Lab 7: Systemd and Package managers

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Assignment Report

SD-01

I. Questions to Answer：

1. Take the systemd unit `graphical.target` as your starting point, start tracing backwards using only the `Requires` variable. At what systemd unit do you reach a dead end where there is no more `Requires` variable?

- **Provide brief explanation for each of the systemd units you encounter while performing this trace.**
- **The unit at this dead end Wants some systemd units. Why does it want these units?**

```
allimi@Ubuntu:~/Desktop$ systemctl show graphical.target -p Requires
Requires=multi-user.target
allimi@Ubuntu:~/Desktop$ systemctl show multi-user.target -p Requires
Requires=basic.target
allimi@Ubuntu:~/Desktop$ systemctl show basic.target -p Requires
Requires=sysinit.target -.mount
allimi@Ubuntu:~/Desktop$ systemctl show sysint.target -p Requires
Requires=
allimi@Ubuntu:~/Desktop$
```

Explanation:

```
allimi@Ubuntu:~/Desktop$ systemctl show graphical.target -p Requires
Requires=multi-user.target
```

`graphical.target`: This is the target used for graphical sessions. It requires multi-user.target to ensure the system is in a multi-user state before starting the graphical environment.

```
allimi@Ubuntu:~/Desktop$ systemctl show multi-user.target -p Requires
Requires=basic.target
```

`multi-user.target`: This target is used for multi-user systems (non-graphical). It requires basic.target to ensure basic system services are running.

```
allimi@Ubuntu:~/Desktop$ systemctl show basic.target -p Requires
Requires=sysinit.target -.mount
```

`basic.target`: This target ensures basic system functionality. It requires sysinit.target to ensure the system initialization is complete.

```
allimi@Ubuntu:~/Desktop$ systemctl show sysint.target -p Requires
Requires=
```

`sysinit.target`: This target is responsible for system initialization. It does not have any Requires dependencies, so this is the dead end.

`sysinit.target`: This is the dead end where there are no more Requires dependencies. However, sysinit.target Wants several units (like udev.service, systemd-tmpfiles-setup.service) to ensure the system is properly initialized. These units are not strictly required but are desired for proper system functionality.

2. Create a simple web server in bash that shows the following: system uptime, inode usage, current memory, disk space usage statistics, and the last 15 lines of `/var/log/syslog.`

- The required information should be queried from the server everytime a user opens or refreshes the page.
- You do not need to save the results anywhere. Users only need live updates when the server is visited.
- The results should be displayed on a single page in an orderly manner that is easy to read.
- Create a systemd service on your system to run this script (web server). Show how you can start your new service, and configure it to run after system reboot.
- Your systemd service should restart the web server if the web server crashes or is killed.
- This service is allowed to use a maximum of 15% of the CPU and 256MB memory.

```
allimi@Ubuntu:~/Desktop$ sudo nano /usr/local/bin/webinfo.sh
```

```
  GNU nano 6.2                                    /usr/local/bin/webinfo.sh *

PORT=8080


generate_page() {
    echo -e "HTTP/1.1 200 OK\r\nContent-Type: text/html\r\n\r\n"
    echo "<html><body>"
    echo "<h1>System Information</h1>"
    echo "<pre>"
    echo "<b>Uptime:</b>"
    uptime
    echo
    echo "<b>Inode Usage:</b>"
    df -i
    echo
    echo "<b>Memory Usage:</b>"
    free -h
    echo
    echo "<b>Disk Space Usage:</b>"
    df -h
    echo
    echo "<b>Last 15 lines of /var/log/syslog:</b>"
    tail -n 15 /var/log/syslog
    echo "</pre>"
    echo "</body></html>"
}


echo "Starting web server on port $PORT..."
while true; do
    (generate_page) | nc -l -p $PORT -q 1
done
```

```
allimi@Ubuntu:~/Desktop$ sudo chmod +x /usr/local/bin/webinfo.sh
```

```
allimi@Ubuntu:~/Desktop$ sudo /usr/local/bin/webinfo.sh
[sudo] password for allimi:
Starting web server on port 8080...
GET / HTTP/1.1
Host: localhost:8080
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:136.0) Gecko/20100101 Firefox/136.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-GB,en;q=0.5
Accept-Encoding: gzip, deflate, br, zstd
DNT: 1
Connection: keep-alive
Upgrade-Insecure-Requests: 1
Sec-Fetch-Dest: document
Sec-Fetch-Mode: navigate
Sec-Fetch-Site: cross-site
Priority: u=0, i
Pragma: no-cache
Cache-Control: no-cache
```

System Information

Uptime:
```
 21:09:26 up 46 min,  2 users,  load average: 0,32, 0,65, 0,86
```

Inode Usage:
```
Filesystem      Inodes  IUsed   IFree IUse% Mounted on
tmpfs           499177    987  498190    1% /run
/dev/sda3      1605632 266852 1338780   17% /
tmpfs           499177      1  499176    1% /dev/shm
tmpfs           499177      4  499173    1% /run/lock
efivarfs             0      0       0     - /sys/firmware/efi/efivars
/dev/sda2            0      0       0     - /boot/efi
tmpfs            99835    160   99675    1% /run/user/1000
/dev/sr0             0      0       0     - /media/allimi/VBox_GAs_7.0.10
```

Memory Usage:
```
               total        used        free      shared  buff/cache   available
Mem:           3,8Gi       1,6Gi       186Mi        92Mi       2,0Gi       1,9Gi
Swap:          2,6Gi          0B       2,6Gi
```

Disk Space Usage:
```
Filesystem      Size  Used Avail Use% Mounted on
tmpfs           390M  1,6M  389M   1% /run
/dev/sda3        24G   14G  9,1G  61% /
tmpfs           2,0G     0  2,0G   0% /dev/shm
tmpfs           5,0M  4,0K  5,0M   1% /run/lock
efivarfs        256K  146K  106K  58% /sys/firmware/efi/efivars
/dev/sda2       512M  6,1M  506M   2% /boot/efi
tmpfs           390M  120K  390M   1% /run/user/1000
/dev/sr0         52M   52M     0 100% /media/allimi/VBox_GAs_7.0.10
```

Last 15 lines of /var/log/syslog:
```
Mar 10 21:06:16 Ubuntu gnome-shell[2786]: Window manager warning: W6 appears to be one of the offending windows with a timestamp of 2580401.  Working around...
Mar 10 21:07:01 Ubuntu CRON[5568]: (allimi) CMD (/bin/bash /home/$USER/test.sh)
Mar 10 21:07:41 Ubuntu kernel: [ 2665.870689] workqueue: e1000_watchdog [e1000] hogged CPU for >10000us 256 times, consider switching to WQ_UNBOUND
Mar 10 21:07:50 Ubuntu gnome-shell[2786]: Window manager warning: Ping serial 2674208 was reused for window W6, previous use was for window W2.
Mar 10 21:08:01 Ubuntu CRON[5581]: (allimi) CMD (/bin/bash /home/$USER/test.sh)
Mar 10 21:09:01 Ubuntu CRON[5600]: (allimi) CMD (/bin/bash /home/$USER/test.sh)
Mar 10 21:09:03 Ubuntu systemd[2615]: vte-spawn-7c5b1eee-f0d4-4cd7-84e3-1130a48815ee.scope: Consumed 1.664s CPU time.
Mar 10 21:09:03 Ubuntu gnome-shell[2786]: JS ERROR: TypeError: this.actor is null#012_syncEnabled@resource:///org/gnome/shell/ui/windowManager.js:138:25#012onStopped@resource:///org/gnome/shell/ui/windowManager.js:150:35#
Mar 10 21:09:03 Ubuntu systemd[2615]: gnome-terminal-server.service: Consumed 22.884s CPU time.
Mar 10 21:09:03 Ubuntu gnome-shell[2786]: Window manager warning: Ping serial 2747554 was reused for window W1, previous use was for window W2.
Mar 10 21:09:06 Ubuntu dbus-daemon[2653]: [session uid=1000 pid=2653] Activating via systemd: service name='org.gnome.Terminal' unit='gnome-terminal-server.service' requested by ':1.157' (uid=1000 pid=5614 comm="/usr/bin/
Mar 10 21:09:06 Ubuntu systemd[2615]: Starting GNOME Terminal Server...
Mar 10 21:09:06 Ubuntu dbus-daemon[2653]: [session uid=1000 pid=2653] Successfully activated service 'org.gnome.Terminal'
Mar 10 21:09:06 Ubuntu systemd[2615]: Started GNOME Terminal Server.
Mar 10 21:09:06 Ubuntu systemd[2615]: Started VTE child process 5637 launched by gnome-terminal-server process 5619.
```

```
allimi@Ubuntu:~/Desktop$ sudo nano /etc/systemd/system/webinfo.service
[sudo] password for allimi:
allimi@Ubuntu:~/Desktop$
```

CPUQuote is 15% and Maximum Memory is 256MB

```
  GNU nano 6.2                                          /etc/systemd/system/webinfo.service *
[Unit]
Description=Simple Web Server for System Information
After=network.target

[Service]
ExecStart=/usr/local/bin/webinfo.sh
Restart=always
RestartSec=5
CPUQuota=15%
MemoryMax=256M

[Install]
WantedBy=multi-user.target
```

```
allimi@Ubuntu:~/Desktop$ sudo systemctl daemon-reload
allimi@Ubuntu:~/Desktop$ sudo systemctl enable webinfo.service
Created symlink /etc/systemd/system/multi-user.target.wants/webinfo.service → /etc/systemd/system/webinfo.service.
allimi@Ubuntu:~/Desktop$ sudo systemctl start webinfo.service
```

```
allimi@Ubuntu:~/Desktop$ sudo systemctl status webinfo.service
● webinfo.service - Simple Web Server for System Information
     Loaded: loaded (/etc/systemd/system/webinfo.service; e>
     Active: active (running) since Mon 2025-03-10 21:15:04>
   Main PID: 6004 (webinfo.sh)
      Tasks: 2 (limit: 4586)
     Memory: 640.0K (max: 256.0M available: 255.3M)
        CPU: 64ms
     CGroup: /system.slice/webinfo.service
             ├─6004 /bin/bash /usr/local/bin/webinfo.sh
             └─6006 nc -l -p 8080 -q 1

map 10 21:15:04 Ubuntu systemd[1]: Started Simple Web Serve>
map 10 21:15:04 Ubuntu webinfo.sh[6004]: Starting web serve>
lines 1-13/13 (END)...skipping...
● webinfo.service - Simple Web Server for System Information
     Loaded: loaded (/etc/systemd/system/webinfo.service; enabled; vendor preset: enabled)
     Active: active (running) since Mon 2025-03-10 21:15:04 MSK; 1min 25s ago
   Main PID: 6004 (webinfo.sh)
      Tasks: 2 (limit: 4586)
     Memory: 640.0K (max: 256.0M available: 255.3M)
        CPU: 64ms
     CGroup: /system.slice/webinfo.service
             ├─6004 /bin/bash /usr/local/bin/webinfo.sh
             └─6006 nc -l -p 8080 -q 1

map 10 21:15:04 Ubuntu systemd[1]: Started Simple Web Server for System Information.
map 10 21:15:04 Ubuntu webinfo.sh[6004]: Starting web server on port 8080...
```

Result:

System Information

Uptime:
```
 21:24:06 up  1:00,  2 users,  load average: 0,36, 0,79, 0,86
```

Inode Usage:
```
Filesystem      Inodes  IUsed   IFree IUse% Mounted on
tmpfs           499177    991  498186    1% /run
/dev/sda3      1605632 267028 1338604   17% /
tmpfs           499177      1  499176    1% /dev/shm
tmpfs           499177      4  499173    1% /run/lock
efivarfs             0      0       0     - /sys/firmware/efi/efivars
/dev/sda2            0      0       0     - /boot/efi
tmpfs            99835    162   99673    1% /run/user/1000
/dev/sr0             0      0       0     - /media/allimi/VBox_GAs_7.0.10
```

Memory Usage:
```
               total        used        free      shared  buff/cache   available
Mem:           3,8Gi       1,8Gi       215Mi       101Mi       1,8Gi       1,7Gi
Swap:          2,6Gi       1,0Mi       2,6Gi
```

Disk Space Usage:
```
Filesystem      Size  Used Avail Use% Mounted on
tmpfs           390M  1,6M  389M   1% /run
/dev/sda3        24G   14G  9,1G  61% /
tmpfs           2,0G     0  2,0G   0% /dev/shm
tmpfs           5,0M  4,0K  5,0M   1% /run/lock
efivarfs        256K  146K  106K  58% /sys/firmware/efi/efivars
/dev/sda2       512M  6,1M  506M   2% /boot/efi
tmpfs           390M  124K  390M   1% /run/user/1000
/dev/sr0         52M   52M     0 100% /media/allimi/VBox_GAs_7.0.10
```

Last 15 lines of /var/log/syslog:
```
Mar 10 21:24:03 Ubuntu webinfo.sh[6430]: #015
Mar 10 21:24:05 Ubuntu webinfo.sh[6439]: GET / HTTP/1.1
Mar 10 21:24:05 Ubuntu webinfo.sh[6439]: Host: localhost:8080
Mar 10 21:24:05 Ubuntu webinfo.sh[6439]: User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:136.0) Gecko/20100101 Firefox/136.0
Mar 10 21:24:05 Ubuntu webinfo.sh[6439]: Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Mar 10 21:24:05 Ubuntu webinfo.sh[6439]: Accept-Language: en-GB,en;q=0.5
Mar 10 21:24:05 Ubuntu webinfo.sh[6439]: Accept-Encoding: gzip, deflate, br, zstd
Mar 10 21:24:05 Ubuntu webinfo.sh[6439]: Connection: keep-alive
Mar 10 21:24:05 Ubuntu webinfo.sh[6439]: Upgrade-Insecure-Requests: 1
Mar 10 21:24:05 Ubuntu webinfo.sh[6439]: Sec-Fetch-Dest: document
Mar 10 21:24:05 Ubuntu webinfo.sh[6439]: Sec-Fetch-Mode: navigate
Mar 10 21:24:05 Ubuntu webinfo.sh[6439]: Sec-Fetch-Site: none
Mar 10 21:24:05 Ubuntu webinfo.sh[6439]: Sec-Fetch-User: ?1
Mar 10 21:24:05 Ubuntu webinfo.sh[6439]: Priority: u=0, i
Mar 10 21:24:05 Ubuntu webinfo.sh[6439]: #015
```

3. Why should System Administrators prefer `apt upgrade` over `apt full-upgrade`?

`apt upgrade`: This command upgrades all installed packages to their latest versions but does not remove any packages. It is safer because it avoids potential conflicts or unintended removals of packages.

`apt full-upgrade`: This command upgrades packages and may remove or install new packages to resolve dependencies. It is more aggressive and can lead to unintended changes in the system.

System administrators prefer `apt upgrade` because it minimizes the risk of breaking the system by avoiding unnecessary package removals.

4. Create an Ubuntu package that meets the following requirements:

- The package creates the directory /var/helloworld/ on the target system.
- The package contains the python script /var/helloworld/helloworld.py. The python script is simple:

```
#!/usr/bin/env python3
print("Hello, World!")
```

- The package should deploy a bash script `helloworld` that executes `/var/helloworld/hello.py` on the target system.

Take the following steps after building the package

- List the content of the package with the command `$ dpkg -c <package-name>.deb`.
- Install the package and show all artifacts added to your system by the package.

```
allimi@Ubuntu:~/Desktop$ mkdir -p helloworld-pkg/DEBIAN helloworld-pkg/var/helloworld helloworld-pkg/usr/local/bin
allimi@Ubuntu:~/Desktop$ nano helloworld-pkg/DEBIAN/control
```

```
  GNU nano 6.2                  helloworld-pkg/DEBIAN/control *
Package: helloworld
Version: 1.0
Architecture: all
Maintainer: Ahmed  <3llimi69@gmail.com>
Description: A simple Hello World package.
```

```
allimi@Ubuntu:~/Desktop$ nano helloworld-pkg/var/helloworld/helloworld.py
allimi@Ubuntu:~/Desktop$ chmod +x helloworld-pkg/var/helloworld/helloworld.py
```

```
  GNU nano 6.2                        helloworld-pkg/var/helloworld/helloworld.py *
#!/usr/bin/env python3
print("Hello, World!")
```

```
allimi@Ubuntu:~/Desktop$ nano helloworld-pkg/usr/local/bin/helloworld
allimi@Ubuntu:~/Desktop$ chmod +x helloworld-pkg/usr/local/bin/helloworld
```

```
  GNU nano 6.2                        helloworld-pkg/usr/local/bin/helloworld *
#!/bin/bash
/var/helloworld/helloworld.py
```

```
allimi@Ubuntu:~/Desktop$ dpkg-deb --build helloworld-pkg
dpkg-deb: building package 'helloworld' in 'helloworld-pkg.deb'.
```

```
allimi@Ubuntu:~/Desktop$ dpkg -c helloworld-pkg.deb
drwxr-xr-x allimi/allimo     0 2025-03-10 22:12 ./
drwxr-xr-x allimi/allimo     0 2025-03-10 22:12 ./usr/
drwxr-xr-x allimi/allimo     0 2025-03-10 22:12 ./usr/local/
drwxr-xr-x allimi/allimo     0 2025-03-10 22:18 ./usr/local/bin/
-rwxr-xr-x allimi/allimo    42 2025-03-10 22:18 ./usr/local/bin/helloworld
drwxr-xr-x allimi/allimo     0 2025-03-10 22:12 ./var/
drwxr-xr-x allimi/allimo     0 2025-03-10 22:15 ./var/helloworld/
-rwxr-xr-x allimi/allimo    46 2025-03-10 22:15 ./var/helloworld/helloworld.py
```

```
allimi@Ubuntu:~/Desktop$ sudo dpkg -i helloworld-pkg.deb
[sudo] password for allimi:
Selecting previously unselected package helloworld.
(Reading database ... 238909 files and directories currently installed.)
Preparing to unpack helloworld-pkg.deb ...
Unpacking helloworld (1.0) ...
Setting up helloworld (1.0) ...
```

Testing:

```
allimi@Ubuntu:~/Desktop$ dpkg -L helloworld
/.
/usr
/usr/local
/usr/local/bin
/usr/local/bin/helloworld
/var
/var/helloworld
/var/helloworld/helloworld.py
allimi@Ubuntu:~/Desktop$ helloworld
Hello, World!
```

Bonus:

5. Create a custom target in `/etc/systemd/system/<your_target>.target`.
   - Add a description of the target file.
   - Create a directory `/etc/systemd/system/<your_target>.wants/`
   - Create sylinks to additional services you wish to enable in this new directory. It should be a symlink to services from `/usr/lib/systemd/system/` that you wish to enable.

```
allimi@Ubuntu:~/Desktop$ sudo nano /etc/systemd/system/point.target
```

```
  GNU nano 6.2          /etc/systemd/system/point.target *
[Unit]
Description=Custom Target for Specific Services
Requires=multi-user.target
After=multi-user.target
AllowIsolate=yes
```

```
allimi@Ubuntu:~/Desktop$ sudo ln -s /usr/lib/systemd/system/nginx.service /etc/systemd/system/point.target.wants/nginx.service
allimi@Ubuntu:~/Desktop$ sudo ln -s /usr/lib/systemd/system/ssh.service /etc/systemd/system/point.target.wants/ssh.service
```

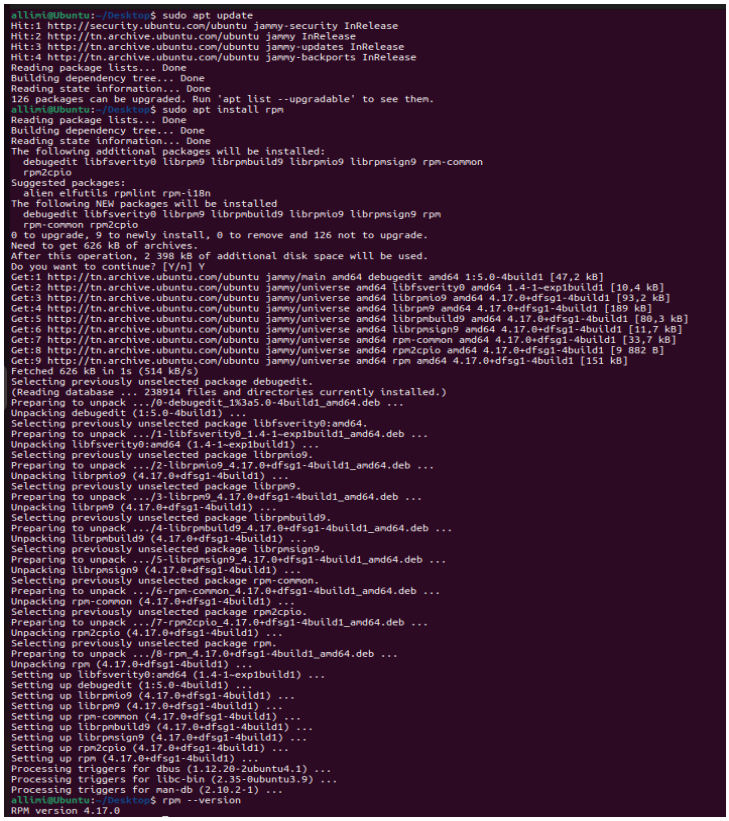
```
allimi@Ubuntu:~/Desktop$ sudo systemctl set-default point.target
Created symlink /etc/systemd/system/default.target → /etc/systemd/system/point.target.
allimi@Ubuntu:~/Desktop$ systemctl get-default
point.target
```

```
allimi@Ubuntu:~/Desktop$ cat /etc/systemd/system/point.target
[Unit]
Description=Custom Target for Specific Services
Requires=multi-user.target
After=multi-user.target
AllowIsolate=yes
allimi@Ubuntu:~/Desktop$ ls -l /etc/systemd/system/point.target.wants/
total 0
lrwxrwxrwx 1 root root 37 мар 10 22:34 nginx.service -> /usr/lib/systemd/system/nginx.service
lrwxrwxrwx 1 root root 35 мар 10 22:34 ssh.service -> /usr/lib/systemd/system/ssh.service
allimi@Ubuntu:~/Desktop$ systemctl get-default
point.target
```

6. Sometimes you might have access to an open-source application source code but might not have the RPM file to install it on your system. In that situation, you can either compile the source code and install the application from source code or build an RPM file from source code by yourself and use the RPM file to install the application. There might also be a situation where you want to build a custom RPM package for the application that you developed.

Create an RPM package to deploy any application of your choice.

Setting Up The Environment:



```
allimi@Ubuntu:~/Desktop$ mkdir -p ~/rpmbuild/{BUILD,RPMS,SOURCES,SPECS,SRPMS}
allimi@Ubuntu:~/Desktop$ mkdir -p ~/myapp
allimi@Ubuntu:~/Desktop$ nano ~/myapp/myapp.py
allimi@Ubuntu:~/Desktop$ chmod +x ~/myapp/myapp.py
```

```
  GNU nano 6.2                  /home/allimi/myapp/myapp.py *
#!/usr/bin/env python3
print("Hello, World! This is my custom application.")
```

```
allimi@Ubuntu:~/Desktop$ tar -czvf ~/rpmbuild/SOURCES/myapp-1.0.tar.gz -C ~/ myapp
myapp/
myapp/myapp.py
```

Defining Specs:

```
allimi@Ubuntu:~/Desktop$ nano ~/rpmbuild/SPECS/myapp.spec
```

```
  GNU nano 6.2                                          /home/allimi/rpmbuild/SPECS/myapp.spec *
Name:           myapp
Version:        1.0
Release:        1%{?dist}
Summary:        A simple Python application

License:        GPLv3
URL:            https://example.com
Source0:        myapp-1.0.tar.gz

BuildArch:      noarch
BuildRequires:  python3

%description
This is a simple Python application that prints "Hello, World!".

%prep
%setup -q

%install
mkdir -p %{buildroot}/usr/local/bin
mkdir -p %{buildroot}/usr/local/share/myapp
install -m 755 myapp.py %{buildroot}/usr/local/bin/myapp
echo "This is a sample file." > %{buildroot}/usr/local/share/myapp/sample.txt

%files
/usr/local/bin/myapp
/usr/local/share/myapp/sample.txt

%changelog
* Mon Mar 10 2025 Your Ahmed  <3llimi69@gmail.com> - 1.0-1
- Initial package.
```

Building:

```
allimi@Ubuntu:~/myapp$ rpmbuild -ba ~/rpmbuild/SPECS/myapp.spec
Executing(%prep): /bin/sh -e /var/tmp/rpm-tmp.ZX6Hre
+ umask 022
+ cd /home/allimi/rpmbuild/BUILD
+ cd /home/allimi/rpmbuild/BUILD
+ rm -rf myapp-1.0
+ /bin/tar -xof -
+ /bin/gzip -dc /home/allimi/rpmbuild/SOURCES/myapp-1.0.tar.gz
+ STATUS=0
+ [ 0 -ne 0 ]
+ cd myapp-1.0
+ /bin/chmod -Rf a+rX,u+w,g-w,o-w .
+ RPM_EC=0
+ jobs -p
+ exit 0
Executing(%install): /bin/sh -e /var/tmp/rpm-tmp.PTCNSH
+ umask 022
+ cd /home/allimi/rpmbuild/BUILD
+ /bin/rm -rf /home/allimi/rpmbuild/BUILDROOT/myapp-1.0-1.x86_64
+ /bin/mkdir -p /home/allimi/rpmbuild/BUILDROOT
+ /bin/mkdir /home/allimi/rpmbuild/BUILDROOT/myapp-1.0-1.x86_64
+ cd myapp-1.0
+ mkdir -p /home/allimi/rpmbuild/BUILDROOT/myapp-1.0-1.x86_64/usr/local/bin
+ mkdir -p /home/allimi/rpmbuild/BUILDROOT/myapp-1.0-1.x86_64/usr/local/share/myapp
+ install -m 755 myapp.py /home/allimi/rpmbuild/BUILDROOT/myapp-1.0-1.x86_64/usr/local/bin/myapp
+ echo This is a sample file.
+ /usr/lib/rpm/brp-compress /usr
+ /usr/lib/rpm/brp-elfperms
+ /usr/lib/rpm/brp-strip /usr/bin/strip
+ /usr/lib/rpm/brp-strip-static-archive /usr/bin/strip
+ /usr/lib/rpm/brp-strip-comment-note /usr/bin/strip /usr/bin/objdump
+ /usr/lib/rpm/brp-remove-la-files
Processing files: myapp-1.0-1.noarch
Provides: myapp = 1.0-1
Requires(rpmlib): rpmlib(CompressedFileNames) <= 3.0.4-1 rpmlib(FileDigests) <= 4.6.0-1 rpmlib(PayloadFilesHavePrefix) <= 4.0-1
Requires: /usr/bin/env
Checking for unpackaged file(s): /usr/lib/rpm/check-files /home/allimi/rpmbuild/BUILDROOT/myapp-1.0-1.x86_64
Wrote: /home/allimi/rpmbuild/SRPMS/myapp-1.0-1.src.rpm
Wrote: /home/allimi/rpmbuild/RPMS/noarch/myapp-1.0-1.noarch.rpm
Executing(%clean): /bin/sh -e /var/tmp/rpm-tmp.fGQe43
+ umask 022
+ cd /home/allimi/rpmbuild/BUILD
+ cd myapp-1.0
+ /bin/rm -rf /home/allimi/rpmbuild/BUILDROOT/myapp-1.0-1.x86_64
+ RPM_EC=0
+ jobs -p
+ exit 0
```

Testing and Showing Proof:

```
allimi@Ubuntu:~/myapp$ rpm -qlp ~/rpmbuild/RPMS/noarch/myapp-1.0-1.noarch.rpm
/usr/local/bin/myapp
/usr/local/share/myapp/sample.txt
```

```
allimi@Ubuntu:~/myapp$ sudo alien ~/rpmbuild/RPMS/noarch/myapp-1.0-1.noarch.rpm
myapp_1.0-2_all.deb generated
allimi@Ubuntu:~/myapp$ sudo dpkg -i myapp_1.0-2_all.deb
Selecting previously unselected package myapp.
(Reading database ... 240846 files and directories currently installed.)
Preparing to unpack myapp_1.0-2_all.deb ...
Unpacking myapp (1.0-2) ...
Setting up myapp (1.0-2) ...
allimi@Ubuntu:~/myapp$ which myapp
/usr/local/bin/myapp
allimi@Ubuntu:~/myapp$ myapp
Hello, World! This is my custom application.
allimi@Ubuntu:~/myapp$
```