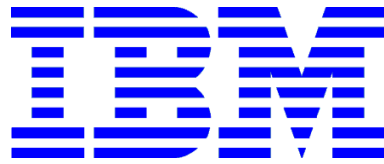


Installing & Configuring



Domino 9

Social Edition

On



CentOS 6

Enterprise Linux

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Introduction

In this document, I will walk you through the necessary steps to perform a ground-up installation of 64-bit CentOS, minimal configuration of the Operating System, configuration specific for IBM Domino installation, and finally the installation of 64 bit IBM Domino 9 Social Edition. This document and any accompanying videos are aimed at administrators who have some working knowledge / understanding of IBM Domino, but who may be unfamiliar or uncomfortable with Linux. The goal of this document is to demonstrate out the very minimal requirements for Domino on Linux, point out some potential pitfalls, and ultimately show that installing and running Domino on a Linux machine is much easier than you think. **NOTE: I have noted 32-bit installation differences where they occur.**

Note on Fonts

I deliberately use larger fonts because they are **easier for me** to read. I realize they may appear gigantic on lower resolution displays, and for that I apologize.

Typographic Conventions

Throughout this document there are several different “types” of text. There is explanatory (normal) text, which appears in Calibri.

- Example file content or lists of information appear in **Consolas**.
- Courier New is used for command-line content (stuff you should type).
- Console commands are **orange bold Courier New**. I use **colors**, *italics*, and **bold** fonts in various areas to **help stuff stand out**. You are a smart person; you will figure it out.

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CentOS Installation and Minimal Configuration

1) Install 64 bit CentOS 6 Minimal.

Latest versions available at www.centos.org. For this document, used:

[CentOS-6.8-x86_64-minimal.iso](#)

2) Configure network

check network interface

```
># ip a
```

Select the non-loopback device, and verify an associated config file exists. Create a new one if necessary.

```
># ls /etc/sysconfig/network-scripts/ifcfg-DEVICENAME
```

use vi to edit the file:

```
># vi /etc/sysconfig/network-scripts/ifcfg-DEVICENAME
```

*i <return> to insert text

<esc> to finish inserting text

*:wq <return> to save and quit.

(DHCP EXAMPLE)

```
DEVICE="DEVICENAME "
```

```
HWADDR="MAC ADDRESS"
```

```
NM_CONTROLLED="yes"
```

```
ONBOOT="yes" # Interface enabled
```

```
BOOTPROTO="dhcp" # Assigning IP from DHCP
```

(STATIC EXAMPLE)

```
DEVICE="DEVICENAME "
```

```
HWADDR="MAC ADDRESS"
```

```
NM_CONTROLLED="yes"
```

```
ONBOOT="yes" # Interface enabled
```

```
BOOTPROTO="static" # Assigning in static mode
```

```
IPADDR=192.168.0.45 #IP address
```

```
NETMASK=255.255.255.0 # Subnet Mask
```

```
GATEWAY=192.168.0.1 # Default Gateway
```

Verify the edits have been saved:

```
># cat /etc/sysconfig/network-scripts/ifcfg-DEVICENAME
```

Start the network:

```
># service network start
```

3) Install the following packages

- `bind-utils`: utilities to test and query Domain Name System (DNS)
- `file`: File-type determination tool
- `gcc`: GNU Compiler Collection front-ends for C, C++. Objective-C, Fortran, Java, Ada, and Go.
- `lsof`: Lists open files
- `ntp`: Network Time Protocol daemon
- `patch`: File-patching tool (applies differences to a file)
- `perl`: Perl programming language
- `rsync`: file-difference transfer / synchronization utility
- `sg3_utils`: SCSI command utilities
- `sudo`: allows for single command line as the superuser (usually root)
- `traceroute`: tool for tracing network routes
- `wget`: Non-interactive command line tool for retrieving files using HTTP, HTTPS, and FTP.
- `yum-utils`: a collection of tools and programs for managing yum repositories
- `zip`: compression and file-packaging utility
- `unzip`: decompression and file-package processing utility

```
># yum -y install bind-utils file gcc lsof ntp patch perl  
rsync sg3_utils sudo tracroute wget yum-utils zip unzip
```

Verify Services and Security

1) Verify the cron service is running, conditionally start

```
># service crond status  
># service crond start
```

2) Turn off and disable SELinux (Domino Incompatible)

```
># cat /etc/selinux/config
```

Look for line beginning with **SELINUX=**

If this is anything other than "**disabled**", edit the file (using vi) and change it to **SELINUX=disabled**, then save the file.

Set the SELinux enforcing mode to permissive (disabled).

```
># setenforce 0
```

3) Enable and activate the time service

```
># ntpdate pool.ntp.org  
># chkconfig ntpd on  
># service ntpd start
```

4) Set up the RPM Forge Repository

Use the RPM command

-i = Install

-v = verbose explanation of what is happening

-H = display hash marks during the installation

Latest releases normally available at

- <http://pkgs.repoforge.org/rpmforge-release/>

Other sites for getting releases:

- <http://repoforge.org/use/>
- http://repository.it4i.cz/mirrors/repoforge/redhat/el6/en/x86_64/rpm-forge/RPMS/

```
># rpm -ivH http://pkgs.repoforge.org/rpmforge-release/rpm-  
forge-release-  
0.5.3-1.el6.rf.x86_64.rpm
```

NOTE: If you are installing on a 32-bit system, be sure to install the 32-bit version instead:

```
># rpm -ivH http://pkgs.repoforge.org/rpmforge-release/rpm-  
forge-release-  
0.5.3-1.el6.rf.i686.rpm
```

Firewall Configuration

NOTE: THIS IS THE MINIMAL configuration. A complete set of firewall rules must be configured if your server will be publicly accessible -and is beyond the scope of this document. DO NOT RELY solely on this configuration.

1) Temporarily disable the firewall

```
># chkconfig iptables off  
># service iptables stop
```

2) Ensure the ports required by the Domino server are open

Common Ports:

- **20** FTP (File Transfer Protocol transfer)
- **21** FTPC (File Transfer Protocol Command)
- **22** SSH (Secure SHell)
- **389** LDAP (Lightweight Directory Access Protocol)
- **636** LDAPS (Lightweight Directory Access Protocol over SSL)
- **1352** NRPC (IBM Notes/Domino RPC)
- **80** HTTP (Hypertext Transfer Protocol)
- **443** HTTPS (Hypertext Transfer Protocol over SSL)
- **25** SMTP (Simple Mail Transfer Protocol)
- **143** IMAP (Internet Message Access Protocol) -only if you will have IMAP
- mail clients
- **220** IMAPV3 (Internet Message Access Protocol Version 3) - only if you will
- have IMAP mail clients
- **993** IMAPS (Internet Message Access Protocol over SSL) -only if you will
- have IMAP mail clients
- **110** POP3 (Post Office Protocol Version 3) - only if you will have POP3
- mail clients
- **995** POP3S (Post Office Protocol Version 3 over SSL) - only if you will
- have POP3 mail clients
- **8585** Used by Domino Remote Server Setup

This can be done either manually (not recommended), or by using a utility tool such as Webmin.

**refer to "B) [OPTIONAL Use Webmin to Configure Firewall*

A) Manual Firewall Configuration

'nixCraft has a great article about iptable configuration:

<http://www.cyberciti.biz/tips/linux-iptables-examples.html>

Make a backup first

```
># cp /etc/sysconfig/iptables /etc/sysconfig/iptables.bak
```

Edit the file using vi

```
># vi /etc/sysconfig/iptables
```

Find the lines

```
*filter
:INPUT ACCEPT [0:0]
:FORWARD ACCEPT [0:0]
:OUTPUT ACCEPT [0:0]
```

Change default INPUT / FORWARD policies from ACCEPT to DROP

```
:INPUT DROP [0:0]
:FORWARD DROP [0:0]
```

Find the line:

```
-A INPUT -j REJECT --reject-with icmp-host-prohibited
```


Add the following information immediately prior to the line you just found. If that line does not exist, add this prior to the **COMMIT** line.

```
# SSH
-A INPUT -m state --state NEW -m tcp -p tcp --dport 22 -j ACCEPT
# LDAP
-A INPUT -m state --state NEW -m tcp -p tcp --dport 389 -j ACCEPT
# LDAPS
-A INPUT -m state --state NEW -m tcp -p tcp --dport 636 -j ACCEPT
# NRPC
-A INPUT -m state --state NEW -m tcp -p tcp --dport 1352 -j ACCEPT
# HTTP
-A INPUT -m state --state NEW -m tcp -p tcp --dport 80 -j ACCEPT
# HTTPS
-A INPUT -m state --state NEW -m tcp -p tcp --dport 443 -j ACCEPT
# SMTP
-A INPUT -m state --state NEW -m tcp -p tcp --dport 25 -j ACCEPT
# Domino Remote Server Setup
-A INPUT -m state --state NEW -m tcp -p tcp --dport 8585 -j ACCEPT
```

If you want to only allow SSH from a specific IP address, change the SSH line to:

```
-A INPUT -s your.allowed.ip.address/24 -m state --state NEW -p tcp
--dport 22 -j A
```

If you want to allow webmin clients to access, you will need to open a port:

```
# WEBMIN
-A INPUT -m state --state NEW -m tcp -p tcp --dport 10000 -j ACCEPT
```

Save and close the file. You can use the `cat` command to verify your changes:

```
># cat /etc/sysconfig/iptables
```

Enable and start the firewall

```
># chkconfig iptables on
># service iptables start
```

B) [OPTIONAL] Use Webmin to configure Firewall

Latest releases available at <http://www.webmin.com/download.html>

Configure to use the Webmin YUM repository. Start by creating a repository config file for webmin:

```
># vi /etc/yum.repos.d/webmin.repo
```

Add the following content and save the file:

```
[Webmin]
name=Webmin Distribution Neutral
#baseurl=http://download.webmin.com/download/yum
mirrorlist=http://download.webmin.com/download/yum/mirrorlist
enabled=1
```

Now create an installation directory for the developer's key, then download and install the key

```
># mkdir /install
># mkdir /install/jcameron
># cd /install/jcameron
># wget -v http://www.webmin.com/jcameron-key.asc
># rpm --import jcameron-key.asc
```

Now use yum to install webmin:

```
># yum -y install webmin
```

Use a web browser to connect to the Webmin Console at port 10000

URL:> your.server.ip.address:10000

Choose **Networking > Linux Firewall**, then edit the firewall rules as needed. When finished, make sure to hit the **[Apply Configuration]** button.

[OPTIONAL] Edit the Hosts file and add the hostname

```
># vi /etc/hosts
```

Add the information for your server to the bottom of the file. Do not change the loopback 127.0.0.1 unless you really know what you are doing and have a very good reason to do so. Changing the loopback hosts entry can cause **very bad things** to happen with your server's network connections.

```
127.0.0.1 localhost localhost.localdomain localhost4
```

```
localhost4.localdomain4
```

```
:::1 localhost localhost.localdomain localhost6 localhost6.local-  
domain6
```

```
your.server.ip.address fully.qualified.host.name short name
```

Make sure everything is up to date.

Use yum to update installed content.

```
># yum -y update
```

User Account & SSH Service

Without going into too much unnecessary detail, all Linux user accounts require a minimum of two things: a username, and a primary group with which the user account is associated. Your Domino server will need to run using a Linux account, which means you need to decide upon a group name and a user name for your Domino server. This can be as simple as “servergroup” and “server”, or (if you follow IBM’s documentation), “Notes” and “Notes”. Once you have decided upon the name for your domino server user and group account, proceed as follows.

1) Create a Group

Use the groupadd command to create your group.

```
># groupadd groupname
```

2) Add the user

Use the useradd command to create your user. This command accepts the following arguments:

-g initial group to which the user should be added

-s shell for the user when signing in. User scripts are here.

-d home directory

-m make the user

```
># useradd -ggroupname -s/bin/bash -d/home/username -m username
```

3) Create a password for the user

```
># passwd username
```

4) Start the SSH service

Use either the command line or Webmin

```
># service sshd restart
```

Domino Specific Configuration

1) Log in via SSH to verify user account

Log in via SSH, then change to SuperUser (root). (tip: Find the server's ip address using the **ip a** command)

```
ssh username@your.server.hostname
```

-- OR --

```
ssh username@your.server.ip.address
```

```
>$ su
```

```
>$ enter password for root
```

2) Verify httpd service is stopped and disabled

This may not be necessary if it wasn't automatically installed.

```
># service httpd stop
```

```
># chkconfig httpd off
```

```
># chkconfig httpd --del
```

3) Verify sendmail service is stopped and disabled

This may not be necessary if it wasn't automatically installed.

```
># service sendmail stop
```

```
># chkconfig sendmail off
```

```
># chkconfig sendmail --del
```

```
># yum remove sendmail
```

4) Verify postfix service is stopped and disabled

This may not be necessary if it wasn't automatically installed.

```
># service postfix stop
```

```
># chkconfig postfix off
```

```
># chkconfig postfix --del
```

```
># yum remove postfix
```

NOTE: Blog O'Matty has a post on disabling unneeded CentOS services:

<http://prefetch.net/blog/index.php/2006/12/27/securing-centos-installationsby-disabling-unneeded-services>

5) Set File Handles

Increase the number of file handles available for use, and make them permanent for *username*.

```
># ulimit -n 20000
># vi /etc/security/limits.conf
```

Add the following lines to the end of the file:

```
username soft nofile 65535
username hard nofile 65535
```

NOTE: If you are installing on a 32 bit system, set these values:

```
username soft nofile 20000
username hard nofile 49152
```

6) Reboot the server

You need to reboot the server at this point. Use either of the following commands:

```
># /sbin/shutdown -r now
```

-- OR --

```
># reboot now
```

7) Log in via SSH

After the server has rebooted, log in again via SSH and change to SuperUser (repeat DOMINO SPECIFIC CONFIGURATION step 1).

8) Allow Domino to tune the Linux kernel

Use the export command to set operating system variable.

```
># export DOMINO_LINUX_SET_PARMS=1
```

Use either vi or the echo command to add the export command to the end of the /home/notes/.bashrc file:

```
export DOMINO_LINUX_SET_PARMS=1
```

```
># vi /home/username/.bashrc
```

edit and save the file.

-- OR --

```
># echo -e "\nexport DOMINO_LINUX_SET_PARMS=1" >>  
/home/username/.bashrc
```

9) Create the directory for your Domino server

```
># mkdir /local
```

```
># mkdir /local/servername
```

```
># mkdir /local/servername/dominodata
```

Verify the directory exists and make note of this directory, you will need it during installation.

```
># cd /directory path you just created
```

10) Create Installation Directory

Create the directory from which to install domino, and change to that directory.

```
># mkdir /install/domino9
```

```
># cd /install/domino9
```

11) Get Install File

Download the Domino Installation file from wherever you have placed it. You must have previously retrieved the file from IBM, because the IBM Download site doesn't play well with **wget**. If you have it on a DVD, load the DVD into the drive.

```
># wget -v URL for Domino_Installation_file.
```

-- OR --

```
># cp /DVD MOUNT FOLDER/Domino_Installation_file  
/install/domino9/ Domino_Installation_file
```

12) Verify File and Unpack

Use the tar command to check the file. Tar arguments:

-t Table of contents. List all the files contained in the tar file.

-v Verbose output.

-f Use the filename from the argument parameters.

-x Extract or restore the file(s)

```
># tar -tvf Domino_Installation_file
```

If there are problems with the file, you will need to delete it and download a clean one. If there are no problems, then go ahead and extract the file contents.

```
># tar -xvf Domino_Installation_file
```


Domino Installation & Setup

1) Find and run the installation

Use the `ls` command (without the `-l` argument) to list the directory contents, then navigate down through the folders using the `ls` and `cd` command as needed until you see the `install` file displayed, then run the file:

```
># ./install
```

2) Follow Prompts

- Do you want to continue installation in console mode? [Yes]
- Welcome to the InstallShield Wizard. [1]
- Read and agree to the license agreement. [1]
- Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]
- Install Data Directories Only (*out of scope for this document*): [0]
- Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]
- Program Files Directory Name [/opt/ibm/domino]
- Partitioned Server (*out of scope for this document*): [No]
- Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]
- Data Files Directory Name [/local/notesdata] **ENTER THE DIRECTORY PATH YOU CREATED IN DOMINO SPECIFIC CONFIGURATION STEP 9**
- Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]
- User Name [root] **ENTER THE USER NAME YOU CREATED IN USER ACCOUNT & SSH SERVICE STEP 2**
- Group Name [root] **ENTER THE GROUP NAME YOU CREATED IN USER ACCOUNT & SSH SERVICE STEP 1**
- Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]
- Select Server Setup (Manual) [3]
- Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]
- Choose the setup type: Domino Utility Server, Domino Messaging Server, Domino Enterprise Server, Customize Domino Server (*Customize is out of scope for this document*)
- Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]
- Installation Summary: Press ENTER to read the text [Type q to quit]
- Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]

The server installation will now begin. Once finished, you will be presented with a post-installation instructions page.

- Press 3 to Finish or 4 to Redisplay [3]

3) Switch user and launch server listen

Change back to the userid you used to log into the SSH session:

```
># exit
```

Then change to the /local/servername/dominodata folder:

```
>$ cd /local/servername/dominodata
```

Launch the server and put it into listen mode for remote server setup access:

```
>$ /opt/ibm/domino/bin/server -listen
```

4) Domino Remote Server Setup Utility

On another Machine, start the Domino Remote Server Setup Utility Client. Enter the ip address of your server in the dialog box, and follow the prompts to configure your server. When you finish the configuration, a dialog will ask you if you want to shut down the listening server. Do so, then go back to the SSH console from which you launched the server. It should be back to a command prompt.

STICKY BITS- IMPORTANT!

Set Sticky-bit on Bindsock

When your Domino Server attempts to start any service that needs to **bind** to a **socket** (port); it does so by invoking the **bindsock** program. There is a problem with the installation / setup of IBM Domino 9 Server, in that it does not set the sticky-bit on the bindsock program file. In a Linux environment, a sticky-bit causes an executable file to be run using the credentials of the file owner instead of the invoking user. The proper term for this is **Set User Identification Attribute**, but everybody just calls it sticky-bit. The bindsock program must be run using the root user's credentials, and therefore must have this sticky-bit set.

If you attempt to start your Domino server immediately after you finish configuring it using the remote server setup you will discover that your HTTP server cannot start, because it cannot bind to port 80. Fortunately, the solution to this is very simple. From the console, change to the Super User and enter the password:

```
>$ su  
>$ enter password for root
```

Change to the domino server program "root" directory:

```
># cd /opt/ibm/domino
```

Use the **find** command to search for the bindsock program file.

```
># find -name 'bindsock'  
./notes/90000/linux/bindsock
```

Change to the containing the file:

```
># cd notes/90000/linux
```

Now use the **ls -l** command to display the information about bindsock:

```
># ls -l bindsock  
-r-sr-xr-x 1 root bin 9880 Mar 9 02:41 bindsock
```

This indicates that this `bindsock` file is owned by the `root` user, and the `bin` group. The block of text at the beginning (`-r-Sr-Xr-X`) indicates the type and permissions for the entry. The very first character “-” indicates the type of entry, in this case a normal file. There are several other possible characters with different meanings, such as “d” for directory, or “b” for block device, but for now all we care about is the “-”.

What follows after this first character are three sub-blocks of three characters each. Each sub-block defines which specific permissions are enabled for the entry, and the position of the sub-block defines for whom the permissions are to be applied. The first sub-block is for the `owner` of the entry, the second for the `group`, and the third for `everybody else`. There are three standard permissions: `read`, `write`, and `execute`. We can interpret the result of the `ls-l` command as follows:

```
-r-sr-xr-x 1 root bin 9880 Mar 9 02:41 bindsock
```

The first block “`r-s`” tells us that the `owner` of the entry (in this case `root`) is allowed to read the entry, is not allowed to write to the entry (no “`w`”), and can execute the entry using the owner's id (the “`s`” denotes that Set User Identification Attribute is in force). Normal executable files just have this set as “`x`”.

The second block “`r-x`” tells us that the `group` for the entry (in this case `bin`) can read the entry, is not allowed to write to the entry (no “`w`”), and may execute the entry.

The third block “`r-x`” tells us that `everybody else` (users who are neither the owner of the file nor a member of the group) can read the entry, cannot write to the entry (again, no “`w`”), and may execute the entry.

These settings are entirely appropriate for most executable files. In this case however they are not correct, because the `bindsock` program makes changes to system resources (ports) that for security reasons are only allowed to be made by the root user. This is why the HTTP (and possibly LDAP, IMAP, SMTP, etc.) service is failing to start. To correct the problem, we need to add the stick-bit to `bindsock`. This is accomplished using the `chmod` utility, followed by an `ls-l` to verify our changes:

```
># chmod +s bindsock
># ls -l bindsock
-r-sr-sr-x 1 root bin 9880 Mar 9 02:41 bindsock
```

This change will now cause all users who are neither the root user, nor members of the `bin` group, to execute the `bindsock` using the root user's credentials. Which means our Domino services can now be properly bound to a socket when starting up.

Launch Domino

1) Restart the Server

Change back to the userid you used to log into the SSH session, then change to the /local/servername/dominodata folder:

```
># exit
```

```
>$ cd /local/servername/dominodata
```

Launch the server, only this time do not add any parameters.

```
>$ /opt/ibm/domino/bin/server
```

2) Celebrate

Congratulations. Your server is now operational. A quick and simple test to verify is to type in the server's ip address in a browser URL window. You should see the new IBM Domino Start Page. Throw your feet up on the desk, pop open a bottle of your favorite beverage (I suggest anything from [Spanky's Brewery](#)), and call it a day.



You have done well padawan.

ADDITIONAL RESOURCES

Obviously there is a lot more configuration you need to do to make your server production ready. Do some research, read some blogs, check out IBM's developer resources. One incredibly useful resource is Daniel Nashed's blog and his wonderful Domino on Unix/Linux Start Script. I use this myself, and **strongly** recommend it.

<http://www.nashcom.de/nshweb/pages/startscript.htm>

Other Sites worth checking out:

- Daniel Nashed's Blog:
<http://blog.nashcom.de/nashcomblog.nsf>
- Devin S. Olson's (that's me!) LearningXPages site:
www.learningxpages.com
- Red Pill Now:
<http://redpillnow.com>
- David Leedy's Notes in 9:
<http://notesin9.com>
- Bill Malchisky's BillMal Your Lotus Pal:
<http://www.billmal.com/billmal/billmal.nsf>
- Open NTF:
www.openntf.org
- Planet Lotus:
<http://planetlotus.org>

Hope this helps!

-Devin.

About Devin S. Olson

Who Am I?

- Christian
- Husband
- Father
- Biker, Brewer, Friend

What do I do?

- Senior Consultant at Red Pill Now
- IBM Champion
- Notes / Domino consultant since 1995
- MCP
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