Linux®/Dell® 370N Installation for VnmrJ

Varian, Inc. NMR and MRI Systems
Pub. No. 01-999309-00, Rev. A1105

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A0905 – Initial release
A1005 – Removed “primary” and “secondary” from steps in sect. 1.2. Emphasized note.
A1105 – Broke section 1.2 into two subsections.

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Table of Contents

Linux Installation and Administration

Varian, Inc. NMR spectrometers use VnmrJ as the data acquisition and processing software. VnmrJ can run on a UNIX or Linux workstation. This manual describes how to prepare a Linux workstation to run VnmrJ.

Getting Started

The general installation steps are as follows:

Task	*More Information*
Collect network information for Linux and Router installation.	"Collect Network Information," page 6
Install the 2nd Ethernet card and connect the host computer to the NMR console	Chapter 1, "Installing and Connecting the Second Ethernet Card,"
Install Linux.	Chapter 2, "Installing Red Hat® Linux®,"
Install VnmrJ as described in the VnmrJ installation manual	Chapter 3, "VnmrJ Installation," or *VnmrJ Installation and Administration*

Requirements

VnmrJ on a Linux workstation requires the following:

Computer	Dell Precision Workstation 370N, 3.4 GHz, P4
RAM	1 GB, non-ECC, 333MHz DDR, 2 x 512, GX270(311-2865)
Graphics	64 MB nVidia Quadro NVS 280
Hard disk	80 GB SATA, 7200 RPM
CD drive	DVD/CD-RW drive
Mouse	wheel mouse
PCI Network Interface Card	Install the PCI Ethernet Network Interface board before loading Linux.
Linux	Red Hat Enterprise Linux WS v. 3, update 2, (64-bit version for 370N)
VnmrJ	VnmrJ LX 1.1D or VnmrJ 2.1A
Web browser	Netscape 7.0, Internet Explorer 5.0, Mozilla 1.0, Firefox 1.0

Before you begin any of the procedures in this manual, you should be comfortable working with Linux, computer hardware, and Ethernet networks.

Note: Only Dell systems purchased from Varian, Inc. for use with a Varian, Inc. NMR or MRI system are supported.

Collect Network Information

Use the "Network Information Worksheet" on page 6 to collect your network information. You will use this information when installing Linux. The network administrator for your site should be able to provide this, or any additional, network information needed.

Network Information Worksheet

Network	*Comments*	*Your Configuration*
Host Name	The host name of the host computer. **DO NOT USE** names listed in Table 1	
Network Device	The network interface (Ethernet board) installed in the computer. Linux systems show **`eth1`** for the primary (on board) interface and **`eth0`** as the secondary (card slot) interface.	**eth1** and **eth0**
IP Address (Primary network card)	The network IP number for the Ethernet board connected to the NMR console (eth1). IP addresses, select one: 172.16.0.1 or 10.0.0.1.	**172.16.0.1** or **10.0.0.1**
IP Address (Secondary network card)	The network IP number for the Ethernet board connected to the network (eth0) — supplied by the local network administrator.	
Netmask	The associated netmask or subnet mask number. Typically, this number is 255.255.255.0.	
Gateway	For or the secondary network card — supplied by the local network administrator.	
Name Service	Depends on the local network setup. NIS+, NIS, DNS, DCE, or similar.	
Domain Name	Your network domain name; for example: `our.domain` — supplied by the local network administrator.	
Name Server	Your network name server and IP address — supplied by the local network administrator.	
Proxy Server (Optional)	Proxy server name, e.g., `proxy.`*`domain`*`.com` — supplied by the local network administrator. To find the proxy server, open Netscape and look under Edit->Preferences->Advanced->Proxies	

Table 1. Reserved System Host Names

`inova`	`master1`	`lock1`	`ddr1`
`inovaauto`	`rf1`	`lock2`	`ddr2`
`gemcon`	`rf2`	`grad1`	`ddr3`
`wormhole`	`rf3`	`grad2`	`ddr4`
	`rf4`	`pfg1`	`ddr5`
	`rf5`	`pfg2`	`ddr6`
	`rf6`		`ddr7`
	`rf7`		`ddr8`
	`rf8`		

Chapter 1. Installing and Connecting the Second Ethernet Card

Sections in this chapter:

1.1 Install the Ethernet Card

To install the Ethernet card, use instructions provided by Dell (with the 370N) or by the card manufacturer. If those instructions are unavailable, use the steps below.

CAUTION: **Avoid damaging any components on the network card. Handle it by the edges. Make sure the network card is fully inserted into the slot to prevent the PC operating system from freezing at startup.**

1. Turn the power off and unplug the power cord from your computer.
2. Remove the PC cover.
3. Choose an available PCI slot (PCI slots are the shorter slots) and remove the corresponding back plate from the PC chassis.
4. Insert the PCI card into the PCI expansion slot.
5. Fasten the network card to the rear of the computer chassis by tightening the screw that is on the PC.
6. Replace the PC cover and reconnect the power cord to the PC.

1.2 Connect the Linux Workstation to the Console and Network

How the Linux workstation is connected to the console and the network differs depending on whether the second card is installed before or after Linux is installed.

Card Installed Before Linux is Installed

If the second Ethernet card is installed before Linux is installed (or reinstalled), connect as follows:

1. Connect the onboard network interface card, **eth1**, to the NMR console.
2. Connect the card-slot network interface card, **eth0**, to the local network.

Card Installed After Linux is Installed

If the second Ethernet card is installed on a system already running Linux, connect and configure as follows:

1. Connect the second card (card-slot, **eth1**) to the NMR console.
2. Connect the onboard card (**eth0**) to the local network.
3. Power up the computer and configure the second card:
   a. Use the Kudzu utility to detect the second card ("Intel 82544 EI Gigabit Ethernet Controller").
   b. Configure with IP=172.16.0.1, netmask=255.255.255.0, no gateway, no nameserver. Click "do nothing" for printer setup.

      The computer boots up displaying "bringing up interface eth1."
   c. Run setacq. The following message appears:

```
PC host is attached to the console via Ethernet port eth1 . . .
    the IP address of eth1 is 172.16.0.1
```

Chapter 2. Installing Red Hat® Linux®

Sections in this chapter:

This chapter describes how to install Red Hat Linux so that it is compatible with VnmrJ. The instructions are based on the Red Had Professional Workstation 3, update 2, of Linux.

2.1 Booting from the Installation CD

1. Insert the first of the Linux installation CDs, or DVD, into the CD/DVD drive.
2. Reboot the computer.

   Your BIOS settings might need to be changed to allow you to boot from the diskette or CD-ROM.
3. To change your **BIOS settings**, watch the instructions provided on your display when your computer first boots. You will see a line of text telling you to press a key to enter the BIOS settings (typically Del, F1, or F2 key).
4. After you have entered the BIOS setup window, go to the **Boot Sequence** section. The default is often C, A or A, C (depending on whether you boot from your hard drive (C:) or a diskette drive (A:)). Change this sequence so that the CD-ROM (typically drive D:) is first in your boot order and that C or A (whichever is your typical boot default) is second.

   This instructs the computer to first look at the CD-ROM drive for bootable media; if it does not find bootable media on the CD-ROM drive, it will then check your hard drive or diskette drive.
5. Save your changes before exiting the BIOS settings. For more information, refer to the documentation that came with your system, or the *Red Hat Linux Installation* manual.
6. Reboot the computer.
7. If asked, select the **CD-ROM** option from the boot loader screen and click **OK**.
8. Select the **Graphical Mode** for the Red Hat installation.

2.2 Installing Linux

The Red Hat Linux installation Welcome screen should appear on your screen. Click **Next** to begin setting up the installation. A series of screens appear in which you will make a selection and click the Next button. The table in the *Quick Install Information* section outlines the information you will need to enter into the screens. The *Detailed Installation* section provides step-by-step details for the relevant screens.

- "Quick Install Information" on this page
- "Detailed Installation" on page 11
- "Linux Setup" on page 12

Quick Install Information

The following table summarizes the suggested choices.

Screen	*Selection*
Language Selection	**English**
Keyboard Configuration	**U.S. English**
Mouse Configuration	**Generic** -> **Wheel Mouse (*port*)**, *port* = PS/2 or USB
Installation Type	**Custom**
Disk Partitioning Setup	**Manually Partition with Disk Druid.** See Step 2 in the Detailed Installation procedure.
Network Configuration (for the secondary ethernet card configuration)	edit **eth0**; *uncheck* **Configure using DHCP**; check **Activate on Boot**; IP Address = assigned by network administrator; see "Network Information Worksheet" on page 6 Netmask = **255.255.255.0** Hostname->Set the hostname:->**manually**: enter a hostname Miscellaneous Settings -> Gateway = see "Network Information Worksheet" on page 6
Boot Loader Configuration	GRUB (default)
Firewall Configuration	select **No firewall**.
Additional Language Support	select **English (USA)** as the default; select other languages you wish to install.
Time Zone Configuration	select your local time zone
Set Root Password	enter a root password.
Package Installation Defaults	select **Customize the set of packages to be installed**
Package Group Selection	select **Everything** (total size of 4600 MB).
Graphical Interface (X) Configuration	accept the selection presented by the installation program; otherwise, choose the settings appropriate for your video card
Monitor Configuration	**24-bit**, **1280x1024** recommended; otherwise, choose the settings appropriate for your monitor
Date and Time	Set the local date and time. Typically disable Network Time Protocol.
User Account	Create a generic user, typically **user01**.
User Network Login	Use the information from the "Network Information Worksheet" on page 6. Ask your network administrator for assistance. *User Information*: from the Network Information Worksheet *Authentication Configuration*: *Uncheck* **Enable MD5 Passwords**.

Detailed Installation

1. In the first several screens, make the selections as listed in the *Quick Install Information* table.
2. When you get to the *Disk Partitioning Setup* screens, set up four (/boot, /home, /, swap) partitions. The disk layout that separates the `/home` partition is as follows. This setup allows you to preserve your NMR data when Linux is reinstalled:

Partition	*Mount point*	*File system type*	*Size*	*Size Options*
`/boot`	`/boot`	ext3	300 MB	
`swap`	leave blank	swap	1 GB	
`/`	`/`	ext3	10000 MB	
`/home`	`/home`	ext3	remaining disk space	Fill to maximum allowable size

   a. If any partitions exist on the disk, select the partition and click **Delete**.
   b. Click **New**. The Add Partition screen appears.

      Add the partitions listed above.
   c. Click **OK** after each partition is set up. Click New to setup the next partition.
3. Select the boot loader in the *Boot Loader Configuration* screen. Keep the GRUB boot loader, which is the default. Change the boot label if desired.
4. Configure the network interfaces in the *Network Configuration* screen:

Network Configuration (for the secondary ethernet card configuration)	edit **eth0**; *uncheck* **Configure using DHCP**; check **Activate on Boot**; IP Address = assigned by network administrator; see "Network Information Worksheet" on page 6 Netmask = **255.255.255.0** Hostname->Set the hostname:->**manually**: enter a hostname Miscellaneous Settings -> Gateway = see "Network Information Worksheet" on page 6

5. Configure the Firewall in the *Firewall Configuration* screen:
   - Select **No firewall**.
6. For *Additional Language Support*, select **English (USA)** as the default. Select other languages you wish to install.
7. Enter the *time zone* information and set the *root password* as appropriate.
8. In the *Package Installation Defaults* screen, select **Customize the set of packages to be installed**.

   The *Package Group Selection* screen appears.
   - Scroll to the bottom and check the **Everything** box, which is at the end of the list.
9. Click **Next** to start the software installation.

   The Installing Packages screen appears with a progress bar. The software begins installing. This can take about an hour to finish. Switch CDs as instructed. Eventually, you will reinsert CD #1 and continue with some more set up steps as outlined below.

10. *Graphics and Monitor* -- Accept the defaults: “unprobed monitor” and “800x600”. You can optimize the monitor after the drivers are installed from the “Linux Patches” CD.

The system reboots and brings up the *Welcome* screen for Linux setup.

Linux Setup

The next couple of screens ask for additional setup information. The only thing VnmrJ requires here is to disable MD5 Passwords and Network Time Protocol, and we suggest creating a generic (user01) user account.

1. Click **Next** in the *Welcome* screen.
2. *License Agreement* -- Read the license agreement and click **Yes, I agree to the License Agreement**. Click **Next**.
3. *Date and Time* -- Set the appropriate date and time and ***disable*** **Network Time Protocol**.
4. *User Account* -- Enter **`user01`** or something else appropriate for your site.
   a. Click **Use Network Login** to configure your name server and authentication.
   b. Click the **User Information** tab and configure your name server as appropriate for your site. Refer to the Network Information Worksheet on page 6 and your network administrator.
   c. Click the **Authentication** tab and ***disable*** **Use MD5 Passwords**.
   d. Click **OK** and click **Next**.
5. *Sound Card* -- Select the appropriate sound card.
6. *Red Hat Network* -- Register Red Had Linux. Select No to register later.
7. *Additional CDs* -- Install any of the additional CDs listed. These might be useful, but are not required by VnmrJ.
8. *Finish Setup* -- Click **Next**.

Linux is now installed.

2.3 Installing Drivers from the Supplement CD

After Linux (Red Hat Workstation 3, Update 2 only) is installed, you must install updated drivers for video and Ethernet.

1. Log in as **root**.
2. Insert the **Linux Patches for Red Hat Ver. 3, Update 2** CD.
3. Open a Terminal window and change to the `drivers` directory on the CD:
   `# cd /mnt/cdrom/drivers`
   If the `cdrom` directory is not accessible, mount the drive with the following command:
   `# mount /mnt/cdrom`
4. Load the **Video Drivers**:
   a. Enter the `pkgsetup` command to update the video and network drivers:

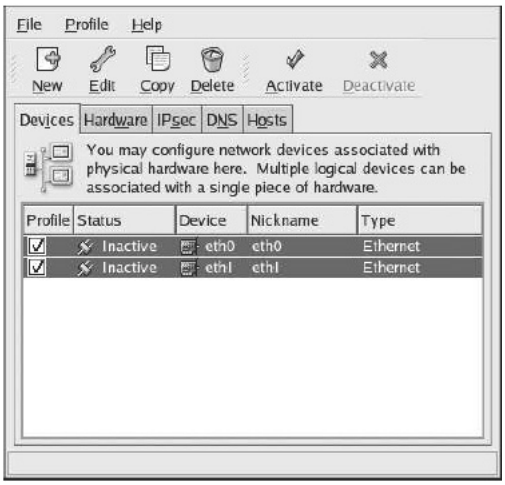
```
# ./pkgsetup
```

b. After the packages have finished loading, reboot the computer. During the boot up, you will now see eth1 listed.

Next, configure the network.

2.4 Configure the Network

Configure the network in the *Network Configuration* screen. Each workstation ethernet port must be configured. Systems not connected to a network require only one ethernet port (on board port) and systems connected to a network require two ethernet ports (one on board and one card).



For DNS IP numbers, refer to the Network Information Worksheet, or ask you network administrator for assistance.

1. Log in as root and start the **Network Administration Tool**.

   From the **Main Menu** (Red Hat icon in lower left of screen), select: **System Settings** -> **Network**

2. Click the **Devices** tab to set up the Ethernet connections. You will configure eth1 first.

   - **`eth0`** – is the secondary Ethernet interface and will be connected to the network (WAN). This port will be set up with the network information provided by the network administrator.
   - **`eth1`** – is the primary Ethernet interface and will be connected to the NMR console. This port will be assigned IP address 172.16.0.*xx* (or 10.0.0.*xx*), where *xx*=1 for Varian NMR Systems or *xx*=11 for INOVA and MERCURY.

3. Double-click the line with **eth1**. The *Configure Network Settings* screen for this port opens. Make the following settings:

   -- Select **Activate device when computer starts**
   -- Select **Statically set IP addresses**
   -- **IP Address** – enter **172.16.0.*xx*** (*xx*=**1** for new Varian NMR System, *xx*=**11** for INOVA or MERCURY)
   -- **Netmask** – enter **255.255.255.0**
   -- **Default Gateway Address** – leave empty

   Click **OK**.

4. For workstations connected to the network, configure the secondary (eth0) Ethernet connection.

   Consult your network administrator for any network information specific to the network at your site. The local network administrator must set up the connection between the workstation and the local network. The local network is connected to the secondary network interface card, eth0. Configure the secondary network interface card as follows:

a. Double-click the line with **eth0**. The *Configure Network Settings* screen for this port opens. Make the following settings:

-- Select **Automatically** or **Statically set IP addresses** – depending on local network setup. Consult network administrator.
-- **Configure using DHCP** – unselect or select depending on local network setup. Consult network administrator.
-- Hostname – enter hostname assigned by network administrator.
-- Select **Activate device when computer starts**

-- **IP Address** – enter IP address assigned by network administrator
-- **Netmask** – enter **255.255.255.0**
-- Default Gateway Address – assigned by the network administrator.

Click **OK**.

5. Click **File**, then **Save** to save the changes. **Exit** the *Network Administration Tool*.
6. Reboot the workstation.

2.5 Setup the Graphics and Monitor

Optimize the graphics and monitor with the Graphics and Monitor screen from the System Settings -> Display menu.

1. From the **Red Hat** menu, select **System Settings** -> **Display**.

   The *Graphics and Monitor* window appears.
2. Select the **Display** tab:
   a. Set Screen Resolution to: **1280x1024**
   b. Set Color Depth to: **Millions of colors**
3. Select the **Advanced** tab and configure the **Monitor** to **Dell 1901 FP (digital)**
4. Save and exit the window.

2.6 Adjusting Mouse Click Speed for VnmrJ

The default mouse click interval in Red Hat Linux must be optimized for VnmrJ.

1. Click the **Main Menu** (Red Hat icon) on the bottom of the screen.
2. Select **Preferences** -> **Mouse**.
3. Change the **Double-click Delay** from 0.4 to **0.5** sec.

Go to the next section to add the window list to the Linux panel.

2.7 Adding the Window List to the Linux Panel

To make sure open windows, including VnmrJ, appear on the Linux panel (which runs along the bottom of the screen), use the following steps:

1. Right-click on the open space on the Linux panel.
2. Select Add to **Panel** -> **Utility** -> **Window List**.

Chapter 3. VnmrJ Installation

Sections in this chapter:

This chapter provides a quick installation procedure for VnmrJ. Refer to the *VnmrJ Installation and Administration* manual for more information on installing, configure, and creating user accounts in VnmrJ.

3.1 Installing VnmrJ

1. Log in as root.

   Click the Main Menu (the red hat at the lower left corner of the screen). Click Log Out. Log in as root.

2. Change to the VnmrJ CD and enter the load.nmr command:

   ```
   # cd /mnt/cdrom
   # ./load.nmr
   ```

   The Load VnmrJ Software screen appears.

3. Select the options to install.

4. Click **Install**.

   The Installation Progress window appears.

5. Click **Done** after the installation is finished.

3.2 Download and Install the VnmrJ Patch

Download and install the Linux/Dell patch for VnmrJ to configure the host computer with the second Ethernet card.

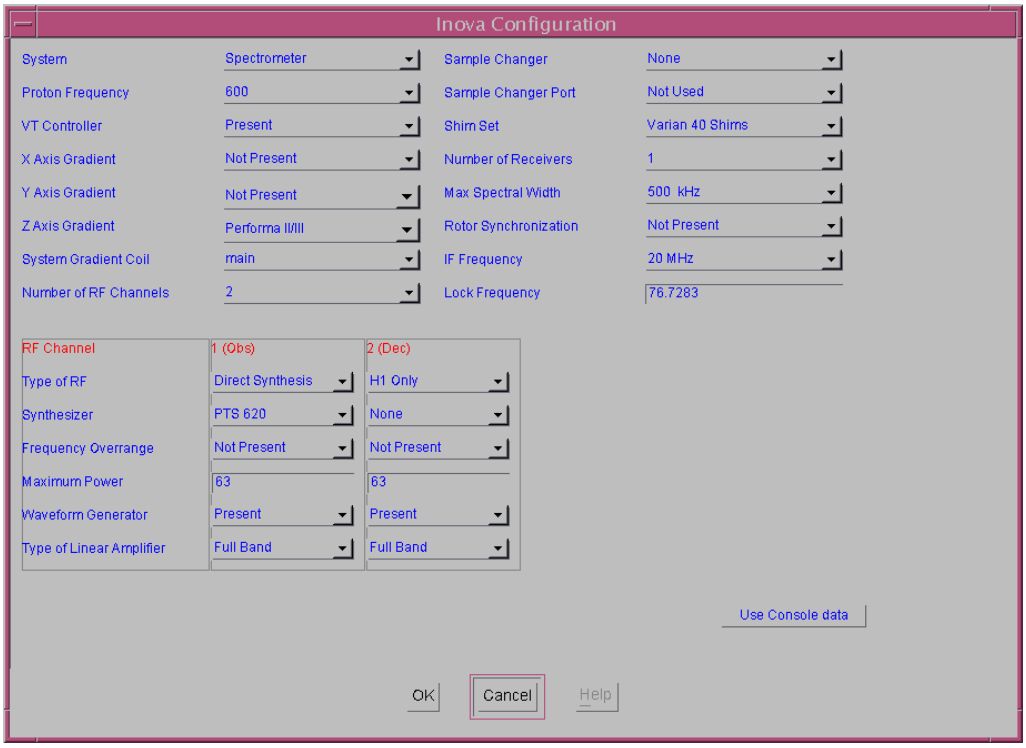
3.3 Set Up Acquisition Communications

Make sure the NMR console is connected to the primary (**onboard**) Ethernet interface (eth1).

Use the `setacq` command to set up host to acquisition communications.

1. Enter the setacq command:
   # **`/vnmr/bin/setacq`**
2. Reboot the NMR console as directed.
3. Reboot Linux as directed.

3.4 Configuring VnmrJ



1. Log in as **vnmr1**.
2. Start VnmrJ by entering **`vnmrj`** in a terminal window.

   To open a terminal window, right-click somewhere in the screen and select New Terminal.
3. Open the System Configuration window and configure VnmrJ for your spectrometer.

   Utilities -> System Settings -> System Config
4. Click **Use Console Data** to gather information from the NMR console.
5. Check the settings and click **Save**.

3.5 Adding a VnmrJ Launcher

Use the following steps to add a VnmrJ launcher to the Linux panel on the bottom of the screen.

1. Right-click on the open space on the Linux panel.
2. Select Add to Panel -> Launcher.
3. Fill in the Create Launcher window as follows:

Name:	VnmrJ
Generic name:	vnmrj-lab
Command	vnmrj
Type:	Application

4. Click Icon and browse to the following directory:
   `/vnmr/iconlib/vnmrj.gif`
5. Click OK.

A VnmrJ icon appears on the panel. You can click and drag the icon to reposition it.

3.6 File Browser

The File Browser operates in conjunction with the Locator.

- "Using the File Browser" on page 17
- "Entering a Directory Path Directly" on page 17

Using the File Browser

When the file browser panel is open, the Locator limits its scope to only files and directories at the current file browser level or below. Closing the file browser by clicking the arrows or dragging the border, causes the Locator to go back to an unlimited display of items.

Drag & drop from Locator to the File Browser sets the File Browser to the director where the dragged item resides.

File browser buttons and controls:

^	click to go up one level
Home	click to go to the current users home data directory
CD/DVD	click to go to the currently open CD or DVD directory
+	(or double clicking a directory)— to open that directory and make it the top level currently in the file browser and also the Locator

Double clicking on a file or directory— operate on that file or directory as the Locator does. That is, double clicking on an NMR data file loads it just as double clicking on the same data file in the Locator does.

Drag a file and directory from file browser — operate on that file or directory as the Locator does when dragging to other windows including the graphics canvas and the study queue.

Entering a Directory Path Directly

The top level of the file browser is editable.

1. Click on the top item to select it.
2. Click again to get the editing cursor.
3. After editing, hit the **Return** key to display the new directory.

3.7 Remote Login to a Linux Workstation

Because of the security features incorporated into Linux, you must use **ssh** (Secure Shell) instead of `rlogin` to remotely log into a Linux workstation.

The typical syntax for the `ssh` command is:

```
ssh [-l login_name] [host_name]
```

Chapter 4. Linux Administration Notes

Sections in this chapter:

This chapter provides some additional information about Linux administration as it relates to VnmrJ.

4.1 More Information About User Accounts

One method of creating user accounts for VnmrJ LX is to let the VnmrJ LX installation software use the “VnmrJ master user” (vnmr1), and to then use vnmrj adm (the VnmrJ Administrative interface) to create any additional users (vnmrj adm calls makeuser internally; calling makeuser in a UNIX shell should also be OK).

The one drawback with this method is that makeuser automatically selects a user-ID (UID) for new users, and if you define multiple users, their user-ID will depend on the sequence in which they are defined. On a single / stand-alone Linux / VnmrJ LX installation this is perfectly OK – the user actually never needs to know what his/her user-ID is. However, in networked installations with multiple Linux / VnmrJ LX installations you may experience problems if the user-ID for a given user name is not the same across all workstations, in that (for example) on NFS-mounted partitions you may not be able to read what you think are your files on the remote system, because these files may have an unexpected UID.

The proper solution for networked systems (apart from using NIS or similar means of sharing user definitions, password information etc.) would be to define all users before starting the VnmrJ LX installation. This way you (or the system administrator) can decide what the user-ID for a given user name should be on all systems, and the user definitions can be made consistent across the network.

Note that makeuser allocates UIDs starting and incrementing from the value 500. Many UNIX system administration handbooks actually recommend the following:

- Not using UIDs below 100 at all (these should be reserved for internal use).
- Using UIDs between 100 and 1000 for administrative accounts only.
- Allocating UIDs from 1001 (or 1000) up for ordinary users.

Note that under Solaris, makeuser allocates UIDs starting at value 72 – we strongly recommend not propagating this to the Linux systems.

The real pitfall with a manual user account definition under Linux is in the choice of user shell: by default, under RedHat Linux, user accounts are set up with “bash” as the default user shell. You will not be able to start VnmrJ with this setting. You must make sure you specify **tcsh** (`/bin/tcsh`) as the user's default shell on Linux platforms.

4.2 Transferring Data from a Sun to a Linux PC

This section (adapted from *Varian NMR News 2005-02-13*) describes transferring data from a Sun workstation to a Linux workstation. You may want to transfer files if you are considering upgrading a NMR spectrometer host from a Sun workstation to a PC running RedHat Linux and VnmrJ LX 1.1D.

Single-User Data Transfer

The most generic solution certainly is to use NFS mounting for temporary access to the Sun disk from the PC. This involves the following steps:

1. Make sure both systems are on the same network branch and can access each other.

   It is convenient if the systems know each other through entries in `etc/hosts` (then you can use host names), but that's not a requirement; the minimal condition is that the two systems can reach each other by IP address - you can test this by using `ping` *`ip_address`* e.g.:

   ```
   # ping 123.45.67.89
   ```

   which should report:

   ```
   host 123.45.67.89 is alive
   ```

   Make sure you try this from both sides.

2. On the Sun, edit the file `/etc/dfs/dfstab` as root, adding a line such as

   ```
   share -F nfs /export/home
   ```

   then (still as root) enter:

   ```
   /etc/init.d/nfs.server start
   ```

   which initiates the sharing and starts the necessary NFS daemon copies. The command `share` without argument should now report the shared file system.

3. On the Linux PC, as root, make sure you have a mount point that you can use, e.g.:

   ```
   mkdir /mnt/sundisk
   ```

   Mount the Sun file system with

   ```
   mount host_name:/export/home /mnt/sundisk
   ```

   or, if the Sun workstation is not listed in `/etc/hosts`:

   ```
   mount ip_address:/export/home /mnt/sundisk
   ```

4. As a VnmrJ user, you should be able to transfer your files, e.g., with

   ```
   cp -r /mnt/sundisk/vnmr1/vnmrsys/data/* ~/vnmrsys/data
   ```

   – OR –

   ```
   cp -r /mnt/sundisk/vnmr1/data/* ~/data
   ```

   (This command will not work if you are logged in as root)

   This works as expected, under two conditions:

   - There are no symbolic links involved (`cp -r` would replace such links by the files they are pointing to). If you want symbolic links to be copied as such, then rather use a command such as:

     ```
     cd /mnt/sundisk/vnmr1/data
     tar cf - . | (cd ~/data; tar xfBp -)
     ```

- All files to be copied are “world-readable”, i.e., have read permission for everybody (and directories must have “execute” permission for everybody). The problem with the last point is that in all likelihood (at least, if you simply used `makeuser` to define the VNMR / VnmrJ users on the two systems), users may have identical names on both systems, but they will have different UIDs (see also Varian NMR News 2005-02-05). If the copying fails, you can alter the permissions first: log into the Sun, then (as VNMR / VnmrJ user) use the following command:

  ```
  chmod -R +r ~
  ```

  and in the case of problems with directory access use

  ```
  find ~ -type d -exec chmod +x {} \;
  ```

It may be necessary for every VnmrJ user to perform these steps. While basic FTP is OK for simple, plain files, it is tedious to use for transferring nested directories - but alternatively, you may user GUI-based, easy-to-use FTP utilities such as gFTP under Linux to do the data transfer.

This should avoid permission issues, as on the remote system you act as a local user.

Note: Beware of transferred binary executables! Compiled programs ONLY work on the architecture for which they have been compiled. Files (other than shell scripts) in `~/bin` or `/vnmr/bin` are suspicious under that aspect.

Multiple-User Data Transfer

With many users a managed data transfer as root might be more efficient than the single-user procedure described above. To do this, you must export the Sun file system(s) *with root permission*. This is achieved by changing the file sharing command in `/etc/dfs/dfstab`, for example:

```
share -F nfs -o root=host1:host2 /export/home
```

where *`host1`* and *`host2`* would be potential NFS clients with root access. Now, after mounting, root retains root access even on the NFS-mounted file system, and a global data transfer can be done with the following commands, for example:

```
mkdir /home/import
cd /export/home
tar cf - vnmr1 vnmr2 user3 user4 ... | (cd /home/import; tar xvfBp -)
```

where `/home/import` is a directory on the Linux system that receives all Sun files. In this case, the transferred files will retain the UID and the GID that they had in the Sun and Solaris environment. Due to the potential discrepancy in the UID and GID assignment, you will need to correct the ownership of the transferred files. You can do this by file or directory name, for example:

```
cd /home/import
chown -Rh vnmr1:nmr vnmr1
chown -Rh vnmr2:nmr vnmr2
...
```

Alternatively, if you have directory trees with mixed ownership, you can change the ownership by UID, for example, if vnmr1 in Solaris had UID 72, you can catch all files with that UID by entering:

```
find /home/import -user 72 -exec chown -h vnmr1:nmr {} \;
```

In this case, the recursion is achieved with the `find` command. The `-h` option causes `chown` to change the ownership of a symbolic link rather than trying to change it on the file the link points at.