Linux for S/390 Installation - Part 2

Richard Lewis (rflewis@us.ibm.com)
Chuck Morse (morsec@us.ibm.com)

Disclaimer

The information contained in this document has not been submitted to any formal IBM test and is distributed on an "AS IS" basis without any warranty either express or implied. The use of this information or the implementation of any of these techniques is a customer responsibility and depends on the customer's ability to evaluate and integrate them into the operational environment. While each item may have been reviewed by IBM for accuracy in a specific situation, there is no guarantee that the same or similar results will be obtained elsewhere. Customers attempting to adapt these techniques to their own environments do so at their own risk.

In this document, any references made to an IBM licensed program are not intended to state or imply that only IBM's licensed program may be used; any functionally equivalent program may be used instead.

Any performance data contained in this document was determined in a controlled environment and, therefore, the results which may be obtained in other operating environments may vary significantly. Users of this document should verify the applicable data for their specific environments.

It is possible that this material may contain reference to, or information about, IBM products (machines and programs), programming, or services that are not announced in your country. Such references or information must not be construed to mean that IBM intends to announce such IBM products, programming or services in your country.

Permission is hereby granted to WAVV to publish an exact copy of this paper in the conference proceedings. IBM retains the title to the copyright in this paper as well as title to the copyright in all underlying works. IBM retains the right to make derivative works and to republish and distribute this paper to whomever it chooses in any way it chooses.

Trademarks

The following are trademarks of International Business Machines Corporation. Those identified with an (*) are registered trademarks of International Business Machines

- Enterprise Systems Architecture/370
- Enterprise Systems Architecture/390
- ESA/370
- ESA/390
- IBM*
- System/370
- VM/ESA*
- OpenEdition

The following are trademarks of the corporations identified

- Windows 98 - is a registered trademark of Mircrosoft Corporation
- Linux - is a registered trademark of Linux Torvalds
- UNIX is a registered trademark in the United States and/or other countries licensed exclusively through X/Open Company Limited.

Agenda

- Continue from Part 1 which discussed Linux for S/390 installation and operational requirements and walked through installation of Marist binaries
- SuSE Beta 2 (6.4) installation
  - VM guest
  - LPAR
- A few administration and maintenance topics

Installing SuSE

Installing SuSE Beta 2 - VM Guest

- Virtual Machine Definition
  - A-disk (191) with at least 40 cylinders (3390)
  - Root file system mdisk, or dedicated dasd
    - At least 1000 cylinders (3390)
  - Swap partition mdisk, or dedicated dasd
    - 200 cylinders (3390) a good starting point
  - Network adapter
    - Real addresses, VCTCA (even/odd), or IUCV

Installing SuSE Beta 2 - VM Guest

- Installation media
  - CD-ROM
  - Workstation server required
    - Must support Rock Ridge CD-ROM extensions (long file name standard for iso9660 file systems)
      - Linux has necessary support
    - FTP server, or NFS server
    - User account with proper access permissions

Installing SuSE Beta 2 - VM Guest

- Logon to guest virtual machine
  - Format 191 mdisk
  - FTP files from SuSE Beta 2 CD-ROM to 191 mdisk
    - suse/images/vmrdr.ikr - upload binary F 80
    - suse/images/initrd - upload binary F 80
  - Create parm file using Xedit, or upload in ascii format /suse/images/parmline
    - ramdisk_size=32768 root=/dev/ram0 ro

Installing SuSE Beta 2 - VM Guest

- From VM guest virtual machine
  - Spool your punch to your reader
  - Punch the kernel, parm file and ram disk files in that order
  - IPL the virtual reader
  - Boot messages should stop with question asking if Linux is connected to a network
    - Respond based upon network hardware type

Installing SuSE Beta 2 - VM Guest

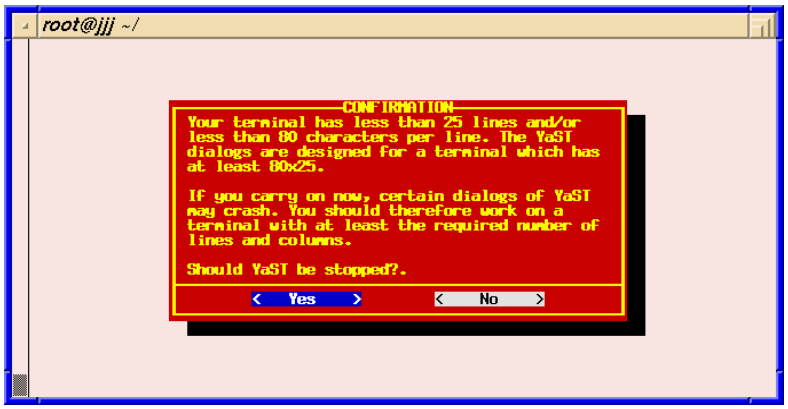
- For a virtual ctca connection you will need to supply
  - Full host name, IP address, Subnet mask, Peer IP address, DNS IP address, DNS search domain
- Perform remainder of install from telnet session
  - Telnet client needs to support at least vt220
  - Client needs to support at least 80x25 screen size

Installing SuSE Beta 2 - Common VM and LPAR

- Load dasd driver
  - insmod dasd dasd=xxxx,yyyy
    - xxxx = virtual address of root file system mdisk
    - yyyy = virtual address of swap partition mdisk
- Check to make sure TERM environment variable is correct
- Start YaST installation and maintenance tool

Installing SuSE Beta 2 - Common VM and LPAR

YaST error if screen size not 25 lines

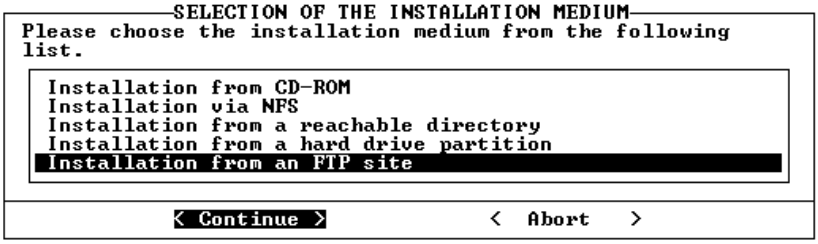


Installing SuSE Beta 2 - Common VM and LPAR

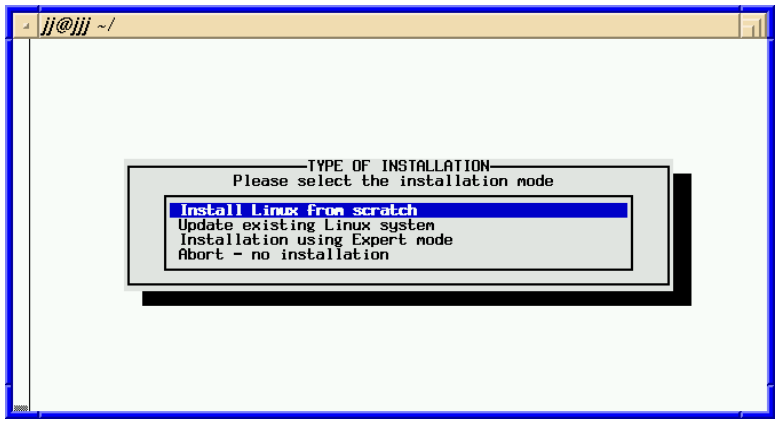
YaST language selection

Installing SuSE Beta 2 - Common VM and LPAR

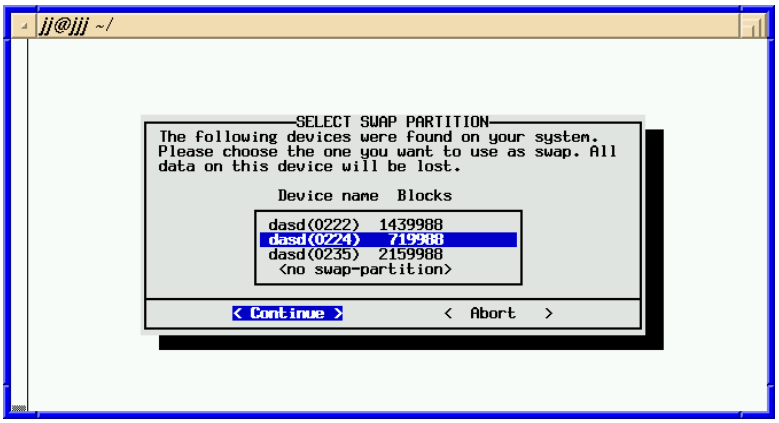
We used an FTP site



Installing SuSE Beta 2 - Common VM and LPAR

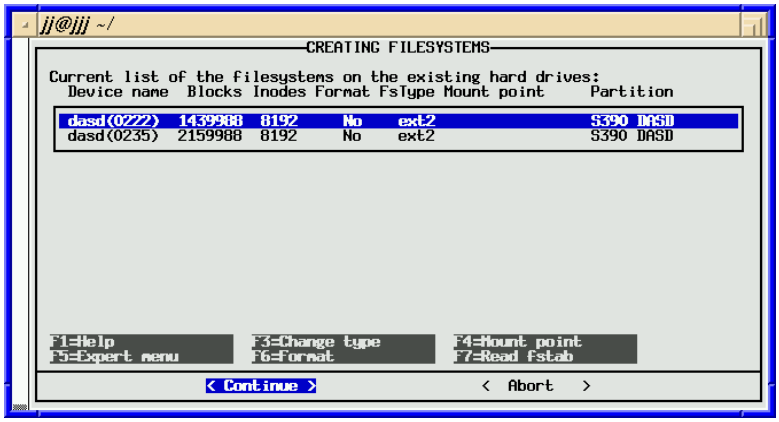


Installing SuSE Beta 2 - Common VM and LPAR



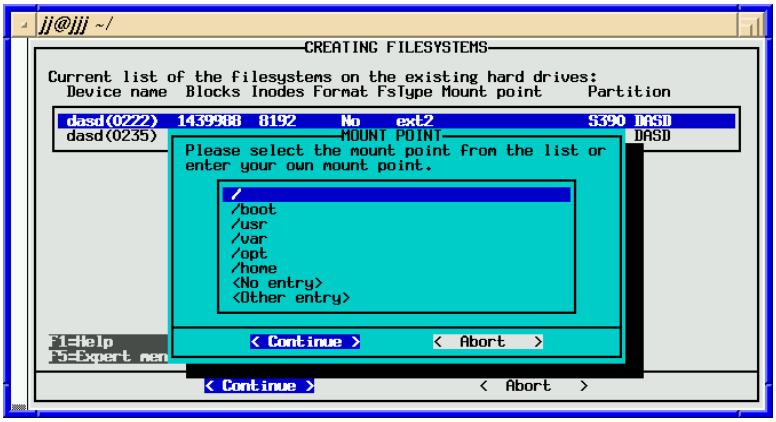
Installing SuSE Beta 2 - Common VM and LPAR

Specify how to use the available DASD



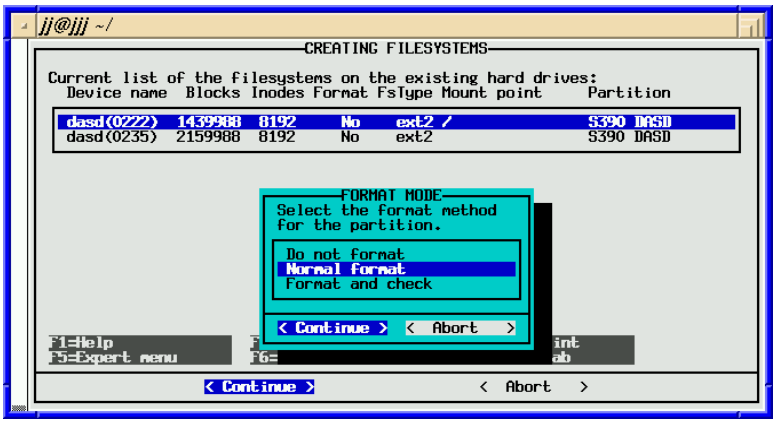
Installing SuSE Beta 2 - Common VM and LPAR

Result of pressing F4



Installing SuSE Beta 2 - Common VM and LPAR

Result of pressing F6

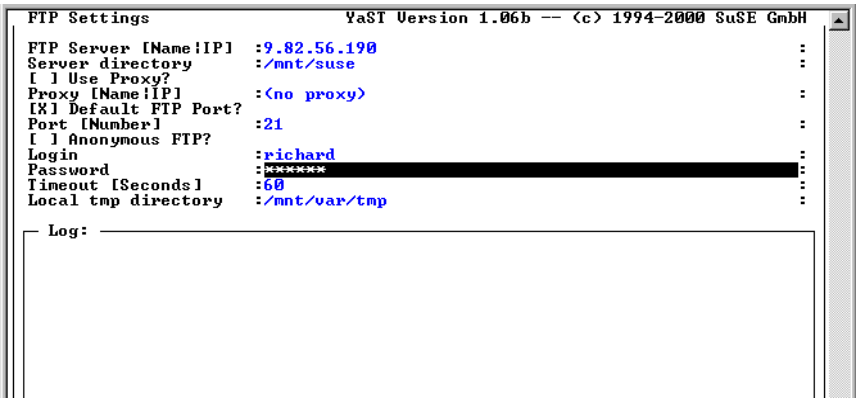


Installing SuSE Beta 2 - Common VM and LPAR

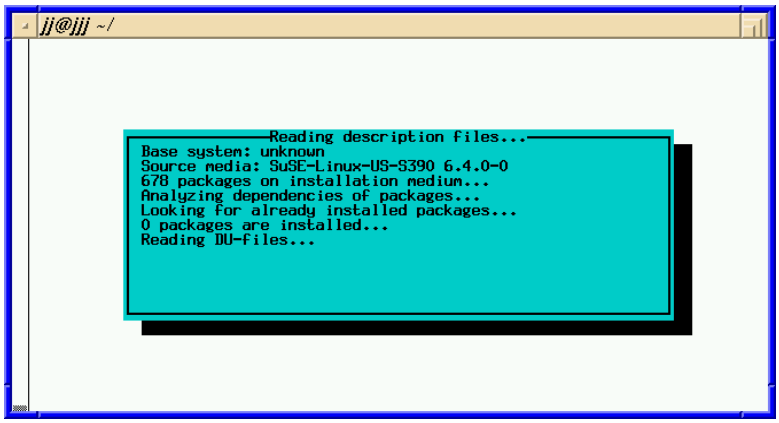
Result of selecting continue

Installing SuSE Beta 2 - Common VM and LPAR

Enter information for ftp and press f10

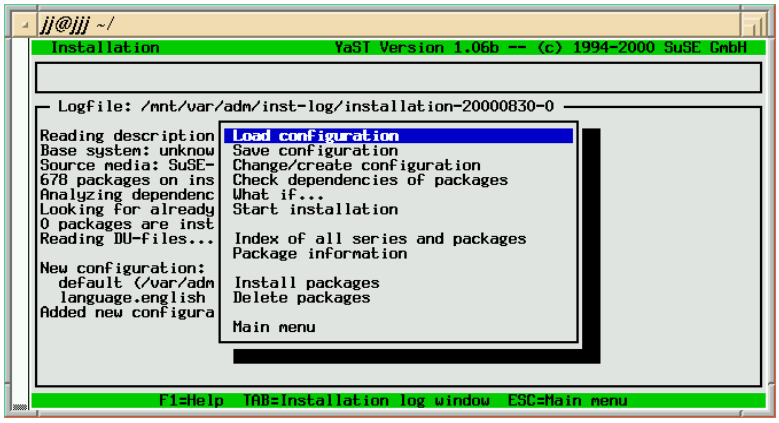


Installing SuSE Beta 2 - Common VM and LPAR

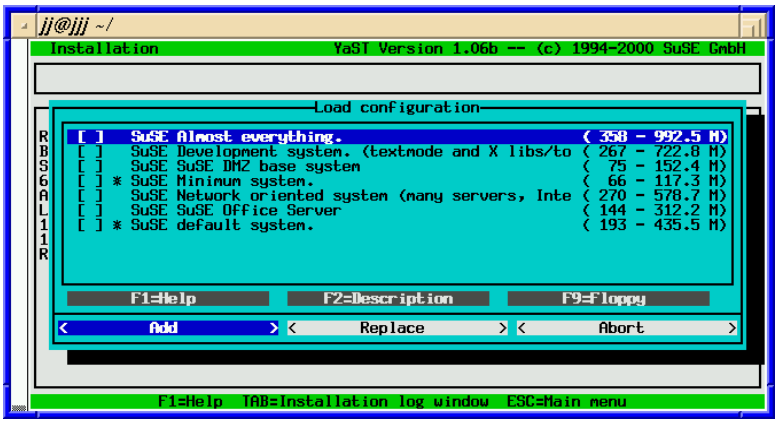


Installing SuSE Beta 2 - Common VM and LPAR

Specify which configuration to install

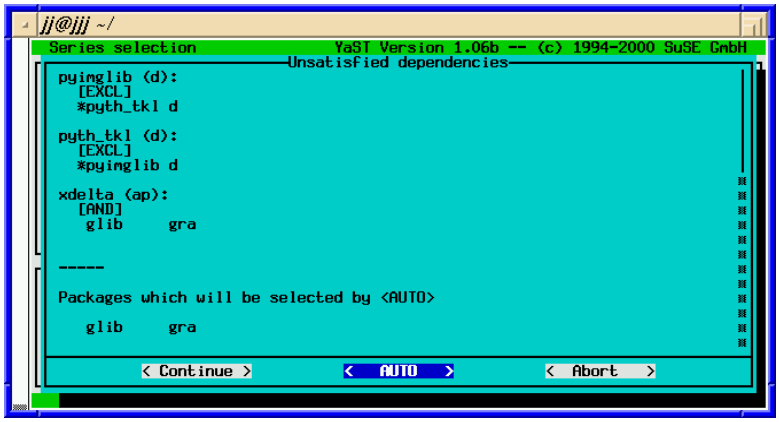


Installing SuSE Beta 2 - Common VM and LPAR



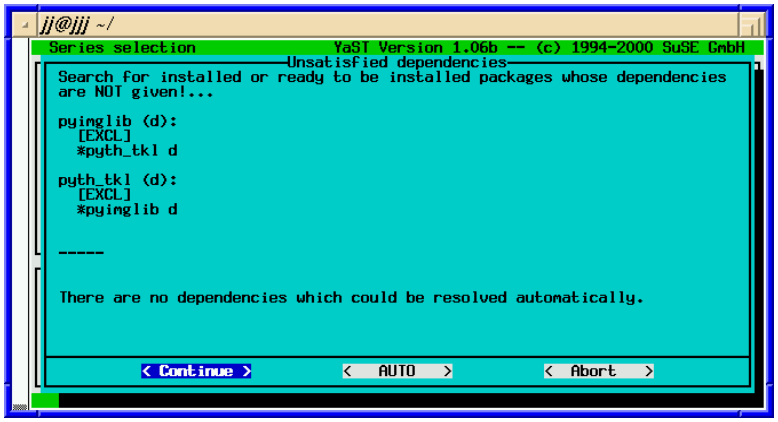
Installing SuSE Beta 2 - Common VM and LPAR

Let YaST try to resolve dependencies



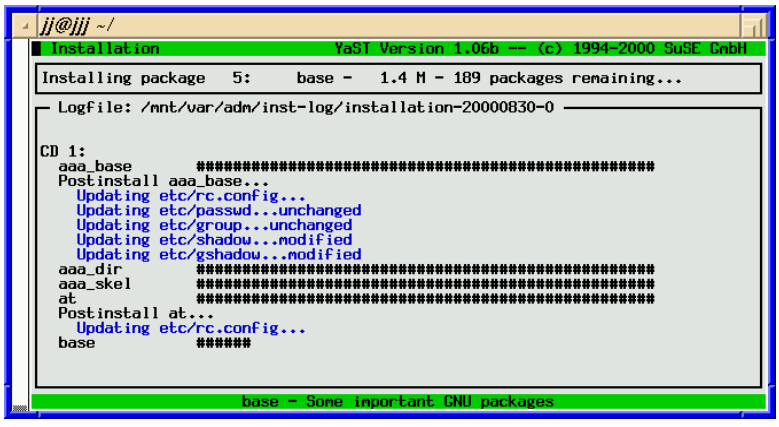
Installing SuSE Beta 2 - Common VM and LPAR

SuSE states press Continue here



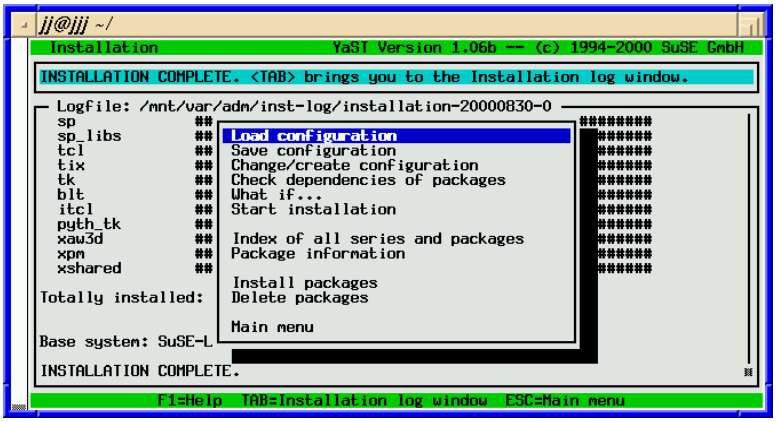
Installing SuSE Beta 2 - Common VM and LPAR

Installing SuSE Beta 2 - Common VM and LPAR



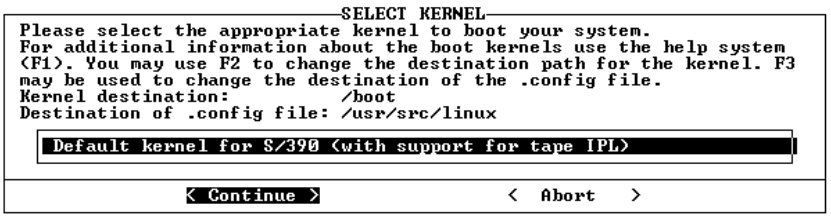
Installing SuSE Beta 2 - Common VM and LPAR

After all packages installed

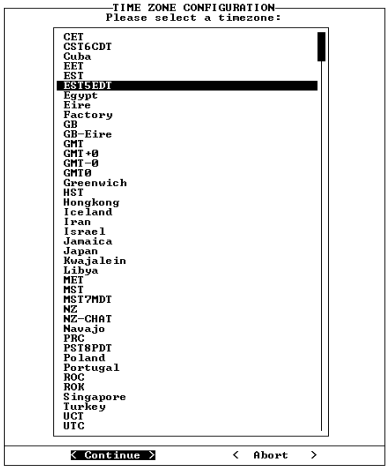


Installing SuSE Beta 2 - Common VM and LPAR

When exit to main menu

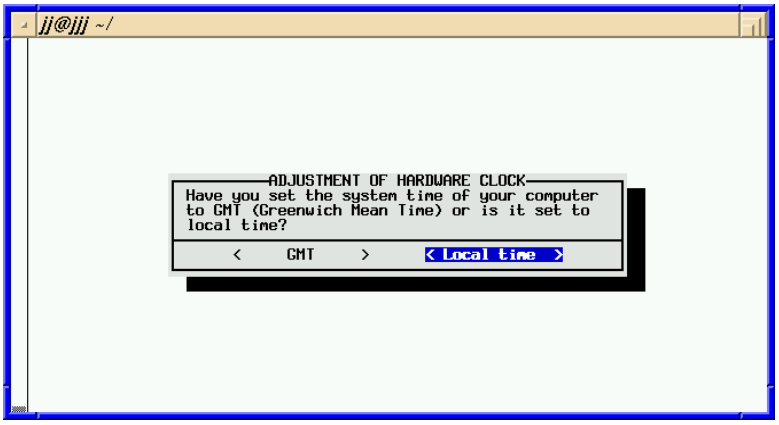


Installing SuSE Beta 2 - Common VM and LPAR

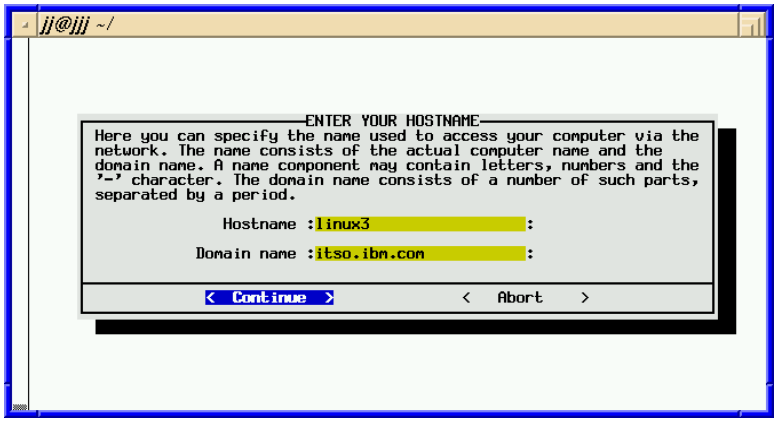


Installing SuSE Beta 2 - Common VM and LPAR

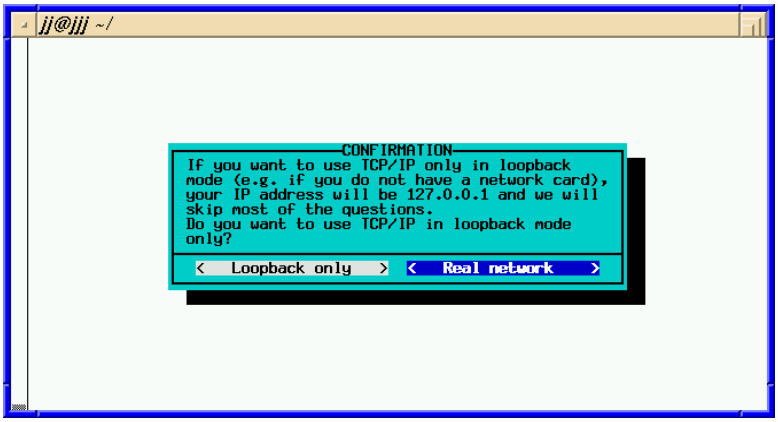
Answer does not seem to make a difference under Beta 2



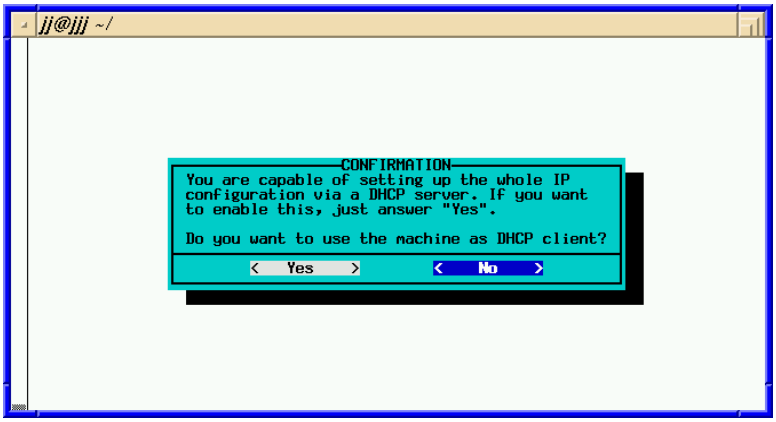
Installing SuSE Beta 2 - Common VM and LPAR



Installing SuSE Beta 2 - Common VM and LPAR

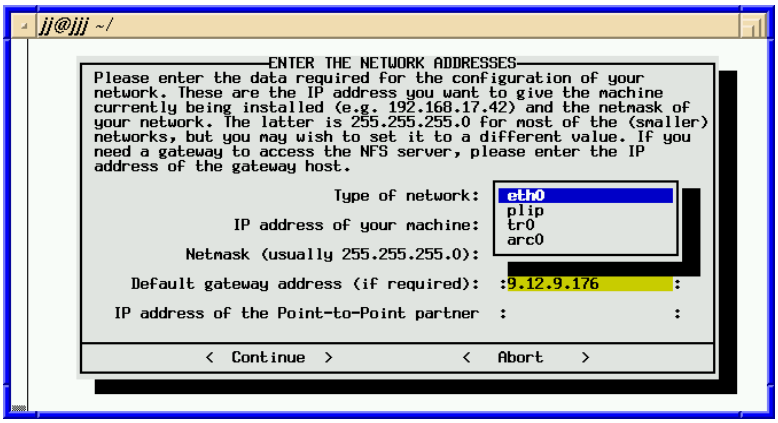


Installing SuSE Beta 2 - Common VM and LPAR



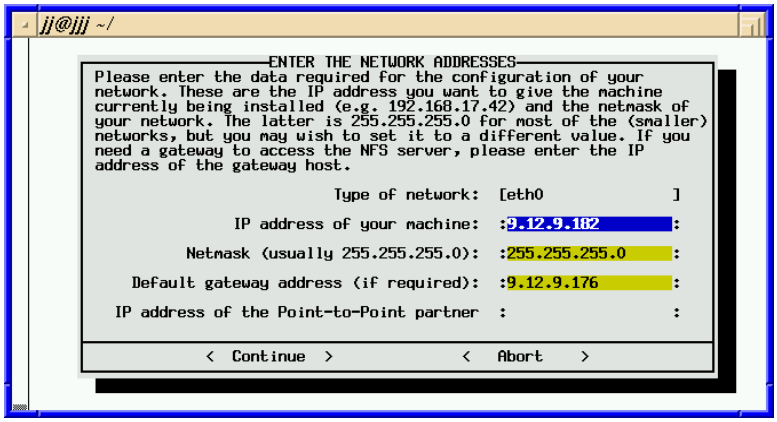
Installing SuSE Beta 2 - Common VM and LPAR

No selection for ctc, so use any device

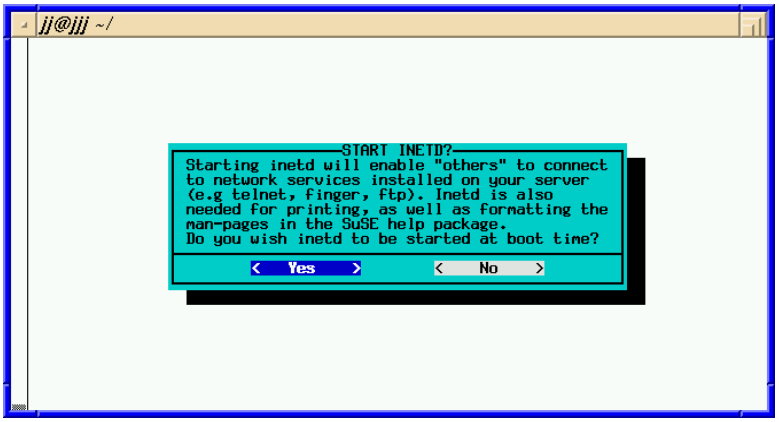


Installing SuSE Beta 2 - Common VM and LPAR

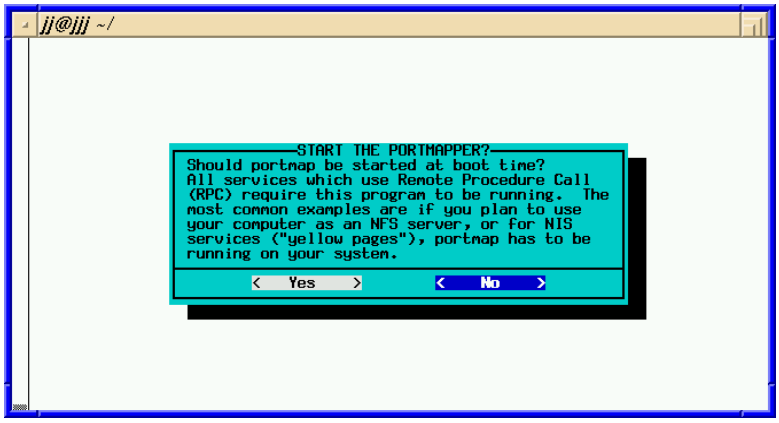
Fix network files after install completes



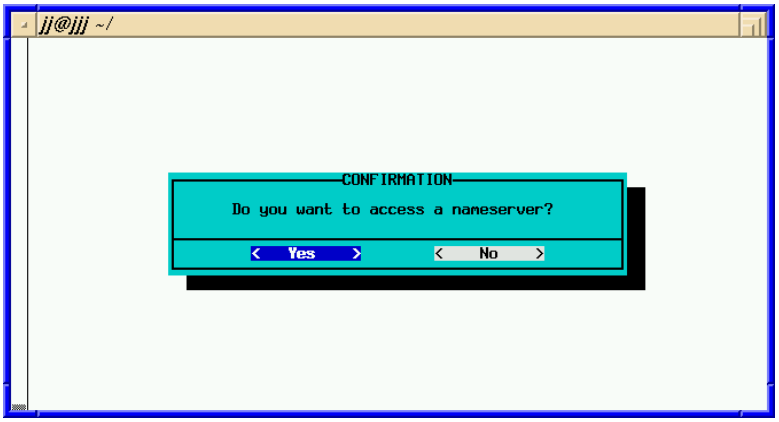
Installing SuSE Beta 2 - Common VM and LPAR



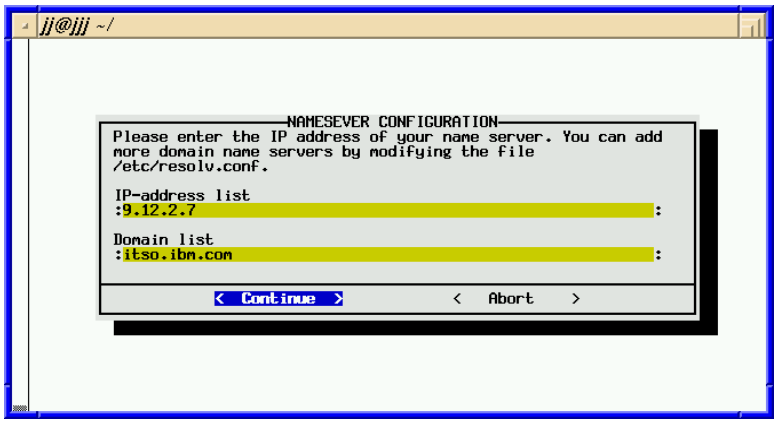
Installing SuSE Beta 2 - Common VM and LPAR



Installing SuSE Beta 2 - Common VM and LPAR

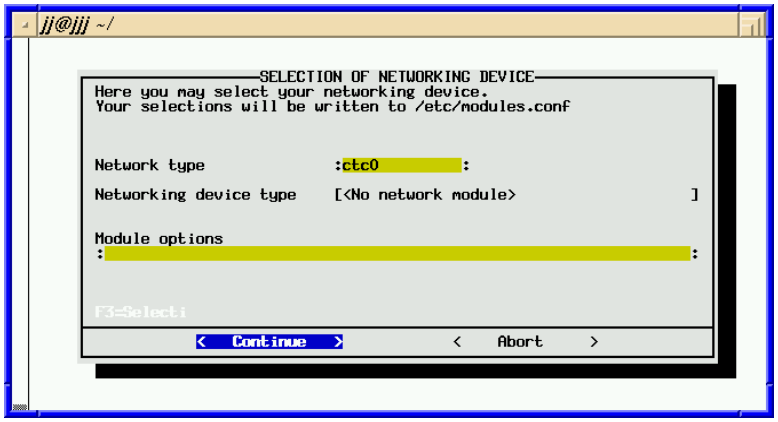


Installing SuSE Beta 2 - Common VM and LPAR

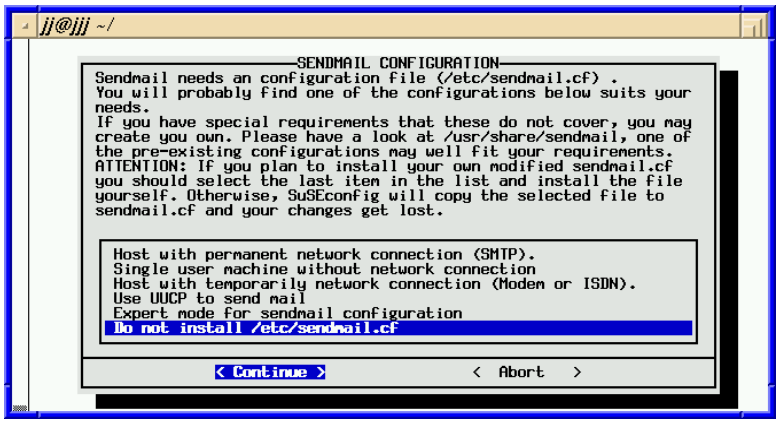


Installing SuSE Beta 2 - Common VM and LPAR

Enter ctc0 and take all defaults

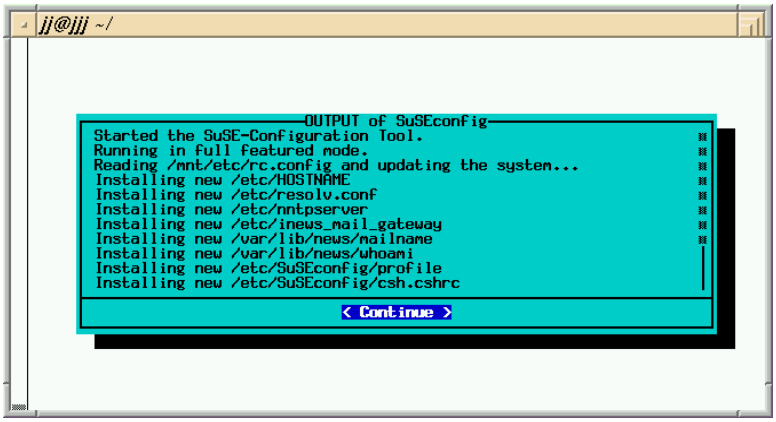


Installing SuSE Beta 2 - Common VM and LPAR



Installing SuSE Beta 2 - Common VM and LPAR

This is the last screen from YaST, when press Continue, return to shell prompt



Installing SuSE Beta 2 - VM Guest

- Cleanup network script for CTC type device
  - Mount /dev/dasda1 (may already be mounted)
  - Edit /etc/rc.config, or use YaST System administration --> Change configuration file
    - Make sure NETDEV_0 is ctc0
    - Update IFCONFIG_0 for pointopoint link

      e.g. 9.82.82.40 pointopoint 9.82.82.30 netmask 255.255.255.0 mtu 1500 up
  - Unmount the /dev/dasda1 file system
- Re-ipl the guest from the just created dasd
  - Additional scripts will run completing the install

Installing SuSE Beta 2 - LPAR

- LPAR definition
  - Recommend two 3390 dasd
    - File system (3390-3)
    - Swap partition (single density more than enough)
    - Could use xstore for swap with xpram driver
  - At least 128M of central storage
  - Communication adapter
  - Tape drive if not using load from cd-rom

Installing SuSE Beta 2 - LPAR

- Installation media
  - CD-ROM
    - Same comments as VM guest install
  - Build tape to load initial kernel and ramdisk
    - suse/images/tapeipl.ikr - upload binary F 1024
    - suse/images/initrd - upload binary F 1024
    - suse/images/parmline - upload ascii (make F 1024)
  - Use Ditto or similar product to copy files to tape
    - tapeipl.ikr, parmline, initrd

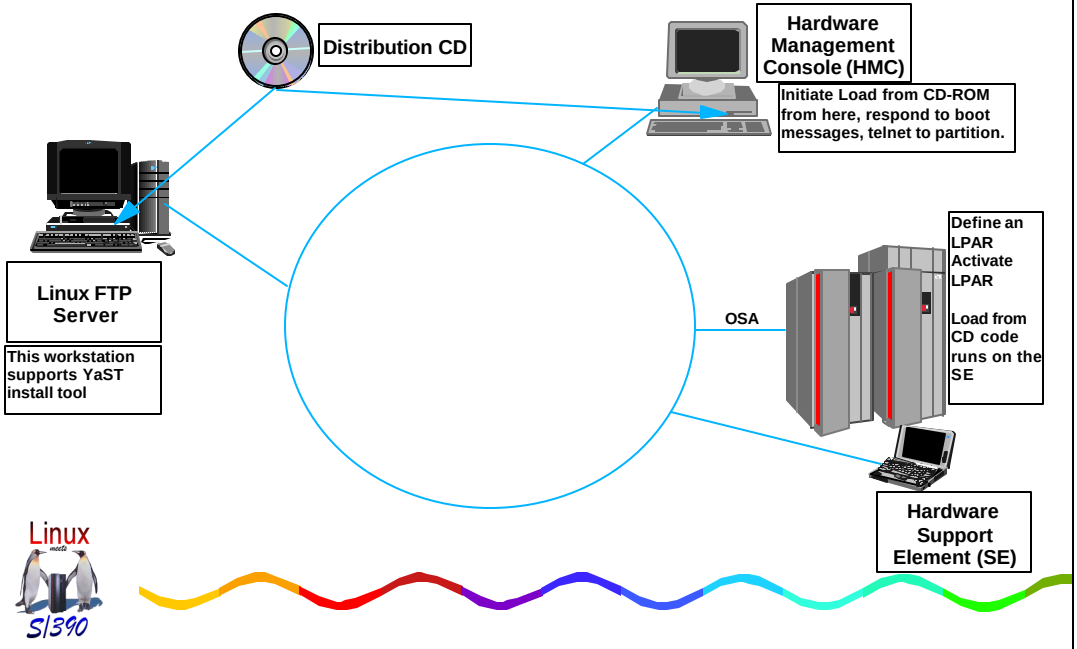
Installing SuSE Beta 2 - LPAR

- Installation media (cont.)
  - Alternative to tape is hardware load from cd or server function
    - G5, G6 with microcode fix MCL025 EC 99918
    - Multiprise 3000 with microcode fixes MCL048 (EC F34643) and MCL087 (EC 34663)

Installing SuSE Beta 2 - LPAR

- Notes for Load from CD-ROM
  - Cannot use HMC CD-ROM as FTP server for Linux install
    - SuSE code requires Rock Ridge CD-ROM extensions which OS/2 Warp does not have
  - Load from CD-ROM function supports loading from an FTP server
    - Must have TCP/IP stack on SE configured with default route, and perhaps other entries in routing table to connect with FTP server
    - Cannot use a RedHat Linux FTP server for initial "Load" function

Installing SuSE Beta 2 - LPAR



Installing SuSE Beta 2 - LPAR

- Activate LPAR
- From HMC
  - Insert distribution CD in CD-ROM drive
  - Logon to console application
  - Select "Defined CPCs"
  - Click on "Single Object Operations"
    - This establishes a session with a single CPC console (SE)

Installing SuSE Beta 2 - LPAR

- From the SE application
  - Select "Images"
  - Select the LPAR target for load
  - Click on "Load from CD-ROM or Server"
  - Select "Hardware Management Console CD-ROM" radio button
  - Enter /suse/images in the file location box
  - Select Linux.ins from choice box

Installing SuSE Beta 2 - LPAR

- Back on the HMC
  - Click on Operating System Messages
- Remove distribution CD from HMC CD-ROM
- Insert distribution CD into CD-ROM on Linux FTP server
- From Operating System Messages on HMC
  - Select type of network attachment
  - Continue as shown on previous "common" slides

Installing SuSE Beta 2 - LPAR

- Selection Of Network Device (YaST panel)
  - LCS module options:
    - noauto=1
    - devno_portno_pairs=0xYYYY,P
    - e.g. devno_portno_pairs=0x0A10,0

Administration and Maintenance

Kernel Maintenance

- YaST loads source from SuSE Beta 2 CD-ROM
  - Source tree in /usr/src/linux-2.2.16
  - Link created /usr/src/linux --> /usr/src/linux-2.2.16
  - .config file for current kernel in /boot
    - image.config
  - S/390 patches already applied
  - Follow standard kernel build sequence
    - make clean, make menuconfig, make dep, make image, make modules, make modules_install
  - Copy new kernel to /boot
  - Run silo to save new boot information

Ongoing System Administration

- SuSE, use YaST tool
  - Changes to installation such as default language, partition/filesystem associations
  - Installation of additional packages from SuSE CD-ROM
  - Changes to network configuration and services
  - Modify SuSE configuration file variables
  - Maintain users and groups

Backups

- No Linux for S/390 tape device driver
  - Native use of S/390 tape drives not possible yet
- Statement of direction for Tivoli client
- Customers using other creative methods to backup until tape and supported clients available
  - DDR of Linux DASD (if have VM/ESA)
  - Network based tar

Backups (cont.)

- Solution described on Linux-390 list
  - Use tar over ftp to store archive on another 390 operating system

Shell script named backup

```
#!/bin/sh
(
date > /tmp/ftp.log
ftp -nv 9.82.2.222 < /root/bin/tape.cntl >> /tmp/ftp.log 2>&1
date >> /tmp/ftp.log
) &
```

/root/bin/tape.cntl

```
user someuser somepw
cd "MAINT.440"
quote site FIXRECFM 4096
bin
put |'"tar -cvlf - /home"' home.tar
bye
```

Backups (cont.)

- Addition of find command can be used to select files for backup

find command

```
find / -mtime -1 \! -type d -print >
/root/filelist.daily
```

New control file

```
user someuser somepw
cd "MAINT.440"
quote site FIXRECFM 4096
bin
put |'"tar -cv -T /root/filelist.daily -f -"'
tar.files
bye
```

- Use cron to schedule execution of commands at regular interval

Migration Considerations

- Keep your additions in separate partition
  - Update /etc/fstab to automatically mount your filesystems
- New version may replace root filesystem
  - Packages with make install function can easily move runtime components to new root filesystem
    - Keep copies of customized files
  - Manual operation for other packages

Rescue System

- Could use the HMC load from cd or server function
- Best to create a tape that can be ipled
  - Use same criteria as for initial installation
- Once tape is ipled
  - Use insmod to access dasd for root file system
  - Mount root file system
  - Repair damaged files, or resave old kernel with silo

Summary

- SuSE install begins similar to Marist install
  - Kernel, parm file, and ramdisk used to provide install environment
- Majority of SuSE install executed by YaST
  - Common in VM guest and LPAR environments
- YaST provides source and environment to build new kernel - however need for this should be rare
- Backup requires creative solution at present
- Installation planning should include planning for upgrade
- Install tape can be used as rescue system