /dev/slram0 /mnt
Filesystem check producing too much output

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

Remove the `-C` in the following lines:
```plaintext
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

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

Press configure twice.

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

Press `cancel - cancel - exit`.

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

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

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

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

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

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

Write down this MAC address.

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

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

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

Write down the `CUNUMBR` of this line.

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

After IPL:
When the **Network device number** is requested: enter the **iodevice address** as noted above.

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

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

In this case the network adapter is properly set up and should work correctly.
23 Building a parameter line file

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

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

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

Building a parameter line file on OS/390

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

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

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

Building a parameter line file using VM/ESA

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

```
XEDIT PARM LINE A
```

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

```
SET RECFM F
```

and

```
SET LRECL 1024
```

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

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

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

The contents of the parameter line file are:

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

Where:

- **root=/dev/ram0 ro**

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

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

  ```
  ipldelay=xyz
  ```

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

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

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

**Notes:**

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

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

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

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

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

3. Set up a loopback device on the downloaded file by issuing
   ```
   losetup /dev/loop<#> initrd
   ```

4. Mount the loopback device by issuing
   ```
   mount -t ext2 /dev/loop<#> <mountpoint>
   ```

5. Change your working directory to the mountpoint and edit the following files according to your requirements
   - etc/fstab
     Check that it contains at least the following two lines
     ```
     /dev/ram0     /   ext2 defaults 0 1
     none          /proc proc defaults 0 0
     ```
     - The initrd comes with a network setup script that asks for your network configuration every time you boot. If you don't want to re-enter the network configuration every time then you have to delete the link /etc/rc.d/rc3.d/S00netsetup and setup the following files:
       ```
       etc/sysconfig/network and etc/resolv.conf
       ```
       Adapt them according to your network environment
       ```
       etc/sysconfig/network-scripts/ifcfg-<netdevice>
       ```
       Adapt it according to your network environment.

6. Unmount the loopback device by issuing
   ```
   umount /dev/loop<#>
   ```

7. Detach the loopback device by issuing
   ```
   losetup -d /dev/loop<#>
   ```

8. Compress the file, (initrd) and rename it:
   ```
   gzip initrd
   mv initrd.gz initrd
   ```
25 Tools

The following tools are used during installation.

silo

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

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

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

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

Usage

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

Parameters

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

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

- `-?`  
  Prints out a short usage message.

- `-h`  
  Prints out a short usage message.

- `-V`  
  Prints version number and exits silo.

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

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

- `-F config-file`  
  There are some defaults for the most common parameters compiled into
the binary. You can overwrite these defaults with your own values using /etc/silo.conf or with another config-file specified by -F config-file. All values set by defaults or the config-file can be overwritten using the command line options of silo.

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

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

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

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

Additional keywords
Some additional entries for the config-file:

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

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

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

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

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

    ipldelay=xyz

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

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

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

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

dasdfmt -help prints out an overview of the syntax.

The parameters are:

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

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

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

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

The following parameters are optional:

- `-v` prints out more messages.
- `-y` omits the security prompt and formats the disk directly (for batch use by daring people!).
- `-t` switches to a test mode, the DASD will not be formatted.
Part 6. Appendixes
Where to find more information

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

Table 1. LINUX for S/390 books

<table>
<thead>
<tr>
<th>Book name</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINUX for S/390 Installation, Configuration</td>
<td>N/A (This document can be downloaded from</td>
</tr>
<tr>
<td>and Use</td>
<td><a href="http://linux390.marist.edu/">http://linux390.marist.edu/</a>)</td>
</tr>
<tr>
<td>LINUX for S/390 LCS Device Driver</td>
<td>N/A (This document can be downloaded from</td>
</tr>
<tr>
<td></td>
<td><a href="http://linux390.marist.edu/">http://linux390.marist.edu/</a>)</td>
</tr>
<tr>
<td>LINUX for S/390</td>
<td>SG24-4987 (at the time of writing, this was</td>
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<td></td>
<td>available as a redpiece on the redbooks</td>
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<td></td>
<td>website)</td>
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</tbody>
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IBM Systems Center publications (redbooks) are available in softcopy at this website: [http://www.redbooks.ibm.com/](http://www.redbooks.ibm.com/).

Table 2. Multiprise books (redbooks)

<table>
<thead>
<tr>
<th>Book name</th>
<th>Number</th>
</tr>
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<tbody>
<tr>
<td>Multiprise 3000 Technical Introduction</td>
<td>SG24-5633</td>
</tr>
<tr>
<td>Multiprise 3000 Basic Emulated I/O Definitions</td>
<td>SG24-5669</td>
</tr>
</tbody>
</table>

Table 3. IOCDS related books

<table>
<thead>
<tr>
<th>Book name</th>
<th>Number</th>
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</thead>
<tbody>
<tr>
<td>IOCP User’s Guide and ESCON</td>
<td>GC38-0401</td>
</tr>
<tr>
<td>Channel-to-Channel Reference</td>
<td></td>
</tr>
<tr>
<td>HCD User’s Guide</td>
<td>SC28-1848</td>
</tr>
</tbody>
</table>

Table 4. Network connection books

<table>
<thead>
<tr>
<th>Book name</th>
<th>Number</th>
</tr>
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<tbody>
<tr>
<td>OSA Planning</td>
<td>GC23-3870</td>
</tr>
<tr>
<td>OS/390 OSA/SF User’s Guide</td>
<td>SC28-1855</td>
</tr>
<tr>
<td>OSA Express Customer Guide and Reference</td>
<td>SA22-7403</td>
</tr>
</tbody>
</table>

Other useful homepages include:

- [http://tune.linux.com](http://tune.linux.com) - General tuning information for LINUX
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