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RED HAT NETWORK POWER

USER TIPS AND TRICKS (PART 2)

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Agenda

- Red Hat and Red Hat Network Satellite Server
 - Spacewalk
- Assumptions
- Packaging internally developed software
- Packaging COTS software

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Red Hat and Red Hat Network Satellite Server

- RHN Satellite is the best systems management solution for Red Hat products.
- Mature, robust product with hundreds of thousands of servers under management at customers in practically every vertical you can imagine.

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Red Hat and Red Hat Network Satellite Server

- As Fedora is the upstream, community project for Red Hat Enterprise Linux, Spacewalk is the upstream, community project for Red Hat Network Satellite Server
 - <http://spacewalk.redhat.com/>



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Assumptions

- You are already somewhat familiar with RPMs
 - This is something of an intro, but we're going to be moving rather quickly!

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Packaging internally developed software

- We'll use an app for which you can get the source code as an example. Say you want to install a new and different version of Apache httpd in `/opt/apache` instead of using the Red Hat provided RPMs.

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Packaging internally developed software

- Make sure the “Development tools” package group is installed.
 - `yum groupinstall "Development tools"`
- For convenience, make sure rpmdevtools is installed.
 - `yum install rpmdevtools`



Packaging internally developed software

- First, we'll talk about how you would install from source.
- For much F/OSS software, it's a simple
 - `./configure`
 - `make`
 - `make install`



Packaging internally developed software

- Since you're installing to a non-standard location and building as a non-root user, maybe:
 - `./configure --prefix=/opt/apache`
 - `make`
 - `make DESTDIR=/var/tmp install`



```
makerpm@host236:/tmp/build/httpd-2.2.17
File Edit View Search Terminal Help
[makerpm@host236 ~]$ mkdir /tmp/build
[makerpm@host236 ~]$ cd /tmp/build
[makerpm@host236 build]$ wget http://apache.osuosl.org//httpd/httpd-2.2.17.tar.g
z
--2011-04-25 23:47:40-- http://apache.osuosl.org//httpd/httpd-2.2.17.tar.gz
Resolving apache.osuosl.org... 140.211.166.134
Connecting to apache.osuosl.org|140.211.166.134|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 6597991 (6.3M) [application/x-gzip]
Saving to: "httpd-2.2.17.tar.gz"

100%[=====>] 6,597,991 620K/s in 11s

2011-04-25 23:47:52 (578 KB/s) - "httpd-2.2.17.tar.gz" saved [6597991/6597991]

[makerpm@host236 build]$ tar xzf httpd-2.2.17.tar.gz
[makerpm@host236 build]$ cd httpd-2.2.17
[makerpm@host236 httpd-2.2.17]$ ./configure --prefix=/opt/apache && make && make
DESTDIR=/var/tmp install
```

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```
makerpm@host236:/tmp/build/httpd-2.2.17
File Edit View Search Terminal Help
done
/usr/bin/install -c -m 644 apr-util.pc /var/tmp/opt/apache/lib/pkgconfig/apr-util-1.pc
list='xml/expat'; for i in $list; do \
    ( cd $i ; make DESTDIR=/var/tmp install ); \
done
make[3]: Entering directory `/tmp/build/httpd-2.2.17/src/lib/apr-util/xml/expat'
/bin/sh ./conftools/mkinstalldirs /opt/apache/lib /opt/apache/include
mkdir /opt/apache
mkdir: cannot create directory `/opt/apache': Permission denied
mkdir /opt/apache/lib
mkdir: cannot create directory `/opt/apache/lib': No such file or directory
mkdir /opt/apache
mkdir: cannot create directory `/opt/apache': Permission denied
mkdir /opt/apache/include
mkdir: cannot create directory `/opt/apache/include': No such file or directory
make[3]: *** [installlib] Error 1
make[3]: Leaving directory `/tmp/build/httpd-2.2.17/src/lib/apr-util/xml/expat'
make[2]: *** [install] Error 2
make[2]: Leaving directory `/tmp/build/httpd-2.2.17/src/lib/apr-util'
make[1]: *** [install-recursive] Error 1
make[1]: Leaving directory `/tmp/build/httpd-2.2.17/src/lib'
make: *** [install-recursive] Error 1
[makerpm@host236 httpd-2.2.17]$
```

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Packaging internally developed software

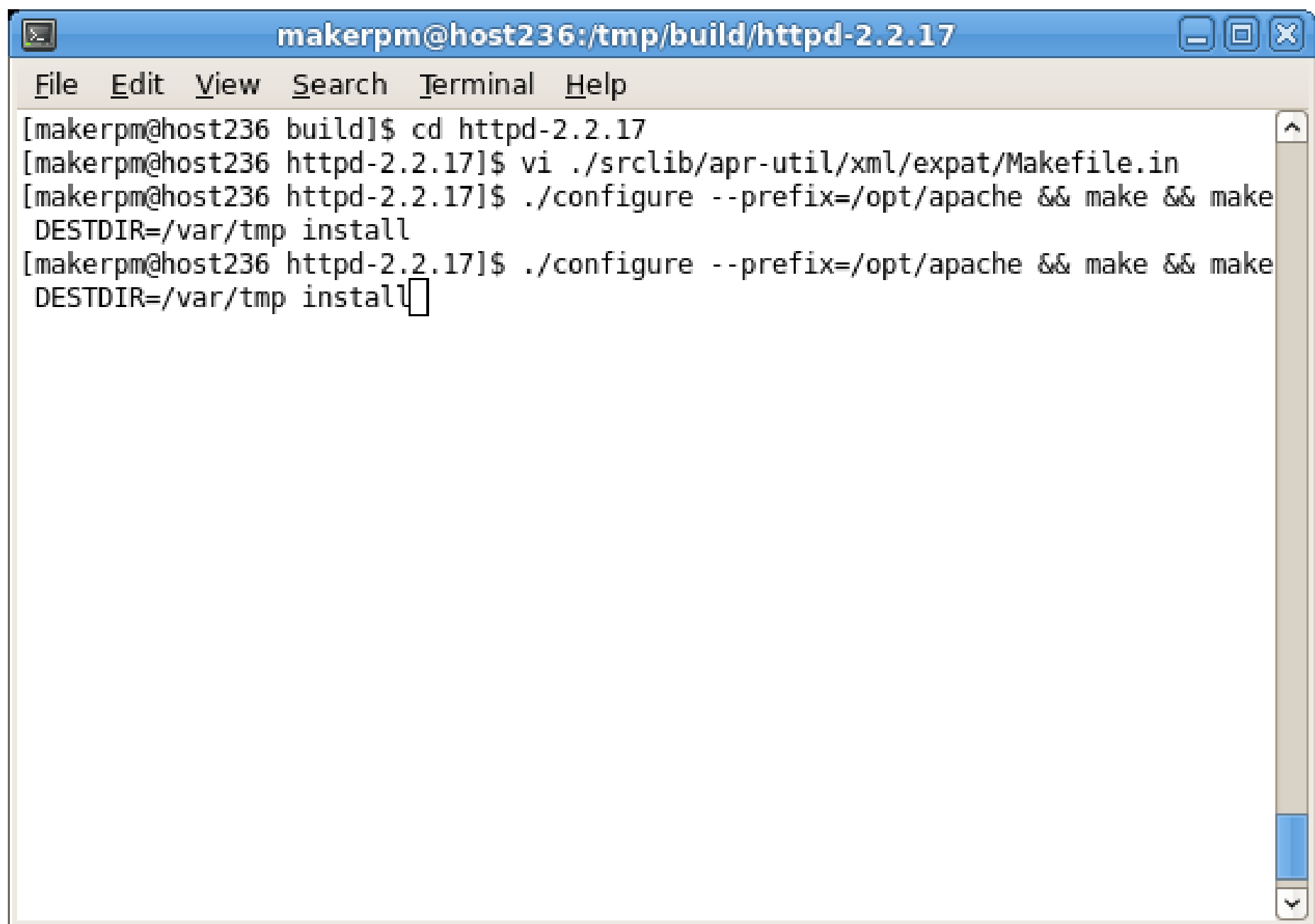
- <grumble>
- “I'm a smart guy, I can do this!”
- Google
- Eureka!
- fix ./src/lib/apr-util/xml/expat/Makefile.in
- recompile
- success!
- “tar it up, baby, it's ready to go!”

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A terminal window titled "makerpm@host236:/tmp/build/httpd-2.2.17" with a menu bar (File, Edit, View, Search, Terminal, Help) and standard window controls. The terminal shows the following commands and output:

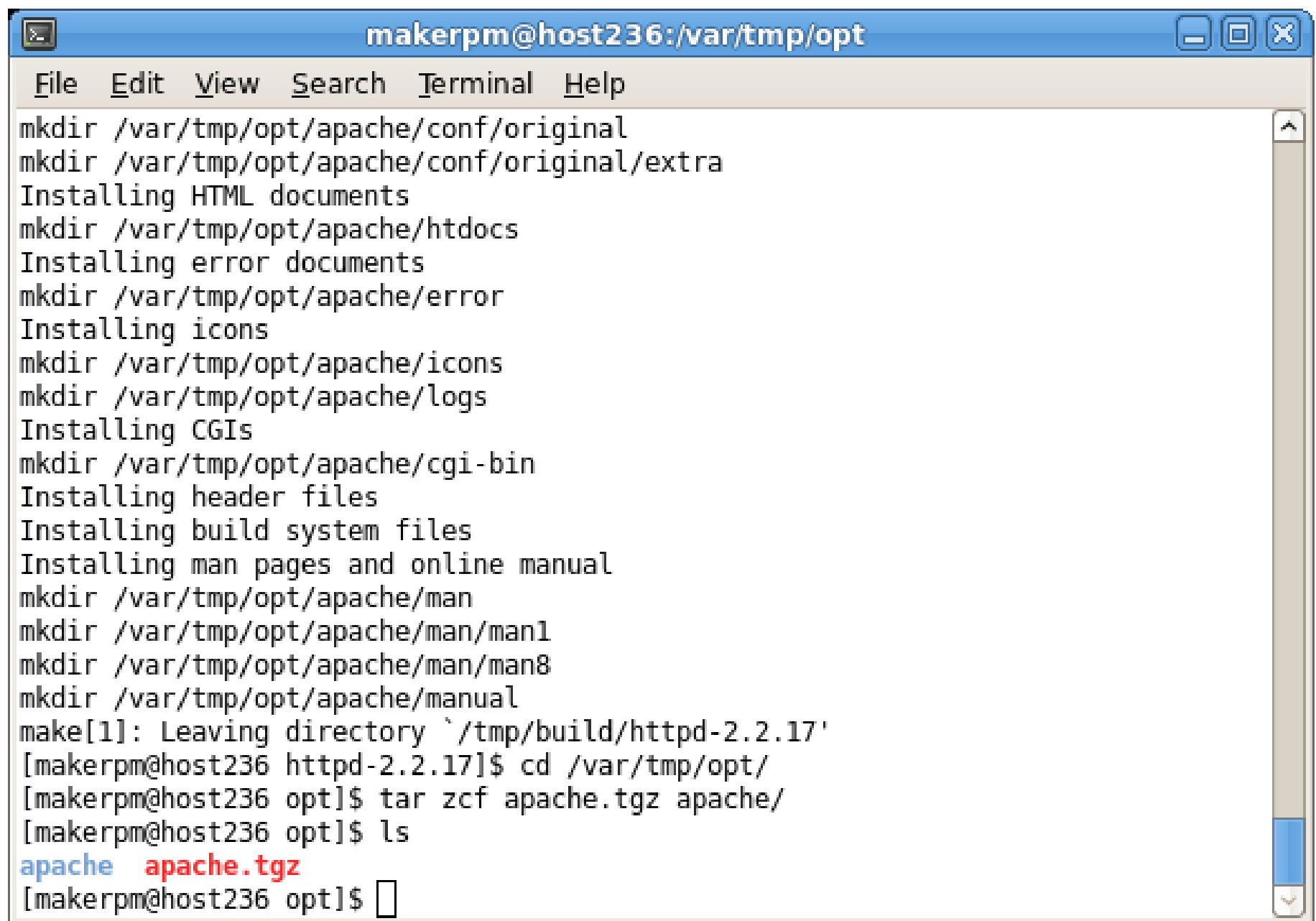
```
[makerpm@host236 build]$ cd httpd-2.2.17
[makerpm@host236 httpd-2.2.17]$ vi ./srclib/apr-util/xml/expat/Makefile.in
[makerpm@host236 httpd-2.2.17]$ ./configure --prefix=/opt/apache && make && make
DESTDIR=/var/tmp install
[makerpm@host236 httpd-2.2.17]$ ./configure --prefix=/opt/apache && make && make
DESTDIR=/var/tmp install
```

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```
makerpm@host236:/var/tmp/opt
File Edit View Search Terminal Help
mkdir /var/tmp/opt/apache/conf/original
mkdir /var/tmp/opt/apache/conf/original/extra
Installing HTML documents
mkdir /var/tmp/opt/apache/htdocs
Installing error documents
mkdir /var/tmp/opt/apache/error
Installing icons
mkdir /var/tmp/opt/apache/icons
mkdir /var/tmp/opt/apache/logs
Installing CGIs
mkdir /var/tmp/opt/apache/cgi-bin
Installing header files
Installing build system files
Installing man pages and online manual
mkdir /var/tmp/opt/apache/man
mkdir /var/tmp/opt/apache/man/man1
mkdir /var/tmp/opt/apache/man/man8
mkdir /var/tmp/opt/apache/manual
make[1]: Leaving directory `/tmp/build/httpd-2.2.17'
[makerpm@host236 httpd-2.2.17]$ cd /var/tmp/opt/
[makerpm@host236 opt]$ tar zcf apache.tgz apache/
[makerpm@host236 opt]$ ls
apache  apache.tgz
[makerpm@host236 opt]$
```

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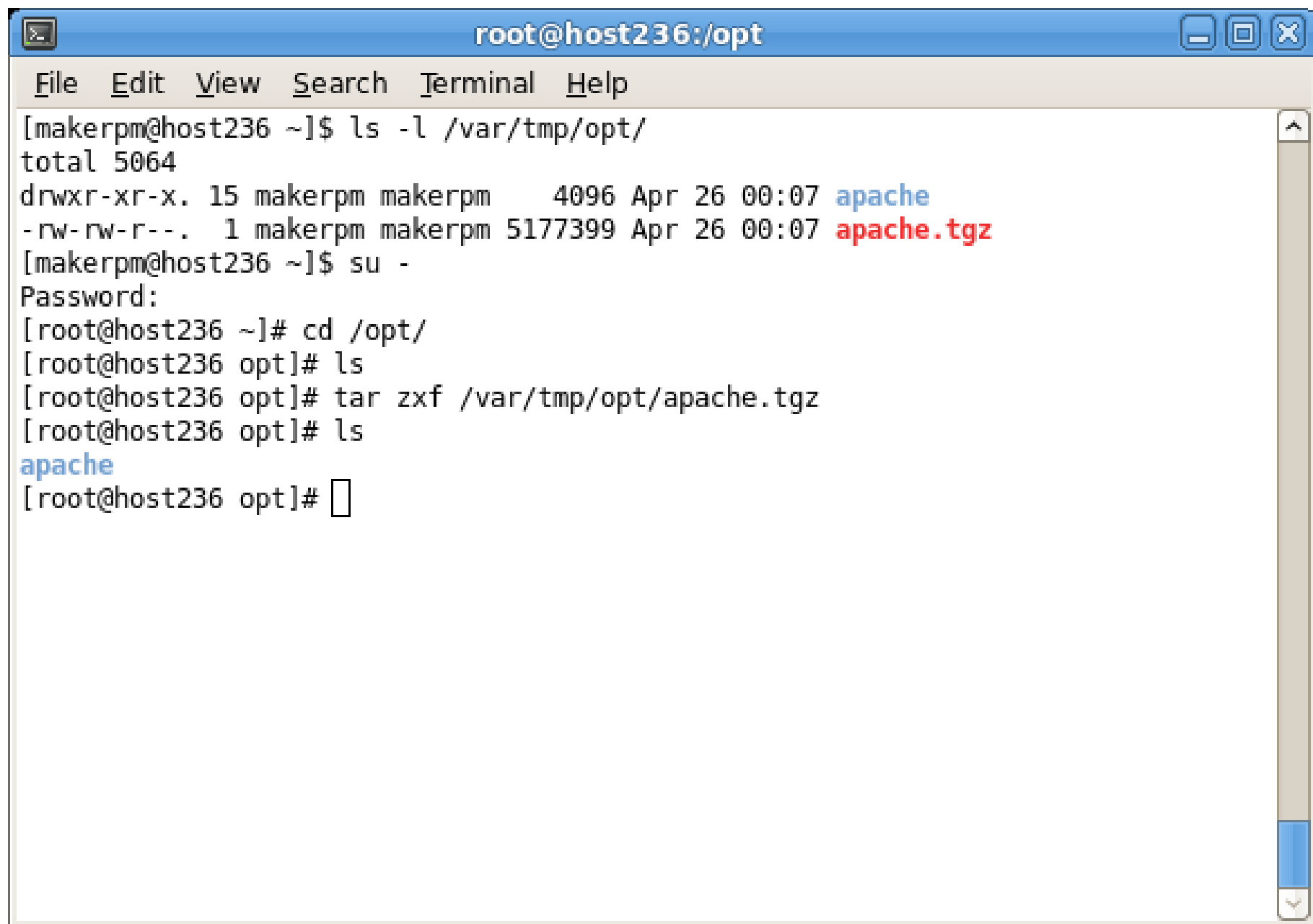
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Packaging internally developed software

- Note this does not take into account setting your search path or manpath.
 - Common mistake: `hack /etc/profile`
- Also doesn't take into account your SysV init scripts.
 - You're either going to copy from an existing one or just pop a line into `rc.local`





```
root@host236:/opt
File Edit View Search Terminal Help
[makerpm@host236 ~]$ ls -l /var/tmp/opt/
total 5064
drwxr-xr-x. 15 makerpm makerpm    4096 Apr 26 00:07 apache
-rw-rw-r--.  1 makerpm makerpm 5177399 Apr 26 00:07 apache.tgz
[makerpm@host236 ~]$ su -
Password:
[root@host236 ~]# cd /opt/
[root@host236 opt]# ls
[root@host236 opt]# tar xzf /var/tmp/opt/apache.tgz
[root@host236 opt]# ls
apache
[root@host236 opt]#
```

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```
root@host236:/opt
File Edit View Search Terminal Help
HOSTNAME=`/bin/hostname 2>/dev/null`
HISTSIZE=1000
if [ "$HISTCONTROL" = "ignorespace" ] ; then
    export HISTCONTROL=ignoreboth
else
    export HISTCONTROL=ignoredups
fi

# Added by Thomas for my custom Apache installation
PATH="/opt/apache/bin:$PATH"
MANPATH="/opt/apache/man:$MANPATH"
# End
export PATH USER LOGNAME MAIL HOSTNAME HISTSIZE HISTCONTROL

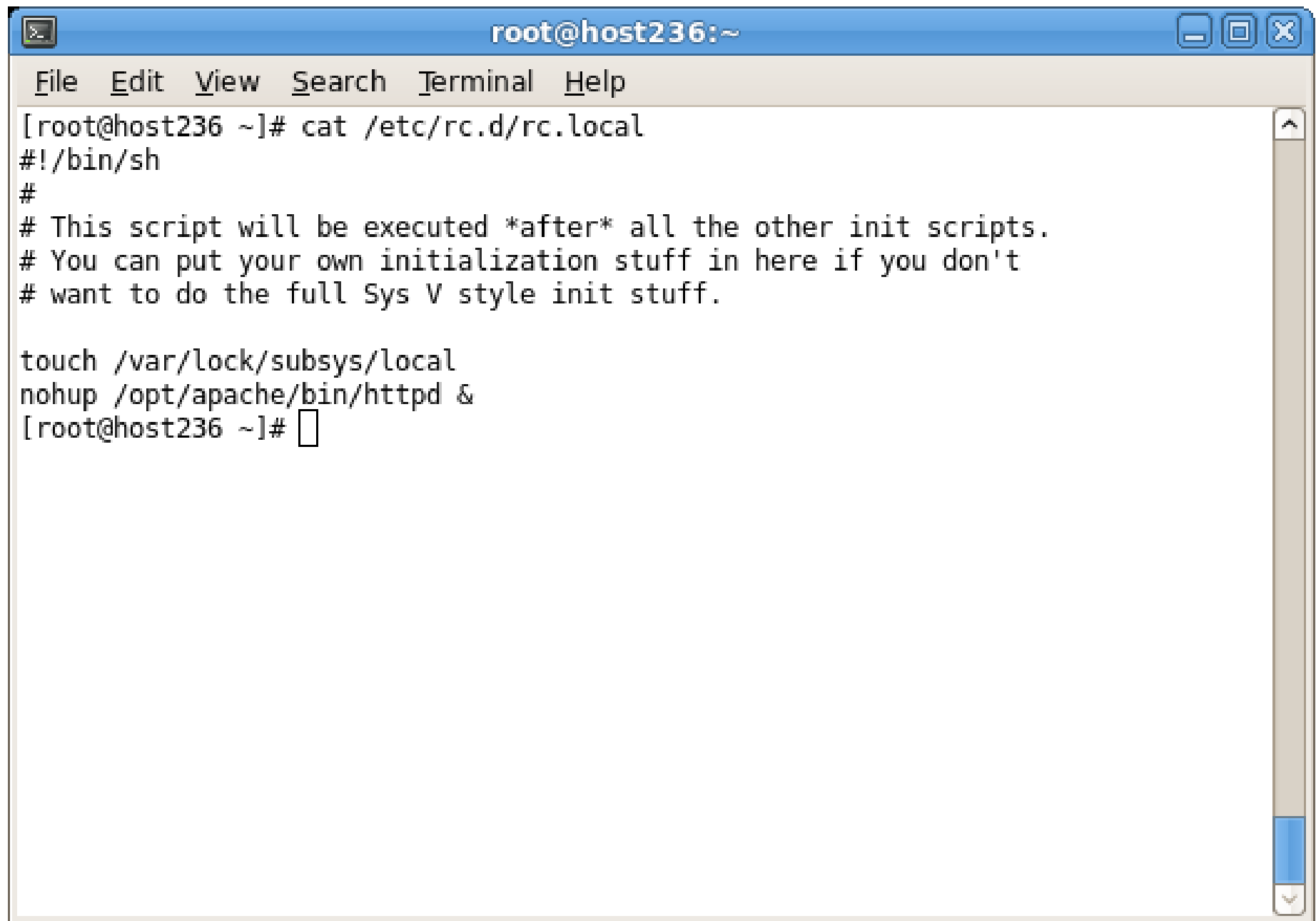
for i in /etc/profile.d/*.sh ; do
    if [ -r "$i" ] ; then
        if [ "$PS1" ]; then
            . $i
        else
            . $i >/dev/null 2>&1
        fi
    fi
done
"/etc/profile" 73L, 1582C written
```

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A terminal window titled "root@host236:~" with a menu bar (File, Edit, View, Search, Terminal, Help). The terminal displays the output of the command "cat /etc/rc.d/rc.local". The output shows a shebang line, a comment about init scripts, and two commands: "touch /var/lock/subsys/local" and "nohup /opt/apache/bin/httpd &". The prompt "[root@host236 ~]#" is followed by a cursor.

```
root@host236:~  
File Edit View Search Terminal Help  
[root@host236 ~]# cat /etc/rc.d/rc.local  
#!/bin/sh  
#  
# This script will be executed *after* all the other init scripts.  
# You can put your own initialization stuff in here if you don't  
# want to do the full Sys V style init stuff.  
  
touch /var/lock/subsys/local  
nohup /opt/apache/bin/httpd &  
[root@host236 ~]#
```

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Packaging internally developed software

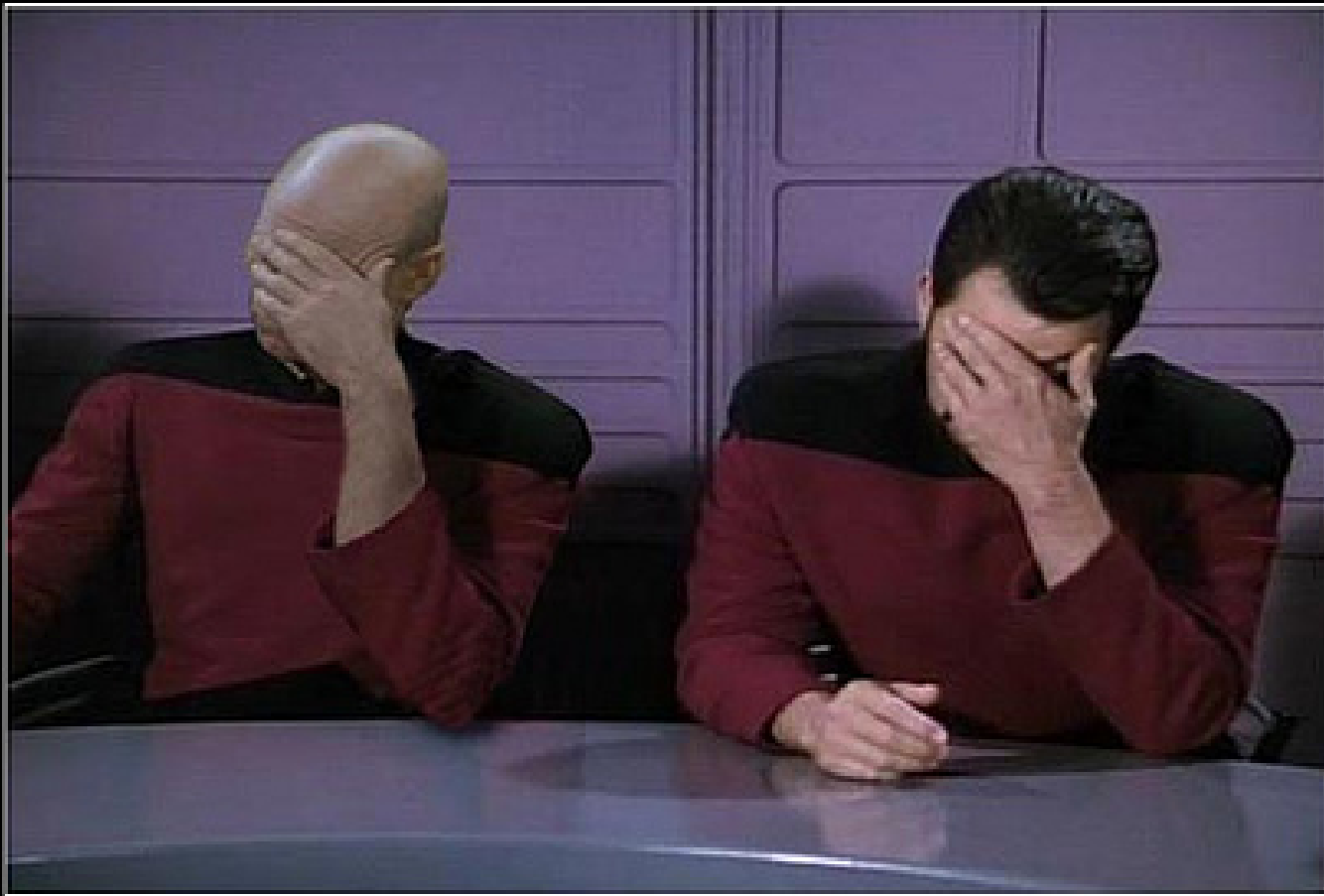
- Awesome! Now your company has a custom, bleeding edge version of Apache installed!
 - No one but you knows about the source code change you made (W00T!!! JOB SECURITY!!!).
 - No one but you knows about the hacks to `/etc/profile`, and even if they did, they'd have to manually add it to every system.



Packaging internally developed software

- Let's say you win the lottery. You're gone, never to darken the door of this joint again.
 - How do they know what version is installed on all the systems?
 - How do they check the integrity of those installations?
 - What if they need to roll out a new version? What about the patch? They'll probably have to figure it out all over again.





DOUBLE FACEPALM

When the Fail is so strong, one Facepalm is not enough.

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Packaging internally developed software

- Let's look at how to package internally developed software.
 - Easier to deploy
 - Easier to consistency check
 - Easier to version control

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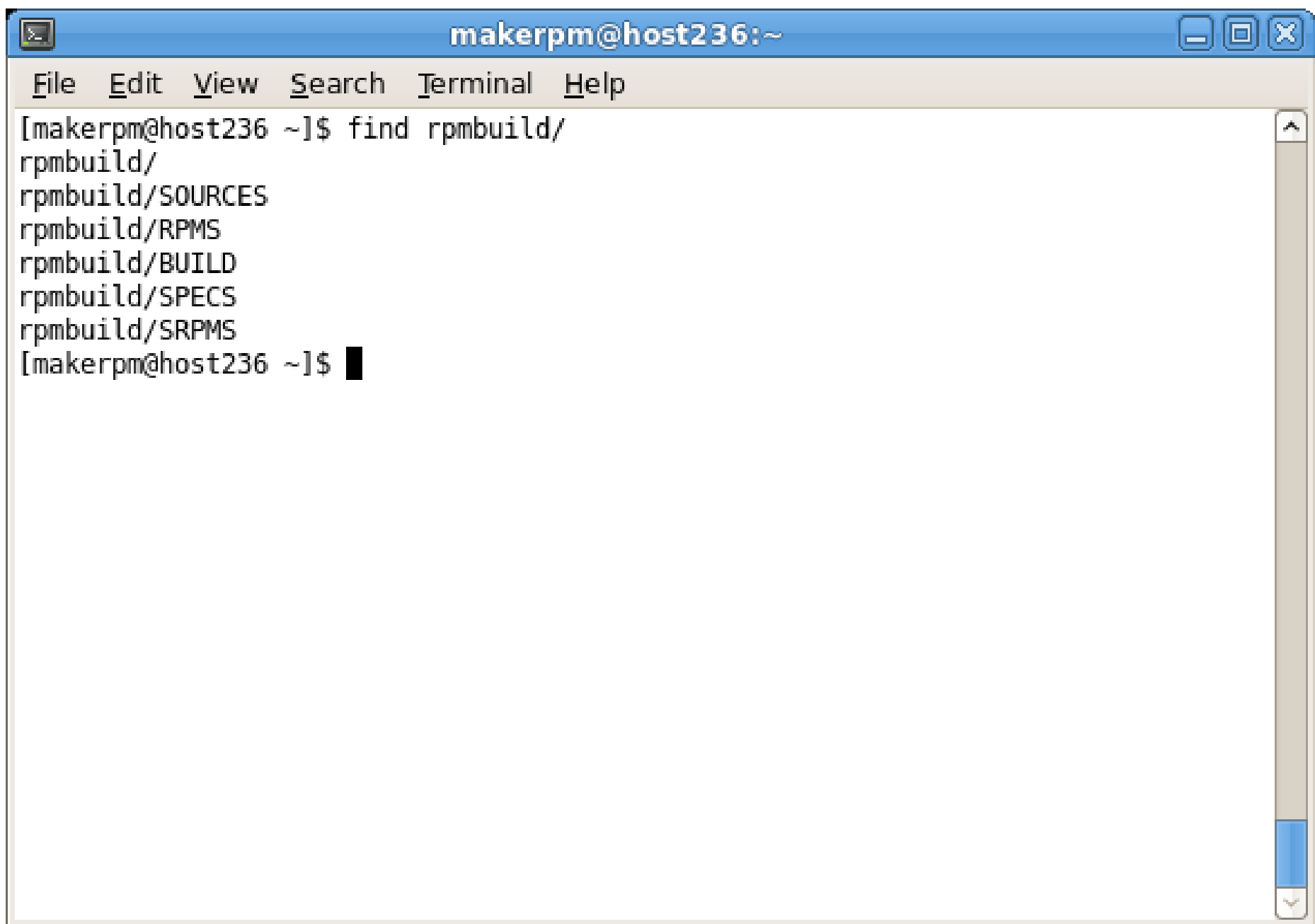
Packaging internally developed software

- As a **non-root** user, use `rpmdev-setuptree`. It will create:
 - `~/rpmbuild` directory
 - `~/rpmmacros` file
- Comment `%__arch_install_post` out



```
makerpm@host236:~  
File Edit View Search Terminal Help  
[makerpm@host236 ~]$ id  
uid=500(makerpm) gid=500(makerpm) groups=500(makerpm) context=unconfined_u:unconfined_r:unconfined_t:s0-s0:c0.c1023  
[makerpm@host236 ~]$ ls -a  
.  ..  .bash_logout  .bash_profile  .bashrc  
[makerpm@host236 ~]$ rpmdev-setuptree  
[makerpm@host236 ~]$  
[makerpm@host236 ~]$  
[makerpm@host236 ~]$  
[makerpm@host236 ~]$ ls -a  
.  ..  .bash_logout  .bash_profile  .bashrc  rpmbuild  .rpmmacros  
[makerpm@host236 ~]$ cat .rpmmacros  
%_topdir      %(echo $HOME)/rpmbuild  
%_smp_mflags  -j3  
%__arch_install_post  /usr/lib/rpm/check-rpaths  /usr/lib/rpm/check-buildroot  
[makerpm@host236 ~]$
```





A terminal window titled "makerpm@host236:~" with a menu bar containing "File", "Edit", "View", "Search", "Terminal", and "Help". The terminal shows the command `find rpmbuild/` and its output: `rpmbuild/`, `rpmbuild/SOURCES`, `rpmbuild/RPMS`, `rpmbuild/BUILD`, `rpmbuild/SPECS`, and `rpmbuild/SRPMS`. The prompt `[makerpm@host236 ~]$` is followed by a black cursor block. A vertical scrollbar is on the right side of the terminal.

```
makerpm@host236:~  
File Edit View Search Terminal Help  
[makerpm@host236 ~]$ find rpmbuild/  
rpmbuild/  
rpmbuild/SOURCES  
rpmbuild/RPMS  
rpmbuild/BUILD  
rpmbuild/SPECS  
rpmbuild/SRPMS  
[makerpm@host236 ~]$
```

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Packaging internally developed software

- GNU Privacy Guard (GPG) is a F/OSS implementation of Pretty Good Privacy (PGP). Per the man page, “It is a tool to provide digital encryption and signing services using the OpenPGP standard.”
- For purposes of this presentation, we will use GPG to sign internally developed packages. You should not allow unsigned packages to be installed (in fact, yum will not allow you to by default)!
- Your package building/signing account will generate a keypair. Keep the private key private, make the public key publicly available.



Packaging internally developed software

- We recommend a secure signing process – have a single, or limited number of accounts with which trusted admins can sign packages.
- Multi-factor or checks and balances is not a bad thing. One person or team can build packages, another has to sign them.



Packaging internally developed software

- Your rpm building account will need to generate a gpg keypair on a build system (not the Satellite server) and then export the ascii armor.
 - `gpg --gen-key`
 - `gpg --export -a [name] --armor > [pubkey]`



```
makerpm@host236:~  
File Edit View Search Terminal Help  
[makerpm@host236 ~]$ gpg --gen-key  
gpg (GnuPG) 2.0.14; Copyright (C) 2009 Free Software Foundation, Inc.  
This is free software: you are free to change and redistribute it.  
There is NO WARRANTY, to the extent permitted by law.  
  
gpg: directory `/home/makerpm/.gnupg' created  
gpg: new configuration file `/home/makerpm/.gnupg/gpg.conf' created  
gpg: WARNING: options in `/home/makerpm/.gnupg/gpg.conf' are not yet active during this run  
gpg: keyring `/home/makerpm/.gnupg/secring.gpg' created  
gpg: keyring `/home/makerpm/.gnupg/pubring.gpg' created  
Please select what kind of key you want:  
  (1) RSA and RSA (default)  
  (2) DSA and Elgamal  
  (3) DSA (sign only)  
  (4) RSA (sign only)  
Your selection? █
```



```
makerpm@host236:~  
File Edit View Search Terminal Help  
gpg: directory `/home/makerpm/.gnupg' created  
gpg: new configuration file `/home/makerpm/.gnupg/gpg.conf' created  
gpg: WARNING: options in `/home/makerpm/.gnupg/gpg.conf' are not yet active during this run  
gpg: keyring `/home/makerpm/.gnupg/secring.gpg' created  
gpg: keyring `/home/makerpm/.gnupg/pubring.gpg' created  
Please select what kind of key you want:  
  (1) RSA and RSA (default)  
  (2) DSA and Elgamal  
  (3) DSA (sign only)  
  (4) RSA (sign only)  
Your selection? 1  
RSA keys may be between 1024 and 4096 bits long.  
What keysize do you want? (2048)  
Requested keysize is 2048 bits  
Please specify how long the key should be valid.  
  0 = key does not expire  
  <n>  = key expires in n days  
  <n>w  = key expires in n weeks  
  <n>m  = key expires in n months  
  <n>y  = key expires in n years  
Key is valid for? (0)  
Key does not expire at all  
Is this correct? (y/N) ☐
```

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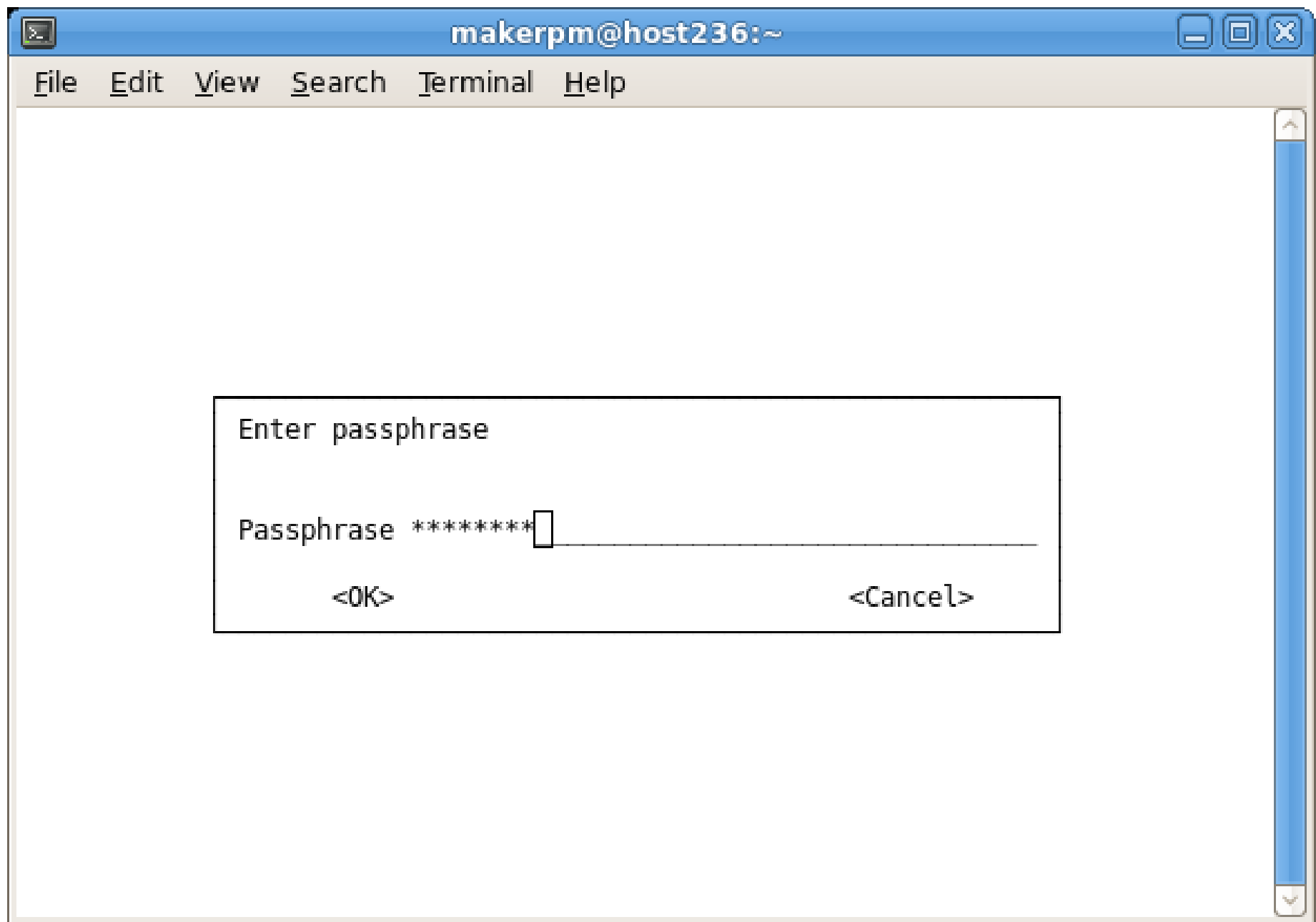
```
makerpm@host236:~  
File Edit View Search Terminal Help  
(4) RSA (sign only)  
Your selection? 1  
RSA keys may be between 1024 and 4096 bits long.  
What keysize do you want? (2048)  
Requested keysize is 2048 bits  
Please specify how long the key should be valid.  
    0 = key does not expire  
    <n> = key expires in n days  
    <n>w = key expires in n weeks  
    <n>m = key expires in n months  
    <n>y = key expires in n years  
Key is valid for? (0)  
Key does not expire at all  
Is this correct? (y/N) y  
  
GnuPG needs to construct a user ID to identify your key.  
  
Real name: Make RPM  
Email address: makerpm@example.com  
Comment:  
You selected this USER-ID:  
    "Make RPM <makerpm@example.com>"  
  
Change (N)ame, (C)omment, (E)mail or (O)kay/(Q)uit? d
```

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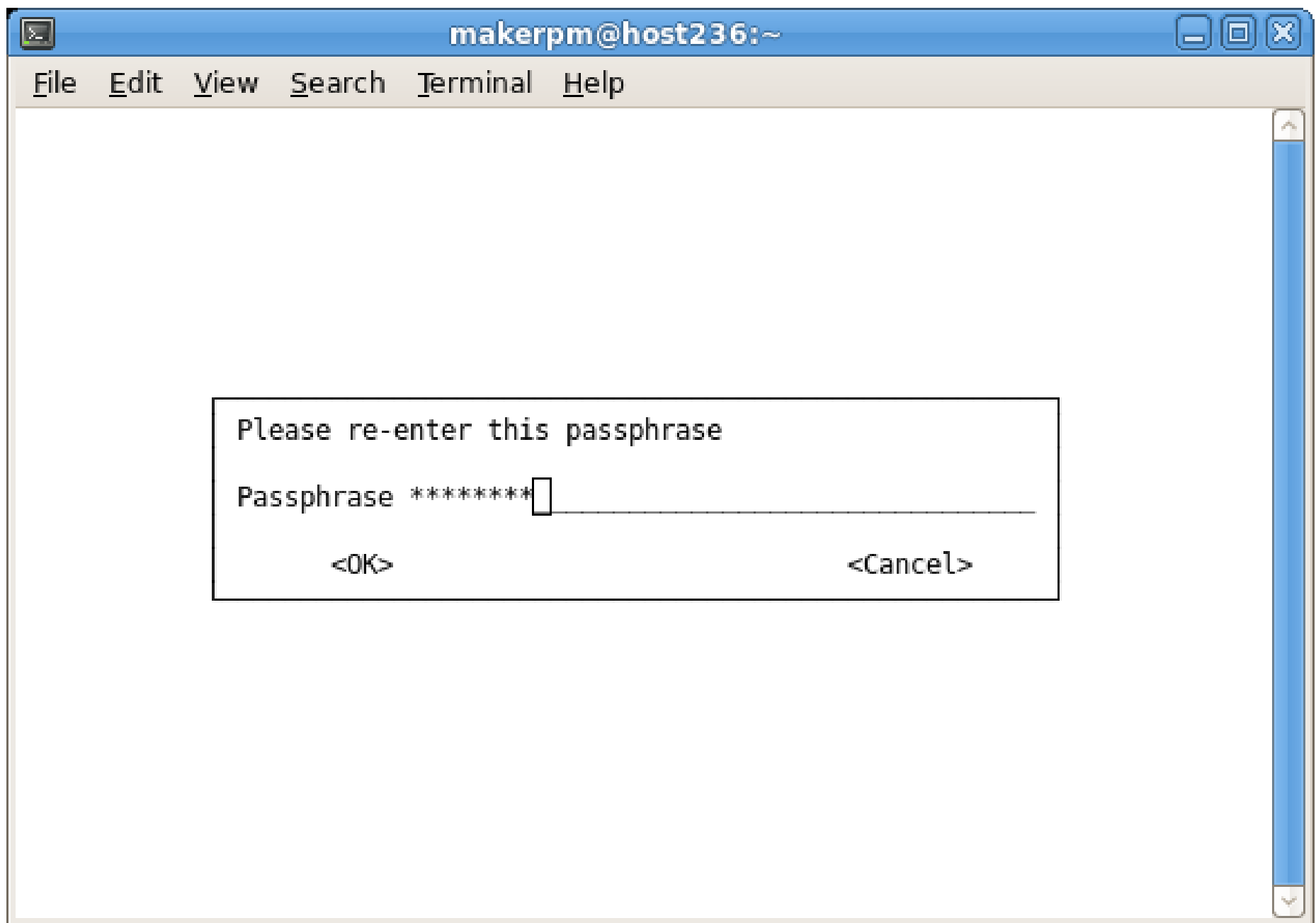


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```
makerpm@host236:~  
File Edit View Search Terminal Help  
    <n>m = key expires in n months  
    <n>y = key expires in n years  
Key is valid for? (0)  
Key does not expire at all  
Is this correct? (y/N) y  
  
GnuPG needs to construct a user ID to identify your key.  
  
Real name: Make RPM  
Email address: makerpm@example.com  
Comment:  
You selected this USER-ID:  
    "Make RPM <makerpm@example.com>"  
  
Change (N)ame, (C)omment, (E)mail or (O)kay/(Q)uit? o  
You need a Passphrase to protect your secret key.  
  
can't connect to `/home/makerpm/.gnupg/S.gpg-agent': No such file or directory  
gpg-agent[5771]: directory `/home/makerpm/.gnupg/private-keys-v1.d' created  
We need to generate a lot of random bytes. It is a good idea to perform  
some other action (type on the keyboard, move the mouse, utilize the  
disks) during the prime generation; this gives the random number  
generator a better chance to gain enough entropy.  
  
☐
```



```
makerpm@host236:~  
File Edit View Search Terminal Help  
can't connect to `/home/makerpm/.gnupg/S.gpg-agent': No such file or directory  
gpg-agent[5771]: directory `/home/makerpm/.gnupg/private-keys-v1.d' created  
We need to generate a lot of random bytes. It is a good idea to perform  
some other action (type on the keyboard, move the mouse, utilize the  
disks) during the prime generation; this gives the random number  
generator a better chance to gain enough entropy.  
We need to generate a lot of random bytes. It is a good idea to perform  
some other action (type on the keyboard, move the mouse, utilize the  
disks) during the prime generation; this gives the random number  
generator a better chance to gain enough entropy.  
gpg: /home/makerpm/.gnupg/trustdb.gpg: trustdb created  
gpg: key 406F995C marked as ultimately trusted  
public and secret key created and signed.  
  
gpg: checking the trustdb  
gpg: 3 marginal(s) needed, 1 complete(s) needed, PGP trust model  
gpg: depth: 0  valid:   1  signed:   0  trust: 0-, 0q, 0n, 0m, 0f, 1u  
pub   2048R/406F995C 2011-04-26  
      Key fingerprint = 9775 51EB 349D CBB2 DE3A  404C 6B23 7DC0 406F 995C  
uid                               Make RPM <makerpm@example.com>  
sub   2048R/B0C11D41 2011-04-26  
  
[makerpm@host236 ~]$
```

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```
makerpm@host236:~  
File Edit View Search Terminal Help  
can't connect to `/home/makerpm/.gnupg/S.gpg-agent': No such file or directory  
gpg-agent[5771]: directory `/home/makerpm/.gnupg/private-keys-v1.d' created  
We need to generate a lot of random bytes. It is a good idea to perform  
some other action (type on the keyboard, move the mouse, utilize the  
disks) during the prime generation; this gives the random number  
generator a better chance to gain enough entropy.  
We need to generate a lot of random bytes. It is a good idea to perform  
some other action (type on the keyboard, move the mouse, utilize the  
disks) during the prime generation; this gives the random number  
generator a better chance to gain enough entropy.  
gpg: /home/makerpm/.gnupg/trustdb.gpg: trustdb created  
gpg: key 406F995C marked as ultimately trusted  
public and secret key created and signed.  
  
gpg: checking the trustdb  
gpg: 3 marginal(s) needed, 1 complete(s) needed, PGP trust model  
gpg: depth: 0 valid: 1 signed: 0 trust: 0-, 0q, 0n, 0m, 0f, 1u  
pub 2048R/406F995C 2011-04-26  
    Key fingerprint = 9775 51EB 349D CBB2 DE3A 404C 6B23 7DC0 406F 995C  
uid                               Make RPM <makerpm@example.com>  
sub 2048R/B0C11D41 2011-04-26  
  
[makerpm@host236 ~]$ gpg --export -a "Make RPM" > MY-PUBLIC-KEY  
[makerpm@host236 ~]$
```

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```
makerpm@host236:~  
File Edit View Search Terminal Help  
[makerpm@host236 ~]$ cat MY-PUBLIC-KEY  
-----BEGIN PGP PUBLIC KEY BLOCK-----  
Version: GnuPG v2.0.14 (GNU/Linux)  
  
mQENBE22M2IBCADU7qRLtEBuFmv6U8hNlzEN0tZPsVa2Aog4P0bwp7+KIQJtG0Bh  
erPMoTLpMHLEfFYPvpftYqKAPt0g3dA1eFUmALimgtAfqimeKD/4SABa29R1uvRy  
Y3QfVZ2LzDsao45+V6fI/swmqlyRBRWxU7gfp8pqIMVjZ4ioYs2usFagWyoy9qn0  
fEd0Zdhok5ikk5UsCrU8Xjxw1PImUBdQt0Xpyt1grCpMlBYh0DLsPab356W55yxY  
v0Q9evz0lCKv0qWx5/t2ojHiqF1r1QLZodJJLb4Do7VMkcxqJinmquRBxqmmDHdr  
buxm/kyjphHUM0SvjfesEcDs5lQxXesdNv+pABEBAAG0Hk1ha2UgUlBNIDxtYWtl  
cnBtQGV4YW1wbGUuY29tPokBOAQTAAQIAIgUCTbYzYgIbAwYLCQgHAwIGFQgCCQoL  
BBYCAwECHgECF4AACgkQayN9wEBvmVyTEggAuz435HDwZ6Y5Suj1aqz7byiS3Lp8  
kF3vMpFRgRlzSwFeWdXVeHuqVpDnW0BmNmGU6vDaMR8rbWTnF4JG/JM060lwizPH  
VNI5Ehzh0hBosNtNkLLIXJt+i0U+th6zecdeg9RGvVVcK8CDV5UJSiW7VN0jgfgd  
b/wje7NKIescBQtc8l1vil91X7q2DNGgLL3KkimCzVYH/bSntgVfDgAW5KPDtz9Dx  
a6kihhc5g9AZ4IoQDQLqF353VIkbkhc7+o/h6lbA7YwQcjPr0xvbImNCpZT0/5Eh  
YV/NzmfNEoXqqeKJD8ady1mpXdwdjU6mpPfX004+9nvBWi9LCWskBg4aqrkBDQRN  
tjNiAQgA100Jm294rqQh3zgoBxLjd3Wq6Yee6qlnsM0x5DRMBwRVp8fLwv1fzSRF  
K9lgI+jfyphXSr/6+jWDezBD5Q9sZud6+EM534DVEqz3p321thxWdKNk/h6dJSH5  
sLzLtegT5gp/U4+6kvQIa21JQvWe2e/uT+4ggLg9LDk1rWjaZ4s7FuTkwb9KoVN/  
ZUCQREWuZ4oGALuXfR5EC0EPWtmgvYkKVBpMemw4y/94scy4j5F1RyGKfpAwNrZt  
5ihJ+6VBIy30x5MUIesLeYntJWMF3fiB1Z0XDAgfd3859MSFL0meW2DsY5rX0xdW  
vttXnn4bk0MvKq4FU1qQ4a7ZJK5ujwARAQABiQEfbBgBAGAJBQJNtjNiAhsMAAoJ  
EGsjfcBAb5lchIch/iuGL/glssTwYZSsRknu4e/PMzky29sMQ5r0Jb9DQlyXos11  
I4FvCNEU00m78EpxA0S3Ng9H75LrurF2n0JL136qkzWpzE7Ldns70+V2pNK82pC  
v02nTV09N3GNR080j6vrtkMQSjYnU0EYKiHswgqIlwvLD+hZLZ2cjIC42xXaz8Rv  
PmTIFuqg+oNd0Hqz/Xj856S7x6pMvLG13JEIE18hCqEFciosIoQhgIf/Lq0ujo+W  
N7yJHFHrflmLnXlQJcR2TPVG0Z5JD5l1TNI10Ygp0NujkAI9avwhauIJxncV6Sr5  
6/FN74cLLwMPHEJjseAFGBuUw+JQEi+lG+B2Q0I=  
=Xici  
-----END PGP PUBLIC KEY BLOCK-----  
[makerpm@host236 ~]$
```

SUMMIT

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Packaging internally developed software

- List your gpg key
- Copy it to your .rpmmacros file

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```
makerpm@host236:~  
File Edit View Search Terminal Help  
[makerpm@host236 ~]$ gpg --list-keys  
/home/makerpm/.gnupg/pubring.gpg  
-----  
pub 2048R/406F995C 2011-04-26  
uid Make RPM <makerpm@example.com>  
sub 2048R/B0C11D41 2011-04-26  
  
[makerpm@host236 ~]$ echo %_signature gpg >> .rpmmacros  
[makerpm@host236 ~]$ echo %_gpg_name 406F995C >> .rpmmacros  
[makerpm@host236 ~]$ cat .rpmmacros  
%_topdir %(echo $HOME)/rpmbuild  
%_smp_mflags -j3  
#%_arch_install_post /usr/lib/rpm/check-rpaths /usr/lib/rpm/check-buildroot  
%_signature gpg  
%_gpg_name 406F995C  
[makerpm@host236 ~]$
```

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Packaging internally developed software

- Grab your source file. In this case, httpd-2.2.17.tar.gz from <http://httpd.apache.org>
- Put it in `~/rpmbuild/SOURCES`



```
makerpm@host236:~/rpmbuild/SOURCES
File Edit View Search Terminal Help
[makerpm@host236 ~]$ cd rpmbuild/SOURCES/
[makerpm@host236 SOURCES]$ wget http://apache.osuosl.org//httpd/httpd-2.2.17.tar.gz
--2011-04-25 22:28:28-- http://apache.osuosl.org//httpd/httpd-2.2.17.tar.gz
Resolving apache.osuosl.org... 140.211.166.134
Connecting to apache.osuosl.org|140.211.166.134|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 6597991 (6.3M) [application/x-gzip]
Saving to: "httpd-2.2.17.tar.gz"

100%[=====>] 6,597,991 1.06M/s in 7.1s

2011-04-25 22:28:35 (907 KB/s) - "httpd-2.2.17.tar.gz" saved [6597991/6597991]

[makerpm@host236 SOURCES]$
```

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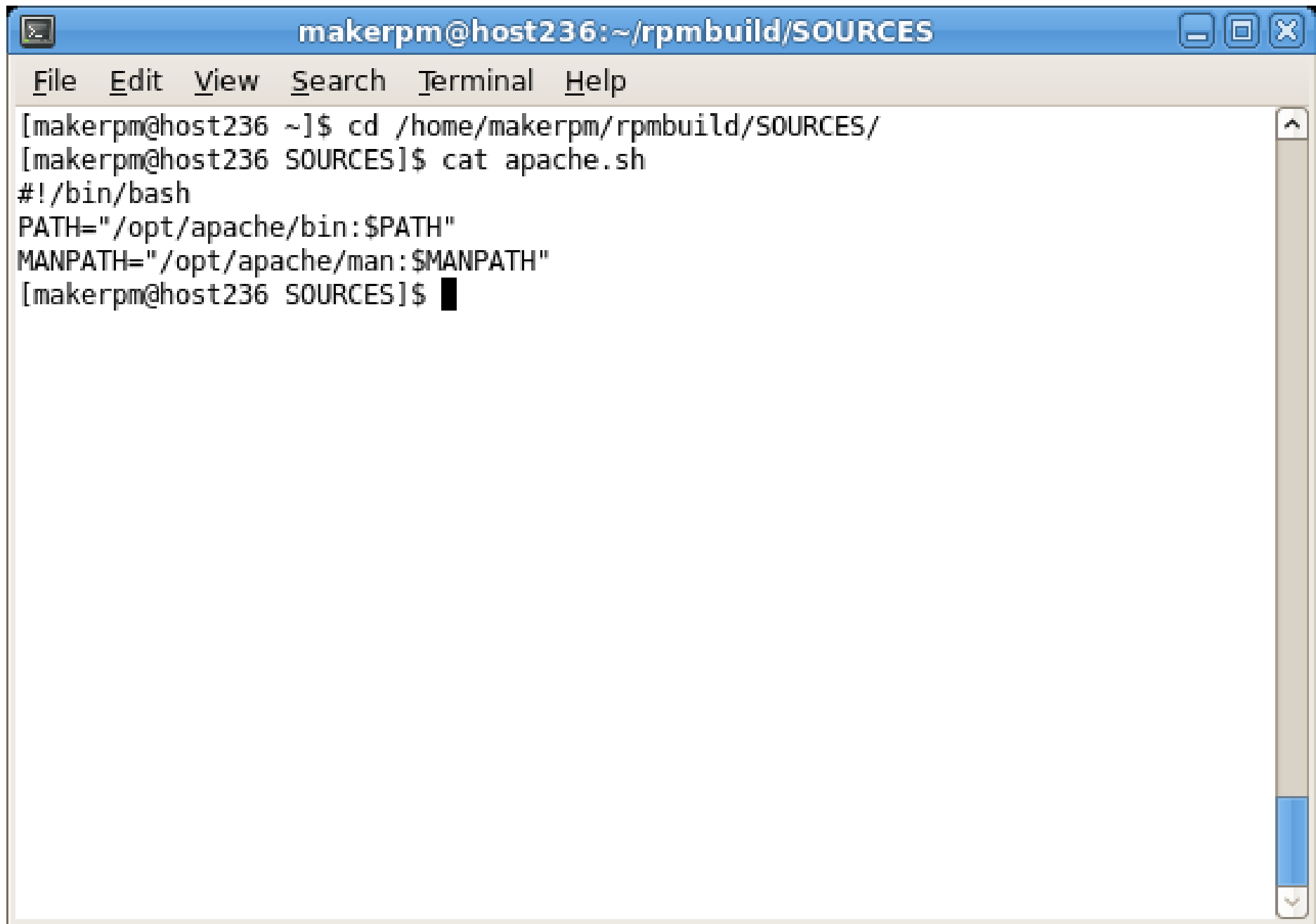
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Packaging internally developed software

- Create a shell script for setting PATH and MANPATH variables
 - Add it to `~/rpmbuild/SOURCES` as well
 - This will go in `/etc/profile.d` on systems upon which this RPM is installed.





A terminal window titled "makerpm@host236:~/rpmbuild/SOURCES" with standard window controls. The menu bar includes File, Edit, View, Search, Terminal, and Help. The terminal output shows the user navigating to the SOURCES directory and displaying the contents of the 'apache.sh' file. The file content sets the shell to bash and updates the PATH and MANPATH environment variables to include Apache's binaries and manual pages.

```
makerpm@host236:~/rpmbuild/SOURCES
File Edit View Search Terminal Help
[makerpm@host236 ~]$ cd /home/makerpm/rpmbuild/SOURCES/
[makerpm@host236 SOURCES]$ cat apache.sh
#!/bin/bash
PATH="/opt/apache/bin:$PATH"
MANPATH="/opt/apache/man:$MANPATH"
[makerpm@host236 SOURCES]$
```

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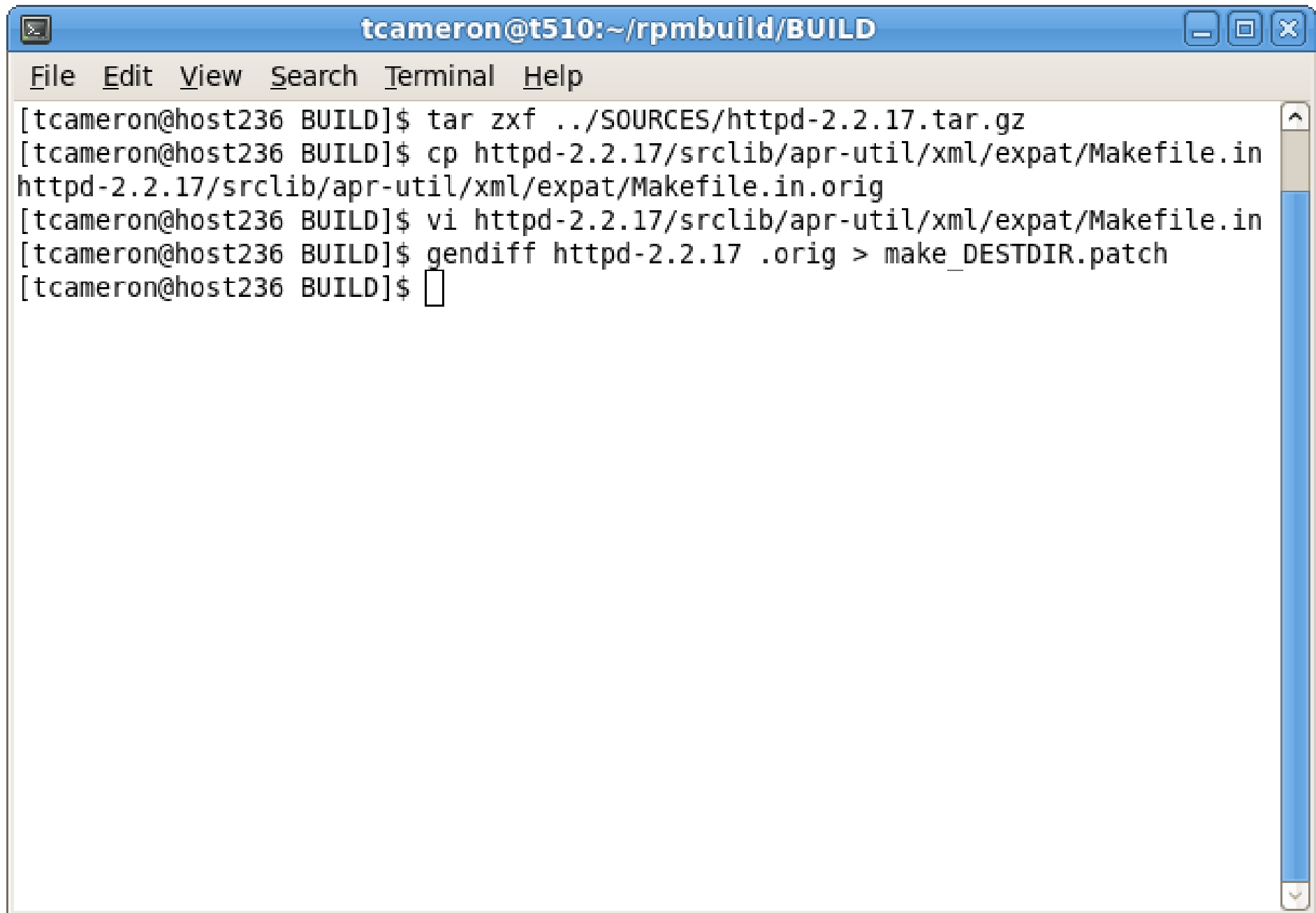
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Packaging internally developed software

- Generate a patch file
 - In this case, the original file is copied and named `Makefile.in.orig`
 - You can use `gendiff` to create the diff file.
 - Copy the diff over to the `SOURCES` directory



A terminal window titled "tcameron@t510:~/rpmbuild/BUILD" with standard window controls. The menu bar includes File, Edit, View, Search, Terminal, and Help. The terminal shows a sequence of commands: tar xzf ../SOURCES/httpd-2.2.17.tar.gz, cp httpd-2.2.17/src/lib/apr-util/xml/expat/Makefile.in httpd-2.2.17/src/lib/apr-util/xml/expat/Makefile.in.orig, vi httpd-2.2.17/src/lib/apr-util/xml/expat/Makefile.in, gendiff httpd-2.2.17 .orig > make_DESTDIR.patch, and a final prompt. A vertical scrollbar is on the right.

```
tcameron@t510:~/rpmbuild/BUILD
File Edit View Search Terminal Help
[tcameron@host236 BUILD]$ tar xzf ../SOURCES/httpd-2.2.17.tar.gz
[tcameron@host236 BUILD]$ cp httpd-2.2.17/src/lib/apr-util/xml/expat/Makefile.in
httpd-2.2.17/src/lib/apr-util/xml/expat/Makefile.in.orig
[tcameron@host236 BUILD]$ vi httpd-2.2.17/src/lib/apr-util/xml/expat/Makefile.in
[tcameron@host236 BUILD]$ gendiff httpd-2.2.17 .orig > make_DESTDIR.patch
[tcameron@host236 BUILD]$
```

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```
tcameron@t510:~/rpmbuild/BUILD
File Edit View Search Terminal Help
[tcameron@host236 BUILD]$ cat make_DESTDIR.patch
diff -up httpd-2.2.17/src/lib/apr-util/xml/expat/Makefile.in.orig httpd-2.2.17/src/lib/apr-util/xml/expat/Makefile.in
--- httpd-2.2.17/src/lib/apr-util/xml/expat/Makefile.in.orig      2011-04-27 19:23:29.030070543 -0500
+++ httpd-2.2.17/src/lib/apr-util/xml/expat/Makefile.in      2011-04-27 19:23:40.250068853 -0500
@@ -85,9 +85,10 @@ check: tests/runtests
 install: installlib

 installlib: $(LIBRARY) $(APIHEADER)
-      $(mkinstalldirs) $(libdir) $(includedir)
-      $(LIBTOOL) --mode=install $(INSTALL) $(LIBRARY) $(libdir)/$(LIBRARY)
-      $(INSTALL_DATA) $(APIHEADER) $(includedir)
+      $(mkinstalldirs) $(DESTDIR)$libdir $(DESTDIR)$includedir
+      $(LIBTOOL) --mode=install $(INSTALL) $(LIBRARY) $(DESTDIR)$libdir/$(LIBRARY)
+      $(INSTALL_DATA) $(APIHEADER) $(DESTDIR)$includedir
+

 $(LIBRARY): $(LIB_OBJS)
      $(LINK_LIB) $(LIB_OBJS)
[tcameron@host236 BUILD]$ cp make_DESTDIR.patch ../SOURCES/
[tcameron@host236 BUILD]$
```

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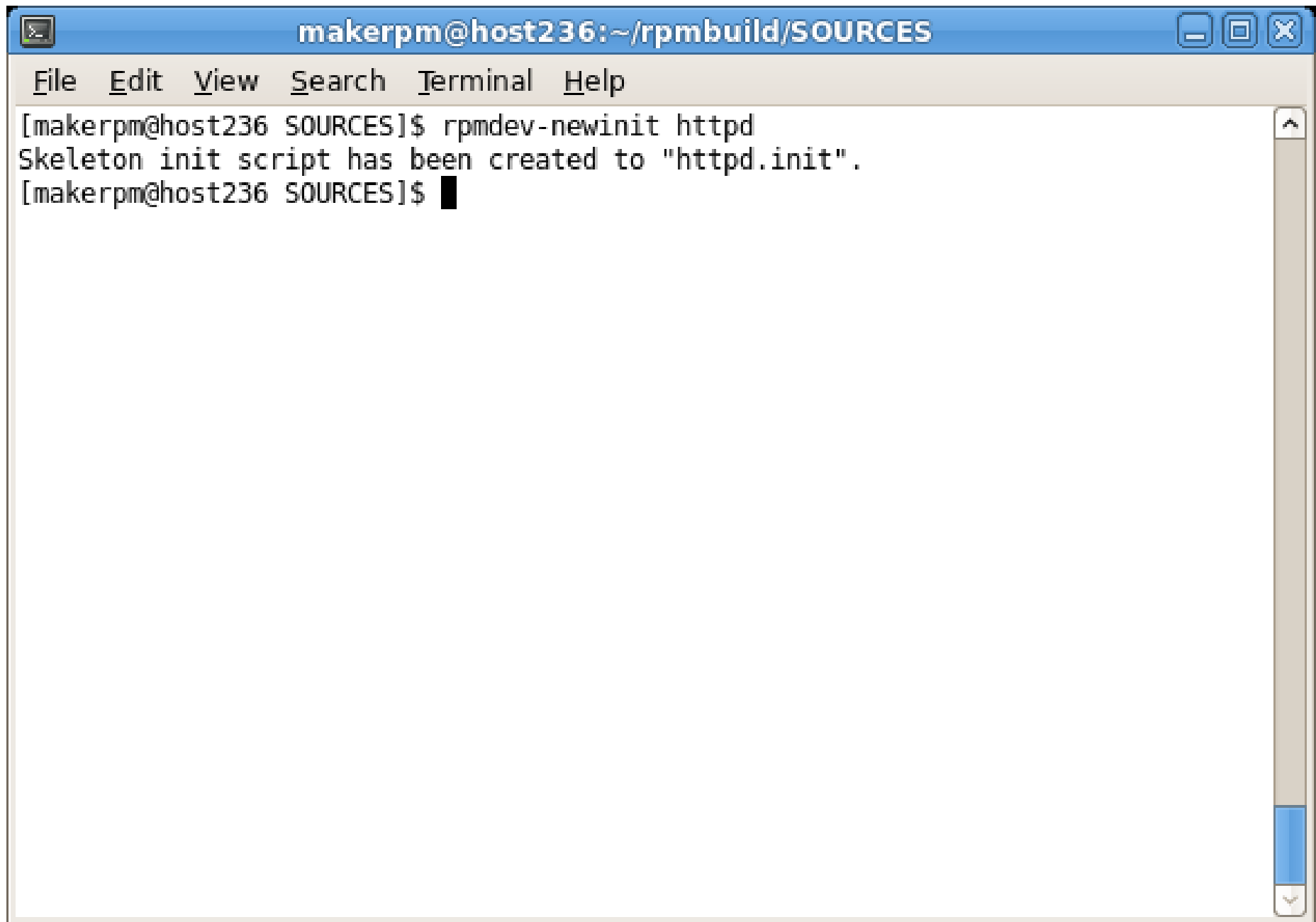
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Packaging internally developed software

- Change to your `~/rpmbuild/SOURCES` directory and create a new init script
 - `rpmdev-newinit httpd`





A terminal window titled "makerpm@host236:~/rpmbuild/SOURCES". The window has a menu bar with "File", "Edit", "View", "Search", "Terminal", and "Help". The terminal content shows the command "rpmdev-newinit httpd" being executed, resulting in the message "Skeleton init script has been created to 'httpd.init'." followed by a new prompt line.

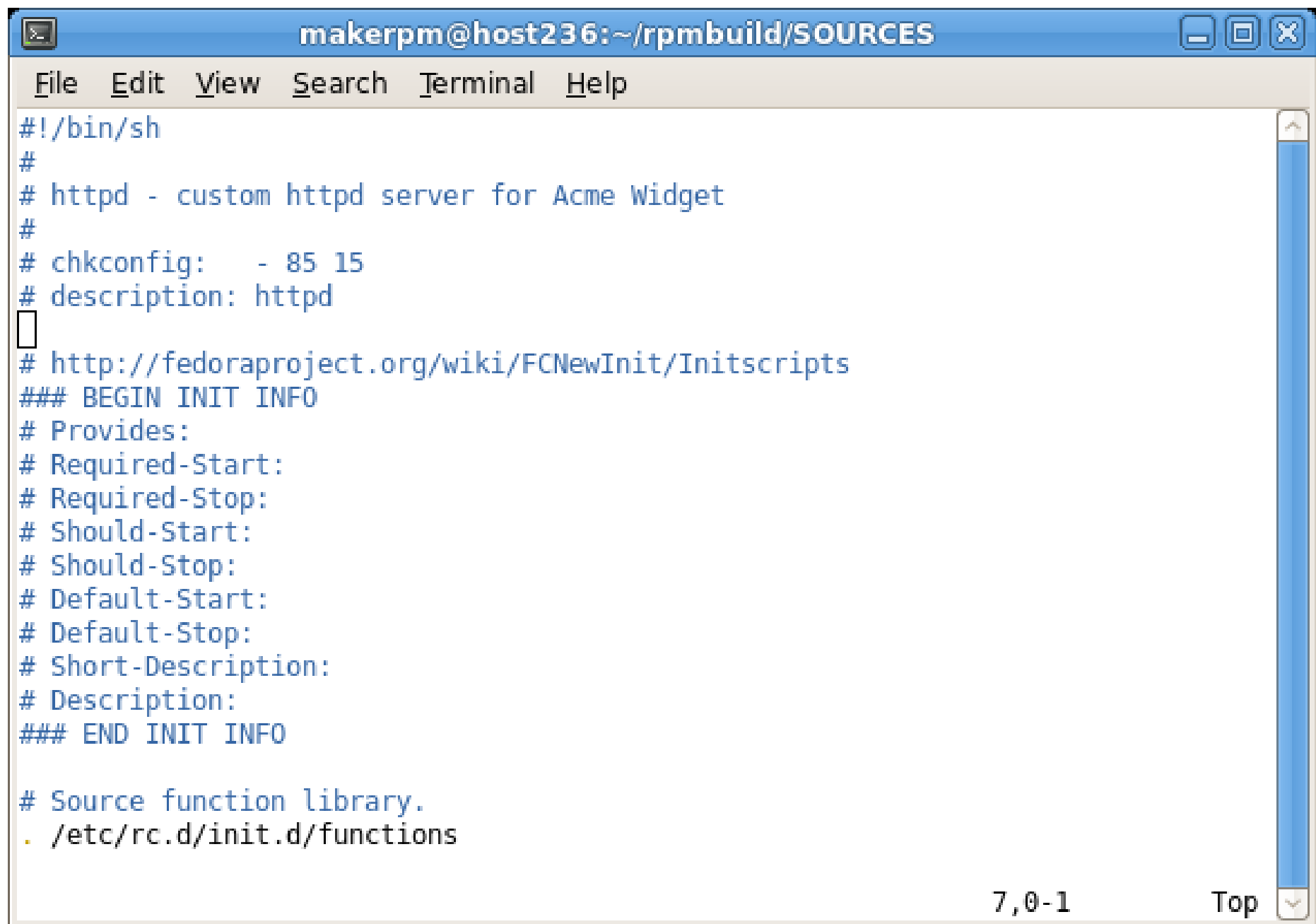
```
makerpm@host236:~/rpmbuild/SOURCES
File Edit View Search Terminal Help
[makerpm@host236 SOURCES]$ rpmdev-newinit httpd
Skeleton init script has been created to "httpd.init".
[makerpm@host236 SOURCES]$
```

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A terminal window titled "makerpm@host236:~/rpmbuild/SOURCES" with a menu bar (File, Edit, View, Search, Terminal, Help). The terminal displays the content of an RPM spec file for httpd. The file includes a header, a description, a URL, and various fields for providing, requiring, and starting/stopping the service. It also includes a source function library path. The terminal has a scrollbar on the right and a status bar at the bottom right showing "7,0-1" and "Top".

```
#!/bin/sh
#
# httpd - custom httpd server for Acme Widget
#
# chkconfig:    - 85 15
# description:  httpd
#
# http://fedoraproject.org/wiki/FCNewInit/Initscripts
### BEGIN INIT INFO
# Provides:
# Required-Start:
# Required-Stop:
# Should-Start:
# Should-Stop:
# Default-Start:
# Default-Stop:
# Short-Description:
# Description:
### END INIT INFO

# Source function library.
. /etc/rc.d/init.d/functions
```

7,0-1 Top



```
makerpm@host236:~/rpmbuild/SOURCES
File Edit View Search Terminal Help
. /etc/rc.d/init.d/functions

exec="/opt/apache/bin/httpd"

prog=$(basename $exec)

[ -e /etc/sysconfig/$prog ] && . /etc/sysconfig/$prog

lockfile=/var/lock/subsys/$prog

start() {
    echo -n "Starting $prog: "
    # if not running, start it up here, usually something like "daemon $exec"
    daemon $exec
    retval=$?
    echo
    [ $retval -eq 0 ] && touch $lockfile
    return $retval
}

stop() {
    echo -n "Stopping $prog: "
    # stop it here, often "killproc $prog"
    -- INSERT --
}
```

35,17

35%

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```
makerpm@host236:~/rpmbuild/SOURCES
File Edit View Search Terminal Help

echo -n $"Stopping $prog: "
# stop it here, often "killproc $prog"
killproc $prog
retval=$?
echo
[ $retval -eq 0 ] && rm -f $lockfile
return $retval
}

restart() {
    stop
    start
}

case "$1" in
    start|stop|restart)
        $1
        ;;
    force-reload)
        restart
        ;;
    status)
        status $prog
-- INSERT --
```

45,19 68%



Packaging internally developed software

- Change to your `~/rpmbuild/SPECS` directory and create a new spec file
 - `rpmdev-newspec`



```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help
[makerpm@host236 ~]$ cd rpmbuild/SOURCES/
[makerpm@host236 SOURCES]$ wget http://apache.osuosl.org//httpd/httpd-2.2.17.tar.gz
--2011-04-25 22:28:28-- http://apache.osuosl.org//httpd/httpd-2.2.17.tar.gz
Resolving apache.osuosl.org... 140.211.166.134
Connecting to apache.osuosl.org[140.211.166.134]:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 6597991 (6.3M) [application/x-gzip]
Saving to: "httpd-2.2.17.tar.gz"

100%[=====>] 6,597,991 1.06M/s in 7.1s

2011-04-25 22:28:35 (907 KB/s) - "httpd-2.2.17.tar.gz" saved [6597991/6597991]

[makerpm@host236 SOURCES]$ cd ../SPECS/
[makerpm@host236 SPECS]$ rpmdev-newspec httpd
Skeleton specfile (minimal) has been created to "httpd.spec".
[makerpm@host236 SPECS]$
```



Packaging internally developed software

- Let's look at the spec file the tool generated to see what it is creating.

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```
tcameron@t510:~/rpmbuild/SPECS
File Edit View Search Terminal Help
Name: httpd
Version:
Release: 1%{?dist}
Summary:

Group:
License:
URL:
Source0:
BuildRoot: %{_tmppath}/%{name}-%{version}-%{release}-root-%(%{__id_u} -n)

BuildRequires:
Requires:

%description

%prep
%setup -q

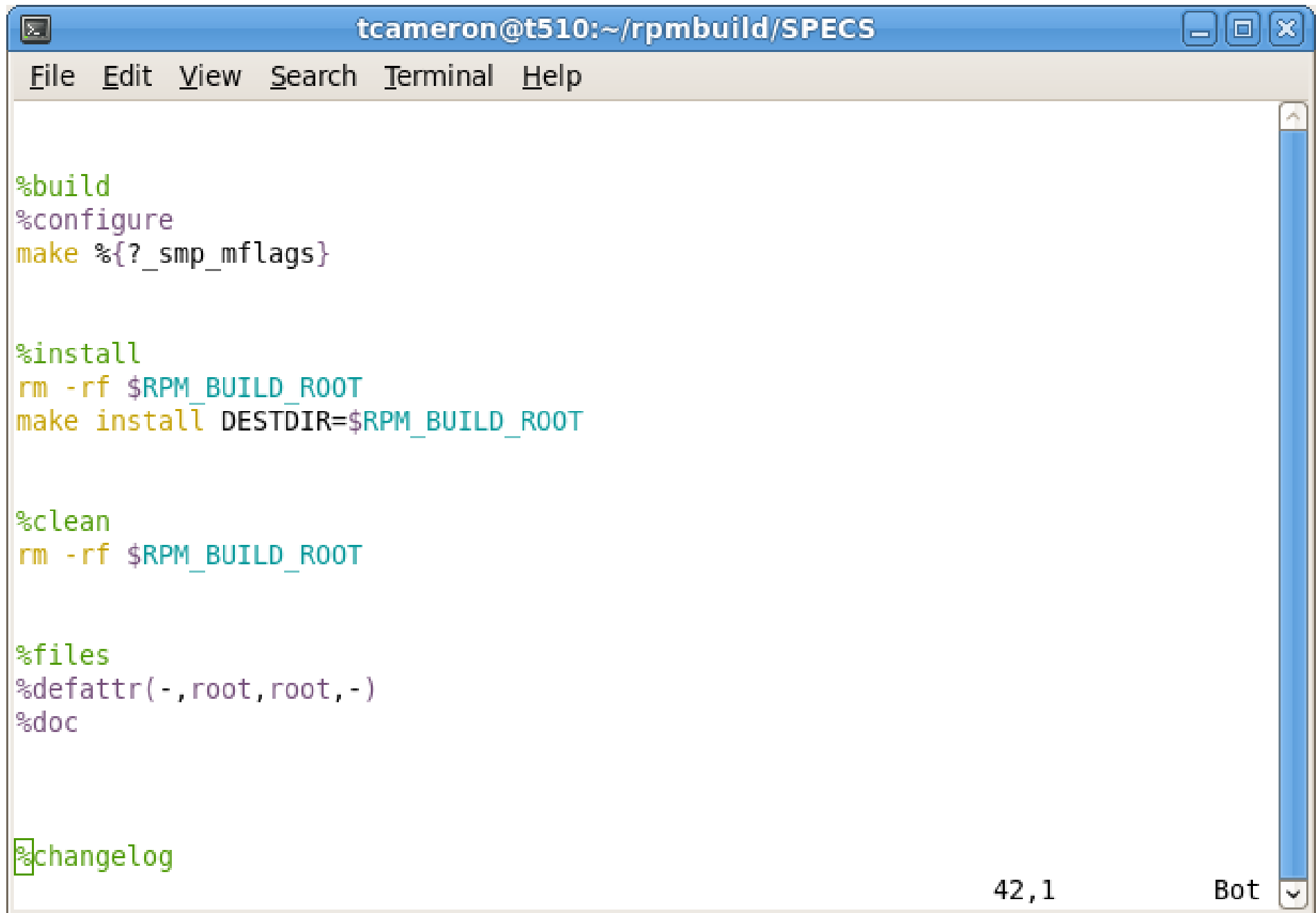
%build
%configure
"httpd.spec" 42L, 493C 1,1 Top
```

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A terminal window titled 'tcameron@t510:~/rpmbuild/SPECS' with a menu bar (File, Edit, View, Search, Terminal, Help). The terminal displays an RPM spec file with sections: %build (configure, make), %install (rm, make install), %clean (rm), %files (defattr, doc), and %changelog. The cursor is at the start of the %changelog line. The bottom right shows '42,1' and 'Bot' with a scroll bar.

```
tcameron@t510:~/rpmbuild/SPECS
File Edit View Search Terminal Help

%build
%configure
make %{?_smp_mflags}

%install
rm -rf $RPM_BUILD_ROOT
make install DESTDIR=$RPM_BUILD_ROOT

%clean
rm -rf $RPM_BUILD_ROOT

%files
%defattr(-,root,root,-)
%doc

%changelog
```

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- A completed spec file might look like this:

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```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help
Name:      httpd
Version:   2.2.17
Release:   1%{?dist}
Summary:   Apache httpd for Acme Widget

Group:     System Environments/Daemons
License:   ASL 2.0
URL:       http://httpd.apache.org
Source0:   httpd-2.2.17.tar.gz
Source1:   apache.sh
Source2:   httpd.init
Patch0:    make_DESTDIR.patch
BuildRoot: %{_tmppath}/%{name}-%{version}-%{release}-root-%(%{__id_u} -n)

BuildRequires: autoconf, libtool, make, gcc
Requires:      compat-expat1

%description
This is a custom build of Apache for Acme Widget Corp

%prep
%setup -q
%patch0 -p1
```

18,1 Top



```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help

%setup -q
%patch0 -p1

%build
./configure --prefix=/opt/apache
make %{?_smp_mflags}

%install
rm -rf $RPM_BUILD_ROOT
make install DESTDIR=$RPM_BUILD_ROOT

mkdir -p $RPM_BUILD_ROOT/etc/profile.d
mkdir -p $RPM_BUILD_ROOT/etc/rc.d/init.d
install -m 755 $RPM_SOURCE_DIR/apache.sh $RPM_BUILD_ROOT/etc/profile.d
install -m 755 $RPM_SOURCE_DIR/httpd.init $RPM_BUILD_ROOT/etc/rc.d/init.d

%clean
rm -rf $RPM_BUILD_ROOT

%files
%defattr(-,root,root,-)
/opt/apache/build/rules.mk
/opt/apache/build/config.nice

40,0-1 1%
```

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```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help
/opt/apache/cgi-bin
/opt/apache/cgi-bin/printenv
/opt/apache/cgi-bin/test-cgi
/opt/apache/conf
/opt/apache/conf/extra
%config /opt/apache/conf/extra/httpd-autoindex.conf
%config /opt/apache/conf/extra/httpd-dav.conf
%config /opt/apache/conf/extra/httpd-default.conf
%config /opt/apache/conf/extra/httpd-info.conf
%config /opt/apache/conf/extra/httpd-languages.conf
%config /opt/apache/conf/extra/httpd-manual.conf
%config /opt/apache/conf/extra/httpd-mpm.conf
%config /opt/apache/conf/extra/httpd-multilang-errordoc.conf
%config /opt/apache/conf/extra/httpd-ssl.conf
%config /opt/apache/conf/extra/httpd-userdir.conf
%config /opt/apache/conf/extra/httpd-vhosts.conf
%config /opt/apache/conf/httpd.conf
%config /opt/apache/conf/magic
%config /opt/apache/conf/mime.types
/opt/apache/conf/original
/opt/apache/conf/original/extra
/opt/apache/conf/original/extra/httpd-autoindex.conf
/opt/apache/conf/original/extra/httpd-dav.conf
105,1 6%
```

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```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help
/opt/apache/manual/style/latex/atbeginend.sty
/opt/apache/manual/style/modulesynopsis.dtd
/opt/apache/manual/style/lang.dtd
/opt/apache/manual/style/build.properties
/opt/apache/manual/style/manualpage.dtd
/opt/apache/manual/style/version.ent
/opt/apache/manual/style/sitemap.dtd
/opt/apache/manual/style/common.dtd
/opt/apache/manual/sections.html.en
/etc/profile.d/apache.sh
/etc/rc.d/init.d/httpd.init
/opt/apache/lib/libapr-1.so
/opt/apache/lib/libapr-1.so.0
/opt/apache/lib/libaprutil-1.so
/opt/apache/lib/libaprutil-1.so.0
/opt/apache/lib/libexpat.so
/opt/apache/lib/libexpat.so.0
%doc

%changelog
* Sat Apr 30 2011 Make RPM <makerpm@example.com>
- first attempt
█

1262,0-1 Bot
```

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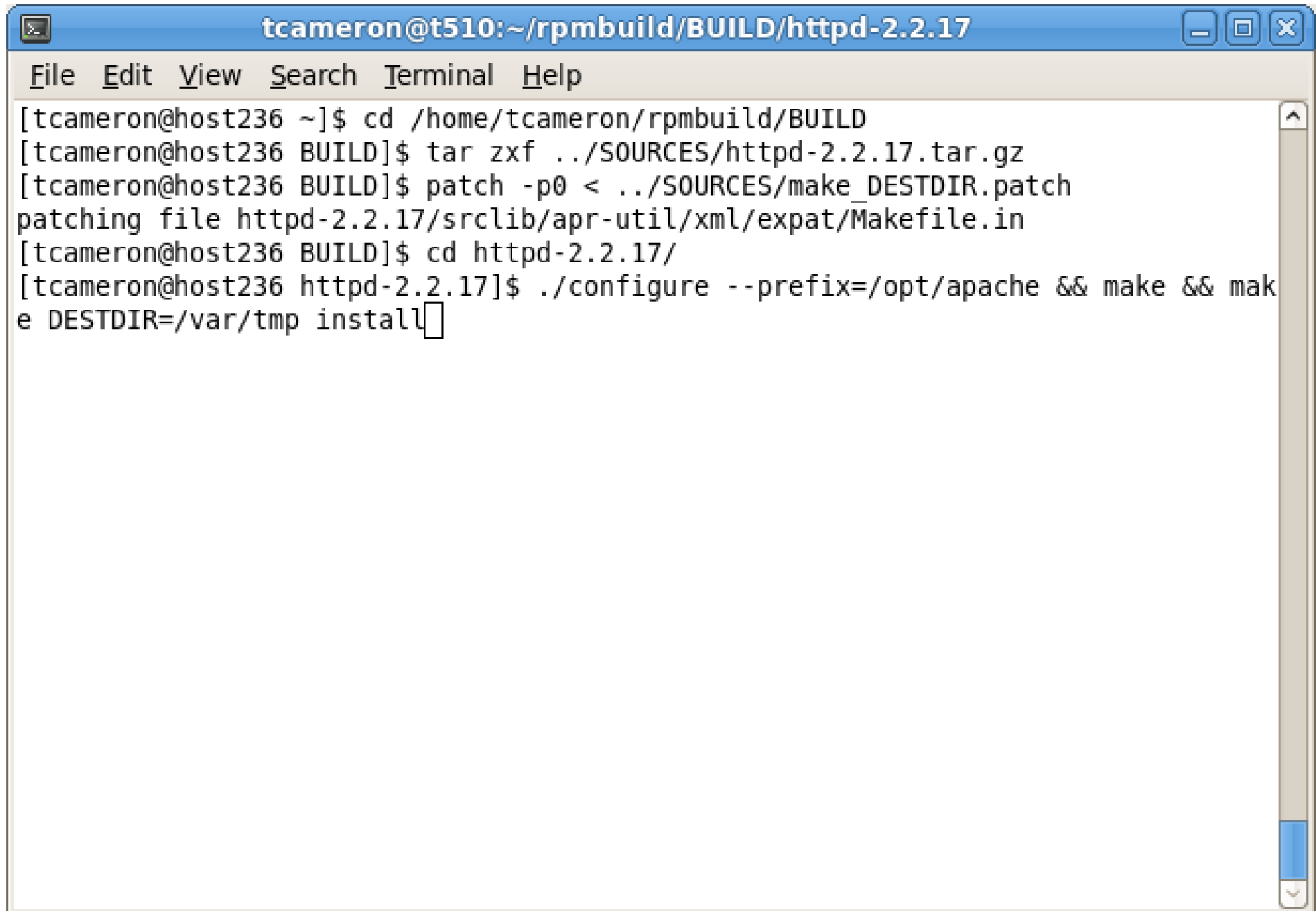
- How did we get that file list?
- The process below (plus trial and error)

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A terminal window titled "tcameron@t510:~/rpmbuild/BUILD/httpd-2.2.17" with a menu bar (File, Edit, View, Search, Terminal, Help). The terminal shows the following commands and output:

```
[tcameron@host236 ~]$ cd /home/tcameron/rpmbuild/BUILD
[tcameron@host236 BUILD]$ tar zxf ../SOURCES/httpd-2.2.17.tar.gz
[tcameron@host236 BUILD]$ patch -p0 < ../SOURCES/make_DESTDIR.patch
patching file httpd-2.2.17/src/lib/apr-util/xml/expat/Makefile.in
[tcameron@host236 BUILD]$ cd httpd-2.2.17/
[tcameron@host236 httpd-2.2.17]$ ./configure --prefix=/opt/apache && make && make
DESTDIR=/var/tmp install
```

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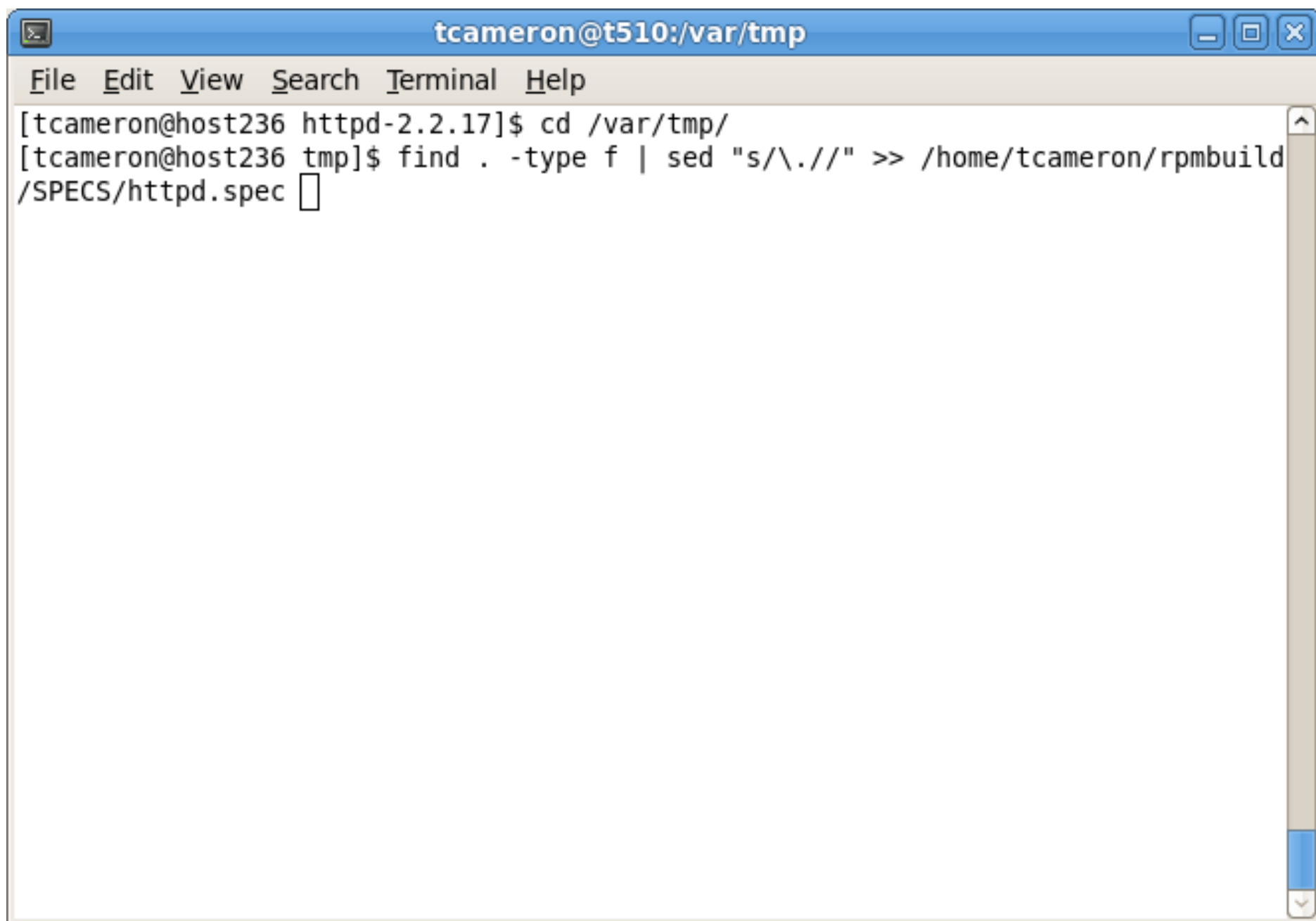
```
tcameron@t510:~/rpmbuild/BUILD/httpd-2.2.17
File Edit View Search Terminal Help
r/libapr-1.1a' has not been installed in '/opt/apache/lib'
Installing configuration files
mkdir /var/tmp/opt/apache/conf
mkdir /var/tmp/opt/apache/conf/extra
mkdir /var/tmp/opt/apache/conf/original
mkdir /var/tmp/opt/apache/conf/original/extra
Installing HTML documents
mkdir /var/tmp/opt/apache/htdocs
Installing error documents
mkdir /var/tmp/opt/apache/error
Installing icons
mkdir /var/tmp/opt/apache/icons
mkdir /var/tmp/opt/apache/logs
Installing CGIs
mkdir /var/tmp/opt/apache/cgi-bin
Installing header files
Installing build system files
Installing man pages and online manual
mkdir /var/tmp/opt/apache/man
mkdir /var/tmp/opt/apache/man/man1
mkdir /var/tmp/opt/apache/man/man8
mkdir /var/tmp/opt/apache/manual
make[1]: Leaving directory '/home/tcameron/rpmbuild/BUILD/httpd-2.2.17'
[tcameron@host236 httpd-2.2.17]$
```

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A terminal window titled "tcameron@t510:/var/tmp" with a menu bar (File, Edit, View, Search, Terminal, Help). The terminal shows the following commands and output:

```
[tcameron@host236 httpd-2.2.17]$ cd /var/tmp/  
[tcameron@host236 tmp]$ find . -type f | sed "s/\./" >> /home/tcameron/rpmbuild  
/SPECS/httpd.spec
```

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Packaging internally developed software

- Now let's test each section of the spec file.

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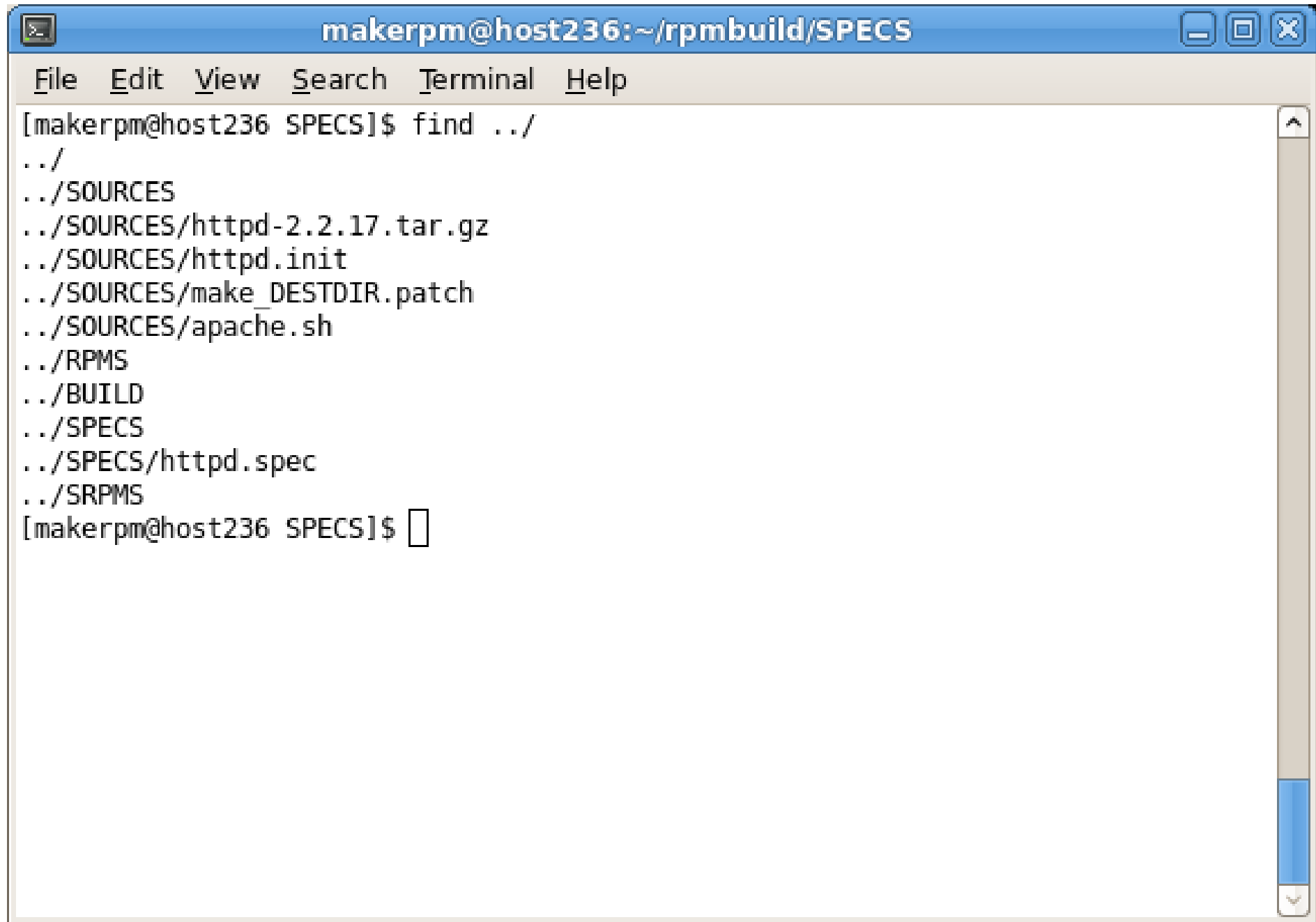
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```
tcameron@t510:/var/tmp
File Edit View Search Terminal Help
[tcameron@host236 tmp]$ rpmbuild --help
Usage: rpmbuild [OPTION...]
  --quiet

Build options with [ <specfile> | <tarball> | <source package> ]:
  -bp      build through %prep (unpack sources and apply
           patches) from <specfile>
  -bc      build through %build (%prep, then compile)
           from <specfile>
  -bi      build through %install (%prep, %build, then
           install) from <specfile>
  -bl      verify %files section from <specfile>
  -ba      build source and binary packages from
           <specfile>
  -bb      build binary package only from <specfile>
  -bs      build source package only from <specfile>
  -tp      build through %prep (unpack sources and apply
           patches) from <tarball>
  -tc      build through %build (%prep, then compile)
           from <tarball>
  -ti      build through %install (%prep, %build, then
           install) from <tarball>
  -ta      build source and binary packages from <tarball>
  -tb      build binary package only from <tarball>
```





A terminal window titled "makerpm@host236:~/rpmbuild/SPECS" with standard window controls. The terminal shows the execution of the "find" command to list files in the current directory and its subdirectories. The output lists the directory structure, including "SOURCES", "RPMS", "BUILD", "SPECS", and "SRPMS", with specific files like "httpd-2.2.17.tar.gz", "httpd.init", "make_DESTDIR.patch", "apache.sh", and "httpd.spec" listed under their respective directories.

```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help
[makerpm@host236 SPECS]$ find ../
../
../SOURCES
../SOURCES/httpd-2.2.17.tar.gz
../SOURCES/httpd.init
../SOURCES/make_DESTDIR.patch
../SOURCES/apache.sh
../RPMS
../BUILD
../SPECS
../SPECS/httpd.spec
../SRPMS
[makerpm@host236 SPECS]$
```

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```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help
[makerpm@host236 SPECS]$ rpmbuild -bp httpd.spec
Executing(%prep): /bin/sh -e /var/tmp/rpm-tmp.Ba2gTm
+ umask 022
+ cd /home/makerpm/rpmbuild/BUILD
+ LANG=C
+ export LANG
+ unset DISPLAY
+ cd /home/makerpm/rpmbuild/BUILD
+ rm -rf httpd-2.2.17
+ /bin/tar -xf -
+ /usr/bin/gzip -dc /home/makerpm/rpmbuild/SOURCES/httpd-2.2.17.tar.gz
+ STATUS=0
+ '[' 0 -ne 0 ']'
+ cd httpd-2.2.17
+ /bin/chmod -Rf a+rX,u+w,g-w,o-w .
+ echo 'Patch #0 (make_DESTDIR.patch):'
Patch #0 (make_DESTDIR.patch):
+ /usr/bin/patch -s -p1 --fuzz=0
+ /bin/cat /home/makerpm/rpmbuild/SOURCES/make_DESTDIR.patch
+ exit 0
[makerpm@host236 SPECS]$
```

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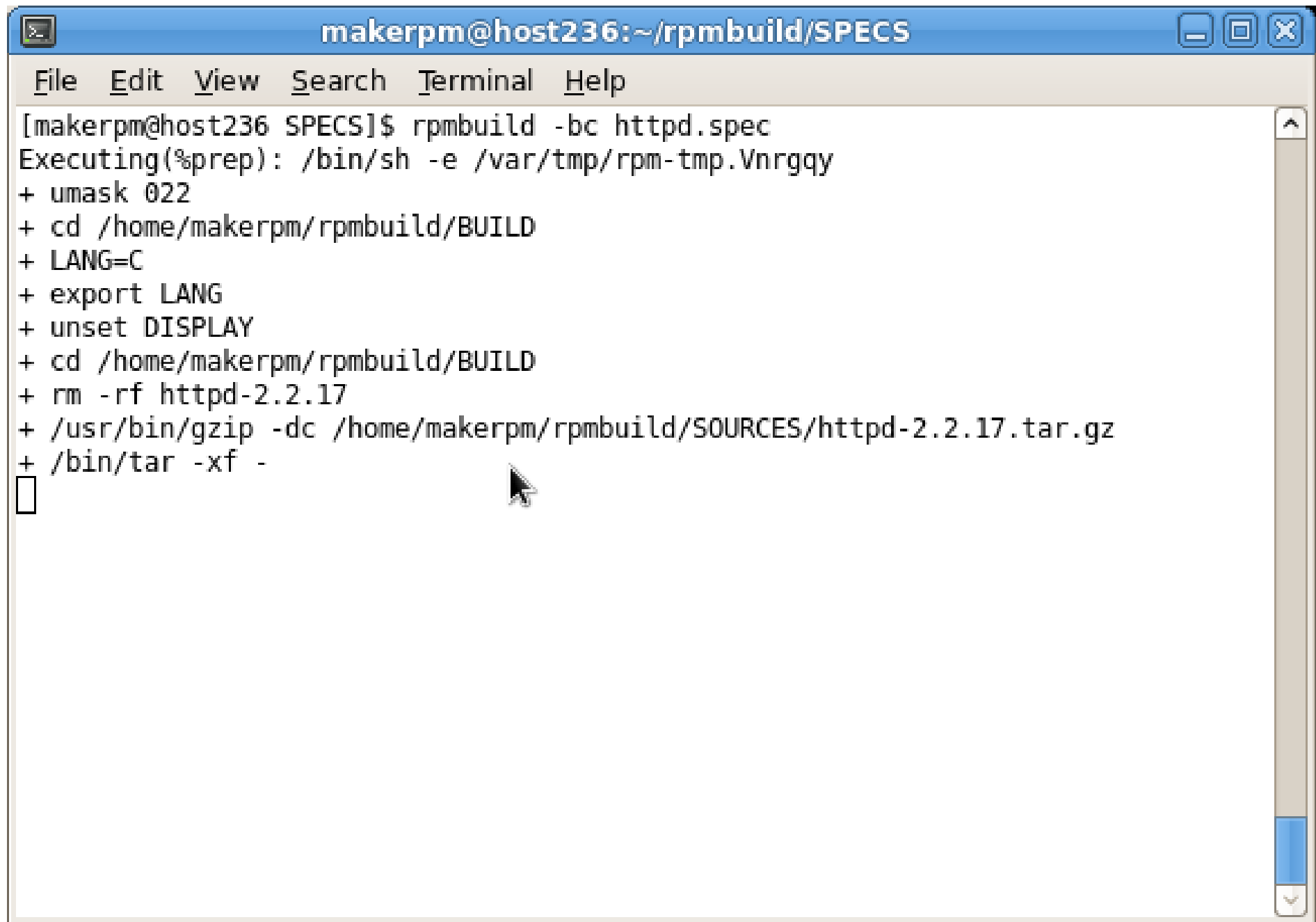
```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help
[makerpm@host236 SPECS]$ find ../ | head -20
../
../SOURCES
../SOURCES/httpd-2.2.17.tar.gz
../SOURCES/httpd.init
../SOURCES/make_DESTDIR.patch
../SOURCES/apache.sh
../BUILDROOT
../RPMS
../BUILD
../BUILD/httpd-2.2.17
../BUILD/httpd-2.2.17/.gdbinit
../BUILD/httpd-2.2.17/LAYOUT
../BUILD/httpd-2.2.17/build
../BUILD/httpd-2.2.17/build/nw_export.inc
../BUILD/httpd-2.2.17/build/apr_common.m4
../BUILD/httpd-2.2.17/build/binbuild.sh
../BUILD/httpd-2.2.17/build/find_apu.m4
../BUILD/httpd-2.2.17/build/rpm
../BUILD/httpd-2.2.17/build/rpm/httpd.logrotate
../BUILD/httpd-2.2.17/build/rpm/httpd.init
[makerpm@host236 SPECS]$
```

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A terminal window titled 'makerpm@host236:~/rpmbuild/SPECS' with standard window controls. The terminal shows the execution of 'rpmbuild -bc httpd.spec'. The output includes environment setup steps like 'umask 022', 'cd /home/makerpm/rpmbuild/BUILD', 'LANG=C', 'export LANG', and 'unset DISPLAY'. It then shows the removal of the previous httpd version and the extraction of the new source tarball. A mouse cursor is visible over the terminal output.

```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help
[makerpm@host236 SPECS]$ rpmbuild -bc httpd.spec
Executing(%prep): /bin/sh -e /var/tmp/rpm-tmp.Vnrgqy
+ umask 022
+ cd /home/makerpm/rpmbuild/BUILD
+ LANG=C
+ export LANG
+ unset DISPLAY
+ cd /home/makerpm/rpmbuild/BUILD
+ rm -rf httpd-2.2.17
+ /usr/bin/gzip -dc /home/makerpm/rpmbuild/SOURCES/httpd-2.2.17.tar.gz
+ /bin/tar -xf -
█
```

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```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help
checking for gfortran... gfortran
checking whether we are using the GNU Fortran 77 compiler... yes
checking whether gfortran accepts -g... yes
checking the maximum length of command line arguments... 1966080
checking command to parse /usr/bin/nm -B output from gcc object... ok
checking for objdir... .libs
checking for ar... (cached) ar
checking for ranlib... (cached) ranlib
checking for strip... strip
checking if gcc supports -fno-rtti -fno-exceptions... no
checking for gcc option to produce PIC... -fPIC
checking if gcc PIC flag -fPIC works... yes
checking if gcc static flag -static works... no
checking if gcc supports -c -o file.o... yes
checking whether the gcc linker (/usr/bin/ld -m elf_x86_64) supports shared libr
aries... yes
checking whether -lc should be explicitly linked in... no
checking dynamic linker characteristics... GNU/Linux ld.so
checking how to hardcode library paths into programs... immediate
checking whether stripping libraries is possible... yes
checking if libtool supports shared libraries... yes
checking whether to build shared libraries... yes
checking whether to build static libraries... yes

```

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```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help
UILD/httpd-2.2.17/modules/proxy/./generators -I/home/makerpm/rpmbuild/BUILD/httpd-2.2.17/modules/ssl -I/home/makerpm/rpmbuild/BUILD/httpd-2.2.17/modules/dav/main -c /home/makerpm/rpmbuild/BUILD/httpd-2.2.17/server/buildmark.c
/home/makerpm/rpmbuild/BUILD/httpd-2.2.17/src/lib/apr/libtool --silent --mode=link gcc -g -O2 -pthread -o httpd modules.lo buildmark.o -export-dynamic server/libmain.la modules/aaa/libmod_authn_file.la modules/aaa/libmod_authn_default.la modules/aaa/libmod_authz_host.la modules/aaa/libmod_authz_groupfile.la modules/aaa/libmod_authz_user.la modules/aaa/libmod_authz_default.la modules/aaa/libmod_auth_basic.la modules/filters/libmod_include.la modules/filters/libmod_filter.la modules/loggers/libmod_log_config.la modules/metadata/libmod_env.la modules/metadata/libmod_setenvif.la modules/metadata/libmod_version.la modules/http/libmod_http.la modules/http/libmod_mime.la modules/generators/libmod_status.la modules/generators/libmod_autoindex.la modules/generators/libmod_asis.la modules/generators/libmod_cgi.la modules/mappers/libmod_negotiation.la modules/mappers/libmod_dir.la modules/mappers/libmod_actions.la modules/mappers/libmod_userdir.la modules/mappers/libmod_alias.la modules/mappers/libmod_so.la server/mpm/prefork/libprefork.la os/unix/libos.la -lm /home/makerpm/rpmbuild/BUILD/httpd-2.2.17/src/lib/apr-util/libaprutil-1.la /home/makerpm/rpmbuild/BUILD/httpd-2.2.17/src/lib/apr-util/xml/expat/libexpat.la /home/makerpm/rpmbuild/BUILD/httpd-2.2.17/src/lib/apr/libapr-1.la -lrt -lcrypt -lpthread
make[1]: Leaving directory `/home/makerpm/rpmbuild/BUILD/httpd-2.2.17'
+ exit 0
[makerpm@host236 SPECS]$
```

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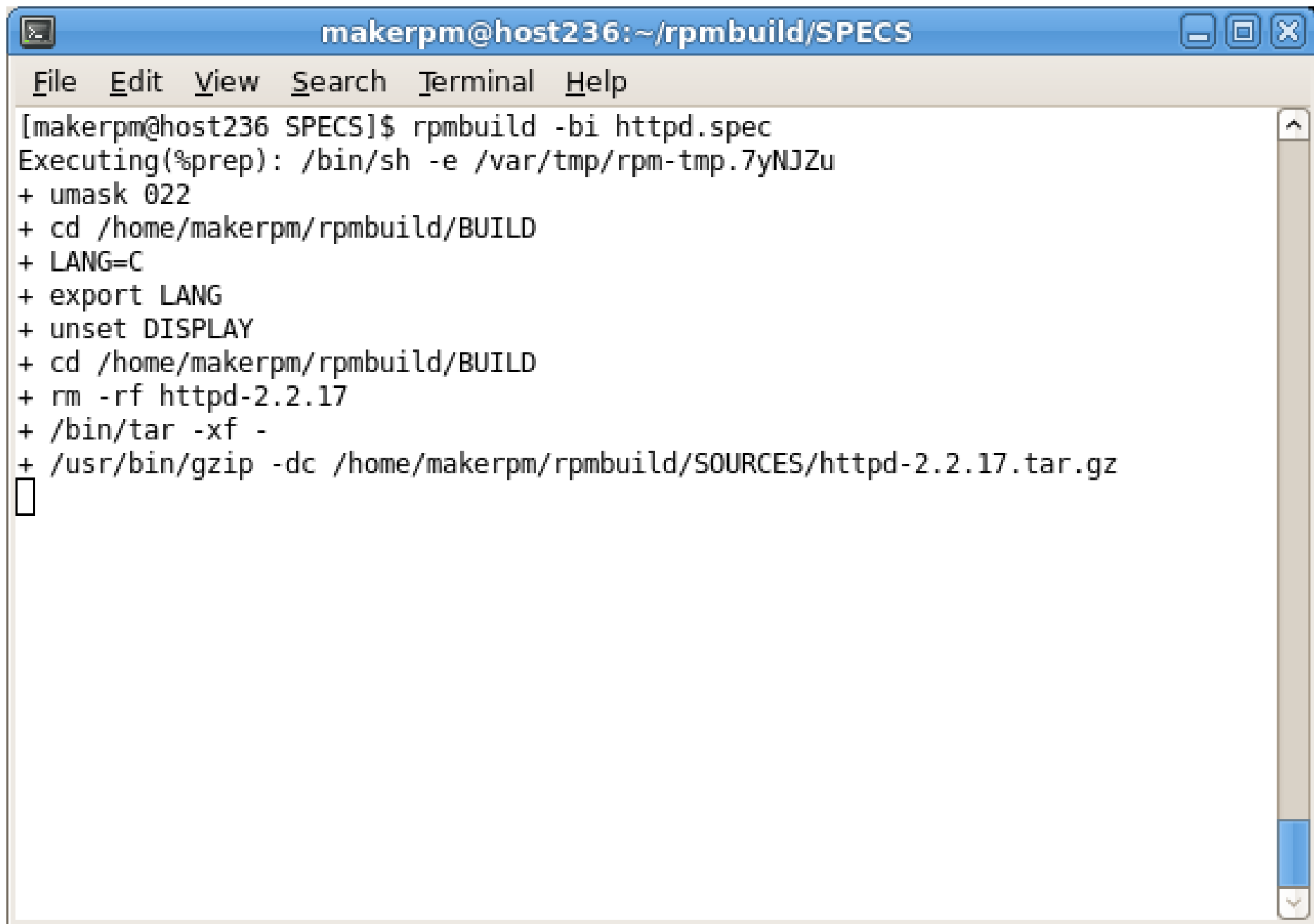
```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help
[makerpm@host236 SPECS]$ find ../ | head -20
../
../SOURCES
../SOURCES/httpd-2.2.17.tar.gz
../SOURCES/httpd.init
../SOURCES/make_DESTDIR.patch
../SOURCES/apache.sh
../BUILDROOT
../RPMS
../BUILD
../BUILD/httpd-2.2.17
../BUILD/httpd-2.2.17/.gdbinit
../BUILD/httpd-2.2.17/LAYOUT
../BUILD/httpd-2.2.17/build
../BUILD/httpd-2.2.17/build/nw_export.inc
../BUILD/httpd-2.2.17/build/apr_common.m4
../BUILD/httpd-2.2.17/build/config_vars.sh
../BUILD/httpd-2.2.17/build/binbuild.sh
../BUILD/httpd-2.2.17/build/rules.mk
../BUILD/httpd-2.2.17/build/find_apu.m4
../BUILD/httpd-2.2.17/build/rpm
[makerpm@host236 SPECS]$
```

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A terminal window titled 'makerpm@host236:~/rpmbuild/SPECS' with standard window controls. The menu bar includes File, Edit, View, Search, Terminal, and Help. The terminal output shows the execution of 'rpmbuild -bi httpd.spec', which triggers a shell script. The script performs several actions: setting umask to 022, changing to the build directory, setting environment variables (LANG=C, unset DISPLAY), removing the previous build directory, and extracting the source tarball. The process is currently paused at a prompt.

```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help
[makerpm@host236 SPECS]$ rpmbuild -bi httpd.spec
Executing(%prep): /bin/sh -e /var/tmp/rpm-tmp.7yNJZu
+ umask 022
+ cd /home/makerpm/rpmbuild/BUILD
+ LANG=C
+ export LANG
+ unset DISPLAY
+ cd /home/makerpm/rpmbuild/BUILD
+ rm -rf httpd-2.2.17
+ /bin/tar -xf -
+ /usr/bin/gzip -dc /home/makerpm/rpmbuild/SOURCES/httpd-2.2.17.tar.gz
█
```

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```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help
+ /usr/lib/rpm/redhat/brp-strip-comment-note /usr/bin/strip /usr/bin/objdump
+ /usr/lib/rpm/brp-python-bytecompile
+ /usr/lib/rpm/redhat/brp-python-hardlink
+ /usr/lib/rpm/redhat/brp-java-repack-jars
Processing files: httpd-2.2.17-1.el6.x86_64
Provides: libapr-1.so.0()(64bit) libaprutil-1.so.0()(64bit) libexpat.so.0()(64bit)
libtool(/opt/apache/lib/libapr-1.la) libtool(/opt/apache/lib/libaprutil-1.la)
libtool(/opt/apache/lib/libexpat.la) pkgconfig(apr-1) = 1.4.2 pkgconfig(apr-util-1) = 1.3.10
Requires(rpmlib): rpmlib(CompressedFileNames) <= 3.0.4-1 rpmlib(FileDigests) <= 4.6.0-1
rpmlib(PayloadFilesHavePrefix) <= 4.0-1 rpmlib(VersionedDependencies) <= 3.0.3-1
Requires: /bin/bash /bin/sh /usr/bin/perl /usr/bin/pkg-config libapr-1.so.0()(64bit)
libaprutil-1.so.0()(64bit) libc.so.6()(64bit) libc.so.6(GLIBC_2.10)(64bit)
libc.so.6(GLIBC_2.2.5)(64bit) libc.so.6(GLIBC_2.3)(64bit) libc.so.6(GLIBC_2.3.2)(64bit)
libc.so.6(GLIBC_2.3.3)(64bit) libc.so.6(GLIBC_2.9)(64bit) libcrypt.so.1()(64bit)
libcrypt.so.1(GLIBC_2.2.5)(64bit) libexpat.so.0()(64bit) libm.so.6()(64bit)
libm.so.6(GLIBC_2.2.5)(64bit) libpthread.so.0()(64bit) libpthread.so.0(GLIBC_2.2.5)(64bit)
libpthread.so.0(GLIBC_2.3.2)(64bit) libpthread.so.0(GLIBC_2.4)(64bit) librt.so.1()(64bit)
perl >= 0:5.004 perl(AnyDBM_File) perl(Fcntl) perl(strict) pkgconfig(apr-1) rtld(GNU_HASH)
Checking for unpackaged file(s): /usr/lib/rpm/check-files /home/makerpm/rpmbuild/BUILDROOT/httpd-2.2.17-1.el6.x86_64
[makerpm@host236 SPECS]$
```

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```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help
[makerpm@host236 SPECS]$ find ../ | head -20
../
../SOURCES
../SOURCES/httpd-2.2.17.tar.gz
../SOURCES/httpd.init
../SOURCES/make_DESTDIR.patch
../SOURCES/apache.sh
../BUILDROOT
../BUILDROOT/httpd-2.2.17-1.el6.x86_64
../BUILDROOT/httpd-2.2.17-1.el6.x86_64/opt
../BUILDROOT/httpd-2.2.17-1.el6.x86_64/opt/apache
../BUILDROOT/httpd-2.2.17-1.el6.x86_64/opt/apache/build
../BUILDROOT/httpd-2.2.17-1.el6.x86_64/opt/apache/build/rules.mk
../BUILDROOT/httpd-2.2.17-1.el6.x86_64/opt/apache/build/config.nice
../BUILDROOT/httpd-2.2.17-1.el6.x86_64/opt/apache/build/make_var_export.awk
../BUILDROOT/httpd-2.2.17-1.el6.x86_64/opt/apache/build/instdso.sh
../BUILDROOT/httpd-2.2.17-1.el6.x86_64/opt/apache/build/config_vars.mk
../BUILDROOT/httpd-2.2.17-1.el6.x86_64/opt/apache/build/libtool
../BUILDROOT/httpd-2.2.17-1.el6.x86_64/opt/apache/build/make_exports.awk
../BUILDROOT/httpd-2.2.17-1.el6.x86_64/opt/apache/build/ltlib.mk
../BUILDROOT/httpd-2.2.17-1.el6.x86_64/opt/apache/build/program.mk
[makerpm@host236 SPECS]$
```

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Packaging internally developed software

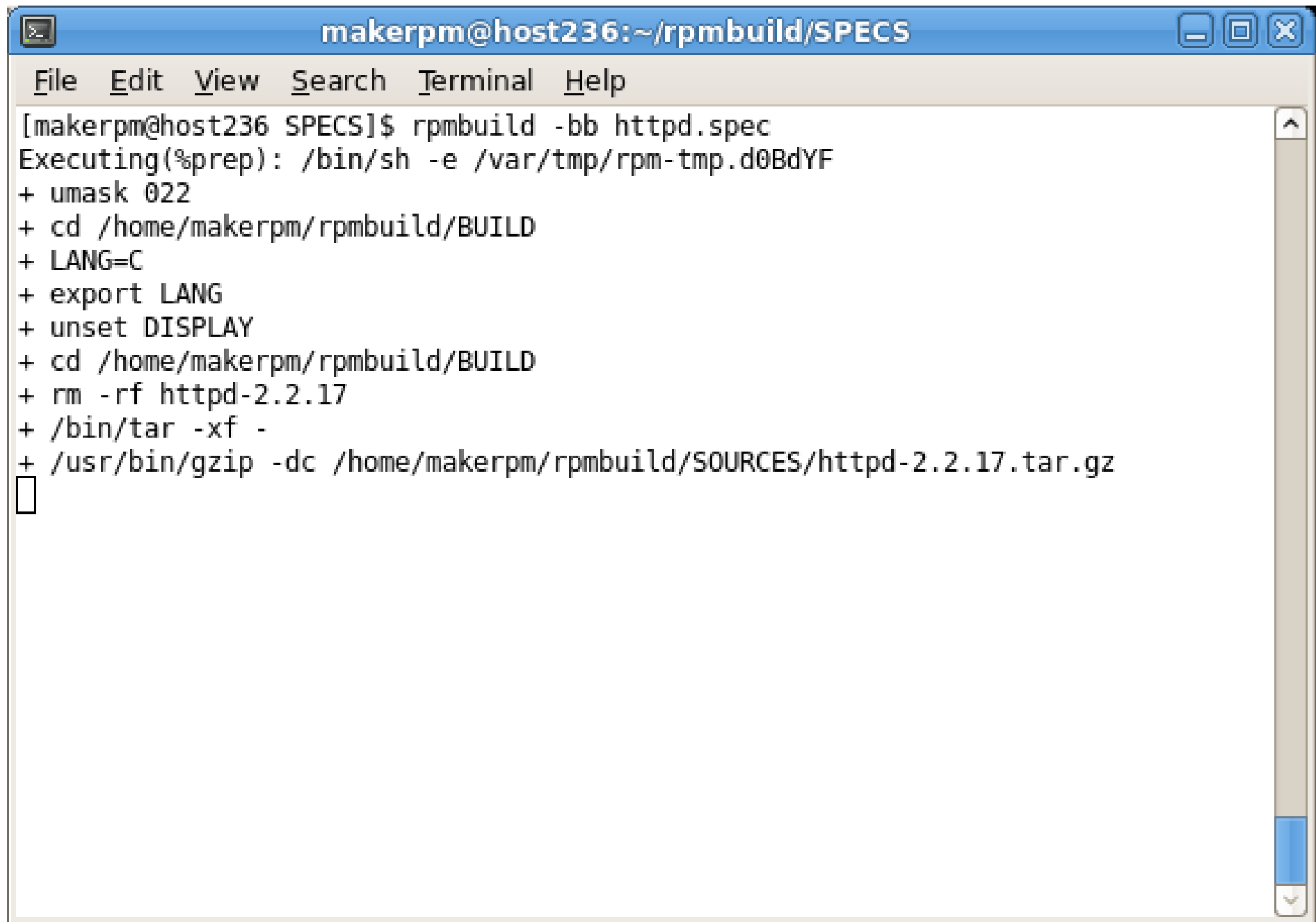
- Hint: This is also a good place to go and make sure your package manifest (the `%files` section) is correct

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A terminal window titled 'makerpm@host236:~/rpmbuild/SPECS' with standard window controls. The menu bar includes File, Edit, View, Search, Terminal, and Help. The terminal content shows the execution of 'rpmbuild -bb httpd.spec', followed by a series of shell commands for environment setup and file extraction. The window has a vertical scrollbar on the right and a blue status bar at the bottom.

```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help
[makerpm@host236 SPECS]$ rpmbuild -bb httpd.spec
Executing(%prep): /bin/sh -e /var/tmp/rpm-tmp.d0BdYF
+ umask 022
+ cd /home/makerpm/rpmbuild/BUILD
+ LANG=C
+ export LANG
+ unset DISPLAY
+ cd /home/makerpm/rpmbuild/BUILD
+ rm -rf httpd-2.2.17
+ /bin/tar -xf -
+ /usr/bin/gzip -dc /home/makerpm/rpmbuild/SOURCES/httpd-2.2.17.tar.gz
█
```

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```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help
4.6.0-1 rpmlib(PayloadFilesHavePrefix) <= 4.0-1 rpmlib(VersionedDependencies) <= 3.0.3-1
Requires: /bin/bash /bin/sh /usr/bin/perl /usr/bin/pkg-config libapr-1.so.0()(64bit) libaprutil-1.so.0()(64bit) libc.so.6()(64bit) libc.so.6(GLIBC_2.10)(64bit) libc.so.6(GLIBC_2.2.5)(64bit) libc.so.6(GLIBC_2.3)(64bit) libc.so.6(GLIBC_2.3.2)(64bit) libc.so.6(GLIBC_2.3.3)(64bit) libc.so.6(GLIBC_2.9)(64bit) libcrypt.so.1()(64bit) libcrypt.so.1(GLIBC_2.2.5)(64bit) libexpat.so.0()(64bit) libm.so.6()(64bit) libm.so.6(GLIBC_2.2.5)(64bit) libpthread.so.0()(64bit) libpthread.so.0(GLIBC_2.2.5)(64bit) libpthread.so.0(GLIBC_2.3.2)(64bit) libpthread.so.0(GLIBC_2.4)(64bit) librt.so.1()(64bit) perl >= 0:5.004 perl(AnyDBM_File) perl(Fcntl) perl(strict) pkgconfig(apr-1) rtld(GNU_HASH)
Processing files: httpd-debuginfo-2.2.17-1.el6.x86_64
Checking for unpackaged file(s): /usr/lib/rpm/check-files /home/makerpm/rpmbuild/BUILDROOT/httpd-2.2.17-1.el6.x86_64
Wrote: /home/makerpm/rpmbuild/RPMS/x86_64/httpd-2.2.17-1.el6.x86_64.rpm
Wrote: /home/makerpm/rpmbuild/RPMS/x86_64/httpd-debuginfo-2.2.17-1.el6.x86_64.rpm
Executing(%clean): /bin/sh -e /var/tmp/rpm-tmp.ptzByC
+ umask 022
+ cd /home/makerpm/rpmbuild/BUILD
+ cd httpd-2.2.17
+ rm -rf /home/makerpm/rpmbuild/BUILDROOT/httpd-2.2.17-1.el6.x86_64
+ exit 0
[makerpm@host236 SPECS]$
```

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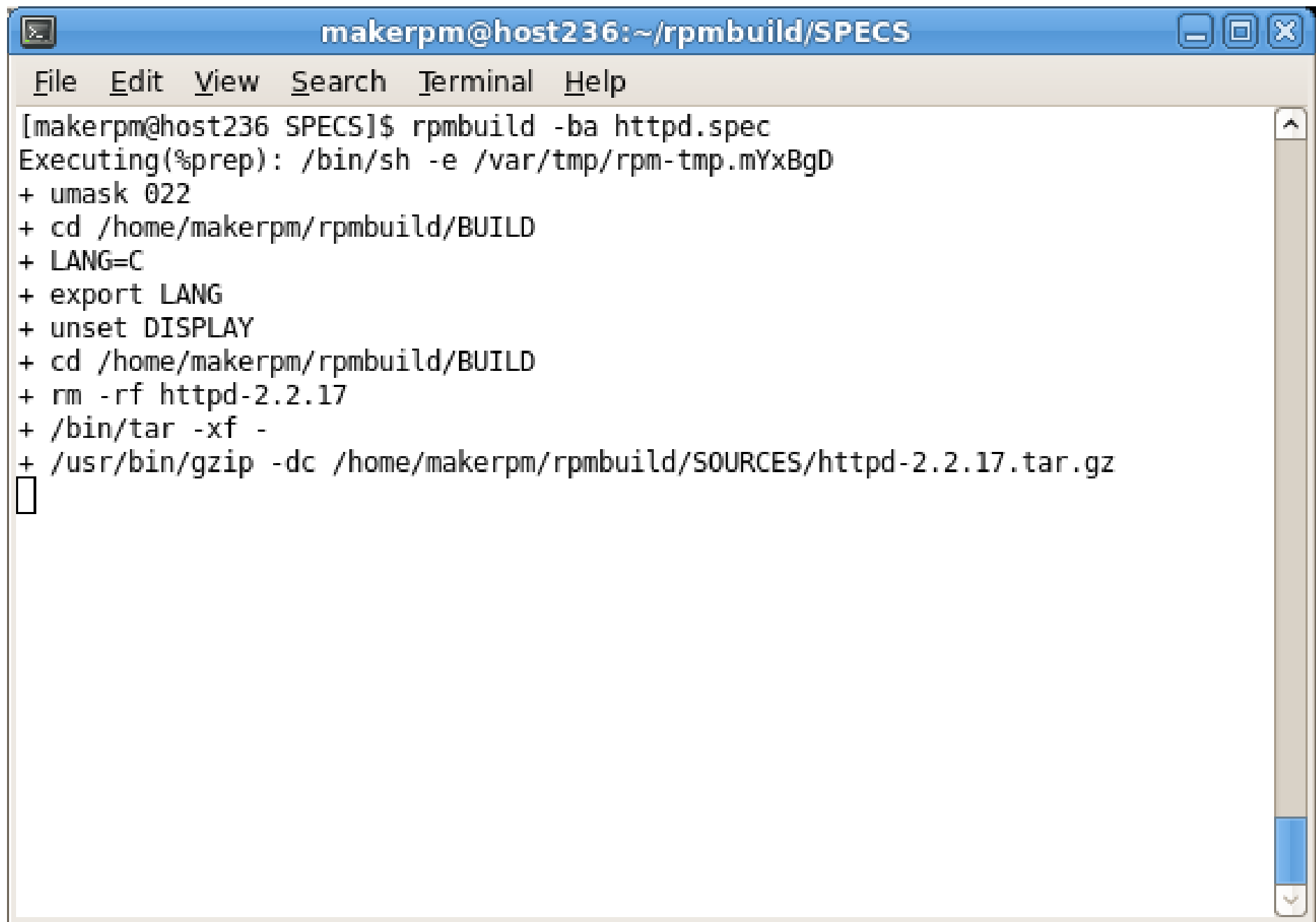
```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help
[makerpm@host236 SPECS]$ find ../ | head -20
../
../SOURCES
../SOURCES/httpd-2.2.17.tar.gz
../SOURCES/httpd.init
../SOURCES/make_DESTDIR.patch
../SOURCES/apache.sh
../BUILDROOT
../RPMS
../RPMS/x86_64
../RPMS/x86_64/httpd-2.2.17-1.el6.x86_64.rpm
../RPMS/x86_64/httpd-debuginfo-2.2.17-1.el6.x86_64.rpm
../BUILD
../BUILD/httpd-2.2.17
../BUILD/httpd-2.2.17/.gdbinit
../BUILD/httpd-2.2.17/debugsources.list
../BUILD/httpd-2.2.17/LAYOUT
../BUILD/httpd-2.2.17/build
../BUILD/httpd-2.2.17/build/nw_export.inc
../BUILD/httpd-2.2.17/build/apr_common.m4
../BUILD/httpd-2.2.17/build/config_vars.sh
[makerpm@host236 SPECS]$
```

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A terminal window titled 'makerpm@host236:~/rpmbuild/SPECS' with standard window controls. The menu bar includes File, Edit, View, Search, Terminal, and Help. The terminal output shows the execution of 'rpmbuild -ba httpd.spec', which triggers a shell script. The script performs several actions: setting umask to 022, changing to the build directory, setting LANG=C, unsetting DISPLAY, removing the previous build directory, and extracting the source tarball. The process is currently paused at a prompt.

```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help
[makerpm@host236 SPECS]$ rpmbuild -ba httpd.spec
Executing(%prep): /bin/sh -e /var/tmp/rpm-tmp.mYxBgD
+ umask 022
+ cd /home/makerpm/rpmbuild/BUILD
+ LANG=C
+ export LANG
+ unset DISPLAY
+ cd /home/makerpm/rpmbuild/BUILD
+ rm -rf httpd-2.2.17
+ /bin/tar -xf -
+ /usr/bin/gzip -dc /home/makerpm/rpmbuild/SOURCES/httpd-2.2.17.tar.gz
█
```

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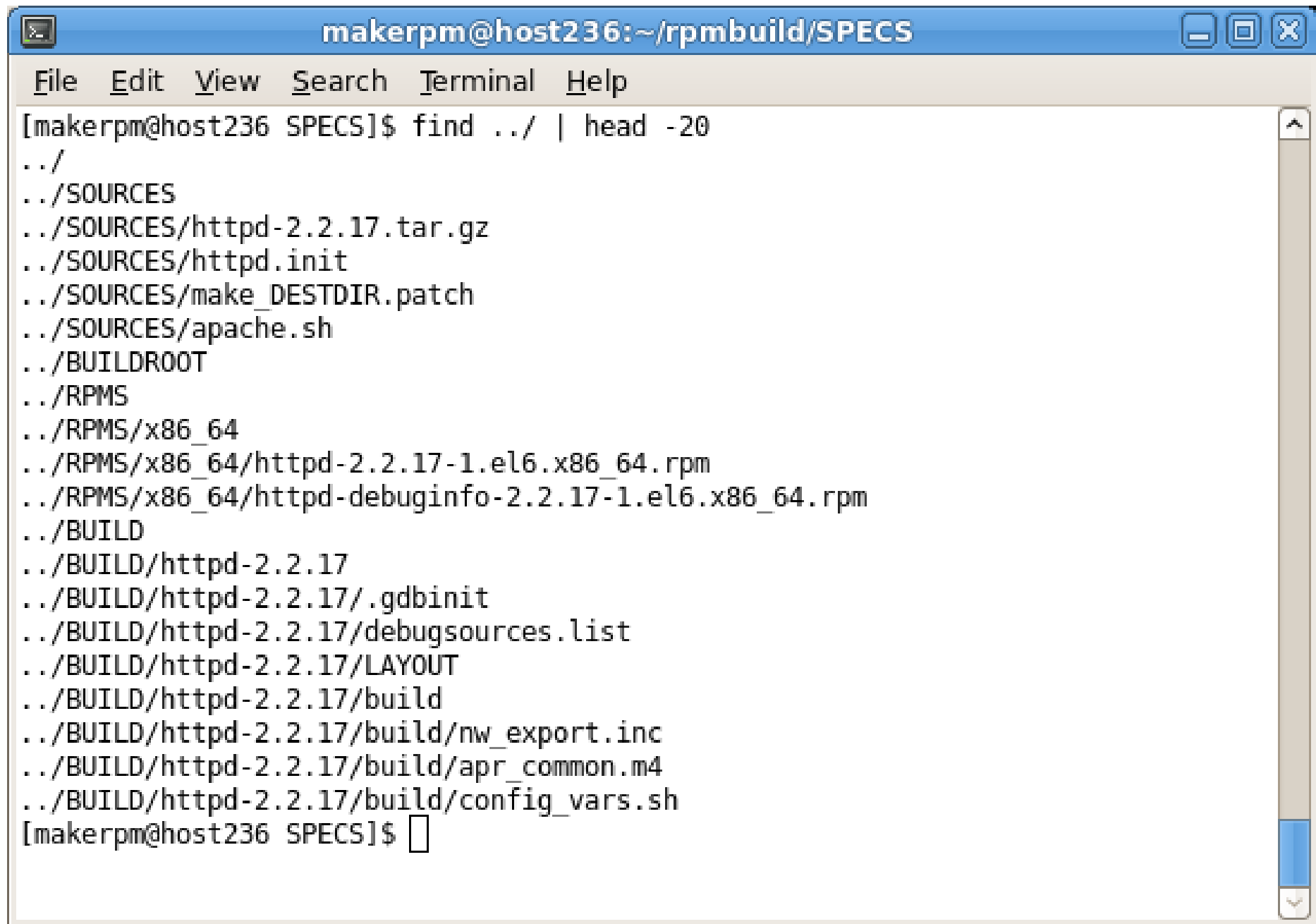
```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help
3.0.3-1
Requires: /bin/bash /bin/sh /usr/bin/perl /usr/bin/pkg-config libapr-1.so.0()(64
bit) libaprutil-1.so.0()(64bit) libc.so.6()(64bit) libc.so.6(GLIBC_2.10)(64bit)
libc.so.6(GLIBC_2.2.5)(64bit) libc.so.6(GLIBC_2.3)(64bit) libc.so.6(GLIBC_2.3.2)
(64bit) libc.so.6(GLIBC_2.3.3)(64bit) libc.so.6(GLIBC_2.9)(64bit) libcrypt.so.1(
)(64bit) libcrypt.so.1(GLIBC_2.2.5)(64bit) libexpat.so.0()(64bit) libm.so.6()(64
bit) libm.so.6(GLIBC_2.2.5)(64bit) libpthread.so.0()(64bit) libpthread.so.0(GLIB
C_2.2.5)(64bit) libpthread.so.0(GLIBC_2.3.2)(64bit) libpthread.so.0(GLIBC_2.4)(6
4bit) librt.so.1()(64bit) perl >= 0:5.004 perl(AnyDBM_File) perl(Fcntl) perl(str
ict) pkgconfig(apr-1) rtld(GNU_HASH)
Processing files: httpd-debuginfo-2.2.17-1.el6.x86_64
Checking for unpackaged file(s): /usr/lib/rpm/check-files /home/makerpm/rpmbuild
/BUILDROOT/httpd-2.2.17-1.el6.x86_64
Wrote: /home/makerpm/rpmbuild/SRPMS/httpd-2.2.17-1.el6.src.rpm
Wrote: /home/makerpm/rpmbuild/RPMS/x86_64/httpd-2.2.17-1.el6.x86_64.rpm
Wrote: /home/makerpm/rpmbuild/RPMS/x86_64/httpd-debuginfo-2.2.17-1.el6.x86_64.rp
m
Executing(%clean): /bin/sh -e /var/tmp/rpm-tmp.KWRfr6
+ umask 022
+ cd /home/makerpm/rpmbuild/BUILD
+ cd httpd-2.2.17
+ rm -rf /home/makerpm/rpmbuild/BUILDROOT/httpd-2.2.17-1.el6.x86_64
+ exit 0
[makerpm@host236 SPECS]$
```

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A terminal window titled "makerpm@host236:~/rpmbuild/SPECS" with standard window controls. The menu bar includes File, Edit, View, Search, Terminal, and Help. The terminal shows the command `find ../ | head -20` and its output, which lists files and directories in a tree structure. The output ends with a prompt `[makerpm@host236 SPECS]$` and a cursor.

```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help
[makerpm@host236 SPECS]$ find ../ | head -20
../
../SOURCES
../SOURCES/httpd-2.2.17.tar.gz
../SOURCES/httpd.init
../SOURCES/make_DESTDIR.patch
../SOURCES/apache.sh
../BUILDROOT
../RPMS
../RPMS/x86_64
../RPMS/x86_64/httpd-2.2.17-1.el6.x86_64.rpm
../RPMS/x86_64/httpd-debuginfo-2.2.17-1.el6.x86_64.rpm
../BUILD
../BUILD/httpd-2.2.17
../BUILD/httpd-2.2.17/.gdbinit
../BUILD/httpd-2.2.17/debugsources.list
../BUILD/httpd-2.2.17/LAYOUT
../BUILD/httpd-2.2.17/build
../BUILD/httpd-2.2.17/build/nw_export.inc
../BUILD/httpd-2.2.17/build/apr_common.m4
../BUILD/httpd-2.2.17/build/config_vars.sh
[makerpm@host236 SPECS]$
```

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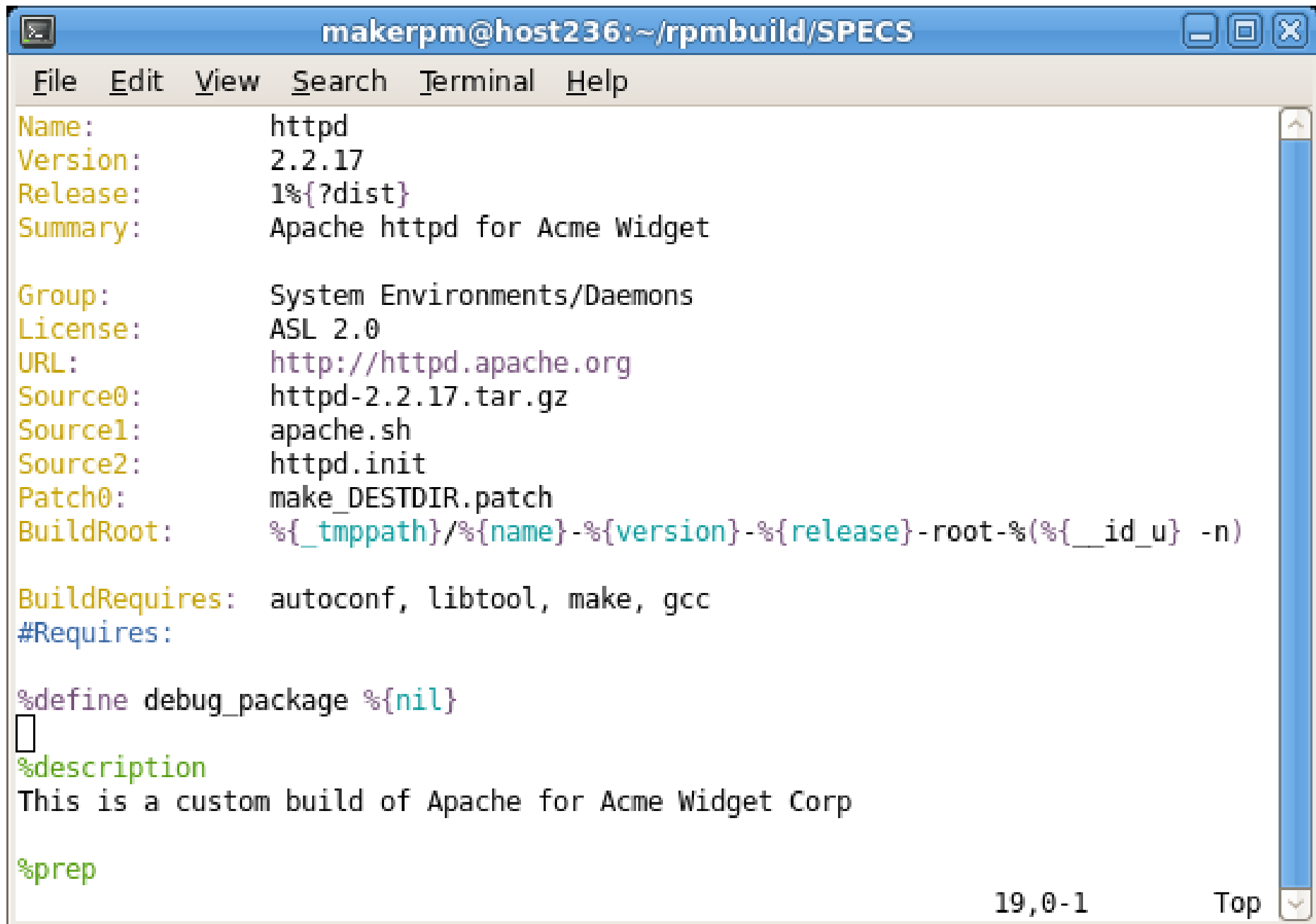
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Packaging internally developed software

- About debuginfo RPMs:
 - To disable stripping binaries and creating the debug packages, add this to the spec file:
 - `%define debug_package %{nil}`





The screenshot shows a terminal window titled "makerpm@host236:~/rpmbuild/SPECS". The window contains an RPM spec file for the "httpd" package. The spec file includes fields for Name, Version, Release, Summary, Group, License, URL, Source0, Source1, Source2, Patch0, BuildRoot, BuildRequires, and a description. The BuildRoot field uses macros like %_tmppath, %name, %version, %release, and %__id_u. The description states: "This is a custom build of Apache for Acme Widget Corp". The terminal window has a menu bar with File, Edit, View, Search, Terminal, and Help. A vertical scrollbar is on the right side of the text area.

```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help

Name:          httpd
Version:       2.2.17
Release:       1%{?dist}
Summary:       Apache httpd for Acme Widget

Group:         System Environments/Daemons
License:       ASL 2.0
URL:           http://httpd.apache.org
Source0:       httpd-2.2.17.tar.gz
Source1:       apache.sh
Source2:       httpd.init
Patch0:        make_DESTDIR.patch
BuildRoot:     %{_tmppath}/%{name}-%{version}-%{release}-root-%(%{__id_u} -n)

BuildRequires: autoconf, libtool, make, gcc
#Requires:

%define debug_package %{nil}
%
%description
This is a custom build of Apache for Acme Widget Corp

%prep

19,0-1 Top
```



```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help
l-1) = 1.3.10
Requires(rpmlib): rpmlib(CompressedFileNames) <= 3.0.4-1 rpmlib(FileDigests) <=
4.6.0-1 rpmlib(PayloadFilesHavePrefix) <= 4.0-1 rpmlib(VersionedDependencies) <=
3.0.3-1
Requires: /bin/bash /bin/sh /usr/bin/perl /usr/bin/pkg-config libapr-1.so.0()(64
bit) libaprutil-1.so.0()(64bit) libc.so.6()(64bit) libc.so.6(GLIBC_2.10)(64bit)
libc.so.6(GLIBC_2.2.5)(64bit) libc.so.6(GLIBC_2.3)(64bit) libc.so.6(GLIBC_2.3.2)
(64bit) libc.so.6(GLIBC_2.3.3)(64bit) libc.so.6(GLIBC_2.9)(64bit) libcrypt.so.1(
)(64bit) libcrypt.so.1(GLIBC_2.2.5)(64bit) libexpat.so.0()(64bit) libm.so.6()(64
bit) libm.so.6(GLIBC_2.2.5)(64bit) libpthread.so.0()(64bit) libpthread.so.0(GLIB
C_2.2.5)(64bit) libpthread.so.0(GLIBC_2.3.2)(64bit) libpthread.so.0(GLIBC_2.4)(6
4bit) librt.so.1()(64bit) perl >= 0:5.004 perl(AnyDBM_File) perl(Fcntl) perl(str
ict) pkgconfig(apr-1) rtld(GNU_HASH)
Checking for unpackaged file(s): /usr/lib/rpm/check-files /home/makerpm/rpmbuild
/BUILDROOT/httpd-2.2.17-1.el6.x86_64
Wrote: /home/makerpm/rpmbuild/SRPMS/httpd-2.2.17-1.el6.src.rpm
Wrote: /home/makerpm/rpmbuild/RPMS/x86_64/httpd-2.2.17-1.el6.x86_64.rpm
Executing(%clean): /bin/sh -e /var/tmp/rpm-tmp.1b40ID
+ umask 022
+ cd /home/makerpm/rpmbuild/BUILD
+ cd httpd-2.2.17
+ rm -rf /home/makerpm/rpmbuild/BUILDROOT/httpd-2.2.17-1.el6.x86_64
+ exit 0
[makerpm@host236 SPECS]$
```

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Packaging internally developed software

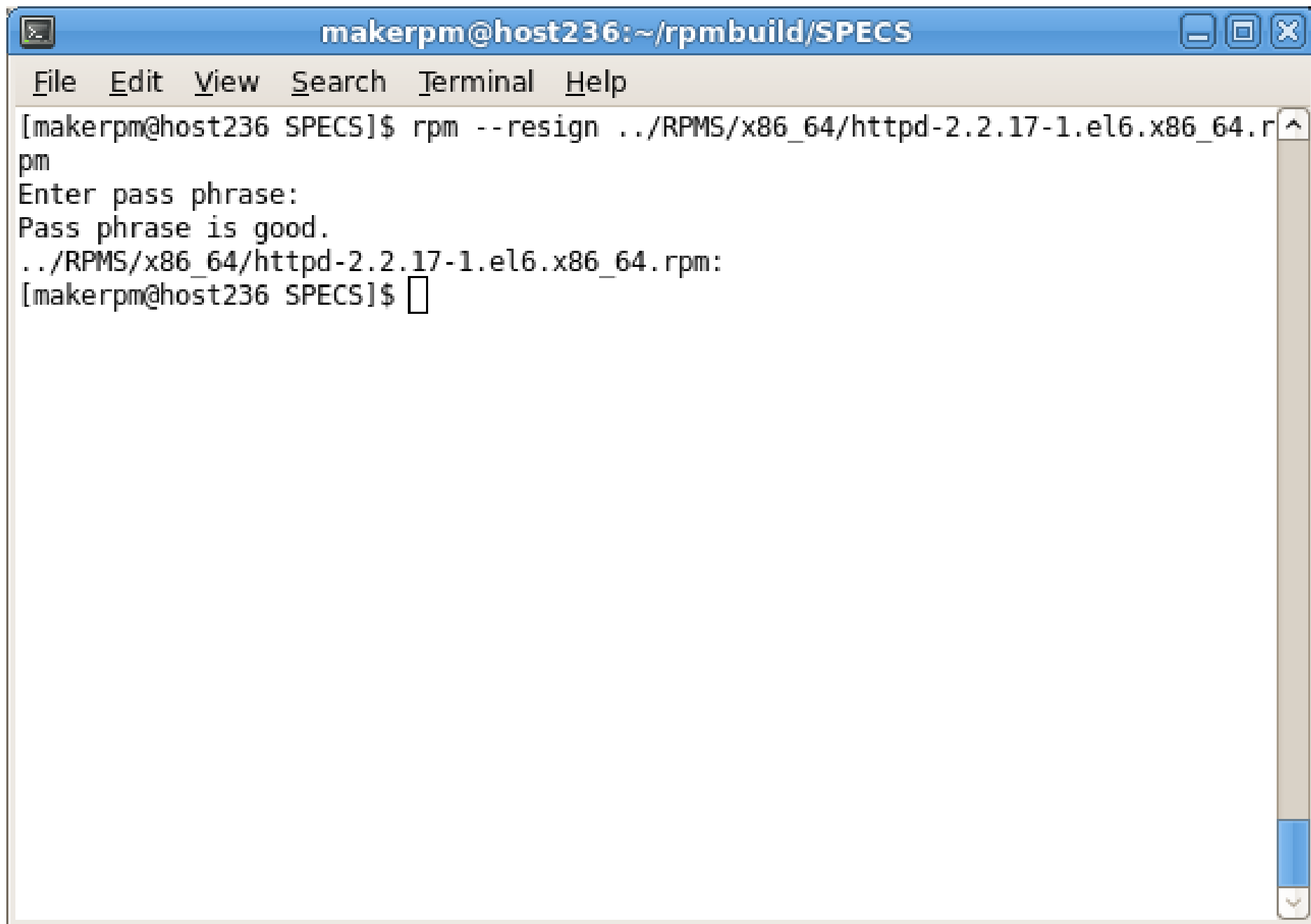
- Sign your RPM

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A terminal window titled "makerpm@host236:~/rpmbuild/SPECS" with a menu bar (File, Edit, View, Search, Terminal, Help). The terminal shows the execution of the command "rpm --resign ../RPMS/x86_64/httpd-2.2.17-1.el6.x86_64.rpm". It prompts for a pass phrase, which is confirmed as good. The prompt then changes to "makerpm@host236 SPECS\$".

```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help
[makerpm@host236 SPECS]$ rpm --resign ../RPMS/x86_64/httpd-2.2.17-1.el6.x86_64.r
pm
Enter pass phrase:
Pass phrase is good.
../RPMS/x86_64/httpd-2.2.17-1.el6.x86_64.rpm:
[makerpm@host236 SPECS]$
```

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Packaging internally developed software

- Import the gpg key into the RPM database and install and test

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```
root@host236:~  
File Edit View Search Terminal Help  
[makerpm@host236 SPECS]$ su -  
Password:  
[root@host236 ~]# rpm --checksig /home/makerpm/rpmbuild/RPMS/x86_64/httpd-2.2.17-1.el6.x86_64.rpm  
/home/makerpm/rpmbuild/RPMS/x86_64/httpd-2.2.17-1.el6.x86_64.rpm: RSA sha1 ((MD5 ) PGP) ((MD5) PGP) md5 NOT OK (MISSING KEYS: (MD5) PGP#406f995c (MD5) PGP#406f995c)  
[root@host236 ~]#  
[root@host236 ~]# rpm --import /home/makerpm/ACME-WIDGET-GPG-KEY  
[root@host236 ~]# rpm --checksig /home/makerpm/rpmbuild/RPMS/x86_64/httpd-2.2.17-1.el6.x86_64.rpm  
/home/makerpm/rpmbuild/RPMS/x86_64/httpd-2.2.17-1.el6.x86_64.rpm: rsa sha1 (md5) pgp (md5) pgp md5 OK  
[root@host236 ~]# rpm --checksig -v /home/makerpm/rpmbuild/RPMS/x86_64/httpd-2.2.17-1.el6.x86_64.rpm  
/home/makerpm/rpmbuild/RPMS/x86_64/httpd-2.2.17-1.el6.x86_64.rpm:  
  Header V4 RSA/SHA1 Signature, key ID 406f995c: OK  
  Header SHA1 digest: OK (f88a2d3b6be50e12628569bbc267dad58653d905)  
  V4 RSA/SHA1 Signature, key ID 406f995c: OK  
  V4 RSA/SHA1 Signature, key ID 406f995c: OK  
  MD5 digest: OK (6948bf7d59d357b9645e9ed6ba5d3661)  
[root@host236 ~]#
```

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```
root@host236:~  
File Edit View Search Terminal Help  
[root@host236 ~]# yum localinstall /home/makerpm/rpmbuild/RPMS/x86_64/httpd-2.2.17-1.el6.x86_64.rpm  
Loaded plugins: rhnplugin  
Setting up Local Package Process  
Examining /home/makerpm/rpmbuild/RPMS/x86_64/httpd-2.2.17-1.el6.x86_64.rpm: httpd-2.2.17-1.el6.x86_64  
Marking /home/makerpm/rpmbuild/RPMS/x86_64/httpd-2.2.17-1.el6.x86_64.rpm to be installed  
rhel-x86_64-server-6 | 1.5 kB 00:00  
rhel-x86_64-server-ha-6 | 1.5 kB 00:00  
rhel-x86_64-server-lb-6 | 1.2 kB 00:00  
rhel-x86_64-server-optional-6 | 1.3 kB 00:00  
rhel-x86_64-server-rs-6 | 1.5 kB 00:00  
rhel-x86_64-server-supplementary-6 | 1.5 kB 00:00  
rhn-tools-rhel-x86_64-server-6 | 1.3 kB 00:00  
Resolving Dependencies  
--> Running transaction check  
---> Package httpd.x86_64 0:2.2.17-1.el6 set to be updated  
--> Finished Dependency Resolution  
  
Dependencies Resolved  
  
=====
```

Package	Arch	Version	Repository	Size
---------	------	---------	------------	------

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```
root@host236:~  
File Edit View Search Terminal Help  
=====
```

Installing:				
httpd	x86_64	2.2.17-1.el6	/httpd-2.2.17-1.el6.x86_64	16 M

```
Transaction Summary  
=====
```

Install	1 Package(s)
Upgrade	0 Package(s)

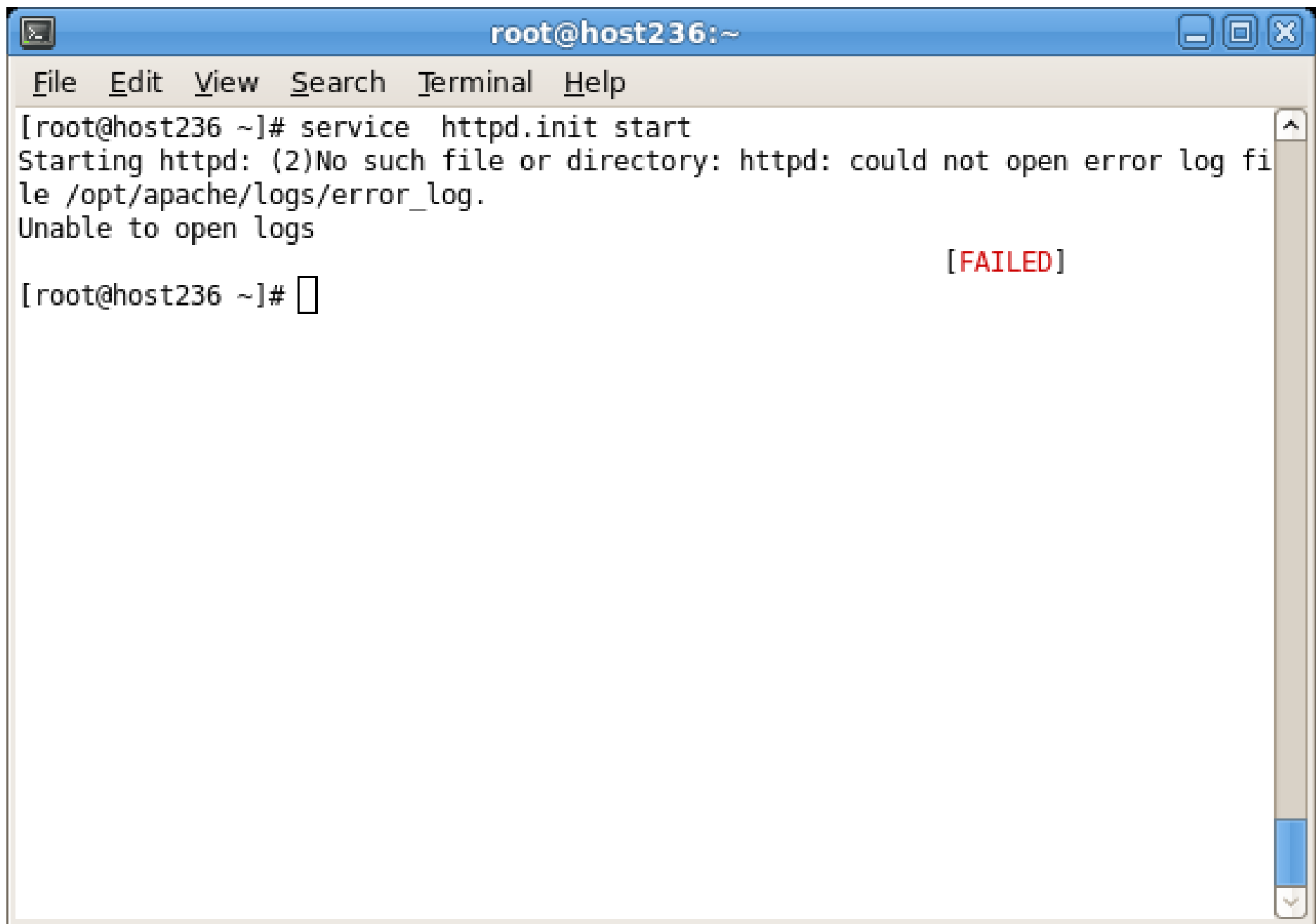
```
Total size: 16 M  
Installed size: 16 M  
Is this ok [y/N]: y  
Downloading Packages:  
Running rpm_check_debug  
Running Transaction Test  
Transaction Test Succeeded  
Running Transaction  
Installing      : httpd-2.2.17-1.el6.x86_64                1/1  
  
Installed:  
httpd.x86_64 0:2.2.17-1.el6  
  
Complete!  
[root@host236 ~]#
```

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A terminal window titled 'root@host236:~' with a menu bar (File, Edit, View, Search, Terminal, Help). The terminal shows the command 'service httpd.init start' being executed. The output is 'Starting httpd: (2)No such file or directory: httpd: could not open error log file /opt/apache/logs/error_log. Unable to open logs'. The word '[FAILED]' is printed in red. The prompt '[root@host236 ~]#' is followed by a cursor.

```
root@host236:~  
File Edit View Search Terminal Help  
[root@host236 ~]# service httpd.init start  
Starting httpd: (2)No such file or directory: httpd: could not open error log fi  
le /opt/apache/logs/error_log.  
Unable to open logs  
[FAILED]  
[root@host236 ~]#
```

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Packaging internally developed software

- Back to the spec file!
- In this case, adding only files was not the right choice, we needed to add the directories the packages owns, as well!



```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help
Name:      httpd
Version:   2.2.17
Release:   2%{?dist}
Summary:   Apache httpd for Acme Widget
█
Group:     System Environments/Daemons
License:   ASL 2.0
URL:       http://httpd.apache.org
Source0:   httpd-2.2.17.tar.gz
Source1:   apache.sh
Source2:   httpd.init
Patch0:    make_DESTDIR.patch
BuildRoot: %{_tmppath}/%{name}-%{version}-%{release}-root-%(%{__id_u} -n)

BuildRequires: autoconf, libtool, make, gcc
Requires:      compat-expat1

%define debug_package %{nil}

%description
This is a custom build of Apache for Acme Widget Corp

%prep

5,0-1 Top
```



```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help

%setup -q
%patch0 -p1

%build
./configure --prefix=/opt/apache
make %{?_smp_mflags}

%install
rm -rf $RPM_BUILD_ROOT
make install DESTDIR=$RPM_BUILD_ROOT

mkdir -p $RPM_BUILD_ROOT/etc/profile.d
mkdir -p $RPM_BUILD_ROOT/etc/rc.d/init.d
mkdir -p $RPM_BUILD_ROOT/opt/apache/logs
install -m 755 $RPM_SOURCE_DIR/apache.sh $RPM_BUILD_ROOT/etc/profile.d
install -m 755 $RPM_SOURCE_DIR/httpd.init $RPM_BUILD_ROOT/etc/rc.d/init.d

%clean
rm -rf $RPM_BUILD_ROOT

%files
%defattr(-,root,root,-)
/opt/apache/build/rules.mk
-- INSERT --
```

35,41 1%



```
makerpm@host236:~/rpmbuild/SPECS
File Edit View Search Terminal Help
/opt/apache/manual/images
/opt/apache/manual/misc
/opt/apache/manual/mod
/opt/apache/manual/platform
/opt/apache/manual/programs
/opt/apache/manual/rewrite
/opt/apache/manual/ssl
/opt/apache/manual/style
/opt/apache/manual/style/css
/opt/apache/manual/style/lang
/opt/apache/manual/style/latex
/opt/apache/manual/style/xsl
/opt/apache/manual/style/xsl/util
/opt/apache/manual/vhosts
/opt/apache/modules
/opt/apache/logs
%doc
%changelog
* Sat Apr 30 2011 Make RPM <makerpm@example.com>
- Fixed lack of log file directory

* Wed Apr 27 2011 Make RPM <makerpm@example.com>
-- INSERT --
1300,17 99%
```

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```
root@host236:~  
File Edit View Search Terminal Help  
Requires: /bin/bash /bin/sh /usr/bin/perl libapr-1.so.0()(64bit) libaprutil-1.so  
.0()(64bit) libc.so.6()(64bit) libc.so.6(GLIBC_2.2.5)(64bit) libc.so.6(GLIBC_2.3  
) (64bit) libcrypt.so.1()(64bit) libcrypt.so.1(GLIBC_2.2.5)(64bit) libexpat.so.0(  
) (64bit) libm.so.6()(64bit) libm.so.6(GLIBC_2.2.5)(64bit) libpthread.so.0()(64bi  
t) libpthread.so.0(GLIBC_2.2.5)(64bit) librt.so.1()(64bit) perl >= 0:5.004 perl(  
AnyDBM_File) perl(Fcntl) perl(strict) rtd(GNU_HASH)  
Checking for unpackaged file(s): /usr/lib/rpm/check-files /home/makerpm/rpmbuild  
/BUILDROOT/httpd-2.2.17-2.el6.x86_64  
Wrote: /home/makerpm/rpmbuild/SRPMS/httpd-2.2.17-2.el6.src.rpm  
Wrote: /home/makerpm/rpmbuild/RPMS/x86_64/httpd-2.2.17-2.el6.x86_64.rpm  
Executing(%clean): /bin/sh -e /var/tmp/rpm-tmp.0Tom0T  
+ umask 022  
+ cd /home/makerpm/rpmbuild/BUILD  
+ cd httpd-2.2.17  
+ rm -rf /home/makerpm/rpmbuild/BUILDROOT/httpd-2.2.17-2.el6.x86_64  
+ exit 0  
[makerpm@host236 SPECS]$ rpm --resign /home/makerpm/rpmbuild/RPMS/x86_64/httpd-2  
.2.17-2.el6.x86_64.rpm  
Enter pass phrase:  
Pass phrase is good.  
/home/makerpm/rpmbuild/RPMS/x86_64/httpd-2.2.17-2.el6.x86_64.rpm:  
[makerpm@host236 SPECS]$ su -  
Password:  
[root@host236 ~]#
```

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```
root@host236:~  
File Edit View Search Terminal Help  
=====
```

Installing:				
httpd	x86_64	2.2.17-2.el6	/httpd-2.2.17-2.el6.x86_64	16 M

```
Transaction Summary  
=====
```

Install	1 Package(s)
Upgrade	0 Package(s)

```
Total size: 16 M  
Installed size: 16 M  
Is this ok [y/N]: y  
Downloading Packages:  
Running rpm_check_debug  
Running Transaction Test  
Transaction Test Succeeded  
Running Transaction  
  Installing      : httpd-2.2.17-2.el6.x86_64                1/1  
  
Installed:  
  httpd.x86_64 0:2.2.17-2.el6  
  
Complete!  
[root@host236 ~]#
```

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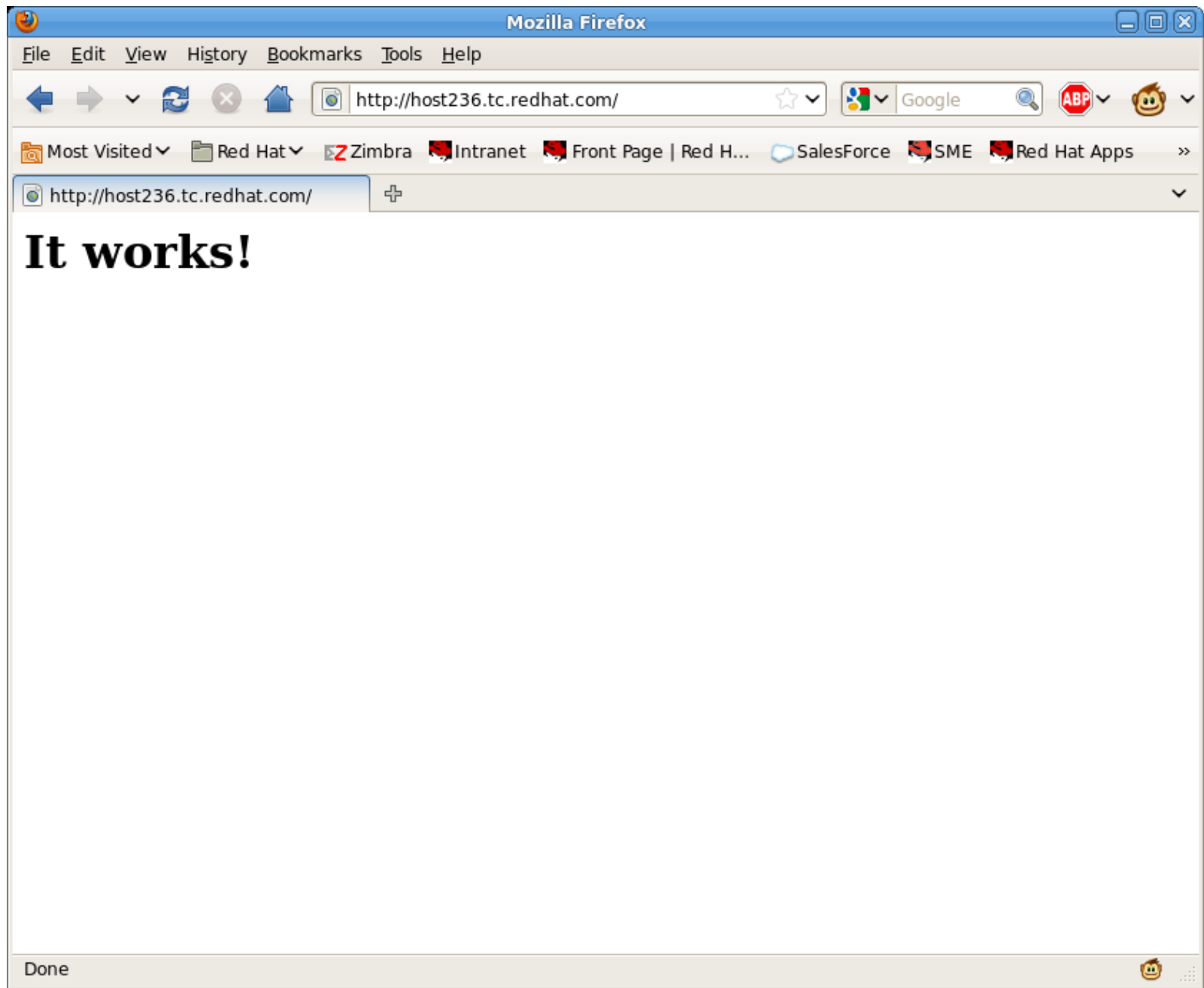
```
root@host236:~  
File Edit View Search Terminal Help  
[root@host236 ~]# service httpd.init start  
Starting httpd: [ OK ]  
[root@host236 ~]# ps ax | grep httpd  
17493 ?        Ss      0:00 /opt/apache/bin/httpd  
17495 ?        S        0:00 /opt/apache/bin/httpd  
17496 ?        S        0:00 /opt/apache/bin/httpd  
17497 ?        S        0:00 /opt/apache/bin/httpd  
17498 ?        S        0:00 /opt/apache/bin/httpd  
17499 ?        S        0:00 /opt/apache/bin/httpd  
17501 pts/0    R+      0:00 grep httpd  
[root@host236 ~]#
```

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```
root@host236:~  
File Edit View Search Terminal Help  
httpd      x86_64      2.2.17-2.el6      @/httpd-2.2.17-2.el6.x86_64      16 M  
  
Transaction Summary  
=====
```

Remove	1 Package(s)
Reinstall	0 Package(s)
Downgrade	0 Package(s)

```
  
Downloading Packages:  
Running rpm_check_debug  
Running Transaction Test  
Transaction Test Succeeded  
Running Transaction  
  Erasing      : httpd-2.2.17-2.el6.x86_64      1/1  
warning: /opt/apache/conf/httpd.conf saved as /opt/apache/conf/httpd.conf.rpmsave  
warning: /opt/apache/conf/extra/httpd-vhosts.conf saved as /opt/apache/conf/extra/httpd-vhosts.conf.rpmsave  
  
Removed:  
  httpd.x86_64 0:2.2.17-2.el6  
  
Complete!  
[root@host236 ~]#
```

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```
root@host236:~  
File Edit View Search Terminal Help  
Running Transaction Test  
Transaction Test Succeeded  
Running Transaction  
Erasing : httpd-2.2.17-2.el6.x86_64 1/1  
warning: /opt/apache/conf/httpd.conf saved as /opt/apache/conf/httpd.conf.rpmsave  
e  
warning: /opt/apache/conf/extra/httpd-vhosts.conf saved as /opt/apache/conf/extr  
a/httpd-vhosts.conf.rpmsave  
  
Removed:  
httpd.x86_64 0:2.2.17-2.el6  
  
Complete!  
[root@host236 ~]# find /opt/  
/opt/  
/opt/apache  
/opt/apache/logs  
/opt/apache/logs/access_log  
/opt/apache/logs/error_log  
/opt/apache/conf  
/opt/apache/conf/httpd.conf.rpmsave  
/opt/apache/conf/extra  
/opt/apache/conf/extra/httpd-vhosts.conf.rpmsave  
[root@host236 ~]#
```

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Madness Break

- Internally developed packages in the mass spectrometer, now on to COTS software!



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Packaging third party COTS software

- Often times software is installed from tarballs and shell scripts or other installers.
 - Makes it very hard to centralize version control
 - Makes it very hard to centralize integrity checking
 - Makes it very hard to centralize deployment
 - And, no, `"for i in host1 host2 host3; do scp my.tgz root@$i; done"` is not an enterprise centralized deployment mechanism!



Packaging third party COTS software

- For this example, we are going to create an RPM from an application which has been installed by an installer program into which we have no visibility.
 - First, get a baseline of what is installed. You can run the `/etc/cron.daily/mlocate` script to update the locate database. Dump that to a text file.
 - Install your app, run the `mlocate` script again, and dump it to a text file.
 - Diff the text files.
 - Use `/bin/find` to find anything on the filesystem modified since your first text file was made.



```
root@t510:~  
File Edit View Search Terminal Help  
[root@t510 ~]# /etc/cron.daily/mlocate.cron  
[root@t510 ~]# locate \* > before.txt  
[root@t510 ~]# cd tmp/  
[root@t510 tmp]# sh install.sh  
[root@t510 tmp]# cd ..  
[root@t510 ~]# /etc/cron.daily/mlocate.cron  
[root@t510 ~]# locate \* > after.txt  
[root@t510 ~]# diff before.txt after.txt  
272a273  
> /etc/foo.conf  
1443a1445  
> /etc/ld.so.conf.d/foo-x86_64.conf  
33843a33846,33855  
> /opt/myapp  
> /opt/myapp/bin  
> /opt/myapp/lib  
> /opt/myapp/sbin  
> /opt/myapp/bin/bar  
> /opt/myapp/bin/foo  
> /opt/myapp/lib/libbar.so  
> /opt/myapp/lib/libbaz.so  
> /opt/myapp/lib/libfoo.so  
> /opt/myapp/sbin/baz  
314662c314674  
< /var/lib/mlocate/mlocate.db.XQMUCv  
---  
> /var/lib/mlocate/mlocate.db.lzsVyC  
[root@t510 ~]#
```

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```
root@t510:~  
File Edit View Search Terminal Help  
[root@t510 ~]# find / -newer before.txt 2> /dev/null | egrep -v "\/sys|\/proc|\/dev|\/tmp"  
/var/lib/mlocate  
/var/lib/mlocate/mlocate.db  
/var/run/pcscd.events  
/var/run/pcscd.events/event.6022.17011352  
/etc  
/etc/ld.so.conf.d  
/etc/ld.so.conf.d/foo-x86_64.conf  
/etc/profile  
/etc/foo.conf  
/opt  
/opt/myapp  
/opt/myapp/bin  
/opt/myapp/bin/bar  
/opt/myapp/bin/foo  
/opt/myapp/lib  
/opt/myapp/lib/libfoo.so  
/opt/myapp/lib/libbaz.so  
/opt/myapp/lib/libbar.so  
/opt/myapp/sbin  
/opt/myapp/sbin/baz  
/root/after.txt  
[root@t510 ~]#
```

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Packaging third party COTS software

- So in this case, we see that the following files have been added to the system or modified:
 - /etc/foo.conf
 - /etc/ld.so.conf.d/foo-x86_64.conf
 - /etc/profile (we know it changed, but not how)
 - /opt/myapp/bin
 - /opt/myapp/bin/bar
 - /opt/myapp/bin/foo



Packaging third party COTS software

- So in this case, we see that the following files have been added to the system or modified:
 - /opt/myapp/lib
 - /opt/myapp/lib/libbar.so
 - /opt/myapp/lib/libbaz.so
 - /opt/myapp/lib/libfoo.so
 - /opt/myapp/sbin
 - /opt/myapp/sbin/baz



Packaging third party COTS software

- Look for any files which will need to be customized
 - Inspect `/etc/profile`

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```
root@t510:~  
File Edit View Search Terminal Help  
fi  
  
HOSTNAME=`/bin/hostname 2>/dev/null`  
HISTSIZE=1000  
if [ "$HISTCONTROL" = "ignorespace" ] ; then  
    export HISTCONTROL=ignoreboth  
else  
    export HISTCONTROL=ignoredups  
fi  
  
# Added by foo installer  
PATH="/opt/myapp/bin:$PATH"  
if [ `id -u` -eq 0 ] || [ `id -g` -eq 0 ]; then  
    PATH="/opt/myapp/sbin:$PATH"  
fi  
# end added by foo installer  
  
export PATH USER LOGNAME MAIL HOSTNAME HISTSIZE HISTCONTROL  
  
for i in /etc/profile.d/*.sh ; do  
    if [ -r "$i" ]; then  
        if [ "$PS1" ]; then  
            . $i  
        fi  
    fi  
done  
:  
:
```

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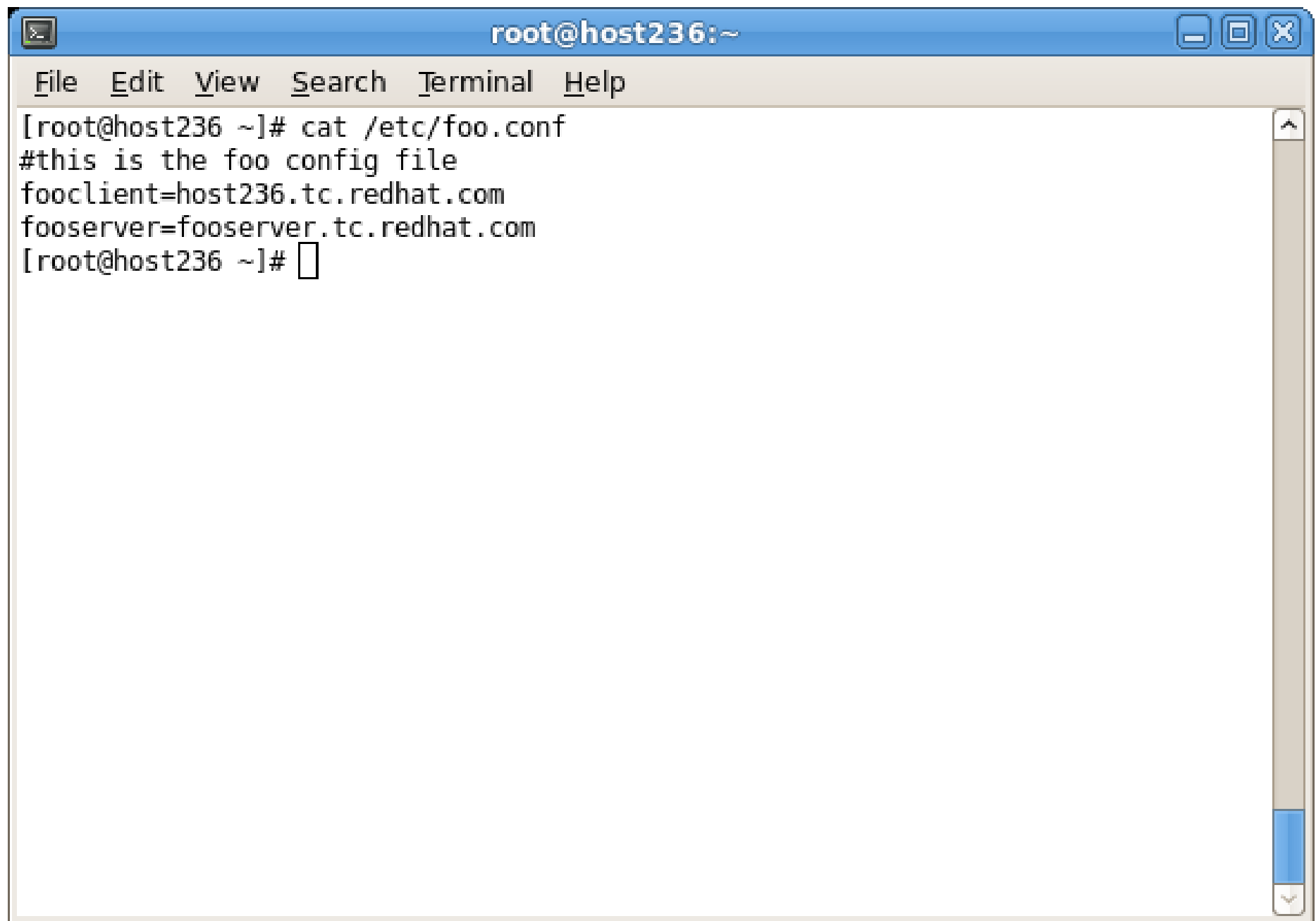
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Packaging third party COTS software

- Look for any files which will need to be customized
 - The only one of these which might change from system to system is the config file, `/etc/foo.conf`





A terminal window titled "root@host236:~" with a menu bar (File, Edit, View, Search, Terminal, Help). The terminal shows the command "cat /etc/foo.conf" and its output: "#this is the foo config file", "fooclient=host236.tc.redhat.com", and "fooserver=fooserver.tc.redhat.com". The prompt "[root@host236 ~]#" is followed by a cursor.

```
root@host236:~  
File Edit View Search Terminal Help  
[root@host236 ~]# cat /etc/foo.conf  
#this is the foo config file  
fooclient=host236.tc.redhat.com  
fooserver=fooserver.tc.redhat.com  
[root@host236 ~]#
```

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Packaging third party COTS software

- For now, just remember that the config file has settings which will need to be changed from host to host.

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Packaging third party COTS software

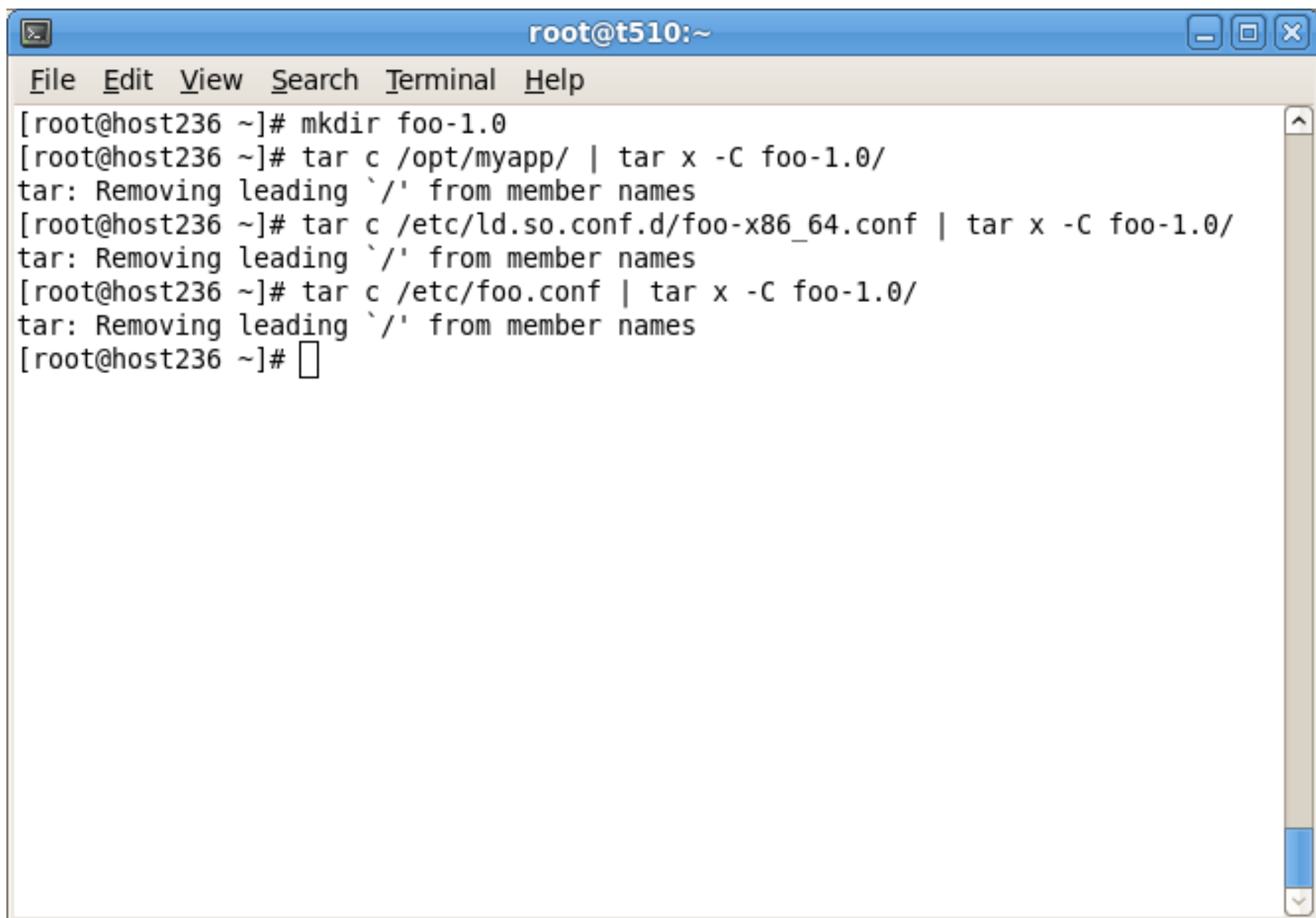
- For now, just remember that the config file has settings which will need to be changed from host to host.
 - Remember config file macros in RHN Satellite...?



Packaging third party COTS software

- Create a directory called [app]-[version].[release]
 - For instance, `~/myapp-1.0`
- Copy the installed software into this directory. Can be hierarchical or just dumped into the directory, but hierarchical is more human recognizable. The directory you create will be the “root” of the RPM.





A terminal window titled "root@t510:~" with a menu bar containing "File", "Edit", "View", "Search", "Terminal", and "Help". The terminal shows the following commands and output:

```
[root@host236 ~]# mkdir foo-1.0
[root@host236 ~]# tar c /opt/myapp/ | tar x -C foo-1.0/
tar: Removing leading '/' from member names
[root@host236 ~]# tar c /etc/ld.so.conf.d/foo-x86_64.conf | tar x -C foo-1.0/
tar: Removing leading '/' from member names
[root@host236 ~]# tar c /etc/foo.conf | tar x -C foo-1.0/
tar: Removing leading '/' from member names
[root@host236 ~]#
```

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```
root@t510:~  
File Edit View Search Terminal Help  
[root@host236 ~]# find foo-1.0/  
foo-1.0/  
foo-1.0/etc  
foo-1.0/etc/ld.so.conf.d  
foo-1.0/etc/ld.so.conf.d/foo-x86_64.conf  
foo-1.0/etc/foo.conf  
foo-1.0/opt  
foo-1.0/opt/myapp  
foo-1.0/opt/myapp/bin  
foo-1.0/opt/myapp/bin/bar  
foo-1.0/opt/myapp/bin/foo  
foo-1.0/opt/myapp/lib  
foo-1.0/opt/myapp/lib/libfoo.so  
foo-1.0/opt/myapp/lib/libbaz.so  
foo-1.0/opt/myapp/lib/libbar.so  
foo-1.0/opt/myapp/sbin  
foo-1.0/opt/myapp/sbin/baz  
[root@host236 ~]#
```

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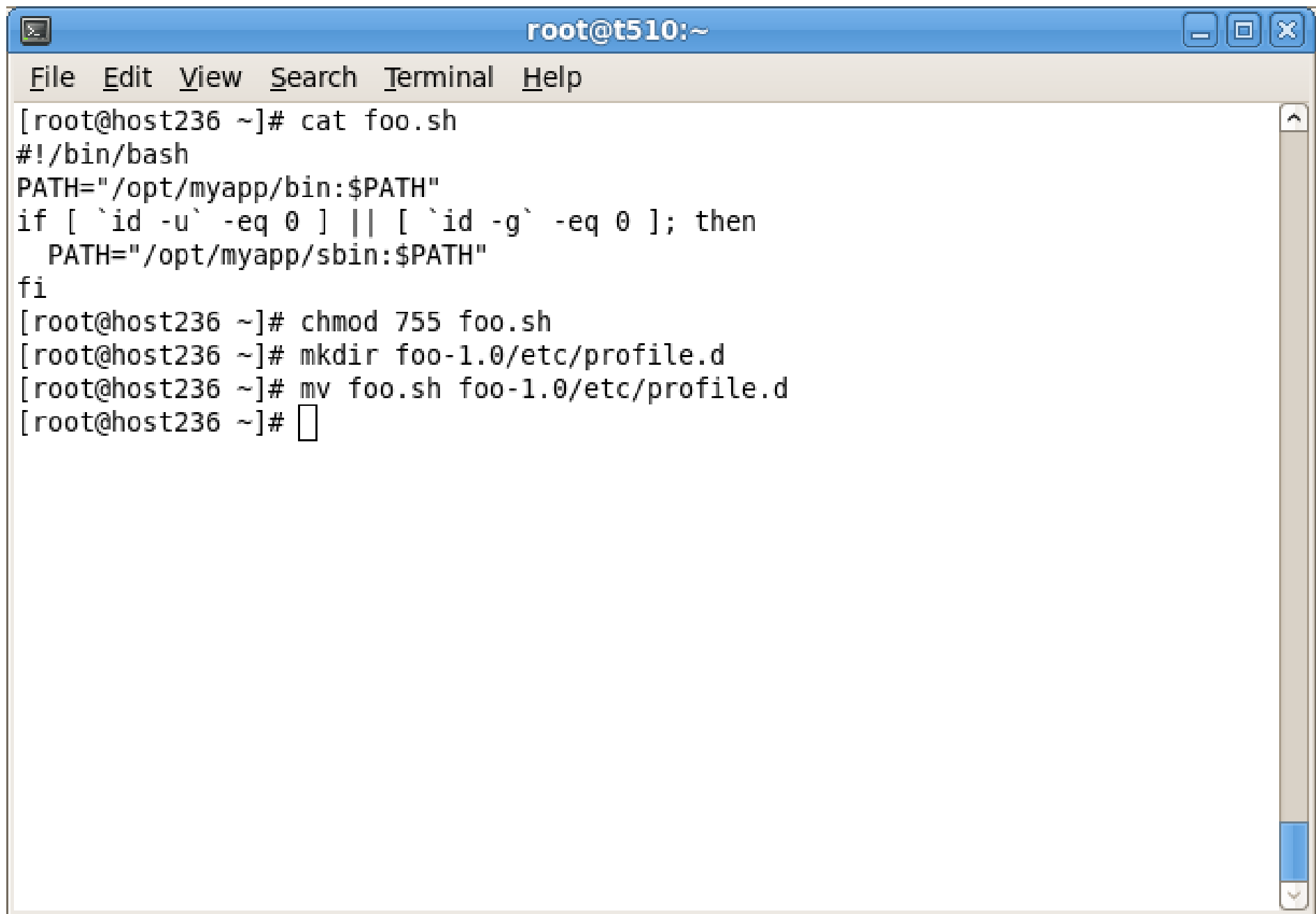
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Packaging third party COTS software

- Since we don't want to modify the system-provided `/etc/profile`, we'll create a script to go in `/etc/profile.d` called `foo.sh` and add it to our tree:





A terminal window titled "root@t510:~" with a menu bar (File, Edit, View, Search, Terminal, Help). The terminal shows the following commands and output:

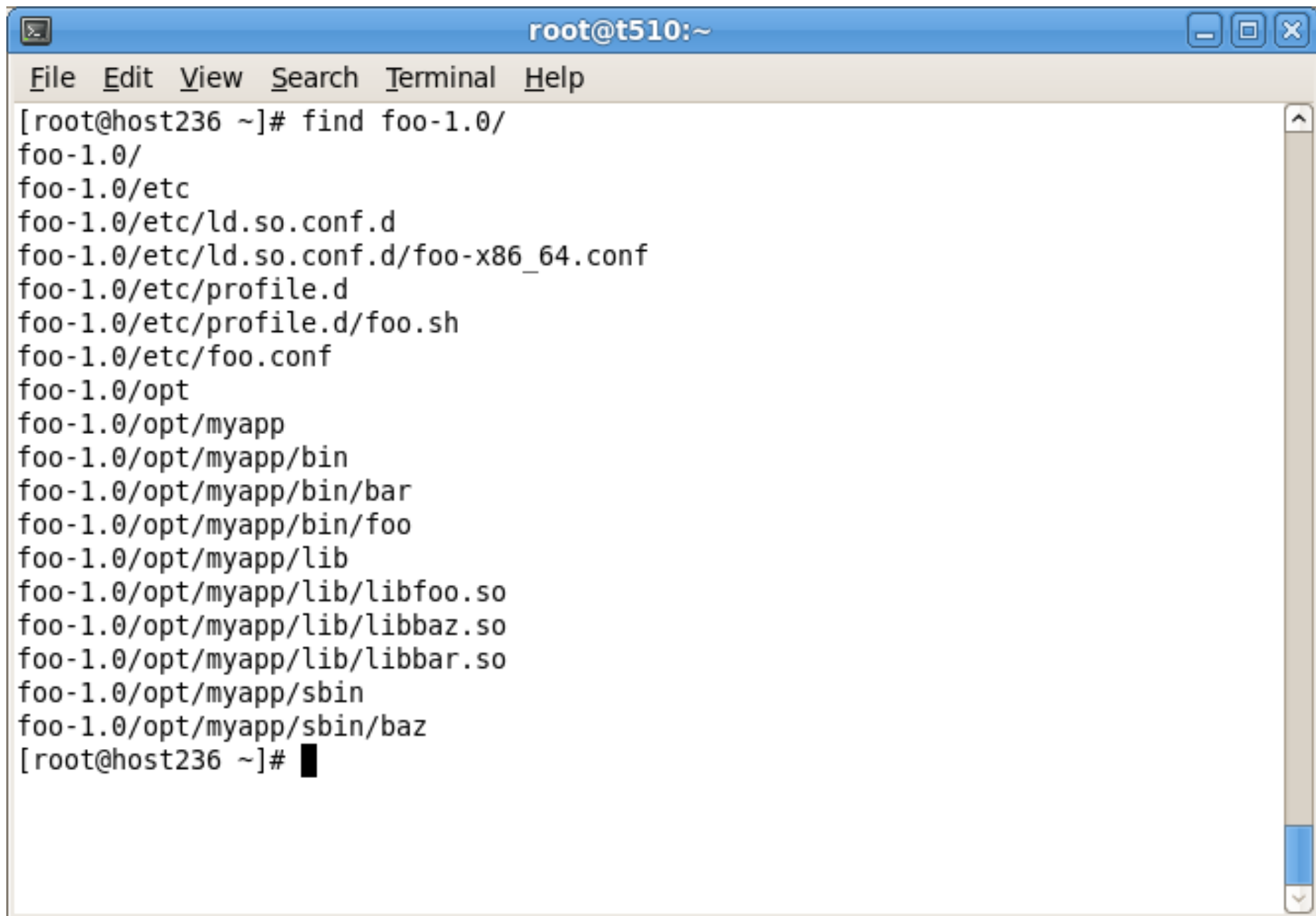
```
[root@host236 ~]# cat foo.sh
#!/bin/bash
PATH="/opt/myapp/bin:$PATH"
if [ `id -u` -eq 0 ] || [ `id -g` -eq 0 ]; then
    PATH="/opt/myapp/sbin:$PATH"
fi
[root@host236 ~]# chmod 755 foo.sh
[root@host236 ~]# mkdir foo-1.0/etc/profile.d
[root@host236 ~]# mv foo.sh foo-1.0/etc/profile.d
[root@host236 ~]#
```

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A terminal window titled 'root@t510:~' with a menu bar containing 'File', 'Edit', 'View', 'Search', 'Terminal', and 'Help'. The terminal displays the output of the command 'find foo-1.0/'. The output lists the following paths:

```
[root@host236 ~]# find foo-1.0/
foo-1.0/
foo-1.0/etc
foo-1.0/etc/ld.so.conf.d
foo-1.0/etc/ld.so.conf.d/foo-x86_64.conf
foo-1.0/etc/profile.d
foo-1.0/etc/profile.d/foo.sh
foo-1.0/etc/foo.conf
foo-1.0/opt
foo-1.0/opt/myapp
foo-1.0/opt/myapp/bin
foo-1.0/opt/myapp/bin/bar
foo-1.0/opt/myapp/bin/foo
foo-1.0/opt/myapp/lib
foo-1.0/opt/myapp/lib/libfoo.so
foo-1.0/opt/myapp/lib/libbaz.so
foo-1.0/opt/myapp/lib/libbar.so
foo-1.0/opt/myapp/sbin
foo-1.0/opt/myapp/sbin/baz
[root@host236 ~]#
```

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Packaging third party COTS software

- Create a tar.gz or tar.bz2 file from this directory. The name should be something like:
 - `[name] - [version] . [build] .tar.gz` or
 - `[name] - [version] . [build] .tgz` or
 - `[name] - [version] . [build] .tar.bz2`



```
root@t510:~
File Edit View Search Terminal Help
[root@host236 ~]# tar jcvf foo-1.0.tar.bz2 foo-1.0/
foo-1.0/
foo-1.0/etc/
foo-1.0/etc/ld.so.conf.d/
foo-1.0/etc/ld.so.conf.d/foo-x86_64.conf
foo-1.0/etc/profile.d/
foo-1.0/etc/profile.d/foo.sh
foo-1.0/etc/foo.conf
foo-1.0/opt/
foo-1.0/opt/myapp/
foo-1.0/opt/myapp/bin/
foo-1.0/opt/myapp/bin/bar
foo-1.0/opt/myapp/bin/foo
foo-1.0/opt/myapp/lib/
foo-1.0/opt/myapp/lib/libfoo.so
foo-1.0/opt/myapp/lib/libbaz.so
foo-1.0/opt/myapp/lib/libbar.so
foo-1.0/opt/myapp/sbin/
foo-1.0/opt/myapp/sbin/baz
[root@host236 ~]# ls
after.txt  before.txt  foo-1.0  foo-1.0.tar.bz2  tmp
[root@host236 ~]#
```

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Packaging third party COTS software

- Now that you've created the tarball, put it where a non-root user can get it. Make sure the non-root user can read it!

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```
root@t510:~
File Edit View Search Terminal Help
[root@host236 ~]# tar jcvf foo-1.0.tar.bz2 foo-1.0/
foo-1.0/
foo-1.0/etc/
foo-1.0/etc/ld.so.conf.d/
foo-1.0/etc/ld.so.conf.d/foo-x86_64.conf
foo-1.0/etc/profile.d/
foo-1.0/etc/profile.d/foo.sh
foo-1.0/etc/foo.conf
foo-1.0/opt/
foo-1.0/opt/myapp/
foo-1.0/opt/myapp/bin/
foo-1.0/opt/myapp/bin/bar
foo-1.0/opt/myapp/bin/foo
foo-1.0/opt/myapp/lib/
foo-1.0/opt/myapp/lib/libfoo.so
foo-1.0/opt/myapp/lib/libbaz.so
foo-1.0/opt/myapp/lib/libbar.so
foo-1.0/opt/myapp/sbin/
foo-1.0/opt/myapp/sbin/baz
[root@host236 ~]# ls
after.txt  before.txt  foo-1.0  foo-1.0.tar.bz2  tmp
[root@host236 ~]# cp foo-1.0.tar.bz2 /tmp/
[root@host236 ~]# chmod 644 /tmp/foo-1.0.tar.bz2
[root@host236 ~]#
```

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Packaging third party COTS software

- Make sure you have the “Development tools” package group installed. For convenience sake, we recommend you also install the rpmdevtools package
- As a **non-root** user, create your RPM build tree using rpmdev-setuptree



```
tcameron@t510:~  
File Edit View Search Terminal Help  
[tcameron@host236 ~]$ ls  
Desktop  
[tcameron@host236 ~]$ rpmdev-setuptree  
[tcameron@host236 ~]$ ls  
Desktop rpmbuild  
[tcameron@host236 ~]$ find rpmbuild/  
rpmbuild/  
rpmbuild/RPMS  
rpmbuild/SRPMS  
rpmbuild/SPECS  
rpmbuild/SOURCES  
rpmbuild/BUILD  
[tcameron@host236 ~]$
```

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Packaging third party COTS software

- Copy the tarball into your ~/rpmbuild/SOURCES directory

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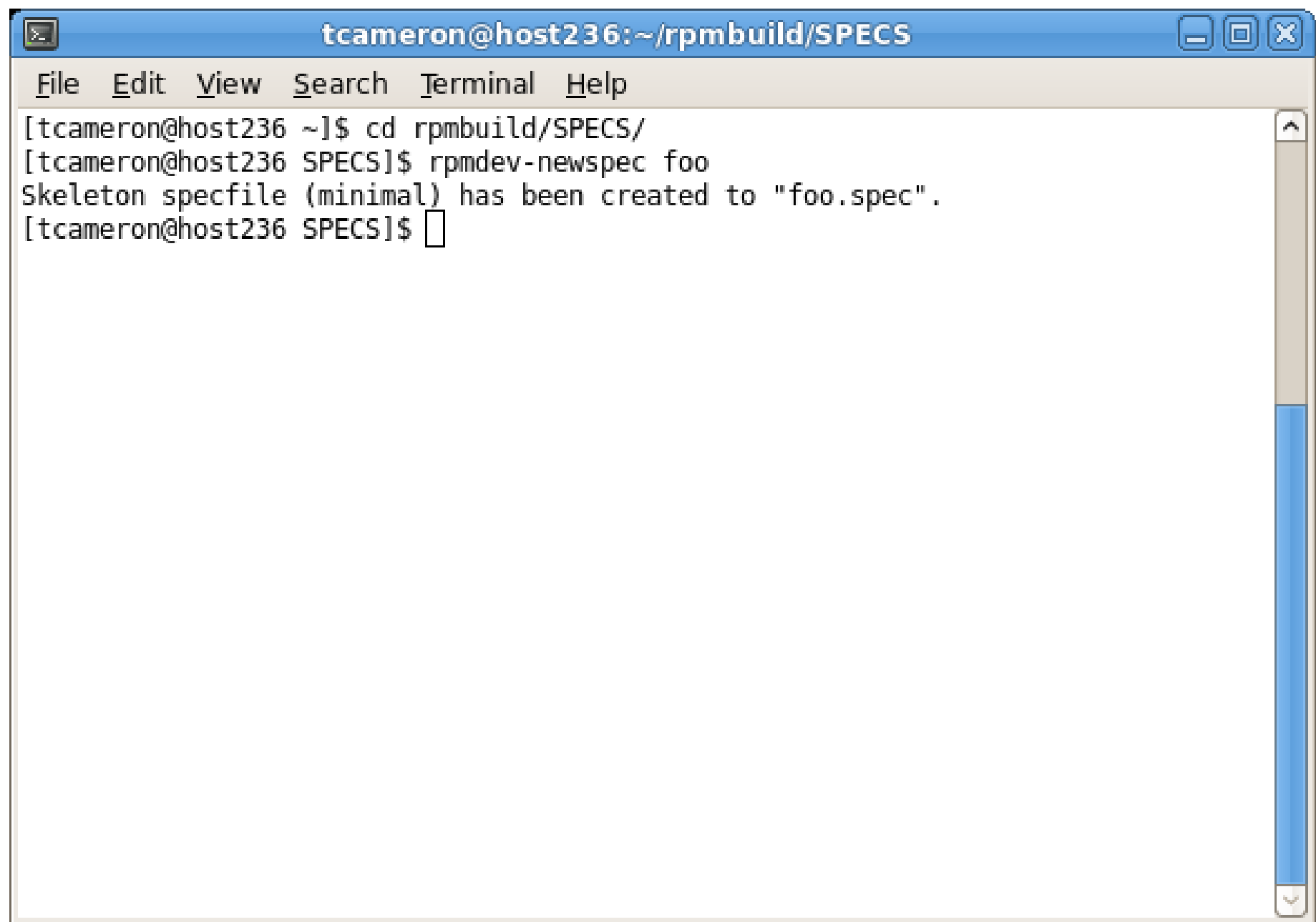
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Packaging third party COTS software

- Change your `~/rpmbuild/SPECS` directory and create a spec file
 - `rpmdev-newspec [name]`





A terminal window titled "tcameron@host236:~/rpmbuild/SPECS" with a menu bar (File, Edit, View, Search, Terminal, Help). The terminal shows the following commands and output:

```
[tcameron@host236 ~]$ cd rpmbuild/SPECS/  
[tcameron@host236 SPECS]$ rpmdev-newspec foo  
Skeleton specfile (minimal) has been created to "foo.spec".  
[tcameron@host236 SPECS]$
```

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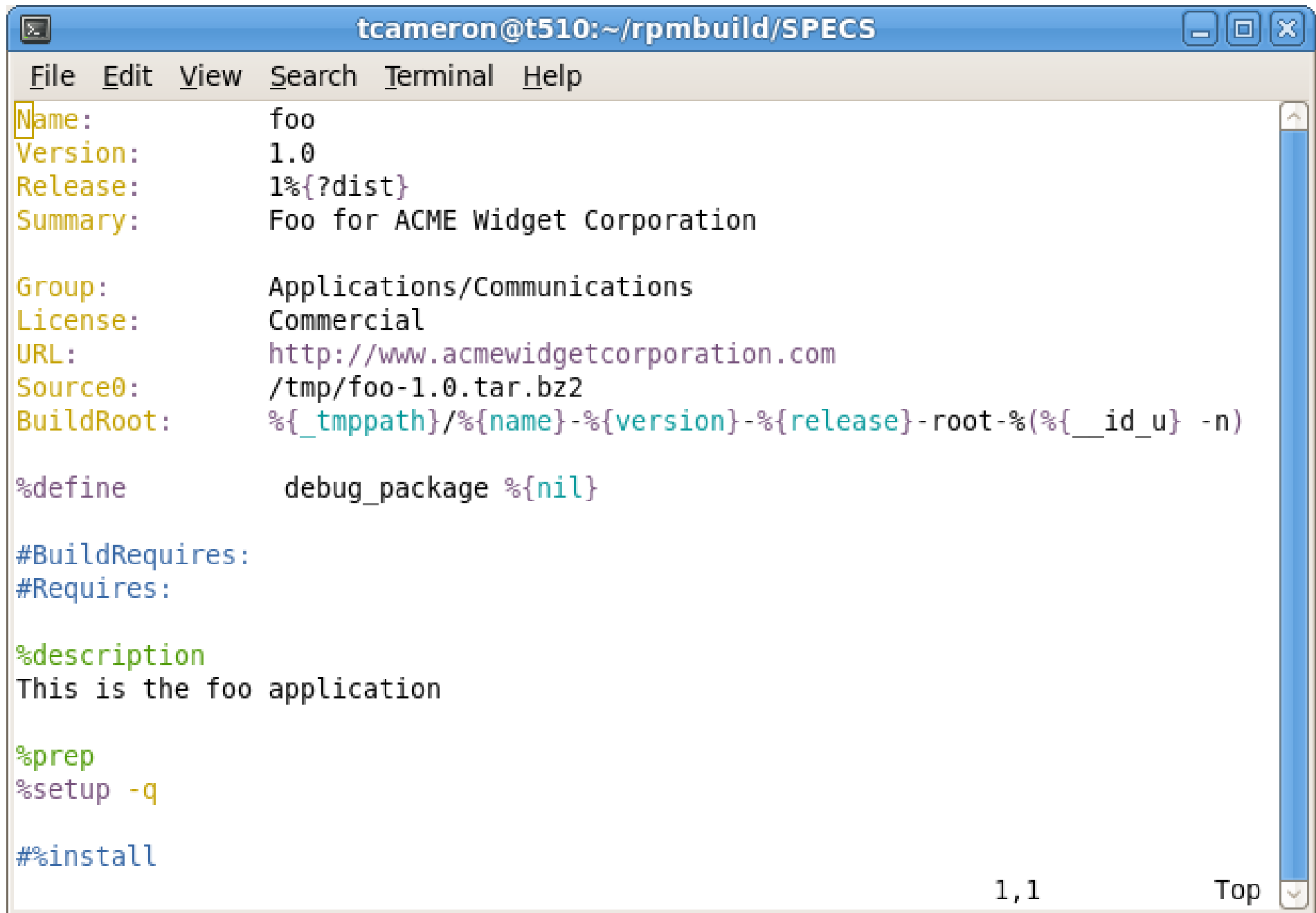
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Packaging third party COTS software

- In this case, we want to setup and prep, but we do **not** want to `./configure` **or** `make` **or** `make DESTDIR install`.
- We also do not want to strip the binaries of debug symbols – they may have been compiled and/or stripped in a non-GNU tools environment and we could break them.





The screenshot shows a terminal window titled "tcameron@t510:~/rpmbuild/SPECS". The window contains an RPM spec file for a package named "foo". The spec file includes fields for Name, Version, Release, Summary, Group, License, URL, Source0, and BuildRoot. It also contains a macro definition for debug_package, build requirements, a description, preparation steps, and an installation section. The terminal window has a menu bar with File, Edit, View, Search, Terminal, and Help. A scrollbar is visible on the right side of the terminal window.

```
File Edit View Search Terminal Help
Name:                foo
Version:             1.0
Release:             1%{?dist}
Summary:             Foo for ACME Widget Corporation

Group:              Applications/Communications
License:            Commercial
URL:                http://www.acmewidgetcorporation.com
Source0:            /tmp/foo-1.0.tar.bz2
BuildRoot:          %{_tmppath}/%{name}-%{version}-%{release}-root-%(%{__id_u} -n)

%define              debug_package %{nil}

#BuildRequires:
#Requires:

%description
This is the foo application

%prep
%setup -q

#%install

1,1 Top
```

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```
tcameron@t510:~/rpmbuild/SPECS
File Edit View Search Terminal Help
[%install
rm -rf $RPM_BUILD_ROOT
#make install DESTDIR=$RPM_BUILD_ROOT
mkdir -p $RPM_BUILD_ROOT/opt/myapp/bin
mkdir -p $RPM_BUILD_ROOT/opt/myapp/lib
mkdir -p $RPM_BUILD_ROOT/opt/myapp/sbin
mkdir -p $RPM_BUILD_ROOT/etc/profile.d
mkdir -p $RPM_BUILD_ROOT/etc/ld.so.conf.d
install -m 755 ./opt/myapp/bin/foo $RPM_BUILD_ROOT/opt/myapp/bin/foo
install -m 755 ./opt/myapp/bin/bar $RPM_BUILD_ROOT/opt/myapp/bin/bar
install -m 644 ./opt/myapp/lib/libbar.so $RPM_BUILD_ROOT/opt/myapp/lib/libbar.so
install -m 644 ./opt/myapp/lib/libbaz.so $RPM_BUILD_ROOT/opt/myapp/lib/libbaz.so
install -m 644 ./opt/myapp/lib/libfoo.so $RPM_BUILD_ROOT/opt/myapp/lib/libfoo.so
install -m 755 ./opt/myapp/sbin/baz $RPM_BUILD_ROOT/opt/myapp/sbin/baz
install -m 755 ./etc/profile.d/foo.sh $RPM_BUILD_ROOT/etc/profile.d/foo.sh
install -m 644 ./etc/ld.so.conf.d/foo-x86_64.conf $RPM_BUILD_ROOT/etc/ld.so.conf
.d/foo-x86_64.conf
install -m 644 ./etc/foo.conf $RPM_BUILD_ROOT/etc/foo.conf

%clean
rm -rf $RPM_BUILD_ROOT

22,0-1 56%
```

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```
tcameron@t510:~/rpmbuild/SPECS
File Edit View Search Terminal Help
install -m 755 ./etc/ld.so.conf.d/foo-x86_64.conf $RPM_BUILD_ROOT/etc/ld.so.conf
.d/foo-x86_64.conf
install -m 755 ./etc/foo.conf $RPM_BUILD_ROOT/etc/foo.conf

%clean
rm -rf $RPM_BUILD_ROOT

%files
%defattr(-,root,root,-)
/etc/foo.conf
/etc/ld.so.conf.d/foo-x86_64.conf
/etc/profile.d/foo.sh
/opt/myapp/bin/bar
/opt/myapp/bin/foo
/opt/myapp/lib/libbar.so
/opt/myapp/lib/libbaz.so
/opt/myapp/lib/libfoo.so
/opt/myapp/sbin/baz
%doc

%changelog
* Thu Apr 28 2011 Thomas Cameron
- first try

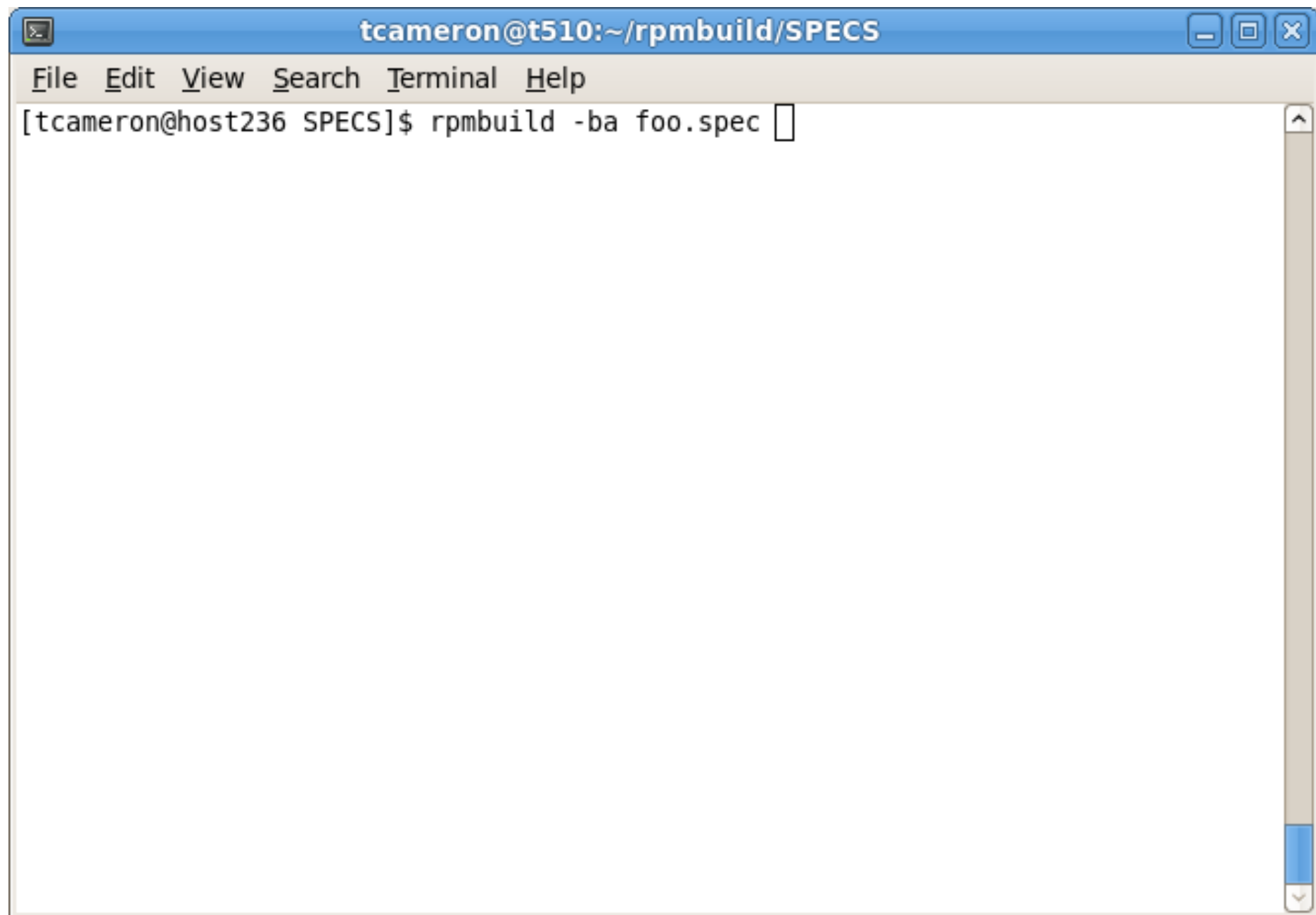
59,1 Bot
```

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A terminal window titled "tcameron@t510:~/rpmbuild/SPECS" with standard window controls. The menu bar includes File, Edit, View, Search, Terminal, and Help. The command prompt shows the user is in the "SPECS" directory and has entered the command "rpmbuild -ba foo.spec".

```
tcameron@t510:~/rpmbuild/SPECS
File Edit View Search Terminal Help
[tcameron@host236 SPECS]$ rpmbuild -ba foo.spec
```

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```
tcameron@t510:~/rpmbuild/SPECS
File Edit View Search Terminal Help
+ /usr/lib/rpm/check-buildroot
+ /usr/lib/rpm/redhat/brp-compress
+ /usr/lib/rpm/redhat/brp-strip /usr/bin/strip
+ /usr/lib/rpm/redhat/brp-strip-static-archive /usr/bin/strip
+ /usr/lib/rpm/redhat/brp-strip-comment-note /usr/bin/strip /usr/bin/objdump
+ /usr/lib/rpm/brp-python-bytecompile
+ /usr/lib/rpm/redhat/brp-python-hardlink
+ /usr/lib/rpm/redhat/brp-java-repack-jars
Processing files: foo-1.0-1.el6.x86_64
Requires(rpmlib): rpmlib(CompressedFileNames) <= 3.0.4-1 rpmlib(FileDigests) <=
4.6.0-1 rpmlib(PayloadFilesHavePrefix) <= 4.0-1
Requires: /bin/bash libc.so.6()(64bit) libc.so.6(GLIBC_2.2.5)(64bit) rtld(GNU_HA
SH)
Checking for unpackaged file(s): /usr/lib/rpm/check-files /home/tcameron/rpmbuil
d/BUILDROOT/foo-1.0-1.el6.x86_64
Wrote: /home/tcameron/rpmbuild/SRPMS/foo-1.0-1.el6.src.rpm
Wrote: /home/tcameron/rpmbuild/RPMS/x86_64/foo-1.0-1.el6.x86_64.rpm
Executing(%clean): /bin/sh -e /var/tmp/rpm-tmp.YxN8Ji
+ umask 022
+ cd /home/tcameron/rpmbuild/BUILD
+ cd foo-1.0
+ rm -rf /home/tcameron/rpmbuild/BUILDROOT/foo-1.0-1.el6.x86_64
+ exit 0
[tcameron@host236 SPECS]$
```

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```
tcameron@t510:~/rpmbuild/SPECS
File Edit View Search Terminal Help
[tcameron@host236 SPECS]$ find ../
../
../RPMS
../RPMS/x86_64
../RPMS/x86_64/foo-1.0-1.el6.x86_64.rpm
../SRPMS
../SRPMS/foo-1.0-1.el6.src.rpm
../BUILDROOT
../SPECS
../SPECS/foo.spec
../SOURCES
../SOURCES/foo-1.0.tar.bz2
../BUILD
../BUILD/foo-1.0
../BUILD/foo-1.0/opt
../BUILD/foo-1.0/opt/myapp
../BUILD/foo-1.0/opt/myapp/bin
../BUILD/foo-1.0/opt/myapp/bin/foo
../BUILD/foo-1.0/opt/myapp/bin/bar
../BUILD/foo-1.0/opt/myapp/lib
../BUILD/foo-1.0/opt/myapp/lib/libbar.so
../BUILD/foo-1.0/opt/myapp/lib/libbaz.so
../BUILD/foo-1.0/opt/myapp/lib/libfoo.so
../BUILD/foo-1.0/opt/myapp/sbin
```

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Packaging third party COTS software

- Sign your packages with gpg as described previously.

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```
tcameron@t510:~  
File Edit View Search Terminal Help  
[tcameron@host236 ~]$ sudo rpm -Uvh rpmbuild/RPMS/x86_64/foo-1.0-1.el6.x86_64.rpm  
Preparing... ##### [100%]  
1:foo ##### [100%]  
[tcameron@host236 ~]$
```

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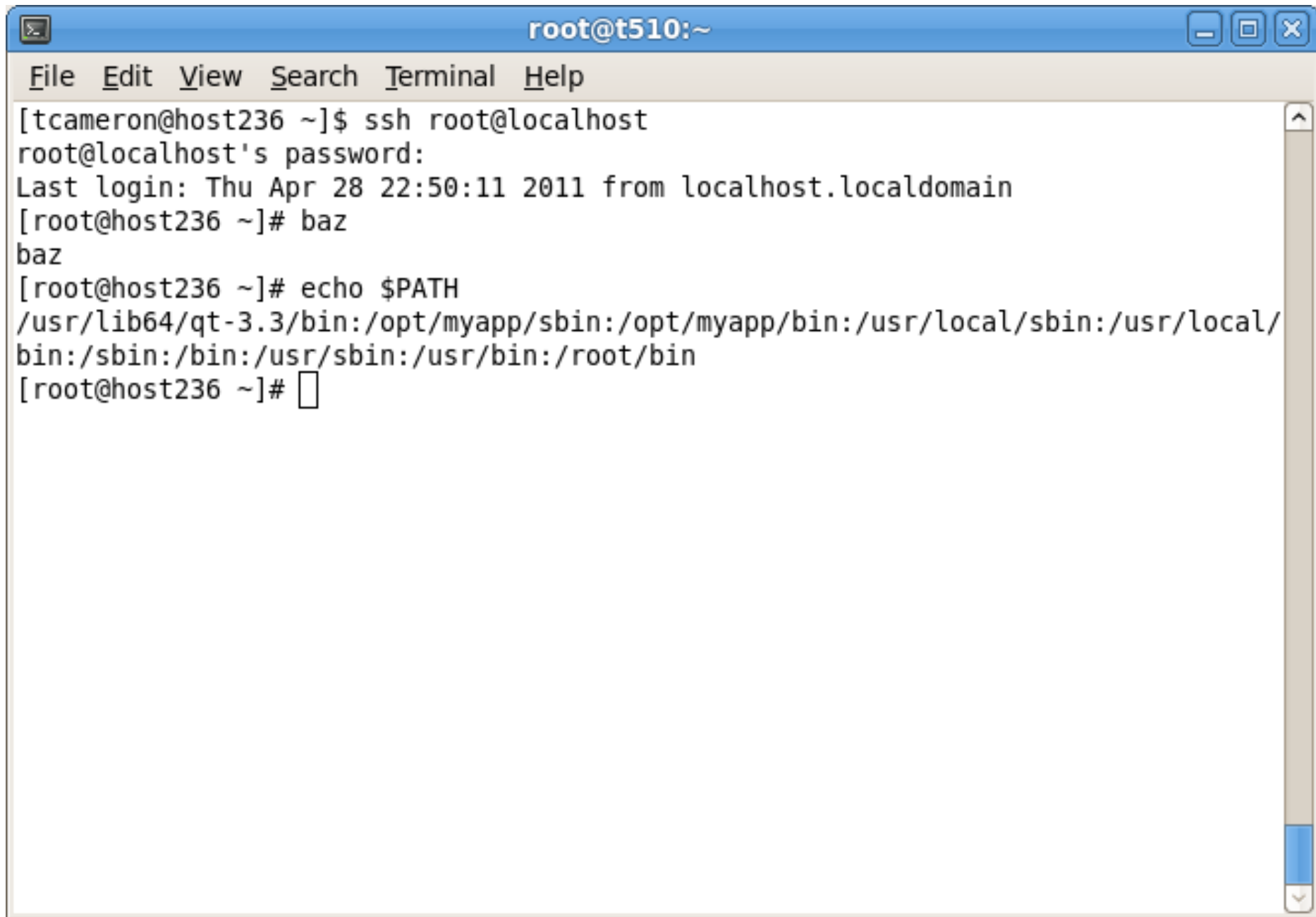
```
tcameron@t510:~  
File Edit View Search Terminal Help  
[tcameron@host236 ~]$ sudo rpm -Uvh rpmbuild/RPMS/x86_64/foo-1.0-1.el6.x86_64.rpm  
Preparing... ##### [100%]  
1:foo ##### [100%]  
[tcameron@host236 ~]$ ssh localhost  
tcameron@localhost's password:  
Last login: Thu Apr 28 22:49:23 2011 from localhost.localdomain  
[tcameron@host236 ~]$ foo  
foo  
[tcameron@host236 ~]$ bar  
bar  
[tcameron@host236 ~]$ baz  
-bash: baz: command not found  
[tcameron@host236 ~]$ echo $PATH  
/usr/lib64/qt-3.3/bin:/opt/myapp/bin:/usr/local/bin:/bin:/usr/bin:/usr/local/sbin:/usr/sbin:/sbin:/home/tcameron/bin  
[tcameron@host236 ~]$
```

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```
root@t510:~  
File Edit View Search Terminal Help  
[tcameron@host236 ~]$ ssh root@localhost  
root@localhost's password:  
Last login: Thu Apr 28 22:50:11 2011 from localhost.localdomain  
[root@host236 ~]# baz  
baz  
[root@host236 ~]# echo $PATH  
/usr/lib64/qt-3.3/bin:/opt/myapp/sbin:/opt/myapp/bin:/usr/local/sbin:/usr/local/  
bin:/sbin:/bin:/usr/sbin:/usr/bin:/root/bin  
[root@host236 ~]#
```

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Questions?



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Thank you!

- If you liked today's presentation, please let us know!
- Rick's contact info:
 - spurgeon@redhat.com
- Thomas's contact info:
 - thomas@redhat.com
 - choirboy on #rhel on Freenode
 - thomasdcameron on Twitter
 - <http://people.redhat.com/tcameron>

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