How to rebuild RPM database on a Red Hat Enterprise Linux system?

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Environment

- Red Hat Enterprise Linux 9
- Red Hat Enterprise Linux 8
- Red Hat Enterprise Linux 7
- Red Hat Enterprise Linux 6
- RPM database

Issue

- RPM is not working correctly, updates cannot be applied.
- How to rebuild the RPM database?
- Why does rpm command segfault when executed?
- `yum update` fails with rpmdb errors.
- Damaged header instance error
- `rpm` command terminates with "cannot open Packages database in /var/lib/rpm"
- Why does rpm or yum terminate with `rpmdb: Lock table is out of available locker entries` ?
- Attempted to do an `rpm -q` on a couple of packages and got errors like this:

```
rpmdb: /var/lib/rpm/Packages: unexpected file type or format
error: cannot open Packages index using db3 - Invalid argument (22)
```

- On doing rpm query or install, it is failing with following error:-

```
error: rpmdbNextIterator: skipping h#    1601 Header V4 RSA/SHA1 signature: BAD,
key ID 2874ffbe
```

- Why "rpm -qa" command is not showing installed packages?
- `rpm` command hangs/hung
- `rpm` database got corrupted

Resolution

Generic notes:

- Depending on the particular scenario, there are several different paths that correct this situation
- On RHEL9, the RPM database implementation was changed to SQLite. Please refer to SQLite RPM database in RHEL9 for RHEL9.
- On RHEL6, before attempting to rebuild the rpm database, first refer to the following known issue: Update to nss-softokn 3.14.3-19 breaks RPM.

1) Stale lock file cleanup - files needed for updating are being held open.

Note: There are two methods (1A & 1B) to correct this.
Note: As *always* it best to start by taking a backup before attempting to repair.

```
# cd /var/lib
# tar -zcvf /tmp/rpmdb-$(date +%Y-%m-%d_%H-%M-%S).tar.gz rpm
```

Note: This `tar` backup can be used if the attempt to recover the RPM database has issues.

1A) Reboot system (preferred)

1. The best course of action is to simply reboot the machine, as the system cleans up stale locks during the sysinit portion of boot. The cleanup occurs at this stage as the system is assured there is no process that would have a lock on the RPM database.

```
# grep rpm /etc/rc.d/rc.sysinit
rm -f /var/lib/rpm/__db* &> /dev/null
```

1B) Reboot not feasible (more risky than reboot)

1. Ensure there are no processes with the RPM database files open. One way to do this is using `lsof` & `ps` as the `root` user:

```
# ps -aux | grep -e rpm -e yum -e up2date
# lsof | grep /var/lib/rpm
```

2. If, and only if, there is no RPM database activity going on it is safe to delete the lock files. **WARNING:** If the system is in multi-user mode it is possible that a process may open the RPM database at any time. Therefore, the recommended method for clearing stale locks is the reboot which cleans up the locks prior to entering multi-user mode.

```
# rm -f /var/lib/rpm/__db*
```

2) DB corruption recovery process - The RPM database has become corrupt and recovery is desired.

Note: If you are coming here from 1B), you can go to step 2-2.

1. As *always* it best to start by taking a backup before attempting to repair.

```
# cd /var/lib
# tar -zcvf /tmp/rpmdb-$(date +%Y-%m-%d_%H-%M-%S).tar.gz rpm
```

Note: This `tar` backup can be used if the attempt to recover the RPM database has issues.

2. Verify integrity of the `Packages` file:

2-1. Delete lock files.

```
# cd /var/lib/rpm
# rm -f __db*      # to avoid stale locks
# /usr/lib/rpm/rpmdb_verify Packages
```

2-2. Verify Packages

```
# /usr/lib/rpm/rpmdb_verify Packages
```

If the command shown in method 2-2 returns without any error, then we can be sure about the integrity of the rpm database. You can also issue the following command to be sure of the success of the rpmdb_verify command.

```
$ /usr/lib/rpm/rpmdb_verify Packages
$ echo $?
0
```

A return value of 0 from `echo $?` means that the last command has been executed successfully.

3. **If the above verify reports success, go to step 6**.
4. If the above verify reports any errors, a dump and load of the database is required.

```
# mv Packages Packages.orig
# /usr/lib/rpm/rpmdb_dump Packages.orig | /usr/lib/rpm/rpmdb_load Packages
```

5. Verify the newly loaded Packages file, as well as `rpm` output.

```
# /usr/lib/rpm/rpmdb_verify Packages
# rpm -qa >/dev/null    # Validating there are no errors
# rpm -qa               # Validating list of installed RPMs
```

6. If no errors and everything looks good, rebuild the RPM indexes

```
# rpm -vv --rebuilddb
```

7. Once again verify RPM database:

```
# cd /var/lib/rpm
# /usr/lib/rpm/rpmdb_verify Packages
```

Notes:

- If the above recovery steps fail or throw errors, restoring `/var/lib/rpm` directory from a recent system backup may be your best option. Remember to not overwrite the `tar` backup as it may still be valuable.
- If you have a rpm database in other directory except for `/var/lib/rpm` and it's corrupted, you will need to do the same things to the rpm database, not one in `/var/lib/rpm` . The rpm command has `--root` option to specify the root directory for the rpm database. Especially, please take care of the `rpm -vv --rebuilddb` command to rebuild the rpm

database. For example, if you are using `/opt/var/lib/rpm` for a directory including rpm database, run this command `rpm -vv --rebuilddb --root /opt` .

- To reconstruct the RPM database, a Packages file (typically located at `/var/lib/rpm/Packages`) is required. Without that file, it might be possible to copy the RPM database from another healthy system which was installed similarly, with the same RHEL minor version. After making a copy of the RPM database, you should execute `rpm -Va` to find out potential discrepancies, and then reinstall those packages.

3.) Other resources:

- To restore rpm database file from `/var/log/rpmpkgs` , refer to: How to recover rpm database file /var/lib/rpm/Packages using /var/log/rpmpkgs ?
- Comprehensive notes on RPM database recovery can be found at: http://people.redhat.com/berrange/notes/rpmrecovery.html.

Root Cause

There are multiple reasons which can lead to rpm database corruption. Refer to: What are the possible reasons for RPMDB corruption?.

Diagnostic Steps

- `yum update` fails with the following:

```
[root@localhost ~]# yum update
rpmdb: PANIC: fatal region error detected; run recovery
error: db3 error(-30974) from dbenv->open: DB_RUNRECOVERY: Fatal error, run
database recovery
error: cannot open Packages index using db3 -  (-30974)
error: cannot open Packages database in /var/lib/rpm
CRITICAL:yum.main:

Error: rpmdb open failed
[root@localhost ~]# yum clean all
rpmdb: PANIC: fatal region error detected; run recovery
error: db3 error(-30974) from dbenv->open: DB_RUNRECOVERY: Fatal error, run
database recovery
error: cannot open Packages index using db3 -  (-30974)
error: cannot open Packages database in /var/lib/rpm
CRITICAL:yum.main:

Error: rpmdb open failed
```

- `rpm` shows damaged header instances:

```
$ rpm -Va
error: rpmdb: damaged header instance #<header number> retrived, skipping
error: rpmdb: damaged header instance #<header number> retrived, skipping
(above message repeated ad infinitum)
```

- `rpm` commands terminate with the error below:

```
rpmdb: unable to join the environment
error: db3 error(11) from dbenv->open: Resource temporarily unavailble
error: cannot open Packages index using db3 - Resource temporarily unavailable
(11)
error: cannot open Packages database in /var/lib/rpm
```

- `rpm` and `yum` commands return the following:

```
$ rpm -qa
...
rpmdb: Lock table is out of available locker entries
error: db4 error(22) from db->close: Invalid argument
```

Product(s) **Red Hat Enterprise Linux** **Component** **rpm** **yum**

Category **Troubleshoot**

Tags **database** **install** **installation** **red_hat_enterprise_linux** **rpm** **rpm_package_manager** **yum**

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