DB2 UDB 7.1 Enterprise Extended Edition Install on Red Hat Linux 7.1

The purpose of this document is to provide a step-by-step installation of DB2 Universal Database 7.1 Enterprise Extended Edition (DB2 EEE) on Red Hat Linux 7.1. It does not cover all the possible installation methods or running environments. All steps should be performed as root unless otherwise noted.

Overview of Installation Steps:

1. Install Red Hat 7.1 on servers
2. Configure networking hardware
3. Setup NFS filesystem
4. Create users and groups
5. Enable rsh
6. Install and setup DB2
7. Configure multiple nodes
8. Configure the Administration Server
9. Configure the Kernel
10. Create a database

(Step 1) Install Red Hat 7.1

Typical installs of Red Hat 7.1 do not include all the necessary packages to install and run DB2 EEE. When installing Red Hat 7.1 choose the option not to install a firewall. The following services also need to be installed:

- X - if you wish to run the DB2 Java Control Center
- Xinetd - required for DB2 Communication
- rsh - required for DB2 EEE only (ssh will not work)
- pdksh - required for install
- Nfs-utils - required for NFS mount

(Step 2) Configure networking hardware

DB2 EEE systems require communication between partitions. The demands for inter-node communication vary based upon implementation. It is recommended that inter-node communication be isolated to a network dedicated for this purpose. The following example setup splits network activity between a public network and a private network for DB2 EEE by utilizing two network cards in each machine.

Machine: DB2lab9
Hostname: DB2lab9
NIC 1 - IP address (public): 9.19.156.33
- Subnet : 255.255.252.0
NIC 2 - IP address (private): 10.10.10.9
- Subnet: 255.255.255.0

Machine: DB2lab10
Hostname: DB2lab10

NIC 1 - IP address (public): 9.19.156.34
- Subnet: 255.255.252.0
NIC 2 - IP address (private): 10.10.10.10
- Subnet: 255.255.255.0

(Step 3) Setup NFS file system

The scalability of DB2 EEE is a result of maximizing the parallelism of hardware resources. There are a small number of configuration control files that all partitions in a DB2 system share. These files are made available by a NFS mounted file system. The steps for creating and testing the NFS mount are:

1. Create a directory /db2home on all the machines that will be in the cluster
2. On the first machine in the cluster (the instance owner) prepare and mount the exported file system
   A. Create the /etc/exports file on DB2lab9
   B. Add the following entry /db2home db2lab*.local.domain(rw)
   C. On DB2lab9 restart the NFS service
      ./etc/init.d/nfs restart
   D. Verify the export is working correctly
      showmount --exports
3. On all other machines in the cluster mount the file system
   A. Add the following entry to /etc/fstab 'DB2lab9:/db2home /db2home nfs rw 0 0'
   B. Mount the exported file system on all the machines in the cluster
      mount /db2home
   C. Verify the mount by issuing the *mount* command with no options

(Step 4) Create users and groups

The DB2 setup program can create the necessary users and groups. The following are steps to create the required groups and users manually to ensure consistency across all machines.

1. Create the necessary groups on all machines
   groupadd -g 550 db2iadm
   groupadd -g 551 db2fadm
   groupadd -g 552 db2as
2. Create the necessary users on all machines
   useradd -u 550 -g 550 -d /db2home/db2inst1 db2inst1
   useradd -u 551 -g 551 -d /db2home/db2fenc1 db2fenc1
   useradd -u 552 -g 552 -d /db2home/db2as db2as
3. Set passwords for users on all machines
   passwd db2inst1
   passwd db2fenc1
   passwd db2as

The user db2inst1 will be the instance owner and administrator for DB2 EEE. Stored procedures will run under the db2fenc1 ID.

(Step 5) Setup rsh

DB2 EEE uses rsh to perform remote execution on machines in the cluster. There are two methods for enabling rsh. The first method is to provide a security file .rhosts file in the instance owner's home directory. The second method is to provide a security file /etc/hosts.equiv for every machine in the cluster. In either case the file/s list the users allowed to issue remote commands and the machines where the remote commands may originate. User root is disabled from using rsh in Red Hat Linux 7.1.

Method One:
1. Create the /db2home/db2inst1/.rhosts.equiv file
2. Add the following entries to the .rhosts.equiv file:
   DB2lab9 db2inst1
   DB2lab10 db2inst1
3. Restart xinetd service on all machines
   /etc/init.d/xinetd restart
4. Verify the rsh service is working
   A. Login as user db2inst1
   B. Issue a remote command on each machine for example:
   rsh DB2lab10 ls /usr

Method Two:
1. On every machine in the cluster create the /etc/hosts.equiv file
2. Add the following entries to the hosts.equiv files:
   DB2lab9 db2inst1
   DB2lab10 db2inst1
3. Restart xinetd service on all machines
   /etc/init.d/xinetd restart
4. Verify the rsh service is working
   A. Login as user db2inst1
   B. Issue a remote command on each machine for example:
   rsh DB2lab10 ls /usr

(Step 6) Install and Setup DB2 EEE

The install steps may depend on how you obtained DB2. If you downloaded the code you will need to extract the files from the tar file before proceeding. If you obtained DB2 EEE on CD this will not be necessary. There are two scripts important to the setup and installation of DB2, db2_install and db2setup. The first, db2_install, will only install the DB2 libraries and can not be used to setup DB2 EEE or create db2 instances. The db2setup utility can be used for both processes. This example will use both utilities to complete the installation. Complete the following steps on each machine.

1. Extract the DB2 RPMs (only required for downloaded TAR files)
   tar -xf db2eee linuxeee.english.tar
2. Extract any fix pack appropriate for your version level
   tar -xf FP3_U475391.tar
3. Install the code on each server

db2_install
/FP3_U475391/installpatch

DB2 will be installed into the following path /usr/IBMdb2/V7.1/. The db2setup script requires libncurses.so.4 to be viewed properly. This library is not installed during the default install of Red Hat 7.1. The alternative to installing these libraries is to create a symbolic link to libncurses.so.5 with the following command. However, you will need to pay close attention when running db2setup. The screen may display characters that do not exist.

ln -sf /usr/lib/libncurses.so.5 /usr/lib/libncurses.so.4

4. Begin the setup of DB2 on the first machine (db2lab9)
   /usr/IBMdb2/V7.1/install/db2setup
5. Choose the option to create a DB2 instance (this will only be completed on one node)
6. Provide the proper user and group information as created in step 4 and continue the setup
   db2inst1 will be used for the DB2 Instance
   db2fenc1 will be used for the Fenced User
7. Verify the setup by stopping and starting the db2 instance (db2inst1)
   As user db2inst1 issue the *db2start* and *db2stop*

(Step 7) Configure multiple nodes

After you have configured and setup DB2 EEE you will need to create new partitions. The /db2home/db2inst1/sqllib/db2nodes.cfg specifies what partitions exist in the DB2 EEE system. To add partitions:

1. Add an entry into the db2nodes.cfg for the new partition
   1 db2lab10 0
2. Update the services file for listening ports both for external communication and for FCM communication between nodes. You can copy the entries from the end of the /etc/services file or simply copy the file from the instance owning machine.
3. To use a specific network for FCM communication edit the /db2home/db2inst1/sqllib/db2nodes.cfg and specify what network FCM should flow over.
   0 db2lab9 0 10.10.10.9
   1 db2lab10 0 10.10.10.10
4. Verify communication by stopping and starting the instance, *db2start* and *db2stop*

(Step 8) Configure the Administration Server

The Administration Server is used for administration of instances.

1. Begin the setup of the Administration Server by executing the db2setup command
   /usr/IBMdb2/V7.1/install/db2setup
2. Choose the option to create an instance
3. Select the option to create the Administration Server
4. Provide the proper user and group information as created in step 4 and continue the setup
   db2as will be used for the Administration Server

(Step 9) Configure the Kernel

To increase performance and the number of simultaneous connections to DB2 EEE change ipc kernel parameters.

1. Configure the msgmni parameter
   sysctl - w kernel.msgmni=128
2. Configure the parameter to be applied at boot time
   Append the following line to /etc/sysctl.conf:
   kernel.msgmni=128

(Step 10) Create a Database

By default the create database command will create the initial database objects in the instance owner's home directory. This is not the desired location as the instance owner's home directory resides on the NFS mounted file system. To change this specify a location when using the create database command. The initial database objects known as the system catalogs will only reside on the first partition. Rows in user created tables will be striped across the partitions. The path specified on the create database command must exist on all the machines and the instance owner's ID must have read write access to the path. The best option is to give ownership of the path to the instance owner's ID.

1. As root create a directory for database objects on db2lab9 and db2lab10
   mkdir /testdbdir
2. Change ownership of this directory to the instance owner on db2lab9 and db2lab10
   chown /testdbdir db2inst1
3. As db2inst1 create the test database
   db2 "create database test on /testdbdir"

For setup instructions of the DB2 Control Center refer to the After Installing DB2 on Red Hat section of the following HOWTO:
http://www.linuxdoc.org/HOWTO/DB2-HOWTO/

Additional thanks to:

- ✍ Nancy Miller for reviewing this document and providing constructive insights.
- ✍ Dan Scott for his web resources unavailable anywhere else.

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