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Show 105 IBM Notes and IBM Domino on Linux 101

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About the presenter

- Daniel Nashed
  - Nash!Com – IBM® Business Partner/ISV
  - Member of The Penumbra group
    - an international consortium of selected Business Partners pooling their talent and resources
  - focused on Cross-Platform C-API, Domino® Infrastructure, Administration, Integration, Troubleshooting and IBM® Notes® Traveler
  - Platform Focus: Windows®, Linux®, AIX® and Solaris®
  - Author of the Domino Start Script for Linux® and Unix®
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- http://www.nashcom.de

Agenda

- Introduction
  - Why Notes & Domino on Linux?
  - Right distribution and Linux version
- Show 'n Tell
  - Start Point: Pre-Installed BASIC SLES 11 SP2 64bit Machine
    - See step by step guide in this presentation
  - End Point: Fully installed Domino Server 9.0 Beta Server
    - And Notes 9.0 Beta Client
  - Tips, Best Practices, Tuning and Admin Standard Operations, Troubleshooting
- Q & A
- Disclaimer: Demos are based on Notes / Domino Social Edition 9.0 Public Beta
  - The demonstration is based on the current status of the beta
  - The Notes/Domino 9 Beta software is subject to change

Why Notes/Domino on Linux?

- Many customers moved their Domino environment to Linux
  - Most time combined with a Company-wide Corporate Strategy
  - Just running Domino on Linux might not make sense from strategic point of view
    - But Domino is a good platform to start with
- Server Consolidation
  - Multiple Partitions on a single Linux box
    - On Windows you should only use one per hardware or need Virtualization
- Cost reduction when migrating from other platforms
  - e.g. AIX®, Solaris®, iSeries®, zSeries®
- More and more customers are interested in Linux on the Desktop
  - A lot software is already available for Linux
  - Very powerful and enterprise ready desktop versions available
- Robust, Fast, Scalable Platform

Why Notes/Domino on Linux?

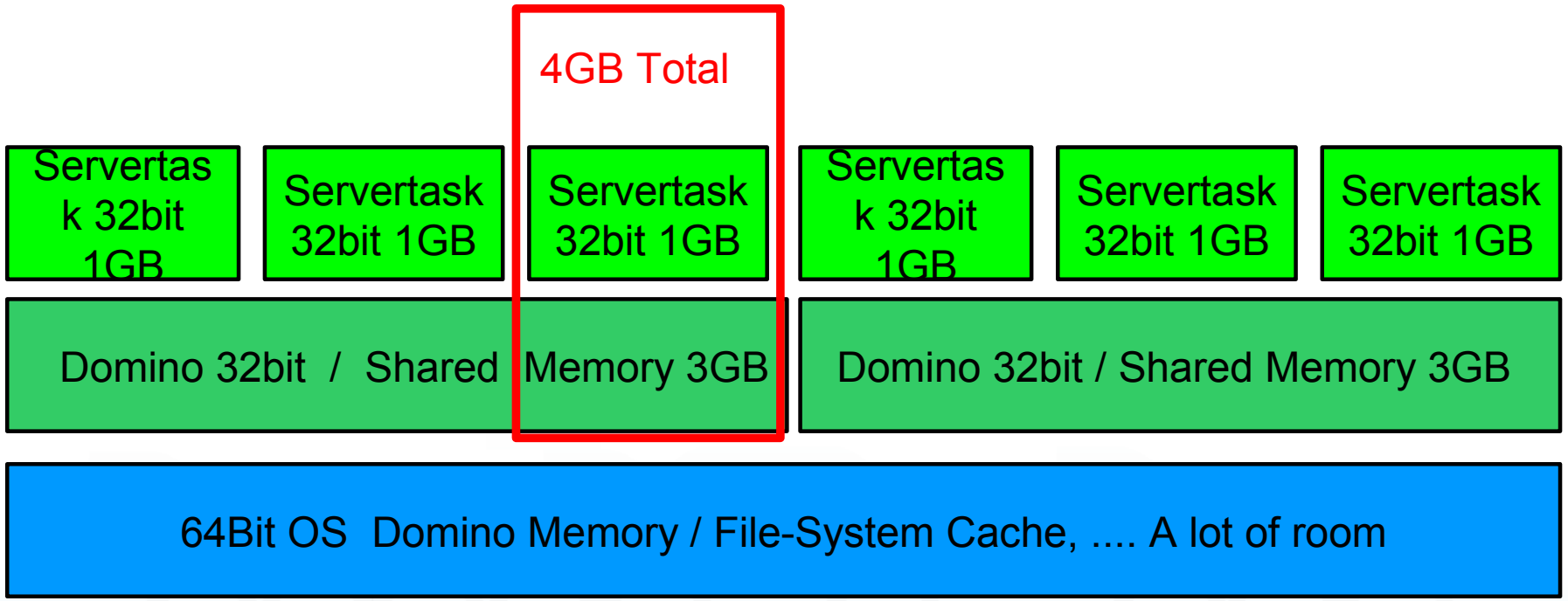
- No Registry
  - Configuration is in text files
  - You know exactly what happens
- Better Security
  - For example when used inside a DMZ
- Better Manageability
  - Scripted operations (shell scripts – Linux uses scripts internally)
  - Mountable file-systems (easier separation of multiple file-systems)
  - Great performance and troubleshooting tools
- “Less licence costs”
- Very effective process scheduler and memory manager
- IBM is using RHEL 64bit Intel Linux for their “IBM SmartCloud™” offering

Domino on Linux Memory Limits

- Domino 8/9 on SLES/RHEL in 64Bit Mode can support many partitions with 32Bit dedicated address space per Domino Partition (DPAR)
  - Practical limit would be 3-4 partitions with 12-16 GB of RAM
  - You need to take care to have fast disk subsystems
  - **TIP:** For better I/O performance use 32 GB of RAM or more
    - File-System cache helps dramatically to reduce the read I/O
- Windows 64bit removed a lot of constrains on the Windows side
  - File-system Cache, full 32bit address space available for the application
- But memory management on Linux is still ahead
  - tempfs – Temporary file-system
  - Better file caching – works better with large amount of RAM
- 32Bit Limit: 4 GB for Shared Memory + Local Process memory
- Domino 9 will support native 64bit Domino on Linux

Domino 32bit on a 64Bit Operating System

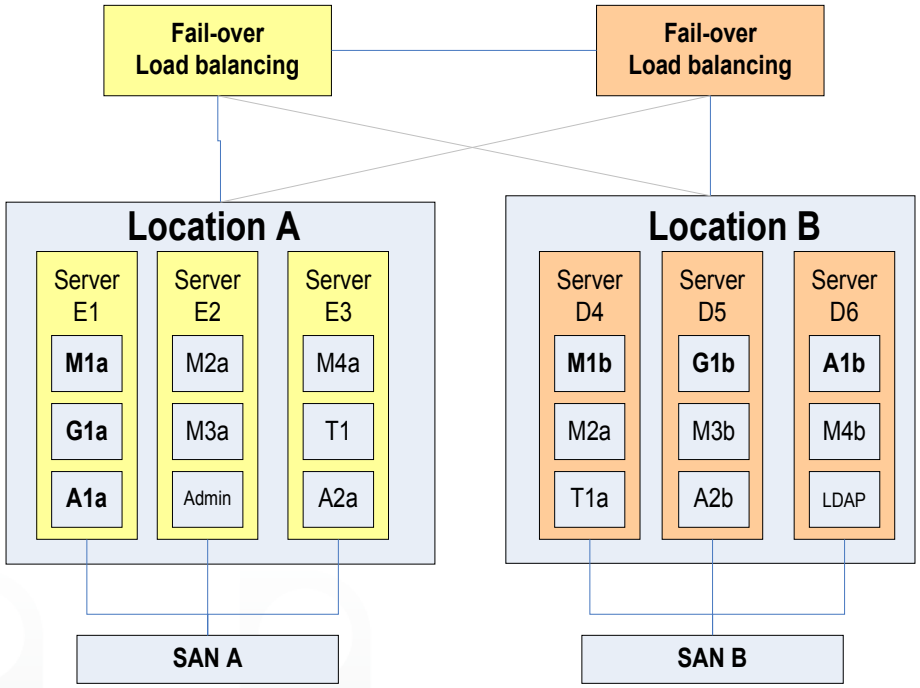
- Total Memory per Process is 32Bit = 4 GB
- Router / HTTP uses most local process memory
- NSF Buffer Pool is the biggest Shared Memory block (512 MB)



Customer Linux Example - Two Locations - 6 Boxes

- Spread multiple Domino Partitions (DPARs)
  - On multiple physical machines
  - Each machine has one counter part on a different phyical box
  - Mail-Servers are sized for 16.000 Users
- 3 Partitions each
  - Balance two busy and
  - one lower profile DPAR
- Leverage Domino Clustering
  - No SAN mirroring!

- 2 Quad-Core CPUs
- 16 GB RAM
- SAN disk for data
- Local Disks for TL



Domino on Linux running on VMware®

- VMware is a great platform for test and demo environments
- Smaller servers that cannot be clustered are also a good candidate for VMware to ensure disaster recovery
  - E.g. Admin Server, SMTP Servers, Smaller Mail (< 800 Users)/Application Servers
- For large mail and application servers native Linux with partitioned servers is still the better option
  - Less complexity and overhead
  - Better resource scheduling because it is native
  - **But VMware has improved over the last years and became a "tier-1" virtualization platform**
  - If you apply best practices on all levels, you could also run large servers above 1000-1500 users
- In case you install productive servers on Linux check
  - www.vmware.com/pdf/vmware_timekeeping.pdf
  - Very detailed information about timer implementation
  - Old presentation but can be still relevant if you run into "time" issues with Linux on VMware

Linux Distributions?

- SuSE®, RedHat® Enterprise are the **only** supported distributions
  - Different Releases of Domino support different Versions of each distribution
  - Take care that you use the right distribution else your Domino server might not run and is totally unsupported
- Enterprise Distributions are supported for longer time
  - Other Distributions are changing often and there is no way to do the QA and support
  - Development & support focus on major commercial distributions with support
- You should only run the supported Distributions and specific versions
  - Linux is not always the same!
  - There are important differences in each version and distribution
  - Different versions use different libraries, stack sizes, Java runtime, ...
  - Using LD_ASSUME_KERNEL=xyz is not really a solution
  - Specially for the Client with Eclipse and Expeditor Framework it is very important
  - Check detailed requirements for each version in readme of each release!

Supported/Recommended Combinations

- Domino 8.5.x is only supported on SLES10/11 and RHEL5/6!
  - Ubuntu is not a supported Server platform
  - If you need a free Linux OS use CentOS
    - not supported but source code compatible with RHEL

- So you should already start with SLES 11 SP2 or RHEL 6.3 if you can

- Notes 8.5.3 Client
  - SLED 10/11 with current SP
  - RHED 5/6 with current patches
  - Ubuntu 10.04 LTS → very nice implementation. Free (support & deployment tools are commercial)
    - Only 32bit is fully supported. 64Bit is specially hard to install because there is no automatic 32bit subsystem installation
    - **Notes 9.0 has planned support also for Ubuntu 12.04 LTS!**
- The choice depends on your preferences and what your Linux team provides

Linux Distributions and Abbreviations

- SLES - SuSE Linux Enterprise Server
  - http://www.novell.com/products/server/
- SLED - SuSE Linux Enterprise Desktop
  - http://www.novell.com/products/desktop/
- Red Hat Enterprise Linux 6
  - http://www.redhat.com/rhel/
- Red Hat Enterprise Linux 6 Desktop
  - http://www.redhat.com/rhel/desktop/
- Ubuntu Desktop
  - http://www.ubuntu.com/

Show 'n Tell - Domino Installation on VMware SLES & RHEL

- VMware Player / Workstation / Server
  - Most other Virtualization Platforms would work
  - Used in this session: “”VMware Workstation”
- SLES 11 SP2
- RHEL 6.3
- Next pages show how to install SLES
  - Takes too long to wait – but we go quickly thru the install screens
  - See also RHEL 6.3 install screens in Appendix
- This is not part of the live demo in the session
  - We start when the BASIC install is finished

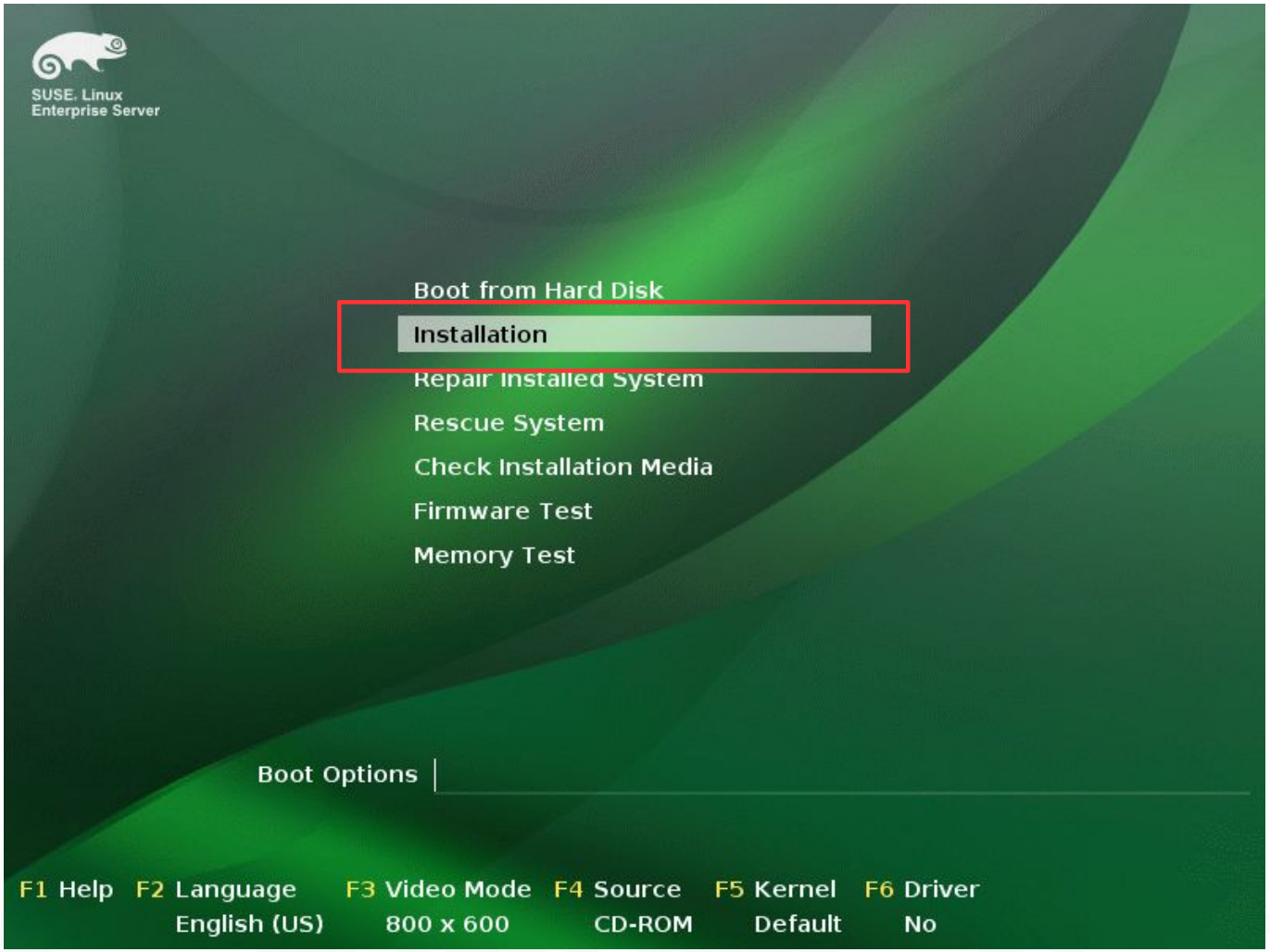
Additional Software Used

- A great free Telnet & SSH client: Putty
  - Current Version: 0.62
  - http://www.putty.org/
- WinSCP - Windows based copy program using SSH
  - Current Version: 5.1.2
  - http://winscp.sourceforge.net
- Free and very good tools
  - Used by many administrators
- Installation is easy
  - Just run the installer
  - I will skip those installation steps and assume an installed Putty and WinSCP

SuSE Enterprise Server 11 SP2 Installation

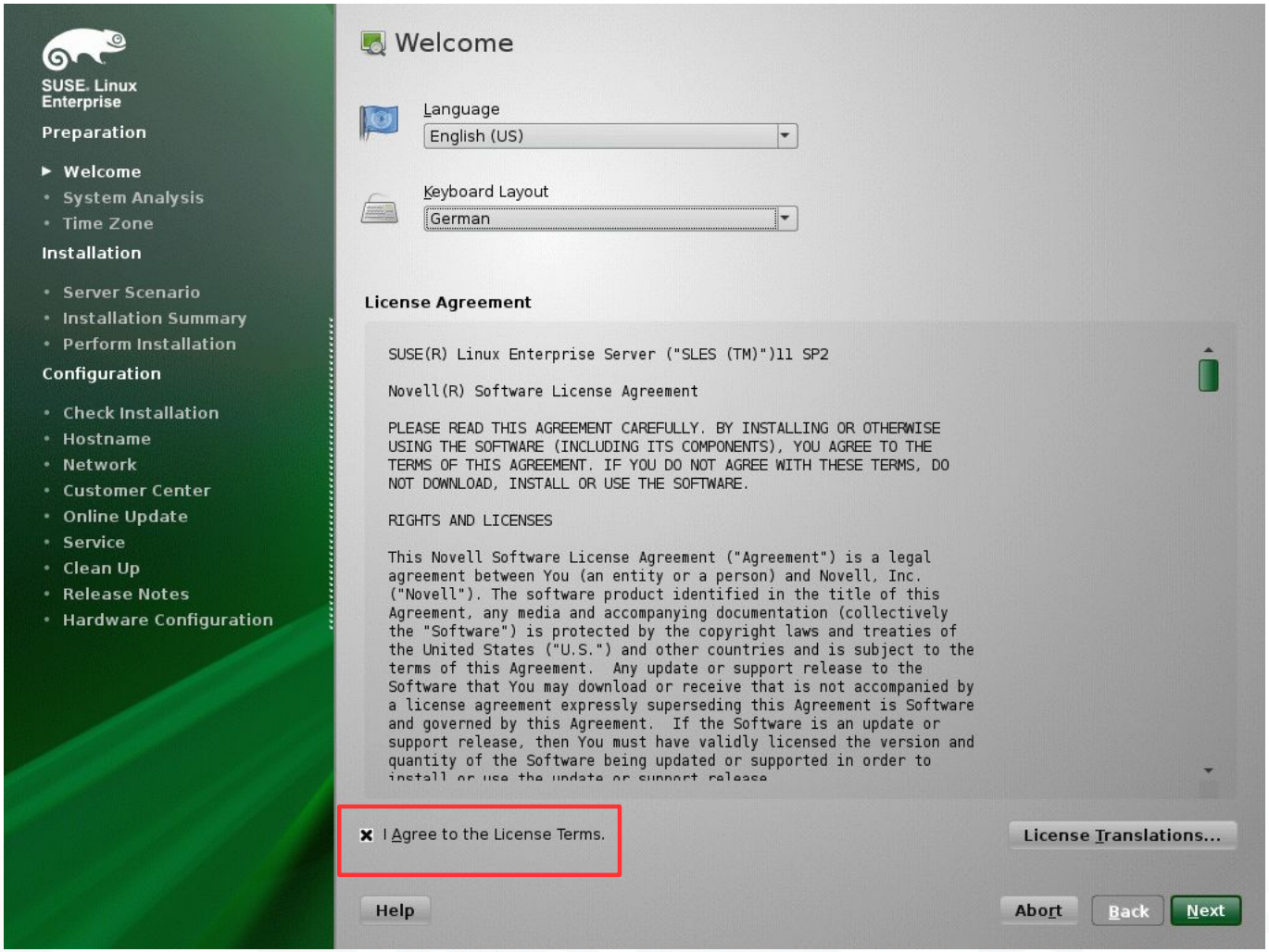
- The following slides show how to install SuSE Enterprise Server
  - Not part of the demo but we need an installed server
- Quite straight forward.
  - Step by Step installation in Screen Prints
  - RHEL installation is very similar
- Takes around 10-15 minutes if you have a fast machine

Boot into Installation Mode



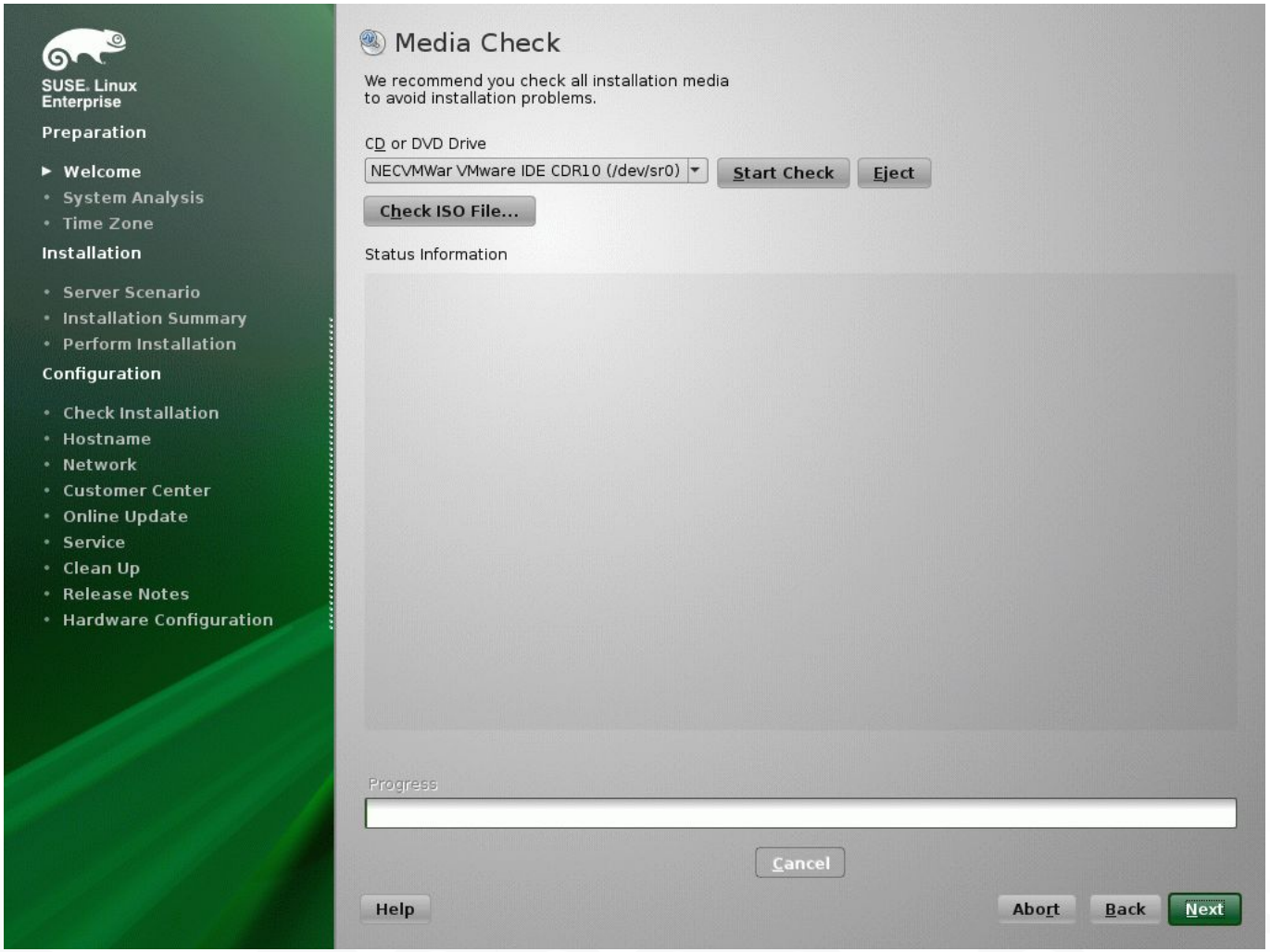
- Choose “Installation” from the boot menu

Accept License



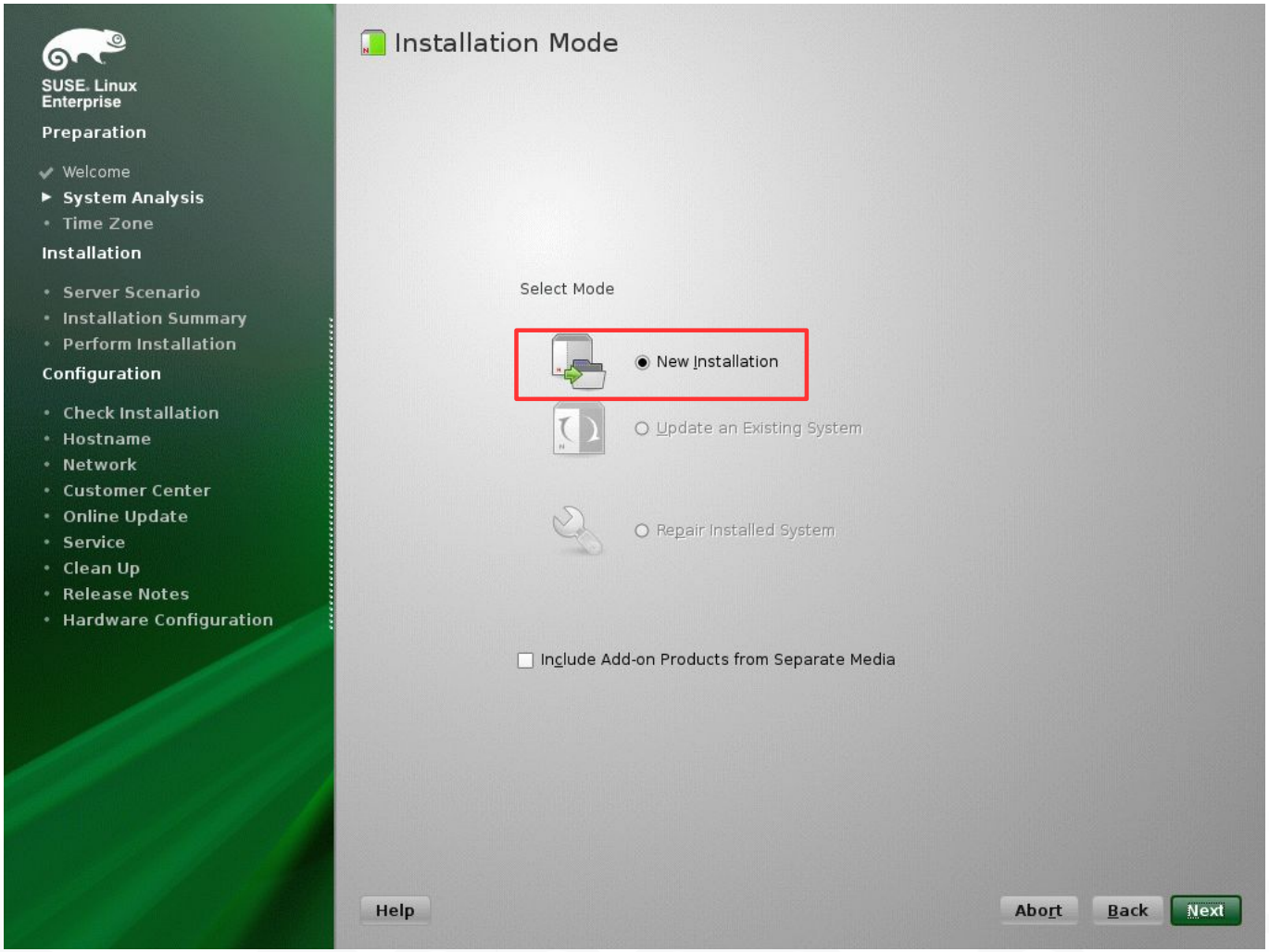
- Accept Licence Terms and Press “Next”

Media Check



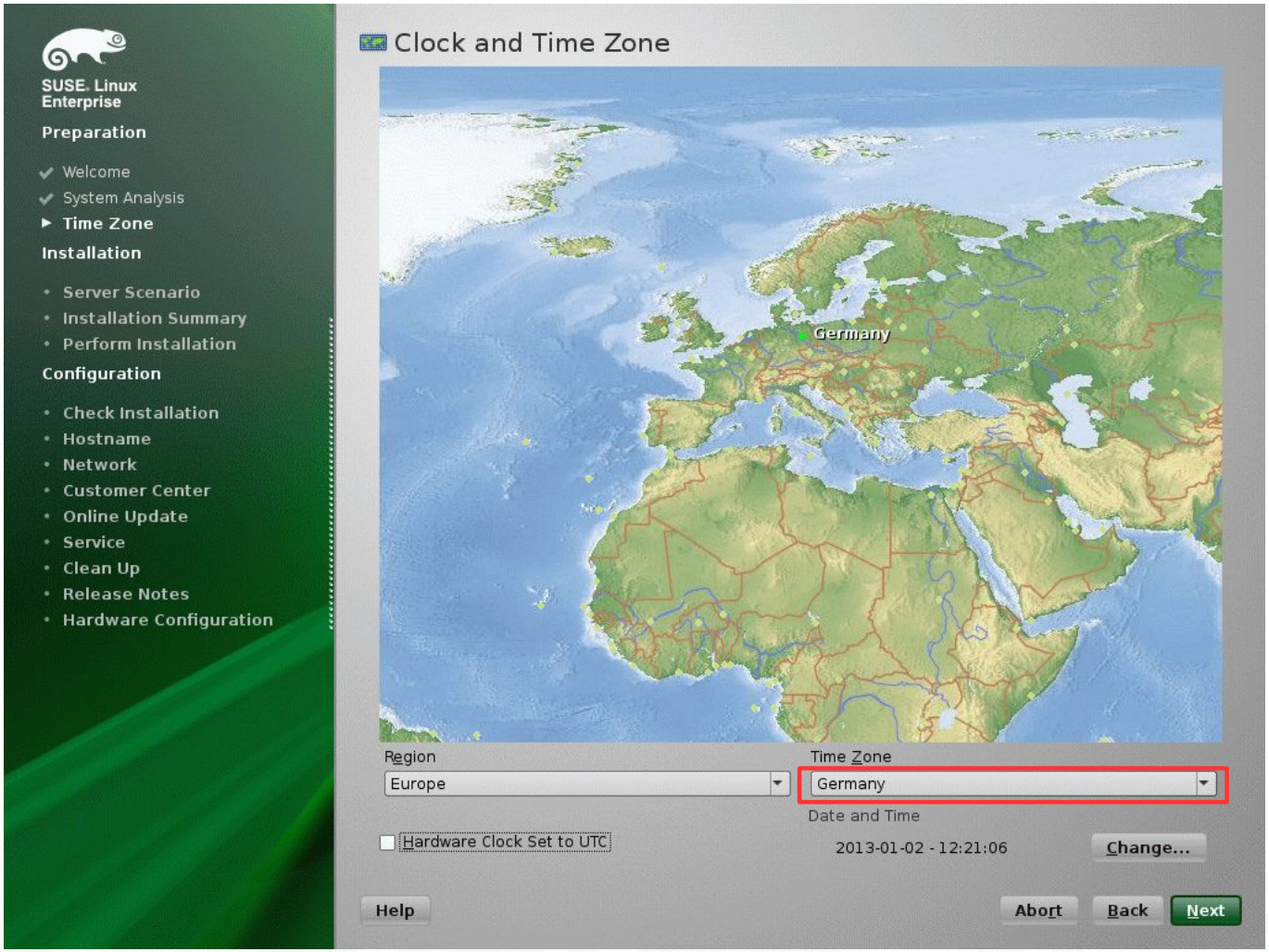
- Skip the media check unless you downloaded the ISO and did not check the checksum of the ISO

Installation Mode



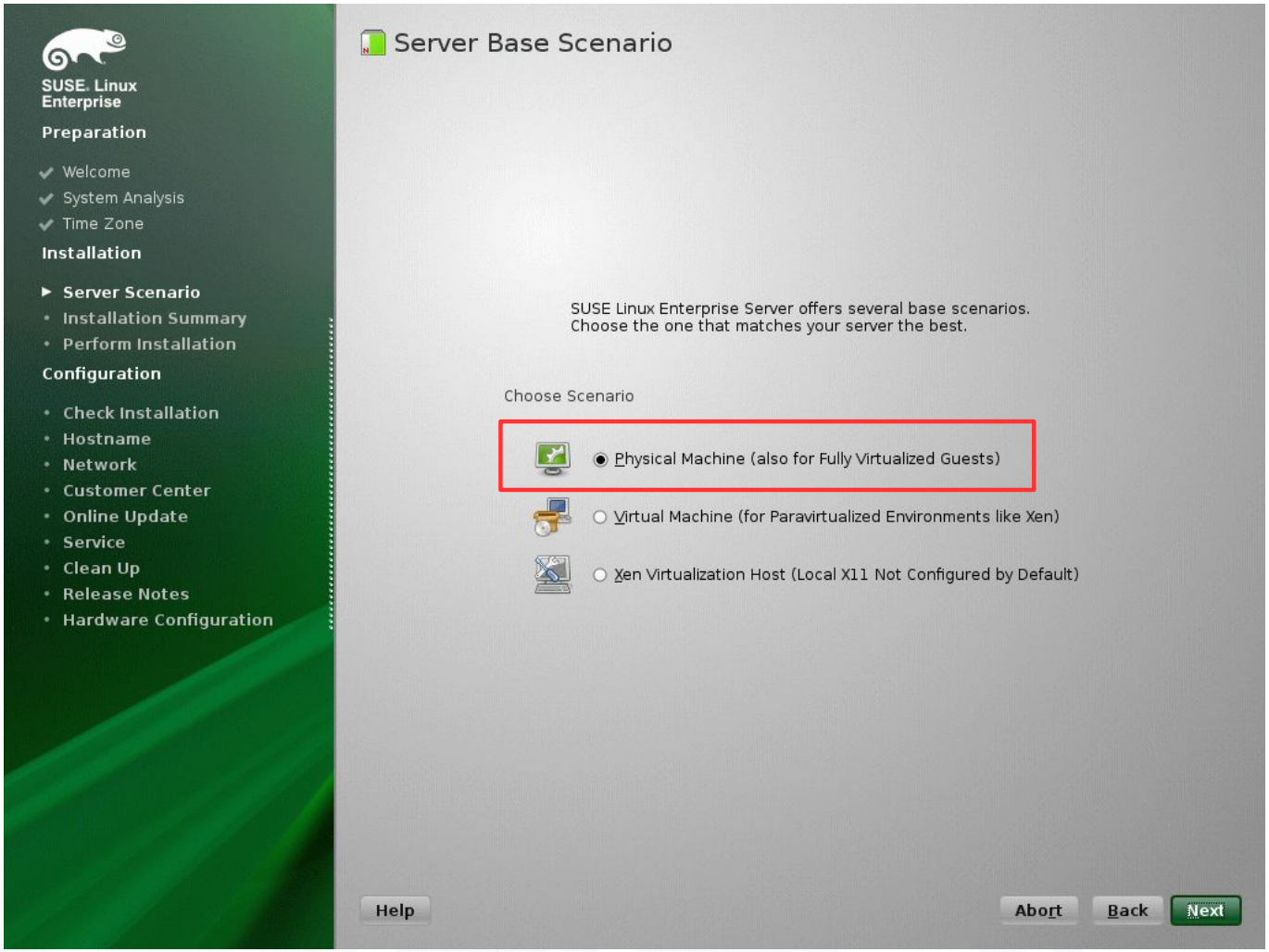
- Choose “New Installation”

Clock and Time Zone



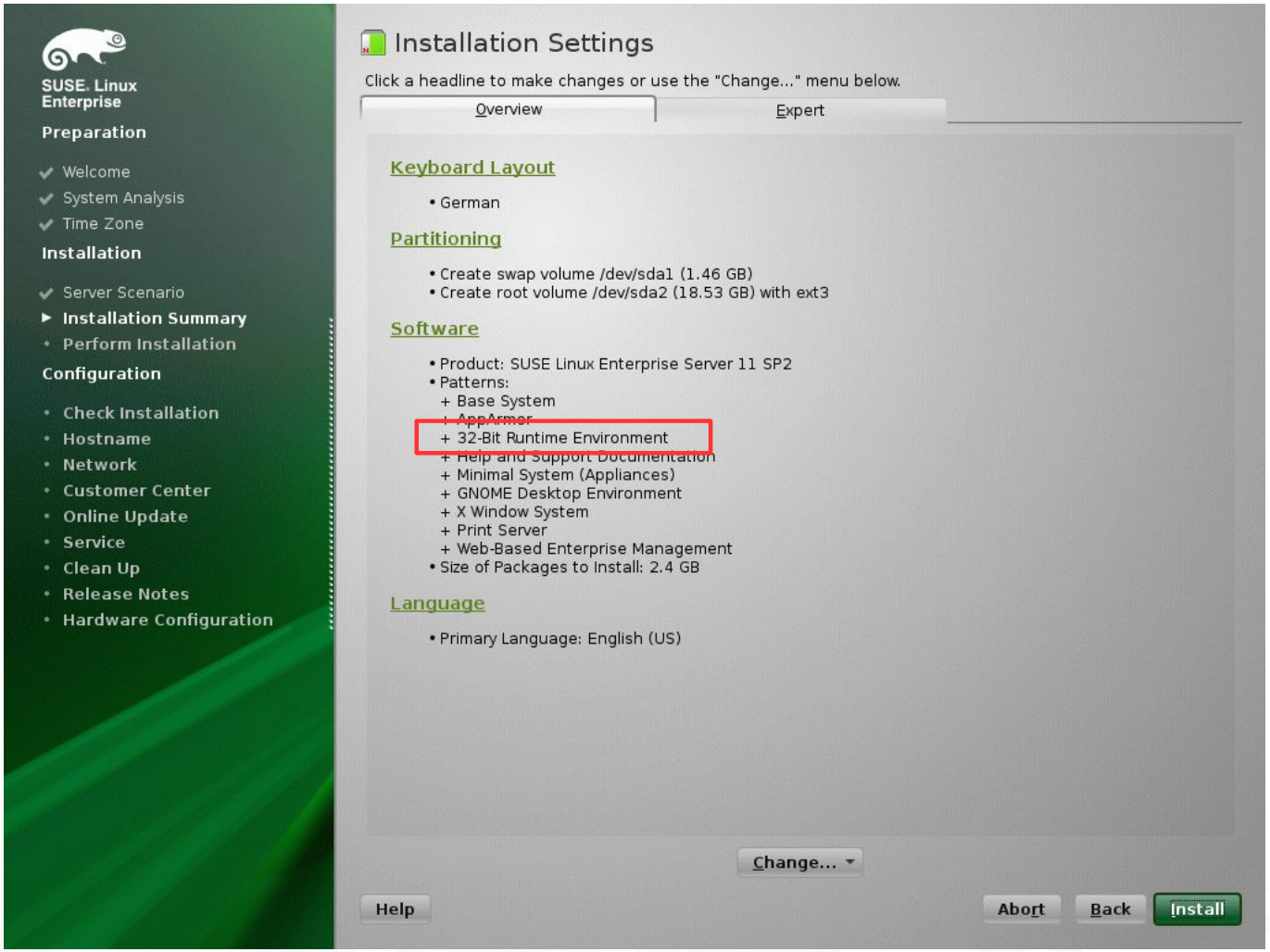
- Check and Set Time, Date and Timezone
- Hardware Clock is usually set to local time instead of UTC

Server Base Scenario



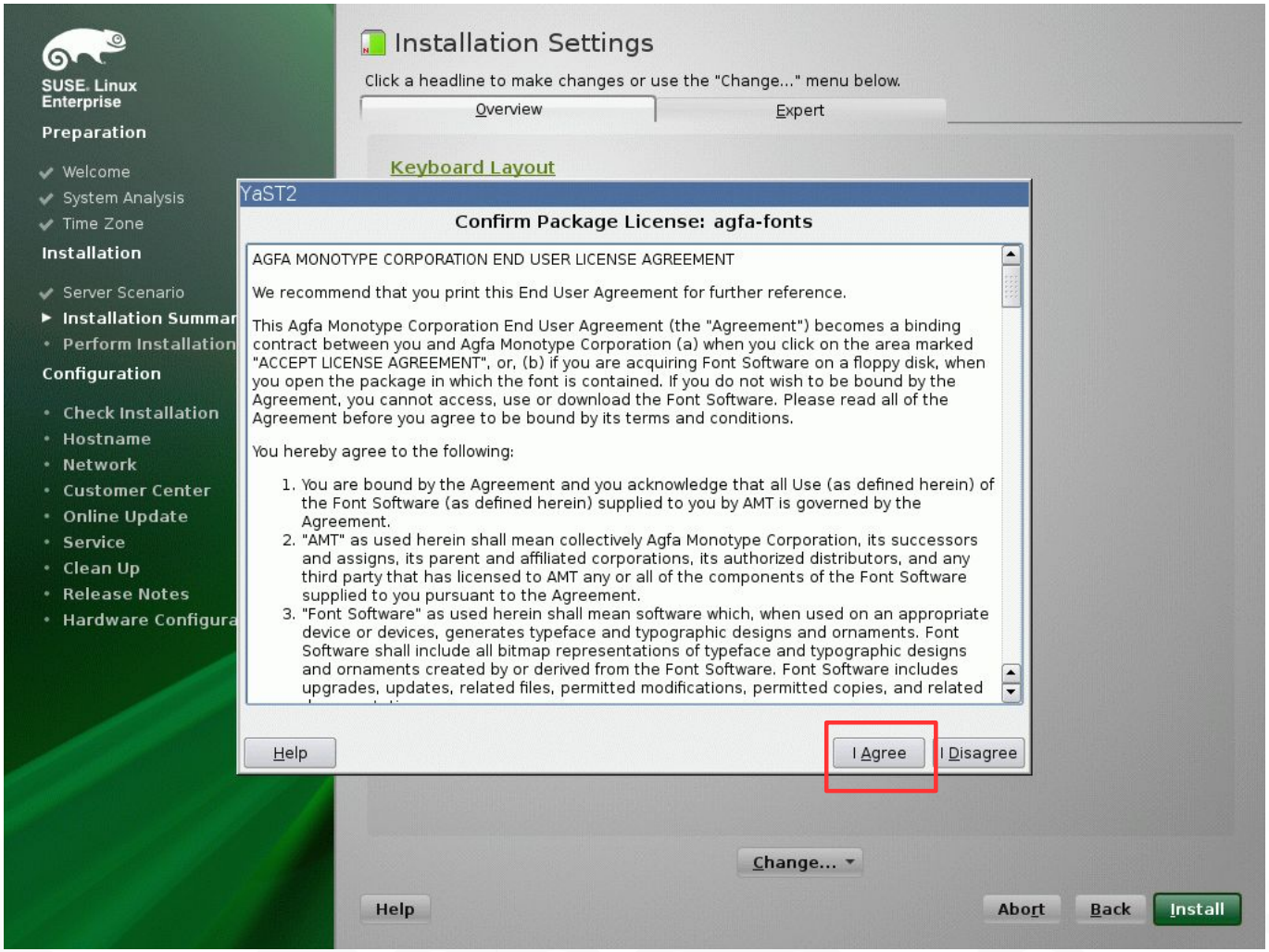
- Choose Physical machine even if you install on VMware
- XEN is the virtualization platform offered by SLES

Installation Settings



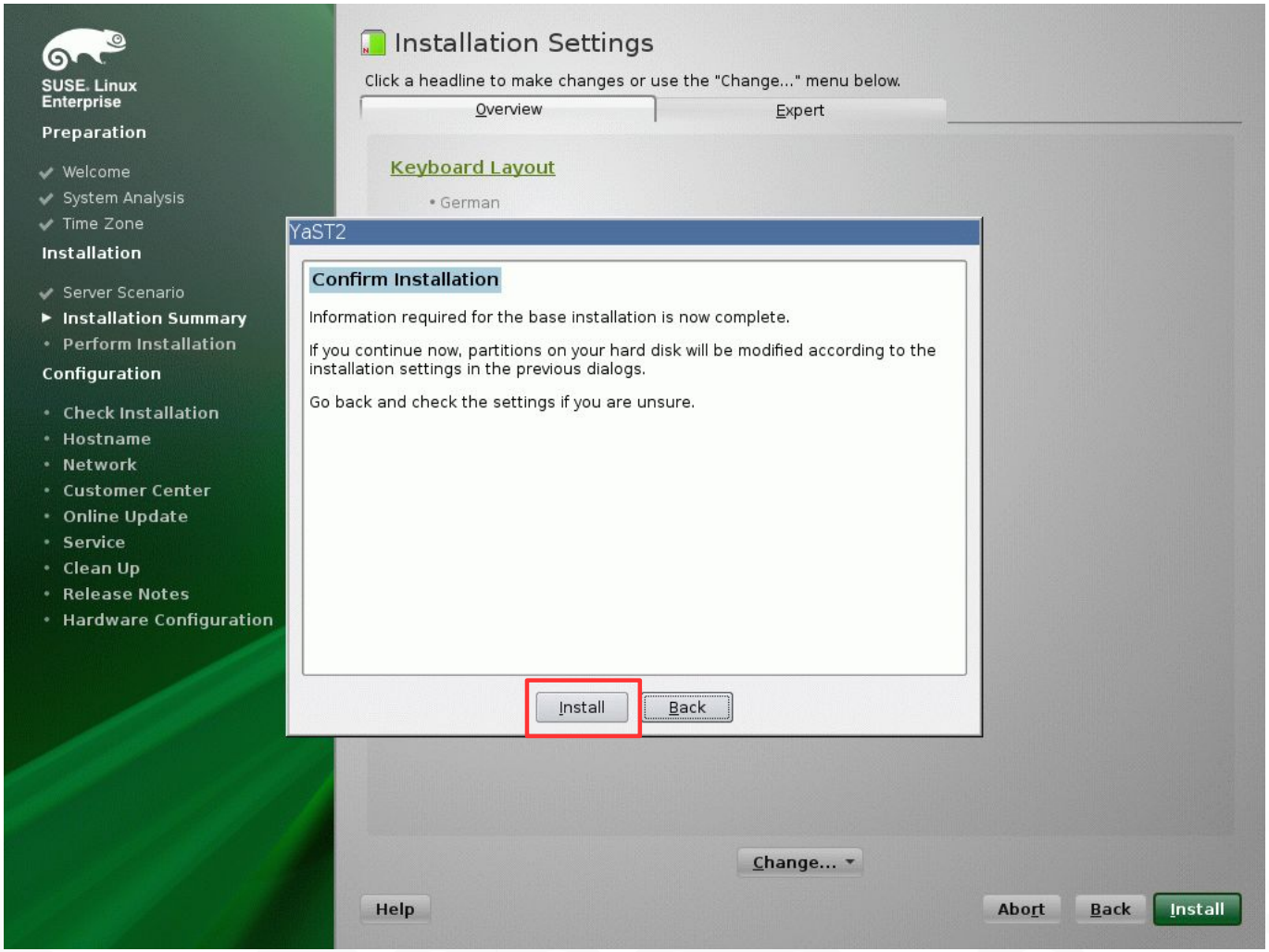
- Default Settings work fine for a test Server
- This includes
  - X Window/GNOME Desktop for the Graphical System
  - 32Bit Runtime Environment
- On a 64bit OS you need a 32Bit Runtime Enviroment for applications like Domino 32bit
- For Domino 9 64bit you can skip the 32bit runtime environment

License Agreement for Agfa-Fonts



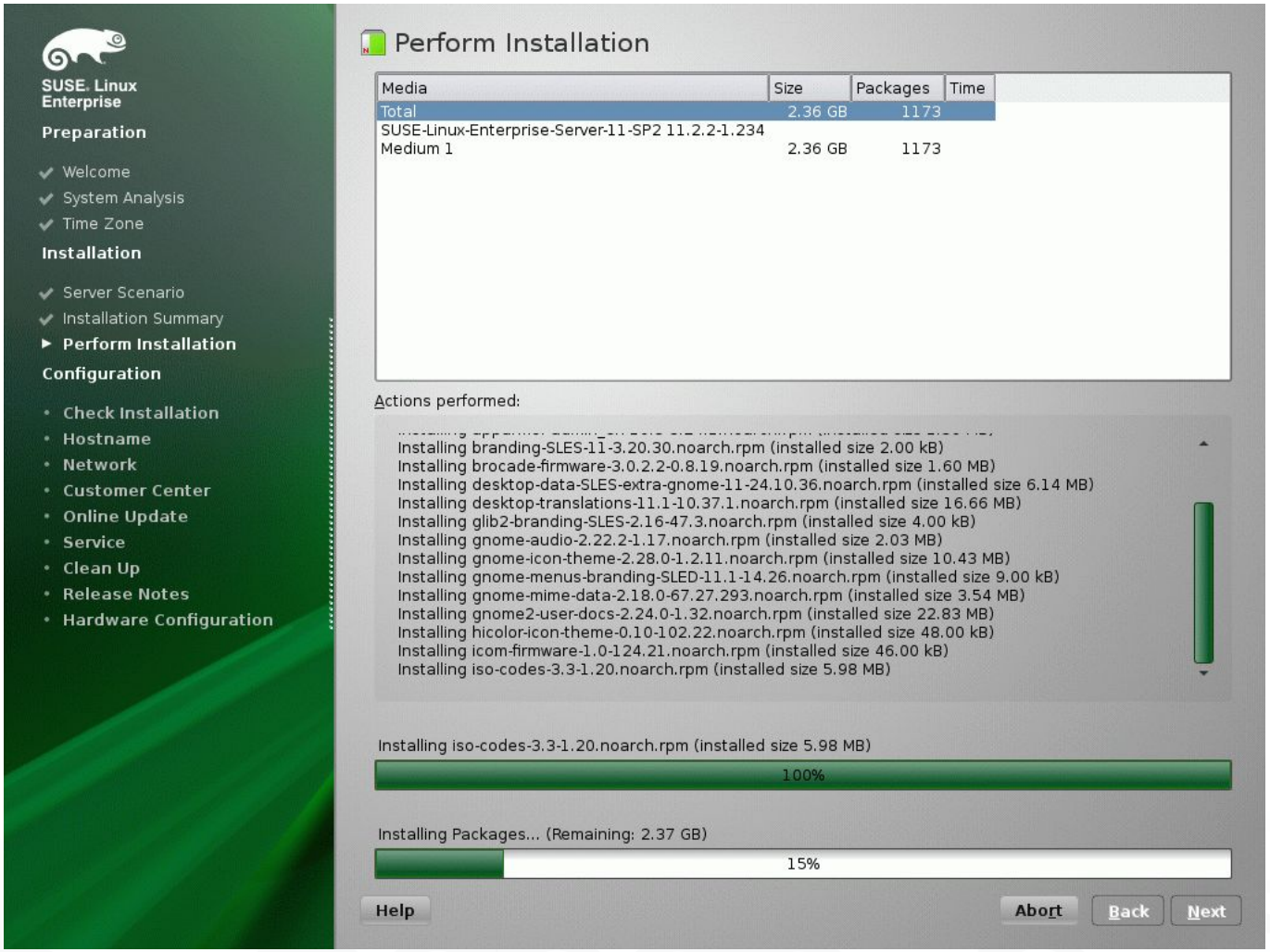
- Current Fonts used by SLES need special license agreement

Confirm Installation



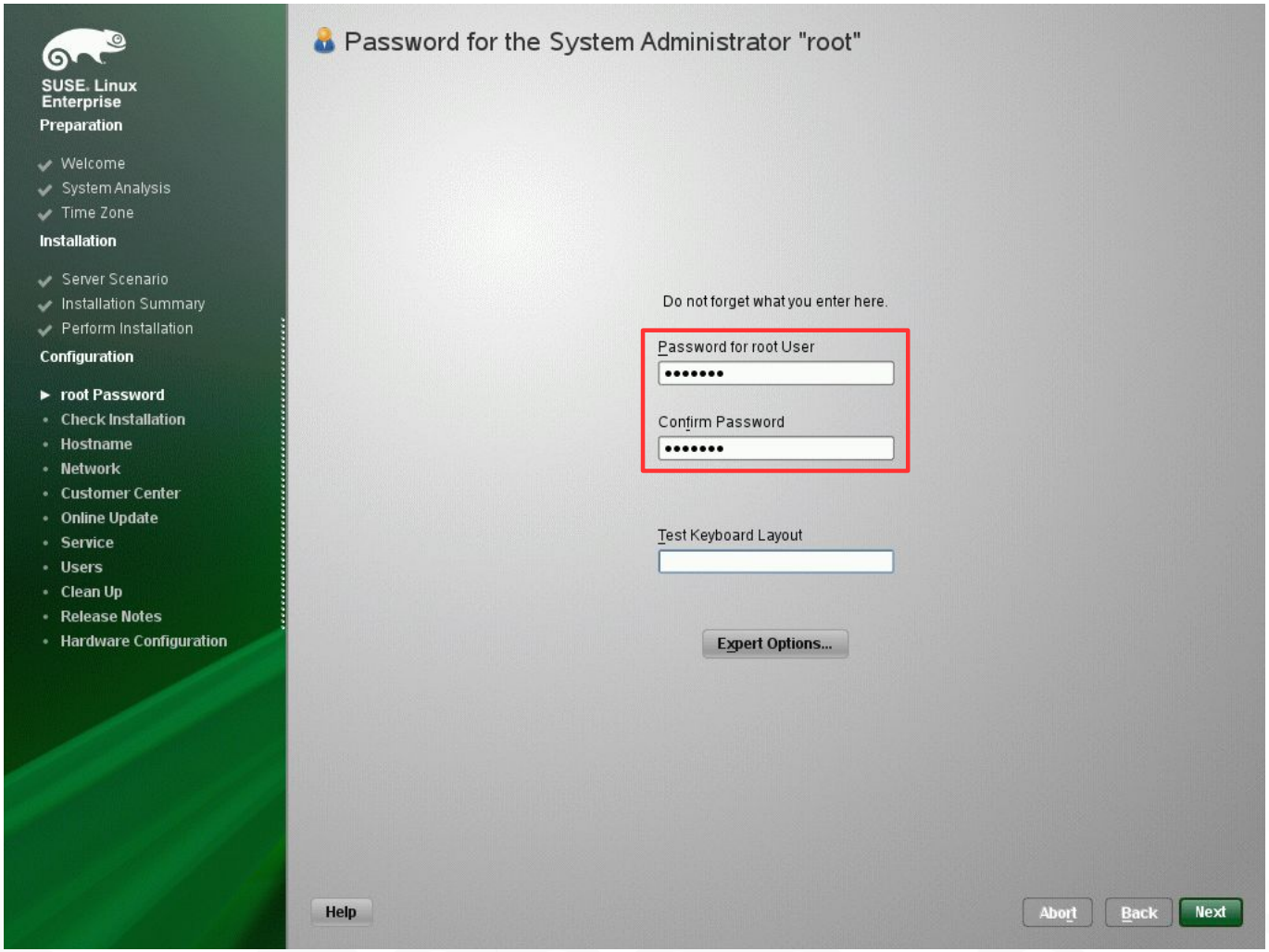
- Confirm your selection
- Start Installation

Installation ...



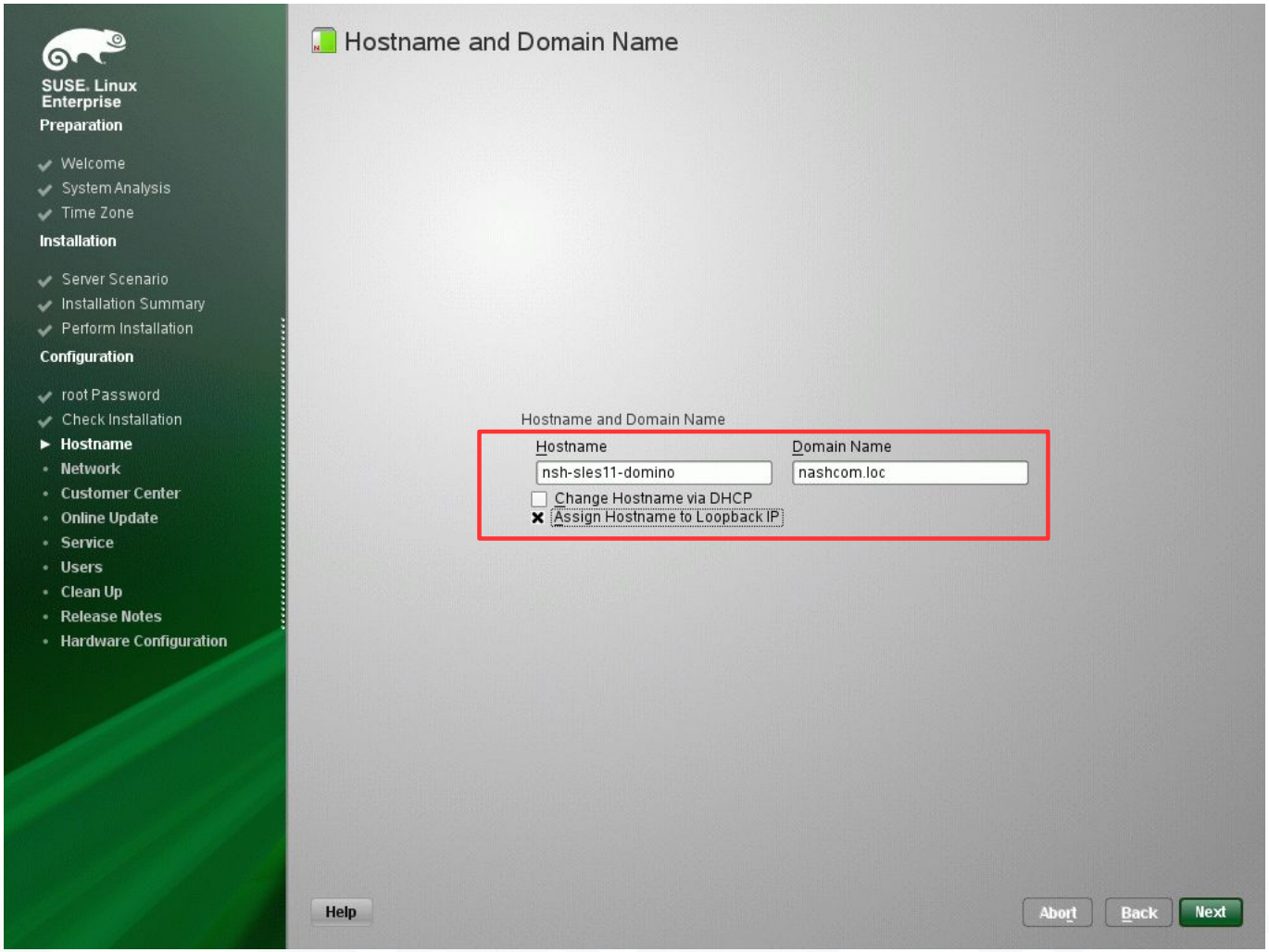
- Installation takes 10-20 minutes depending on your hardware
- Kernel Installation
- Packet Installation

Root Password



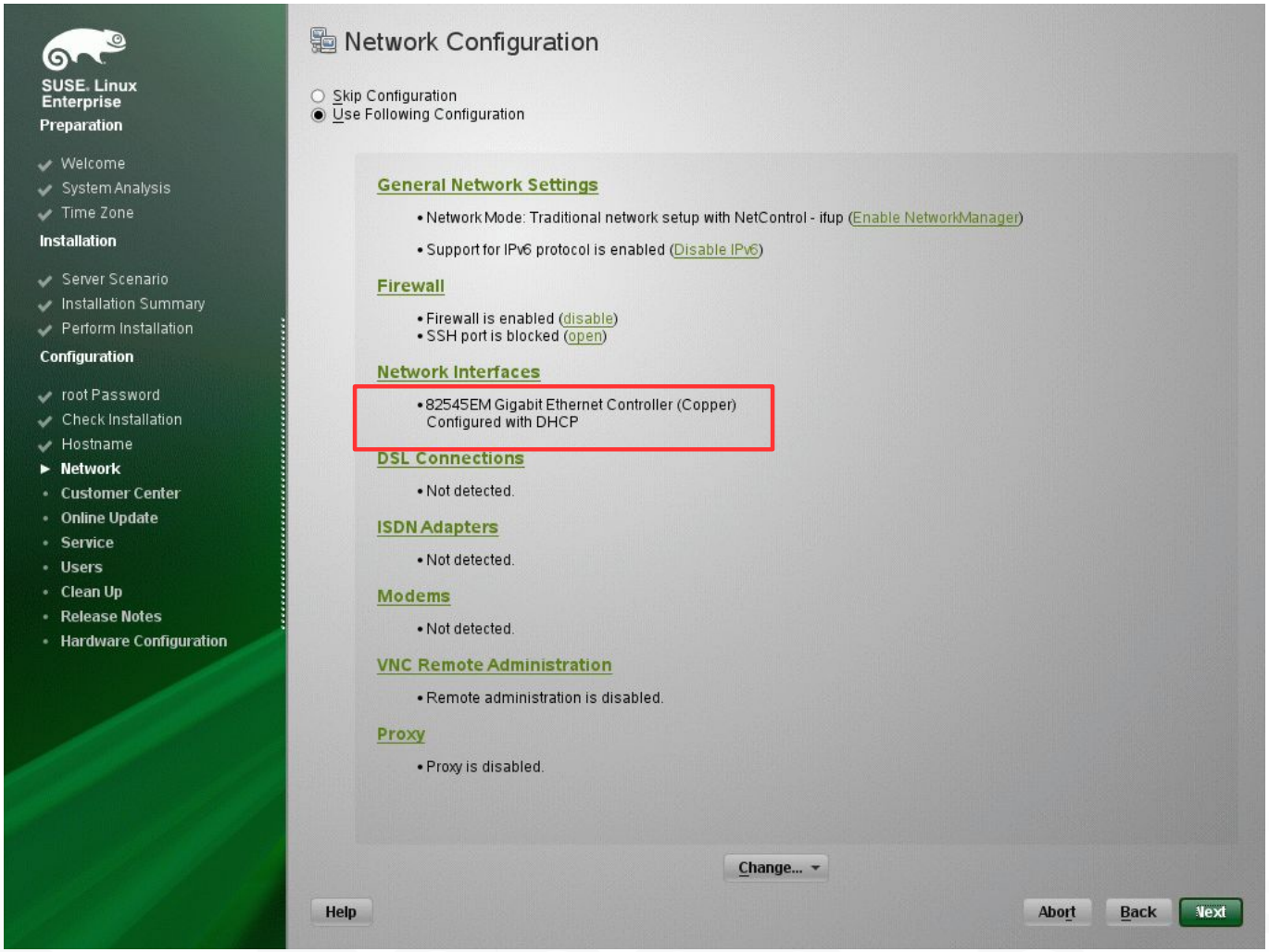
- "root" is the super user / system account
- You should specify a strong password

Hostname and Domain Name



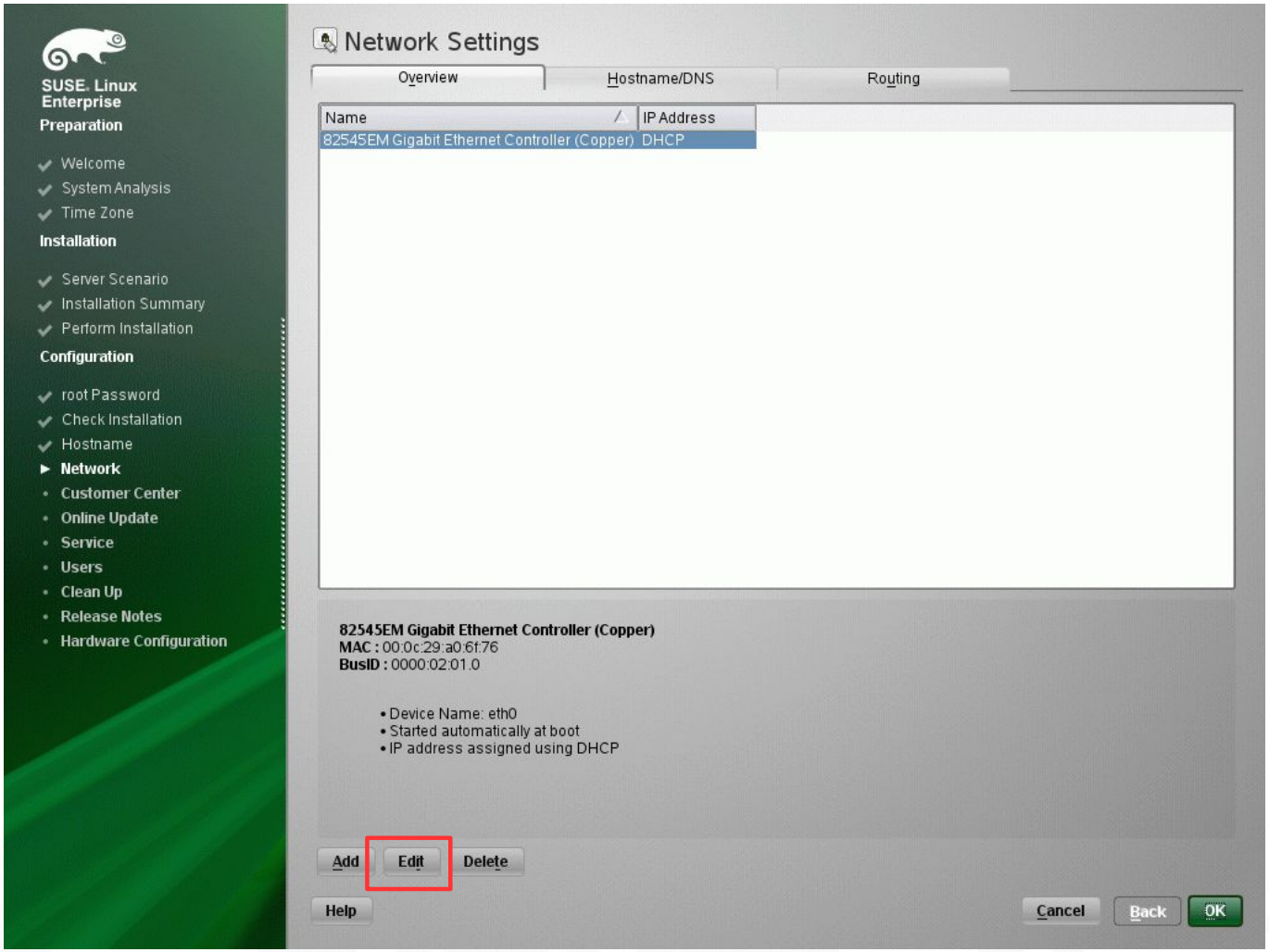
- Specify Hostname and Internet Domain

Network Configuration



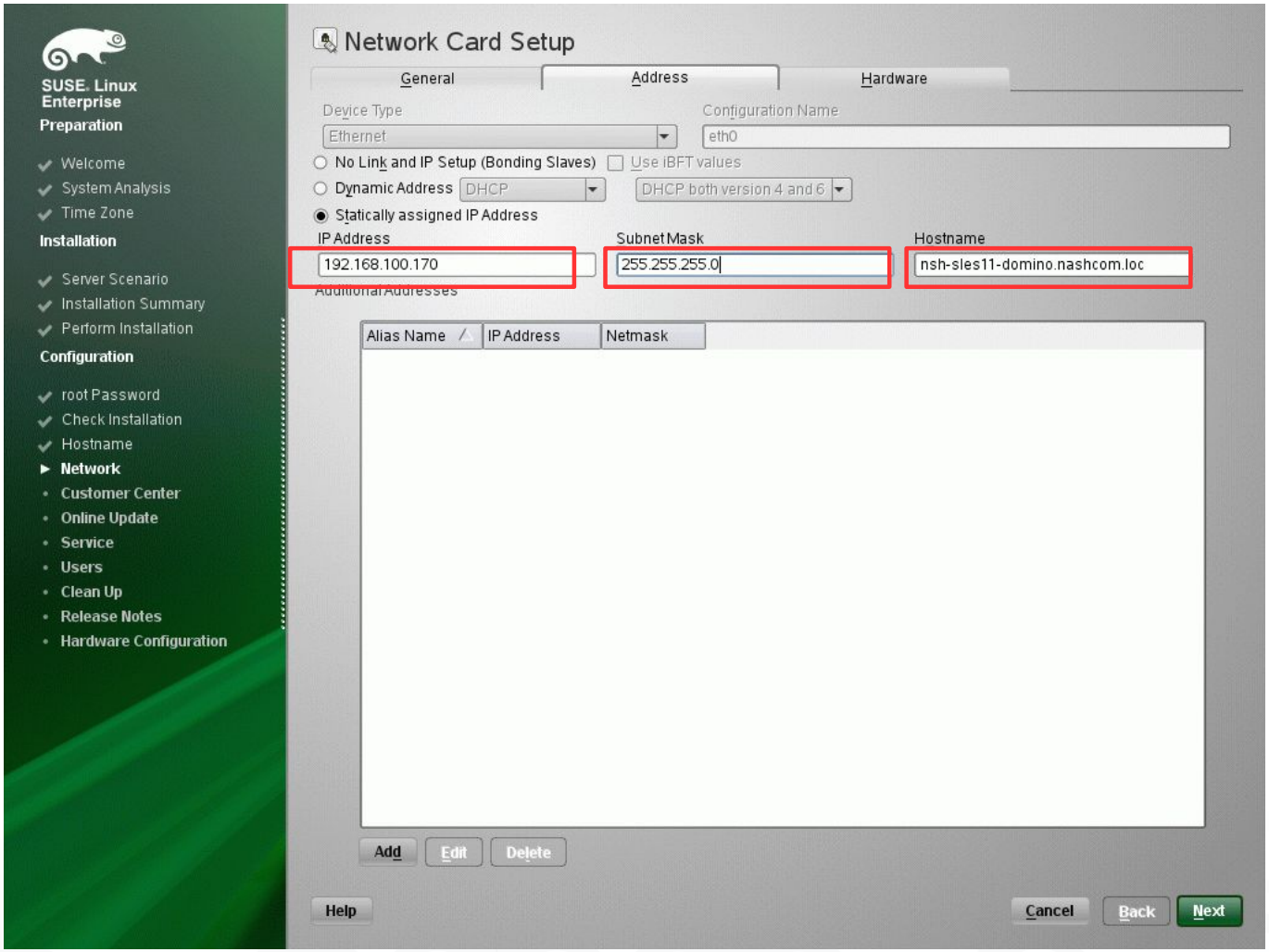
- Firewall is enabled by default
- You can open the SSH (Secure Shell Port 22) in the firewall now
  - Or later when we open other ports for the Domino server
- Network-Card is configured using DHCP by default
  - Change settings for a static IP in your subnet

Network Settings



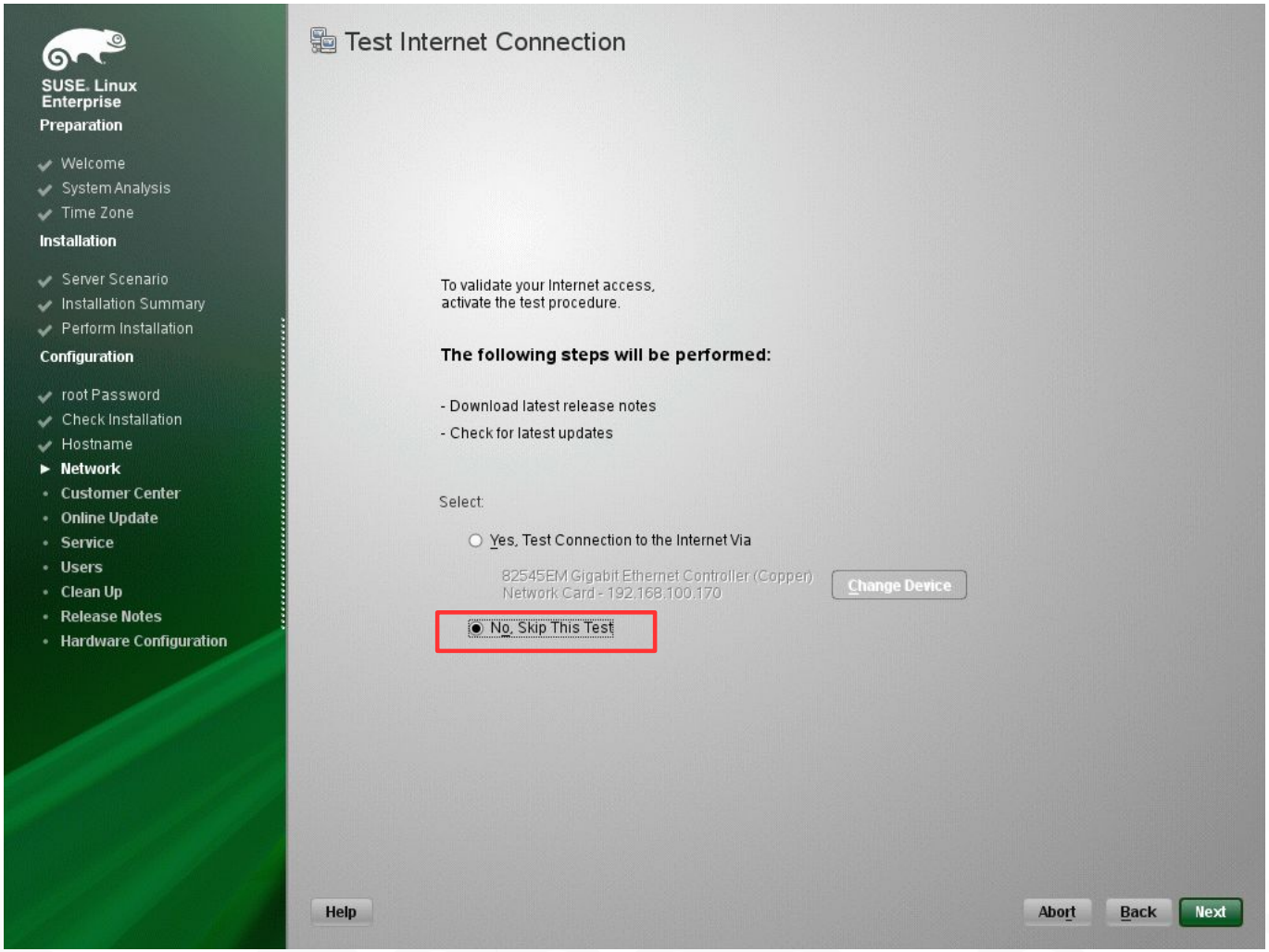
- Edit Network Card Settings

Network Card Setup



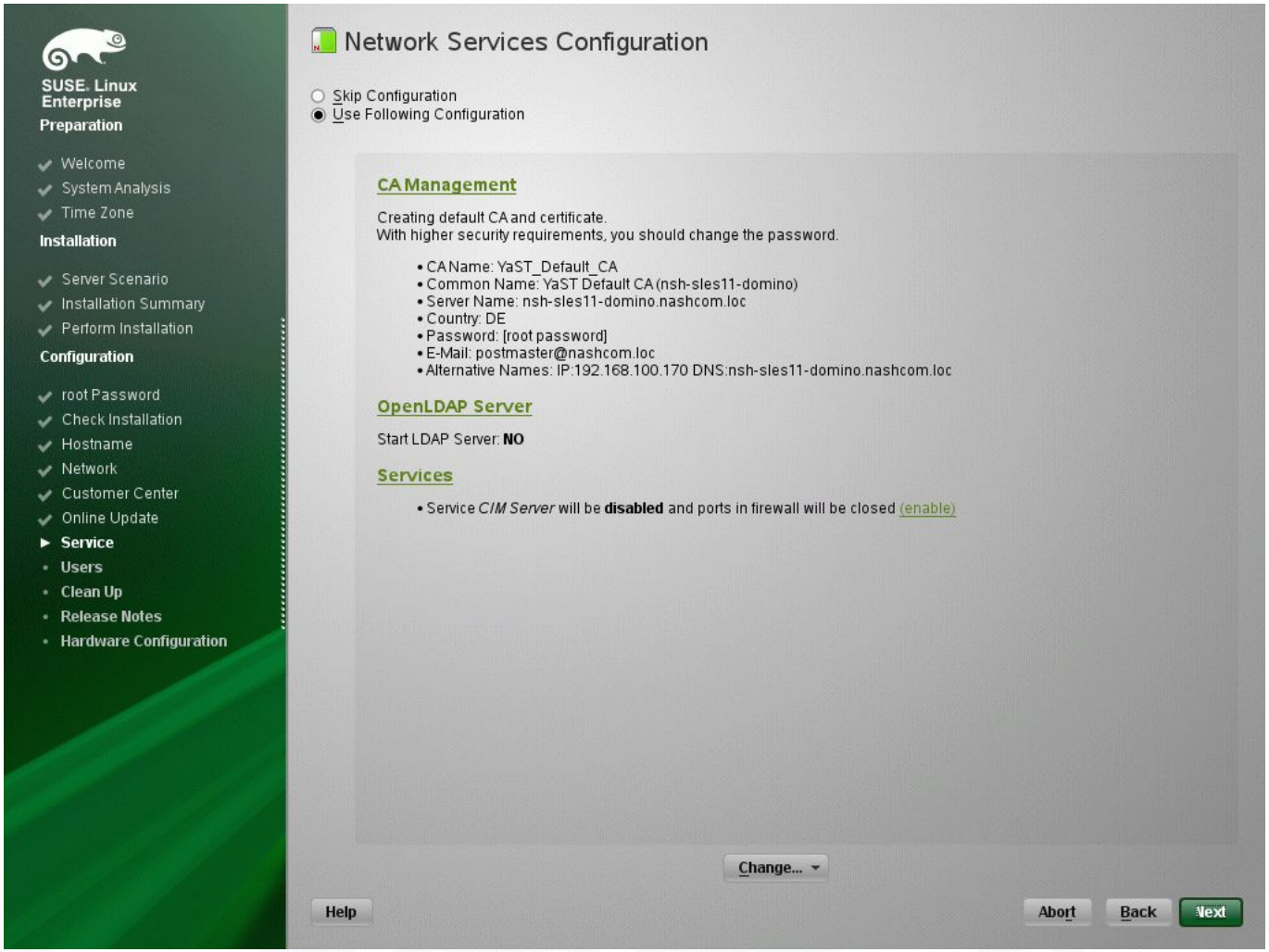
- Choose “Statically assiged IP Address”
- Enter IP Adresse and Subnet Mask

Test Internet Connection



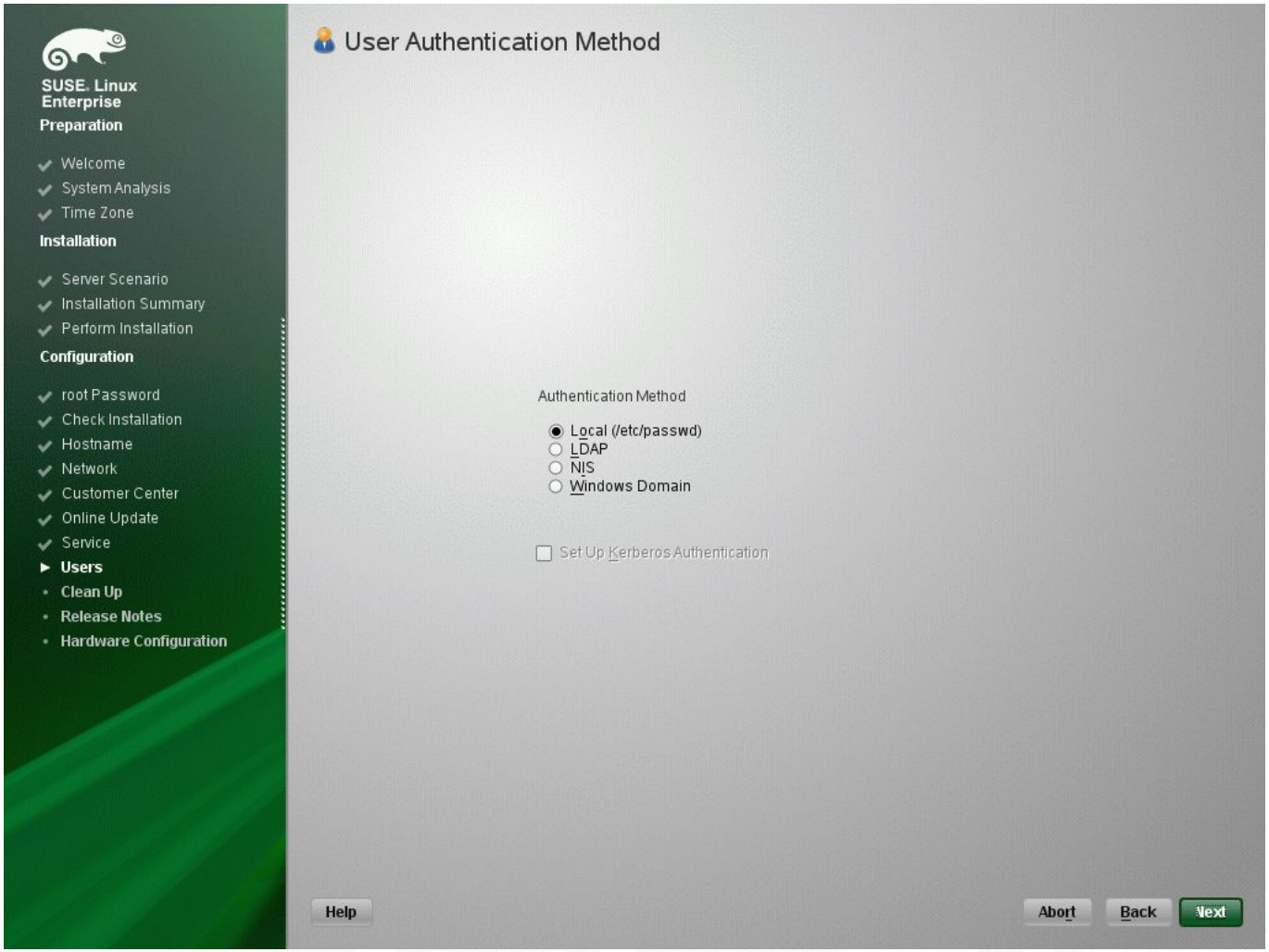
- You can skip the internet connection test
- You always can test the connection via ping later on

Network Services Configuration



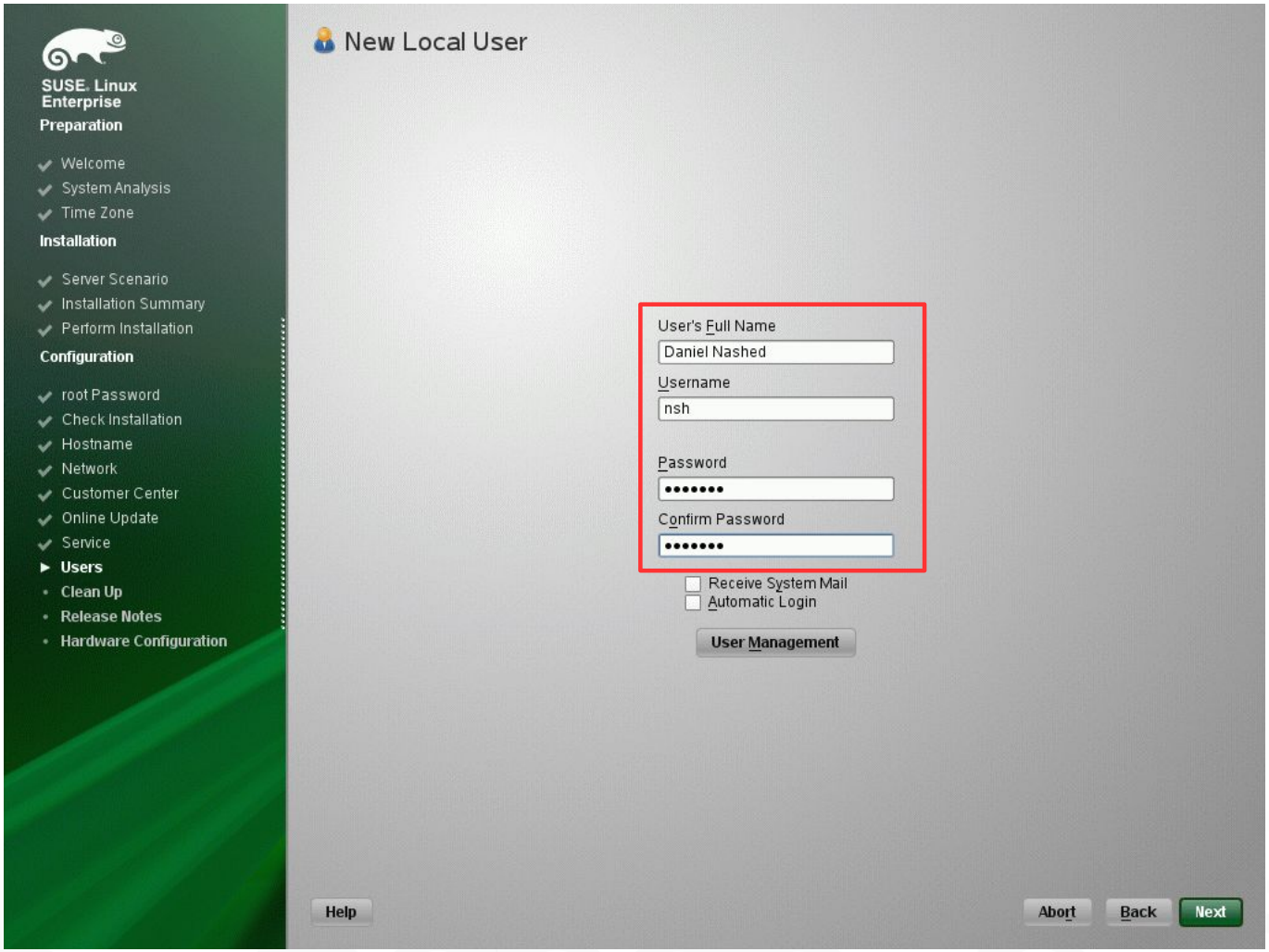
- No additional services are needed
- But it is good to have a CA and Certificate just in case
  - Default option

User Authentication Method



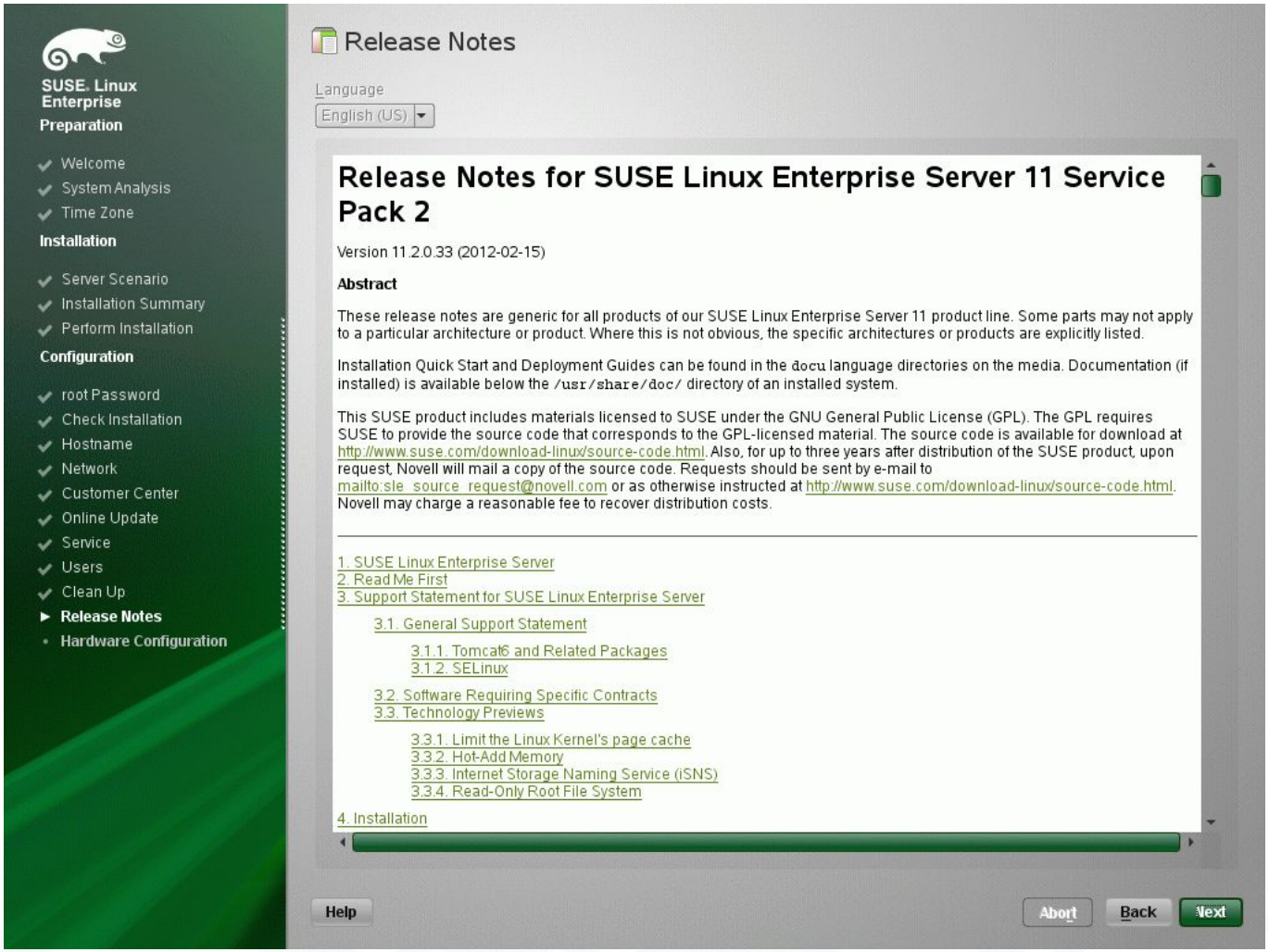
- Choose Local Password
- Other methods are available for enterprise wide authentication
- Can make sense if you have many users and servers
  - For example if every admin has his own account on a Domino server for login

New Local User



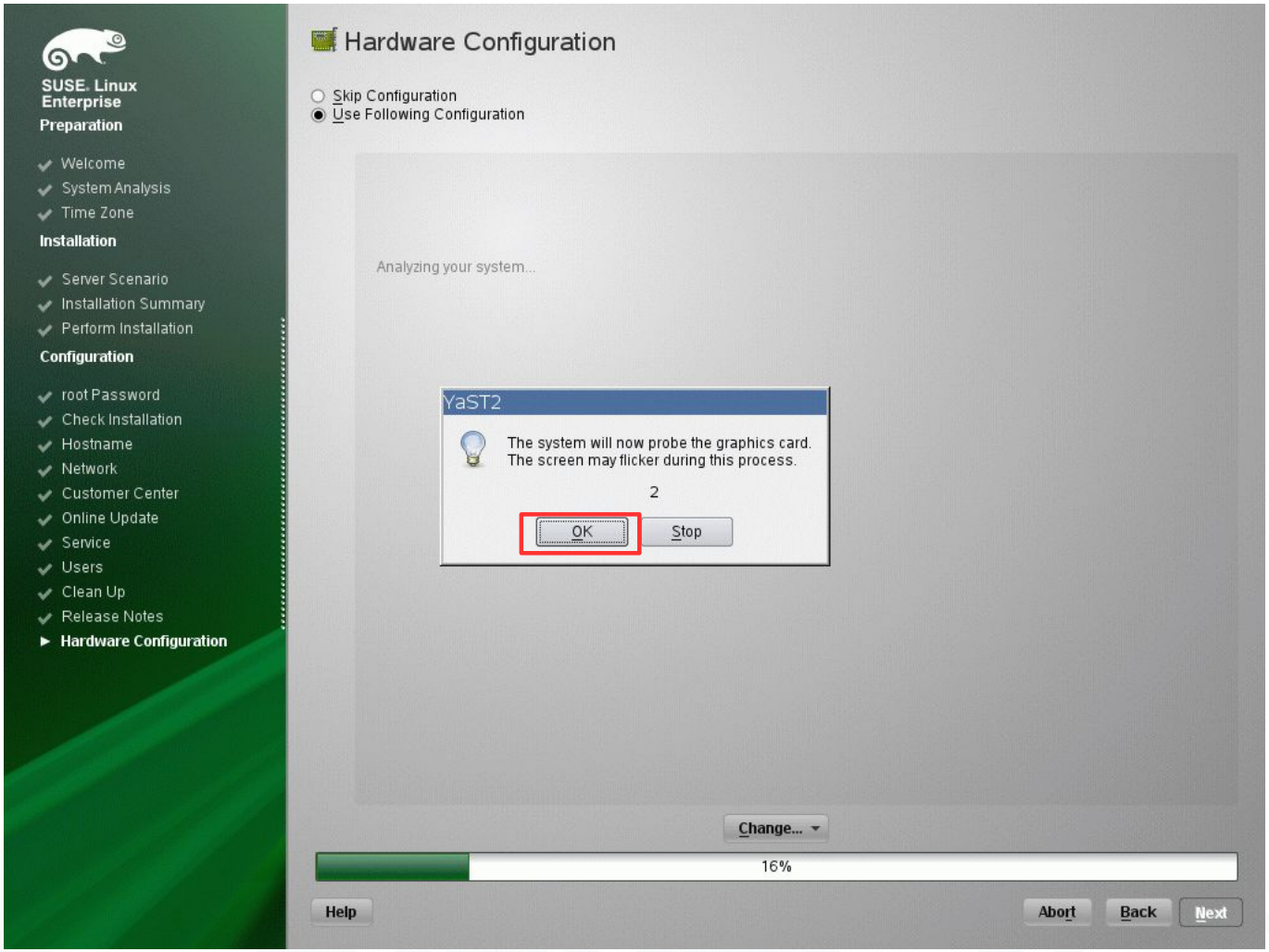
- Create your local user for login
  - Fullname
  - Username
  - Password
- Click “Next”

Release Notes



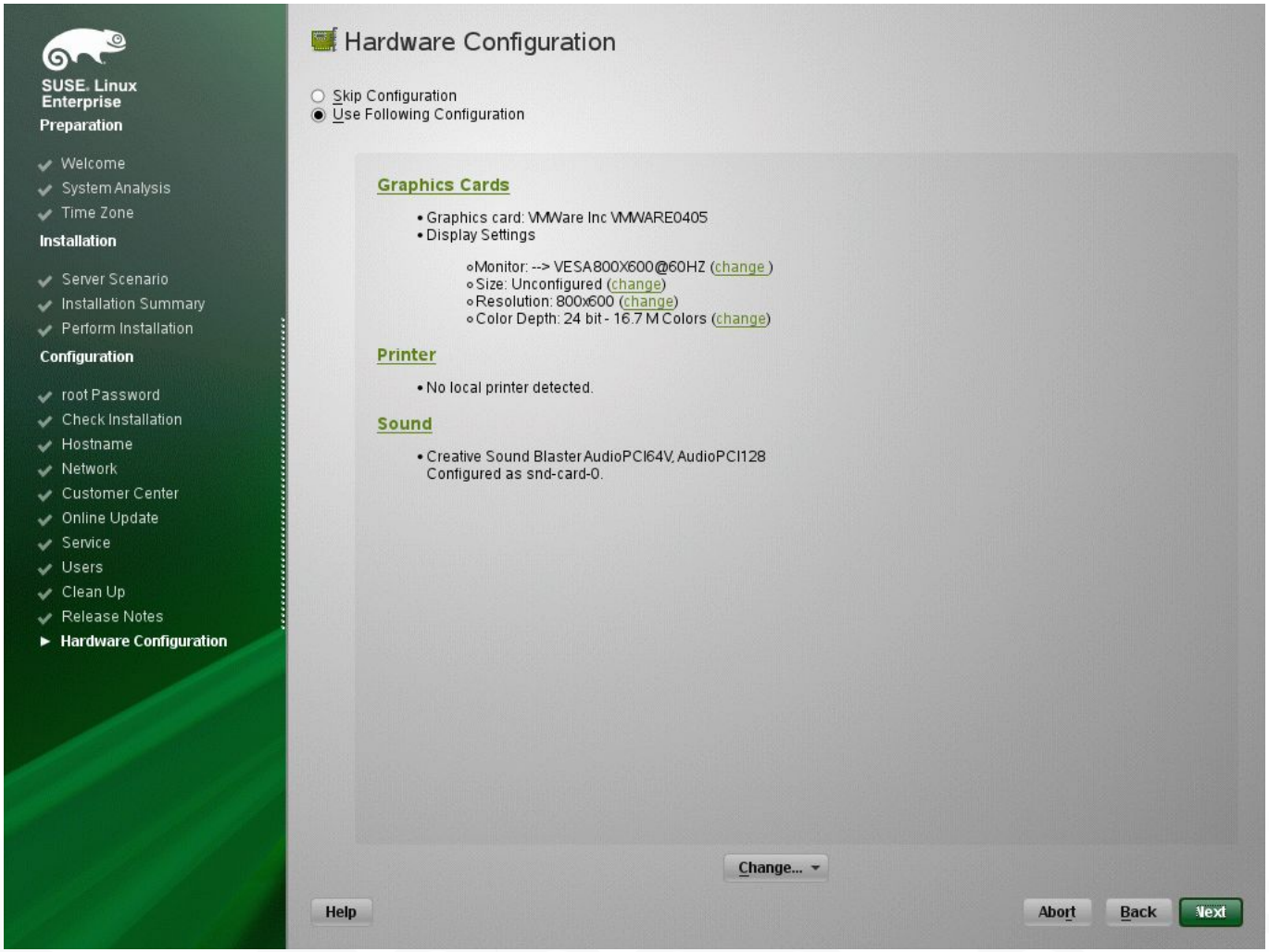
- Release Notes give an overview over changes and new functionality

Hardware Configuration



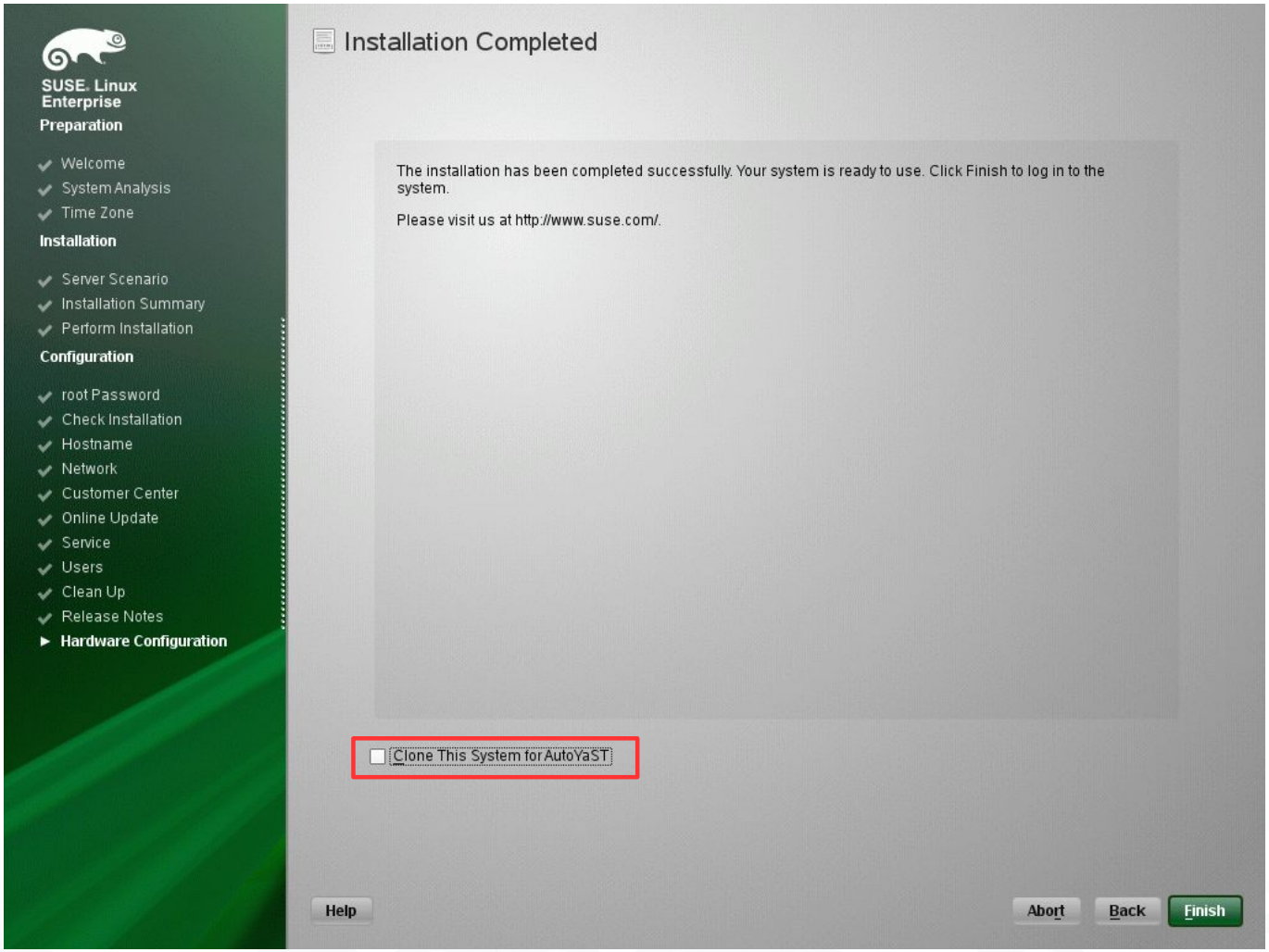
- Hardware Configuration will probe the graphic card

Hardware Configuration



- Confirm detected graphics card
  - Should be fine in most cases
  - You could also switch to a different resolution
  - VMware should auto detect the resolution when you change it

Installation Complete

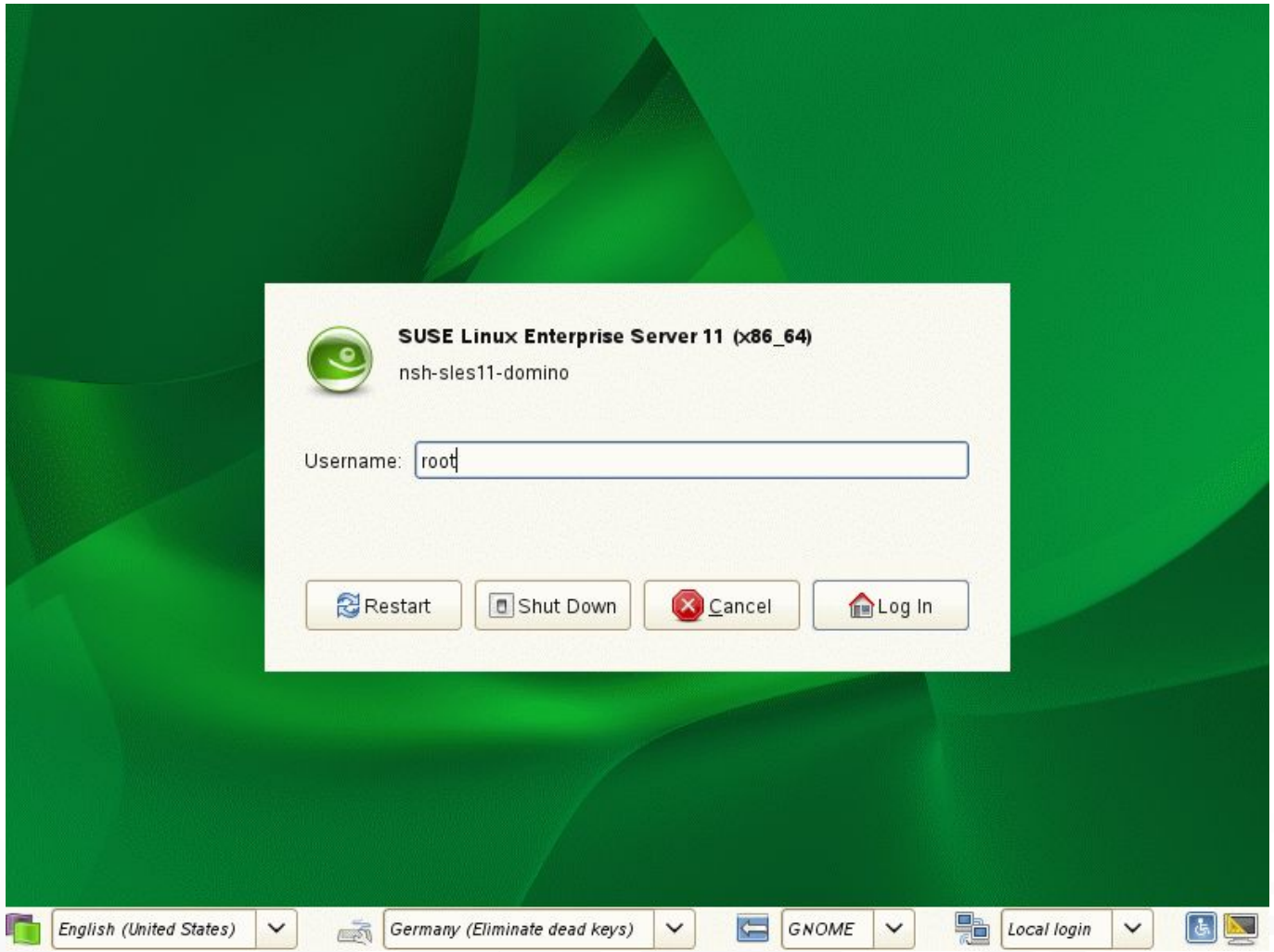


- Disable “Cone This System to AutoYaST” unless you want to setup the same configuration on a different server
  - Takes a while to clone the config

Starting Point for the “Show” part of “Show & Tell”

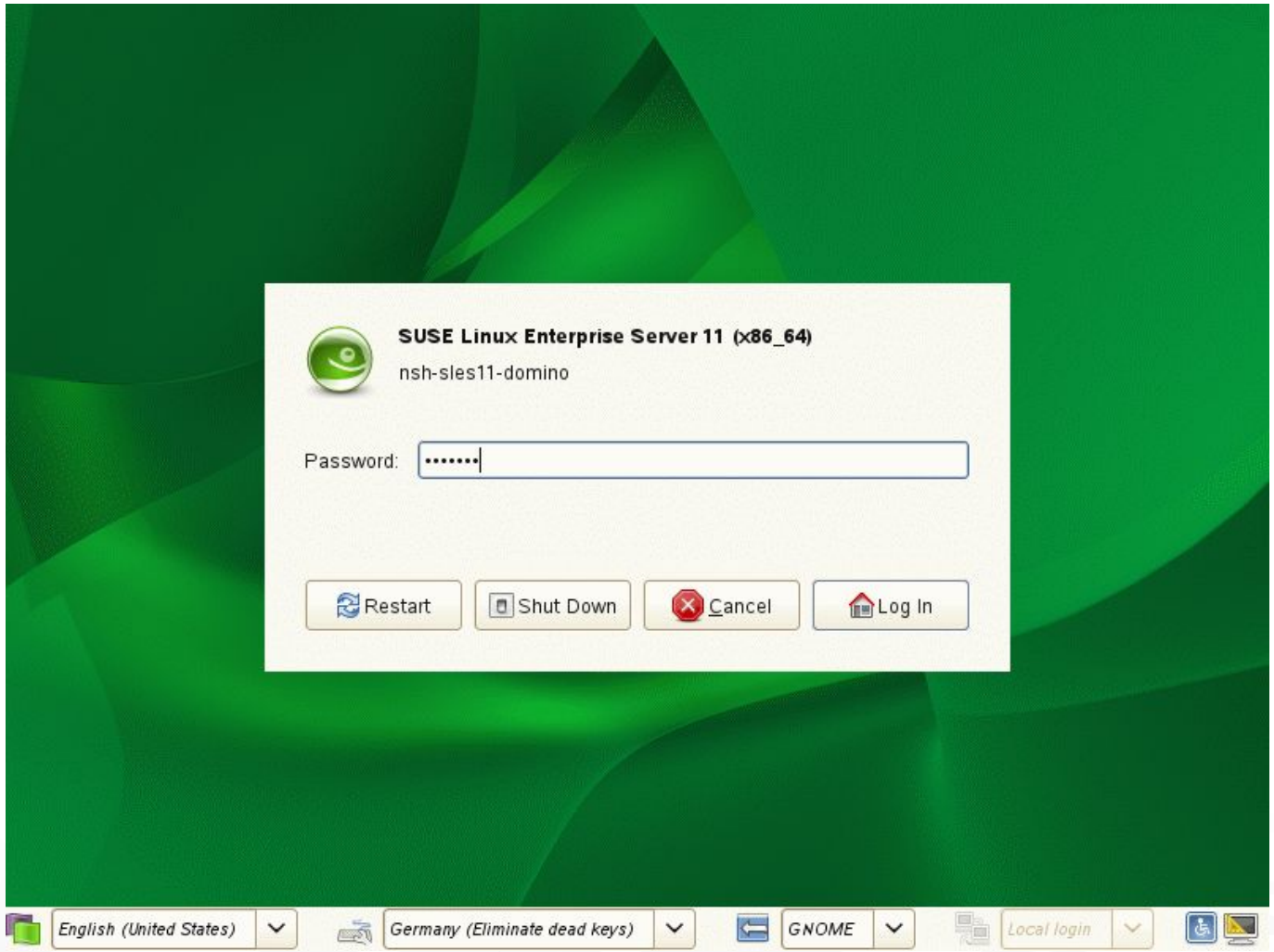
- Installation on SLES and RHEL are quite similar
- The installation in this Show & Tell presentation is done on SLES
  - I will also show differences for the RHEL install part
- The installation is pretty straight forward too
- So we will focus on the important aspects
  - Domino Server configuration/setup looks very similar to what we know from Windows

First Login



- Login into the machine using either your new account or “root”

First Login

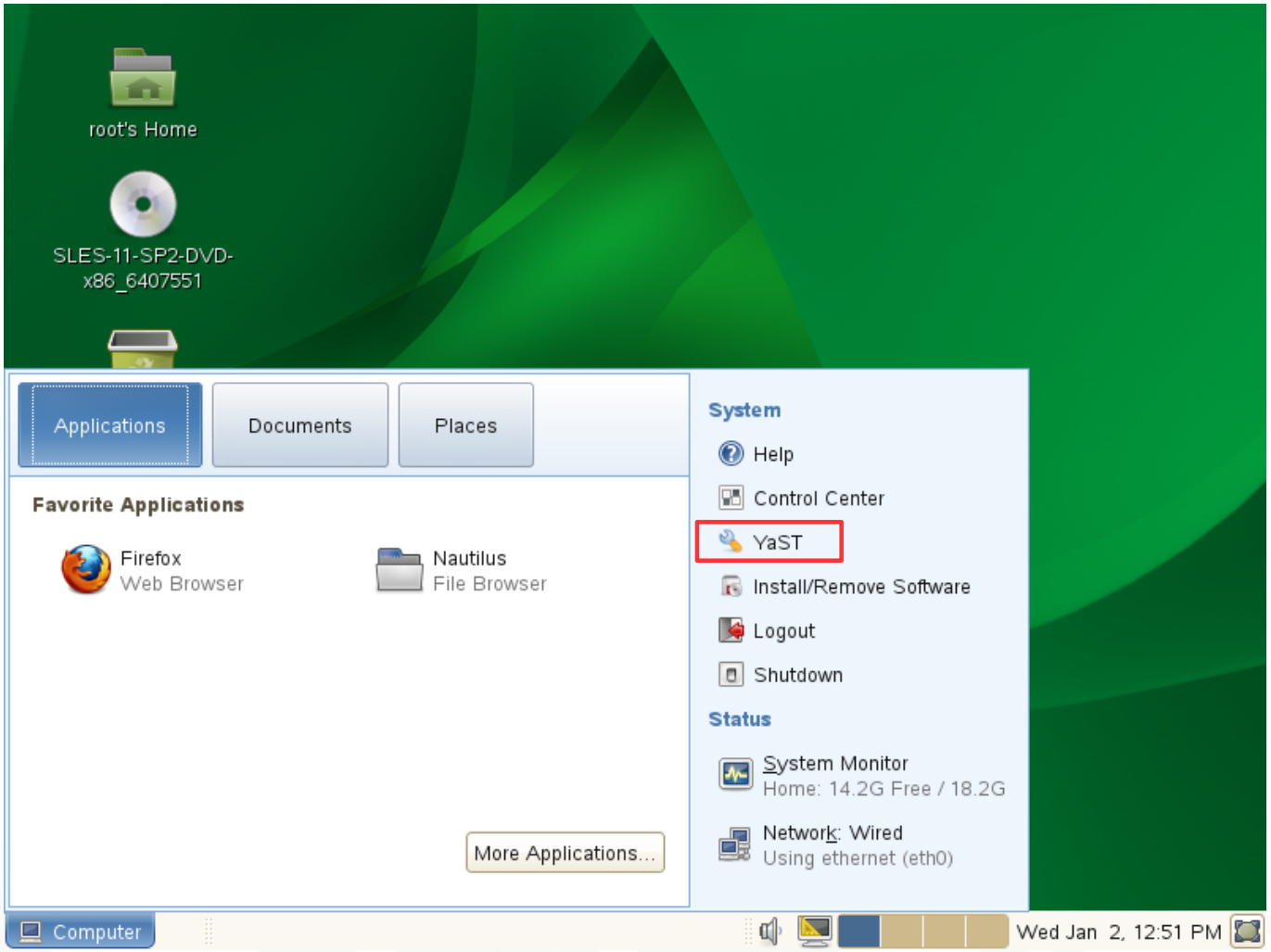


- Type in your password

Linux Desktop after Installation

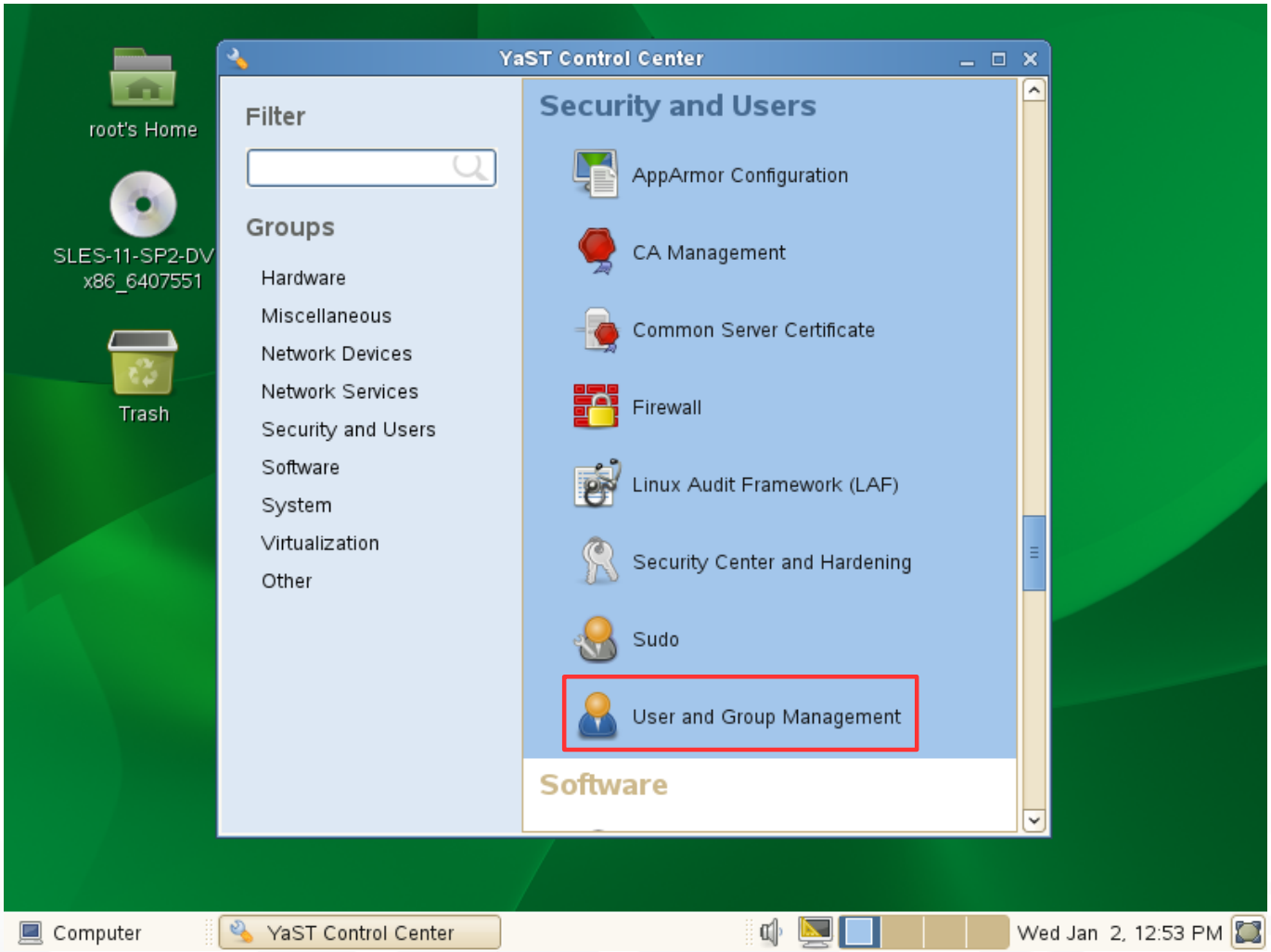
- This is the graphical UI for SLES 11 SP2

“Computer Menu” contains applications



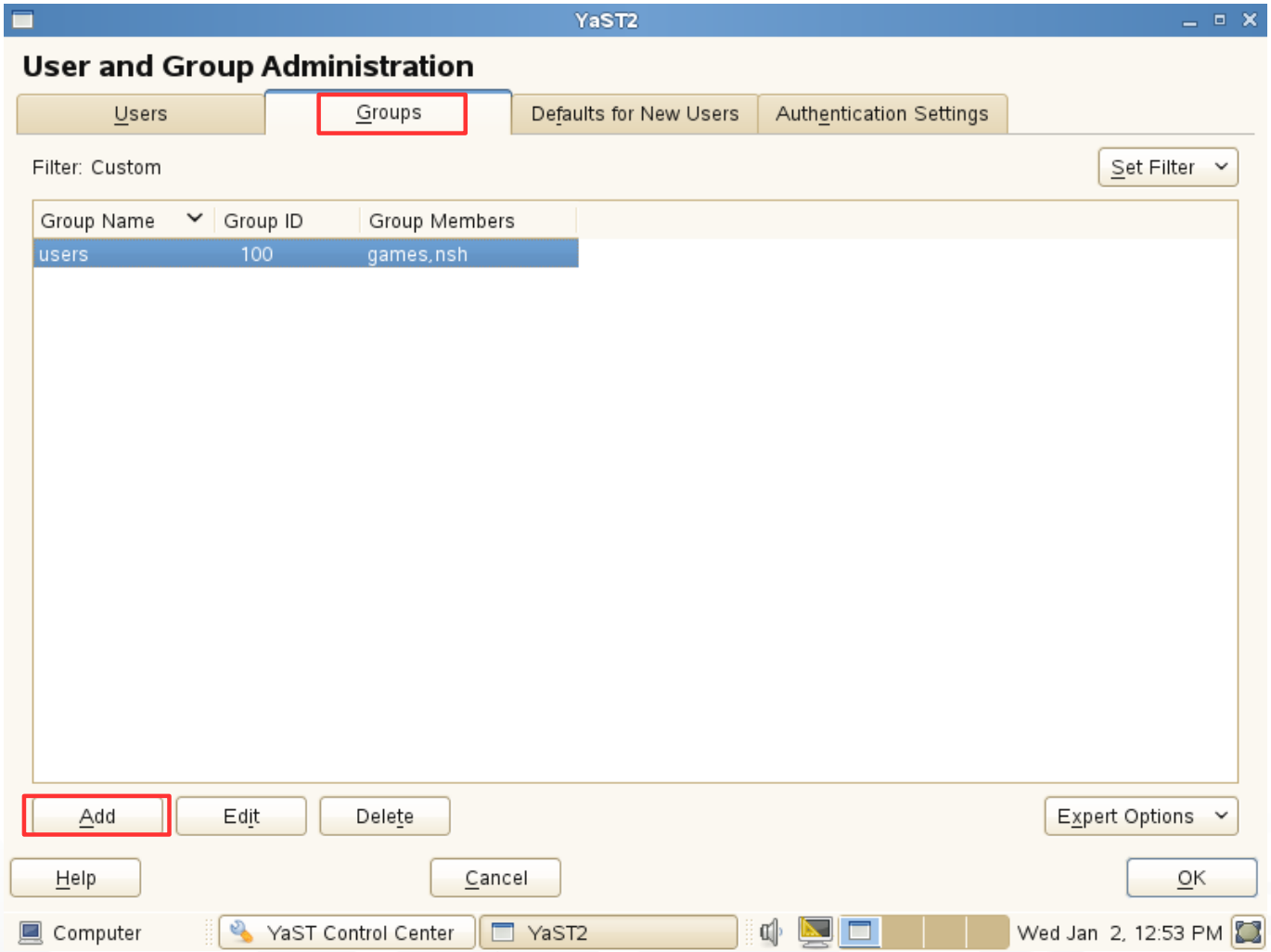
- Alll installed software you need is here
- Select YaST for admin tools

YaST Control Center



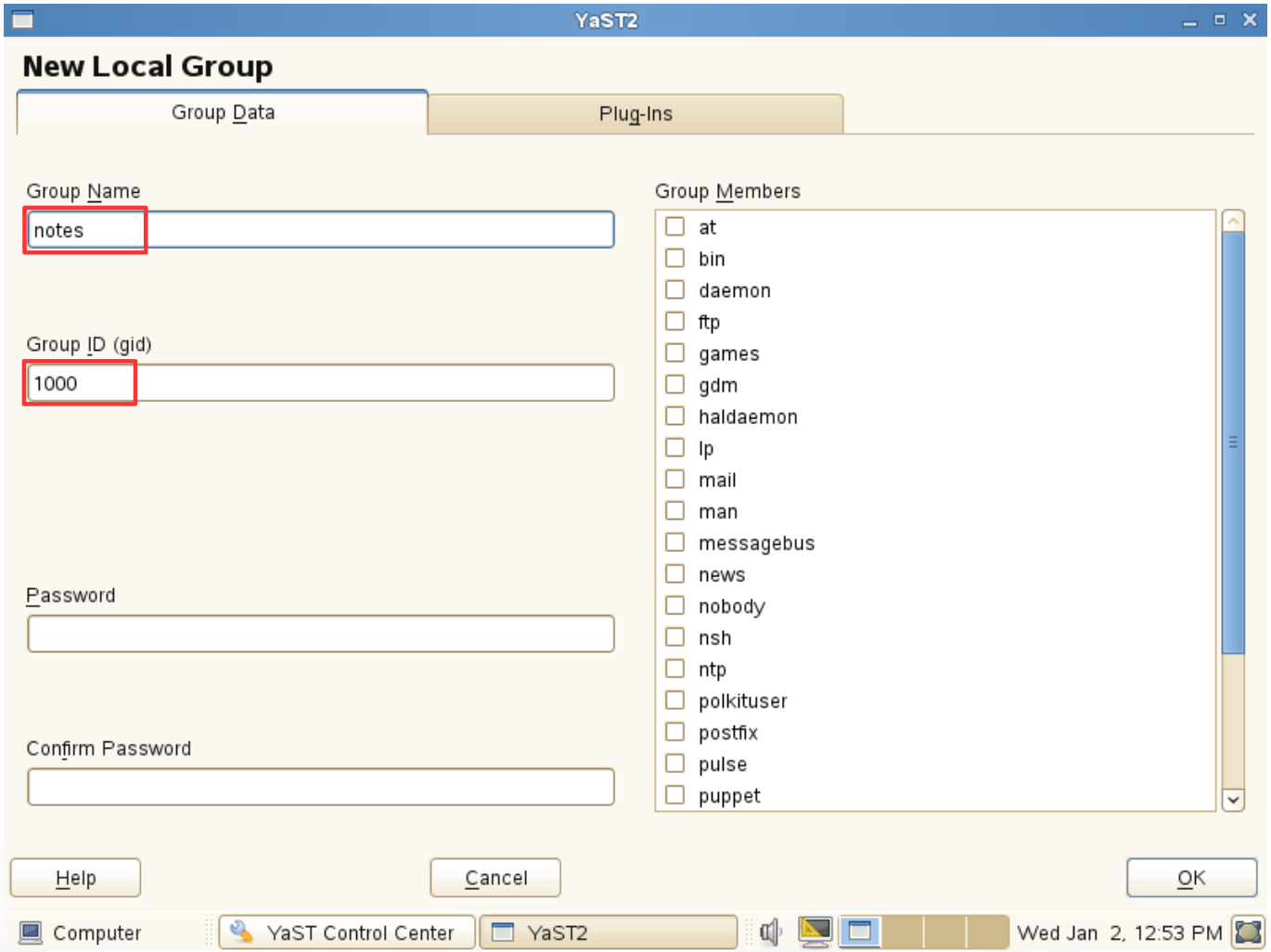
- YaST = Yet another Setup Tool
  - Sounds basic but contains all essentail admin steps you need
  - Different sections for most of your administrative work
- Select “User and Group Management”

Group Administation



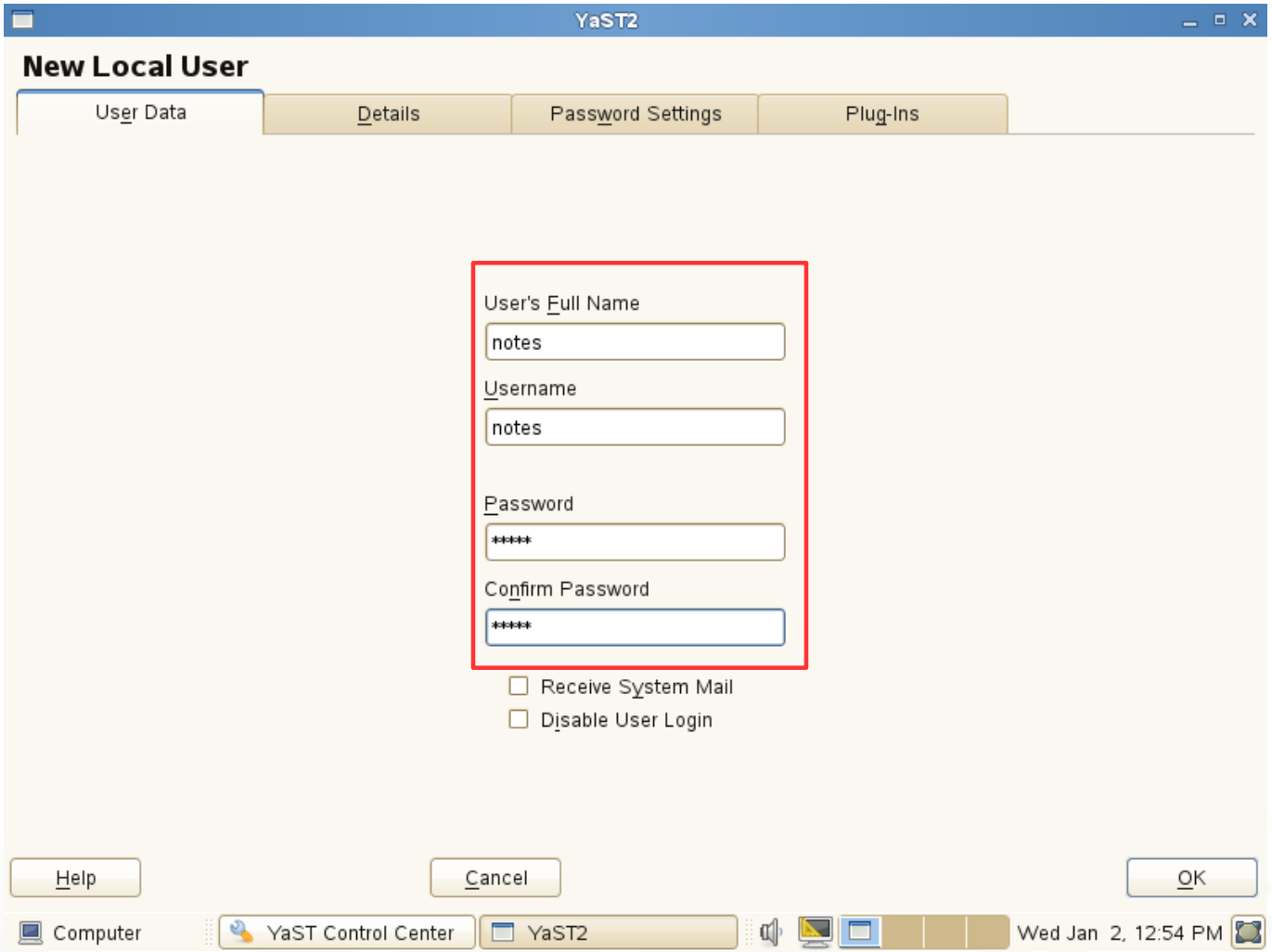
- Select “Groups”
- Click “Add”

Add Group “notes”



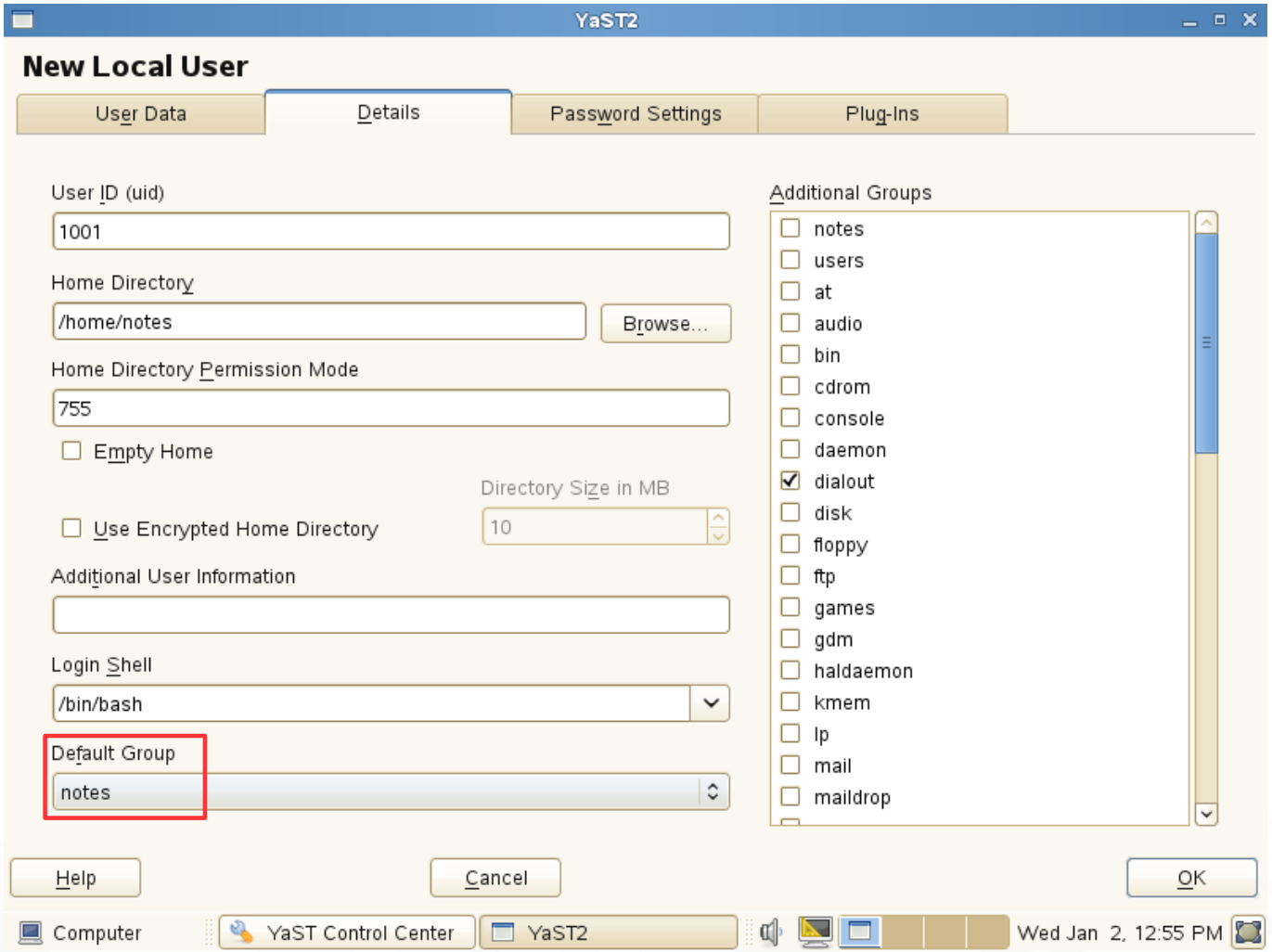
- Type in “notes”
- Group ID defines the internal ID used for this group
  - Automatically maintained
- Click “OK”

New Local User “notes”



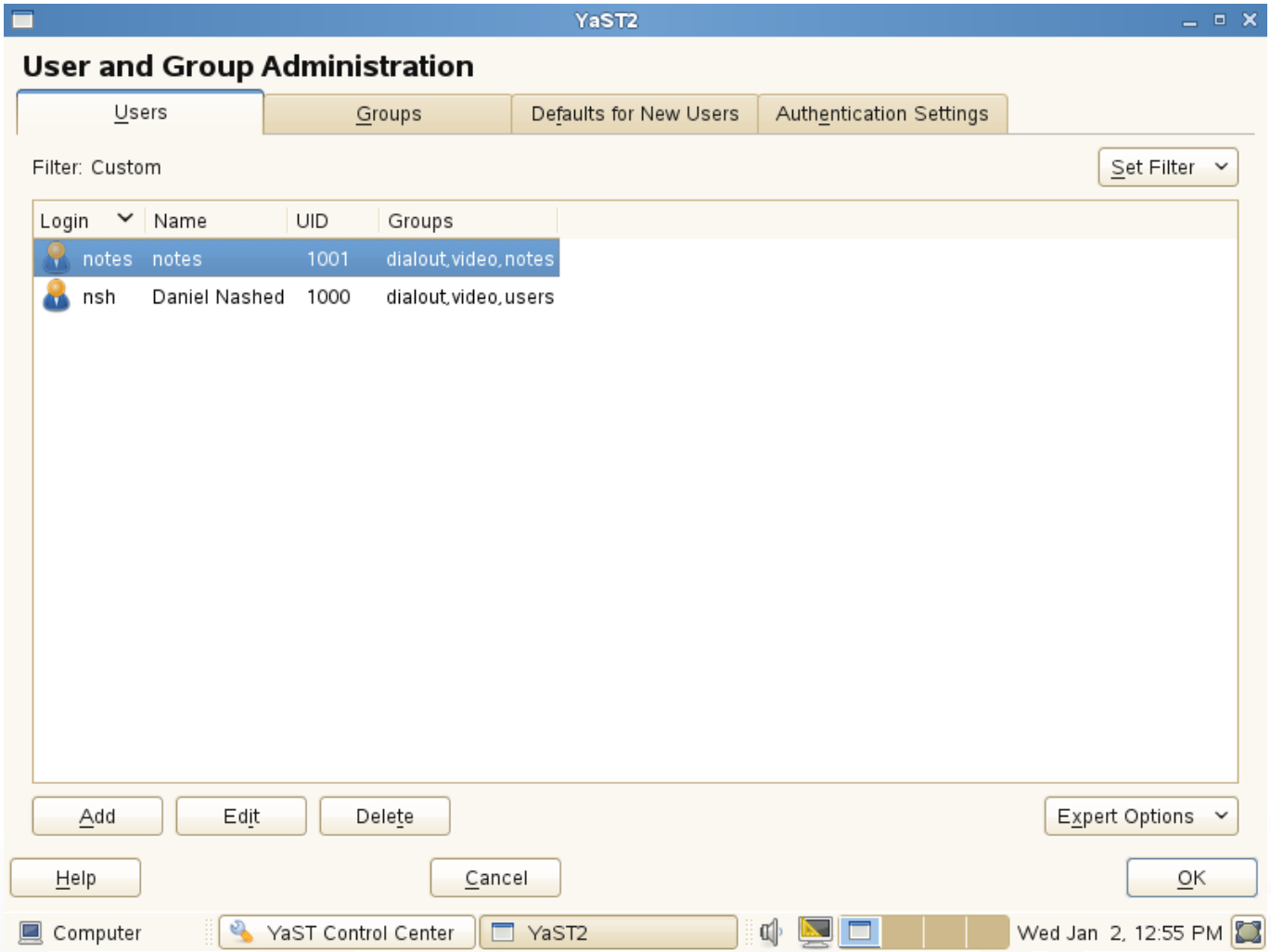
- Create an user “notes”
- Type in
  - Fullname
  - Username
  - Password
- Username should never exceed 8 chars
  - Does not work well with some admin tools like “ps” (process list)
- Click on “Details”

New Local User - Details



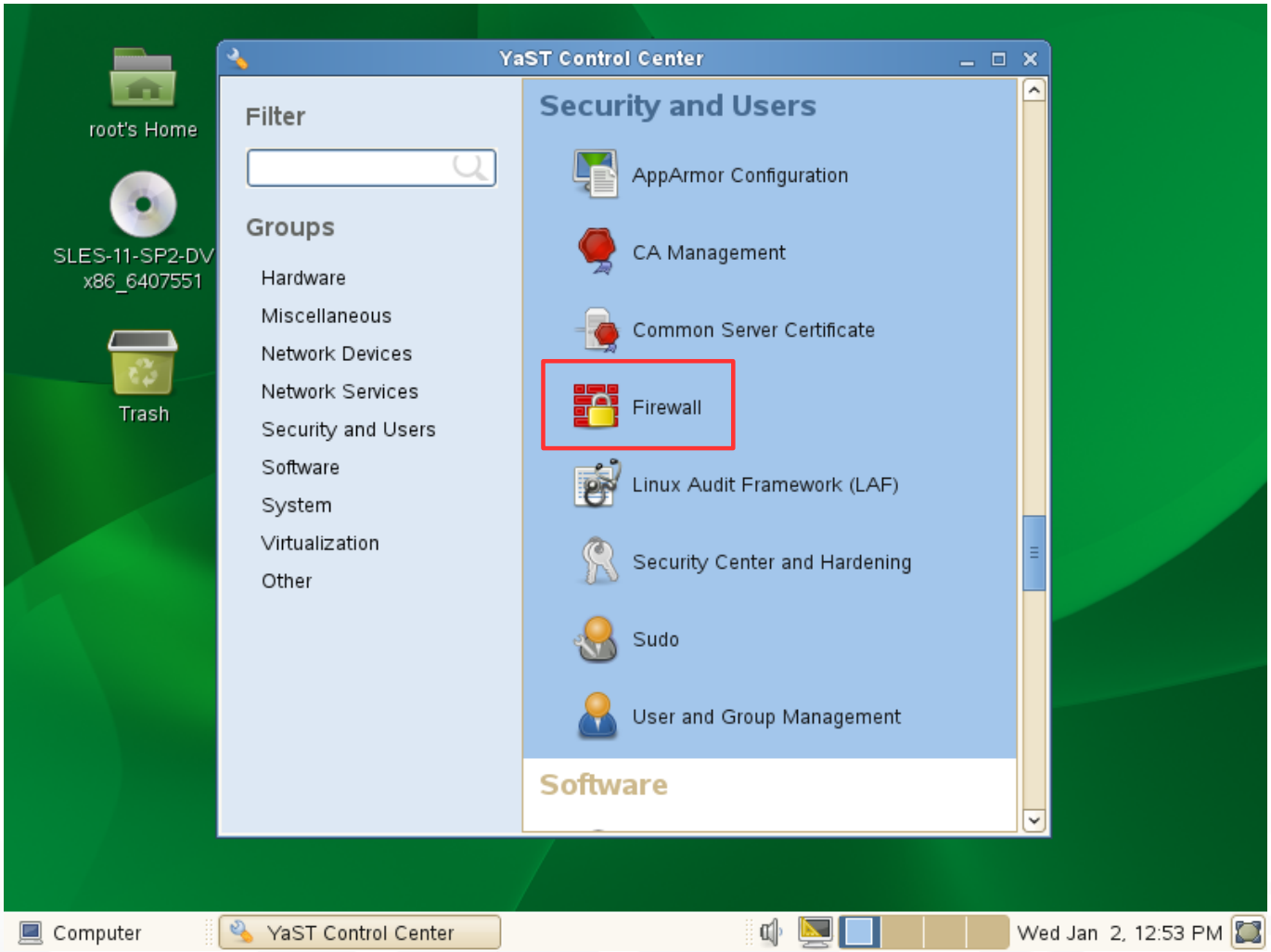
- Select “notes” as the Default Group for this user
  - The group we created earlier
- Click “OK”

User and Group “notes” created



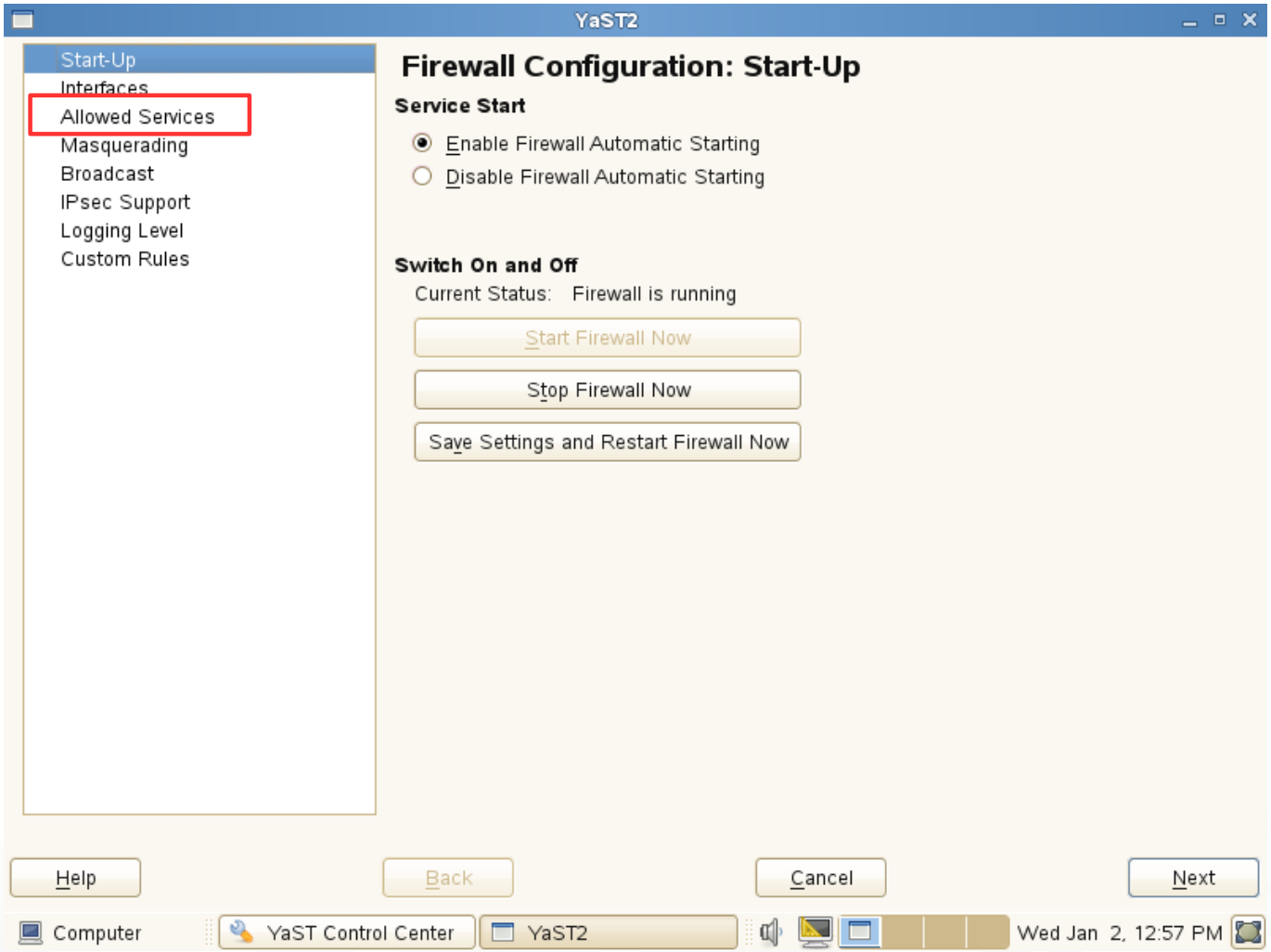
- Overview shows current users
- Click “OK”

Firewall Configuration



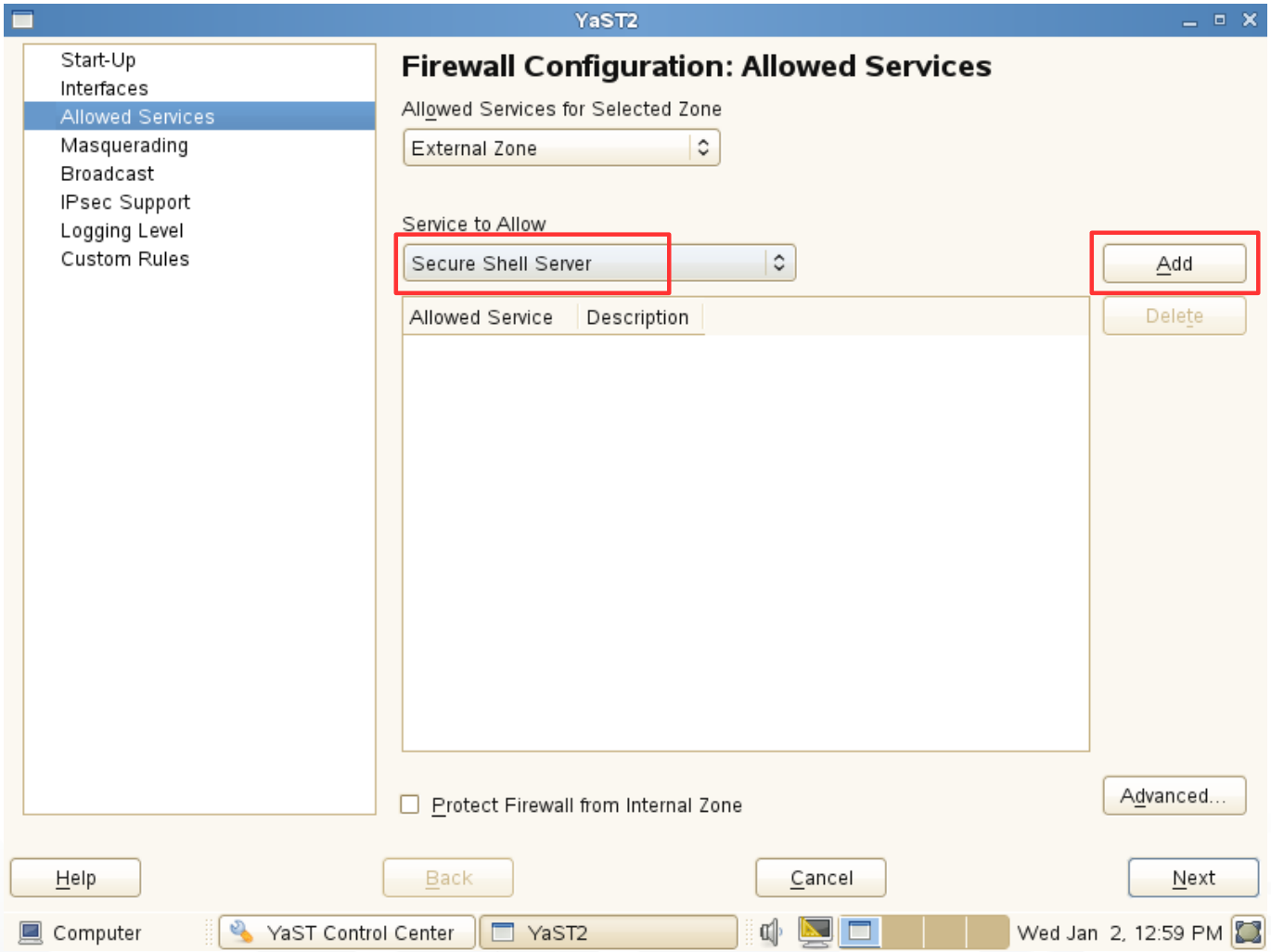
- Click on “Firewall”

Firewall Configuration



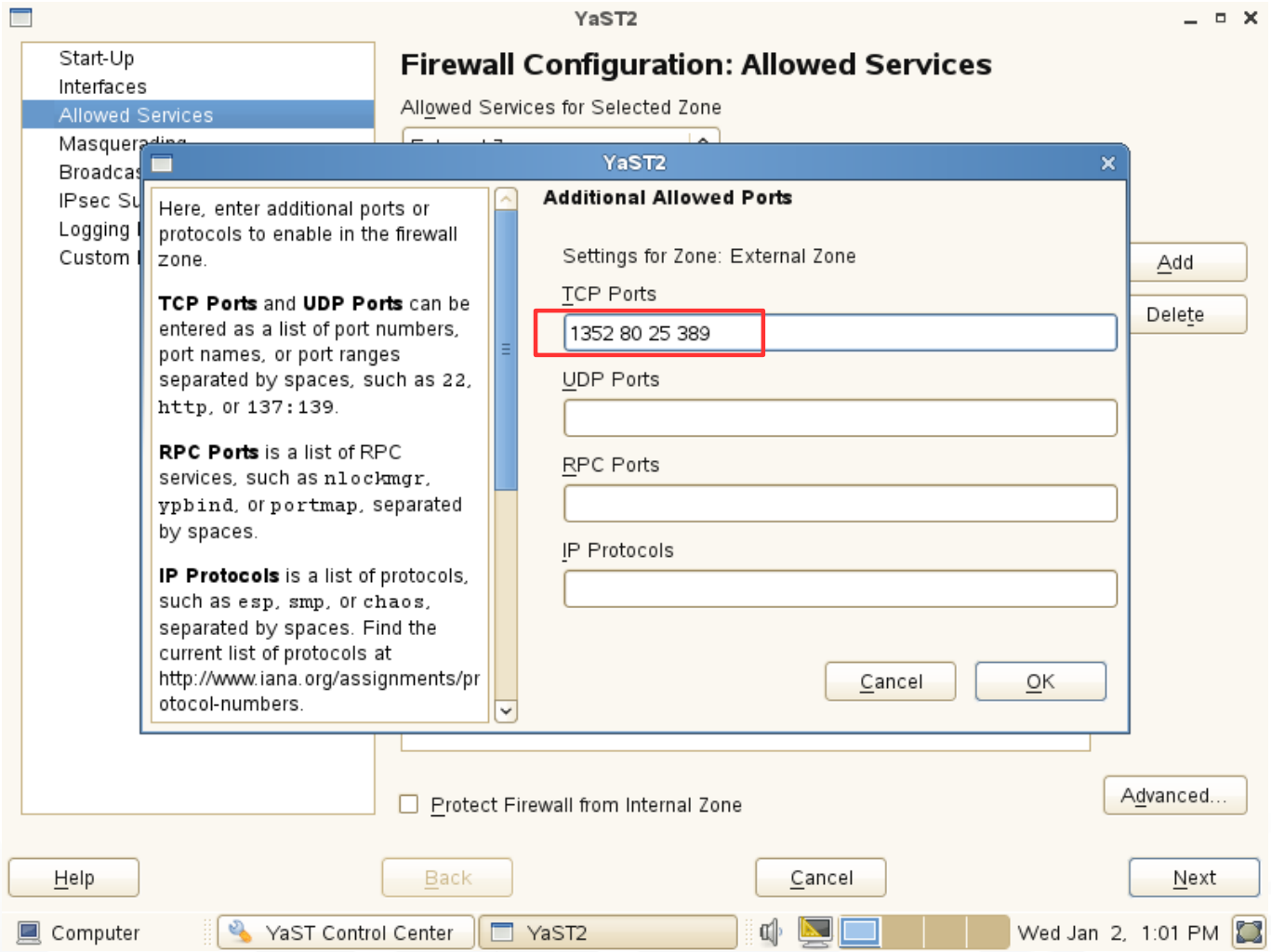
- Firewall is enabled by default
- You just need to enable required services
- Click “Allowed Services”

Firewall Configuration – Allow SSH



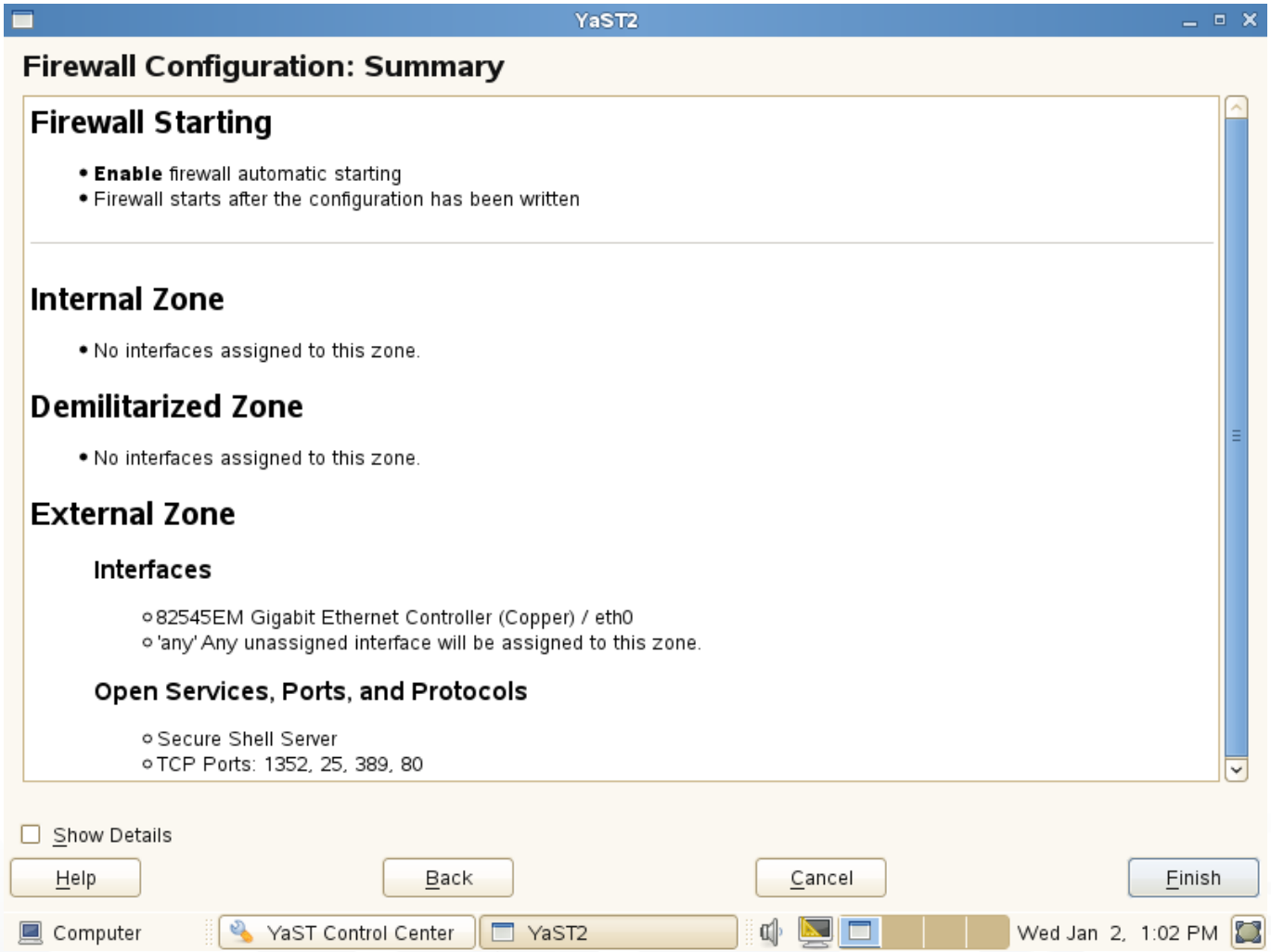
- Add “Secure Shell Server” (SSH) to the allowed services by selecting and clicking “Add”
- Click on “Custom Rules” to specify additional services

Firewall Configuration – Allow Additional Ports



- Specify Ports for NRPC, HTTP, SMTP, LDAP
  - 1352 80 25 389
- Note: Do not add a comma between the ports!
- Click “OK”

Firewall Configuration Summary

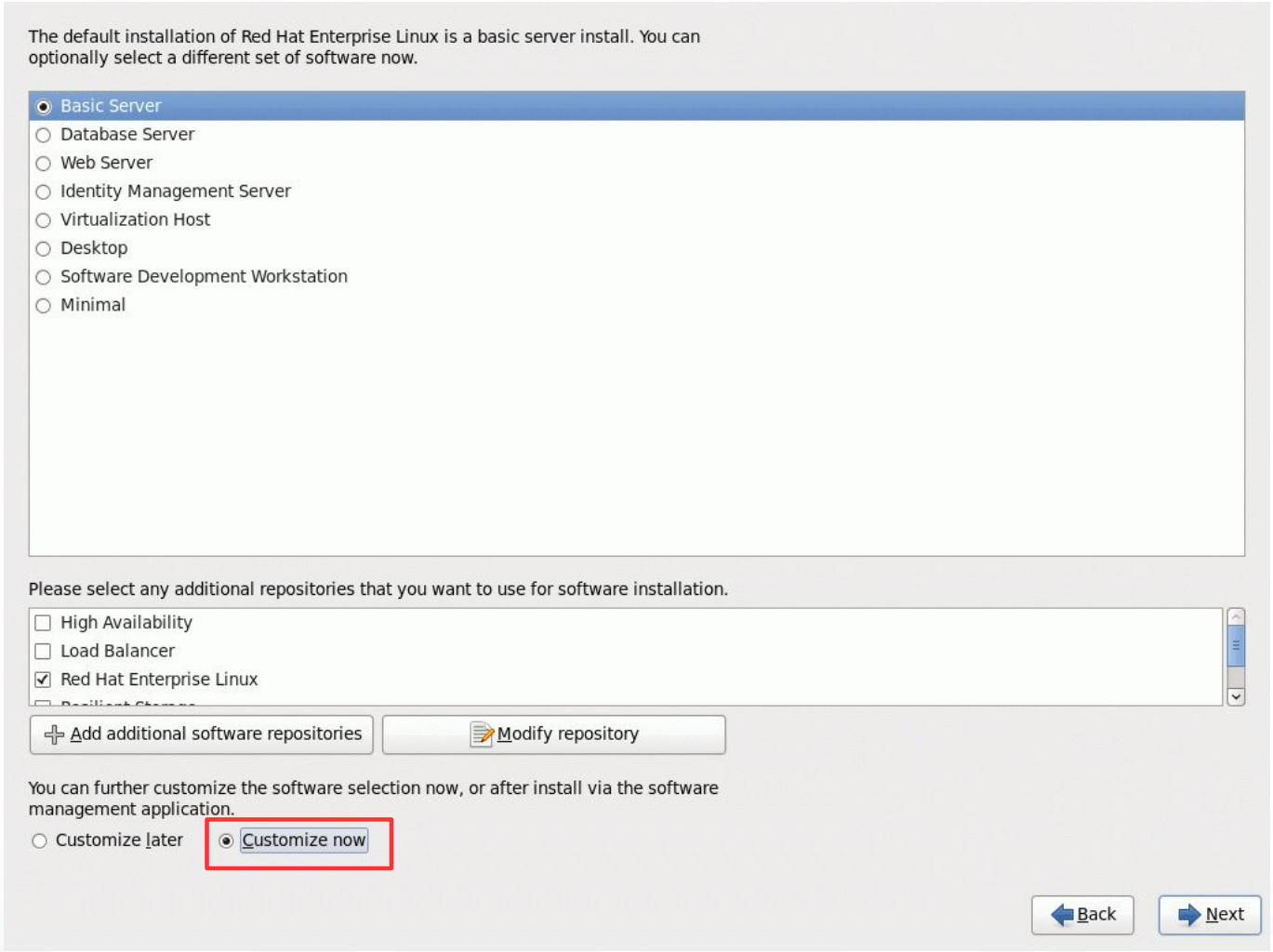


- Check the changes
- Click “Finish”

RHEL 6.3 - Installation and Configuration

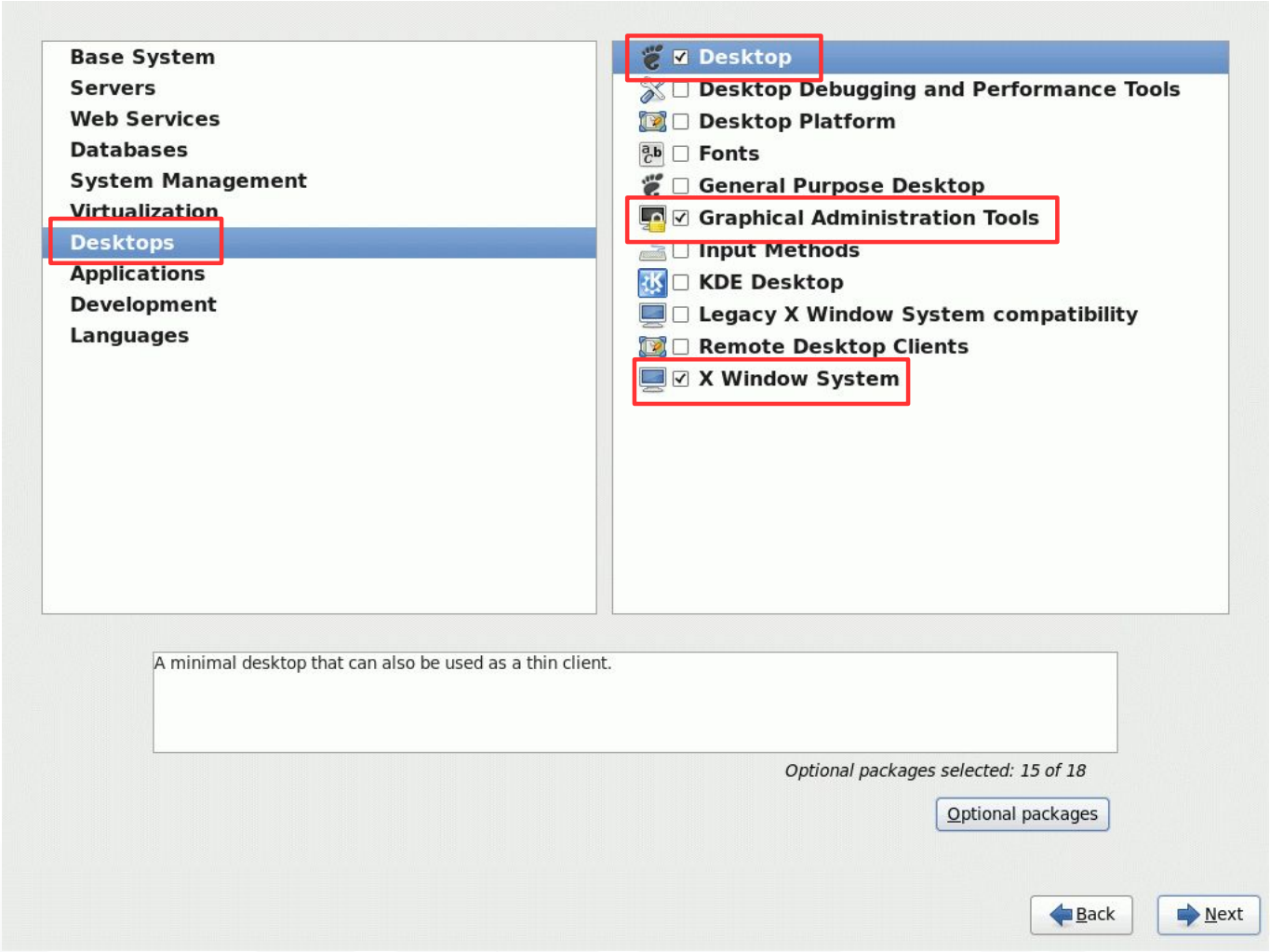
- RHEL installation is very similar to SLES installation
- Menus and Admin Tools are different
- For RHEL the default is a text based UI (not X11)
  - You can install the X11 interface and graphical Admin Tools
- Bonus Material → Appendix
  - Screenshoots for RHEL 6.3 Install
- Next slides contain the parts you need to take special care for RHEL install

RHEL 6.3 - Install Basis Server with Custom Options



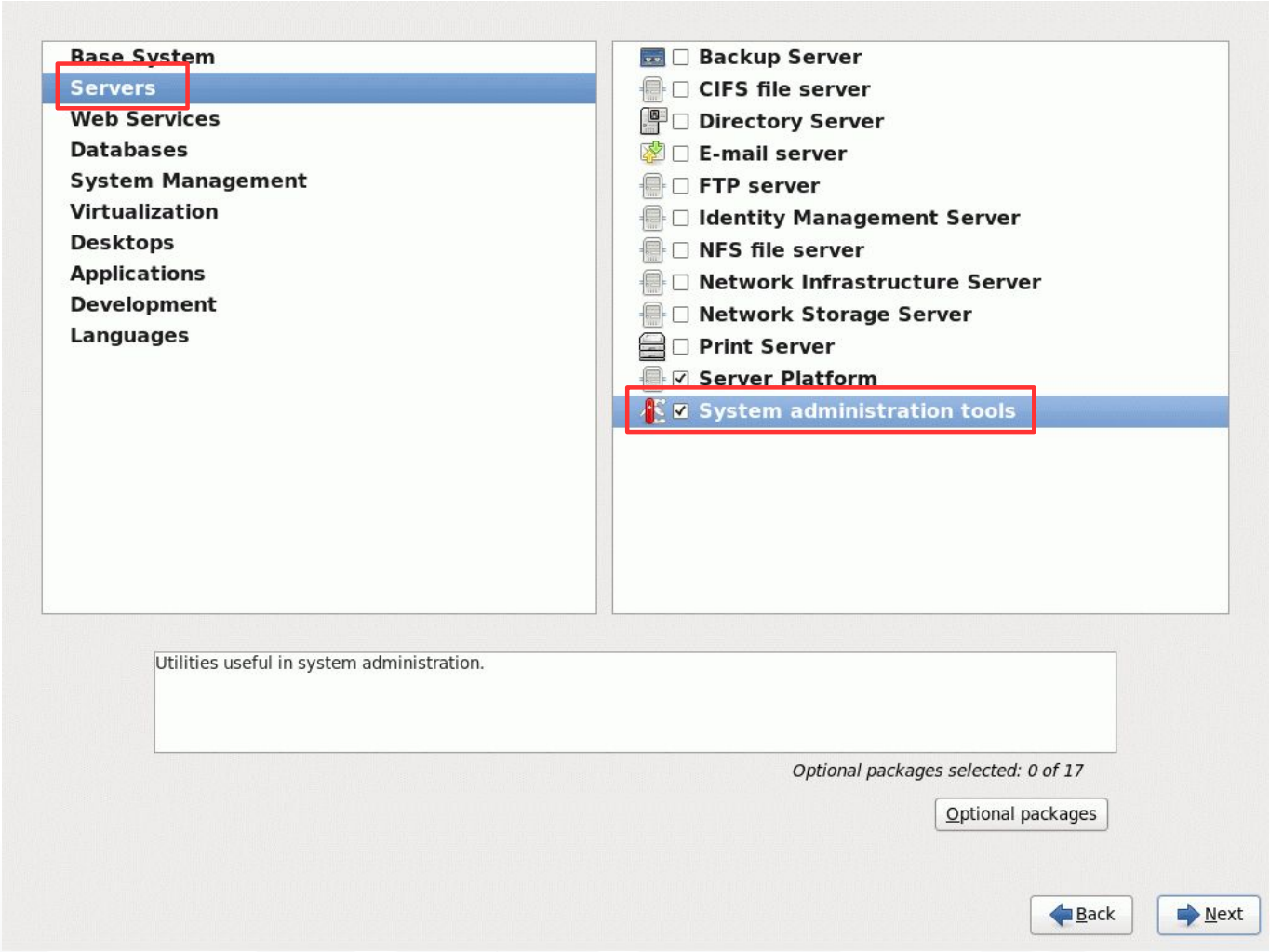
- Default installation does not select the graphical interface and Admin Tools
- Select “Customize now”
- And press “Next”

RHEL 6.3 - Install Graphical Interface (X11)



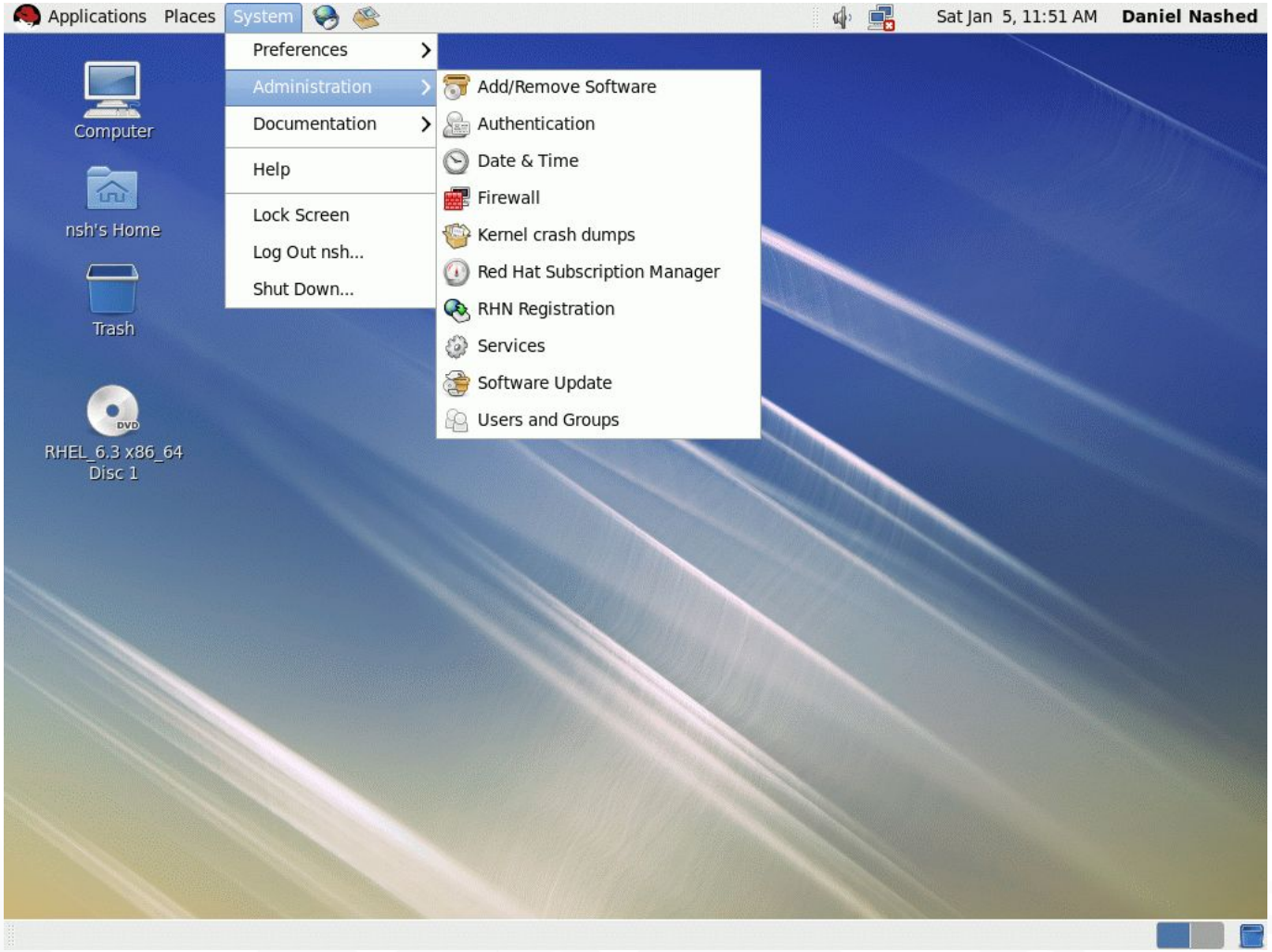
- Select “Desktops”
- Enable
  - Desktop
  - Graphical Administration Tools
  - X Window System

RHEL 6.3 - Install System Administration Tools



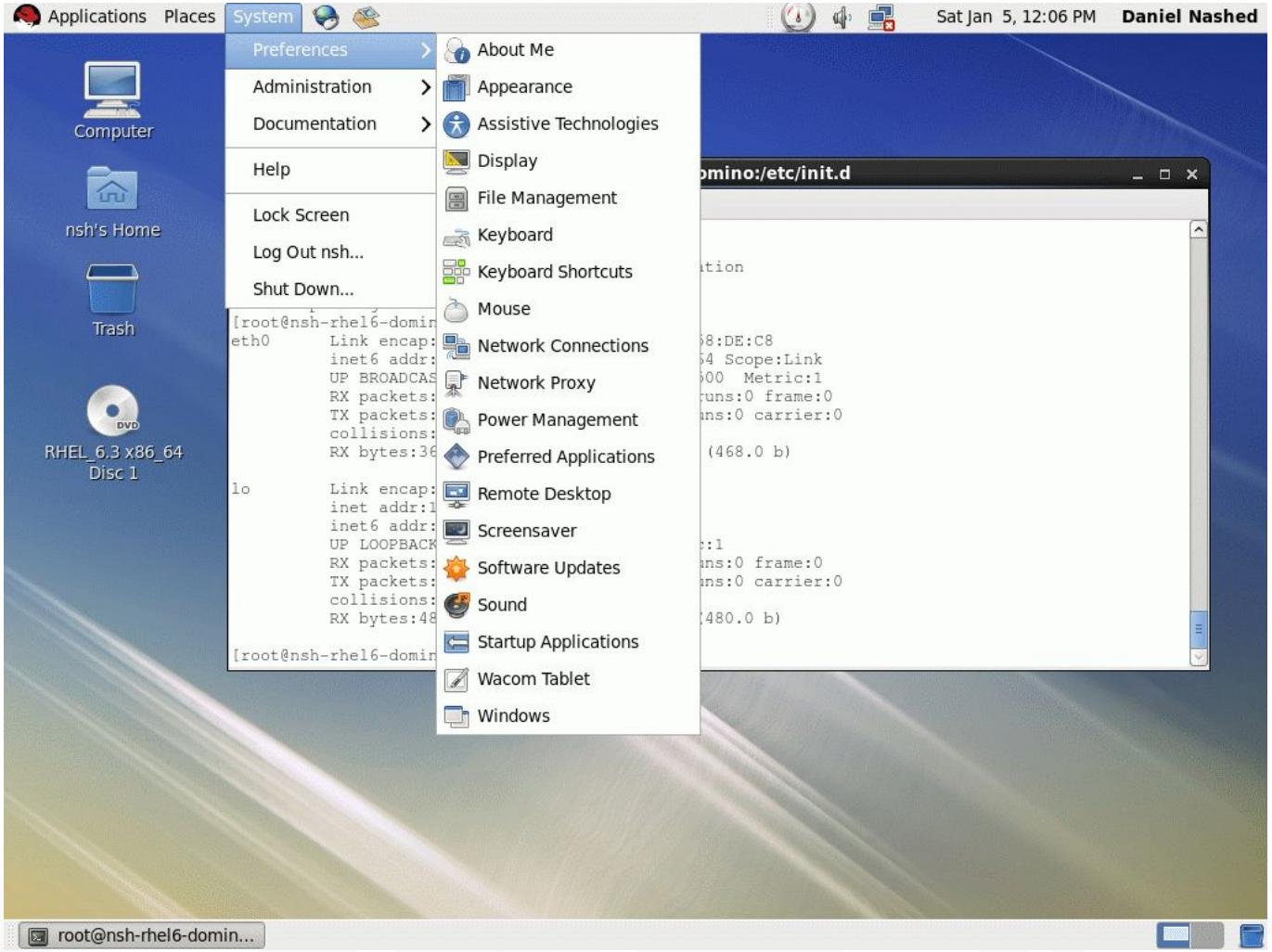
- Select “Servers”
- Select “System administration tools”
- Press “Next”
- Install looks very similar to what you have seen for SLES

RHEL 6.3 - Admin Menu



- Quite similar basic options
- YaST is a bit ahead for system configuration etc
- You have to register your server to use “yum” to install additional packages
- On SLES all packages can be installed quite easy from the DVD image
  - But you need to register on SLES too for updates afterwards

RHEL 6.3 - Preferences Menu

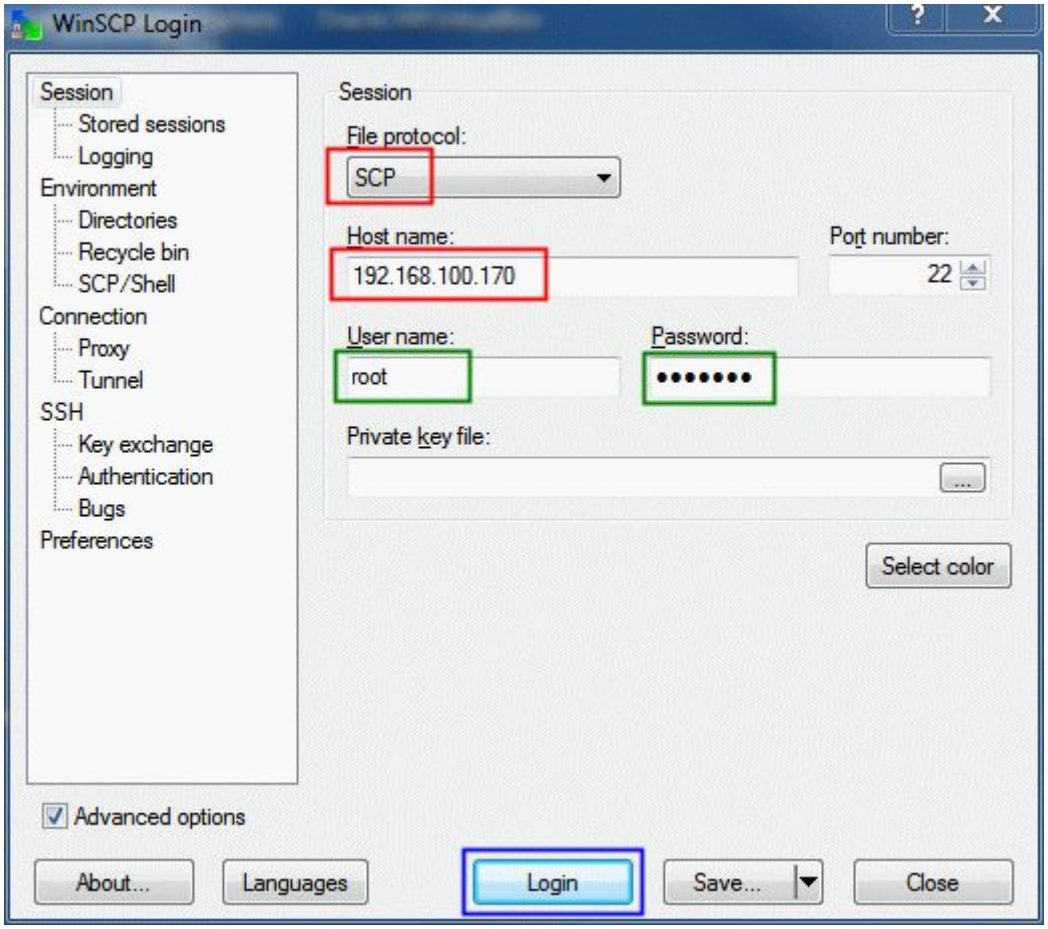


- Quite similar basic options

Next Steps

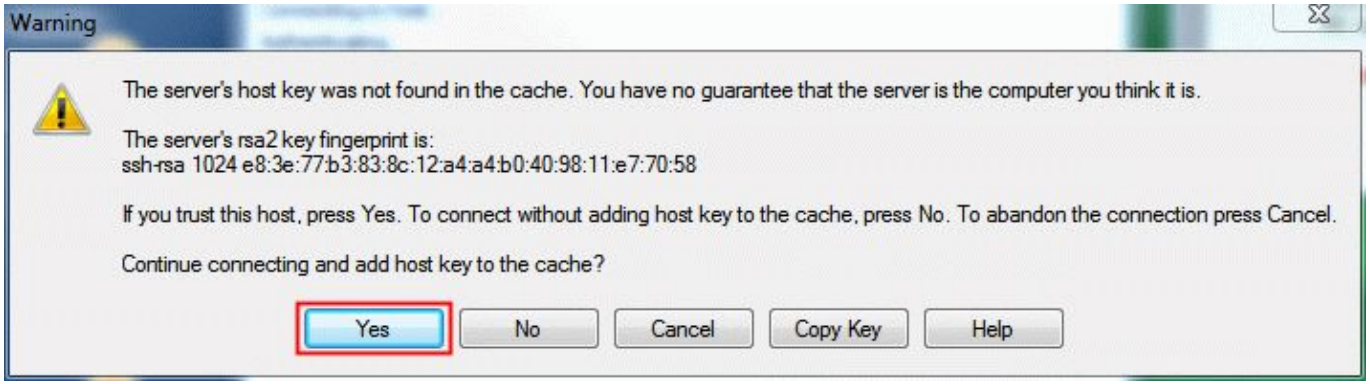
- Now that we have configured the basis Linux machine we can install Domino
- The basic remote protocol for accessing a Linux machine is “SSH”
  - Secure Shell (Port 22)
  - Used for Login into the machine and for file-transfer
- Next steps:
  - Copy installations files
  - Install Domino
  - Configure Domino

WinSCP - File-Transfer



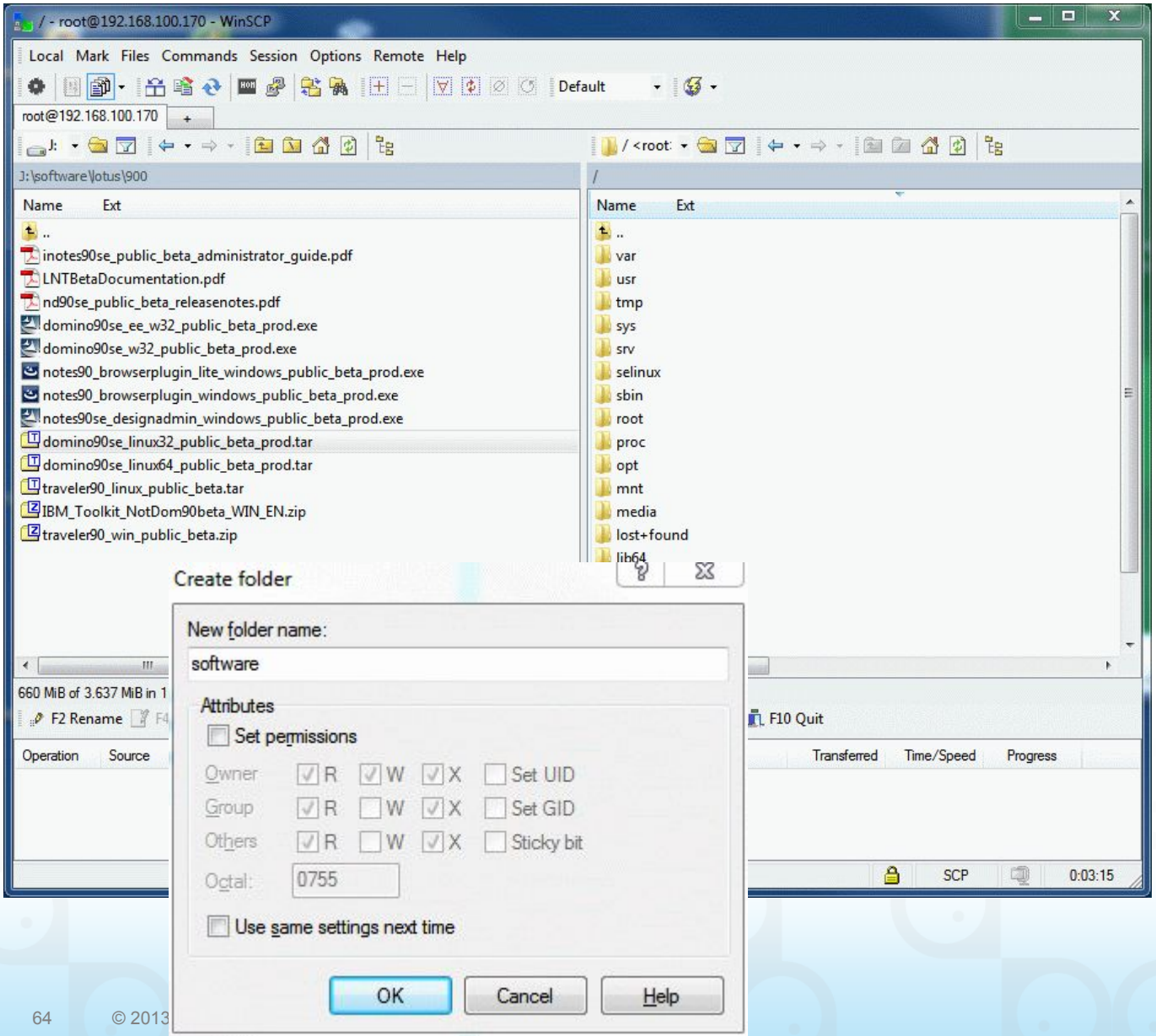
- Start WinSCP
- Specify a new Connection
- Use SCP Protocol
- Type in IP Address of the Linux machine for the host name
- Type in “root”and the password you configured earlier
- Type “Login”

Confirm SSH Fingerprint



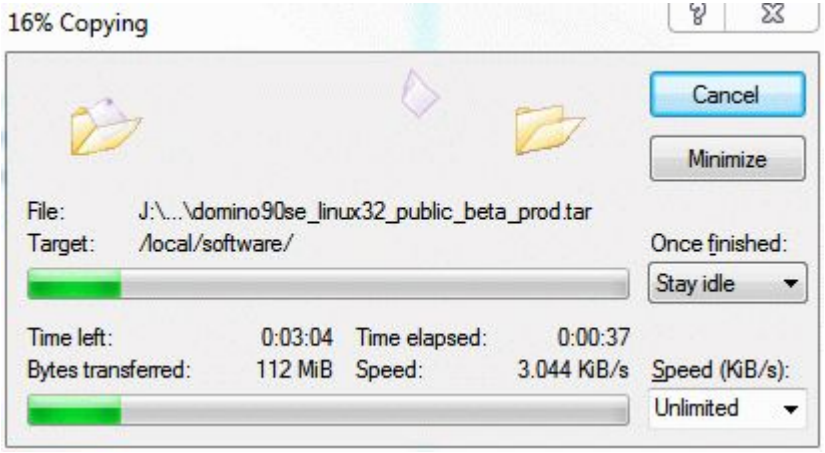
- Each machine generates a RSA certificate which is use to identify the machine
- When connecting for the first time the key is unknown and you have to confirm it
- Next time the key is verified
  - If it does not match a security warning is shown
  - Similar to this dialog
- Press “Yes” to confirm

WinSCP GUI



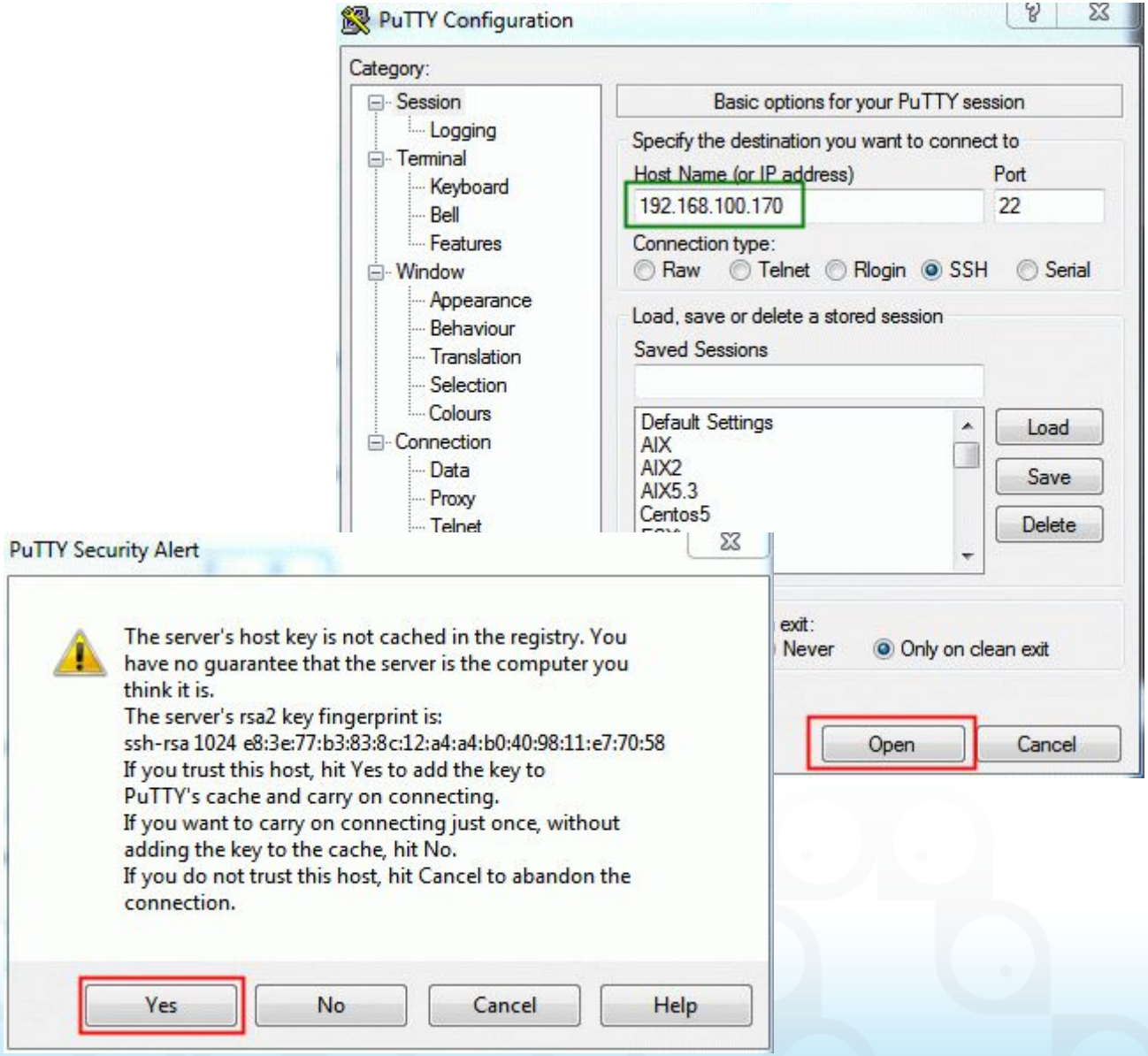
- WinSCP uses a Norton Commander like Style by default
- Left side shows local disk
- Right side shows remote Linux file-system
- Press F7 and create the folder “software”
- Keep default permissions

WinSCP - Copy Installation Files



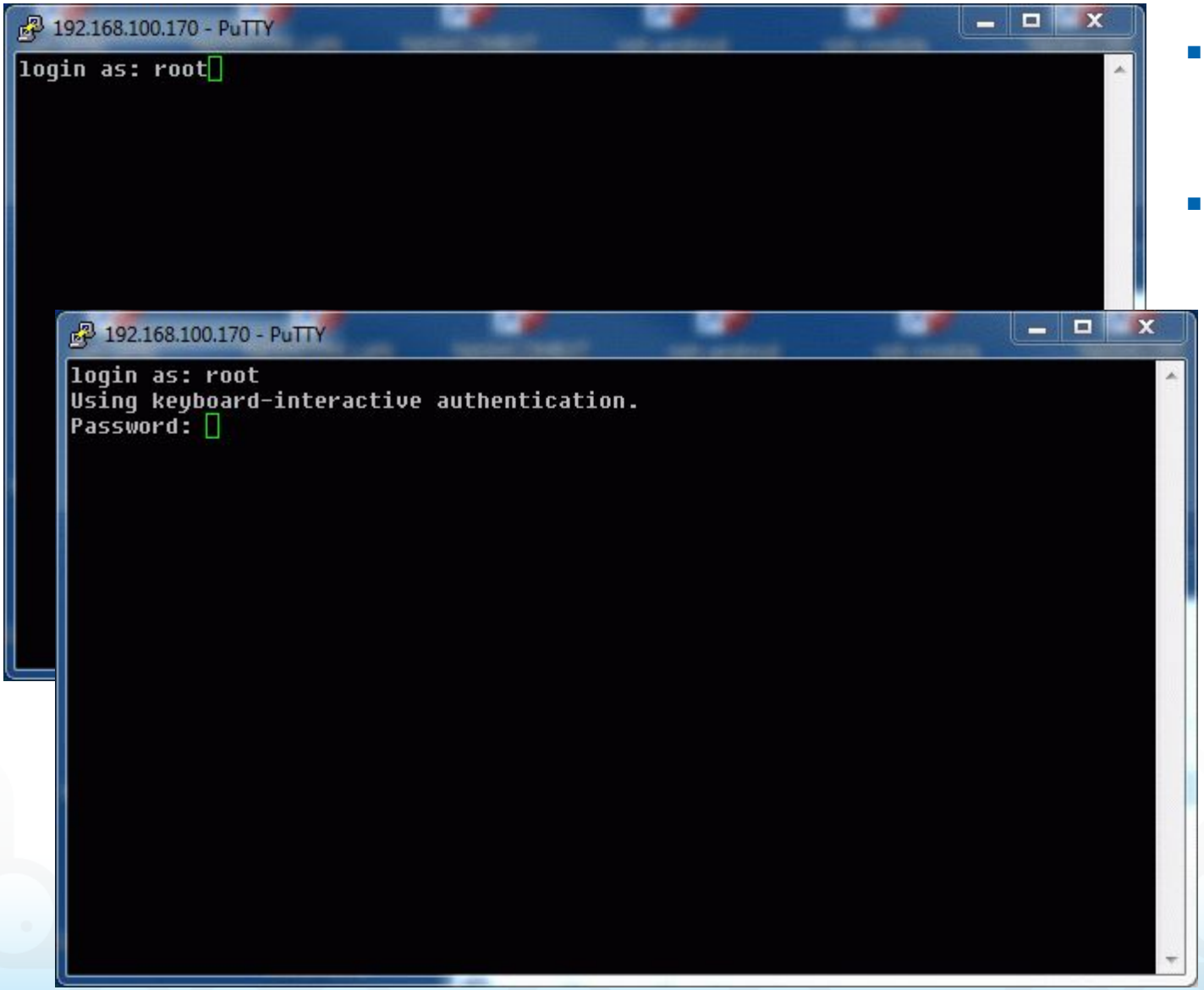
- Press F5 to copy selected Files
- Navigation with WinSCP is straight forward
- Look and feel can be changed to Explorer style.

SSH Console Login using Putty



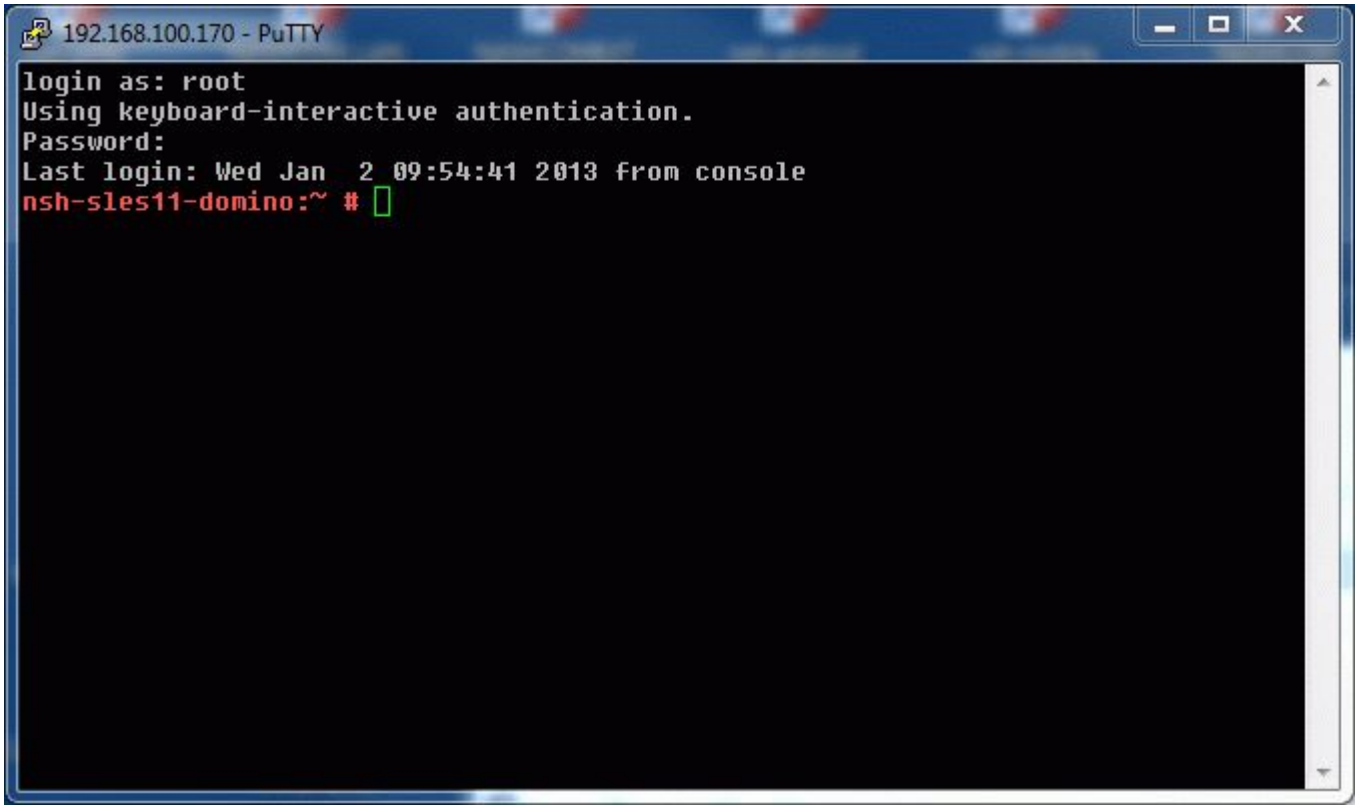
- Putty is a very common SSH client
- Configuration is very similar to WinSCP
- Configure Hostname and click “Open”
  - You could also save your configuration later
  - See stored sessions
- Similar key warning seen on WinSCP
  - Confirm the warning with “Yes”
  - This will put the key into cache

SSH Window – First Login



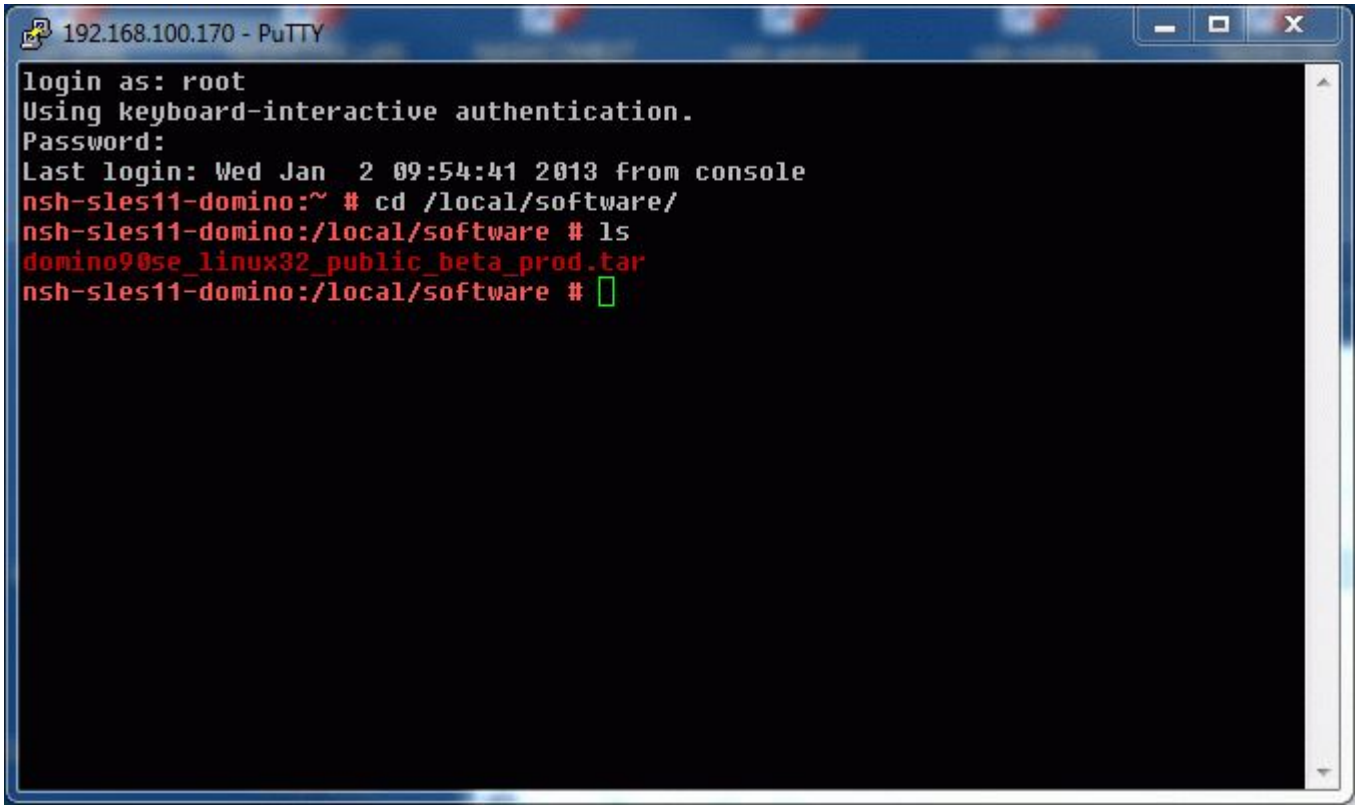
- Login using your root user and password
- SSH command line shell is what is used most for administration

Console after First Login



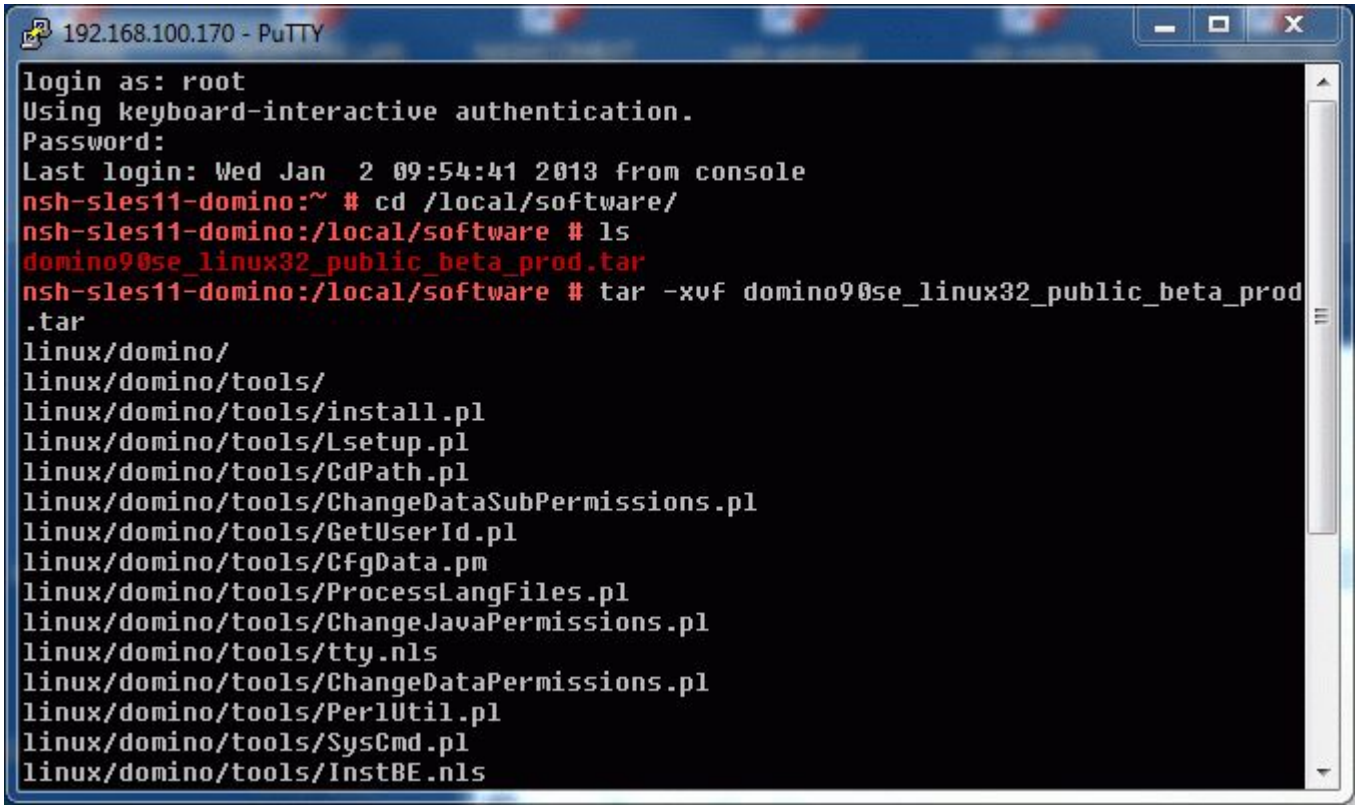
- Prompt shows
  - Machine Name
  - # means you are root user
- Command Line is similar to "DOS" command-line
- Only the "root" User can install a Domino server

Switch to “Software” Directory



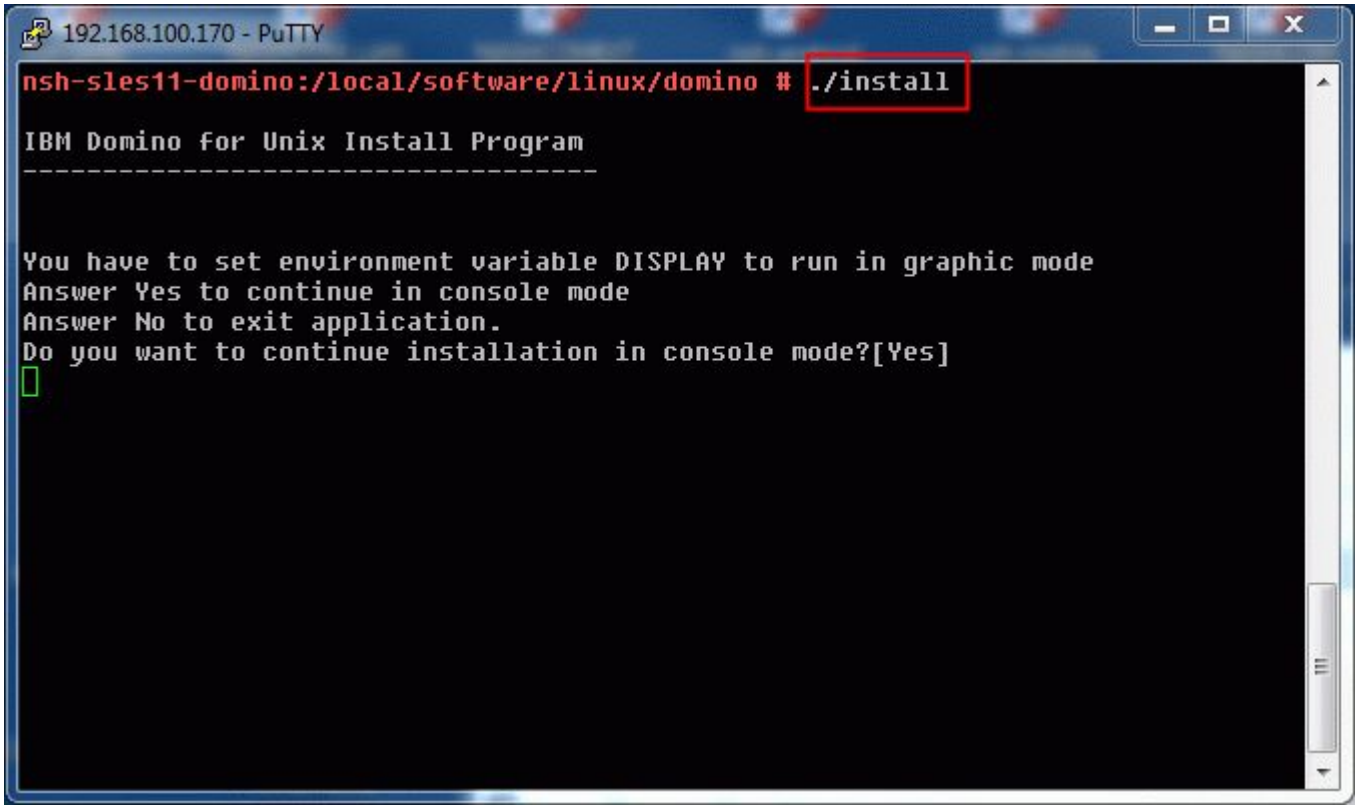
- Linux uses “/” instead of “\”
- “ls” is the directory list command
- There are no drive letters
  - Everything is mounted into the root tree
  - More details later
- Switch to software directory via: “cd /local/software”
- List directory via “ls”

Extract Installation Files



- Installation files are packed together using the “tar” tool
- “untar” (extract) files via tar command
- tar -xvf file.tar
  - -x = extract
  - -v = verbose
  - -f specify file
- Tar outputs the extracted file list

Run Install



- Switch to “linux/domino” via cd linux/domino
  - Without leading slash for a relative path
- Run ./install to start the installation
- “./” means current directory
  - Root does not search the current directory by default
  - You have to specify ./ explicitly
- There is a console mode (used in our case) and a graphical mode
  - Both work similar
  - You need to get used to the way data is entered
  - Type Numbers and Option
  - Enter = confirm

RHEL 6.3 needs additional packages for Domino 32bit

- By default RHEL 6.3 does not install 32 bit packages!
- If you install a 32 bit the server will complain about missing packages
- The following is the missing list for Domino 8.5.x and 9.x Public Beta
  - The installer complains about those missing packages – see below

```
To run this installer you need 32bit (i686) packages installed on your 64 bit Linux RedHat.
 They are not installed by default, but are mandatory. The installer will exit after
 this message.

 glibc-2.12-1.7.el6.i686
 libgcc-4.4.4-13.el6.i686
 libXtst-1.0.99.2-3.el6.i686
 libXmu-1.0.5-1.el6.i686
 libXp-1.0.0-15.1.el6.i686
 libXft-2.1.13-4.1.el6.i686
 libXi-1.3-3.el6.i686
 libstdc++-4.4.4-13.el6.i686
```

RHEL 6.3 needs additional packages for Domino 32bit

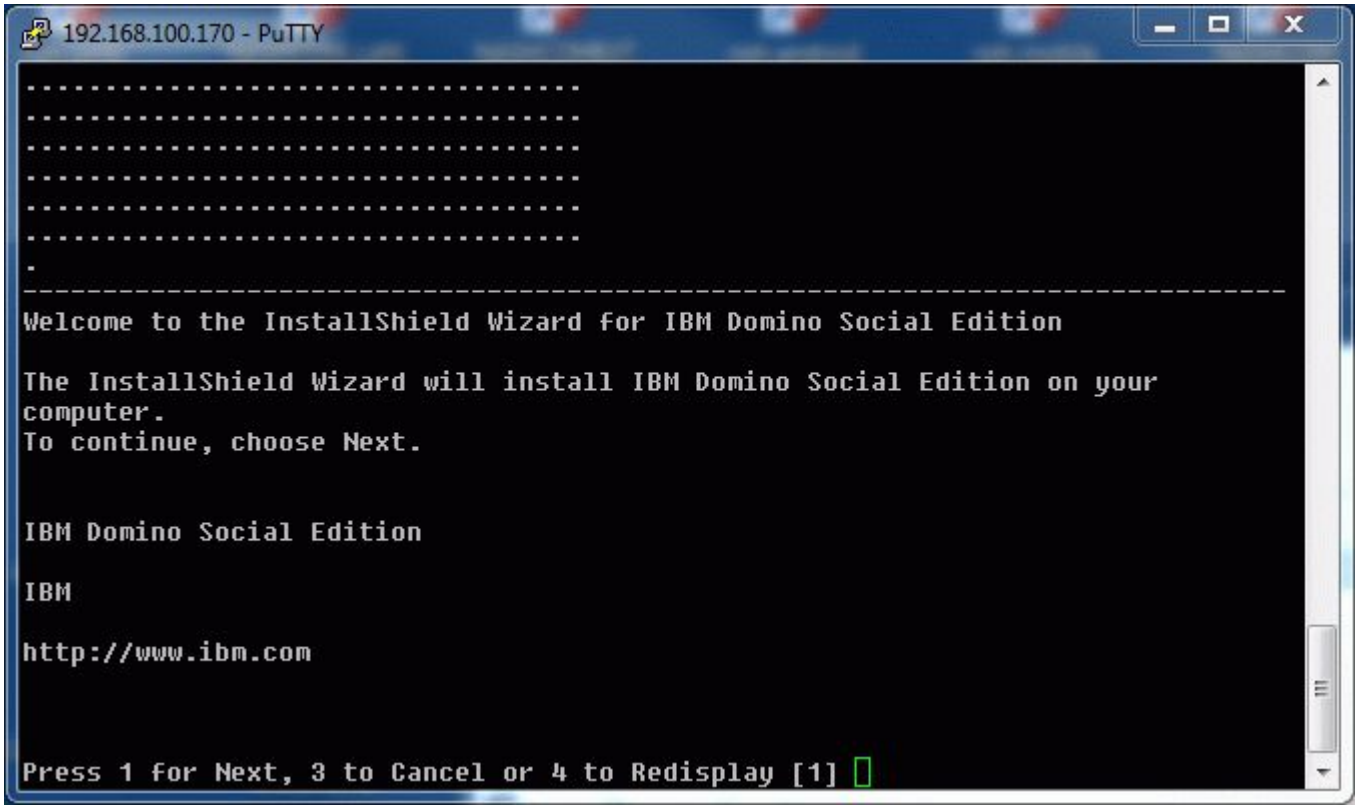
- Add the following line to /etc/yum.conf
  - multilib_policy=all
  - This will install also 32bit LIBs in addition to 64 bit LIBs on your 64bit machine
- Run yum install <packagename> to install missing packages
  - You can specify multiple packages in the same install command line → see below

```
# yum install glibc

# yum install libgcc libXtst libXmu libXp libXft libXi

# yum install libstdc++
```

YUM Example Output

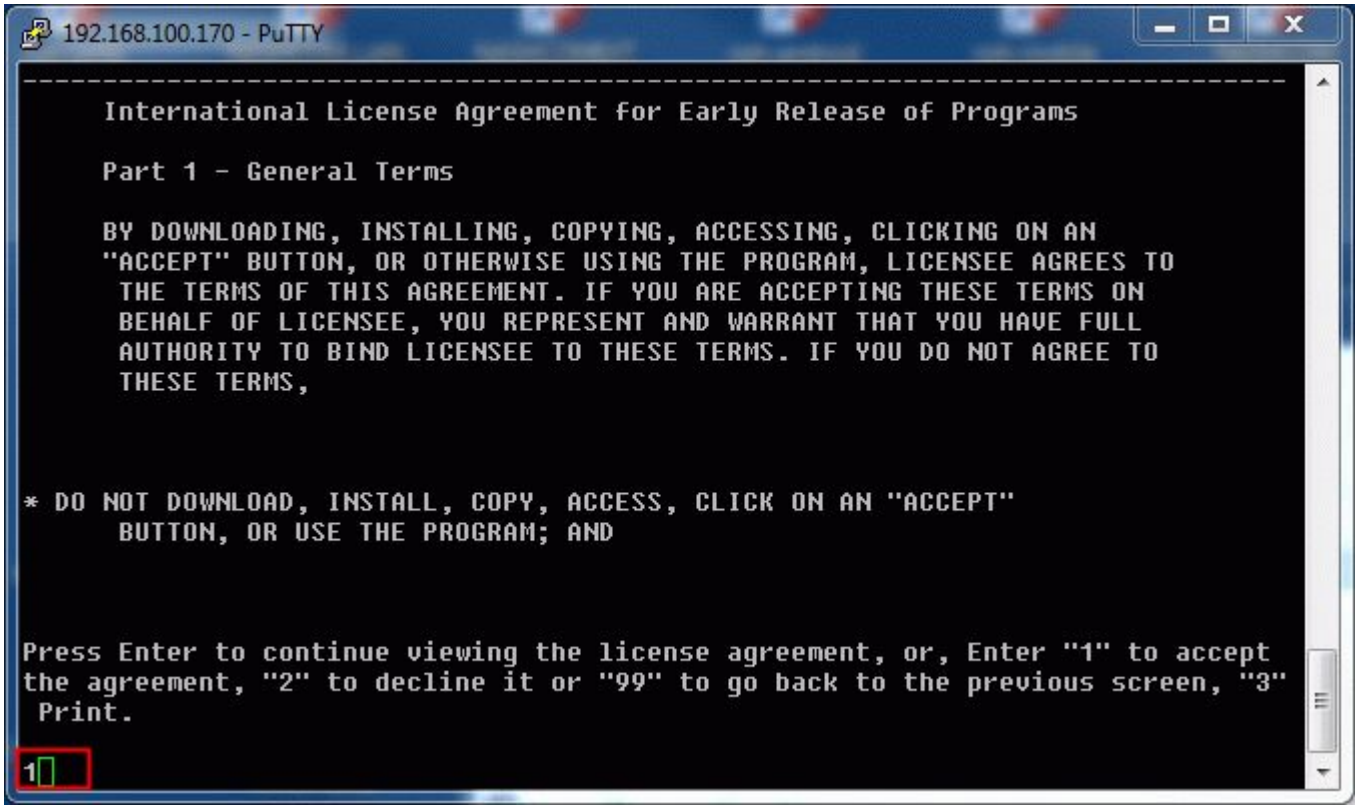
```
# yum install glibc
Loaded plugins: product-id, refresh-packagekit, rhnplugin, security, subscription-manager
Updating certificate-based repositories.
Setting up Install Process
Package glibc-2.12-1.80.el6_3.6.x86_64 already installed and latest version
Resolving Dependencies
--> Running transaction check
 ---> Package glibc.i686 0:2.12-1.80.el6_3.6 will be installed
 --> Processing Dependency: libfreebl3.so(NSSRAWHASH_3.12.3) for package: glibc-2.12-1.80.el6_3.6.i686
 --> Processing Dependency: libfreebl3.so for package: glibc-2.12-1.80.el6_3.6.i686
 --> Running transaction check
 ---> Package nss-softokn-freebl.i686 0:3.12.9-11.el6 will be installed
 --> Finished Dependency Resolution

Dependencies Resolved
 ================================================================================================
   Package                     Arch           Version                Repository             Size
 =================================================================================================
 Installing:
  glibc                       i686           2.12-1.80.el6_3.6      rhel-x86_64-server-6    4.3 M
 Installing for dependencies:
  nss-softokn-freebl          i686           3.12.9-11.el6          rhel-x86_64-server-6    116 k

 Transaction Summary
 ================================================================================================
 Install       2 Package(s)

Total download size: 4.4 M
Installed size: 0
Is this ok [y/N]: y
```

InstallShield Dialog



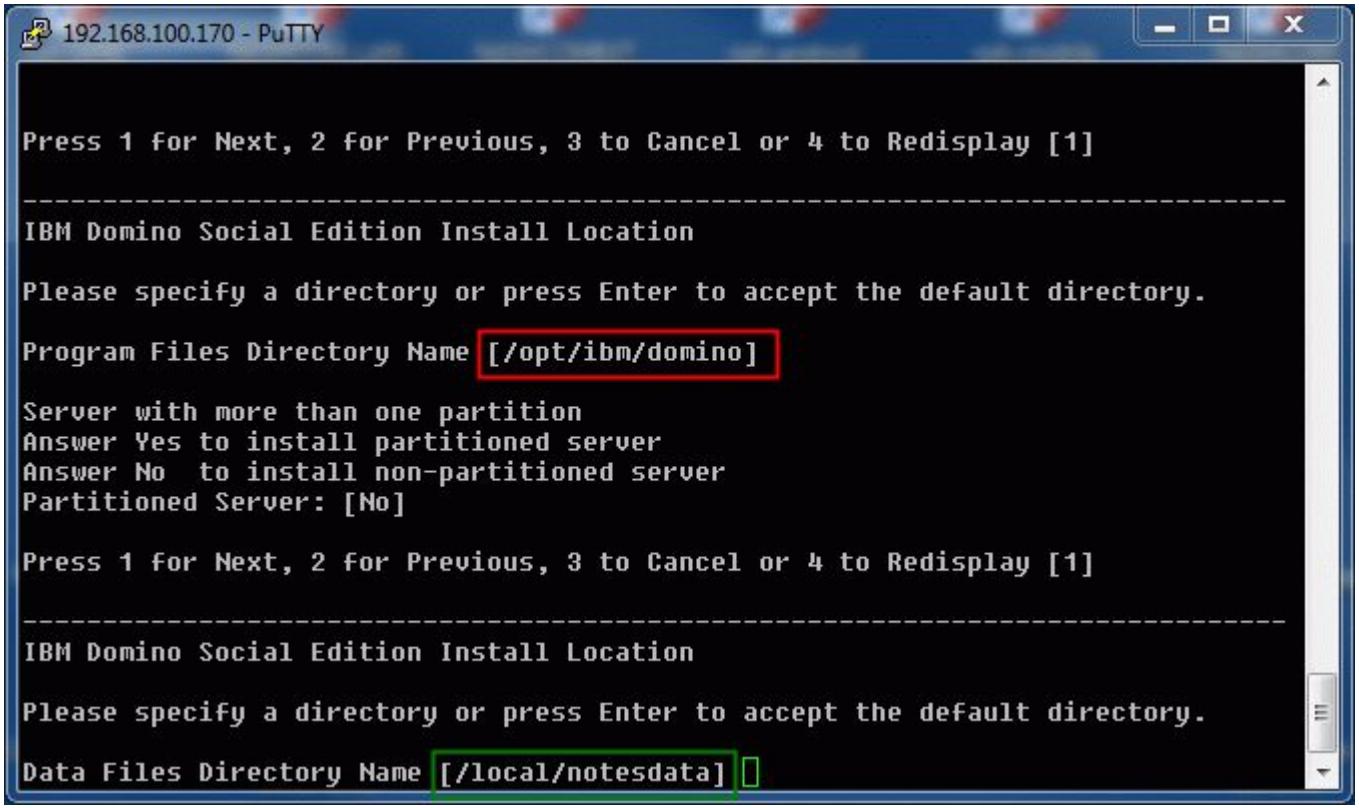
- Domino uses the Java version InstallShield to install
  - Same tools family used on Windows
  - JVM is included in the package
- Type in “1” and “Enter”

Read and Confirm License



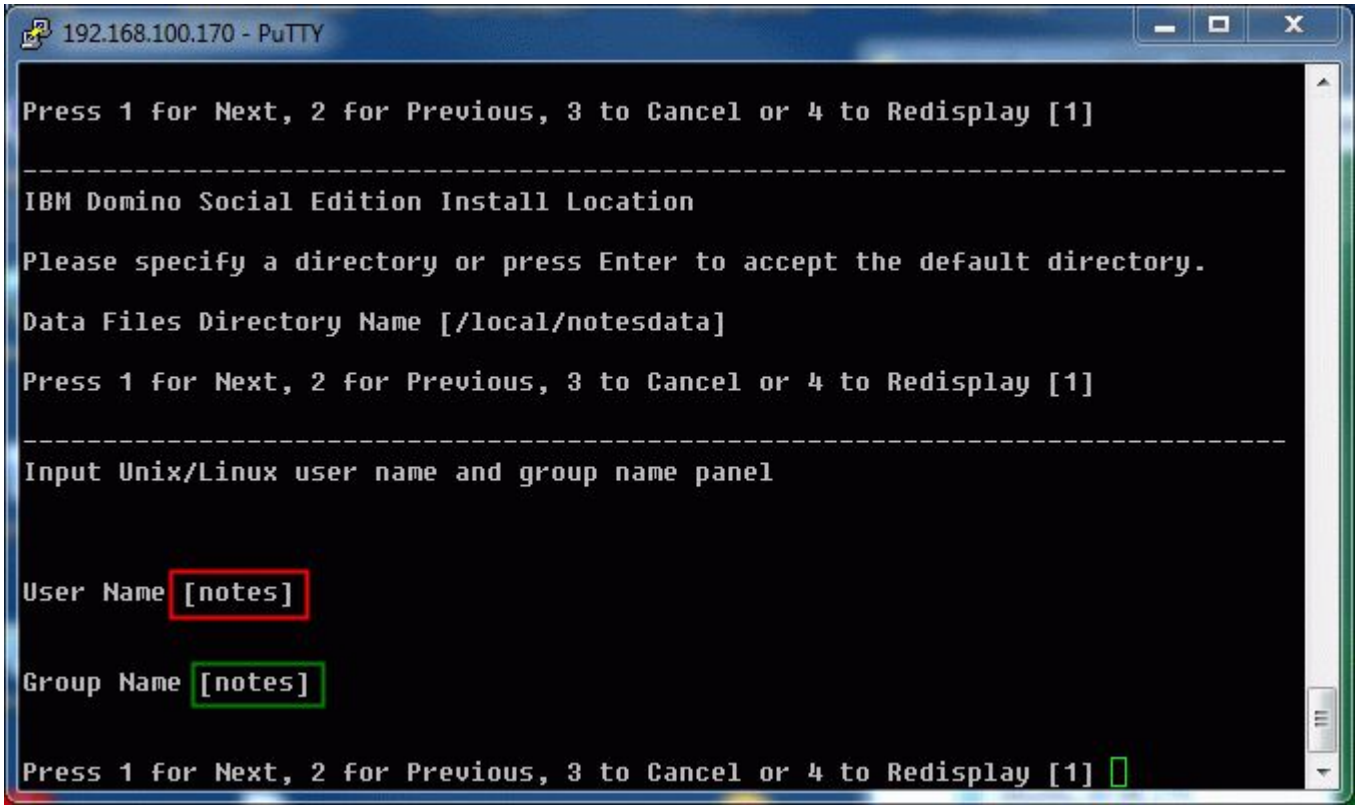
- Read and confirm the License
- Type “1” and “Enter”

Installation Directories



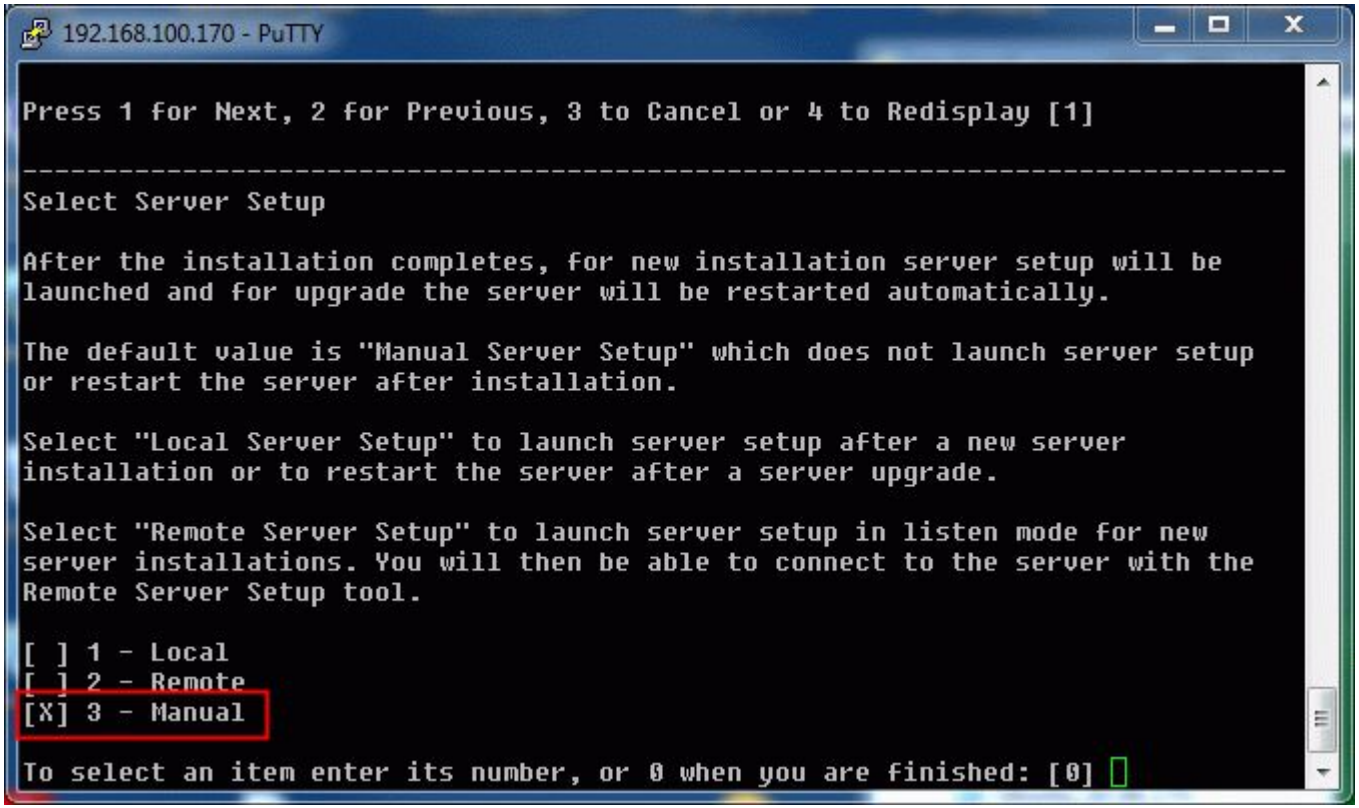
- Keep the defaut for binaries if you can
  - Domino 8.x: /opt/ibm/lotus
  - Domino 9.x: /opt/ibm/domino
- Data Directory can be anywhere but default is used quite often
  - /local/notesdata
- Confirm selection with “Enter”

User and Group for Domino Server



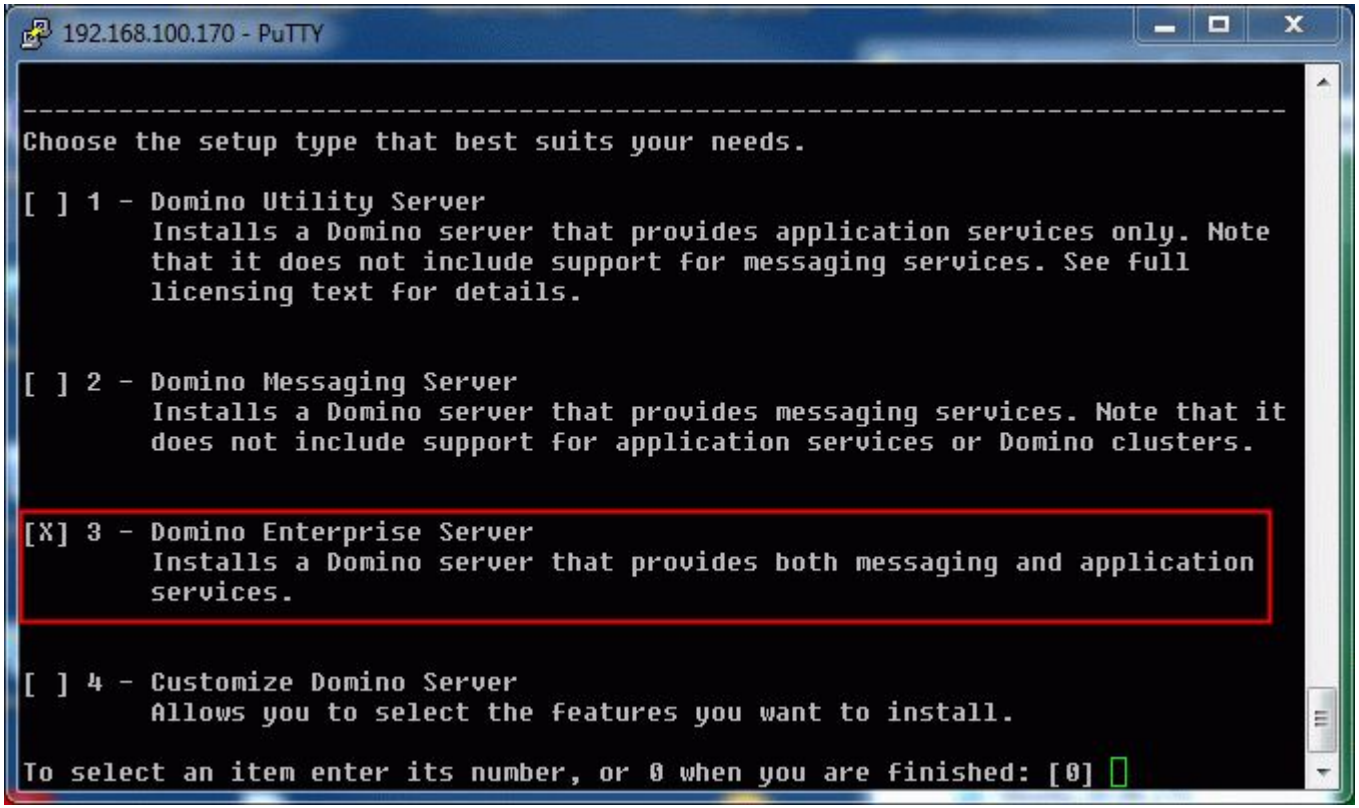
- By default the user and group “notes” is used
- User and Group need to exist before the installation
  - That's why we created user and group earlier
- Confirm selection with “Enter” and continue
  - “[1]” is already selected

Configuration Mode



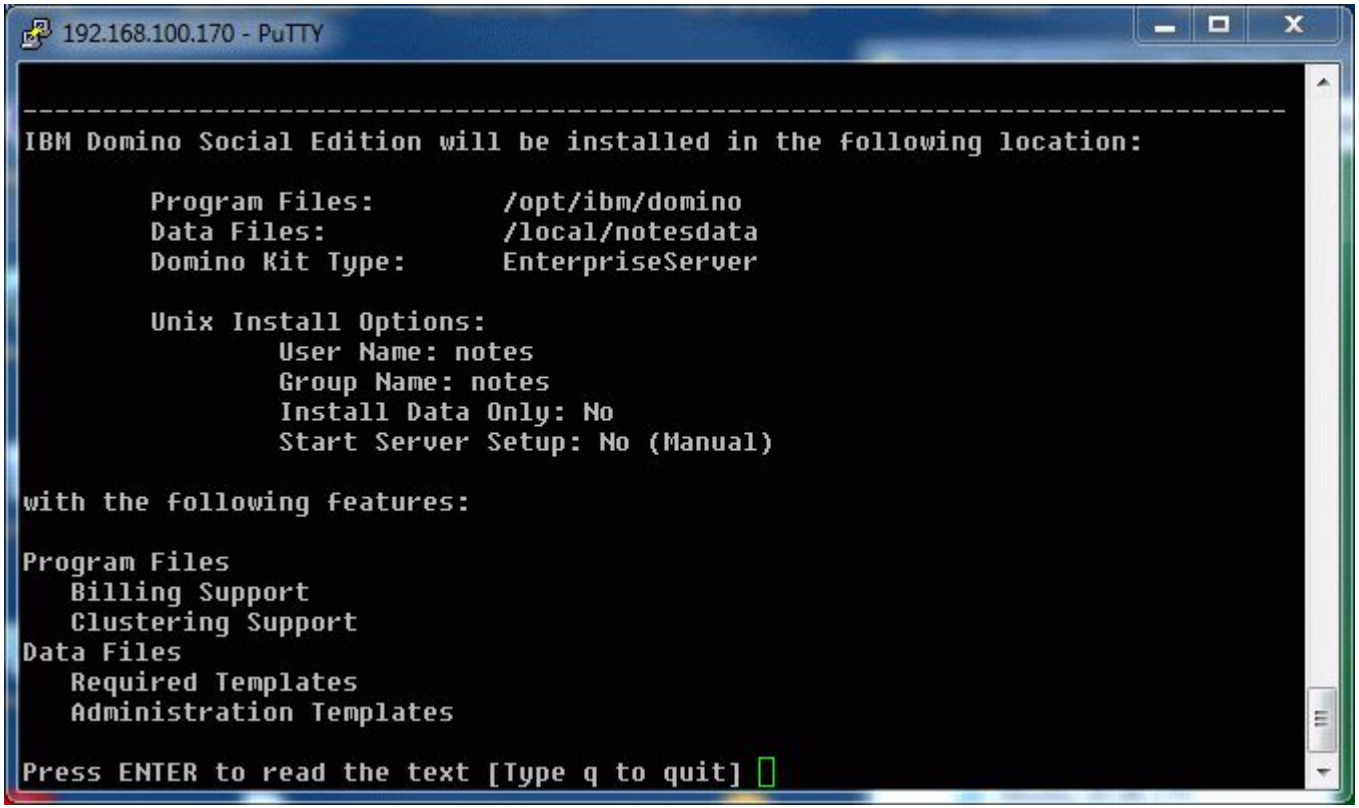
- Different options available
  - Manual means you specify how to install depending how you invoke the server
- Keep “Manual” and confirm with “Enter”
  - More details about configuration in a minute

Server Type



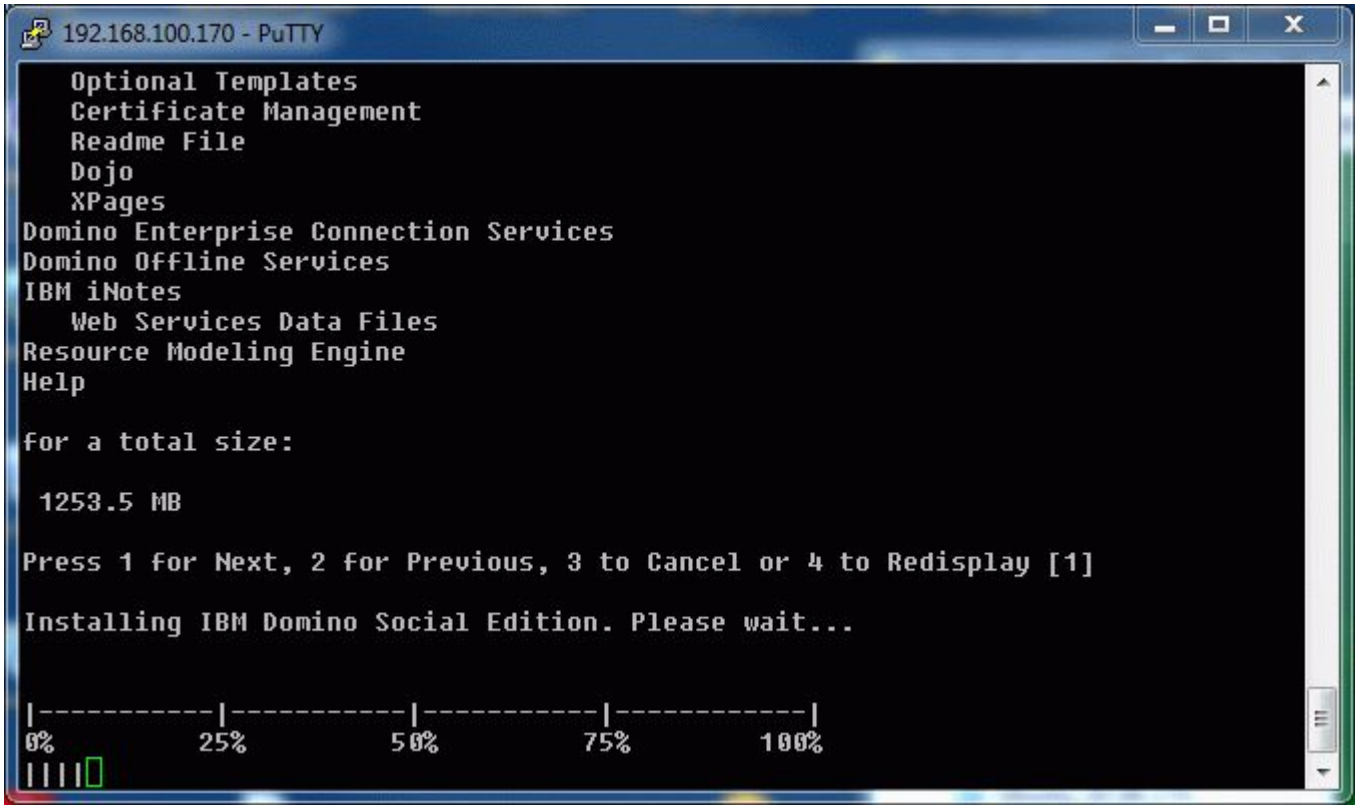
- In most of the cases the server type “Domino Enterprise Server” is what you want to install
- But there might be other options depending on your needs
- Enterprise Server is pre-selected
- Confirm selection with “Enter”

Installation Preparation Summary



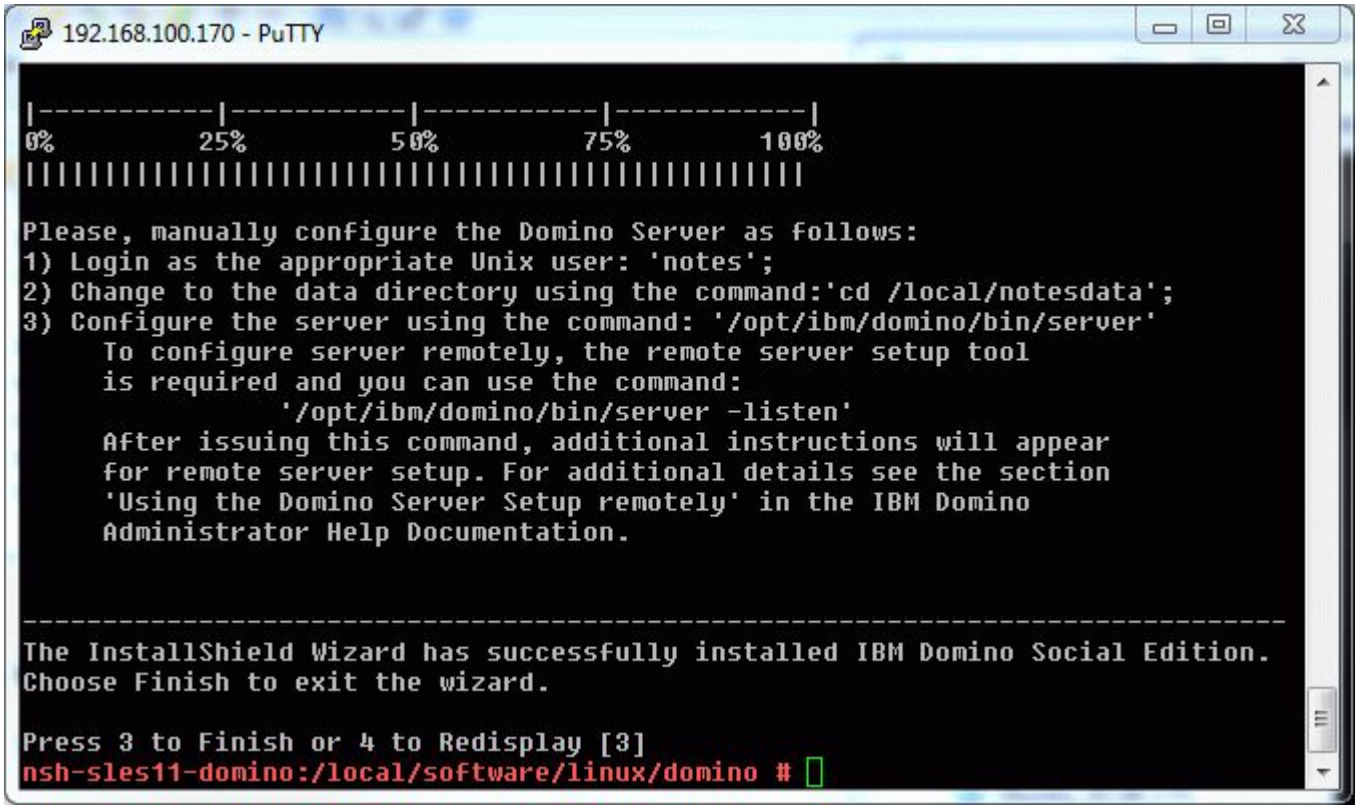
- Review the Configuration Summary and confirm with “Enter”

Installation



- Installation takes a couple of minutes
  - The uninstaller is created in the last step and the install might looks like hanging at 100% for a while
  - That's normal
- Installation should take only a couple of minutes

Installation Done



- Press “Enter” to terminate the finished installation
- Installation is fast and straight forward
- There is not much that can go wrong
- If you typed in something in the wrong way you can always go back

Fixpack & Hotfix Installer

- Installer looks different than Fixpack installer
  - Fixpack installer uses “**Tab**” instead of “**Enter**”
  - Based on IBM code not InstallShield
- Fixpack / Hotfix is only aware of the standard location for binaries and data
- If you switch chose a different binary directory you need an environment setting “**NUI_NOTESDIR**” to specify the location
  - If you keep the original location you don't need this
- Example: export **NUI_NOTESDIR=/opt/domino**
- This allows the installer to find .install.dat
  - .install.dat contains all information about the installed Domino version

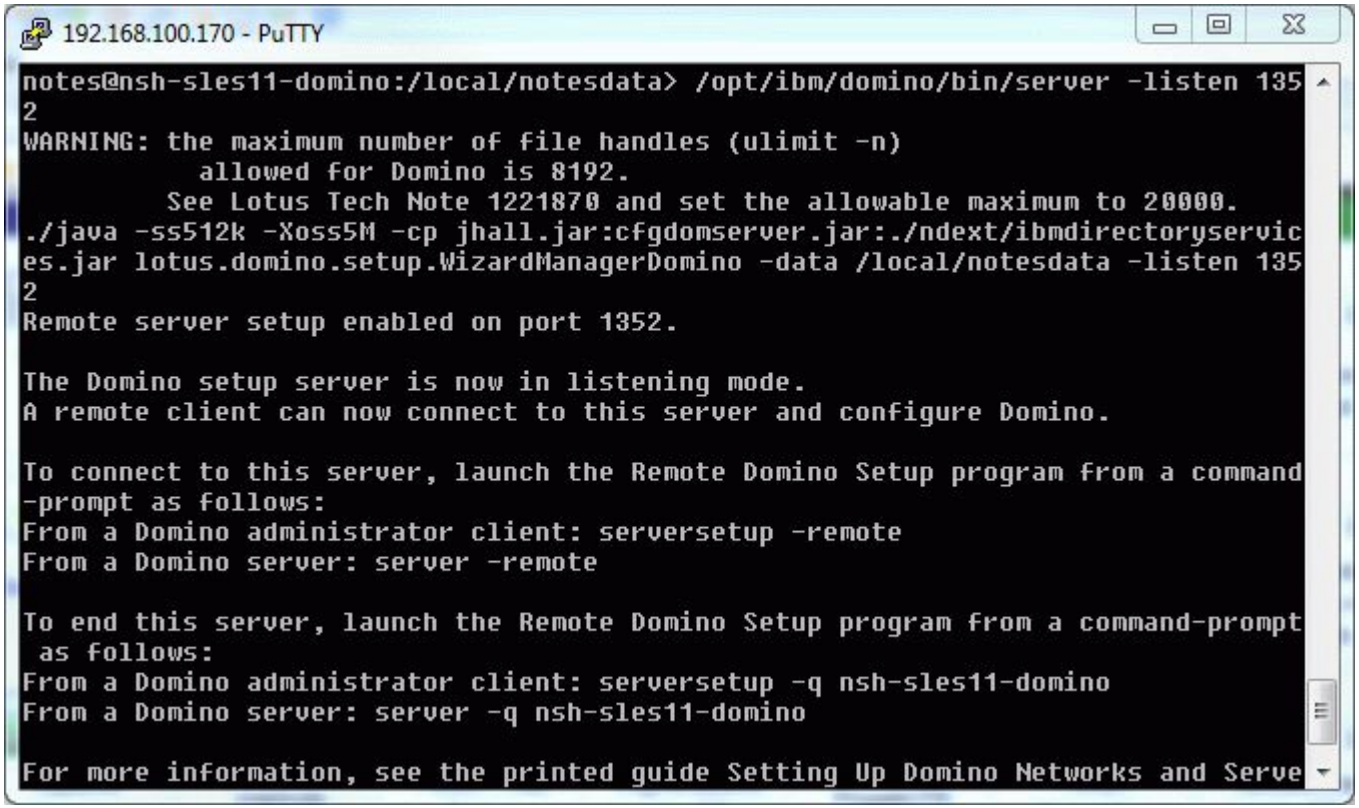
Domino Server Configuration

- Now that we have installed the Server we have two options to configure the server

- a.) Remote Setup
  - Start Server in “Listen” mode
  - Connect via Remote Setup Utility to the server
  - See some screen prints on the next slides

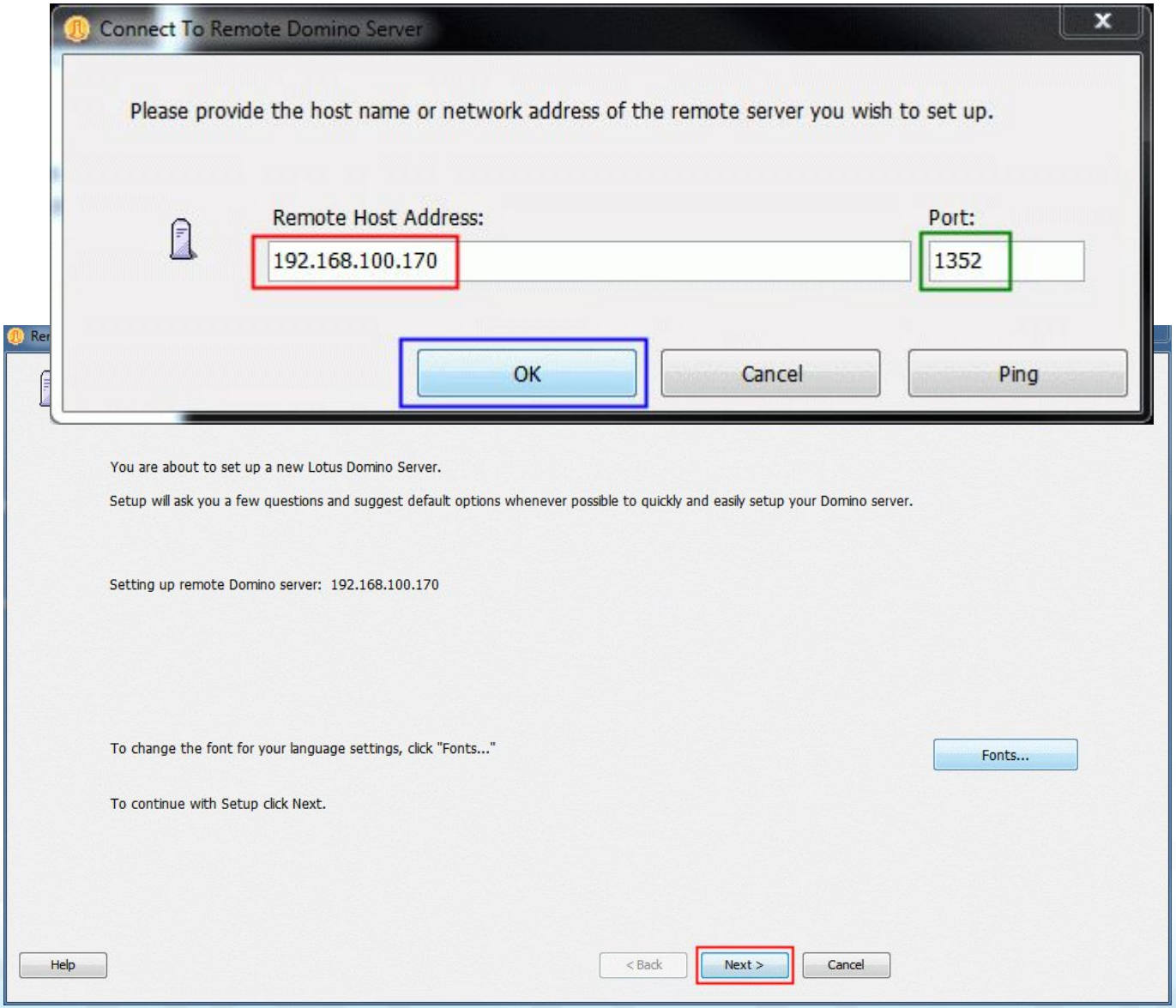
- b.) Local Setup using the Graphical Interface
  - Just start the Icon installed on the notes user's desktop
  - See live demo

Start Server in “Listen” Mode



- Login as “notes” user
- Switch to data directory
  - cd /local/notesdata
- Run server via -listen Option
- /opt/ibm/domino/bin/server **-listen 1352**
- Tip: You can specify a port number instead using the default port (8585)
- In my case I have used 1352 because this port is already open in the firewall

Connect to Server via “Remote Server Setup”



- Invoke “Remote Server Setup”
  - Installed as an option in Admin Client
  - serversetup.exe
- Connect to Domino Server on Linux via IP Address and port the server is currently listening on
- Setup looks very similar to a Domino on Windows server setup

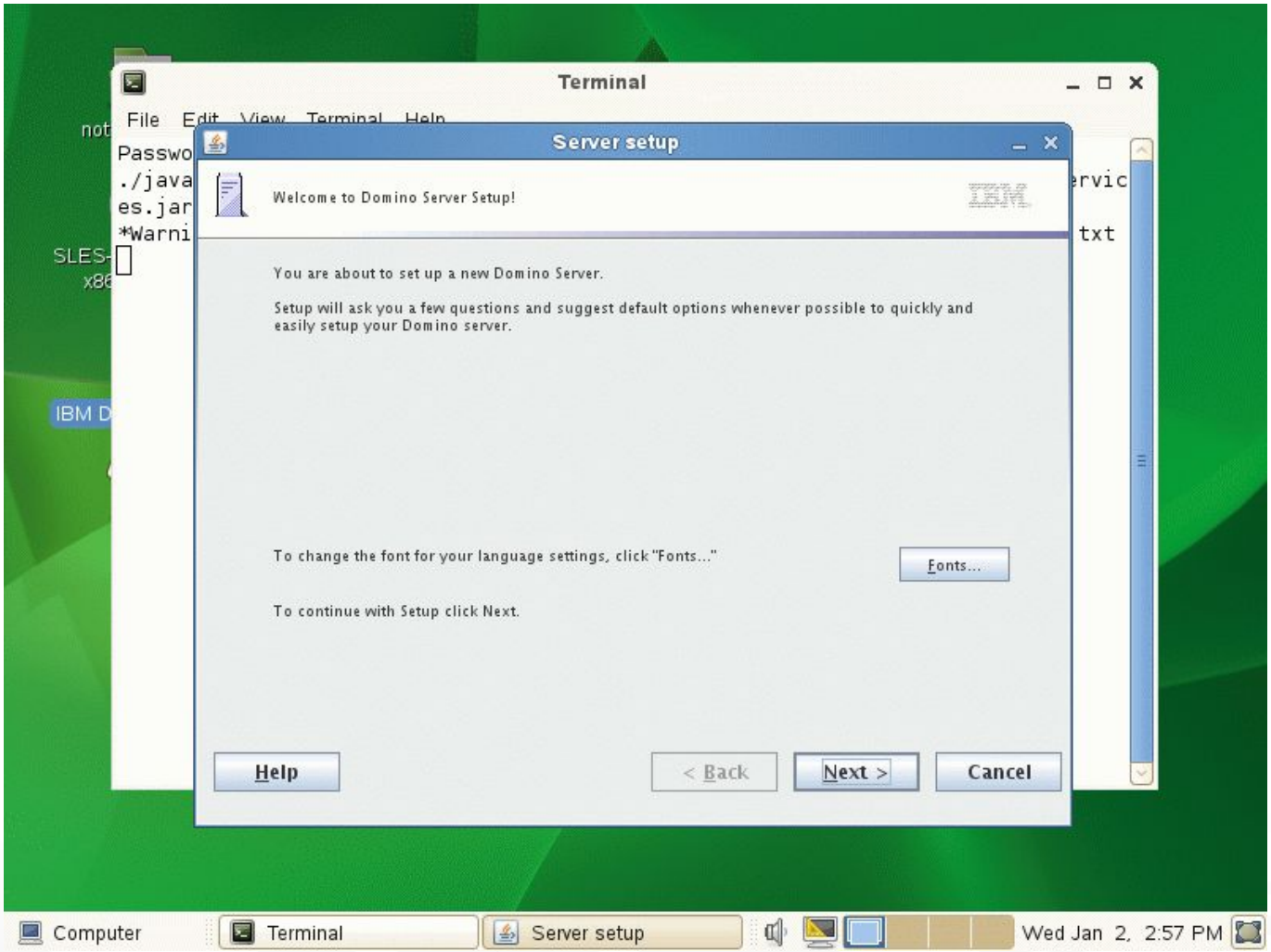
Local Configuration

- Login via “notes” User instead of the “root” user
- Click on “IBM Domino Server” icon on desktop
  - Configuration will start on first server invokation
- You might have to type in the “notes” password again

Domino 9 Social Edition Splash Screen

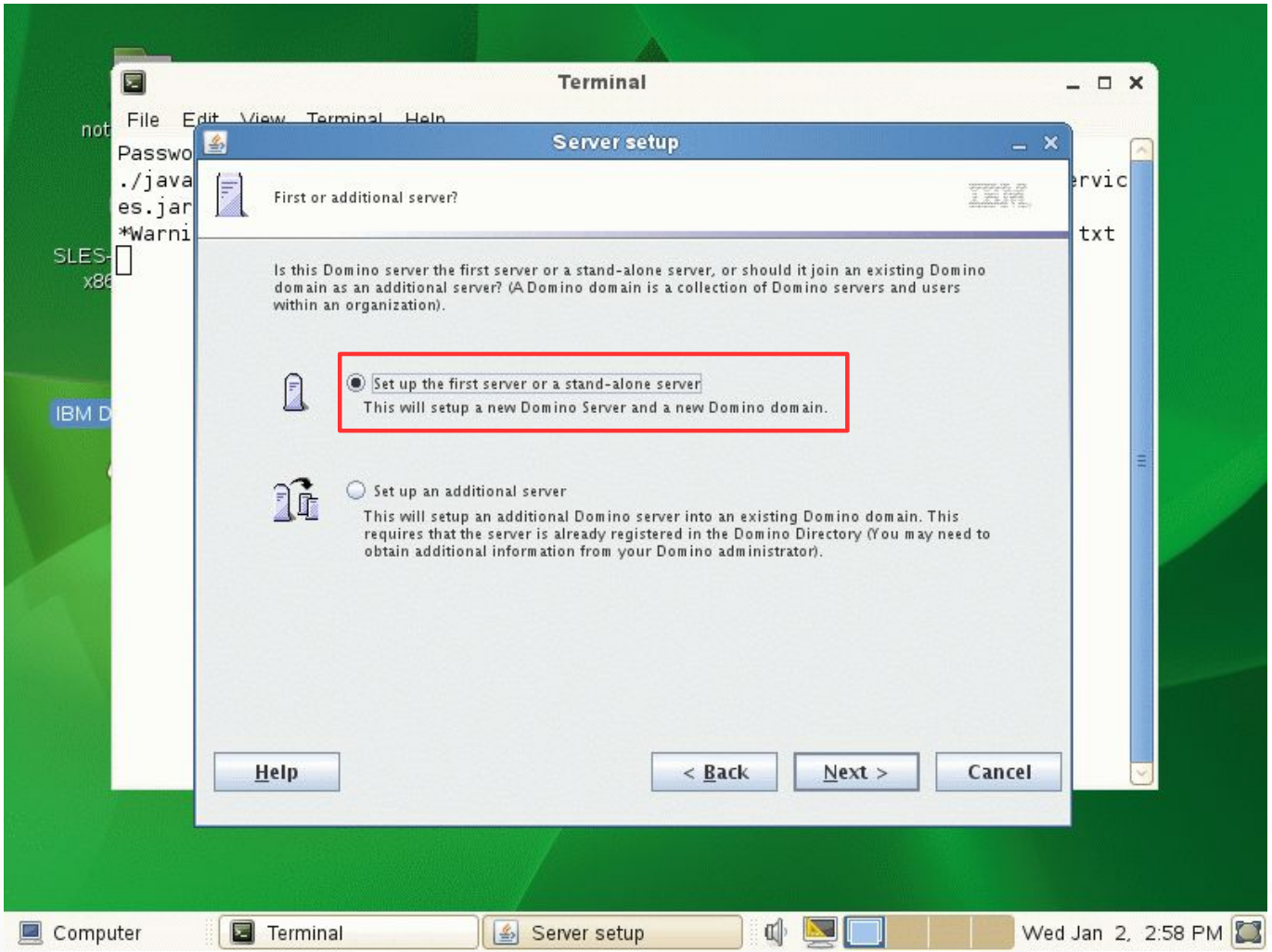
- New Splash Screen
- Configuration looks very similar to Windows
  - No surprises

Font Setup



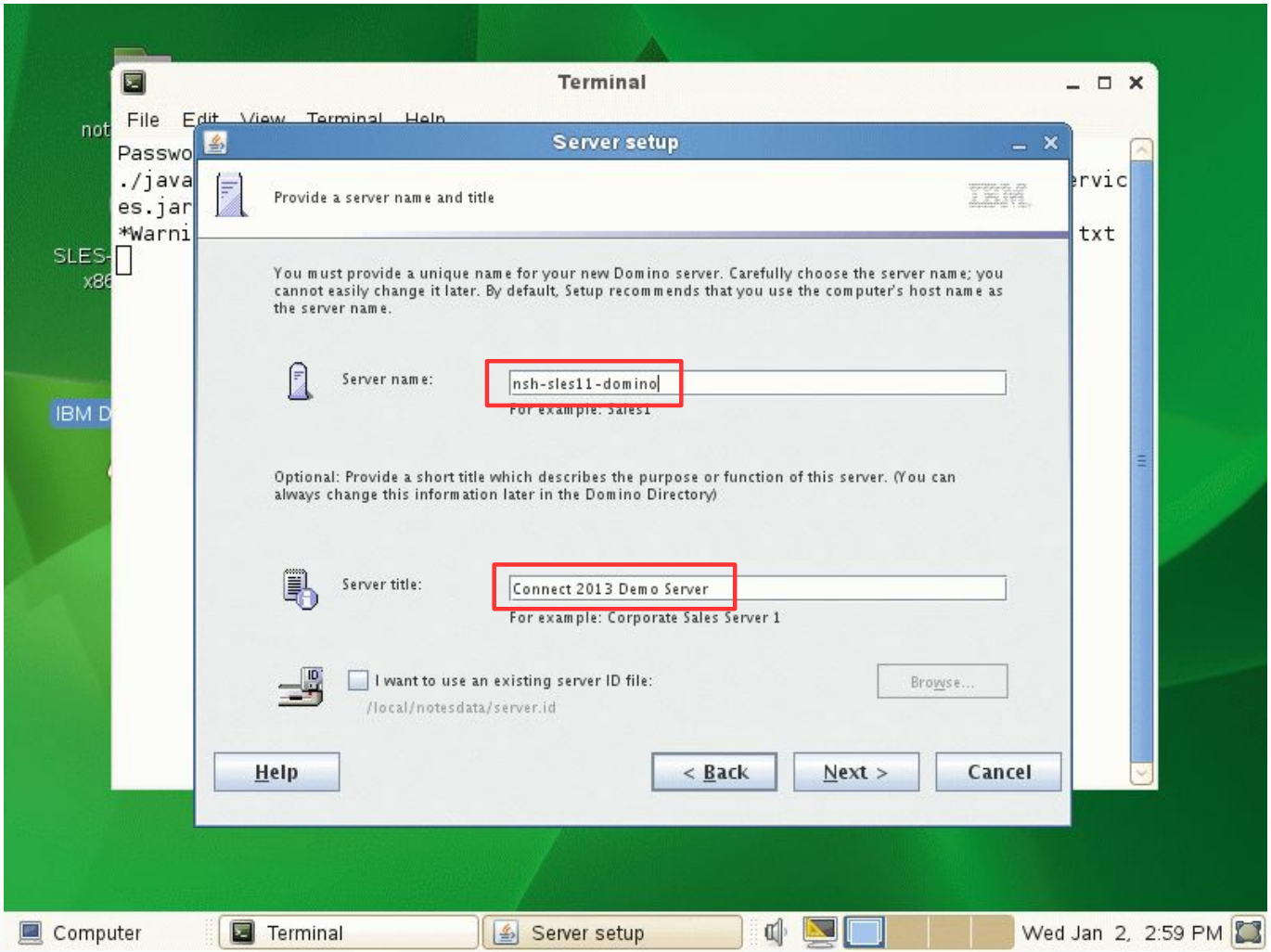
- The Fonts should match
- Just confirm with “Next”

First Server Setup



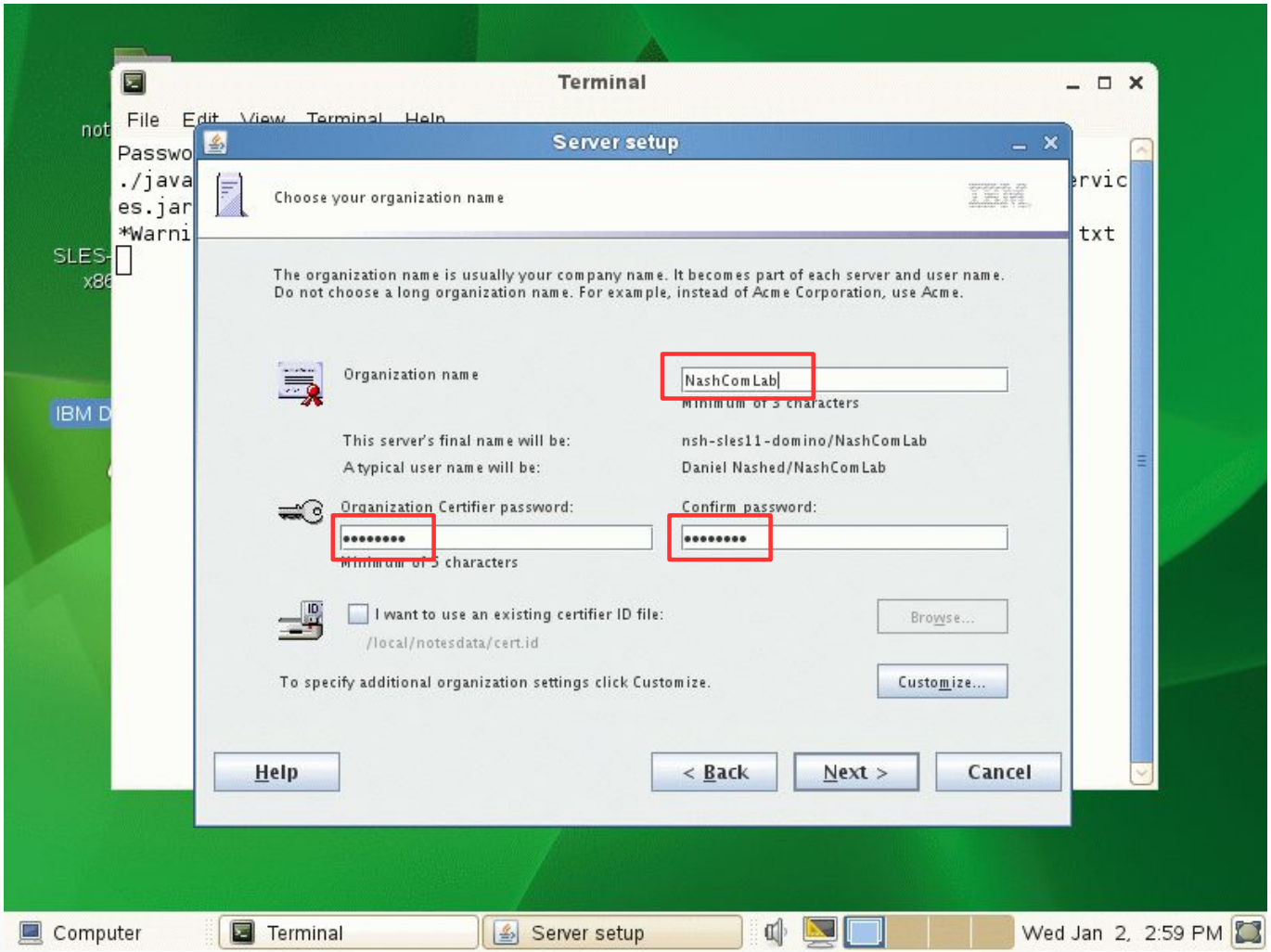
- Normal Setup
- Just specify first Server and Click “Next”

Specify Server Name



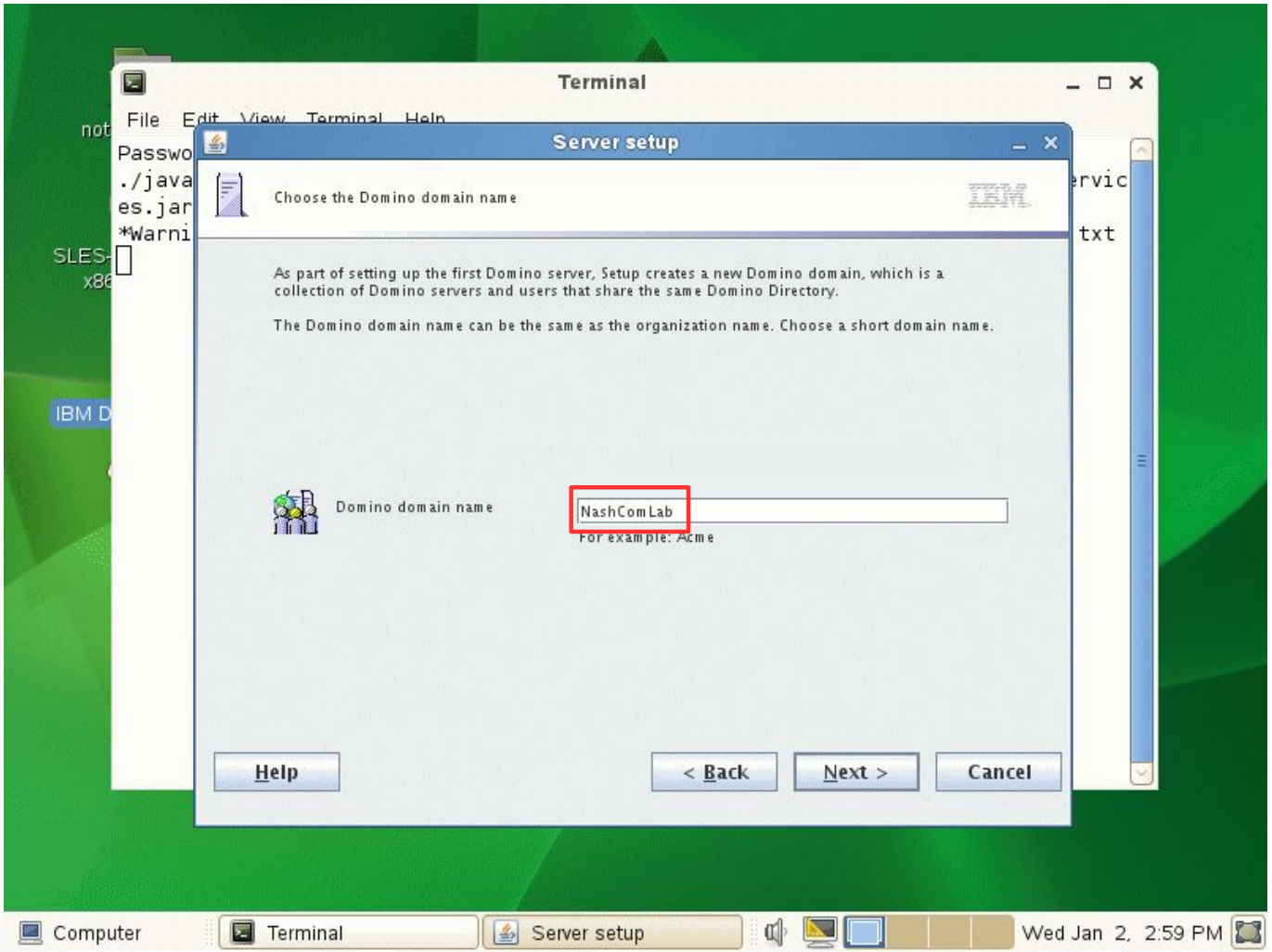
- Type in Server name and Title
- Press “Next”

Specify Organisation and Password



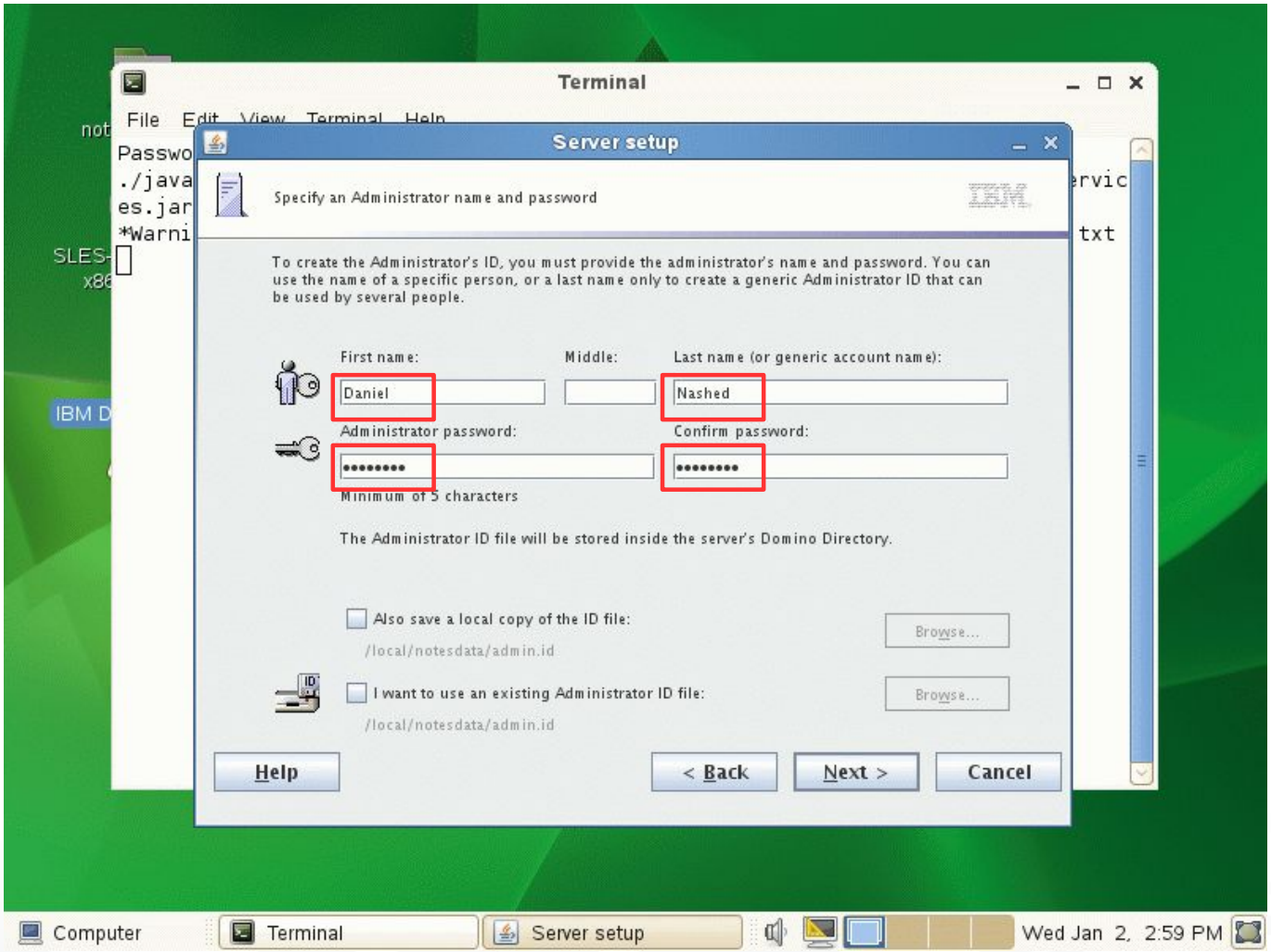
- Type in Organization Name and Password
- Press “Next”

Specify Notes Domain



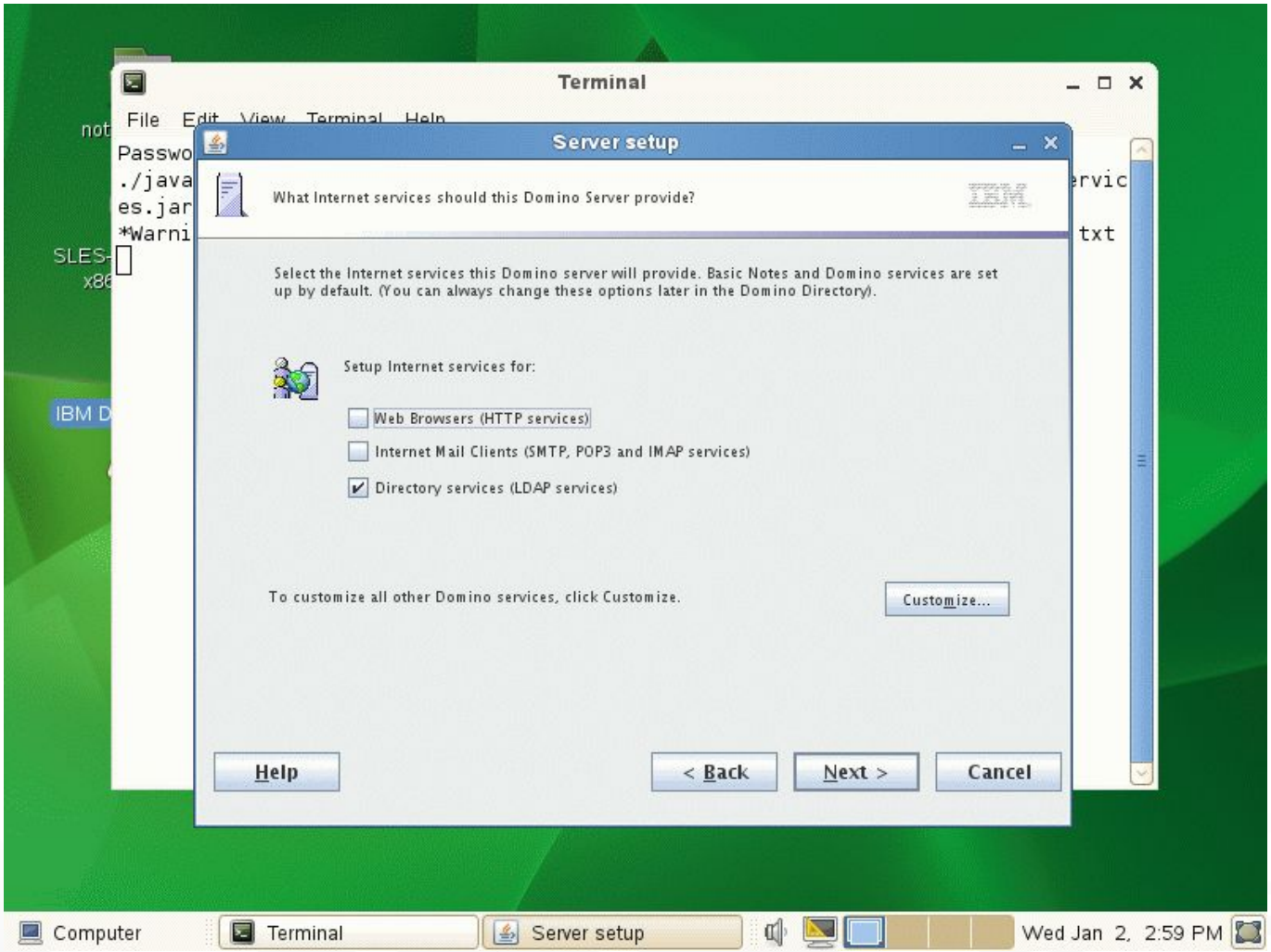
- Type in Notes Domain
- Press “Next”

Specify Admin User



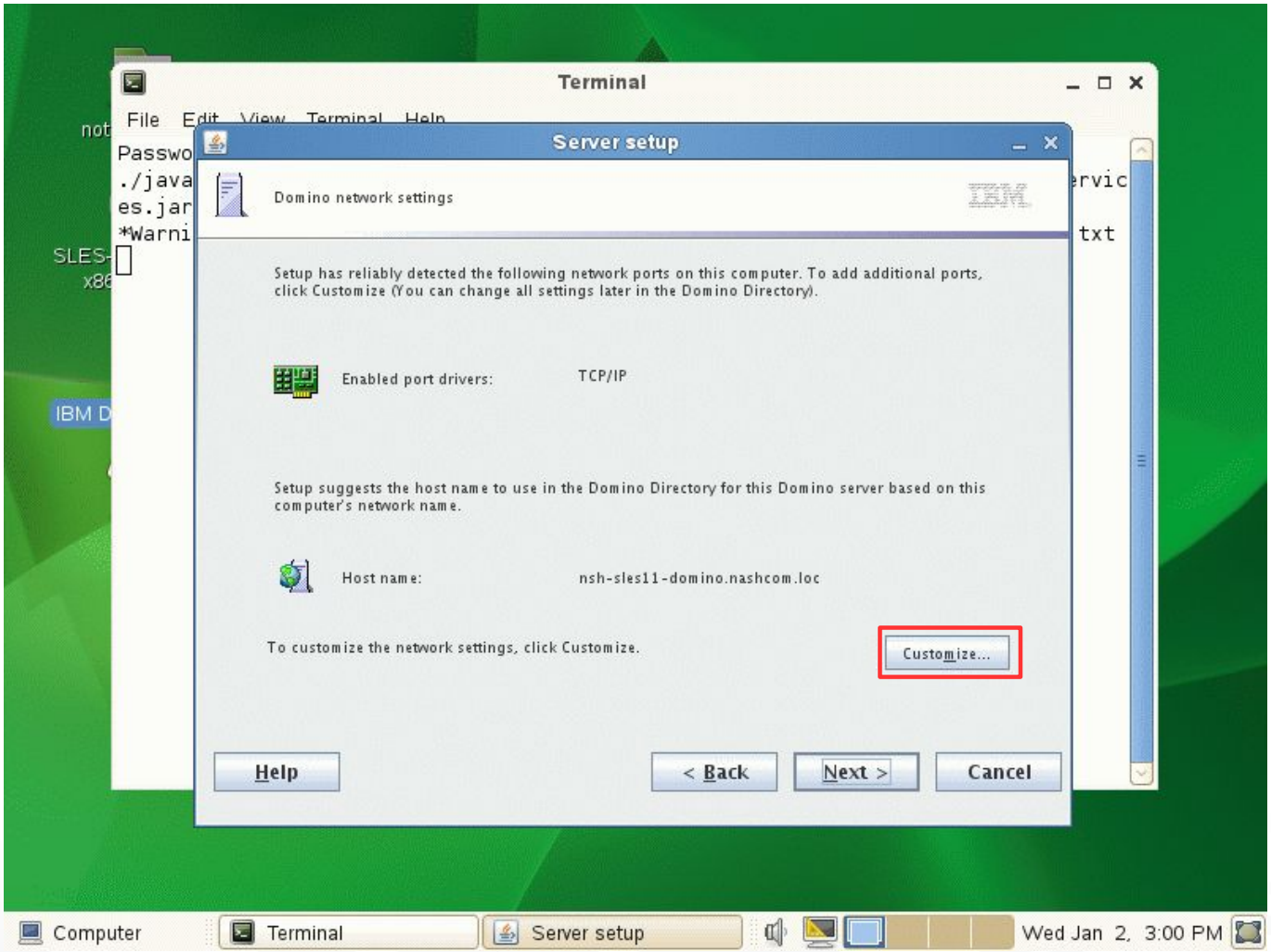
- Type in information for Admin User including Password
  - You might want to save a local copy of the ID
- Press “Next”

Configure Internet Services



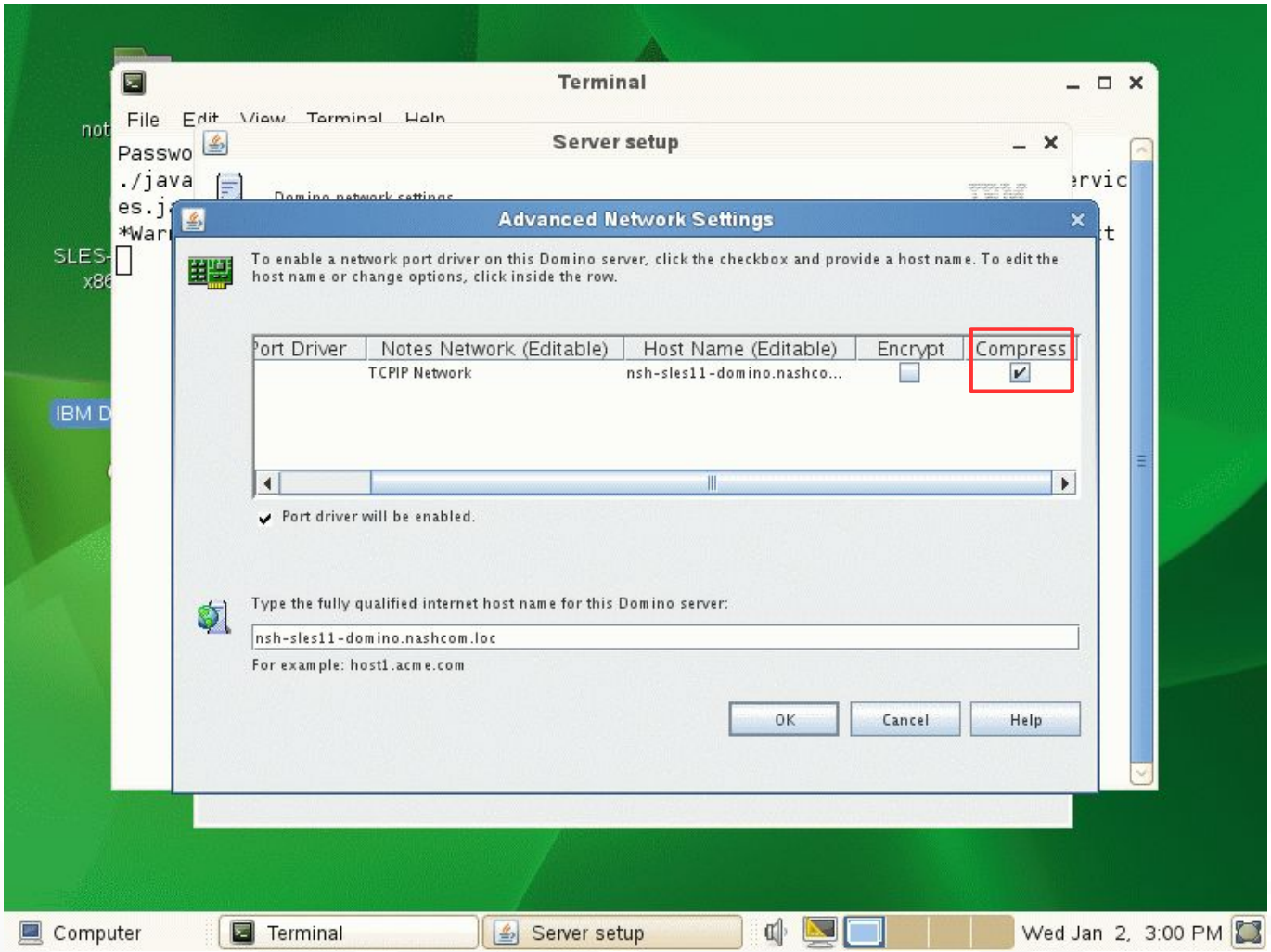
- Select the Internet Services you want to enable
- Press “Next”

Customize Network Settings



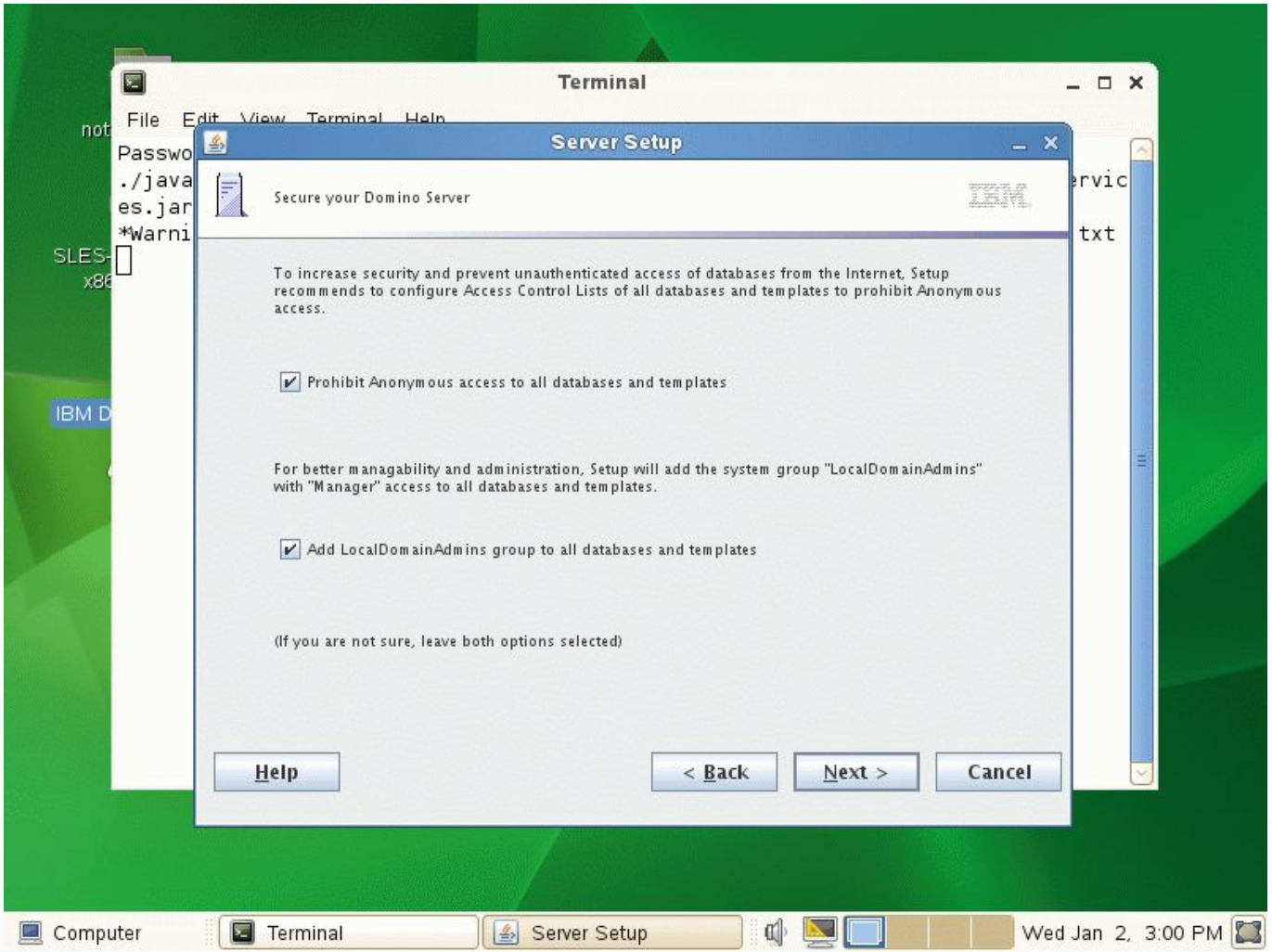
- Press "**Customize**" to change network settings

Enable Network Compression



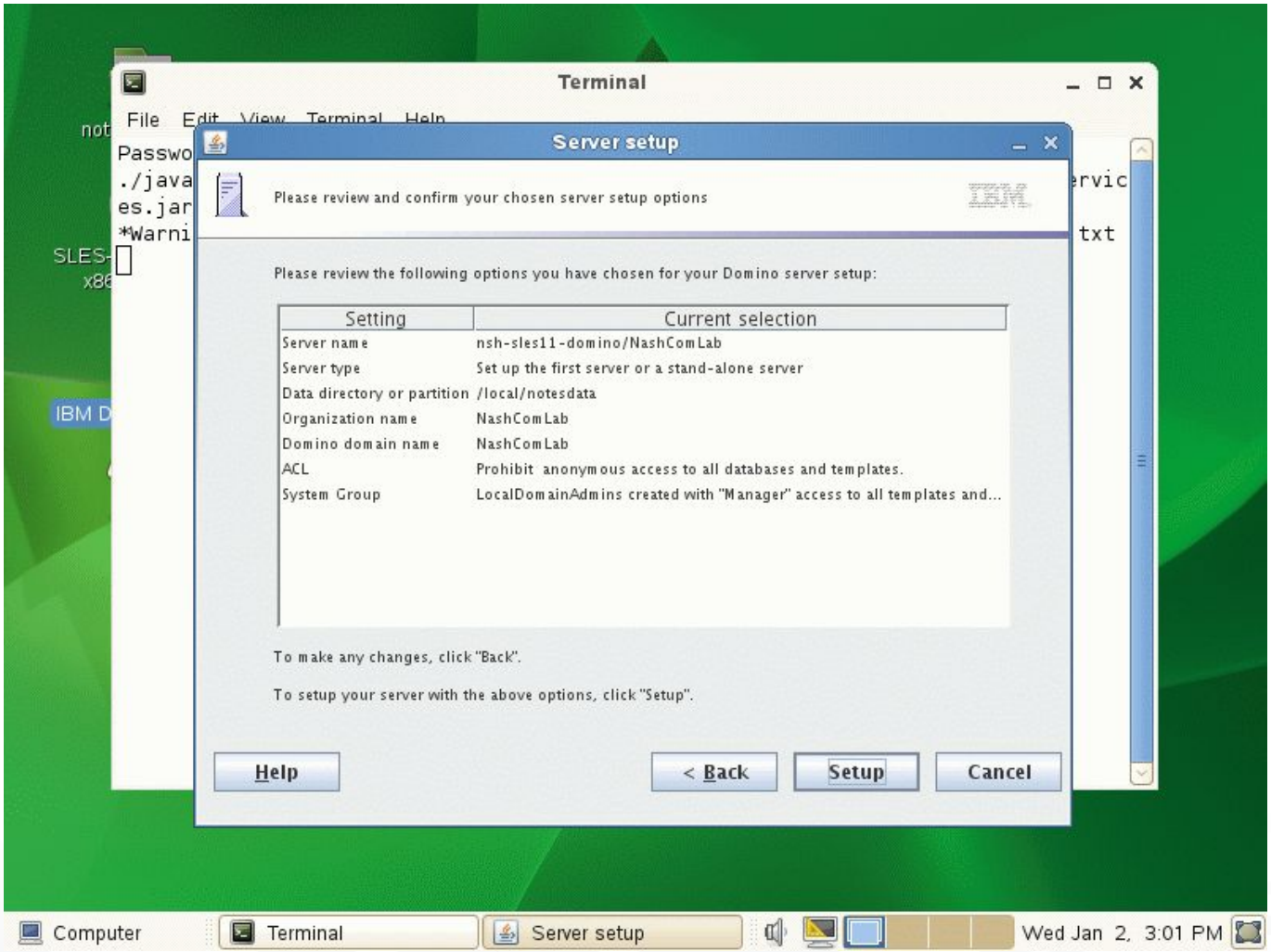
- Verify Settings
- Select “Compress” Option and press “OK”

Domino Server Database Security



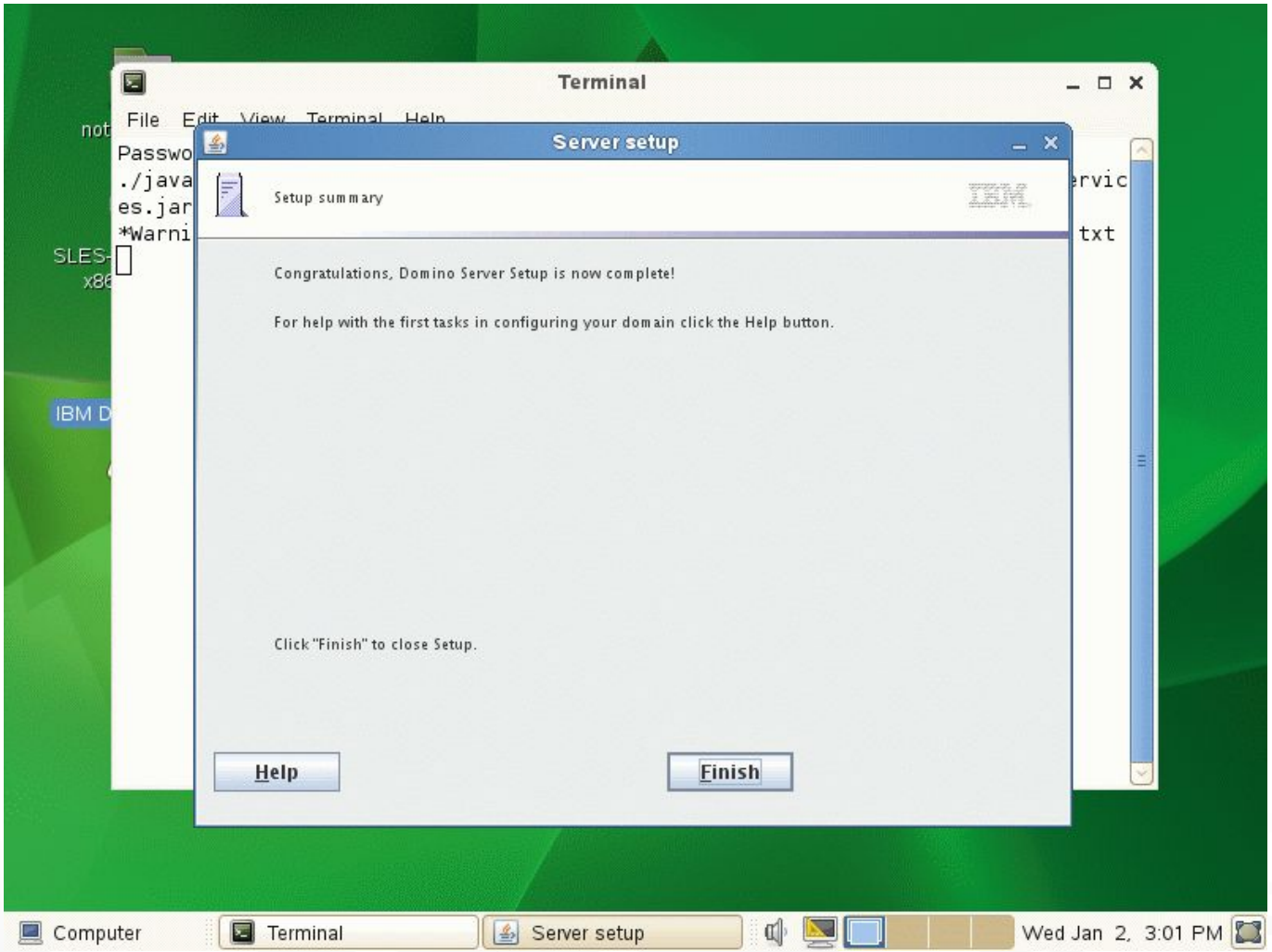
- Confirm the standard Security Settings
  - Press “Next”

Setup Summary before Configuration



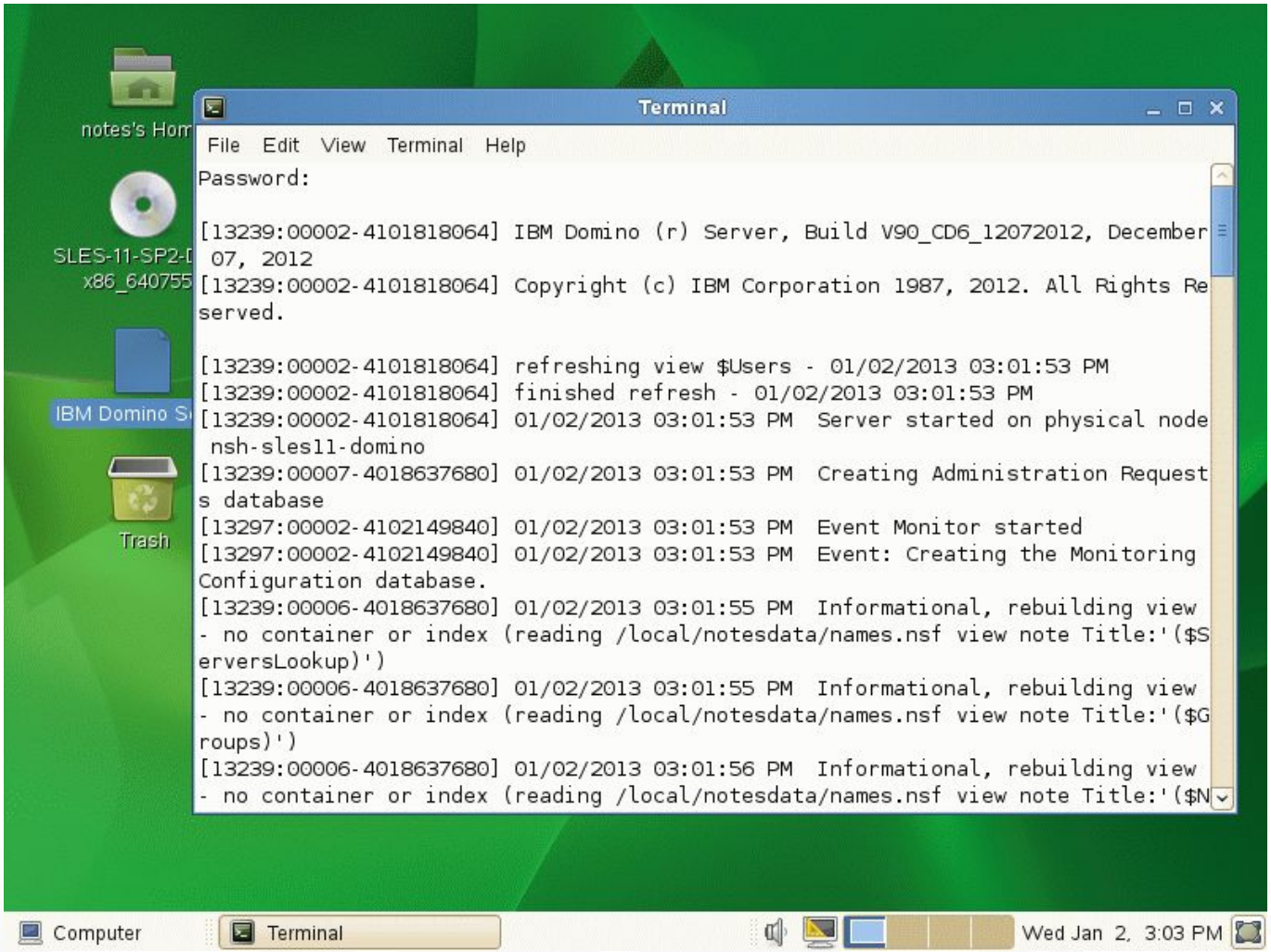
- Check the Setup Summary and confirm via “Setup”

Configuration Done



- Press “Finish” to start the server for the first time

Started Domino Server



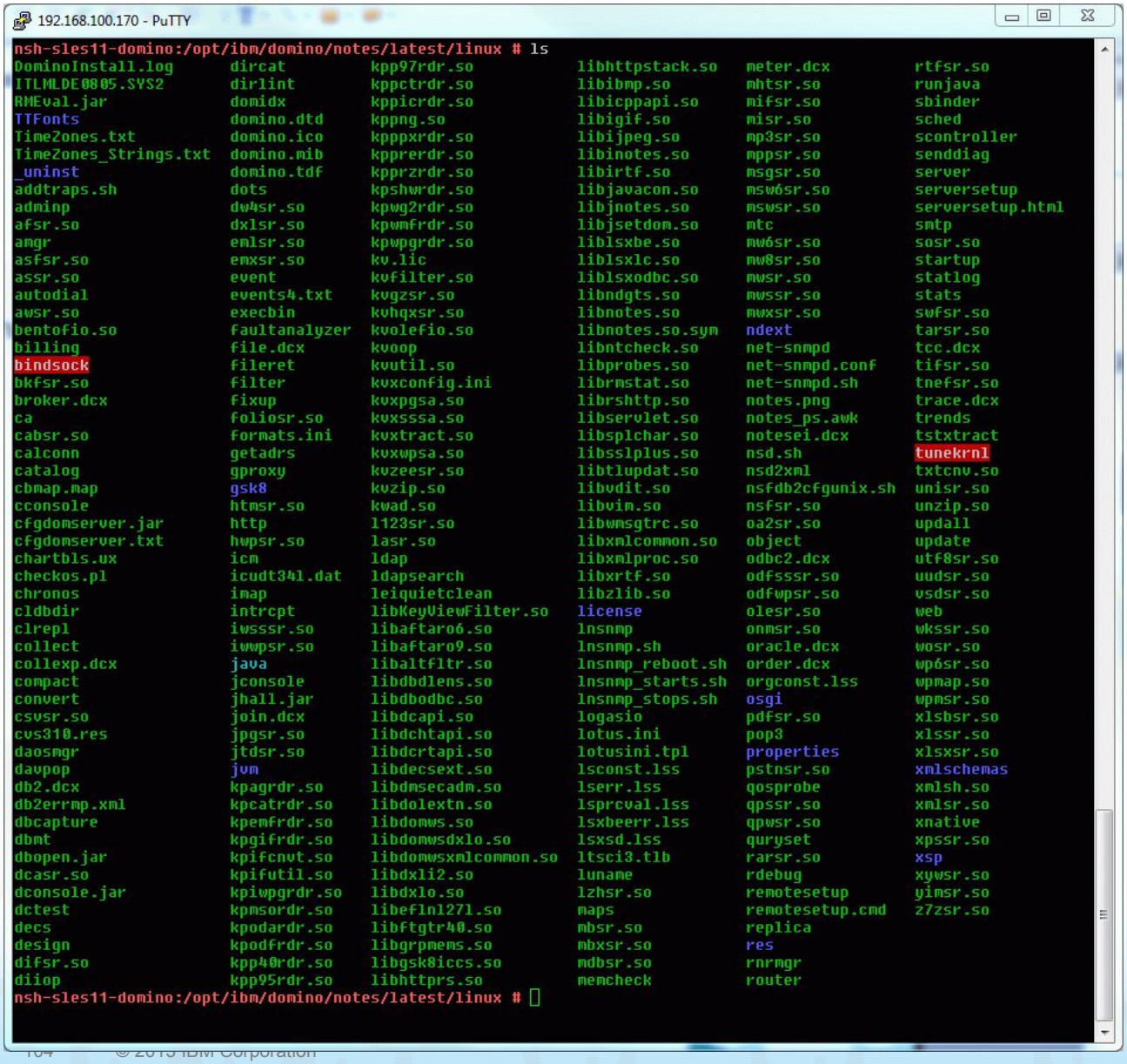
- Domino Server runs in Terminal Window very similar how it runs on Windows

Let's take a look at the server

- Domino Binary Directory **/opt/ibm/domino**
  - Directory "**bin**": contains startup links for all binaries like server, replica, etc
    - All those links are also links to an internal start script
      - Used to configure the environment for the process
      - Each add-on product should have also a startup link
  - Directory "**notes**" : contains sub-directories and links.
  - "**latest**" points to "**linux**" which contains all binaries

```
# cd /opt/ibm/domino/
# ls -l
total 12
-rw-r--r-- 1 root root  766 Jan  2 14:31 .install.dat
drwxr-xr-x 3 root root 4096 Jan  2 14:30 bin
drwxr-xr-x 3 root root 4096 Jan  2 14:30 notes


 cd notes
# ls -l
drwxr-xr-x 3 root root 4096 Jan  2 14:29 90000
lrwxrwxrwx 1 root root    5 Jan  2 14:30 latest -> 90000
# cd latest/
# ls
linux
```

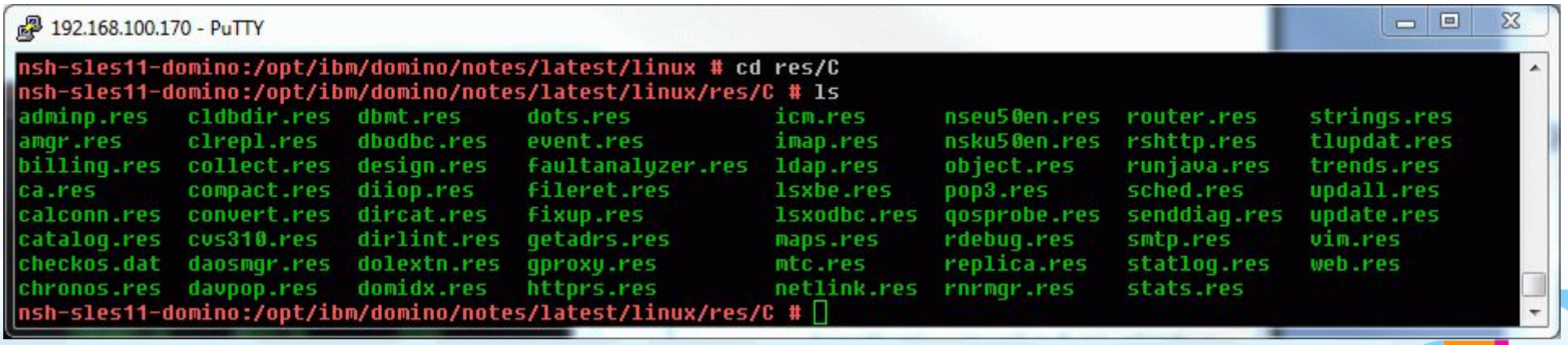
Binary Directory



- Contains all Binaries and a couple of sub-directories
- Special files
  - **bindsock** - used to bind to restricted ports below 1024
  - **tunekrnl** – invoked on startup to set Domino specifiy kernel parameters
- Directory “**res**” contains string resources like error texts etc

Resource Directory “res”

- Files contain string resources for Domino binaries
  - If they are missing or wrong you don't get error messages but cryptic error codes!
- Often an installation issue
- The sub-directory should be called “**res/C**”
- C is the Posix locale and fallback for all other languages
- If the directory name is something like “**en_US..**” and your server uses a different locale like “**de_DE..**” you will run into issues.
- Also often an issue with updates
  - If the installer writes into a different directory!



.Install.dat

- .install.dat: contains installation information – on Windows this information is stored in Registry
  - This information is also used for remote server setup
  - Of special interest for partitioned servers – contains location of data directories and user names

```
 add_data_directories_only = 0
 asp_install_option =  0
 components = ("License","Program Files","Data Files","Domino Enterprise Connection Services","Domino
Offline Services","IBM iNotes","Domino Directory Sync Services","Domino As A Windows Service","Performance
Monitoring","Resource Modeling Engine","Help","OS Integration","OS Integration Linux","IBM HTTP Server")
  data_directories {
        "/local/notesdata" {
        data_UNIX_gid = 1000
        data_UNIX_group = notes
        data_UNIX_uid = 1001
        data_UNIX_user = notes
        }
        }
 installation_type = 2
 isLocal = 1
 kitArch = linux
 opt_domino_softlink = 0
 pPath = /opt/ibm/domino/notes/90000/linux
 program_directory = /opt/ibm/domino
 ptPath = /opt/ibm/domino
 rev = 90000
 start_server_setup = 0
```

Data Directory “/local/notesdata

- Contains the full data directory exactly like on Windows
- Ownership of the files is the user and the group used for installation (notes:notes)
  - Warning: Take care when transferring or creating files with other users!!!
  - If the “notes” user cannot read or write those files because of permission issues you are in trouble!
- Best practice: Always use the “notes” user for all operations
  - “**su – notes**” switches to the user in case you are root
  - “**whoami**” tells you which user you are
  - The server cannot be stared with “root” for that reason
- Recommendation: Create all file names e.g. for databases with **lower-case** without **umlauts**!!!
- **THE LINUX FILE-SYSTEM IS CASE SENSITIVE!!!**

Linux File and Directory Permissions

- Linux (Unix) uses 3 different types of rights for 3 different types or classes
- Types
  - Read = r
  - Write = w
  - Executable = x
- Classes
  - Owner = the owner of a file
  - Group = the group who owns a file
  - World = all Others
- There are two representations
  - Text and Octal Numbers
  - Each right is defined by a bit
    - 1 = x, 2=w, 4=r

Permission Octal Values

- 0 --- no permission
- 1 --x execute
- 2 -w- write
- 3 -wx write and execute
- 4 r-- read
- 5 r-x read and execute
- 6 rw- read and write
- 7 rwx read, write, and execute

- Different meanings for directories
  - Read = read directory
  - Write = write entries in directory
  - Execute = switch into directory

List Permissions and Examples

- You can list permissions for a file via “ls -l” (long version of the list command)
  - Tip: You can also see and can change permissions in WinSCP

```
/local/notesdata # ls -l notes.ini
-rw-r--r-- 1 notes notes 2089 Jan  4 00:39 notes.ini


/opt/ibm/domino/notes/latest/linux # ls -l libnotes.so
-rwxr-xr-x 1 root root 42618137 Dec  8 08:41 libnotes.so
```

- “ls” shows:
  - File type
  - Permissions for Owner, Group, World
  - Owner and Group
  - File Size
  - File Modifcation TimeDate
  - File Name

- File Type:
  - regular file “-”
  - directory “d”
  - symbolic link “l”

Change Permissions and Owner of Files and directories

- You can permission for file or directory using “chmod” command
- There are two different ways to specify the permissions
- Either octal representation or rwx notation (`[ugoa]*([-+=]([rwxXst]*|[ugo]))+)
  - I prefer the octal presentation (755)

```
/etc/init.d #  chmod 755 rc_domino

/etc/init.d #  chmod a+rx rc_domino
```

- You can change the owner of a file or directory using “chown” command
- Specify the user and group
- In case of a directory you might want to use -R to recurse thru sub-directories

```
/local/notesdata # chown notes:notes notes.ini

/local # chown -R notes:notes notesdata
```

Domino on Linux Mixed Case File-System Issues

- As long you stay with lower-case files you are save!
- Customers migrating from W32 have problems with mixed case file-names
- Cache issue with lower upper case characters for Notes and Web
  - Domino is case in-sensitive. The file-system is case-sensitive
  - This causes all sorts of issues with databases and directory-names
  - Sometimes a database is found sometimes it is not found
  - Quite inconsistent
  - Mail-files, Desktop, Agents, ...
  - There is no out of the box solution yet - still!

- Nash!Com has a (work-around-)solution based on an Extension-Manager routine
  - Free on Linux -- commercial on other platforms
  - Translates all requests to lower-case (Open, Create, Delete...)
  - Works fine if all database and directory names are converted to lower-case during migration
  - Has additional logging to trace problems (prints error codes from API calls)

Migration from Windows to Linux -- Differences

- Some Windows specific functionality is not supported on Unix
  - Like OLE, DDE in Backend Agents
    - Frontend Agents running in Client are OK
  - Take care about OS level or Notes API level calls
    - Can be ported but need special attention
    - For example calling Windows API → More difficult to port
    - Calling C-API from **nnotes.dll** → can be ported to call **libnotes.so**
- File-System Differences
  - Drive-Letters vs Mounted File-System in “root” file-system
  - If working with relative path you might be save
  - “/” is the path separator but in most cases also “\” works
- Native C-API Applications
  - Can be ported → C-API is cross platform
  - Most vendors support Linux
  - New challenge → Porting Applications to Domino 9 64Bit

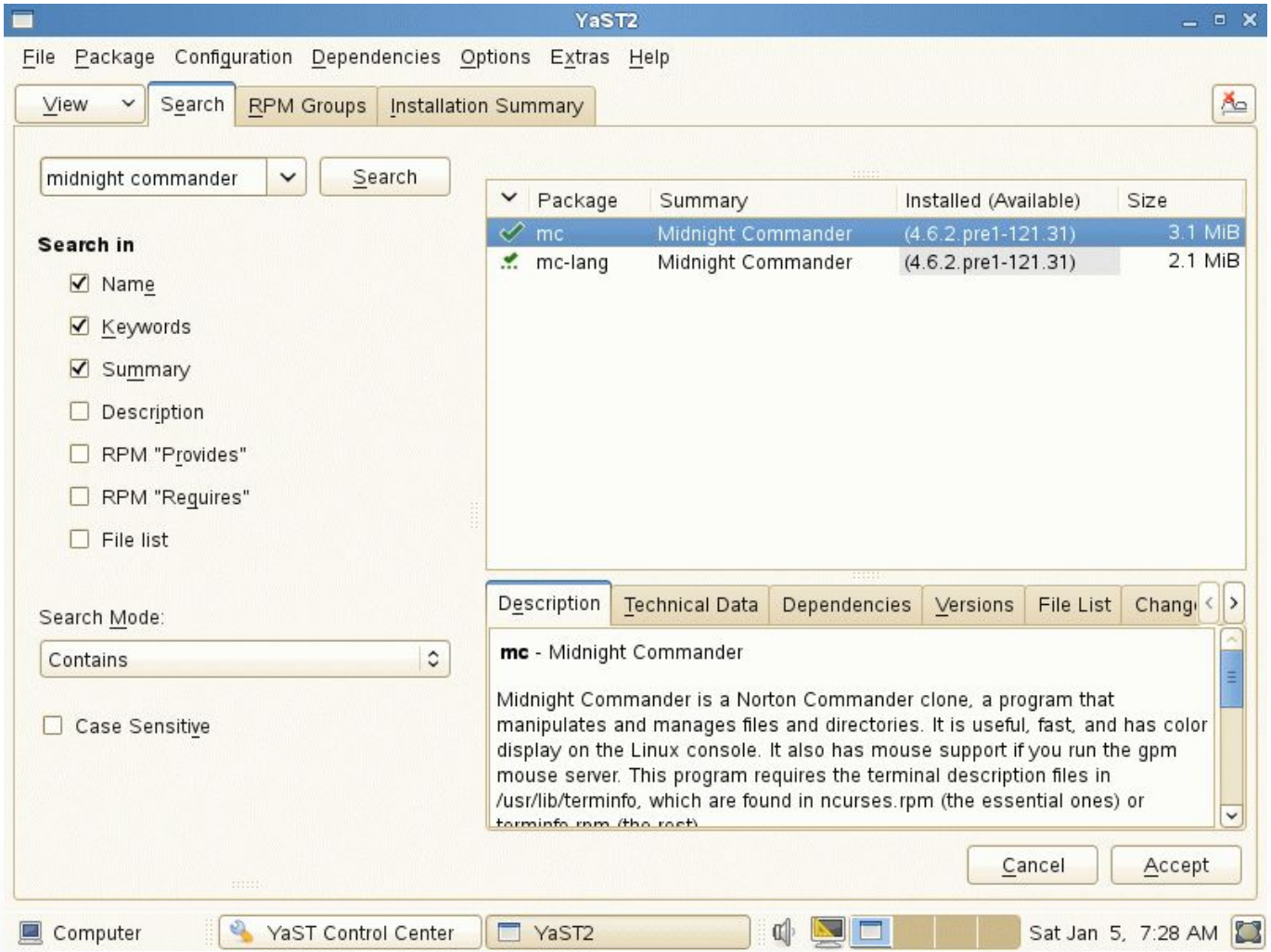
Edit Files on Linux? -- vi?

- Default is still a very very cryptic tool called “vi”
  - Very cryptic syntax and different modes
- Invoke with file like this “**vi notes.ini**”
- Now you are in command mode and can scroll around
- Edit mode
  - Create new line press “o” or “O” for new line before or after current line
  - Insert Text into Line press “i”
  - Append Text into Line press “a”
  - Remove char “x”, Remove line “d”
  - When you are done with editing press “ESC” to go back into command mode
- Type in commands via “:” in command mode
  - Save and Exit: “:wq”
  - Exit without save “:q!”
- That is weird (“vi” is a very very old tool)
- Search for “vi cheat sheet” to get good starting point

Midnight Commander (MC)

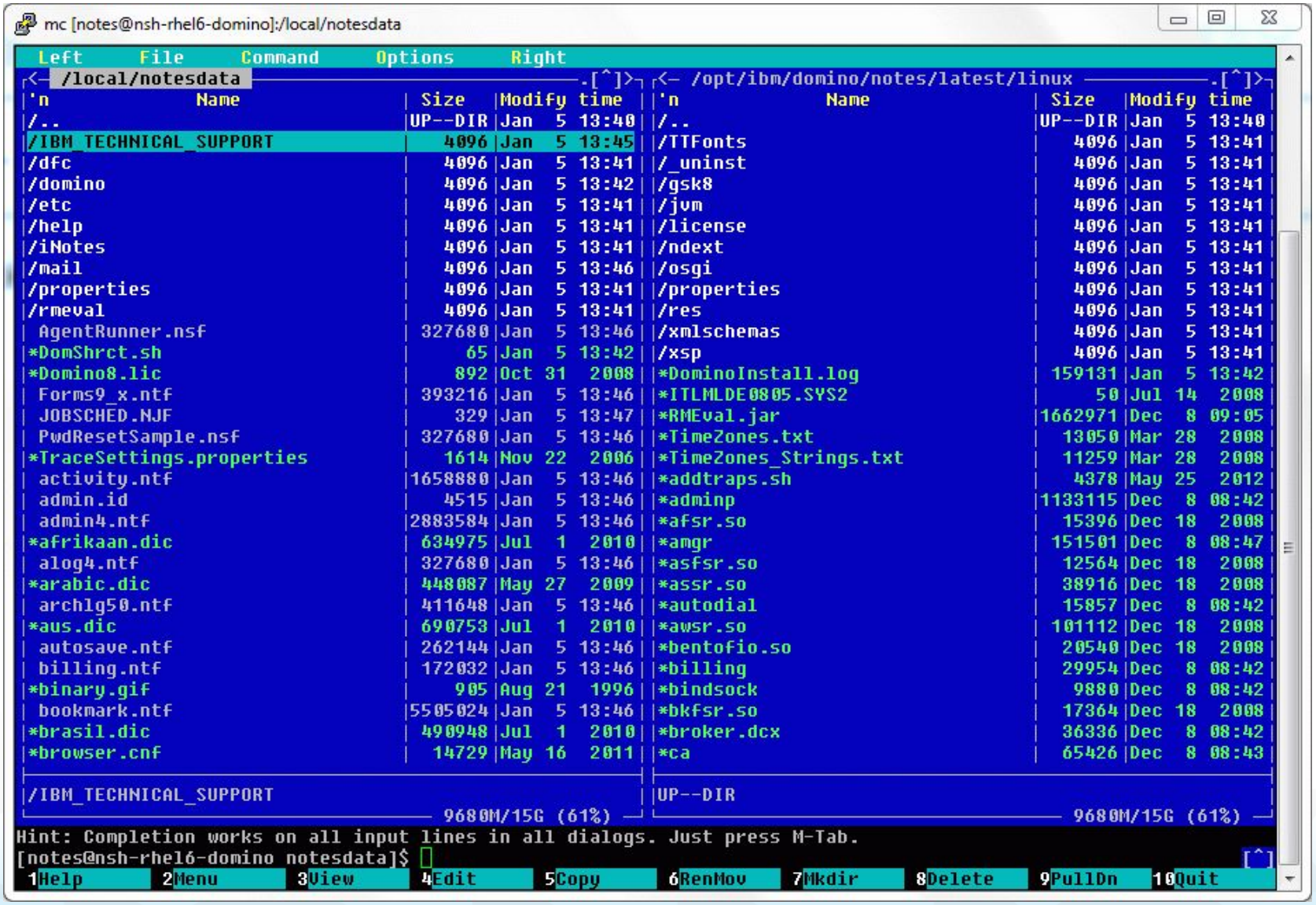
- Midnight Commander uses a “Norton Commander” Style Text-based semi-graphics interface
  - Needs to be installed but is included in the distribution
  - Invoked via “**mc**” on command-line
- You need to switch your terminal into UTF-8 Mode for graphical chars to work depending on your locale settings
- Can be used to
  - Edit Files (much easier than using vi)
  - Copy, Rename Files
  - Change Permissions and Owner
- With Putty “MC” even has mouse support!
- Install via software tool in YaST
  - Or “yum install mc” on RHEL (installs mc-4.7.0.2-3.el6.x86_64.rpm)

SLES 11 - Install Software – Midnight Commander



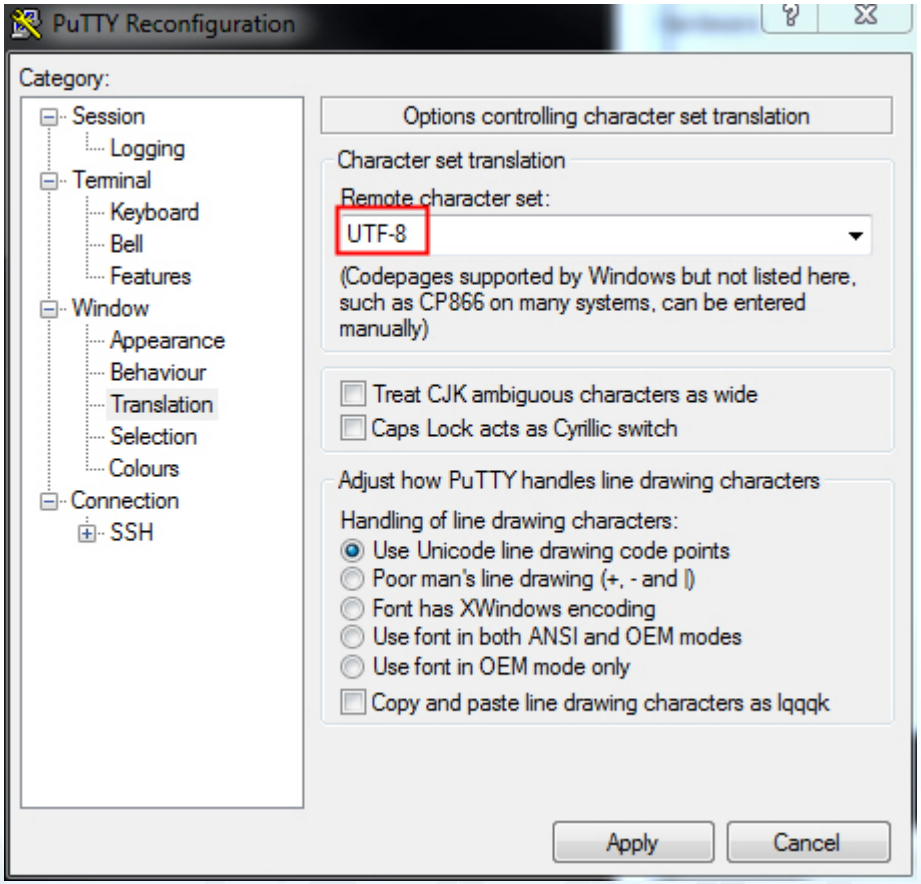
- Run YaST Software Install
- Search for “Midnight Commander”
- Select Packet
- Dependencies are automatically resolved
  - See smaller checkmark
- Click “Accept”
- Installs from “DVD” if still mounted

Midnight Commander UI – Let's have a Look



TIP - Putty Charset – UTF-8

- For Line Drawings and Umlauts you need UTF-8 terminal settings
- Click “Translation” and set “Remote character set”



Linux “Locale”

- The Linux Locale defines the language settings for your user
- Basic setting for the locale is the “LANG” variable
  - Defined in the profile of the user (.profile file in home directory)
- Depending on the LANG variable Domino defines certain settings
  - Clock Type, Decimal Point, Server Language, Language ID (CSID)
- Current SLES and RHEL Servers use Unicode Locale
  - Example: **LANG=en_US.UTF-8**, **LANG=de_DE.UTF-8**
  - Check user's locale via “**locale**” command

```
Locale
LANG=en_US.UTF-8
LC_CTYPE="en_US.UTF-8"
LC_NUMERIC="en_US.UTF-8"
LC_TIME="en_US.UTF-8"
LC_COLLATE="en_US.UTF-8"
LC_MONETARY="en_US.UTF-8"
LC_MESSAGES="en_US.UTF-8"
…
LC_ALL=
```

Check Domino Server Locale

- You can check locale and timezone settings via Domino server console command
  - "**Show Locale**"
  - "**Show Timezone**"
- Let's have a look

```
show locale

Region:    de [German]
Collation: de [German]
CSID:      AB(Hex)

show timezone

Standard Time: GMT+1:00
DST:           Observed
DST Begin:     Month[ 3] Week[-1] Weekday[Sunday]
DST End:       Month[10] Week[-1] Weekday[Sunday]
```

How to automatically start the Domino Server

- Starting the Domino Server from desktop does not really work in production environments
  - We need a kind of background process like a service on Windows
- Redirect console output stream to a file for problem analysis
  - some debug messages are only written to console
  - crash info will only written to console
- Redirect console input stream from a file to allow local console
  - Example: /opt/lotus/bin/server < console.in >> server.log 2>&1 &
  - Attach to input and output files for a kind of "life console"
  - More a troubleshooting mode. Better use remote console in Admin Client

Nash!Com Domino Start Script for Linux, AIX, Solaris

- Free cross platform start script
  - http://www.nashcom.de/nshweb/pages/startscript.htm
  - More than a start script.
  - Allows to start/stop
  - Monitor / Live Console
  - Troubleshoot your server (different options for NSD)
  - Archives log files
  - Cleanup resources low-level
- Fill out a form to get the start script by mail
  - http://www.nashcom.de/nshweb/pages/startscript.htm
- Will demo how to install and how to use
  - But first check the components

Start Script Components

- a.) Start script: /etc/init.d/**rc_domino**
  - Main entry point for the script
  - One instance per partition
  - Contains the user name for the Domino server
    - By default “notes”
    - By default based on the user name the corresponding config file is used
- b.) Config file: /etc/sysconfig/**rc_domino_config_notes**
    - Contains the configuration for the server
- c.) Main script logic: /opt/ibm/domino/**rc_domino_script**
  - Contains the full logic of the script with all functionality
  - Invoked by **rc_domino** script
- The current start script is still by default configured for Domino 8.5.x
  - You need to change the configuration in rc_domino and rc_domino_config_notes
  - Change the binary file location to “**/opt/ibm/domino**” if you used the new defaults

a.) rc_domino

```
#!/bin/sh
# change this to #!/bin/ksh for AIX and Solaris
#########################################################################
# RC RunLevel Entry Point
#########################################################################
# Start/Stop Script for Domino on xLinux/zLinux/AIX/Solaris
# 2005-2013 Copyright by Daniel Nashed, feedback domino_unix@nashcom.de
# You may use and distribute the unmodified version of this script.
# Use at your own risk. No implied or specific warranties are given.
# You may change it for your own usage only
# Version 2.6 03.01.2013
#########################################################################
# chkconfig: 345 66 19
# description: Lotus Domino Server

### BEGIN INIT INFO
# Provides: rc_domino
# Required-Start: $remote_fs $syslog $network
# Required-Stop:  $remote_fs $syslog
# Default-Start:  3 5
# Default-Stop:   0 1 2 6
# Short-Description: IBM Lotus Domino Server (notes)
# Description:       IBM Lotus Domino Server (notes)
#       Start/Stop Script V2.6 for xLinux/zLinux/AIX/Solaris
#       2005-2013 Copyright by Daniel Nashed (domino_unix@nashcom.de)

### END INIT INFO

# Optional get the name from script name e.g. 'domino_notes1"
#DOMINO_USER=`basename $0 | cut -f 2 -d _`

# Set default user to "notes" if no user is specified
if [ -z "$DOMINO_USER" ] ; then
  DOMINO_USER=notes
fi
```

b.) rc_domino_config_notes

```
# mandatory configuration

LOTUS=/opt/ibm/lotus
# change for Domino 9 --> LOTUS=/opt/ibm/domino
DOMINO_DATA_PATH=/local/notesdata
DOMINO_SHUTDOWN_TIMEOUT=600
DOMINO_CONFIGURED="yes"

# -- LANG setting on OS level that should be used.
# new default is to use what is specified in user profile.
#DOMINO_LANG=en_US.UTF-8
#DOMINO_LANG=de_DE.UTF-8
#DOMINO_LANG=en_US
#DOMINO_LANG=de_DE

# -- remove loadmon.ncf on startup
DOMINO_RESET_LOADMON="yes"

# -- run NSD before killing the Domino server when DOMINO_SHUTDOWN_TIMEOUT has been reached
DOMINO_NSD_BEFORE_KILL="yes"

# -- Shared DPOOLSIZE for Linux Tuning
#DOMINO_SHARED_DPOOLSIZE=20971520

# -- remove temp-files on startup
#DOMINO_REMOVE_TEMPFILES="yes"

# -- Domino Server Name if different from Linux/UNIX username
#DOMINO_SERVER=$DOMINO_USER

# -- Start Script Debuging
#DOMINO_DEBUG_MODE="yes"
...
```

c.) rc_domino_script

```
#!/bin/sh
# change this to #!/bin/ksh for AIX and Solaris
#########################################################################
# Main Start Script Logic
#########################################################################
# Start/Stop Script for Domino on xLinux/zLinux/AIX/Solaris
# 2005-2013 Copyright by Daniel Nashed, feedback domino_unix@nashcom.de
# You may use and distribute the unmodified version of this script.
# Use at your own risk. No implied or specific warranties are given.
# You may change it for your own usage only
# Version 2.6 03.01.2013
#########################################################################

# Determine Notes/OS level user
DOMINO_USER=$LOGNAME

if [ -z "$DOMINO_USER" ]; then
   echo "Empty login name. Please check your configuration"
   exit 1
fi

DOMINO_CONFIG_FILE=/etc/sysconfig/rc_domino_config_$DOMINO_USER

# Include config file if a exists and is readable
if [ -r "$DOMINO_CONFIG_FILE" ]; then
 . $DOMINO_CONFIG_FILE
 echo "Using Domino config File " $DOMINO_CONFIG_FILE
fi

# --- Configuration per Domino Partition - if not already specified in separate config file ---

if [ -z "$DOMINO_CONFIGURED" ]; then
  # Use configuration in this routine if no external configuration specified
  # Either in environment or in external config file
fi
```

Install and run Start Script

- Transfer Files to software directory via WinSCP
- copy **rc_domino_script** into **/opt/ibm/domino**
  copy **rc_domino** into **/etc/init.d**
  copy **rc_domino_config_notes** into **/etc/sysconfig**

```
# cd /local/software/startscript

# cp rc_domino_script /opt/ibm/domino

# chmod 755 /opt/ibm/domino/rc_domino_script

# cp rc_domino /etc/init.d/
# chmod 755 /etc/init.d/rc_domino

# cp rc_domino_config_notes /etc/sysconfig
# chown notes:notes /etc/sysconfig/rc_domino_config_notes
```

- Copy on Linux → cp
- Change modus (executable and readable) chmod 755 file
- Change owner and group to notes:notes → chown notes:notes
- D9: Change binary location in rc_domino and rc_domino_config_notes

Start the Server in Background

- On SLES any user can start services if execution control allows
- On RHEL only root can start services
  - Because a “lock” directory for service control is only writable by root
  - Workaround: sudo to start certain operations that need root permissions – needs to be setup
- Invoke the main script “**rc_domino**” with the “**start**” option
  - Manual start in background
  - Check with “**status**” if the server is running
  - Use “**monitor**” to see a kind of “**live console**”
  - Attaches to the input and output files and “simulates” a console

```
# /etc/init.d/rc_domino start
Switching to notes
Using Domino config File  /etc/sysconfig/rc_domino_config_notes
Removed LoadMon-Data '/local/notesdata/loadmon.ncf'
Starting Domino for xLinux (notes)
done PID is 31971
                                                              done
```

Boot-Process and Run-Levels

- Runlevels are used to provide different level of services
  - Different services are started depending on runlevel
- Runlevel
  - 0 - Halt System
  - 1 - Single User Mode
  - 2 - No Network (similar to runlevel 1)
  - **3 - With Networking, Standard Services and Applications**
  - 4 - Unused
  - **5 - Same as run-level 3 + X-Window (xdm)**
  - 6 - Reboot
  - Domino is started in runlevel 3 or 5
  - Servers usually use runlevel 3
  - You can switch runlevels via "init <n>"

Enable Domino on Startup

- The start script is the same for SLES, RHEL
  - Works for CentOS (unsupported) SLES, RHEL, AIX and Solaris
  - It contains script logic for each platform
- Install command to list the server in the right run-levels depend on the platform
  - SLES → **insserv /etc/init.d/rc_domino**
  - RHEL → **chkconfig --add rc_domino**
  - This will automatically create the start (“S”) and stop/kill (“K”) links in the rc-system
  - See example blow:

```
 /etc/init.d # find . -name "*rc_domino*"

./rc_domino
./rc5.d/S08rc_domino
./rc5.d/K01rc_domino
./rc3.d/S08rc_domino
./rc3.d/K01rc_domino
```

Useful Commands for Linux Start/Stop

- **shutdown -h 0**
  - 0=Shutdown immediately
  - Will terminate all running services like Domino (start script)
- **shutdown -r 0**
  - Will reboot the server
- **init 3**
  - Will bring the server into text mode
- **init 5**
  - Will bring the server into graphical mode

Useful Commands – Let's take a look on the Live System

- **"find"**
  - searches for files
  - Syntax: find "start-point" -name "expression"
  - Example: **find . -name "*.nsf"**
- **ps -ef**
  - Shows list of all processes
- **| ("pipe")**
  - Pipe sends output from one command to another command
- **grep**
  - Finds information in files or output streams
  - Example: **ps -ef|grep domino**
- **tail -f filename**
  - Lists the end of an file and continues with output when the file changes

Typical Linux Commands

- Shell commands are similar to DOS command window
  - But most commands have different names
  - Use “man” command to find out about syntax details and options (e.g. “man ls”)

- **ls** - lists content of a directory (e.g. ls -l)
- **cd** - switch directory
- **pwd** - prints current working directory
- **mv** - move (rename) file
- **cp** - copy file
- **mkdir** - creates a new directory
- **rm** - removes files (e.g. rm -r mydir)
- **cat** - lists content of a file
- **more** - lists content page by page
- **uptime** – shows how long the machine is up

Network Commands

- **netstat -an**
  - Shows network connections and listening ports

```
netstat -an|grep tcp
tcp        0      0 0.0.0.0:1352            0.0.0.0:*               LISTEN
tcp        0      0 0.0.0.0:22              0.0.0.0:*               LISTEN
tcp        0      0 127.0.0.1:25            0.0.0.0:*               LISTEN
tcp        0      0 192.168.100.170:22      192.168.100.1:55856     ESTABLISHED
tcp        0      0 192.168.100.170:22      192.168.100.1:54395     ESTABLISHED
tcp        0      0 :::22                   :::*                    LISTEN
tcp        0      0 ::1:25                  :::*                    LISTEN
```

- **ifconfig**
  - Shows network configuration

```
ifconfig
eth0      Link encap:Ethernet  HWaddr 00:0C:29:A0:6F:76
          inet addr:192.168.100.170  Bcast:192.168.100.255  Mask:255.255.255.0
          inet6 addr: fe80::20c:29ff:fea0:6f76/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:1279 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1059 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:134388 (131.2 Kb)  TX bytes:195442 (190.8 Kb)
```

Bind Services to Specify IP Address

- By default Domino listens on all IP Addresses
  - For a single partition this would be OK
  - But for example postfix by default listens on the loopback IP address (127.0.0.1)
- Bind Domino to the service IP address via notes.ini settings
- Bind HTTP using Server.Doc Settings / HTTP Tab
  - “Bind to host name: Enabled” → or use Internet Sites accordingly

```
TCPIP_TcpIpAddress=0,192.168.100.170:1352
SMTPNotesPort=TCPIP
LDAPNotesPort=TCPIP
POP3NotesPort=TCPIP
IMAPNotesPort=TCPIP
```

Install Servertasks and Extension Managers

- Install Nash!Com mixed case tool
- Install a sample work-load servertask
- Examples how to install any kind of C-API based application
  - This will help to understand how other add-on software can be installed and checked
- Normal binaries have no extension
- Library files like Extension Managers have the extension ".so"
  - On Windows it would be called .dll
  - Usually prefixed with "lib" example: **libnotes.so** is the main Notes LIB
- Shell Scripts are usually called "sh"
  - But they don't have to
  - Shell Scripts are a bit similar to "batch" files on Windows but much more flexible

Install Nash!Com Mixed Case Extension Manager

- Switch to root user
  - "su -" command switches to a different user
    - The "-" does load the environment for the user like for a normal login
    - If you do not specify a user, "root" is assumed.
    - If you switch from root to another user no password is needed!
- Copy .so file to IBM binary directory
- Make it executable via **chmod 755** (all rights to root, read and execute for all)

```
su -
Password:
Directory: /root
Fri Jan  4 02:10:25 CET 2013

# cp libnshextlo.so /opt/ibm/domino/notes/latest/linux/
# chmod 755 /opt/ibm/domino/notes/latest/linux/libnshextlo.so
```

Install Nash!Com Mixed Case Extension Manager

- Add the following Lines to notes.ini
- Best would be to use “set config ..”
  - But you can also edit notes.ini directly when the server is down
- **extmgr_addins=libnshextlo.so**
  - will load the Extension Manager on next Server start
- **NshextloOptions=4**
  - Will enable lower-case translation for incoming requests
- When the server starts you should see a copyright message
  - This tells you that the extension manager is loaded

```
extmgr_addins=libnshextlo.so
nshextloOptions=4
```

Install Servertask

- Switch to root user

- Copy binary file to IBM binary directory
- Make it executable via **chmod 755** (all rights to root, read and execute for all)
- Switch to binary containing servertask links **cd /opt/ibm/lotus/bin**
- Create a “symbolic link” to internal startup script for servertask (“ln -s”)

```
# cp nshload /opt/ibm/domino/notes/latest/linux/
# chmod 755 /opt/ibm/domino/notes/latest/linux/nshload

# cd /opt/ibm/domino/bin
# ln -s tools/startup nshload

#  ls -l nshload
lrwxrwxrwx 1 root root 13 Jan  4 02:12 nshload -> tools/startup
```

Symbolic Links on Linux

- Symbolic link (or soft-link) creates a “pointer” that links to the original file
- Link can be used instead of the file itself in the new directory position

- You should not use links for Domino Data!
- But it is used for binaries
  - like the latest link for the current set of binaries and the startup links

- Command **ln -s “new_name” “existing_name”** generates the link
- You can see symbolic links via “**ls -l**”

Linux Performance Tuning / Monitoring

- The following slides give you an overview of Linux specify performance tuning
  - It's not a complete list of all tuning options
  - The basic Domino Tuning options remain the same
- Focus is on the Linux specific part

Auto Tuning - tunekrnl

- When you start the server the "**tunekrnl**" binary will automatically tune kernel parameters
  - tunekrnl runs with "root" permission because it has a special permission bit set
- Auto configuration example RHEL 6.3
  - /proc/sys/kernel/sem has been set to "250 256000 32 1024".
  - /proc/sys/net/ipv4/tcp_fin_timeout has been set to "15".
  - /proc/sys/net/ipv4/tcp_max_syn_backlog has been set to "16384".
  - /proc/sys/net/ipv4/tcp_tw_reuse has been set to "1".
  - /proc/sys/net/ipv4/ip_local_port_range has been set to "1024 65535".
- There is nothing you need to change
  - The information is logged into the server output-log

Linux Security Limits

- Some resources like number of open files, processes, memory, file-space can be restricted on Linux level per user for security reasons
  - Most of the settings are OK by default in current releases
- Security Limits are enforced when switching to the “notes” user via “su -”
  - In earlier Linux versions you had to modify the “pam” configuration (plugable authenticaion modules) to include “pam_limits.so”
- Edit the **/etc/security/limits.conf** file and ensure you have at least the following limits set for your Domino server user “notes”
  - Tip: If you plan multiple partitions you could use “*” instead of the “notes” user
  - **vi /etc/security/limits.conf**

```
notes soft nofile 49152
notes hard nofile 49152

notes soft nproc 12500
notes hard nproc 12500

notes soft memlock -1
notes hard memlock -1
```

Check Security Limits

- Login again via "**su – notes**"

- Check Security Limits via "**limits -a**" for soft limits
- Check Security Limits via "**limits -aH**" for hard limits
- TIP: security limits and environment settings are listed in the start script output

```
# ulimit -aH
core file size          (blocks, -c) unlimited
data seg size           (kbytes, -d) unlimited
scheduling priority             (-e) 0
file size               (blocks, -f) unlimited
pending signals                 (-i) 14873
max locked memory       (kbytes, -l) unlimited
max memory size         (kbytes, -m) unlimited
open files                      (-n) 49152
pipe size            (512 bytes, -p) 8
POSIX message queues     (bytes, -q) 819200
real-time priority              (-r) 0
stack size              (kbytes, -s) unlimited
cpu time               (seconds, -t) unlimited
max user processes              (-u) 12500
virtual memory          (kbytes, -v) unlimited
file locks                      (-x) unlimited
```

Some General Performance Settings

- **Server_Pool_Tasks=50**
  - Maximum number of initial thread-pool tasks (IOCP threads)
- **Server_Max_Concurrent_Trans= Server_Pool_Tasks * Domino Ports**
  - Number of concurrent I/O threads to run (throttle to reduce CPU usage and Context-Switches)
  - Example: **Server_Max_Concurrent_Trans=50**
- Always tune both at the same time !
- **NSF_DbCache_MaxEntries**
  - In case of high statistical value for **DbCache.OvercrowdingRejections** set it either the maximum number of concurrent users or the maximum number of databases open (whatever is higher)
  - Example: **NSF_DbCache_MaxEntries=3000**

Important Server Settings

- Increase Shared Memory Maximum Size for Domino 32bit on 64bit OS to 3 GB
  - **ConstrainedSHMSizeMB=3072**
- Default for many pools is too small
  - **EVENT_POOL_SIZE=41943040**
  - **CATALOG_POOL_SIZE_MB=100**
  - **dirman_poolsize_mb=100**
  - **nsf_monitor_pool_size_mb=200**
- Separate Update FT Thread
  - **UPDATE_FULLTEXT_THREAD=1**
- Router Optimization
  - **RouterMaxConcurrentDeliverySize=1048576**
  - **Disable_BCC_group_expansion=1**

View Rebuild Directory

- By default Domino uses a memory optimized way to rebuild views
- You can specify a directory (e.g. on system disk) for optimized view rebuild
- On Linux you can put temp-files and view rebuild files into **tempfs**
- **tempfs** is a kind of virtual file-system optimized for temporary files that exist only for a short period of time.
  - Similar to a RAM drive but not reserving memory and self organized in Virtual Memory
  - Changes are only written to disk if memory is needed by the server
    - It would swap to disk if space is needed → ensure you have sufficient SWAP space
  - Tempfs is enabled by default with half the size of the physical memory
    - Located in **/dev/shm**
- Notes.ini
  - **view_rebuild_dir=/dev/shm/**
  - You cannot create sub-directories because for each machine start tmpfs is empty!

Write Temp Directory and Log Files into tempfs too

- Temp Directory, Log and also the server console.log can be moved to tempfs or other file-systems
  - TIP: Start Script has options to create sub-directories in the tempfs file-system

- notes.ini
  - **debug_outfile=/dev/shm/notes/console.log** (sub-directory is automatically created)
  - **view_rebuild_dir=/dev/shm/notes/view_rebuild/**
  - **notes_tempdir=/tmp/notes/tempdir** (instead of data directory, could be also located in tmpfs)
  - **logfile_dir=/local/log/notes/IBM_TECHNICAL_SUPPORT**

- Start Script Variables in **rc_domino_config_notes**
  - **DOMINO_VIEW_REBUILD_DIR="/dev/shm/$DOMINO_USER/view_rebuild"**
  - **DOMINO_TEMP_DIR="/tmp/$DOMINO_USER/tempdir"**
  - **DOMINO_LOG_PATH="/local/log/$DOMINO_USER/IBM_TECHNICAL_SUPPORT"**
  - **DOMINO_LOG_DIR="/local/log/$DOMINO_USER"**
  - **DOMINO_LOG_BACKUP_DIR="/local/log/$DOMINO_USER/backup"**

Linux File Systems

- Linux does “mount” file-systems into the “root” file-system
  - You can mount separate disks/file-systems on every level of the file-system tree
- You should have separate file-systems / disks for
  - **Root file-system**
  - **Swap** → at least the size of your RAM or better two times your RAM if you use tempfs
  - **/var** → used by the system for logging etc
  - **/opt** → if your root file-system is quite small else it would be OK to have the static binaries in root
  - **Domino data** (NSF)
  - **Translog** (TXN)
  - **DAOS** (NLO)
  - **FT Index Directory** since 8.5.3 if you have a lot of FT Indexing on your server
    - notes.ini FTBasePath=/local/notes/fulltext

Example File-System Configuration for a Domino Server

- **/local/notes/notesdata**
- /local/translog
- /local/daos
- /local/fulltext

- You could have also a separate directory for archive databases or cluster replicas to split file-systems

- Create File-Systems via YaST on SLES
  - Very straight forward
  - **SLES 11 SP2** still only supports **ext3** (only read-only migration support for ext4)
  - **RHEL 6.x** supports **ext4** and switched the default to ext4!
    - Claims to have better performance
    - Known Issue: Currently ext4 is not shown in the Domino platform stats!

Check File-System Space

- "**df -h**"
  - Disk free shows all file-systems
  - -h means human readable format (sizes in KB/MB/GB)
- Stats shown
  - File-System internal Device Name
  - Size
  - Used
  - Available
  - Use in %
  - Mount Point

```
df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/sda2        19G  7.5G  9.9G  43% /
devtmpfs        1.5G  144K  1.5G   1% /dev
tmpfs           1.5G  100K  1.5G   1% /dev/shm
/dev/sr0        3.1G  3.1G     0 100% /media/SLES-11-SP2-DVD-x86_6407551
/dev/sdb1       9.9G  151M  9.2G   2% /local
```

SLES 11 / RHEL 6.x Performance Issue / RunFaster=1

- SPR# PHEY8RJHXR fixed in 8.5.3 FP2
  - Fixes a timing issue with the CFQ process scheduler introduced in
  - Caused response time issues with transactions – up to 100 ms delay
  - This fix changes semaphore handling for the server thread pool
  - In SLES 11 SP2 use the following in addition to improve performance
    - **echo NO_FAIR_SLEEPERS > /sys/kernel/debug/sched_features**
  - In earlier relases (SLES 11 SP1 + RHEL 6.x) with CFQ you might want to use
    - **echo "0" > /proc/sys/kernel/sched_features**
  - And you need 8.5.3 FP2 or higher to fix the issue
  - This will fix the 100 ms delays completely
  - Performance Test - 30 threads / 100 documents / attachment size 2 MB

	no network	without fix	fix + fair sleeper	fix + no fair sleeper
elapsed time (sec)	56	828	78	68
response time client (ms)	2	40-60	5	3

Linux File-System Tuning

- Use your favorite journaled file-system ext3, etx4, Reiser FS, XFS, ...
- Disable write of meta information via mount option -noatime
  - Change in **/etc/fstab**
    - Contains an entry for each file-system to mount
- A real Runfaster=1 Parameter:
  - Change the default scheduler from CFQ (complete fair queuing) to NOOP
  - CFQ tries to optimize disk access by reordering requests
    - But it would be better to send it to a SAN, RAID controller directly
    - Tests have shown that this works better for almost all SAN or local disk configurations
    - Dramatical improvement!
    - See next slides for details
  - Disable per device
    - **echo noop > /sys/block/hda/queue/scheduler**
  - Disable globally via kernel boot parameter
    - Edit **/boot/grub/grub.conf** and enter in kernel line **elevator=noop**.

Linux Performance CFQ vs noop

- Read-Test - 80 thread to read 32000 docs each
  - 80 separate local databases on the server with small documents
- Result:
  - 51 sec with CFQ scheduler
  - 28 sec with noop scheduler
  - 19 sec all data in cache
- Write Test - 80 threads creating 2000 docs each
  - 80 separate local databases on the server
- Result:
  - 132 sec with CFQ
  - 42 sec with noop
- Environment: SLES11 SP2 with local RAID10 disks
- Test-Tool: iostat -x 2 → check the improvement in the “await” column

Troubleshooting

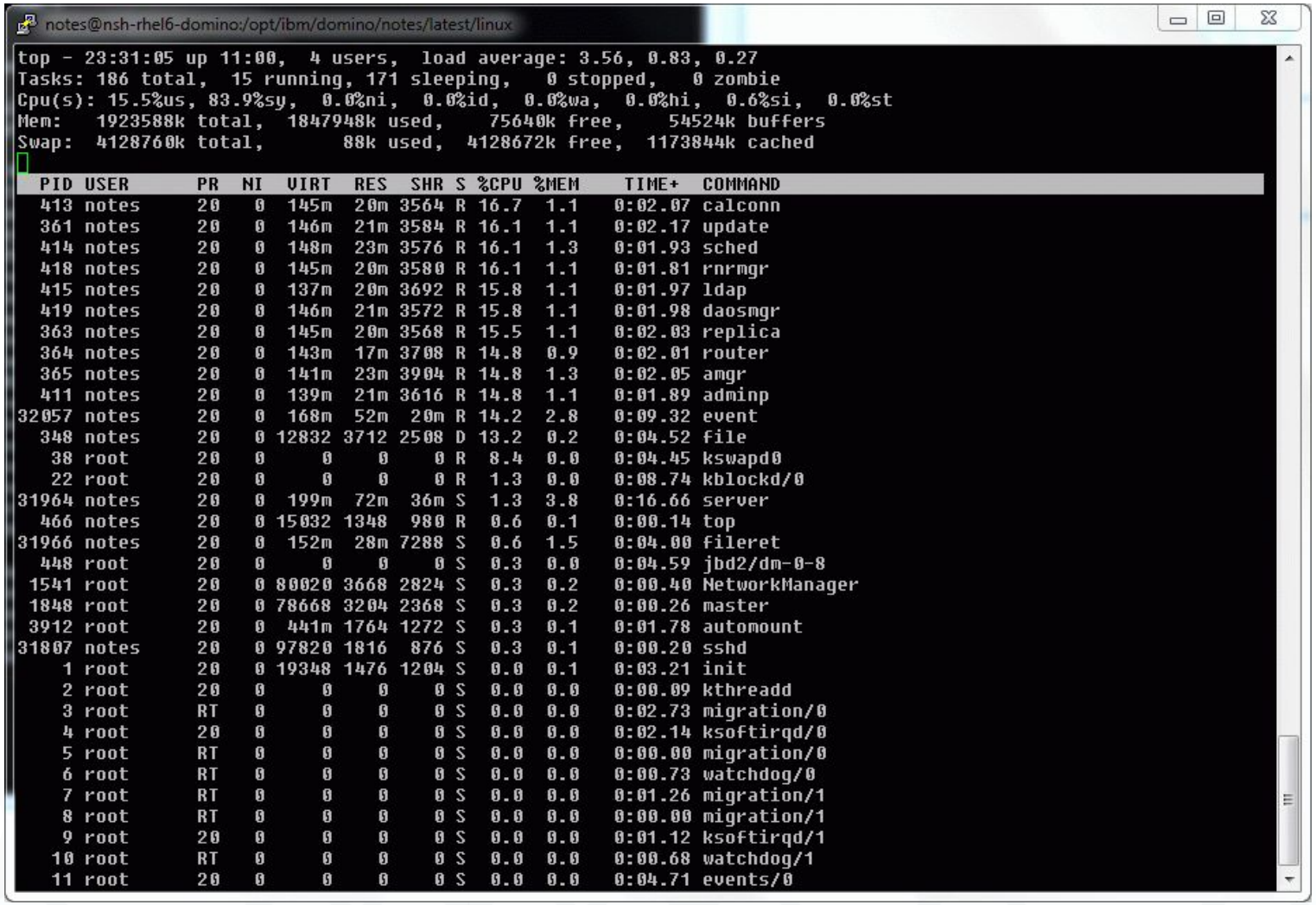
- This section focuses on Linux specific Troubleshooting
- Not a complete troubleshooting guide but provides the parts that are different in the Linux world

- NSD
- System Monitoring
- Disk Monitoring

NSD – Notes System Diagnostics

- NSD is invoked automatically in case of a server crash
- Implemented as a shell script and leverages the GNU debugger (**gdb**)
  - "**gdb**" is installed by default on current SLES and RHEL servers and dumps call-stacks
- Can be manually invoked
  - For example in case of a hang
  - Switch to data directory and run **/opt/ibm/domino/bin/nsd <options>**
- You can also use the start script
  - **/etc/init.d/rc_domino nsd | fullnsd | hang | kill**
- Kill is used to kill the server and free resources in case of a crash, hang, etc
  - But it could happen that NSD cannot cleanup all resources
  - Third party software, not successfully registered resources
  - TIP : "**cleanup**" function of Start Script removes all processes, shared memory, MQs and semaphores
    - "cleanup" is "last resort" in some cases

top – System Utilization and Processes



- Shows
  - Processes
  - Memory Utilization
  - File System Cache
  - Swap Utilization
  - CPU Utilization
  - Load Average
  - Wait I/O
- Load Average
  - Indicator how busy the machine is
    - Last minute
    - 5 Minutes
    - 15 Minutes
  - Should be below the number of CPUs/cores

Linux vmstat – Main Performance Indicator

- **vmstat <interval> e.g. vmstat 1 prints stats every second**
- **r** = Processes/threads waiting for CPU or running
  - should be less than 1,5 * number of CPUs
- **b** = Processes/threads waiting for I/O
  - should be less than number of CPUs
- **us** = % CPU in “user mode”
- **sy** = % CPU in “system mode” (kernel operations)
- **cs** = Context switches (how often the CPU is “switched from thread to thread)
  - Should be much more than 10000 per partition
- **wa** = % the system is waiting for I/O
  - Should not be much more than 30% else you system is I/O bound
  - In that case we need other tools to measure disk performance in more detail (see next slides)

```
 vmstat 1
procs -----------memory---------- ---swap-- -----io---- --system-- -----cpu-----
 r  b   swpd   free   buff  cache   si   so    bi    bo   in   cs us sy id wa st
 2  0      0 641168  31464 580700    0    0  2012  1212  732 1035 10  5 74 11  0
 1  2      0 622444  31492 599740    0    0  4012   420 1267 1719  7 25 26 42  0
 3  0      0 614136  31492 607964    0    0  4924    24 1271 1827  5 22  5 67  0
```

Linux Level I/O Performance Measurement

- Domino Platform Statistics are your friend
  - Can be used for longer term monitoring via collect task into statrep.nsf
  - But they are updated every 60 seconds and collected usually every 10 minutes
    - See Platform Statistics Disk Values below
  - Not all information is included – for example “await” on Linux (disk queue response time)
  - TIP: events4.nsf contains documentation for platform stats & how they are measured per platform
- For troubleshooting you should use Linux level statistics
  - vmstat (see details next slide)

```
Platform.LogicalDisk.1.AssignedName = sda
Platform.LogicalDisk.1.AvgQueLen = 11.89
Platform.LogicalDisk.1.AvgQueLen.Avg = 11.89
Platform.LogicalDisk.1.AvgQueLen.Peak = 11.89
Platform.LogicalDisk.1.PctUtil = 95.63
Platform.LogicalDisk.1.PctUtil.Avg = 95.63
Platform.LogicalDisk.1.PctUtil.Peak = 95.63
Platform.LogicalDisk.1.ServiceTimeinmsecs = 8.35
Platform.LogicalDisk.1.ServiceTimeinmsecs.Avg = 8.35
Platform.LogicalDisk.1.ServiceTimeinmsecs.Peak = 8.35
```

Linux Native I/O Stats “iostat”

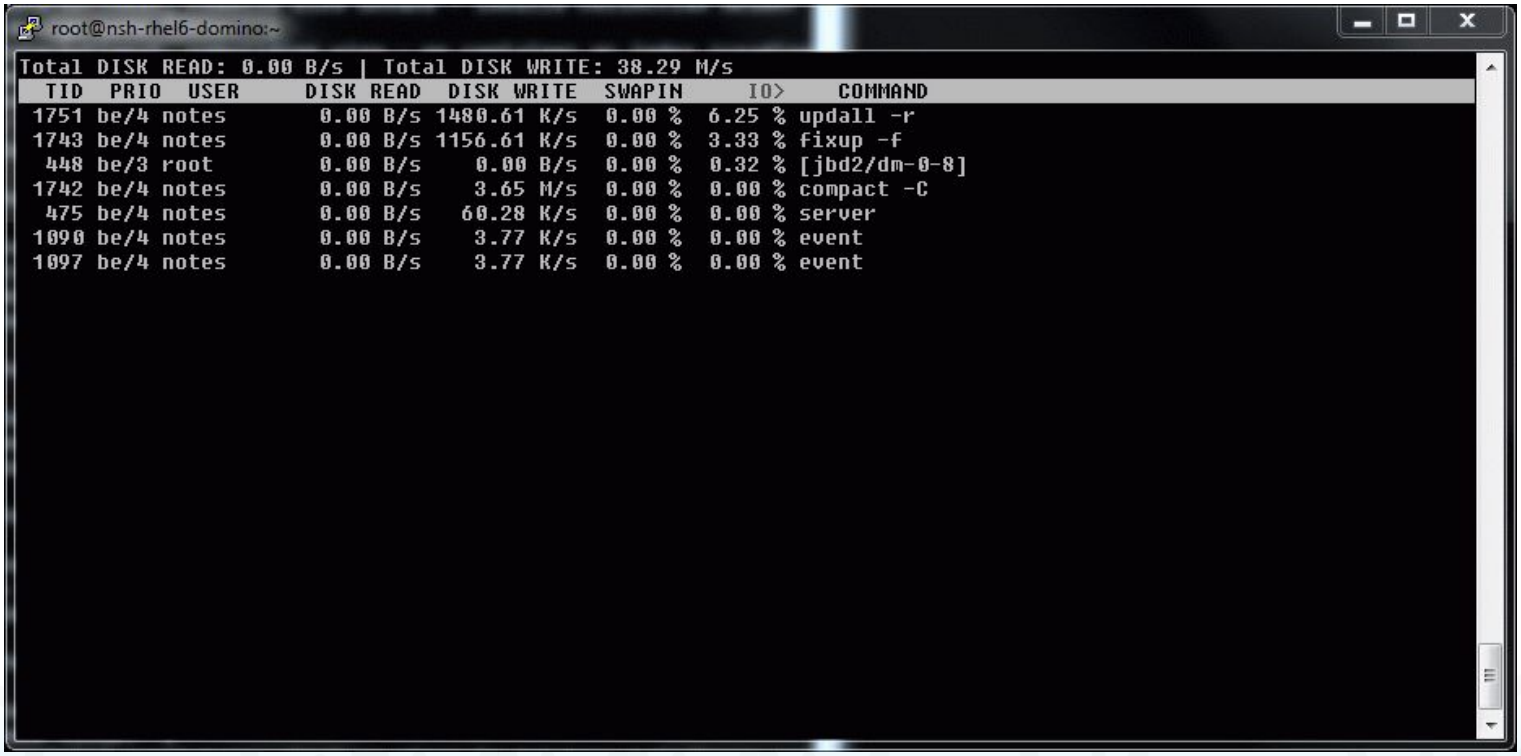
- iostat provides more detailed information about the current I/O statistics
  - Output by device (e.g. sda = first disk)
  - Example shows just one value for one disk
  - TIP: You can filter via grep – e.g. “iostat -x 2 |grep sda”
- **%util** =Disk Utilisation in % → Values above 90% are an indicator for a busy disk
- **r/s** = Disk reads per second
- **w/s** = Disk writes per second
- **svctm** = Disk services time in ms (how fast the device responds)
- **await** = Time the whole request needs (application to disk queue, disk and back)
  - This is the most important statistic and key indicator (should be < 10 ms)

```
# iostat -x 2

Device:         rrqm/s   wrqm/s     r/s     w/s   rsec/s   wsec/s avgrq-sz avgqu-sz   await  svctm  %util
sda               0.00  2024.50    0.00  762.00     0.00 22268.00    29.22     0.86    1.13   0.38  28.80
```

- Let's have a live look into the server

iotop – Current I/O Load by Process

- Can be helpful to figure out which process generates most I/O
- You might need to separate install it
- Needs root permission



Notes Client Setup

- Two different setup types
  - RPM Packages for SuSE and RedHat Enterprise Desktop
  - Debian Packages for Ubuntu
- On Ubuntu you just click on the extracted Debian packages to get the client installed
- With RPM you have to install manually
  - With the current 9.0 Social Edition Beta Client you have to install some depricated LIBs before you can install the client
    - RPM will give you the name of the missing packages
  - Works with SLES 11 SP2 64bit with 32bit LIBs installed
    - Currently not supported – Only Redhat Desktop is supported in 64bit Mode
  - Demo Install SLES 11 SP2
  - Bonus-Slide-Pack: Ubuntu 12.04 LTS Install including Client
    - Planned support for 12.04 LTS with Notes 9.0 Social Edition
    - For the current Beta only 32bit is supported

Default Directories for Notes 9.0 Beta on Linux

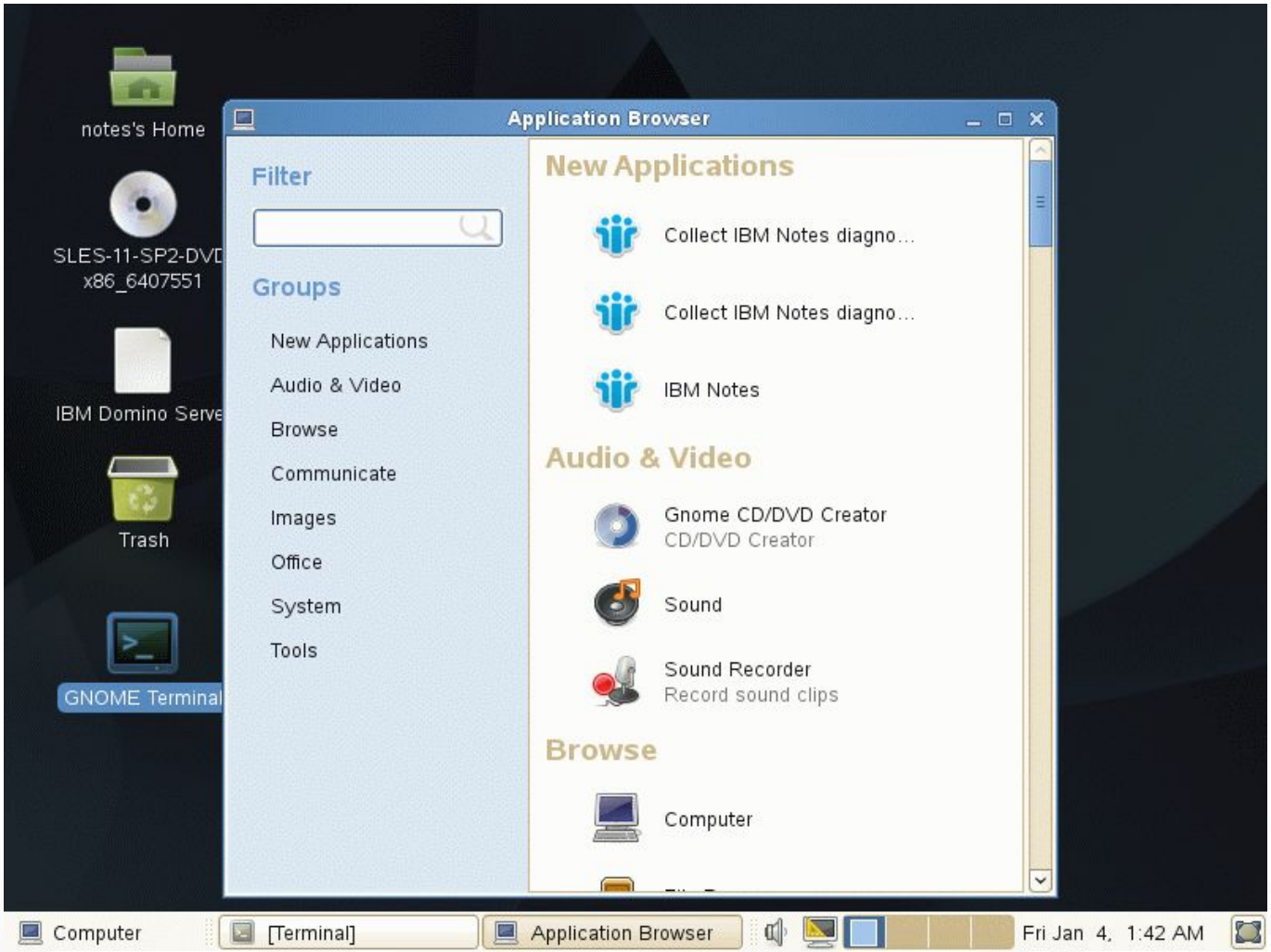
- **/opt/ibm/notes**
  - Notes product and binary files installation directory
- **/opt/ibm/notes/framework**
  - Eclipse base directory
- **/opt/ibm/notes/data/shared**
  - Shared Directory (NTFs, Dictionaries, Helpfiles)
  - Configured automatically via notes.ini SharedDataDirectory (NTFs etc)
  - notes.ini with initial information -> **/opt/ibm/notes/data/notes.ini**
    - Will be used to setup new users
- **/home/nsh/ibm/notes/data**
  - After configuration every user has his own “data directory” in “ibm/notes/data” below his home dir
- Take care: Old standard location in 8.5.x still contains “lotus”

Extract Software and Install

- Switch to “root” user for installation (**su -**)
- Extract software using “tar”
- Install software using “**rpm -i <package name>**”
  - See missing packages and install using YaST → ensure you install 32bit LIBs!
  - Search for the packages in the same way we did earlier for “Midnight Commander”

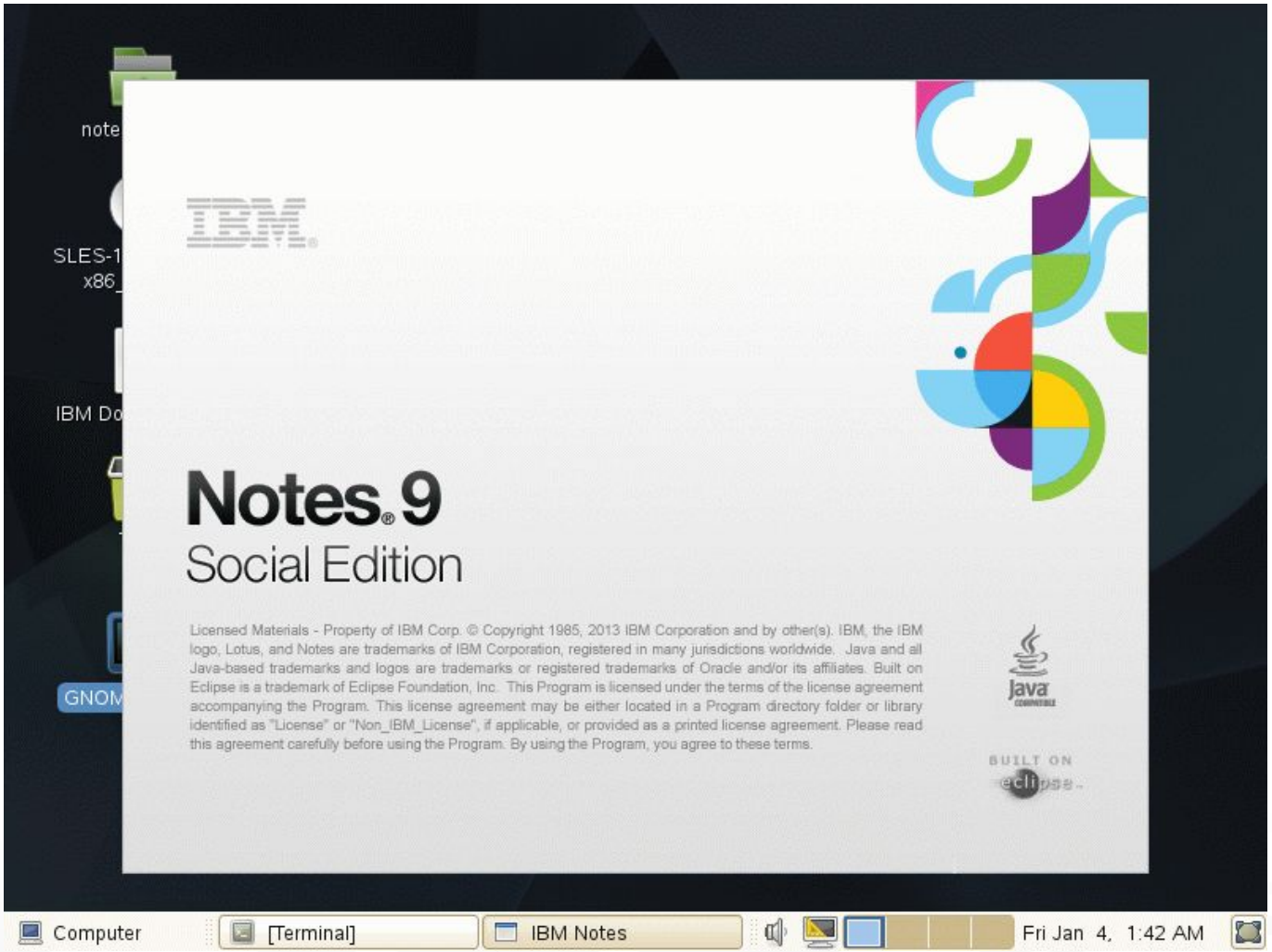
```
/local/software # tar -xvf notes90se_notes_linux_rpm_public_beta_prod.tar

 ibm_activities-9.0.i586.rpm
 ibm_cae-9.0.i586.rpm
 ibm_feedreader-9.0.i586.rpm
 ibm_notes-9.0.i586.rpm
 ibm_opensocial-9.0.i586.rpm
 ibm_sametime-9.0.i586.rpm
 license.tar
 pub_ibm_notes.gpg
 smartupgrade.sh

 /local/software # rpm -i  ibm_notes-9.0.i586.rpm
 warning: ibm_notes-9.0.i586.rpm: Header V3 DSA signature: NOKEY, key ID 34f9ae75
 error: Failed dependencies:
     libgnomeprint-2-2.so.0 is needed by ibm_notes-9.0-20121208.0914.i586
     libgnomeprintui-2-2.so.0 is needed by ibm_notes-9.0-20121208.0914.i586
     libgnomeui-2.so.0 is needed by ibm_notes-9.0-20121208.0914.i586
```

Menu Entries after install



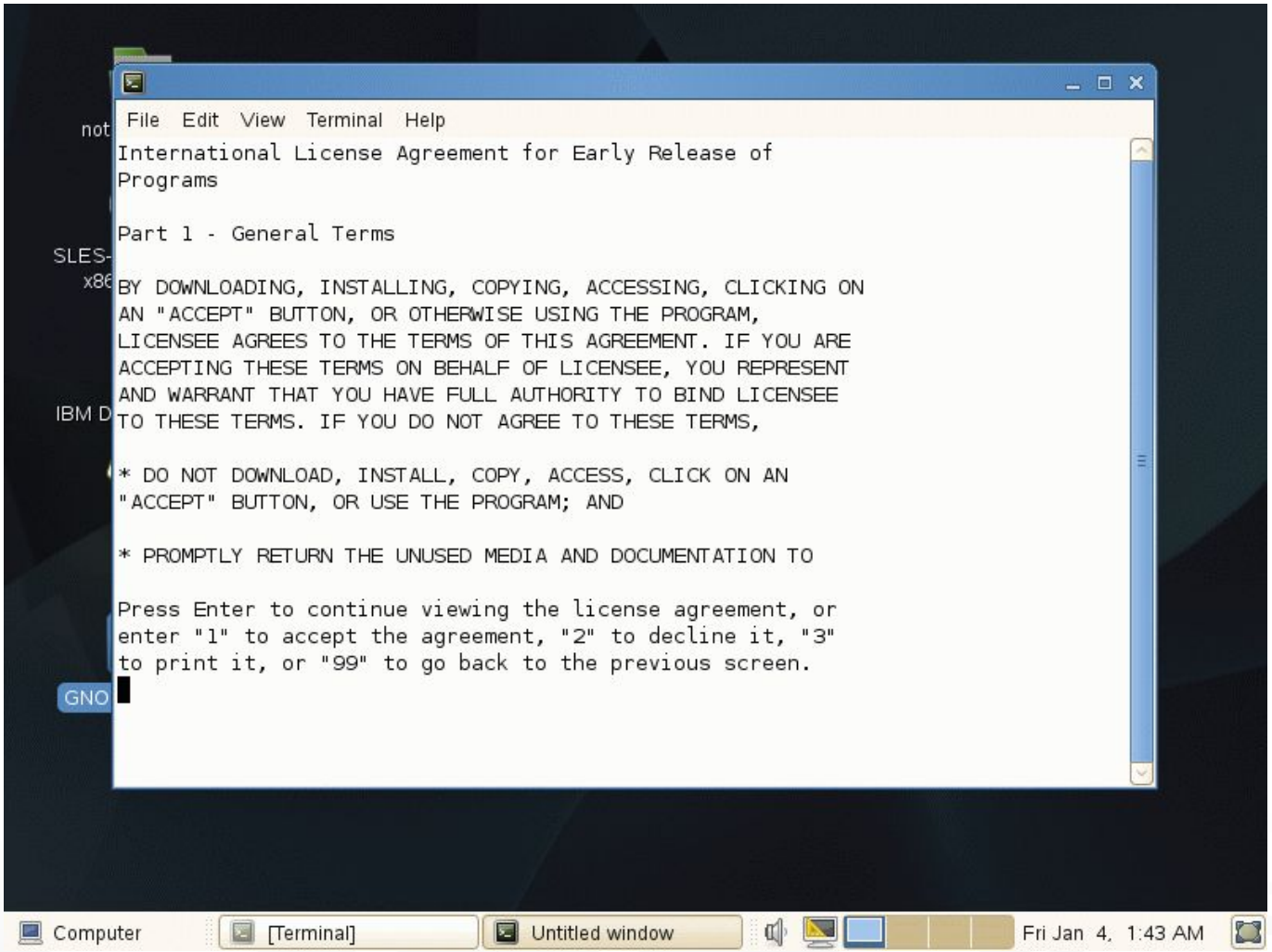
- Click “IBM Notes”

Notes Client Splash Screen



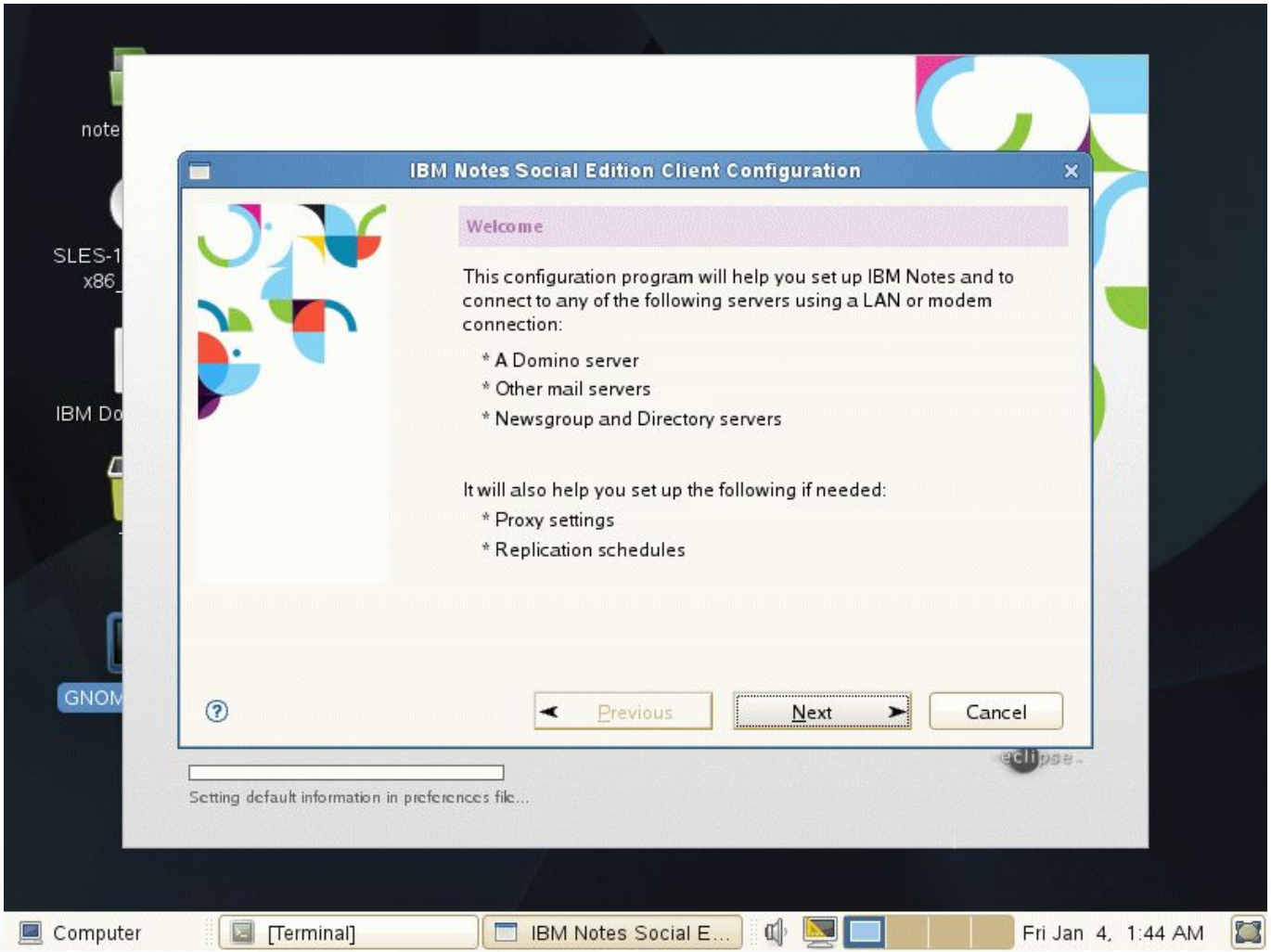
- :-)

License Terms...



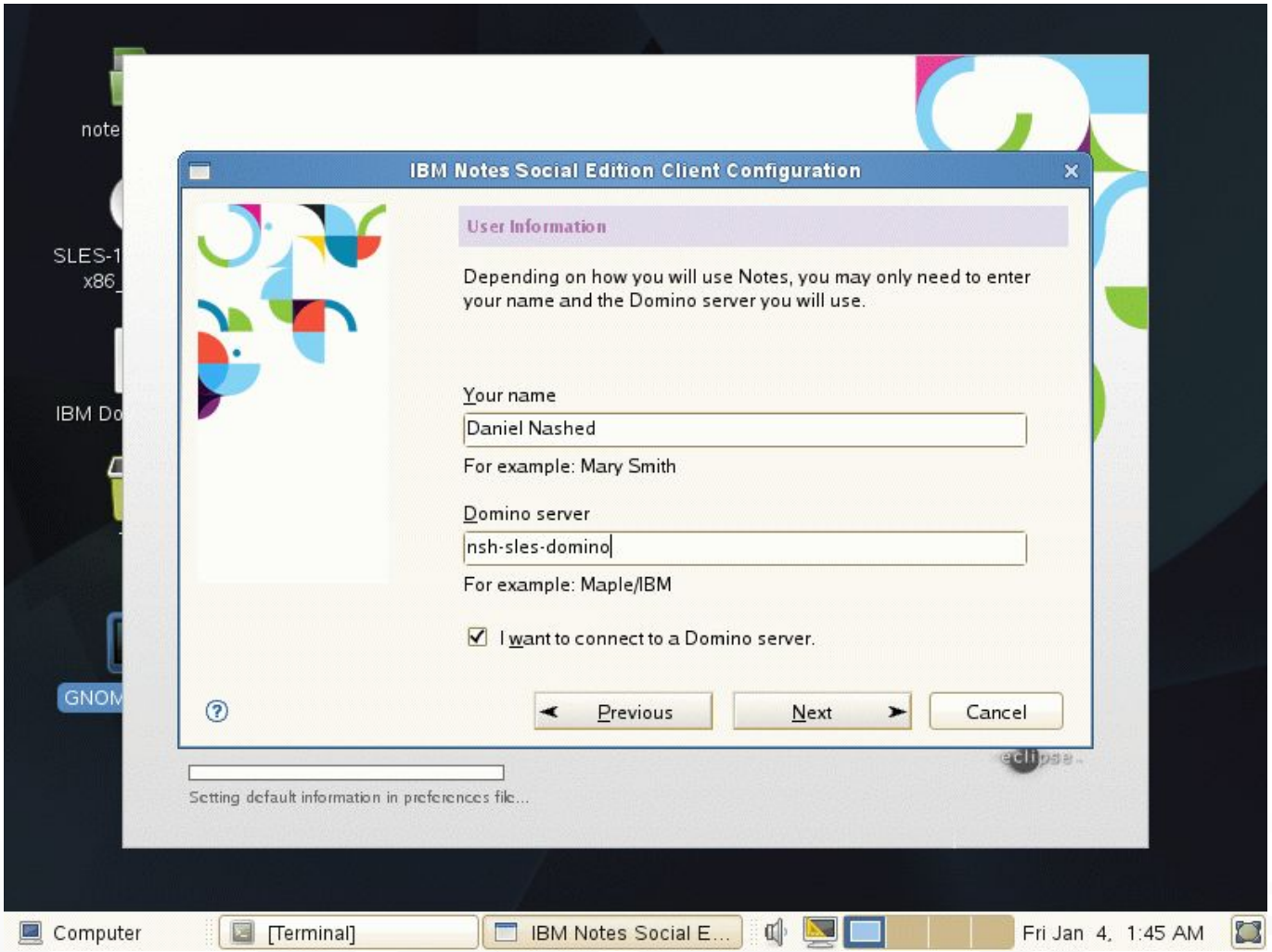
- Confirm the License Terms with “1”

Client Configuration



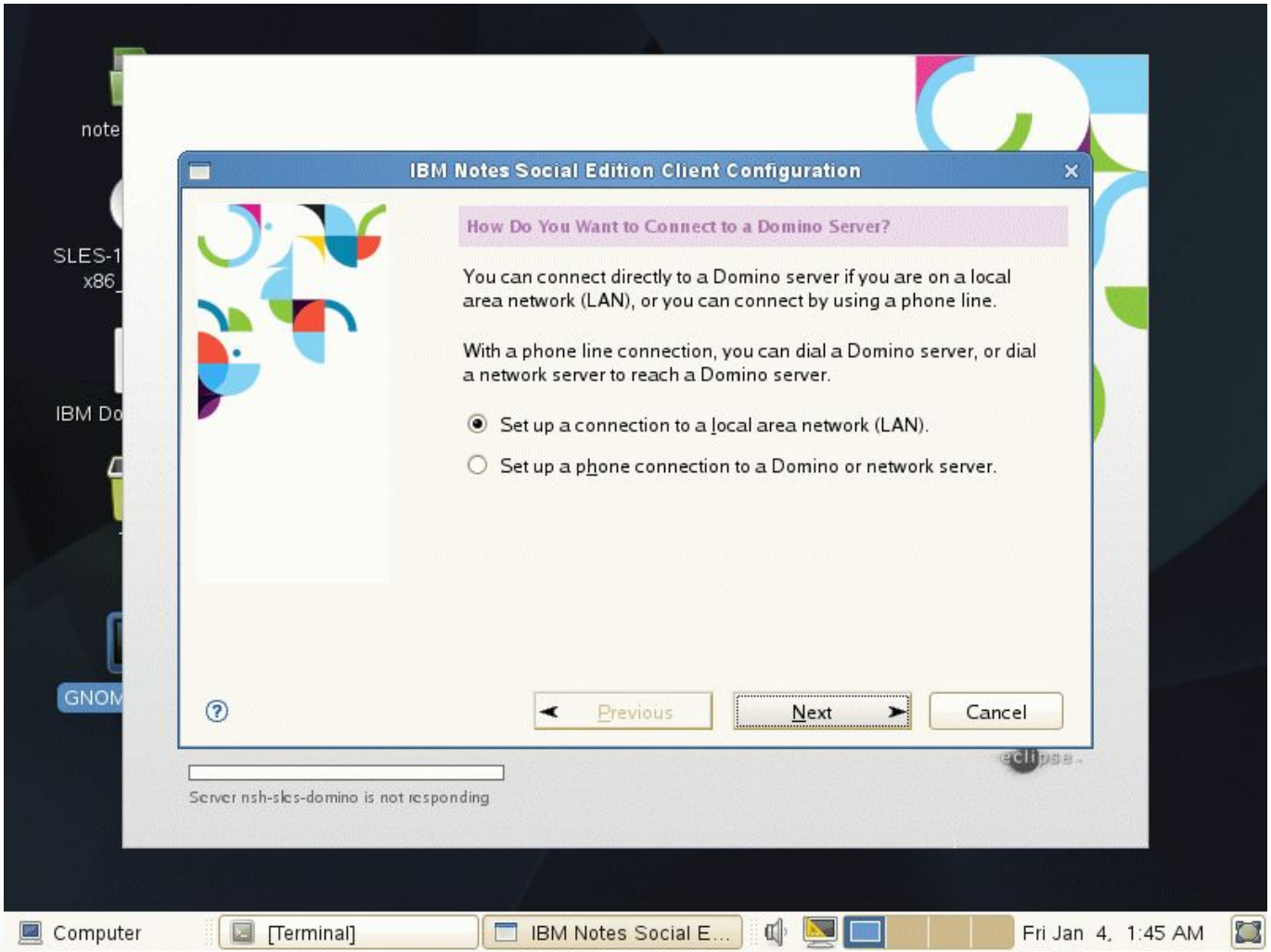
- Click “Next”

Client Configuration



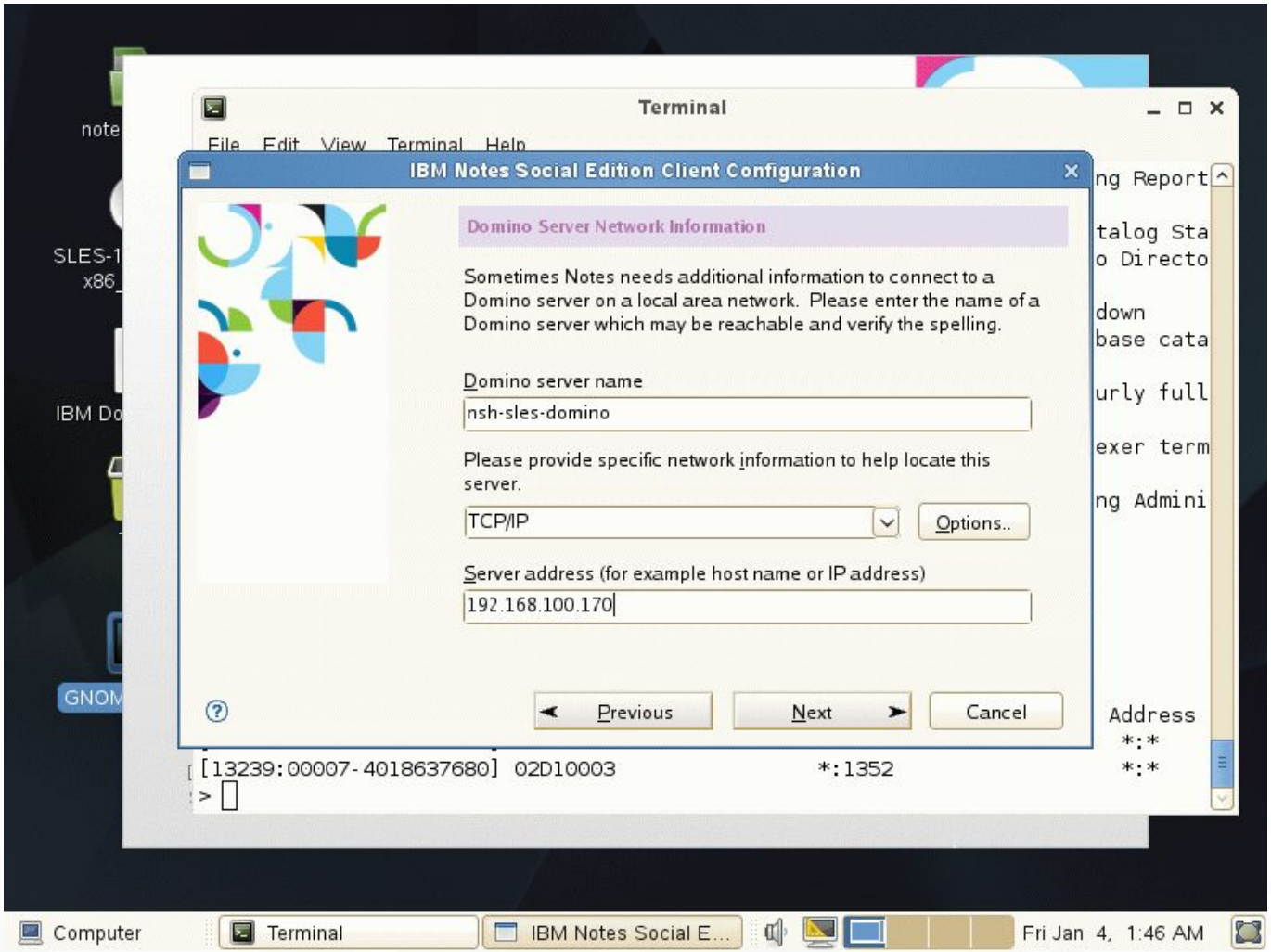
- Enter registered user
- Enter Server Name
- Press “Next”

Client Configuration



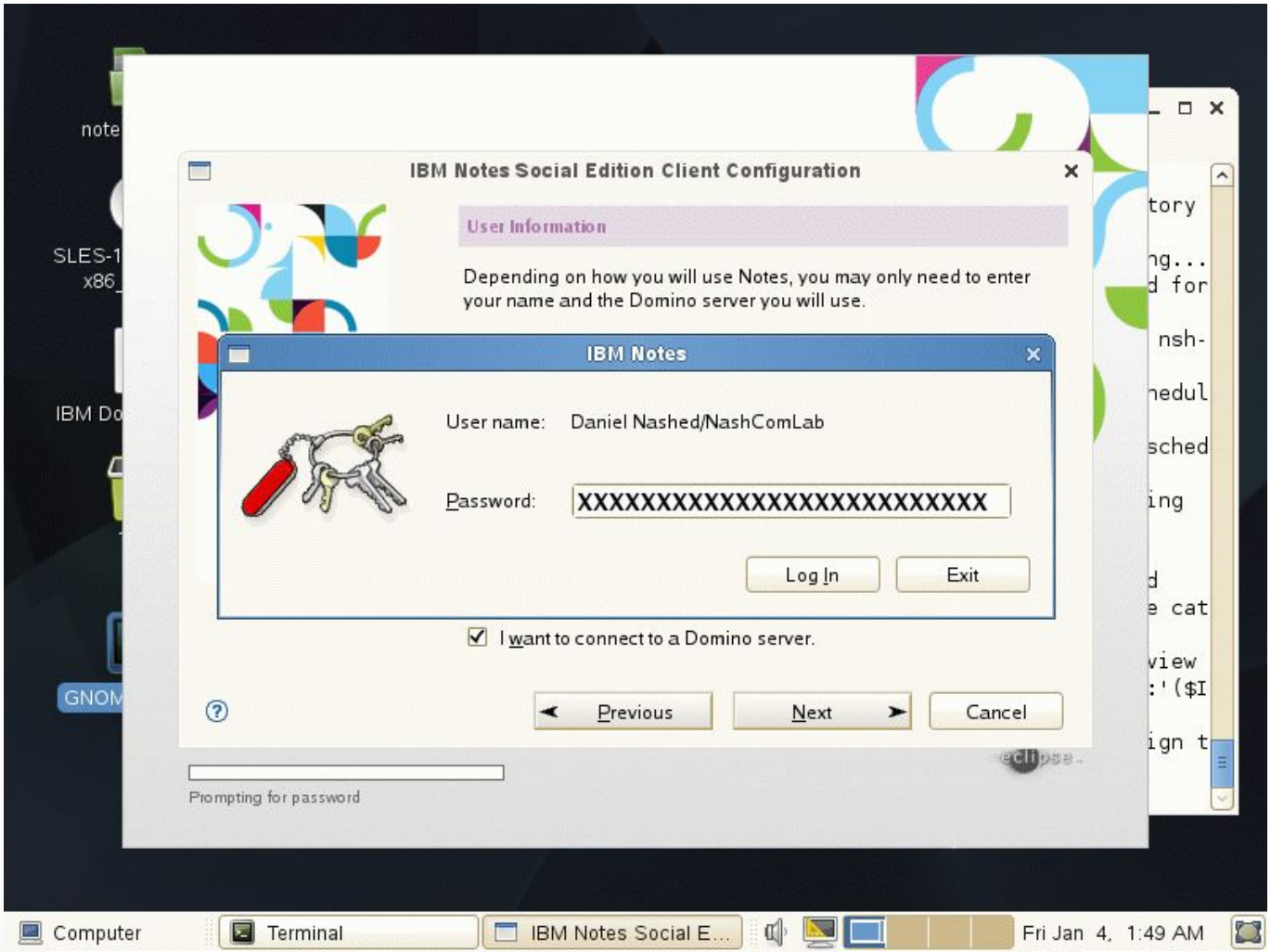
- Press “Next”

Client Configuration



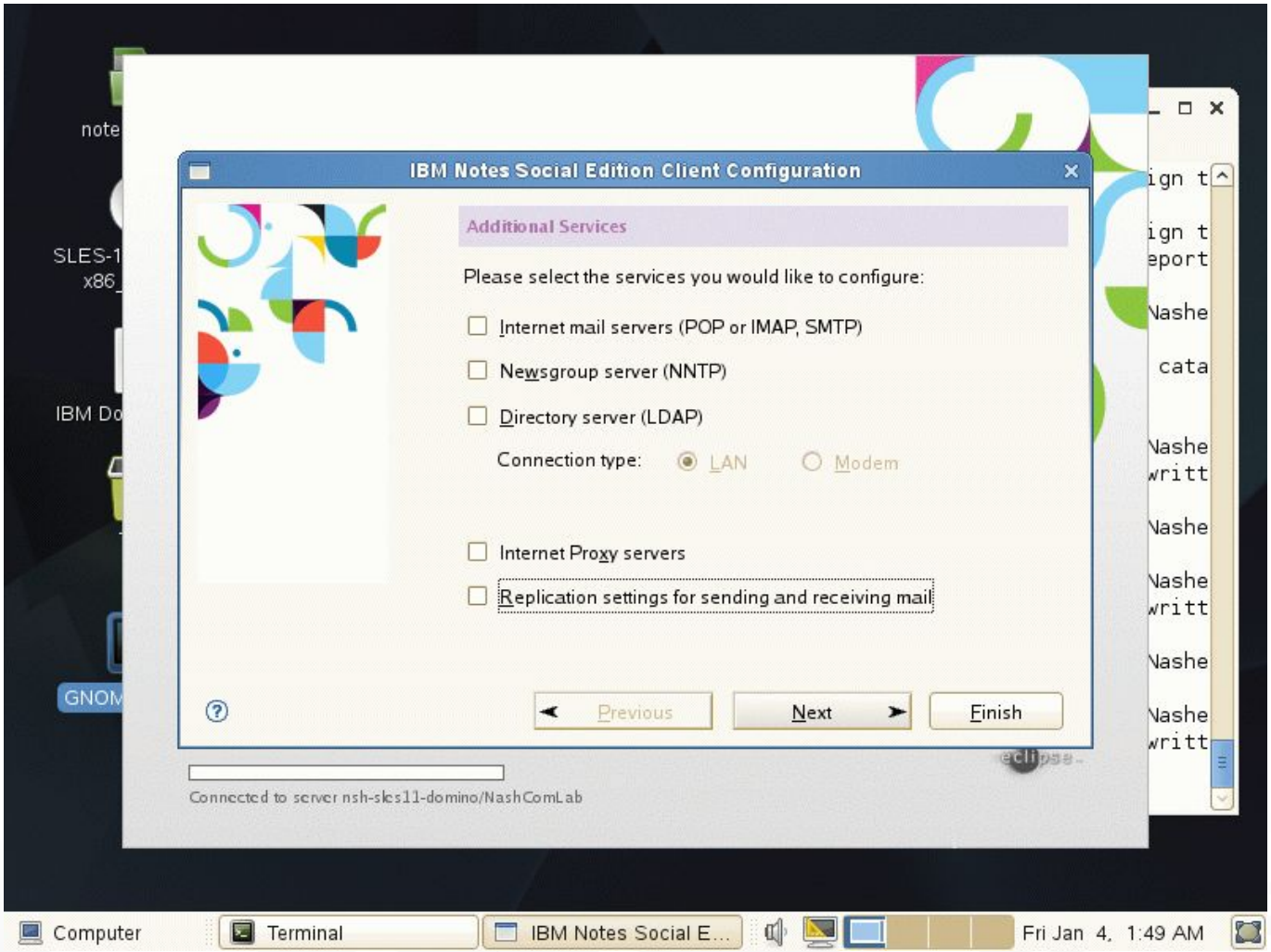
- In case you have no name resolution type in the IP
- Press “Next”

Client Configuration



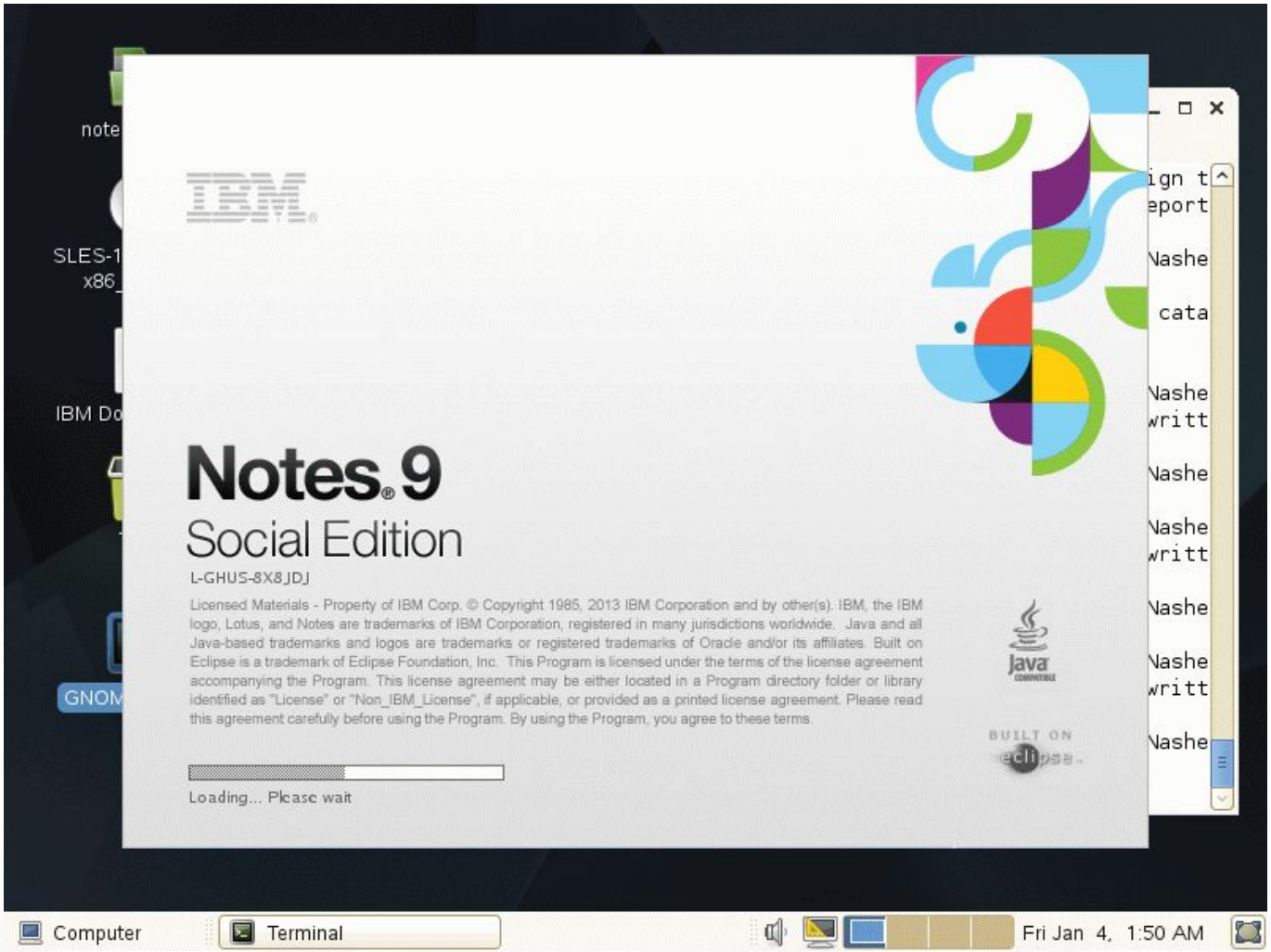
- ID should be downloaded automatically because we registred the user keeping the user.id in the person doc
- In production environments you would leverage ID-Vault

Client Configuration

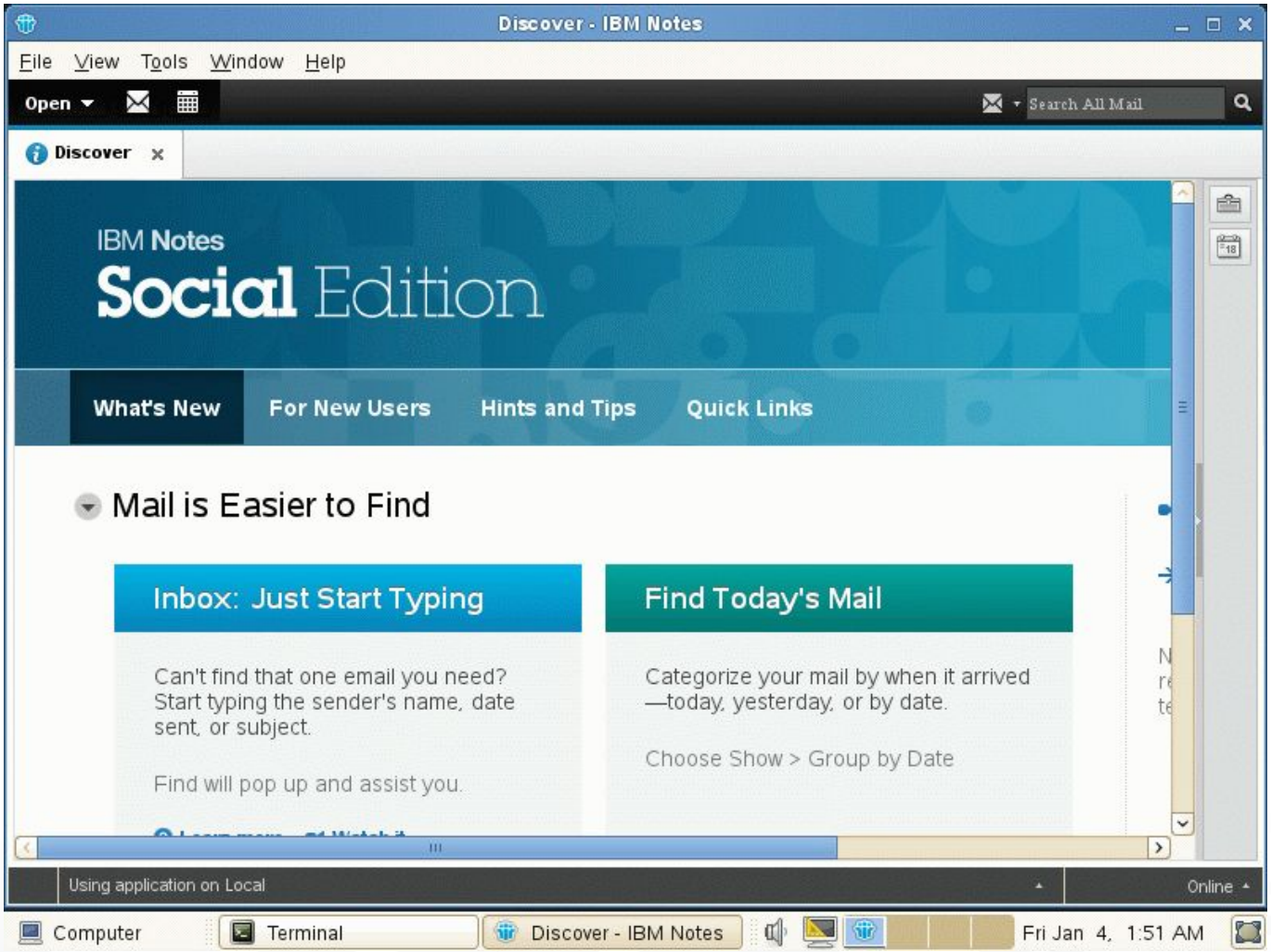


- Press “Next”

First Notes Client Start

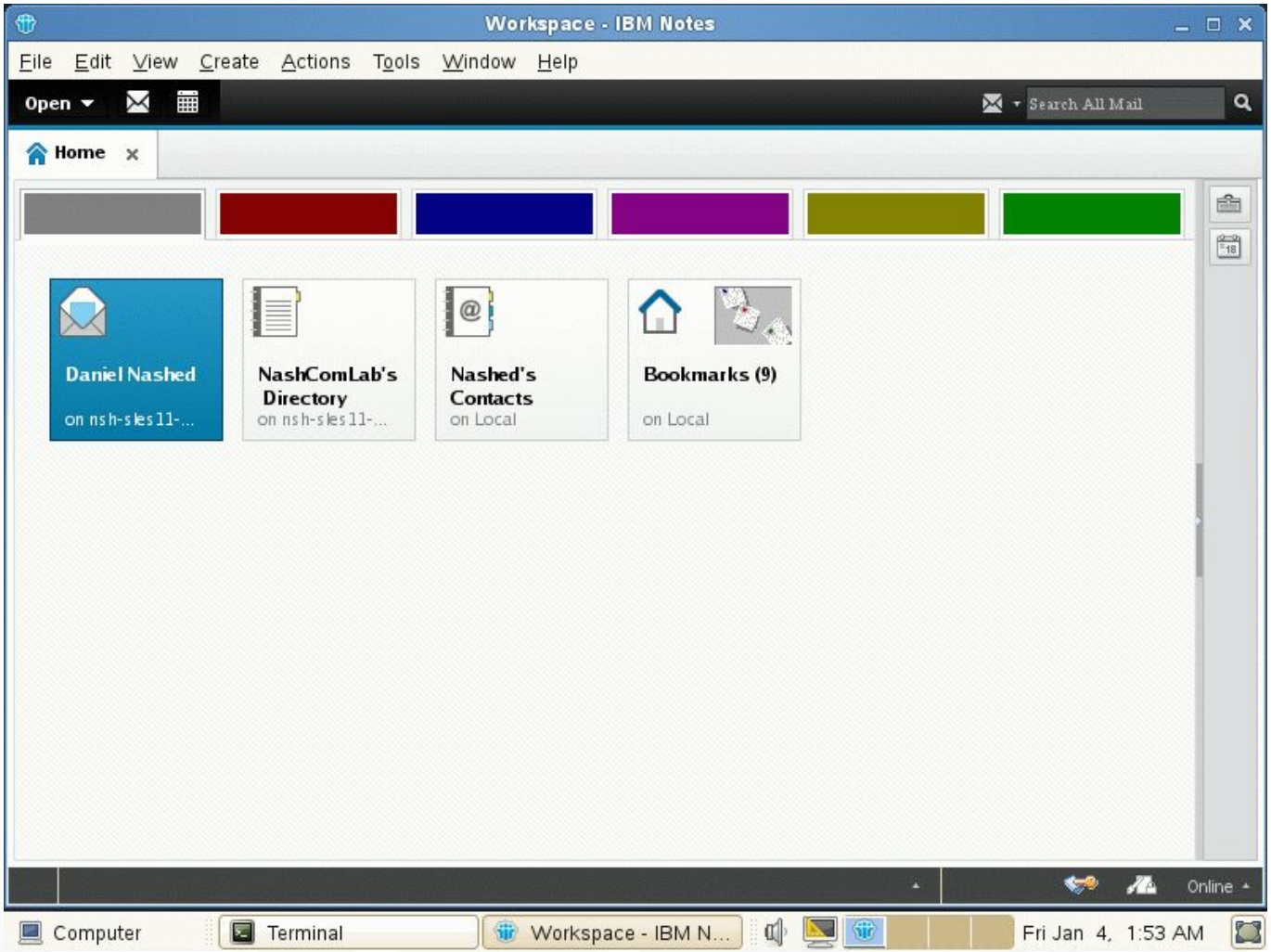


New Welcome Screen



- Amost Same Look & Feel you know from Windows

Desktop is still there...



- Almost Same Look & Feel you know from Windows

Linuxfest Returns!

Back for another informative all-inclusive Linux session in 2013

Join Bill Malchisky, Wes Morgan, and guest Daniel Nashed!

When: Thursday, 31 January

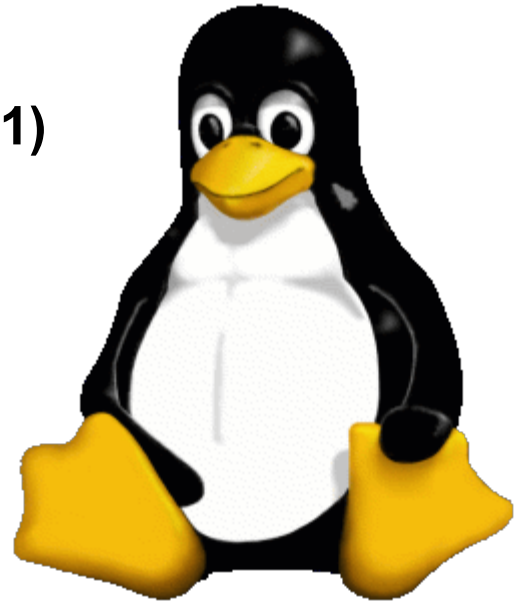
Where: **Dolphin Hotel - Sum Chow's (Next to Picabu, Level 1)**

Time: 12:15 - 1:30 pm

Other: Bring your box lunch!

We're not in the program guide, so mark your calendar, or

See our listing in the ConnectOsphere agenda Notes app



redhat

Special thanks to Red Hat for providing our session swag!

Q&A

- Thanks for your attention!
  - Please fill out your evaluations!
- Questions?
  - Now, find me later at the conference or contact me offline
- Contact
  - nsh@nashcom.de
  - http://www.nashcom.de
  - http://blog.nashcom.de
  - +49 172 2141912

Appendix: Additional Slides

- RHEL 6.3 Install & Configuration
- Notes Client on Ubuntu 12.04 LTS

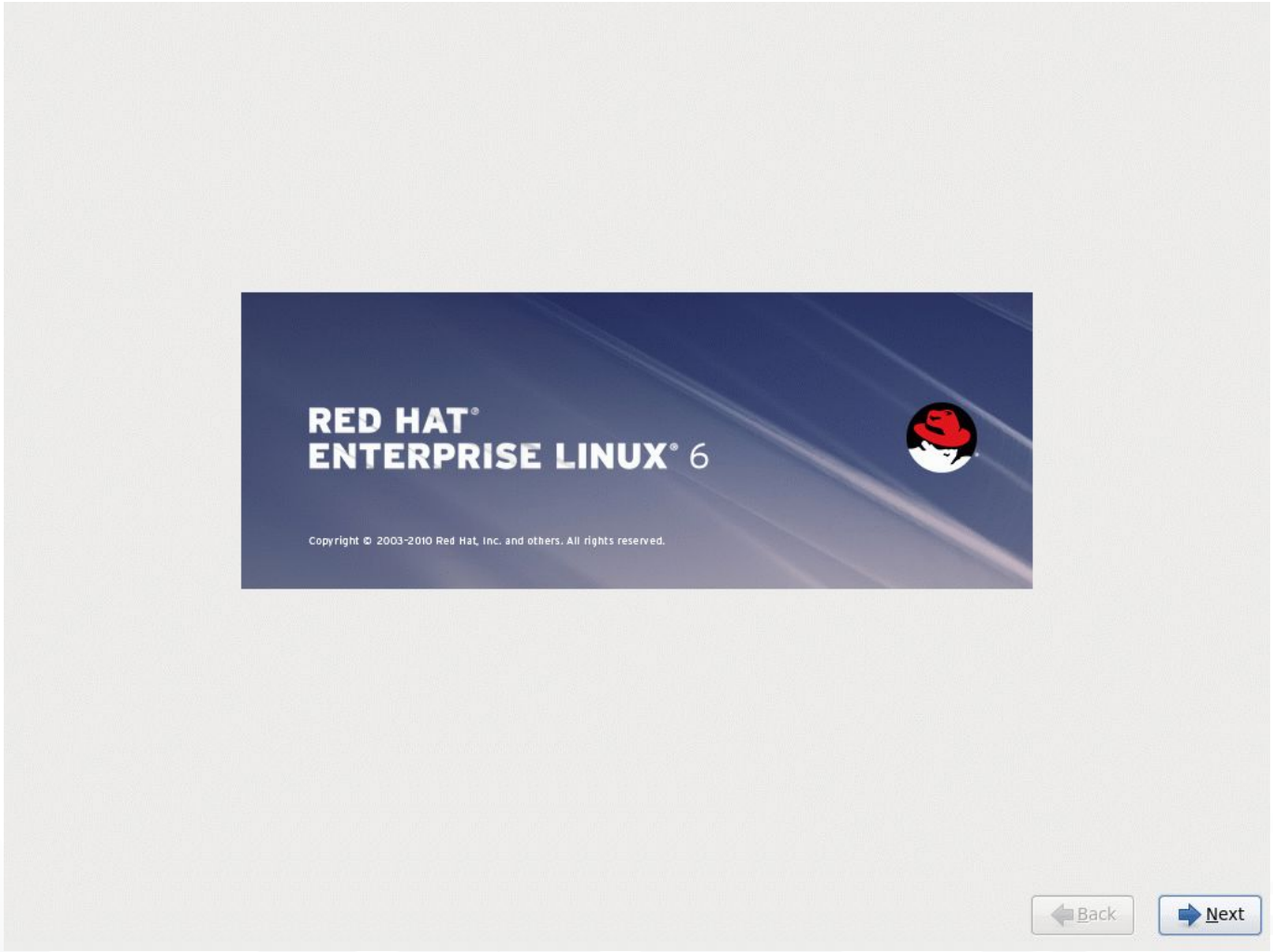
Boot Screen

- Select “Install or upgrade and existing system”

Media Test

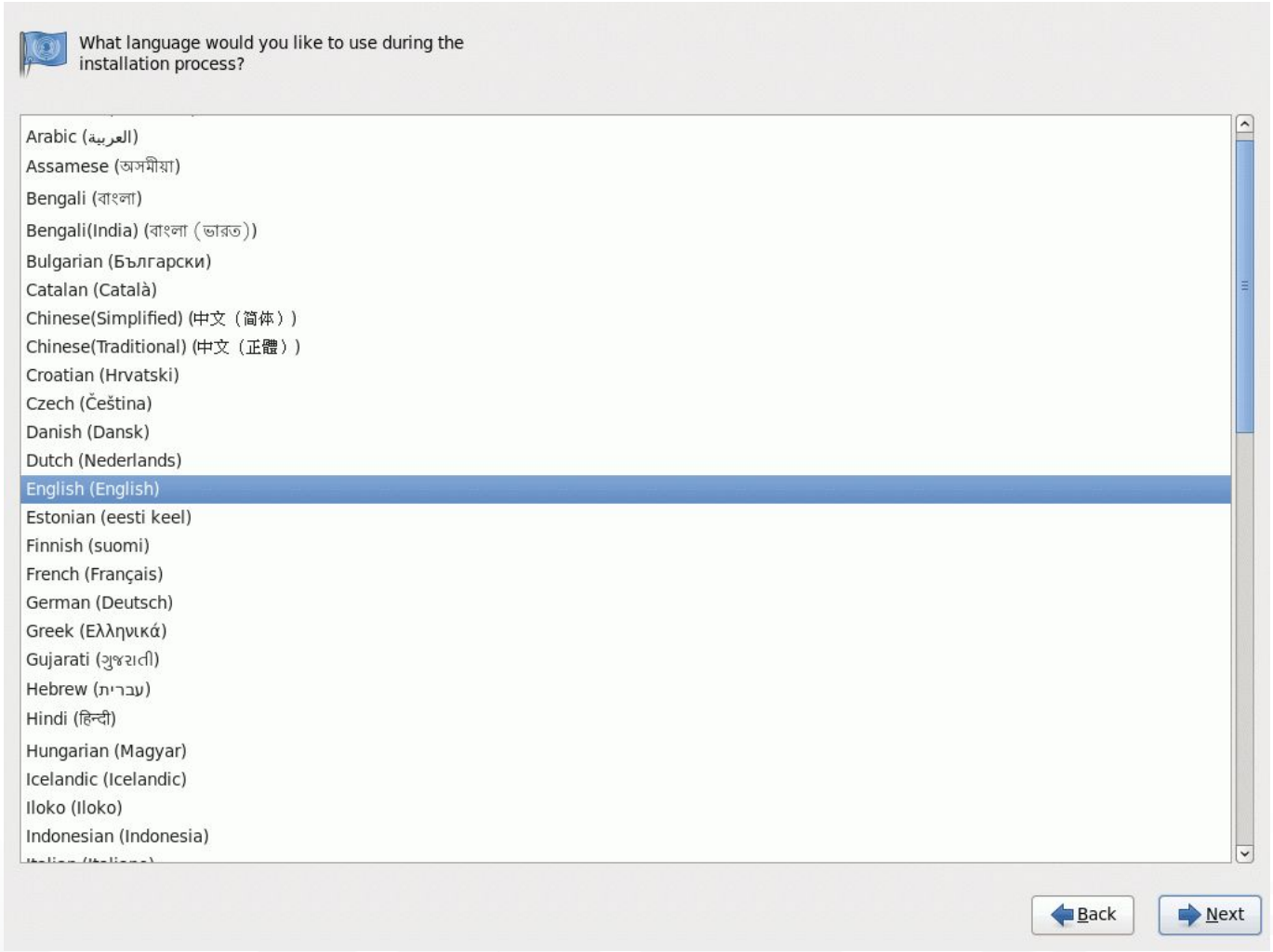
- Skip Media Test unless you downloaded the image and did not check the checksum
- Click “Next”

RedHat Entry Screen



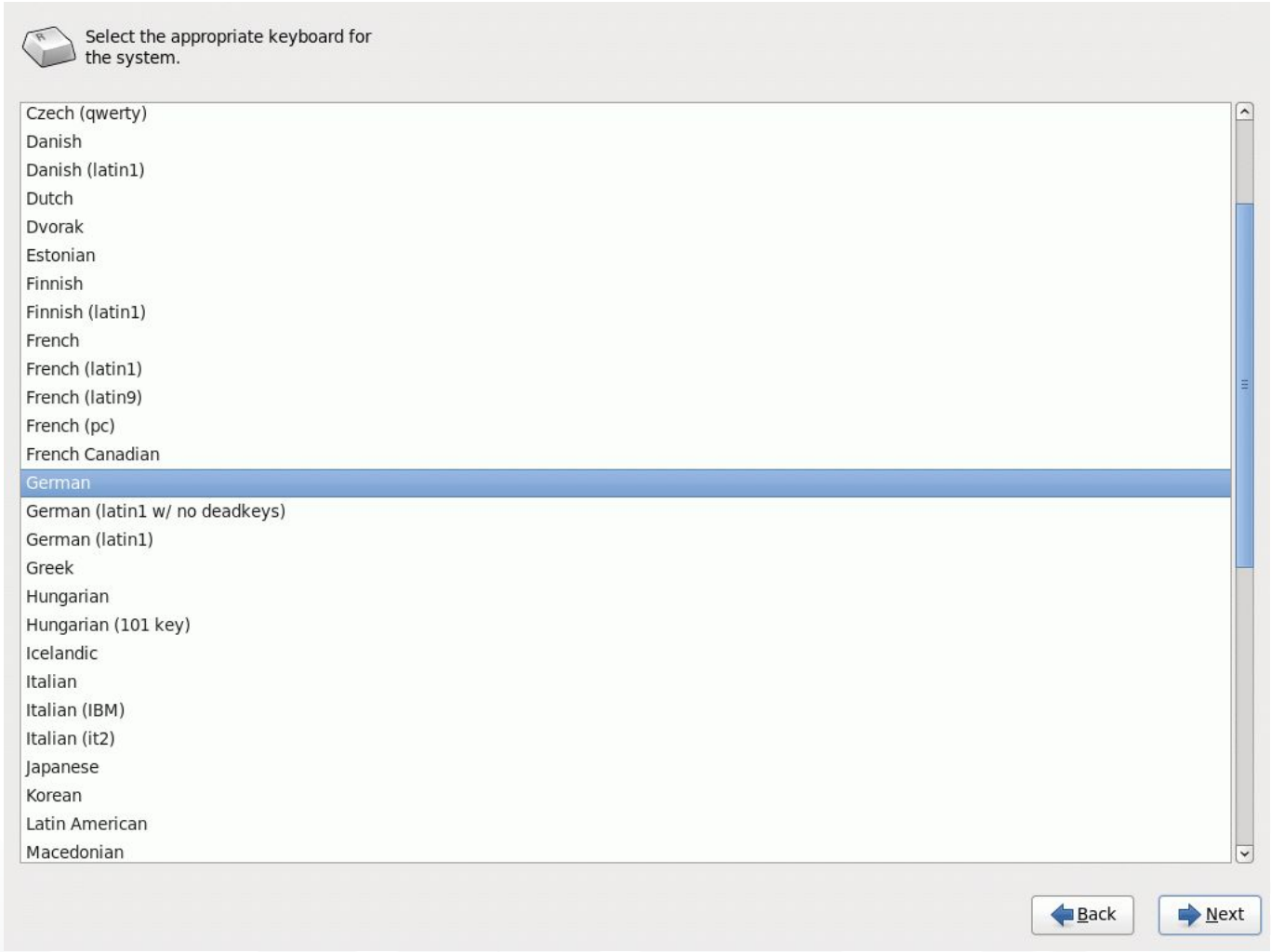
- Click “Next”

Install Language Select



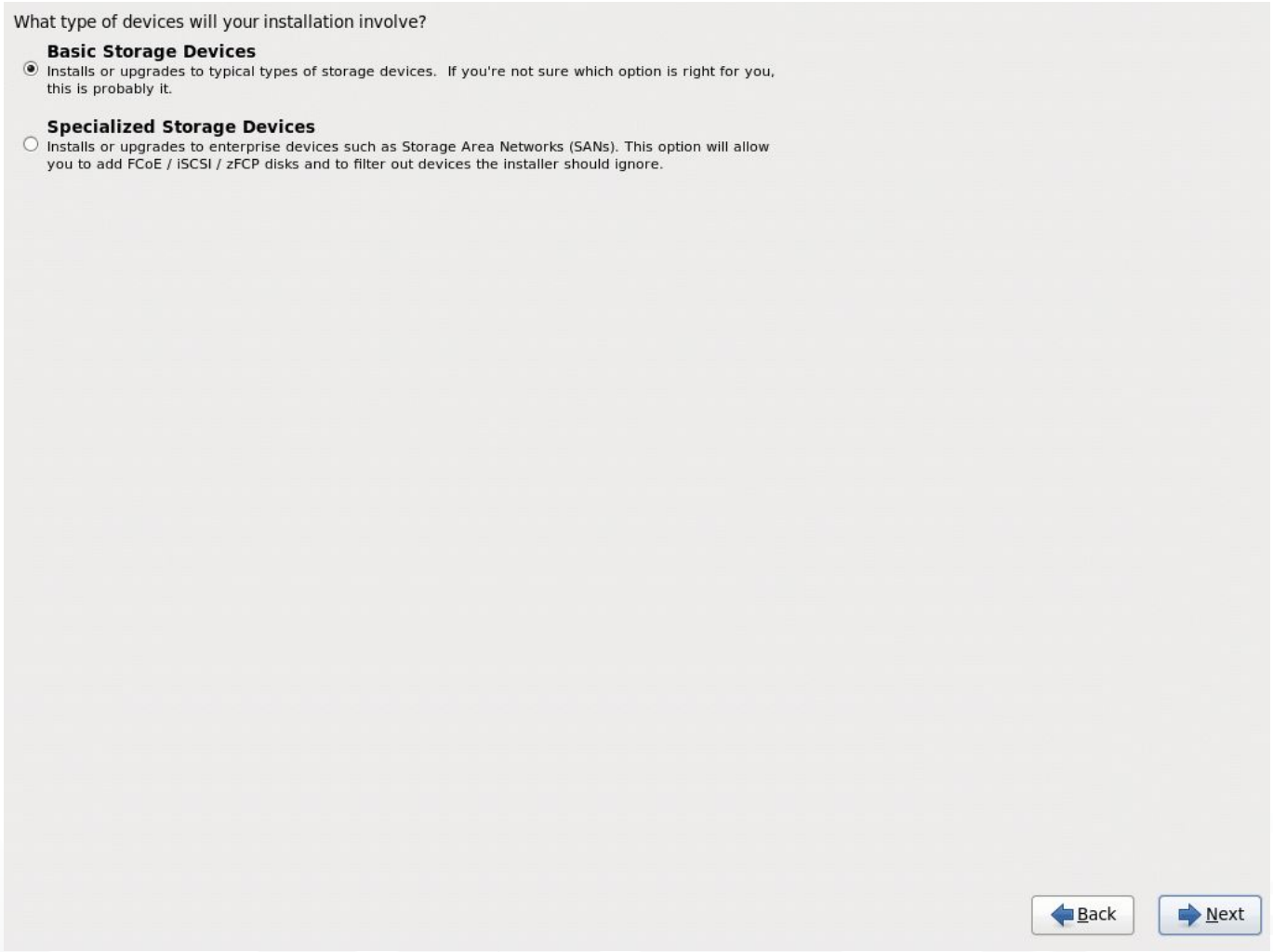
- Select your Language
- Press “Next”

Keyboard Select



- Select your Keyboard Layout
- Press “Next”

Storage Devices

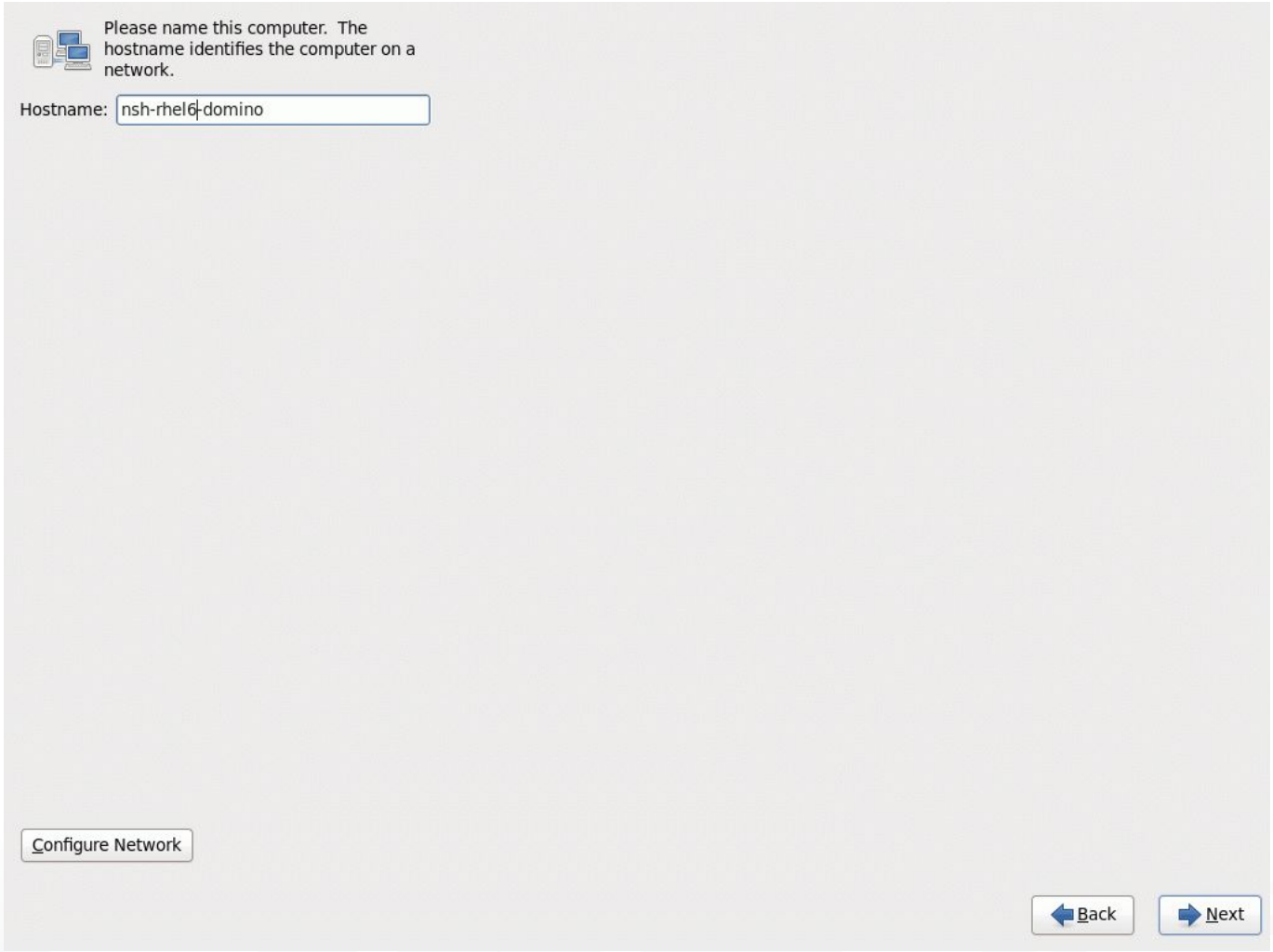


- Select “Basis Storage Devices”
- Press “Next”

Discard Disk Data

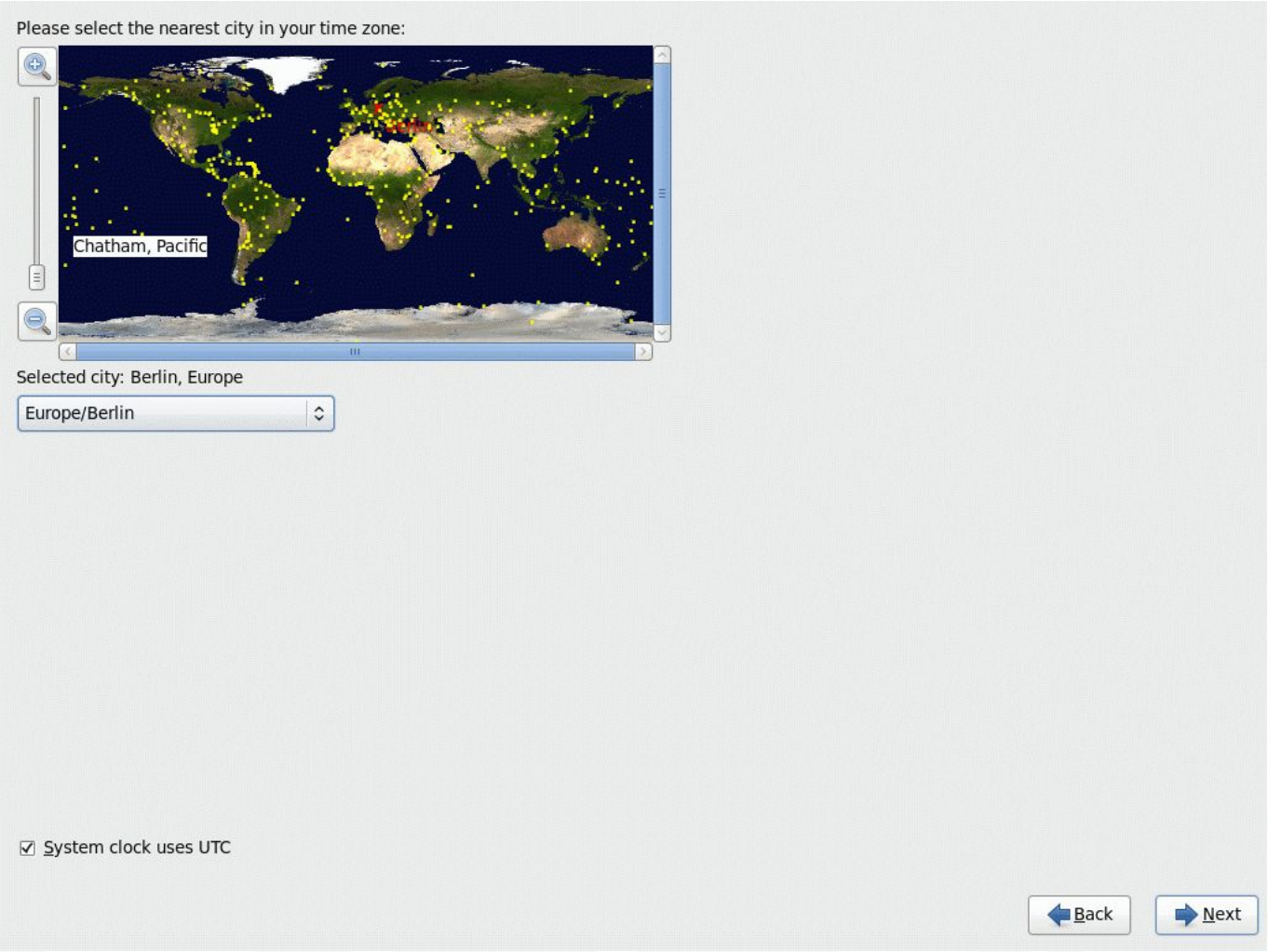
- Click “Yes discard any data”
- It's a new disk

Hostname



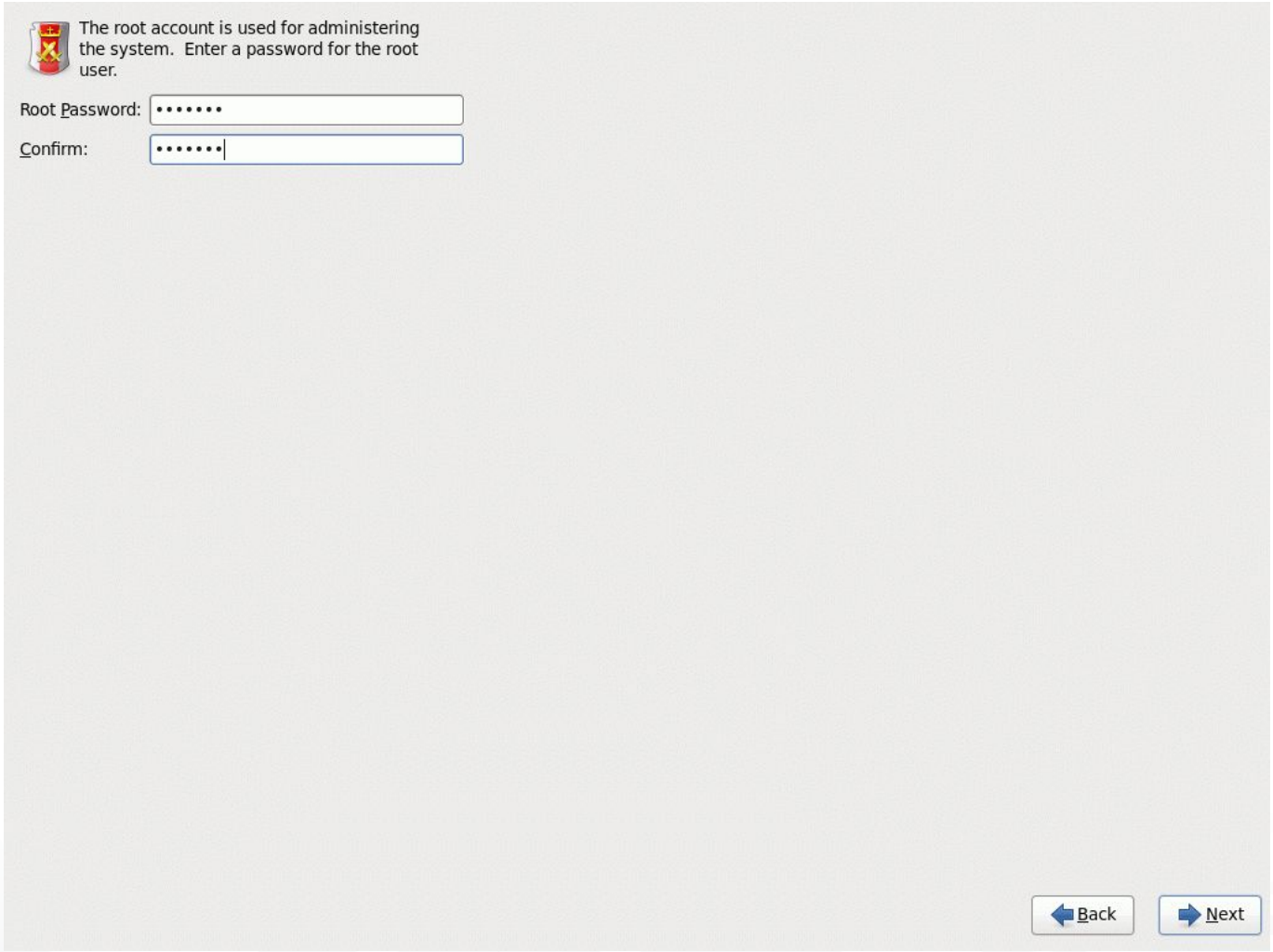
- Type in Hostname
- Press “Next”

Select Timezone



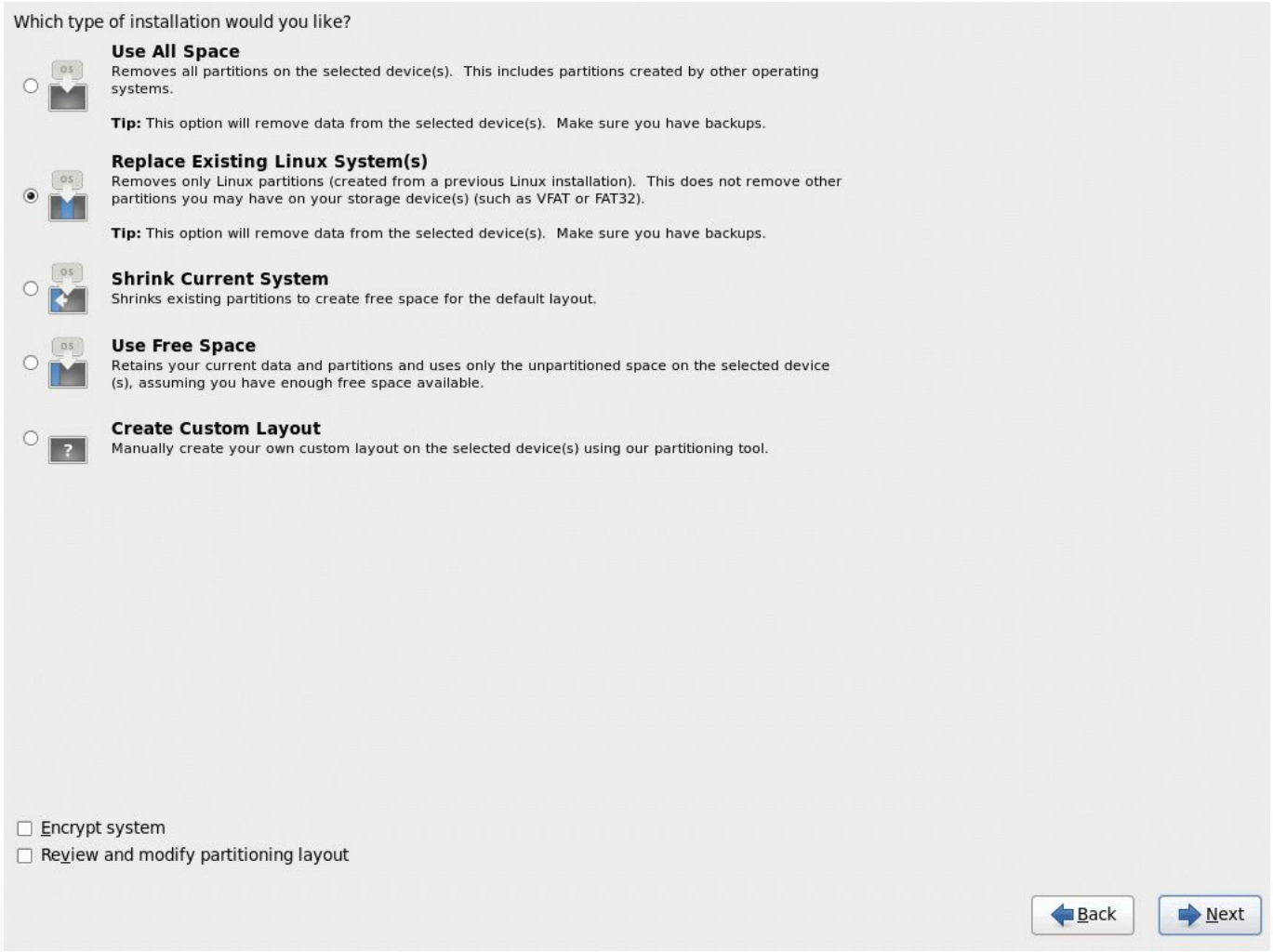
- Select your Timezone
- Press “Next”

Root Password



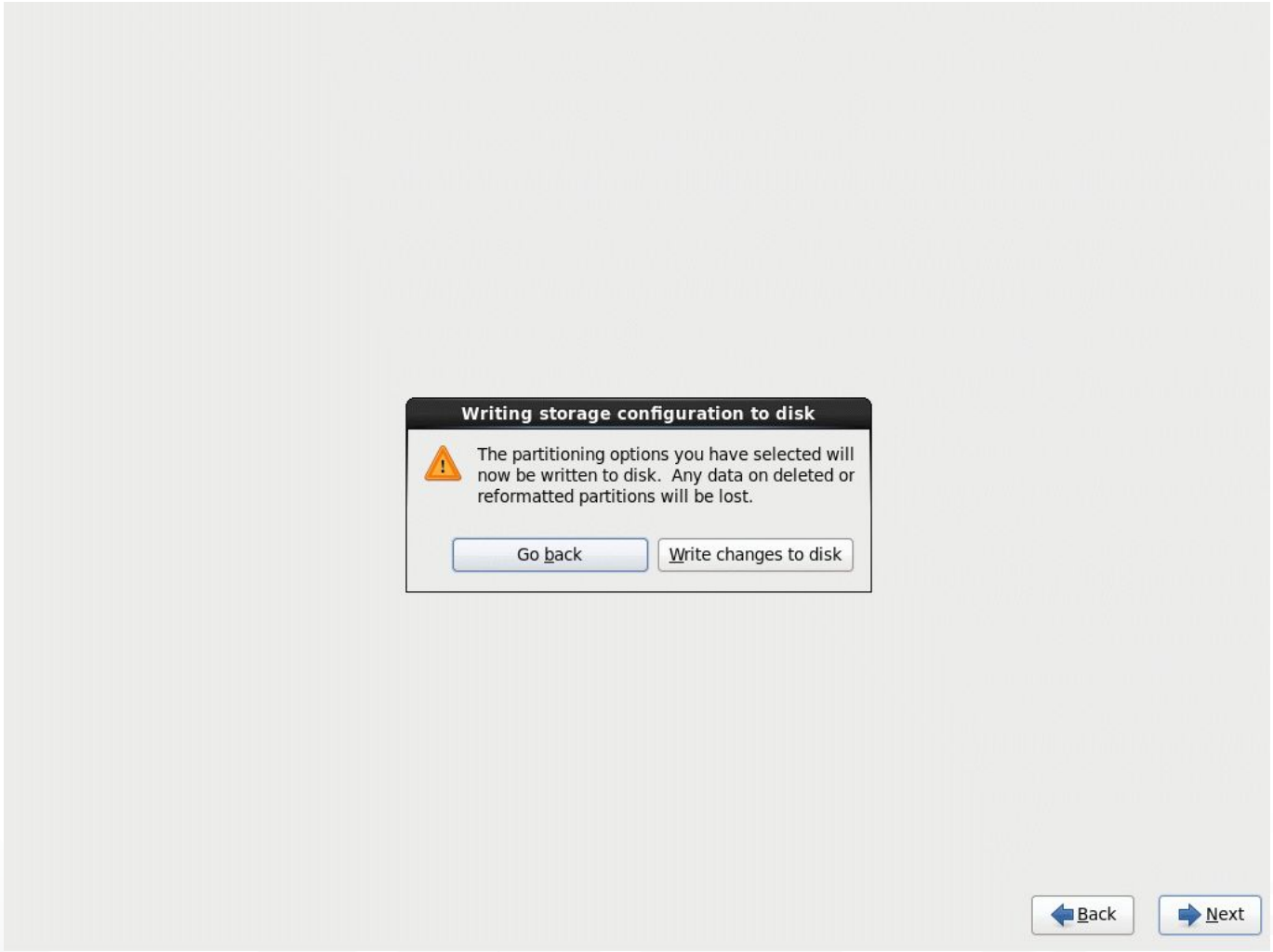
- Type in a new, secure “root” password
- Type “Next”

Disk Installation Type



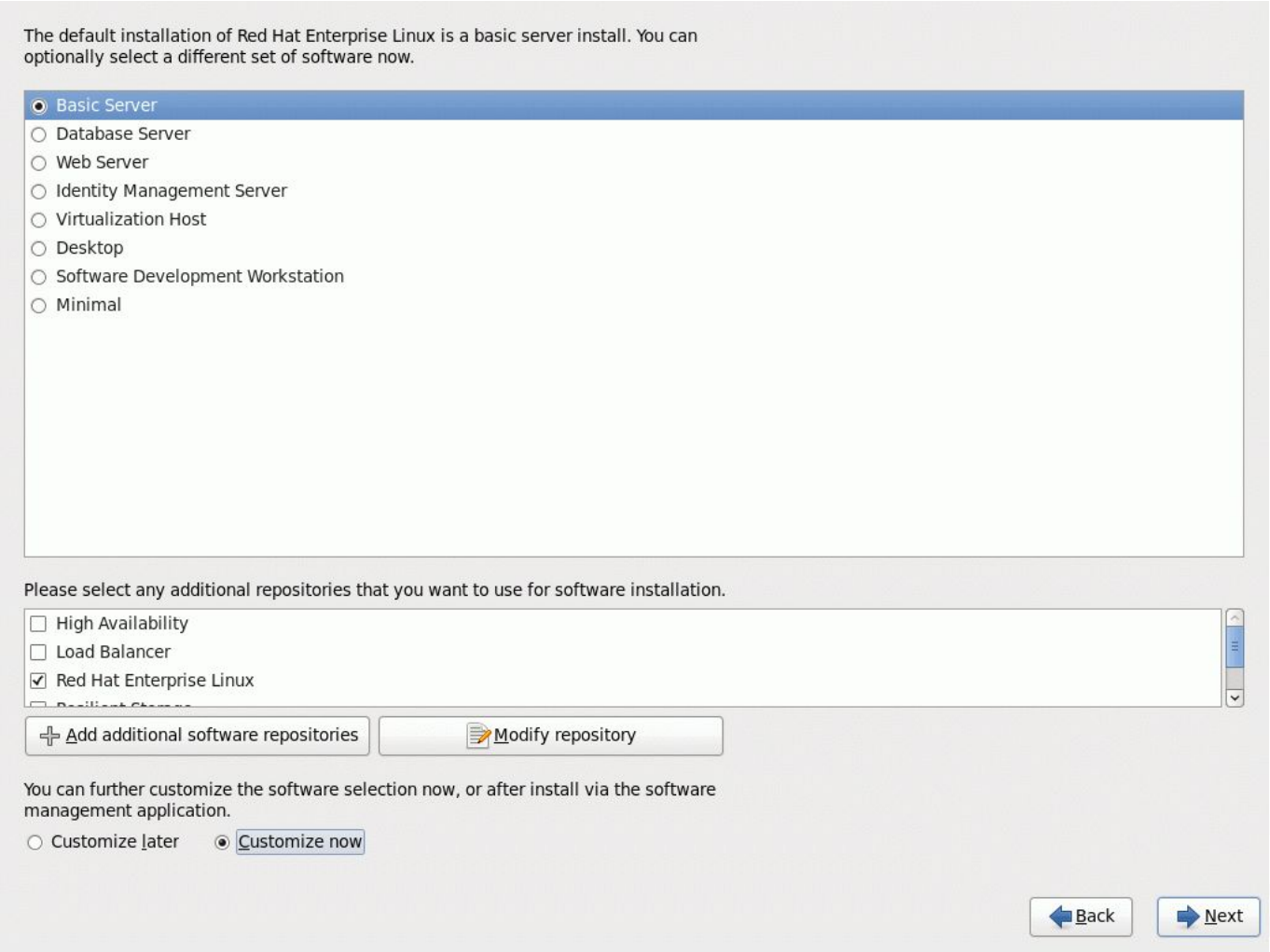
- Keep default option
- Works fine for a new disk and existing data, you don't want to delete
- Press “Next”

Confirm Disk Changes



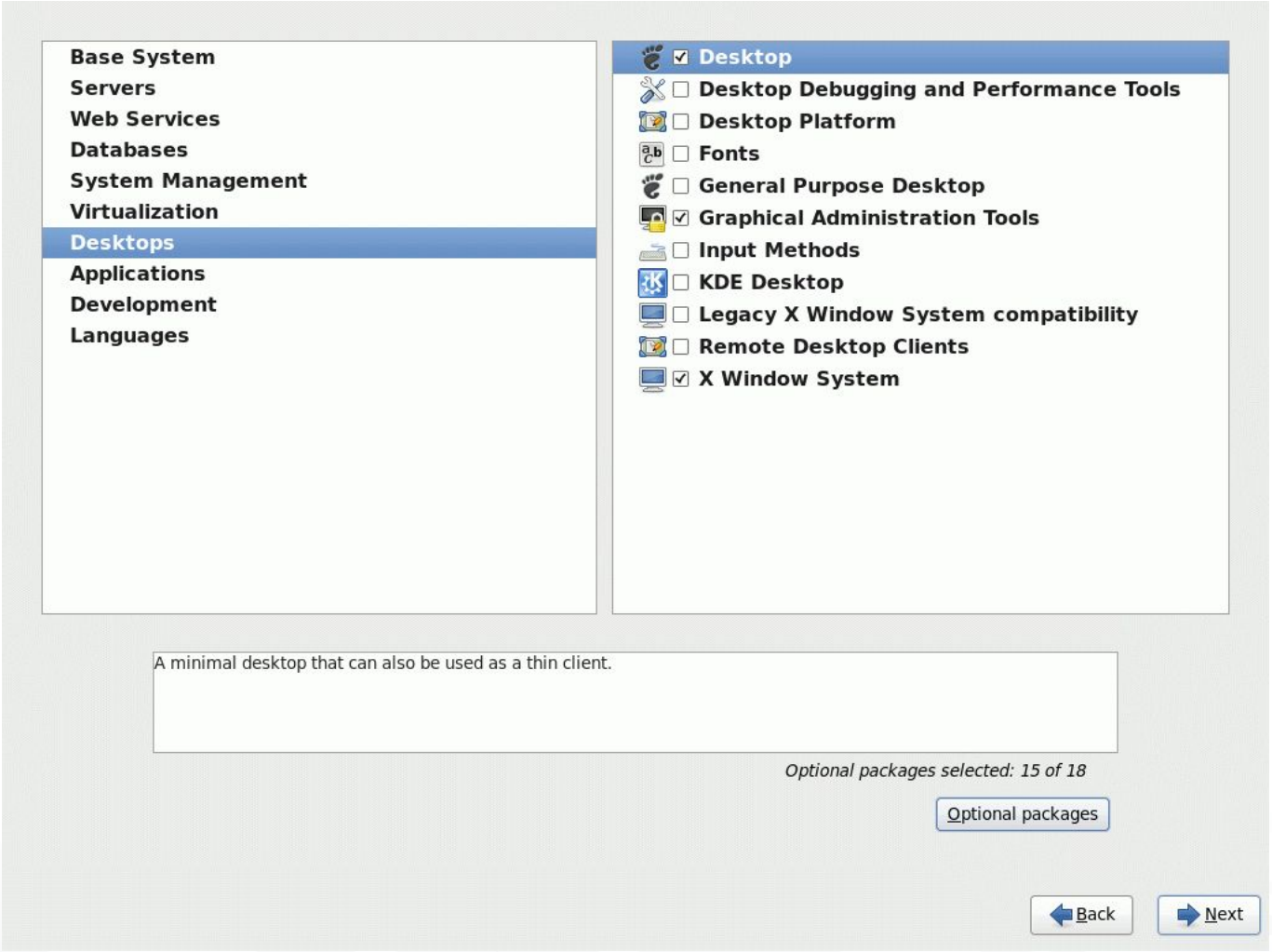
- Select "Write changes to disk"

Select Server Type and Options



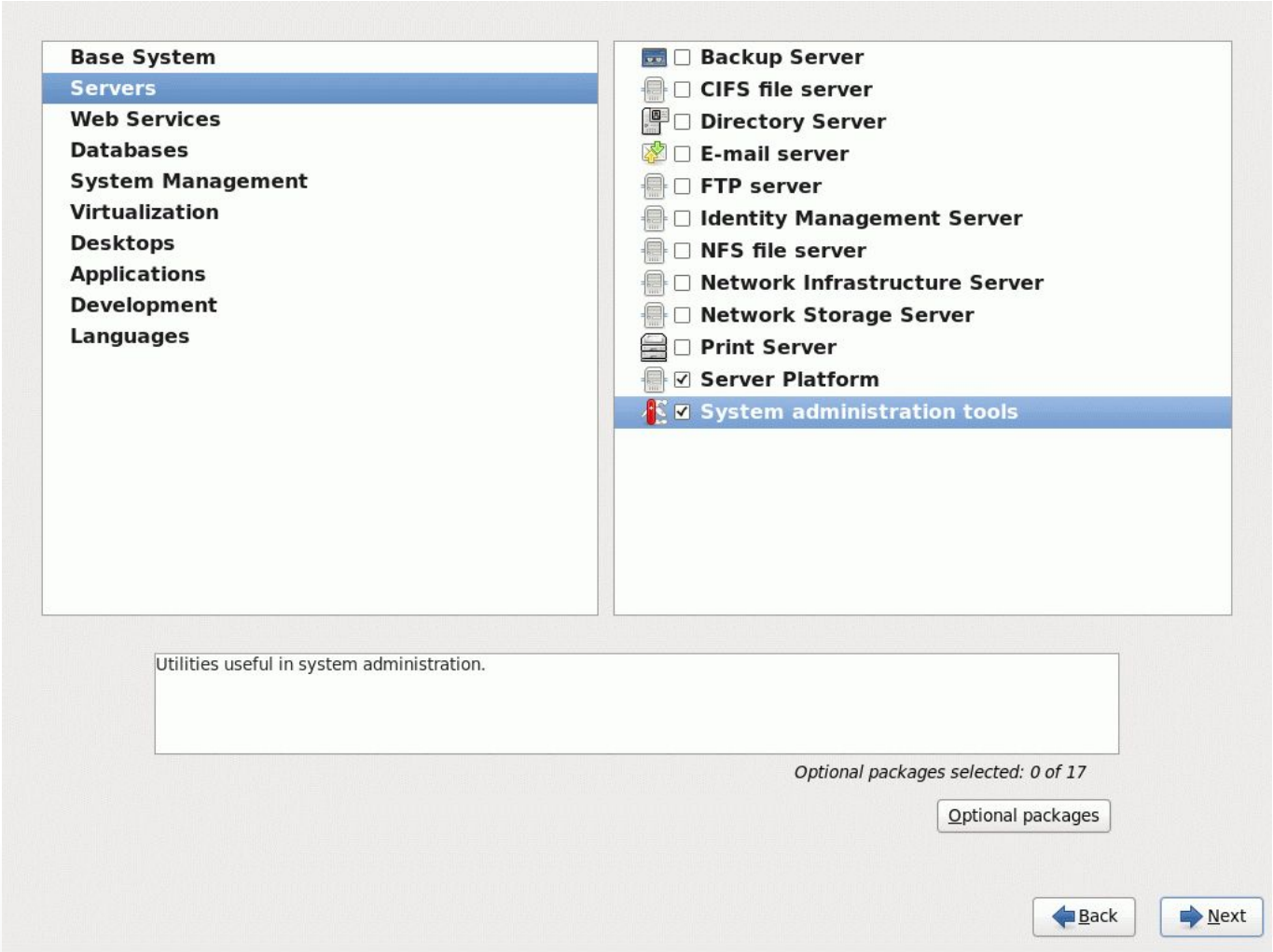
- Select “Basis Server”
- Select “Customize now”
- Press “Next”

Select Desktop Options for X11 and Admin Tools



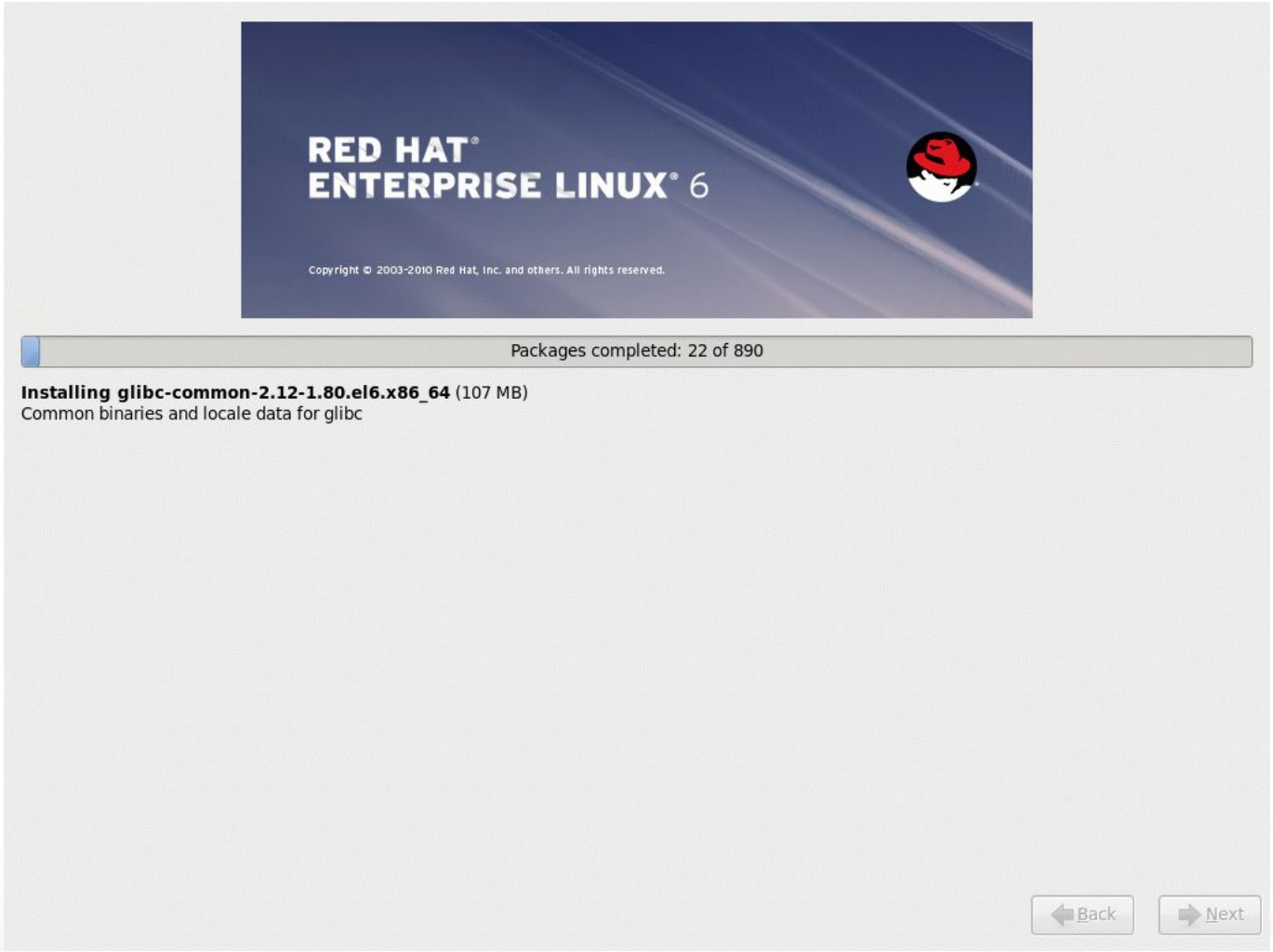
- Select
  - Desktop
  - X Window System
  - Graphical Administration Tools
- Press “Next”

Select Server Options

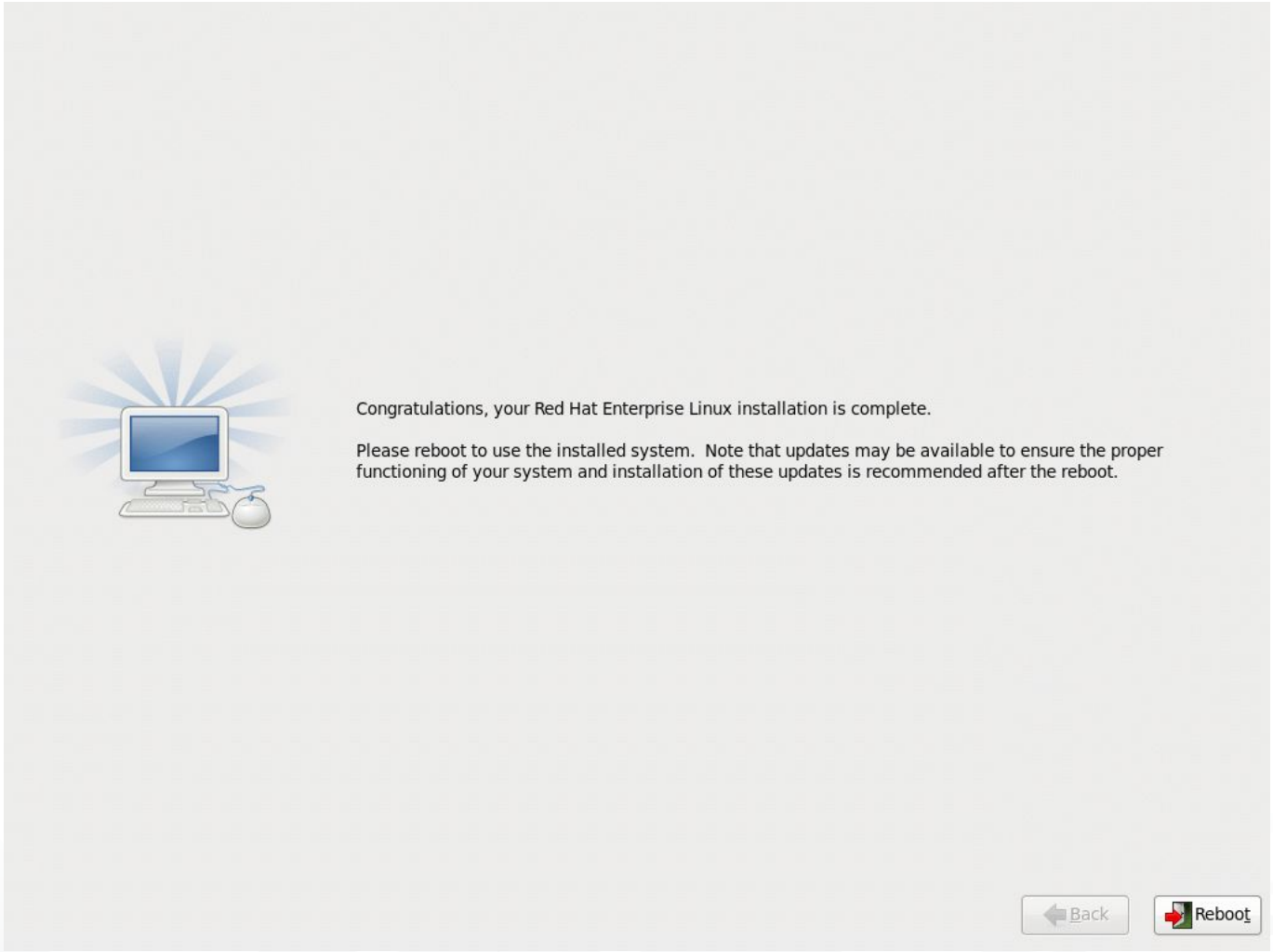


- Select “Server”
- Select
  - System admistration tools

Installation ...

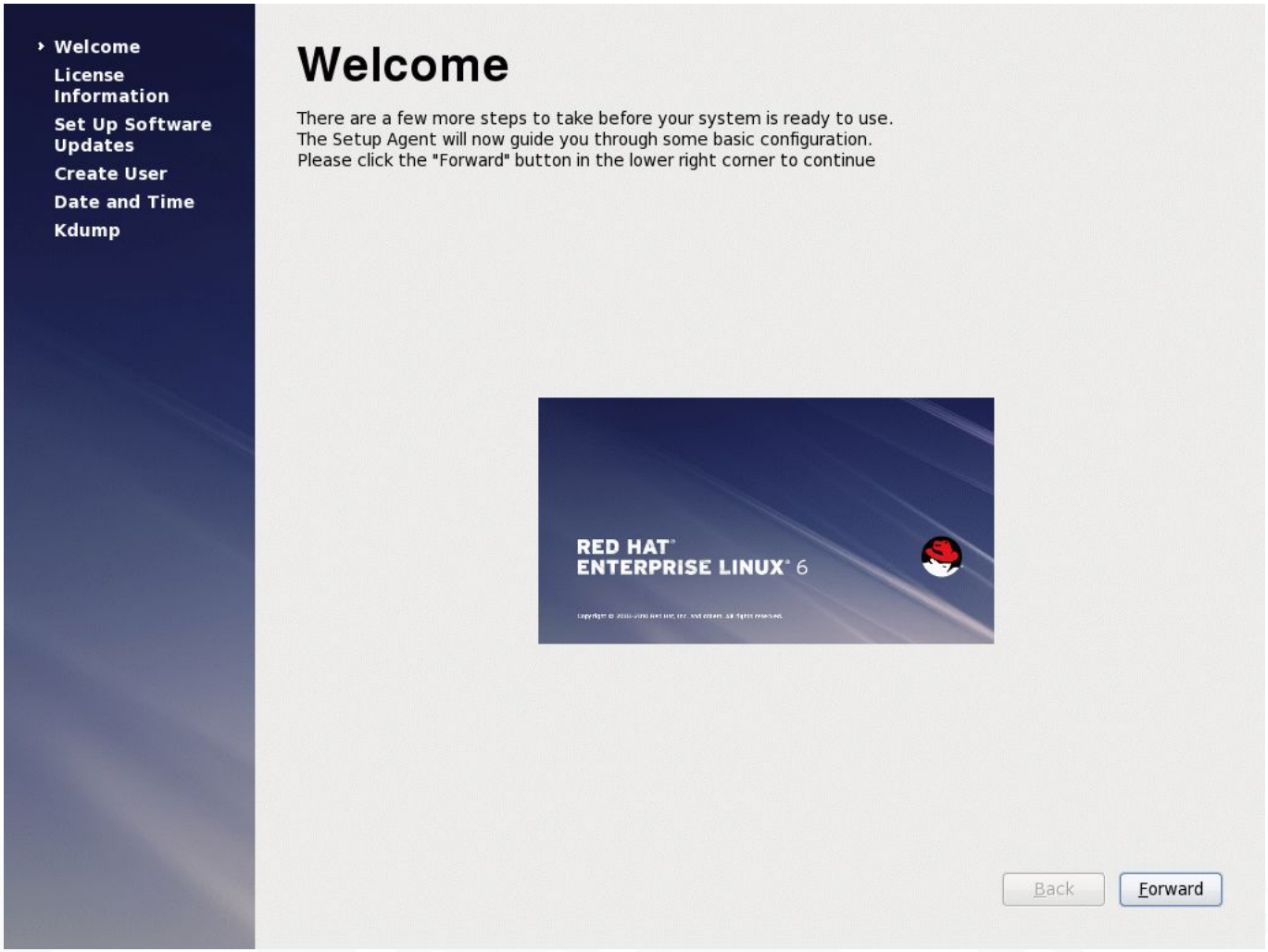


Installation Done



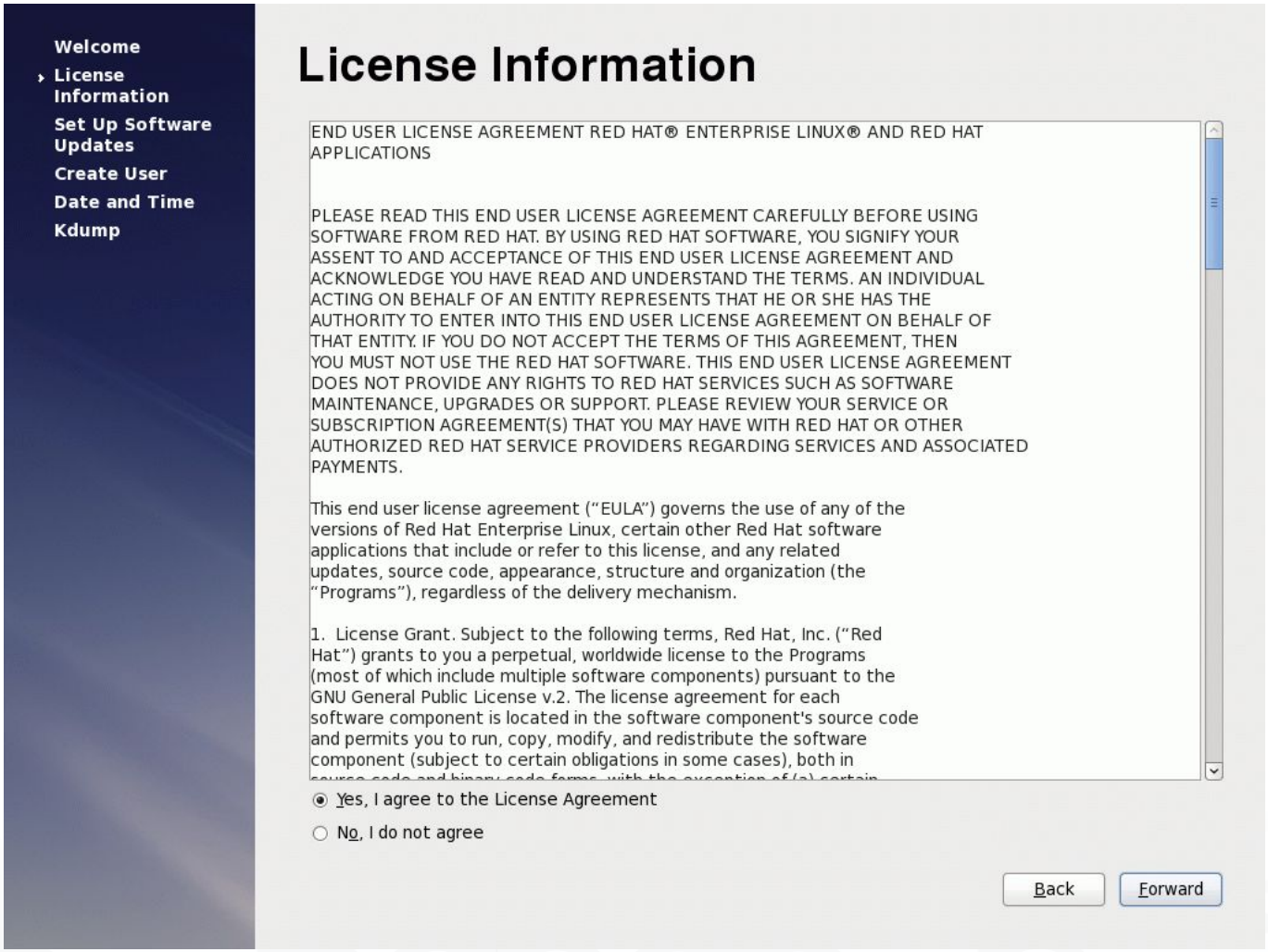
- Select “Reboot”

Welcome to Configuration



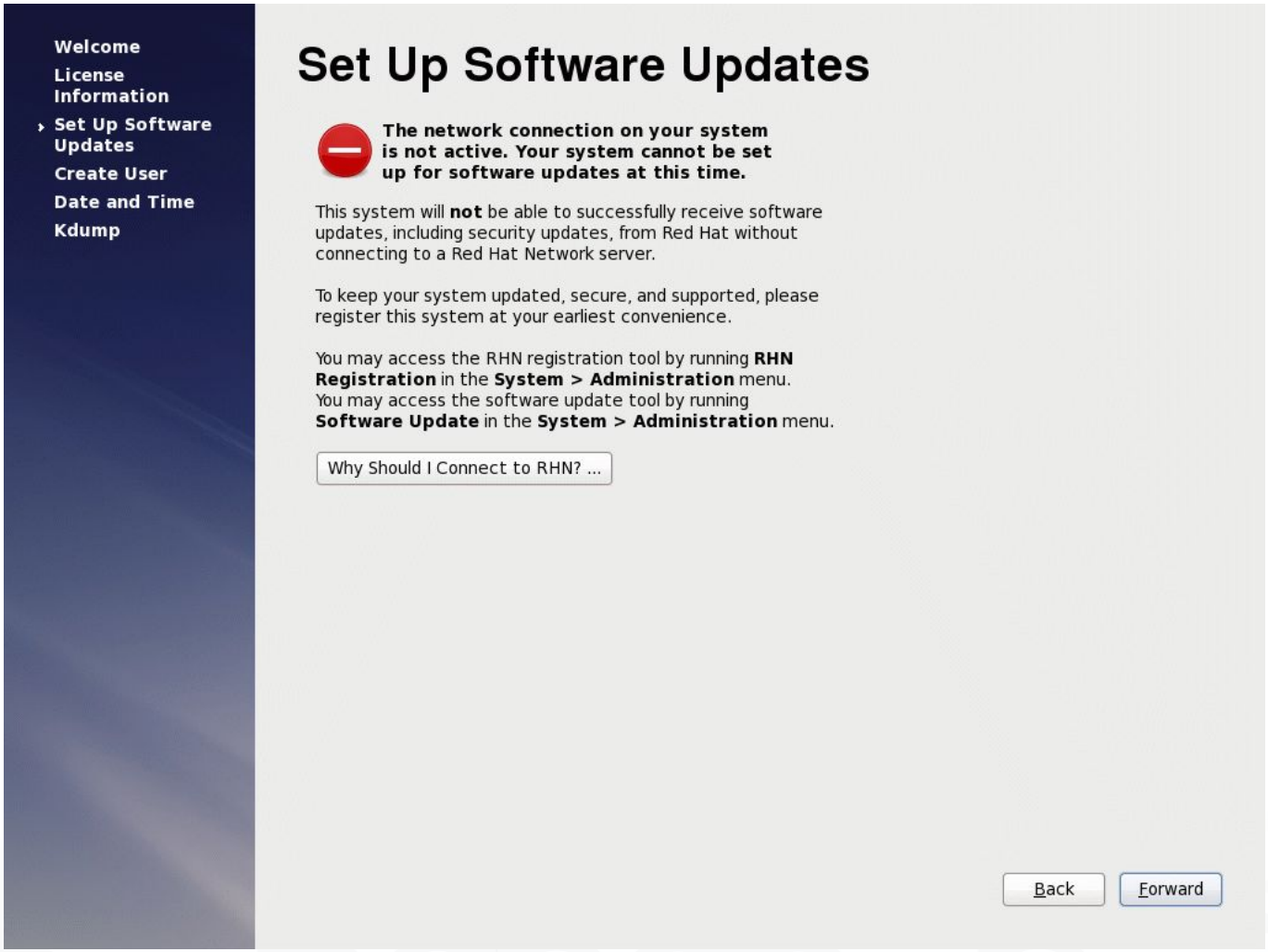
- Click “Forward”

License Information



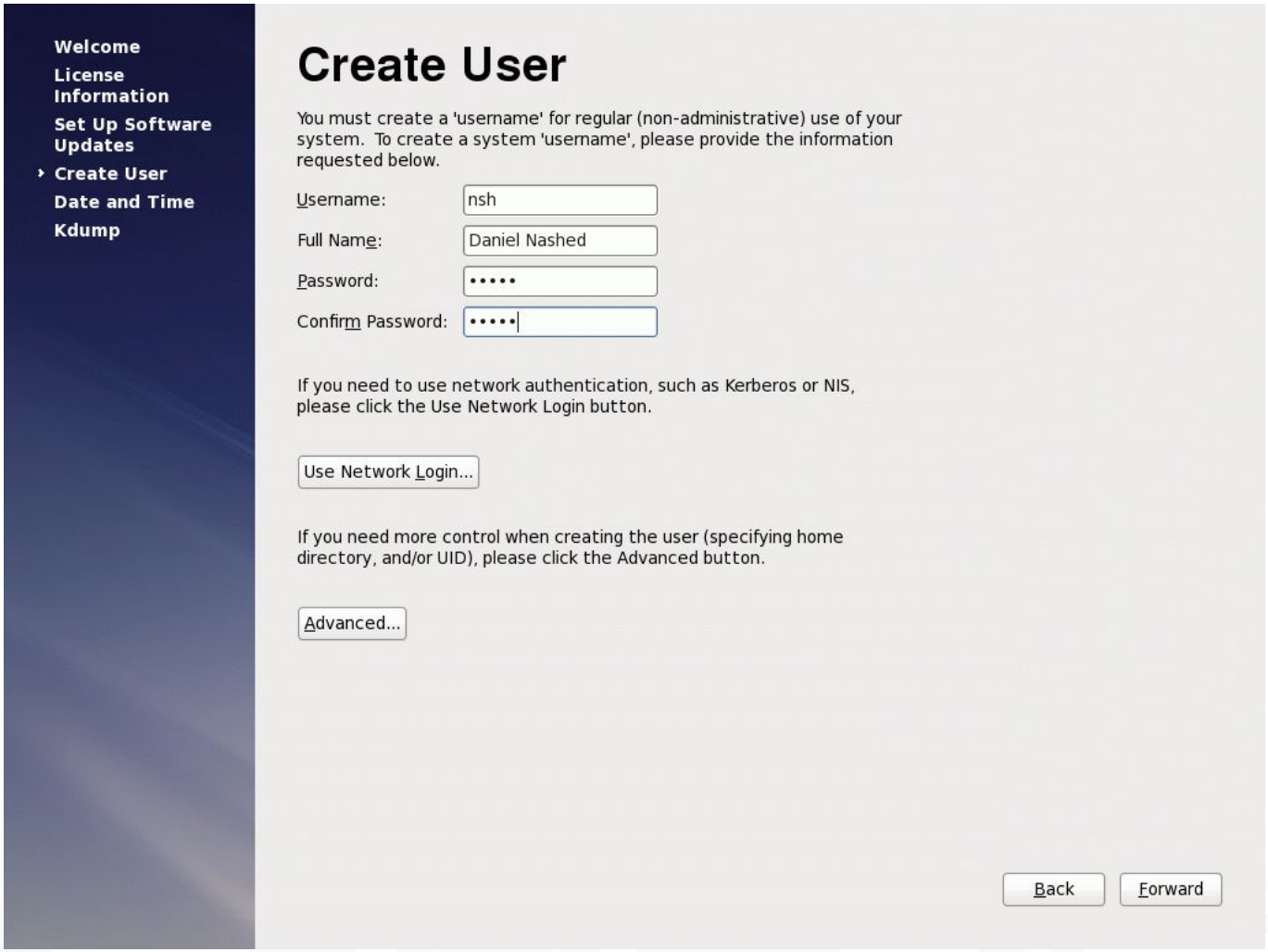
- Agree to License Terms
- Press “Forward”

Setup Software Updates



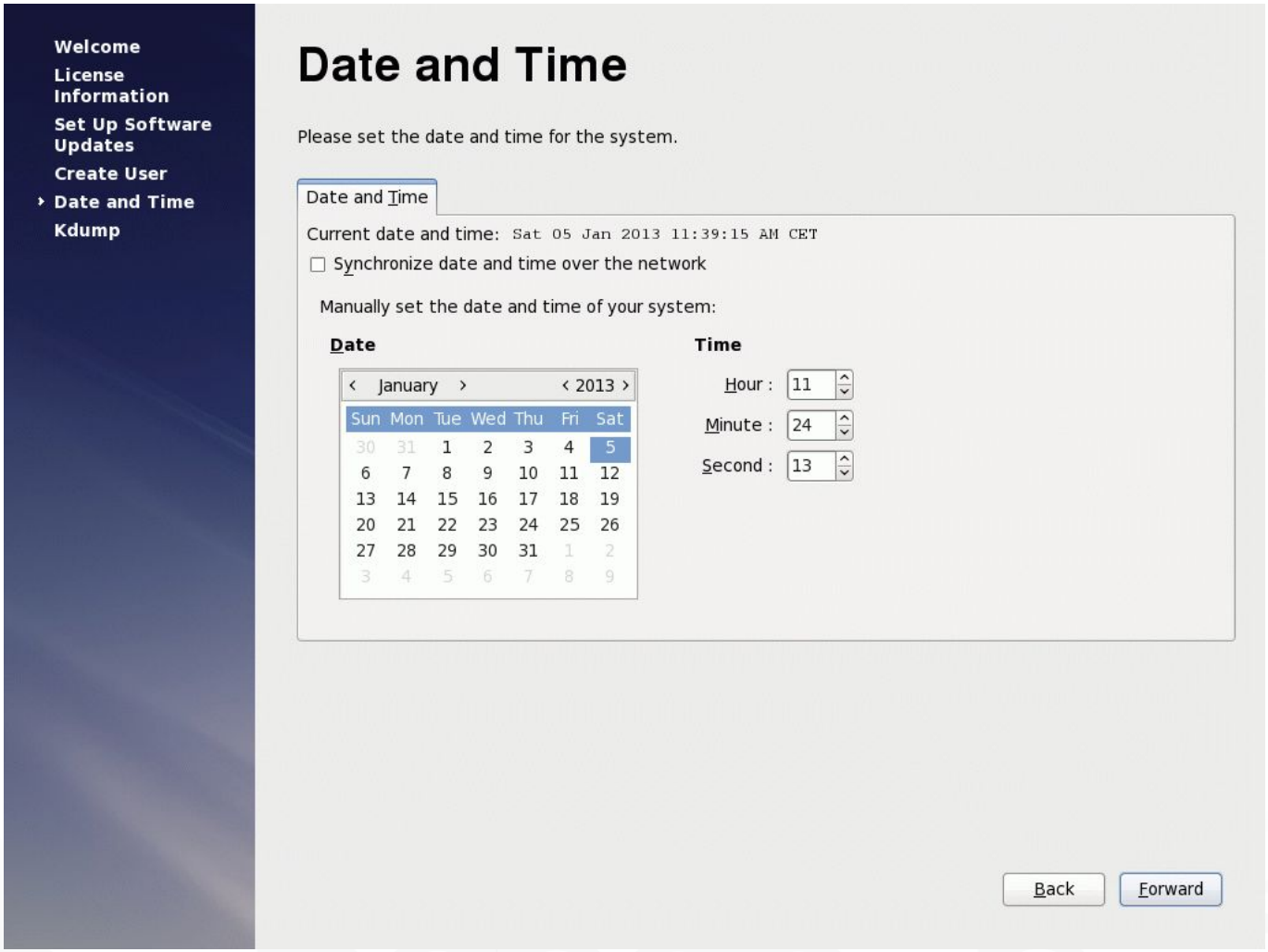
- You might need to skip this step because you are not yet connected to the network
- Click “Forward”

Create User



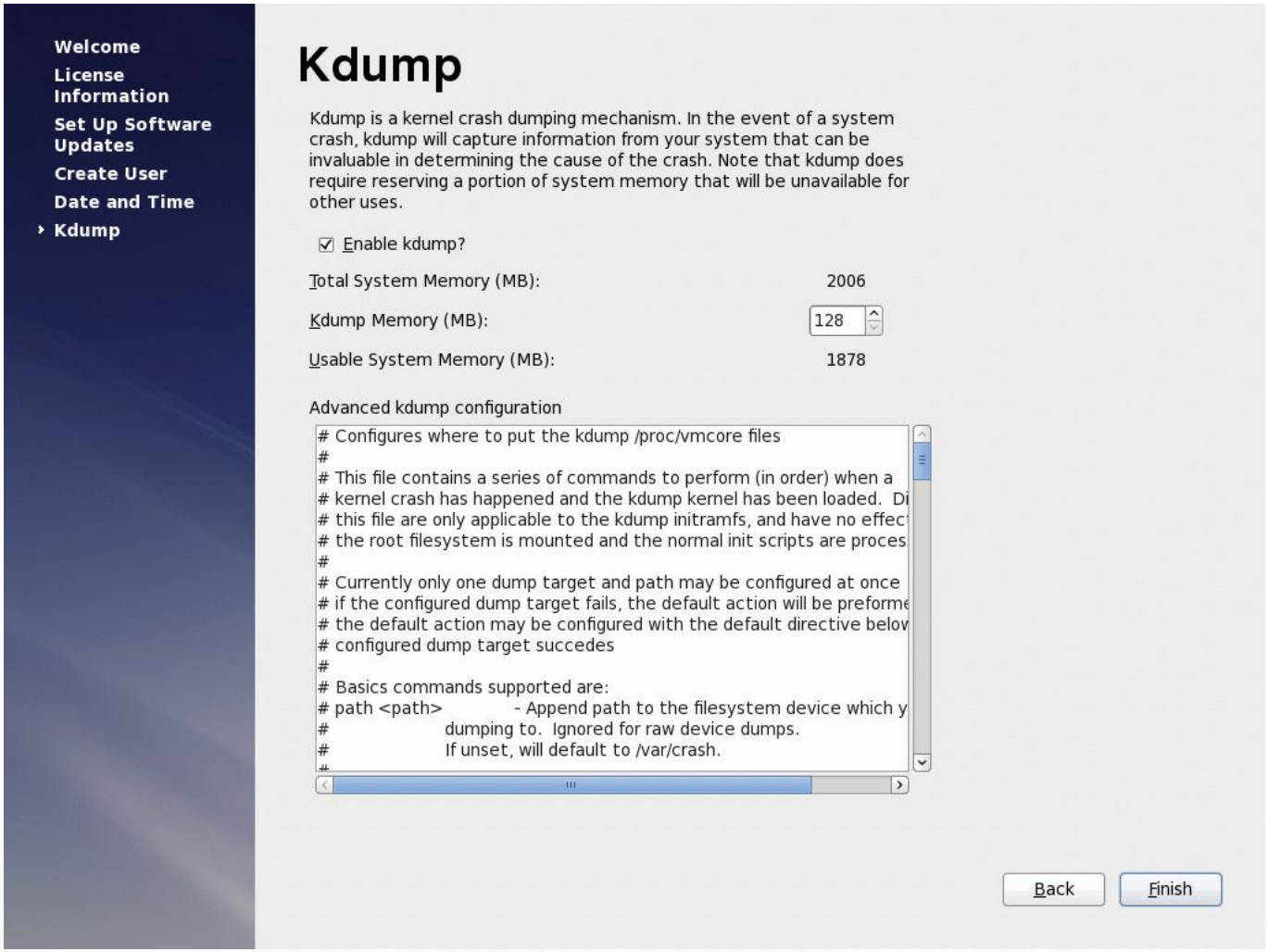
- Type in user details
  - Username
  - Full Name
  - Password
- Click “Forward”

Date and Time



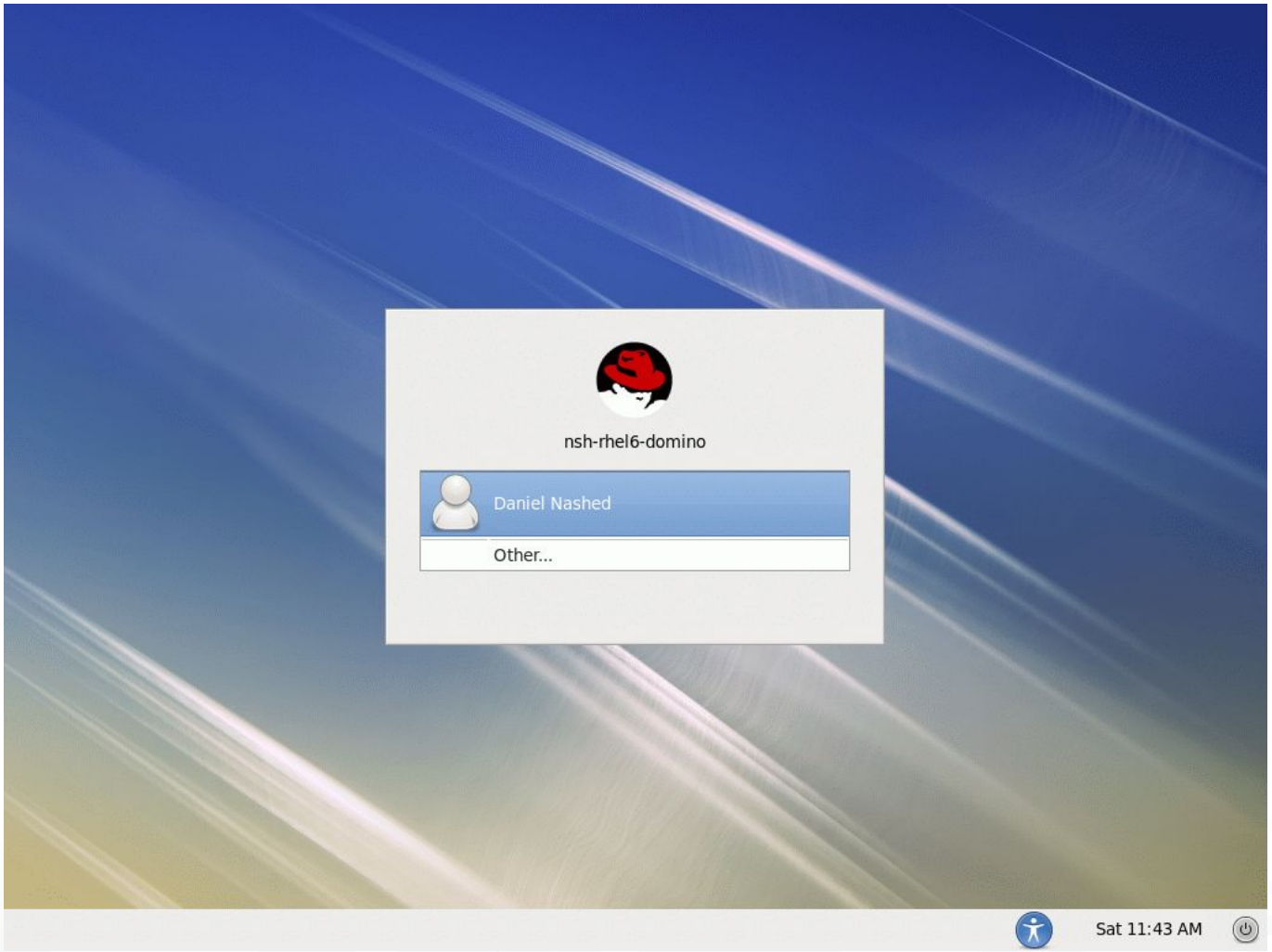
- Check Date & Time
- Click “Forward”

Kdump – Kernel Dump



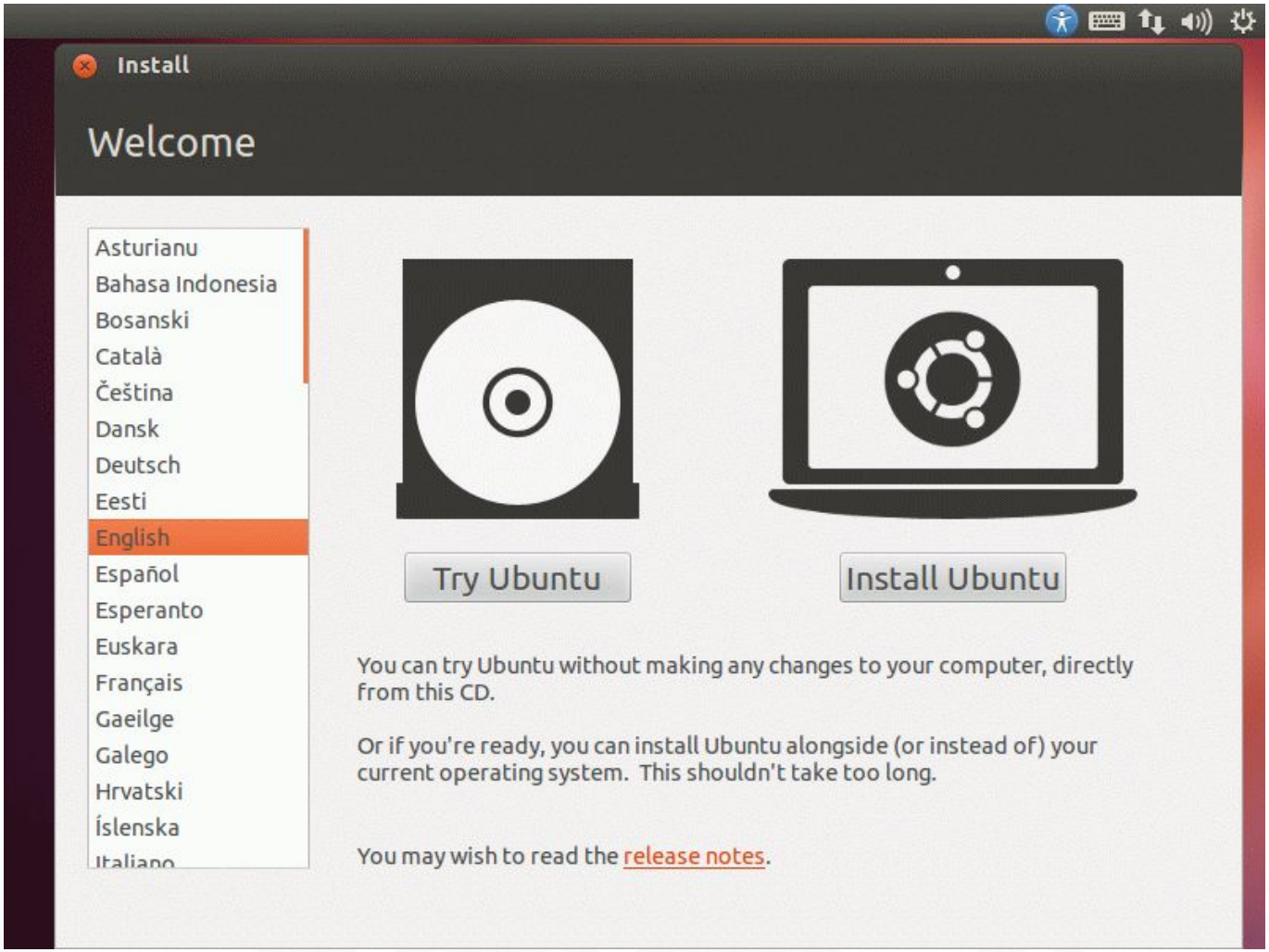
- Enable default Options for Kdump
- Click “Finish”

First Login



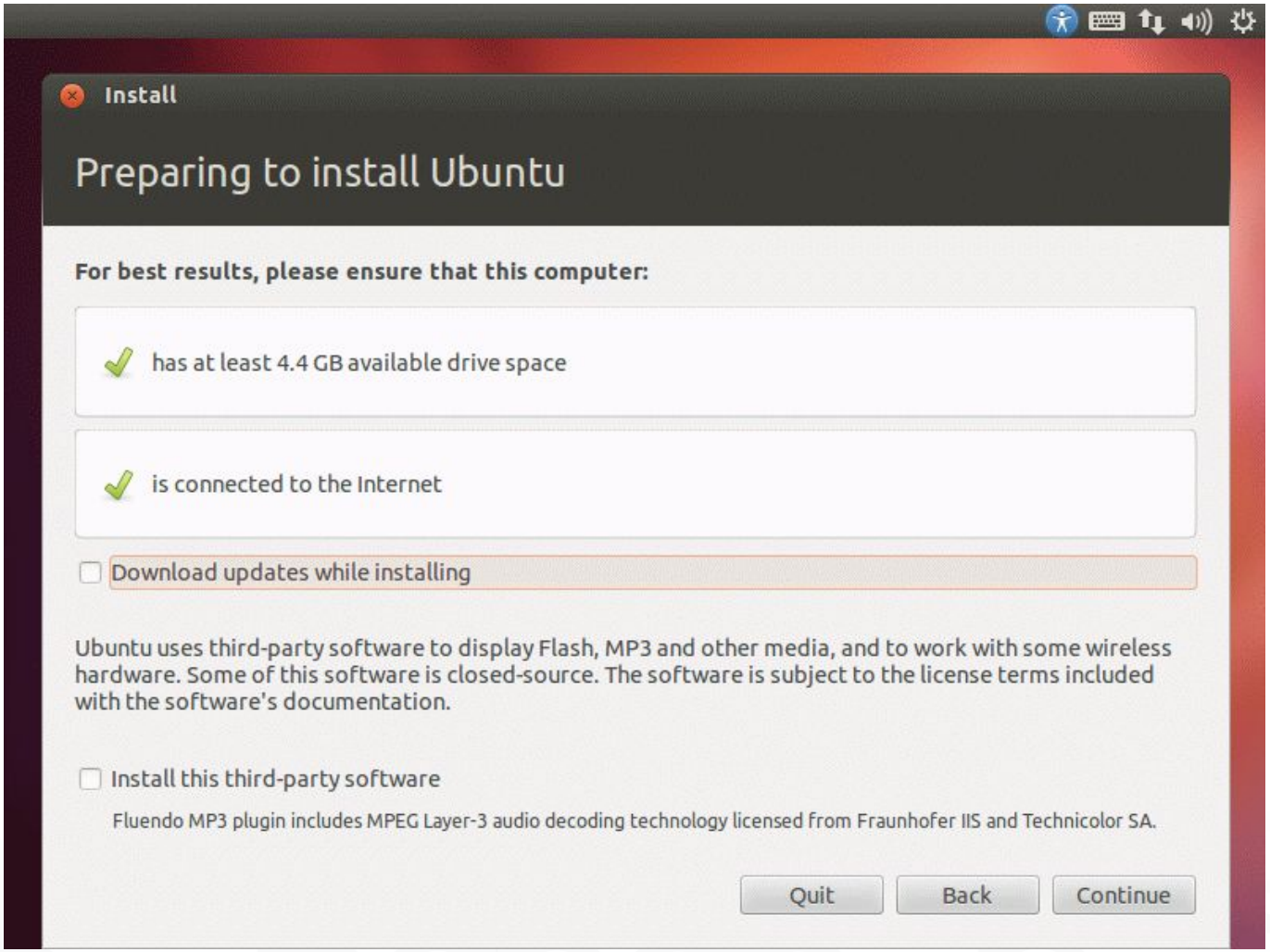
- Select User
- Type in Password

Ubuntu Install Welcome Screen



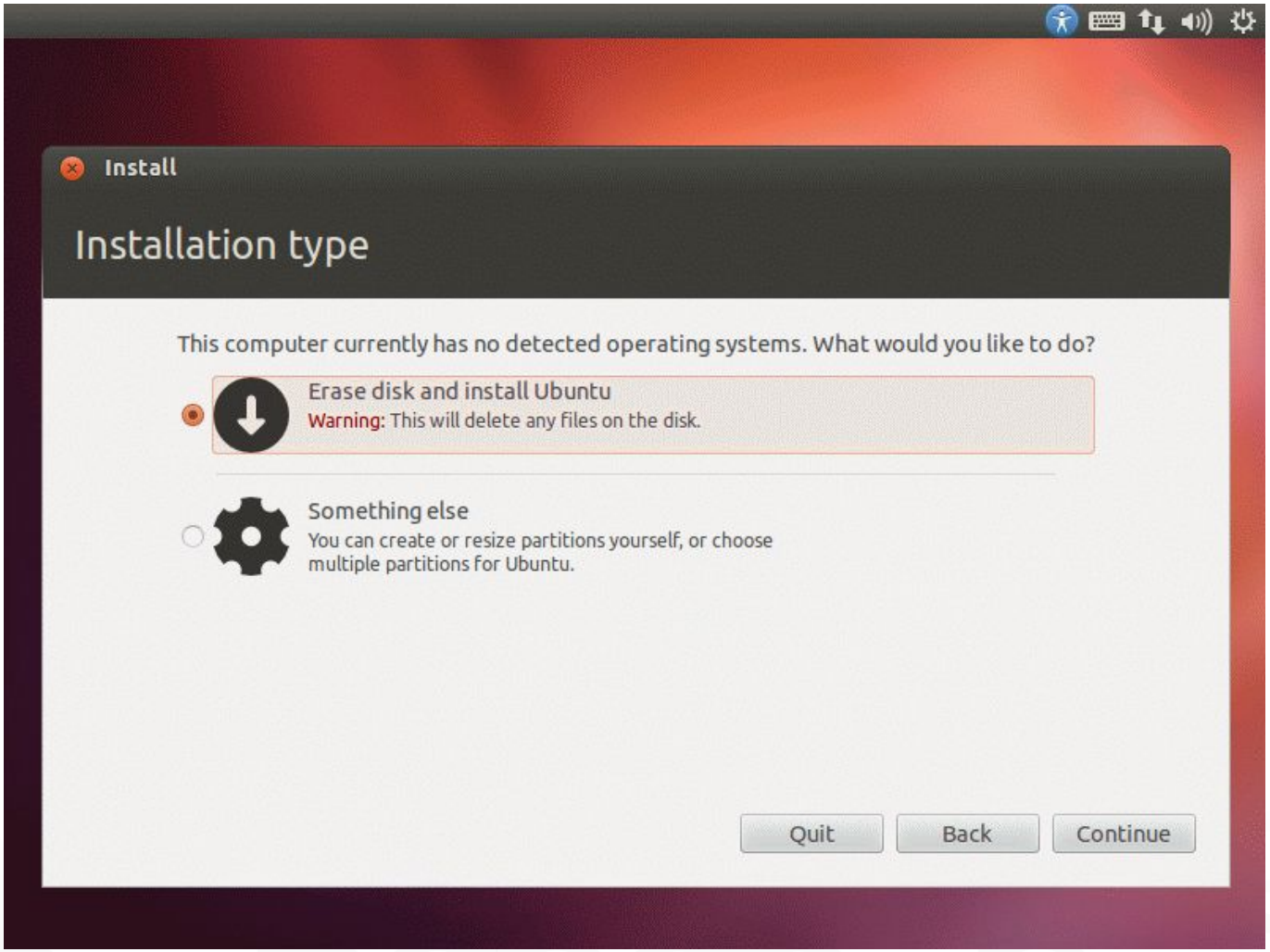
- Select “Install Ubuntu”

Install Preparation



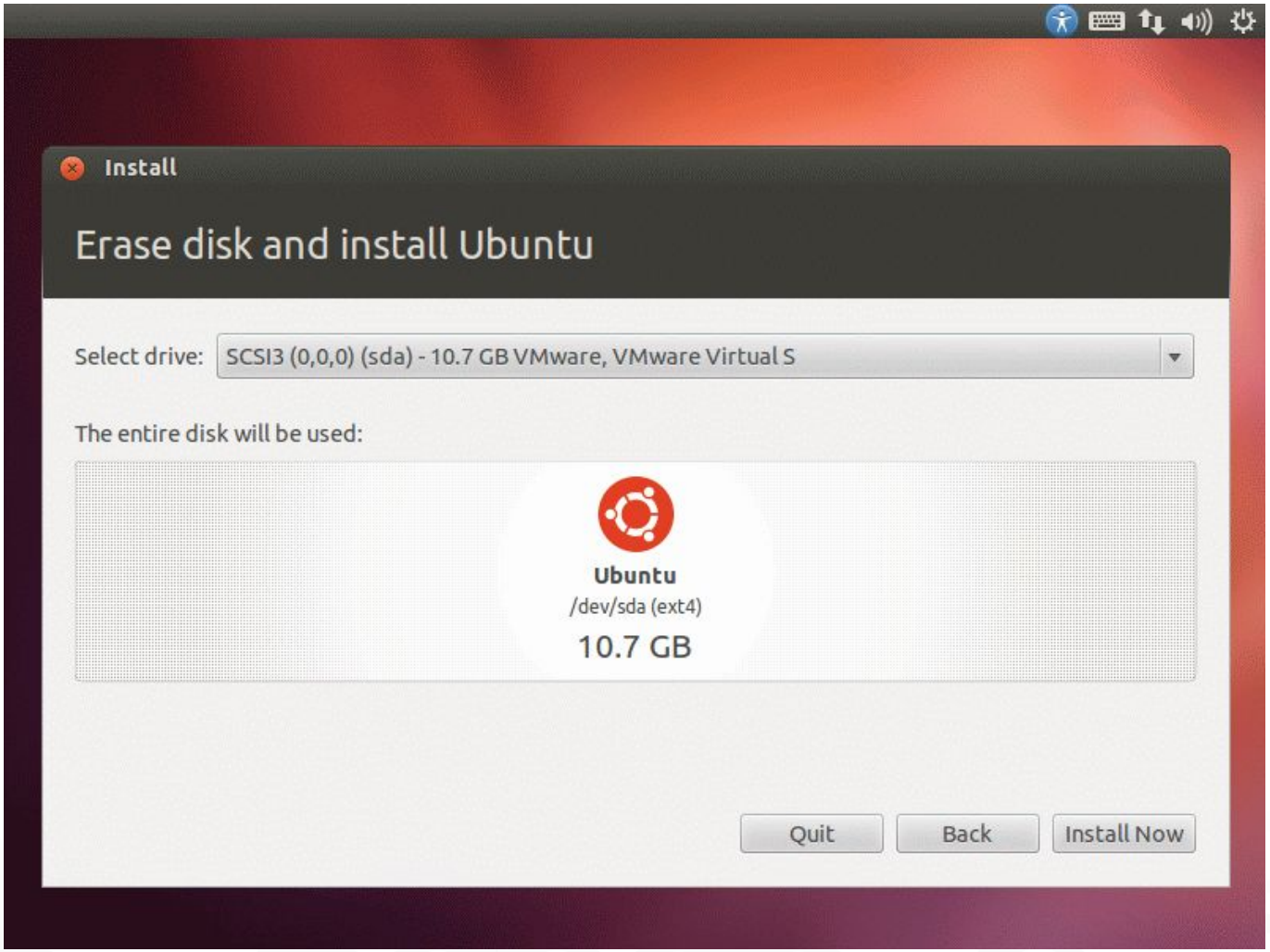
- Ensure you have sufficient space and Internet Connection
- You might select “Download updates while installing”
- Click “Continue”

Install Type



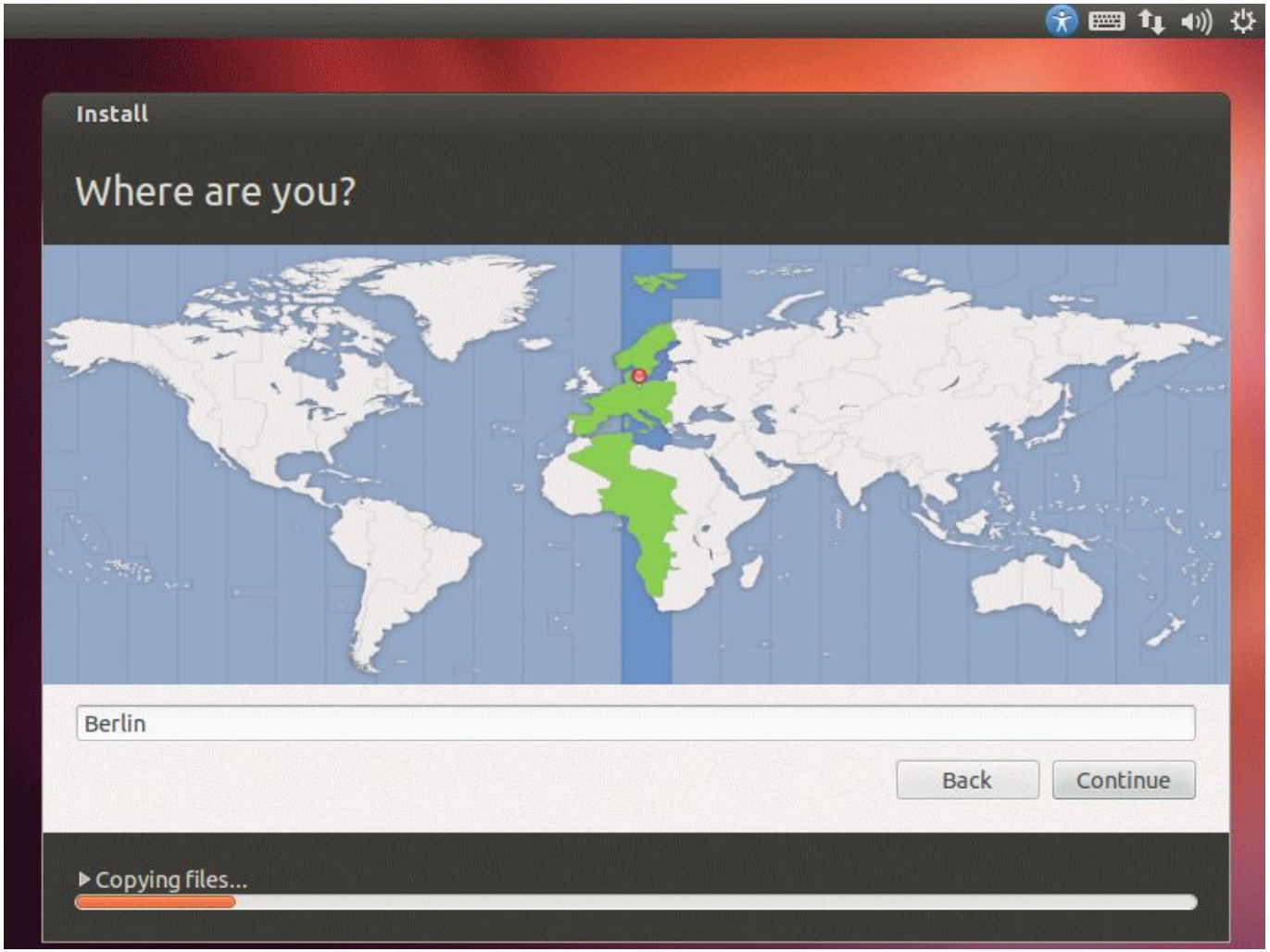
- Click “Erase disk and install Ubuntu”
- Click “Continue”

Erase Disk and install Ubuntu



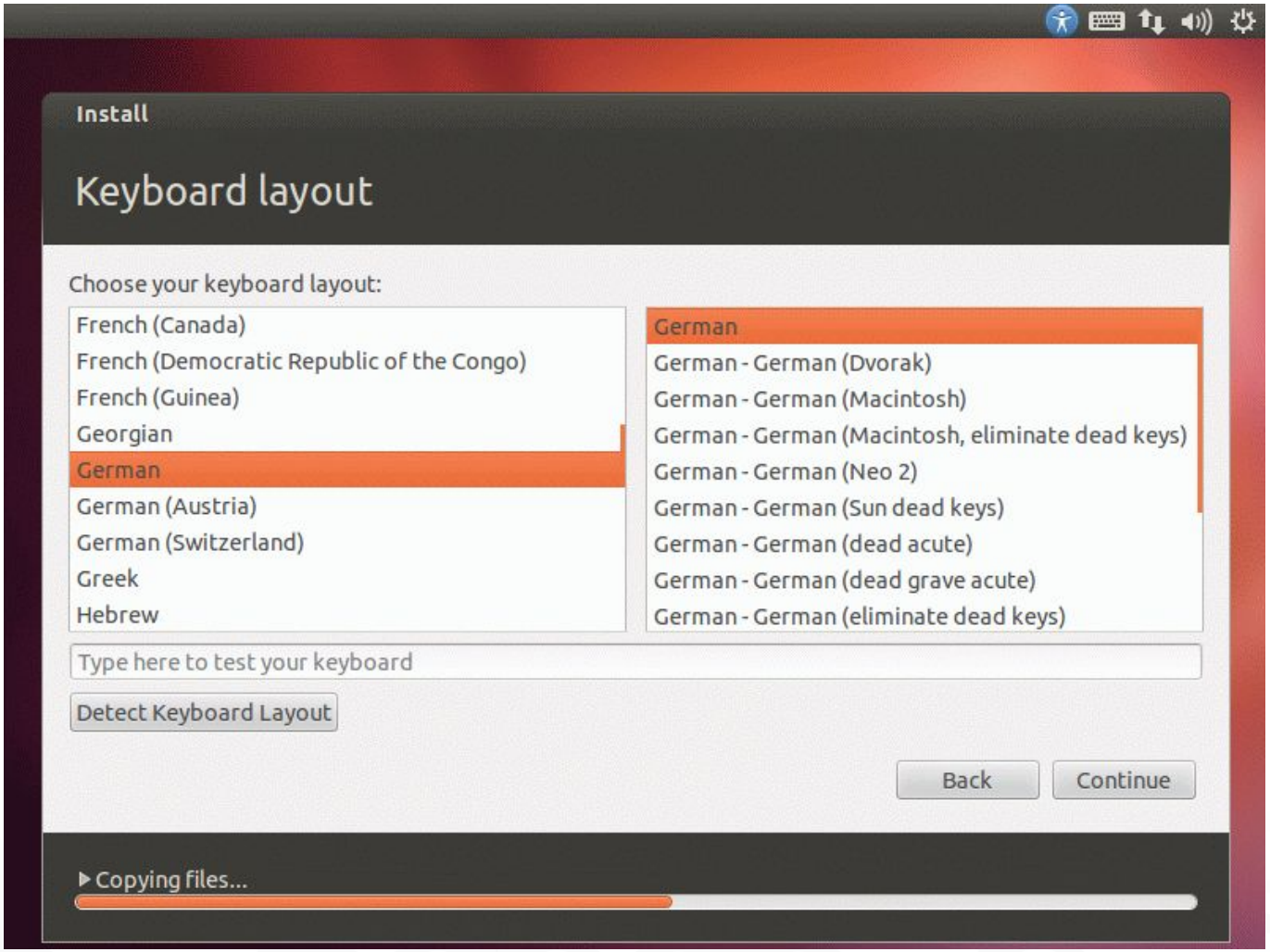
- Free Disk is selected
- Press “Install Now”

Selecdt Timezone



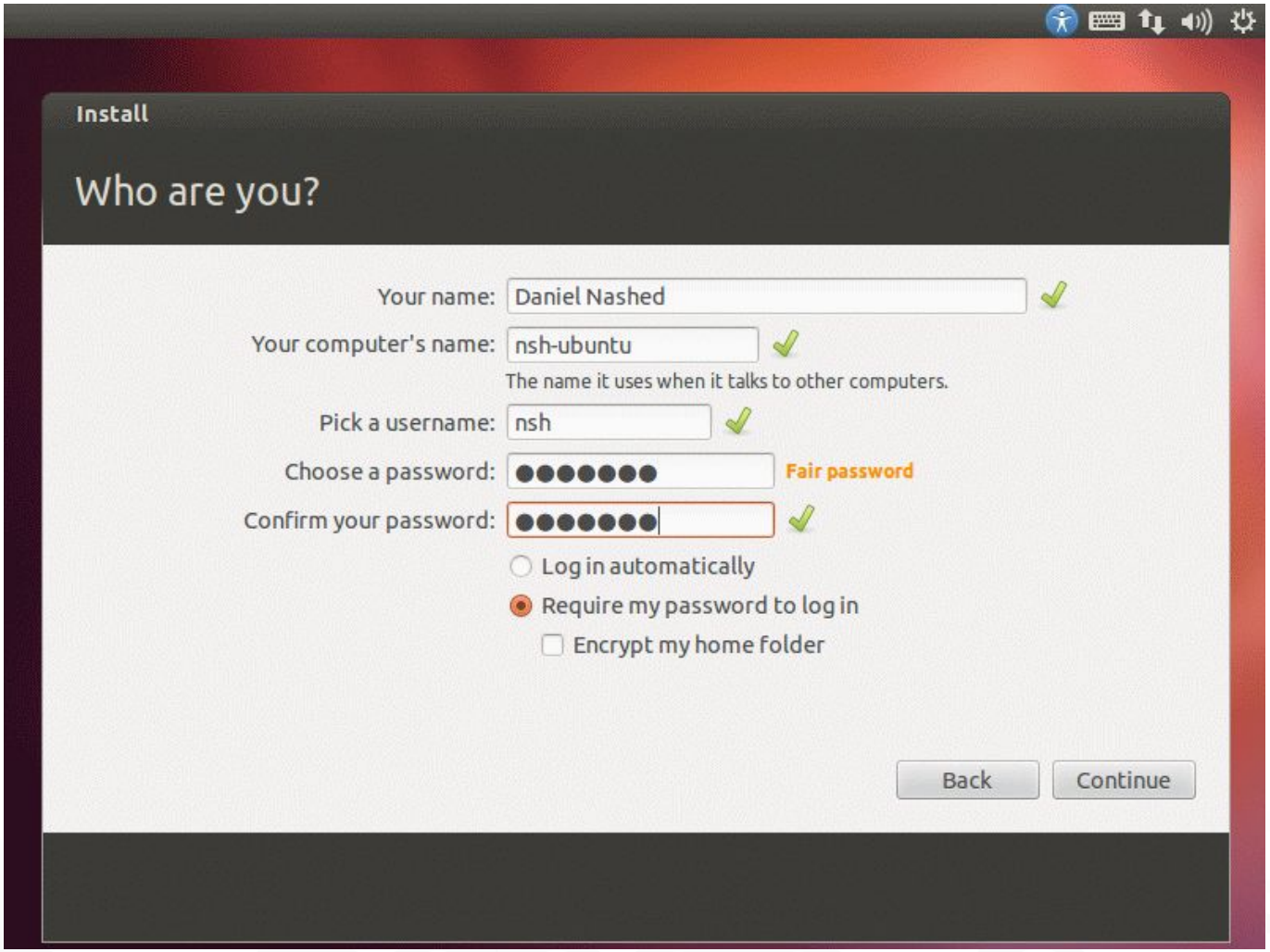
- Select your Timezone
- Click “Continue”

Select your Keyboard Layout



- Select your keyboard layout
- Click “Continue”

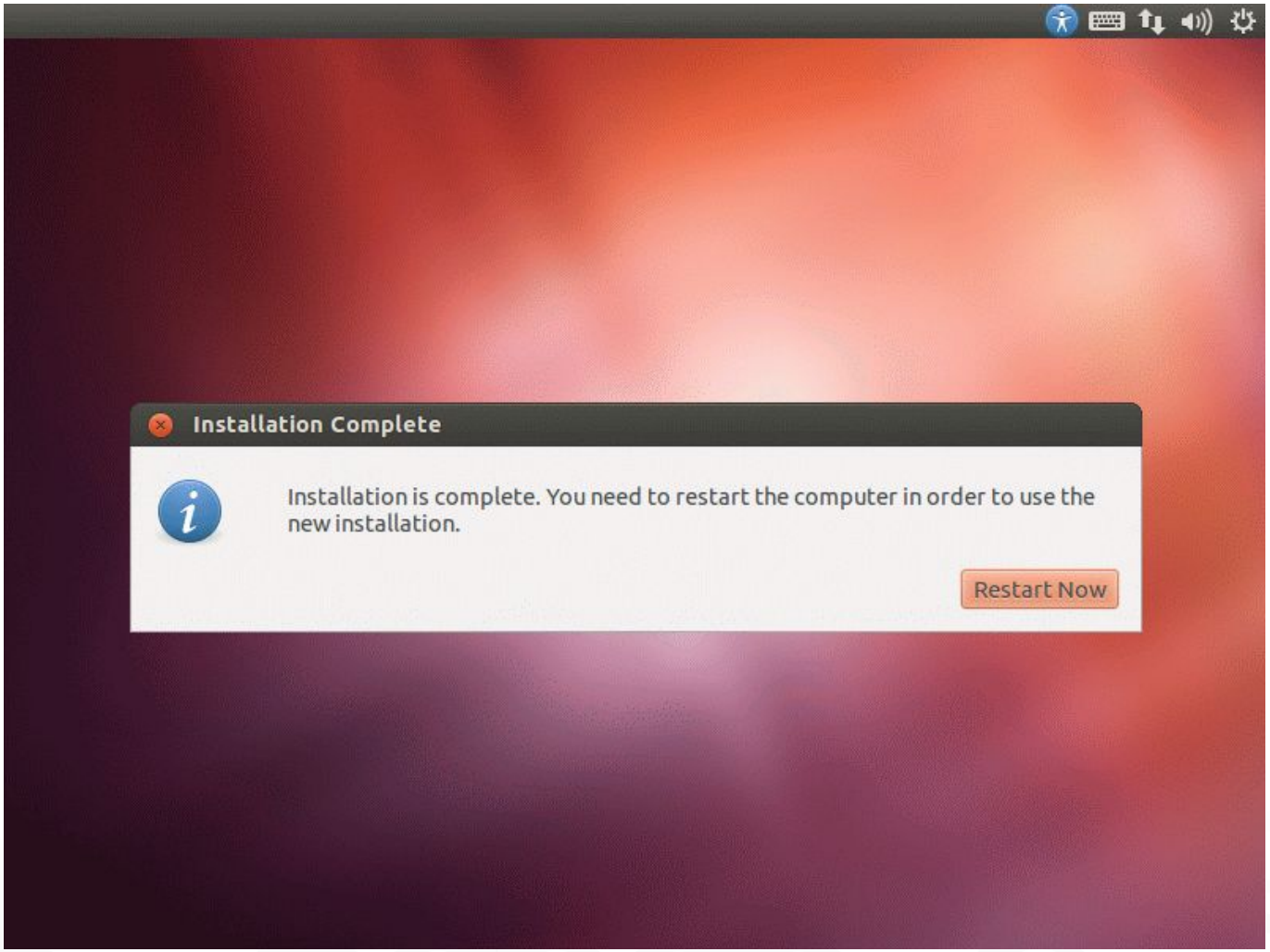
Create User Account



- Enter
  - Fullanme
  - Comuter Name
  - Username
  - Password
- Click “Continue”
- There is no “root” account on Ubuntu
- You can “sudo” with your account for administation purposes

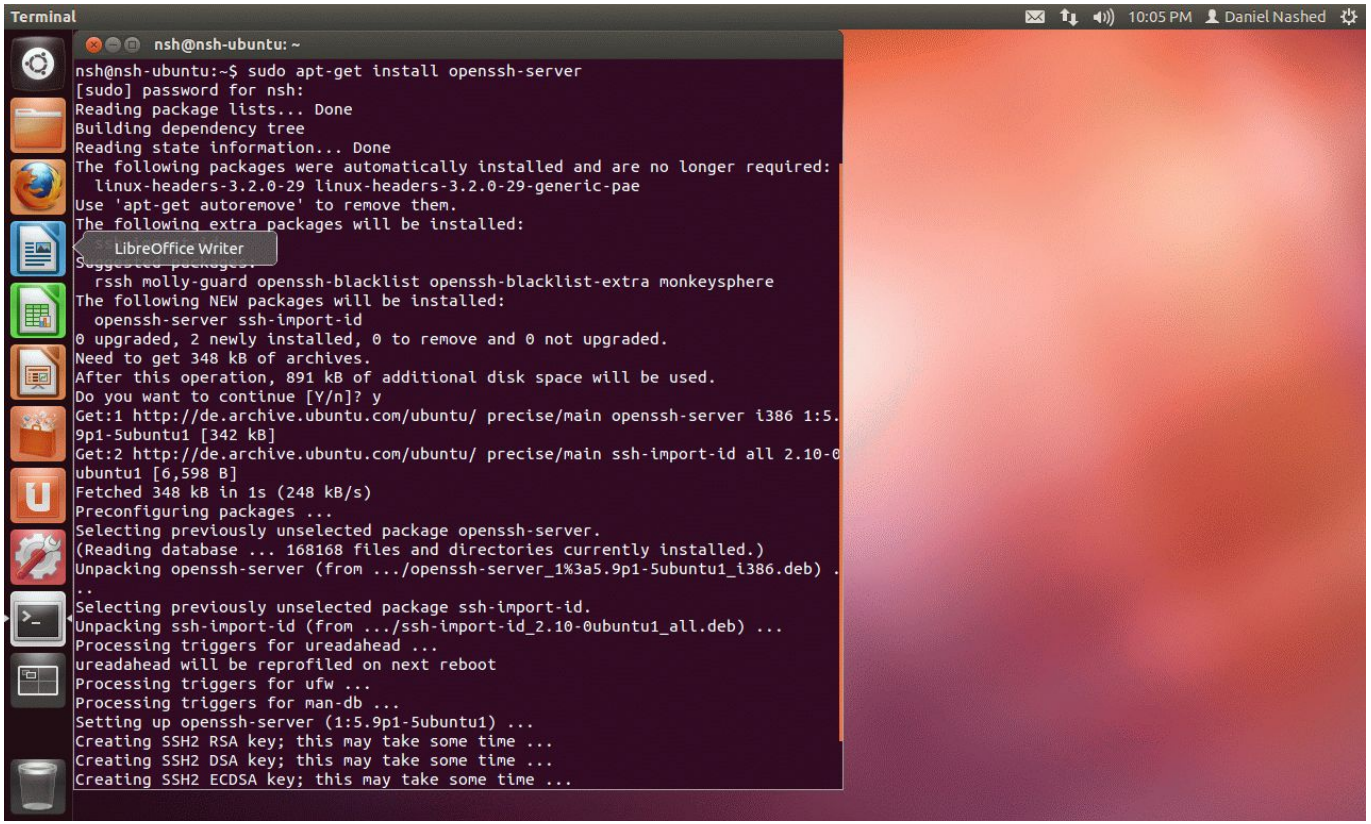
Installation ...

Installation Complete



- Click “Restar Now”

Install Secure Shell Server (sshd)

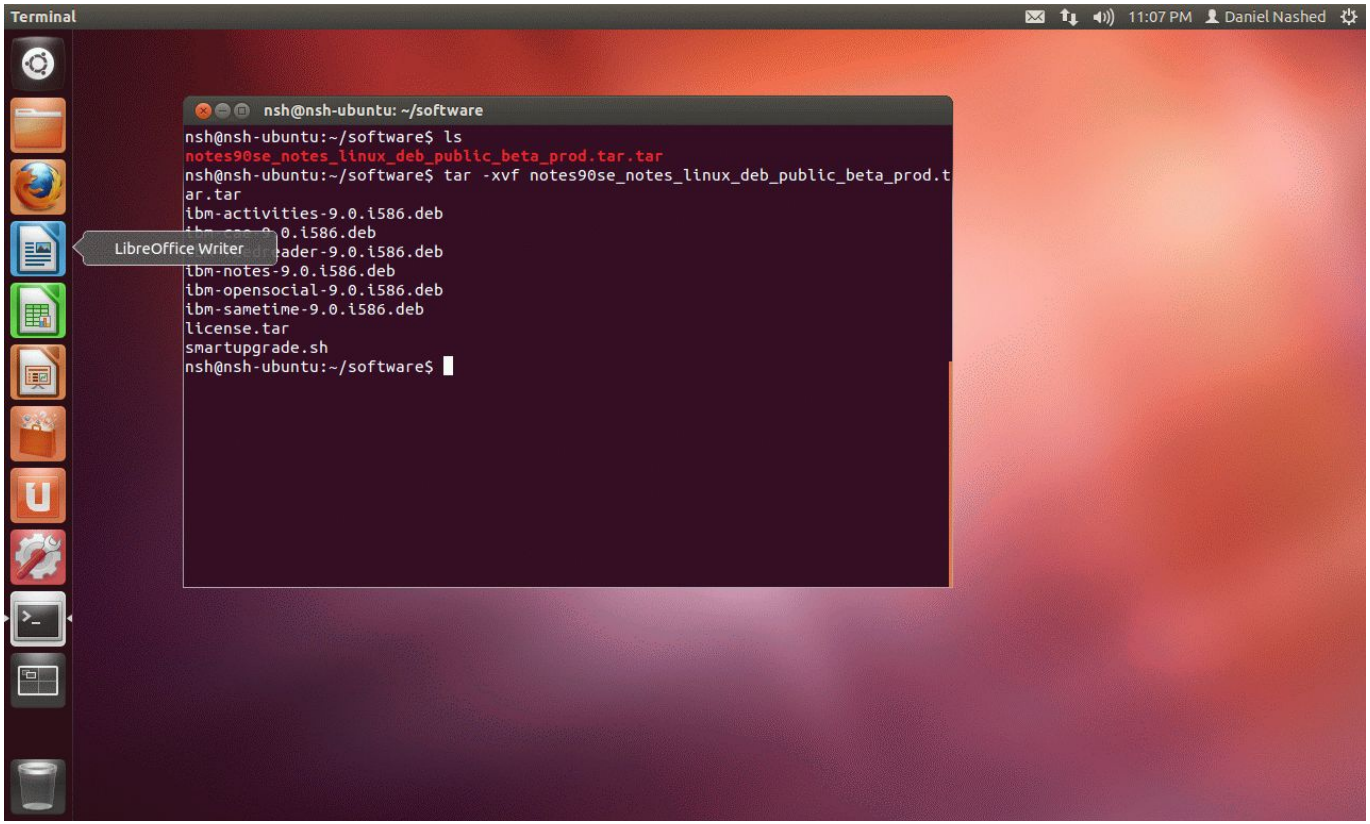


- Run

  Sudo apt-get install openssh-server

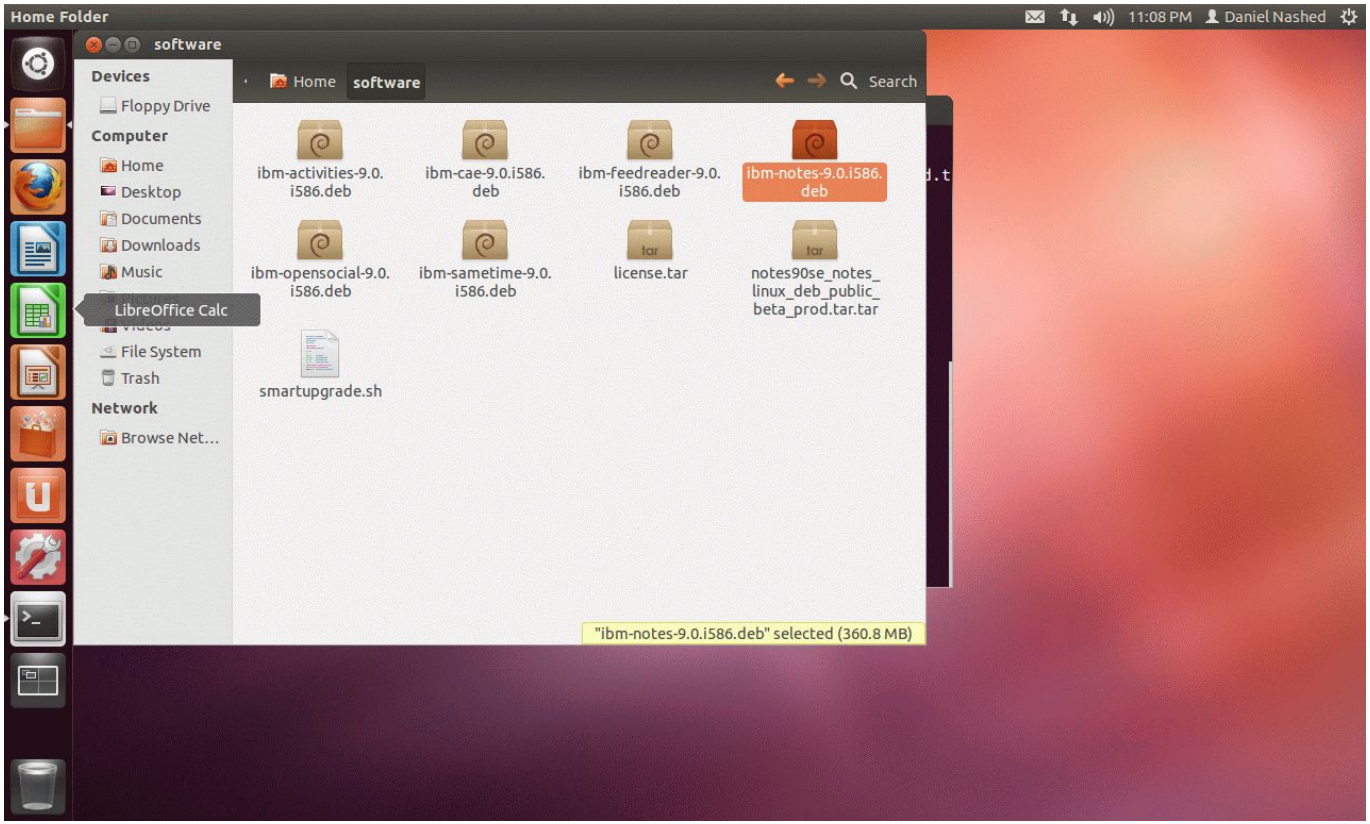
- See screen

Extract Notes Client Install Files



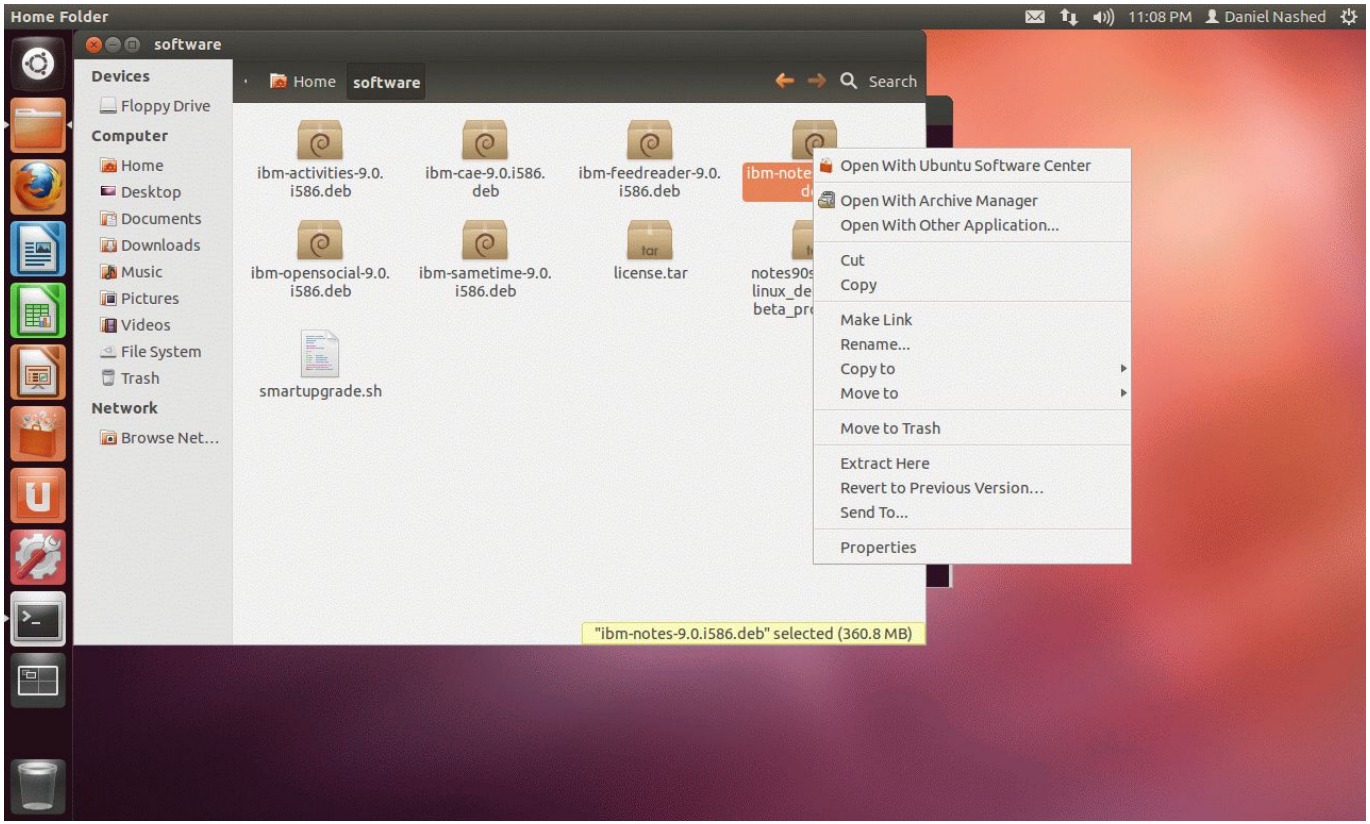
- Use tar -xvf to extract files

Install Notes Client Debian Packages



- Click on the Package to install Packages

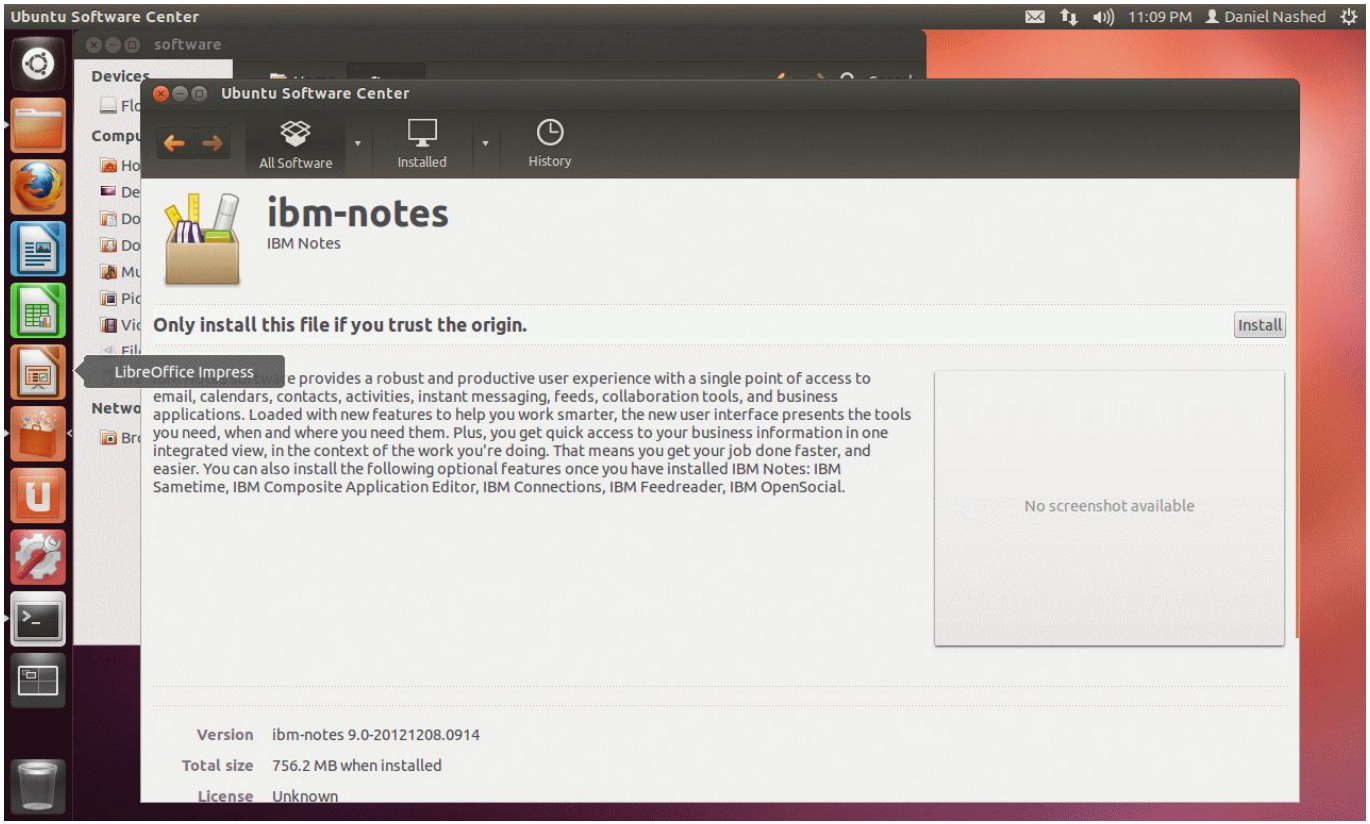
Install Notes Client Debian Packages



- Right click and select

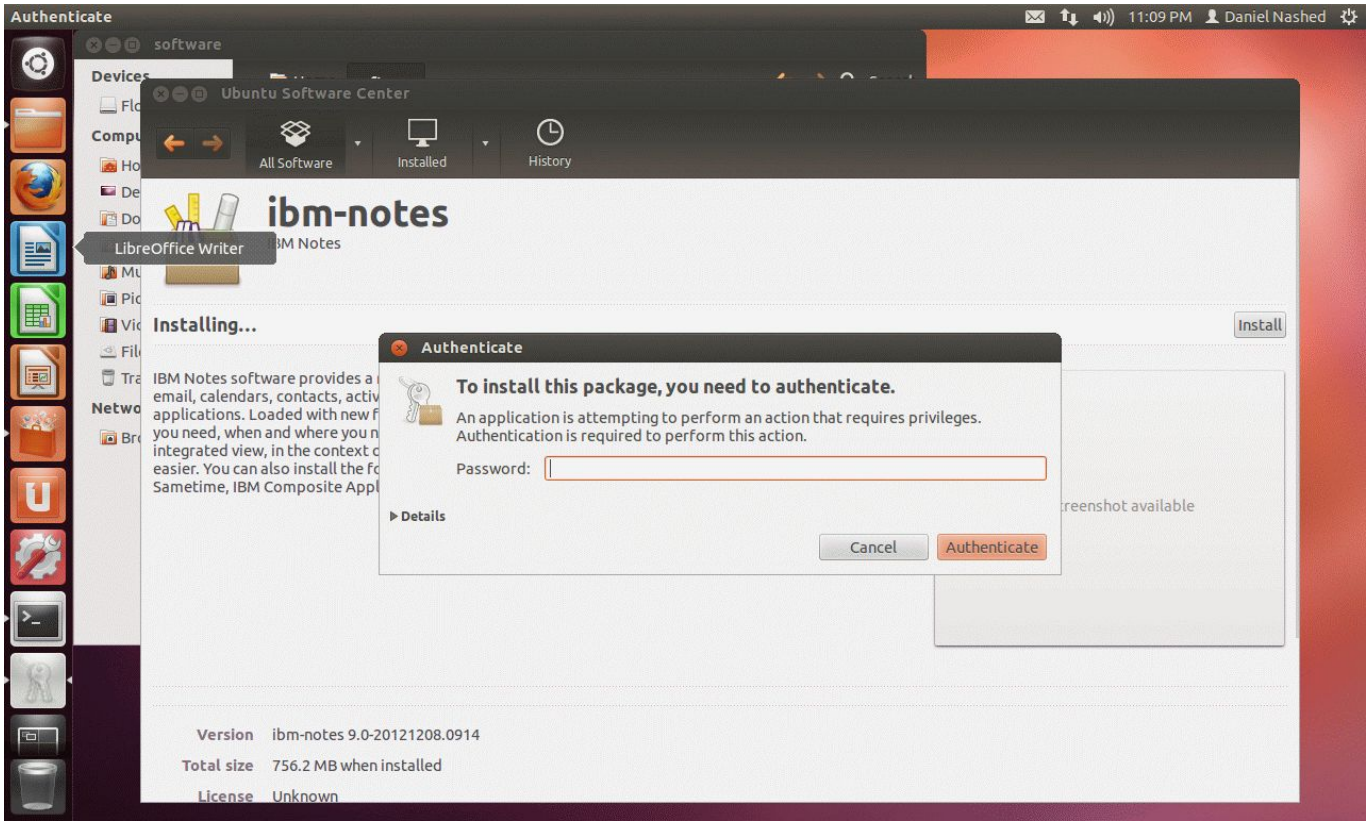
  “Open With Archive Manager”

Install Notes Client Debian Packages



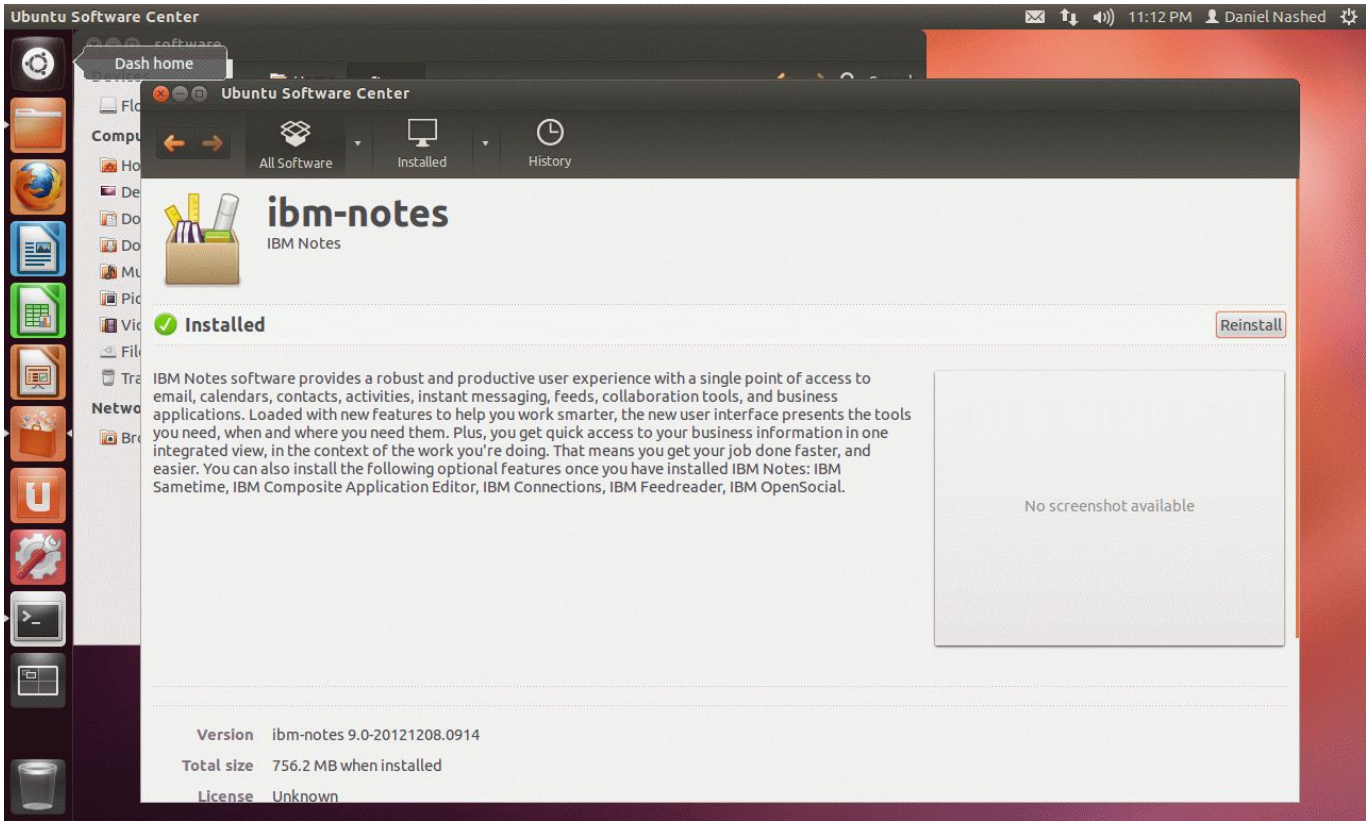
- Click “Install”

Install Notes Client Debian Packages



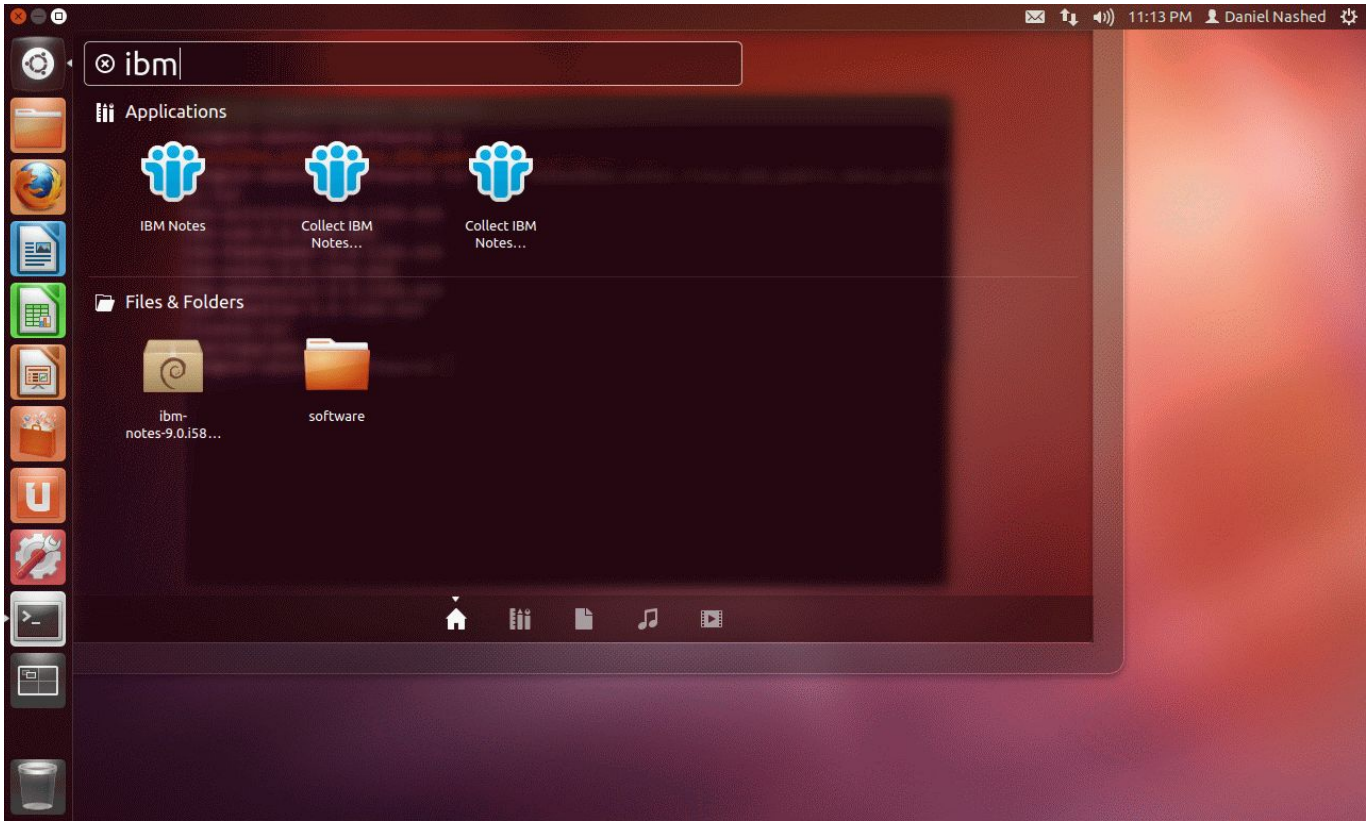
- Type in Admin Password

Install Notes Client Debian Packages - Done

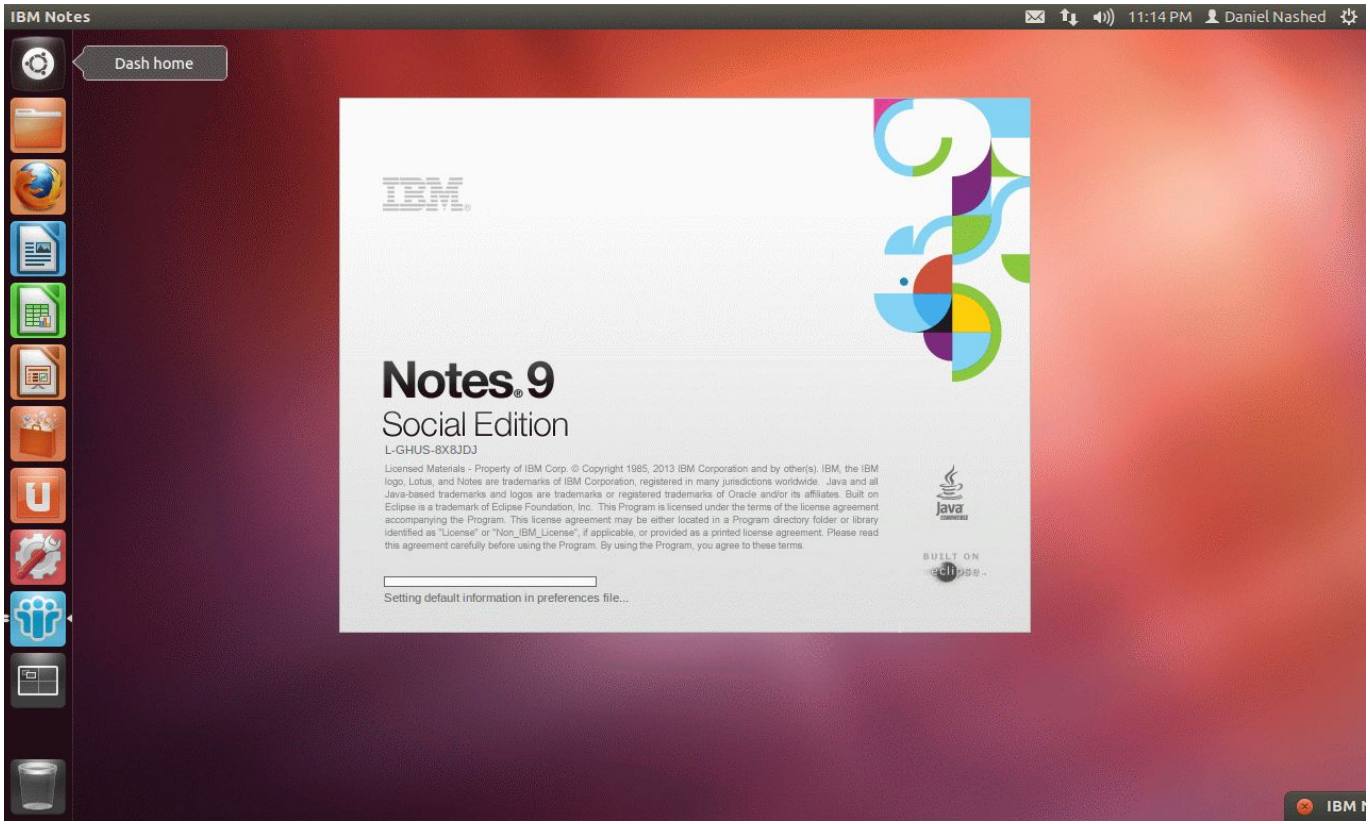


- Installation Done

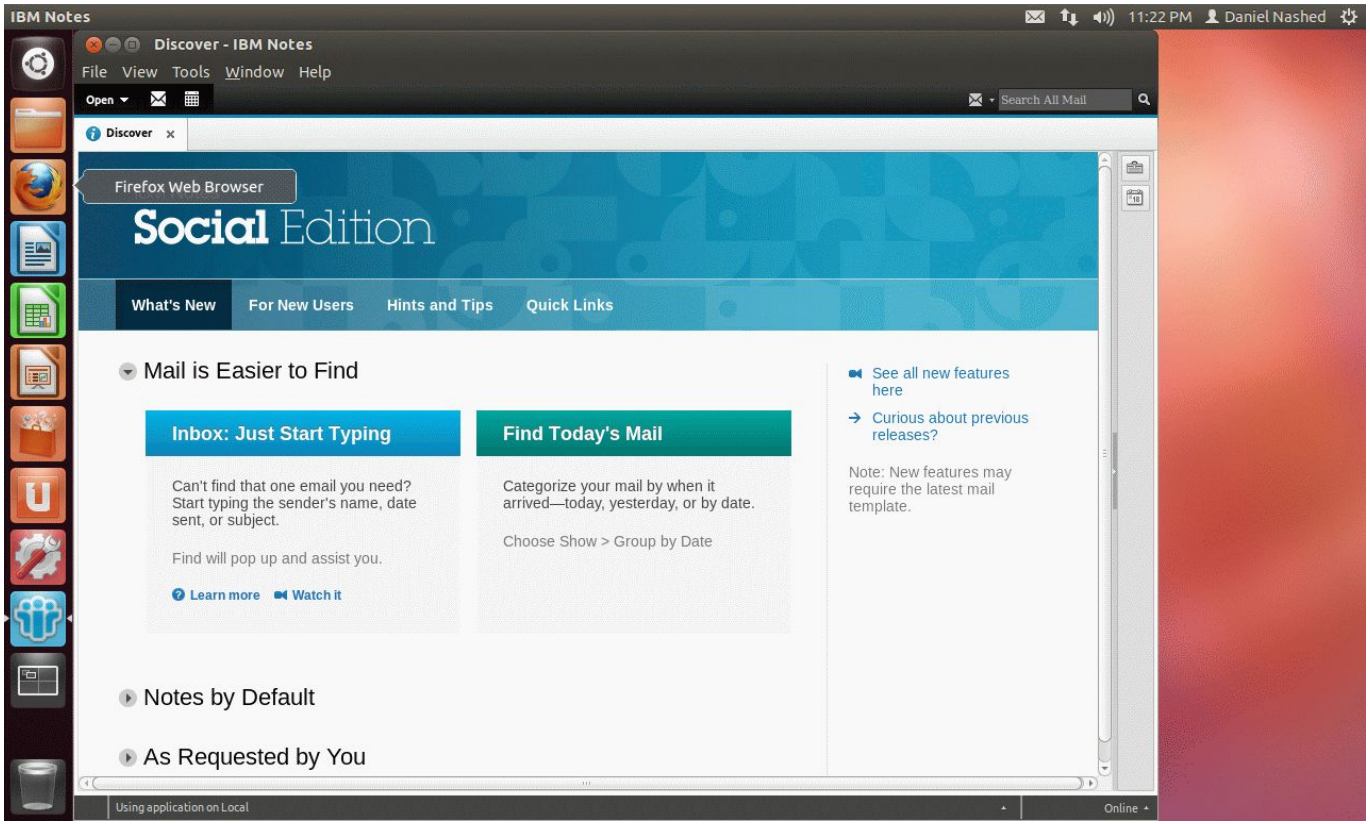
Installed Notes Client in Ubuntu Menu



Notes 9 Social Edition Beta Splash Screen on Ubuntu



Notes 9 Social Edition Beta Welcome Screen



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