

# 软件管理

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## 软件管理

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# 软件管理

## 内容概述

- 软件运行环境
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- yum和dnf 管理
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- Ubuntu软件管理

# 1 软件运行和编译

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## 1.1 软件相关概念

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### 1.1.1 ABI

ABI : Application Binary Interface

Windows与Linux不兼容

- ELF(Executable and Linkable Format) Linux
- PE (Portable Executable) Windows

库级别的虚拟化:

- Linux: WINE
- Windows: Cygwin

### 1.1.2 API

API即Application Programming Interface, API可以在各种不同的操作系统上实现给应用程序提供完全相同的接口, 而它们本身在这些系统上的实现却可能迥异, 主流的操作系统有两种, 一种是Windows系统, 另一种是Linux系统。由于操作系统的不同, API又分为Windows API和Linux API。在Windows平台开发出来的软件在Linux上无法运行, 在Linux上开发的软件在Windows上又无法运行, 这就导致了软件移植困难, POSIX 标准的出现就是为了解决这个问题

POSIX: Portable Operating System Interface 可移植操作系统接口, 定义了操作系统应该为应用程序提供的接口标准, 是IEEE为要在各种UNIX操作系统上运行的软件而定义的一系列API标准的总称。

Linux和windows都要实现基本的posix标准, 程序就在源代码级别可移植了

### 1.1.3 开发语言

系统级开发

- 汇编语言
- C
- C++

应用级开发

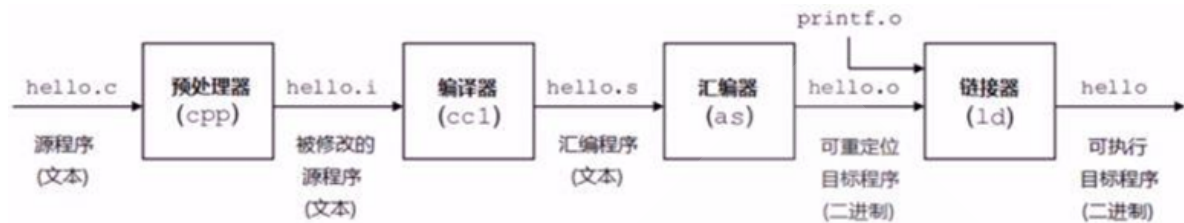
- java
- Python
- go
- php
- perl
- delphi

- basic
- ruby
- bash

## 1.2 C 语言程序的实现过程

C 程序源代码 --> 预处理 --> 编译 --> 汇编 --> 链接

C语言的程序编译主要经过四个过程：



- 预处理 (Pre-Processing)

- 1) 将所有的#define删除，并且展开所有的宏定义
- 2) 处理所有的条件预编译指令，比如#if #ifdef #elif #else #endif等
- 3) 处理#include 预编译指令，将被包含的文件插入到该预编译指令的位置。
- 4) 删除所有注释 "/\*"和"/\* \*/".
- 5) 添加行号和文件标识，以便编译时产生调试用的行号及编译错误警告行号。
- 6) 保留所有的#pragma编译器指令，因为编译器需要使用它们

- 编译 (Compiling)

编译过程就是把预处理完的文件进行一系列的词法分析，语法分析，语义分析及优化后，最后生成相应的汇编代码

- 汇编 (Assembling)

汇编器是将汇编代码转变成机器可以执行的命令，每一个汇编语句几乎都对应该一条机器指令。汇编相对于编译过程比较简单，根据汇编指令和机器指令的对照表——翻译即可

- 链接 (Linking)

通过调用链接器ld来链接程序运行需要的一大堆目标文件，以及所依赖的其它库文件，最后生成可执行文件

范例：gcc 编译过程

### #分步骤编译运行

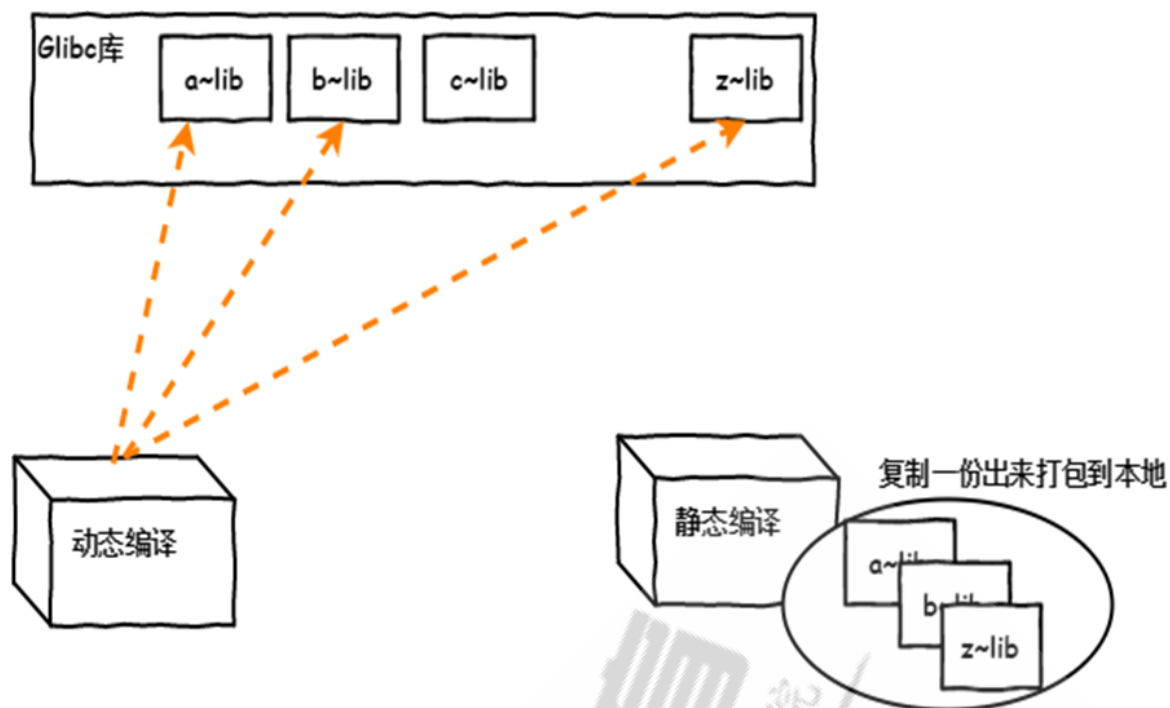
```
gcc -E hello.c -o hello.i    对hello.c文件进行预处理，生成了hello.i 文件
gcc -S hello.i -o hello.s    对预处理文件进行编译，生成了汇编文件
gcc -c hello.s -o hello.o    对汇编文件进行编译，生成了目标文件
gcc hello.o -o hello         对目标文件进行链接，生成可执行文件
```

### #一步实现编译过程

```
gcc hello.c -o hello        直接编译链接成可执行目标文件
```

## 1.3 软件模块的静态和动态链接

链接主要作用是把各个模块之间相互引用的部分处理好，使得各个模块之间能够正确地衔接，分为静态和动态链接



### 1.3.1 静态链接

- 把程序对应的依赖库复制一份到包
- 生成模块文件libxxx.a
- 嵌入程序包
- 升级难，需重新编译
- 占用较多空间，迁移容易

### 1.3.2 动态链接

- 只把依赖加做一个动态链接
- 生成模块文件libxxx.so
- 连接指向
- 占用较少空间，升级方便

### 1.3.3 模块（库）文件

查看二进制程序所依赖的库文件

```
ldd /PATH/TO/BINARY_FILE
```

管理及查看本机装载的库文件

```
#加载配置文件中指定的库文件
ldconfig

#显示本机已经缓存的所有可用库文件名及文件路径映射关系
/sbin/ldconfig -p
```

配置文件：

```
/etc/ld.so.conf
/etc/ld.so.conf.d/*.conf
```

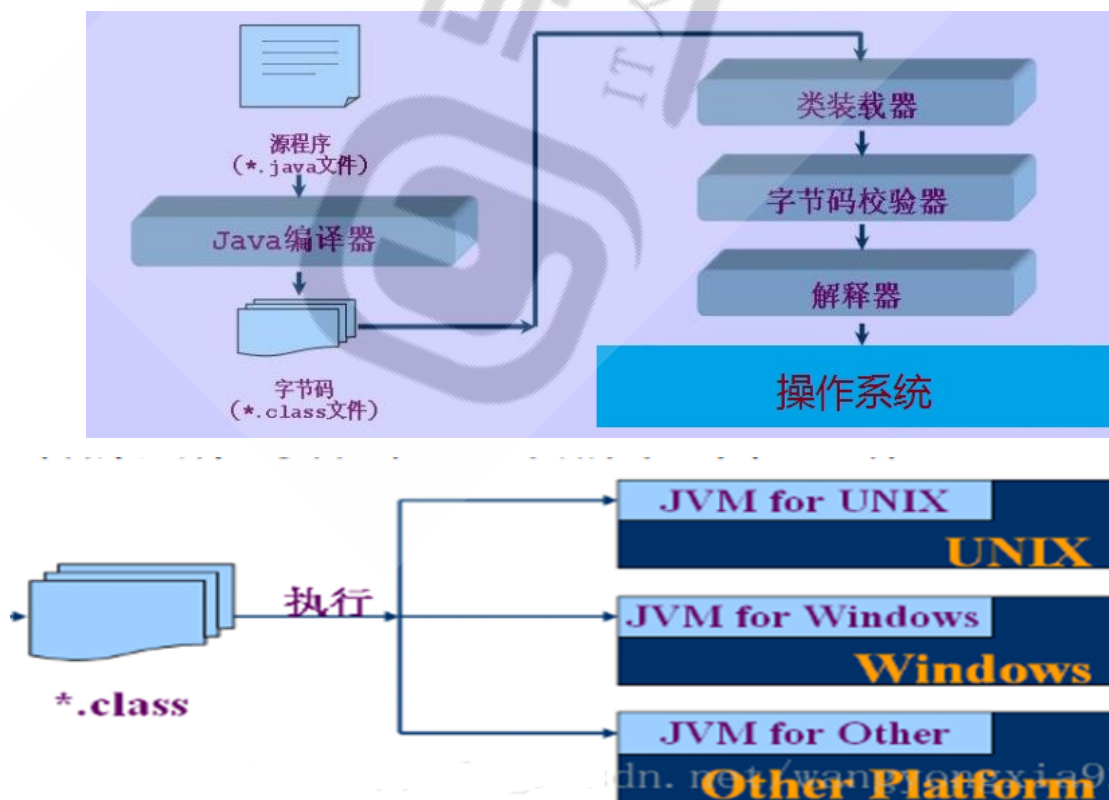
缓存文件:

```
/etc/ld.so.cache
```

范例: 库文件破坏后, 将导致依赖的程序无法正常运行

```
[root@centos8 ~]# ldd /bin/ls
linux-vdso.so.1 (0x00007ffc509fd000)
libselinux.so.1 => /lib64/libselinux.so.1 (0x00007fc6ef24a000)
libcap.so.2 => /lib64/libcap.so.2 (0x00007fc6ef044000)
libc.so.6 => /lib64/libc.so.6 (0x00007fc6eec81000)
libpcre2-8.so.0 => /lib64/libpcre2-8.so.0 (0x00007fc6ee9fd000)
libdl.so.2 => /lib64/libdl.so.2 (0x00007fc6ee7f9000)
/lib64/ld-linux-x86-64.so.2 (0x00007fc6ef698000)
libpthread.so.0 => /lib64/libpthread.so.0 (0x00007fc6ee5d9000)
[root@centos8 ~]# ldd /bin/cat
linux-vdso.so.1 (0x00007ffe335dd000)
libc.so.6 => /lib64/libc.so.6 (0x00007fa34749e000)
/lib64/ld-linux-x86-64.so.2 (0x00007fa347a6b000)
[root@centos8 ~]# mv /lib64/libc.so.6 /tmp
[root@centos8 ~]# ls
ls: error while loading shared libraries: libc.so.6: cannot open shared object
file: No such file or directory
[root@centos8 ~]# cat
cat: error while loading shared libraries: libc.so.6: cannot open shared object
file: No such file or directory
```

## 1.4 Java程序编译运行过程



## 2 软件包和包管理器

### 2.1 软件包介绍

开源软件最初只提供了.tar.gz的打包的源码文件，用户必须自己编译每个想在GNU/Linux上运行的软件。用户急需系统能提供一种更加便利的方法来管理这些软件，当Debian诞生时，这样一个管理工具dpkg也就应运而生，可用来管理deb后缀的"包"文件。从而著名的"package"概念第一次出现在GNU/Linux系统中，稍后Red Hat才开发自己的rpm包管理系统

范例: 使用光盘

```
#神奇的光盘挂载目录
#CentOS
[root@centos8 ~]#rpm -q autofs || yum -y install autofs
[root@centos8 ~]#systemctl enable --now autofs

#Ubuntu
root@ubuntu2004:~# apt install autofs -y
root@ubuntu2004:~# vim /etc/auto.master
/misc /etc/auto.misc
root@ubuntu2004:~# systemctl restart autofs
```

### 2.2 软件包中的文件分类

- 二进制文件
- 库文件
- 配置文件
- 帮助文件

范例: 利用 cpio工具查看包文件列表

```
rpm2cpio 包文件|cpio -itv 预览包内文件
rpm2cpio 包文件|cpio -id "*.conf" 释放包内文件
```

### 2.3 程序包管理器

软件包管理器功能:

将编译好的应用程序的各组成文件打包一个或几个程序包文件，利用包管理器可以方便快捷地实现程序包的安装、卸载、查询、升级和校验等管理操作

主流的程序包管理器

- redhat: rpm文件, rpm 包管理器, rpm: Redhat Package Manager, RPM Package Manager
- debian: deb文件, dpkg 包管理器

### 2.2 包命名

源代码打包文件命名:



```
name-VERSION.tar.gz|bz2|xz
VERSION: major.minor.release
```

范例:Linux 最新内核的C源码的行数

```
[root@centos8 ~]#tar xvf linux-5.7.2.tar.xz
[root@centos8 ~]#cd linux-5.7.2/
[root@centos8 linux-5.7.2]#for file in `find -name "*.c"`;do line=`cat $file|wc
-l`;let sum+=line;done;echo $sum
19517994
[root@centos8 linux-5.7.2]#cat `find -name "*.c"` |wc -l
19517994
[root@centos8 linux-5.7.2]#find -name "*.c" | xargs cat |wc -l
19517994
```

rpm包命名方式:

```
name-VERSION-release.arch.rpm
VERSION: major.minor.release
release: release.OS
```

常见的arch:

- x86: i386, i486, i586, i686
- x86\_64: x64, x86\_64, amd64
- powerpc: ppc
- 跟平台无关: noarch

范例:

```
bash-3.2-32.el5_9.1.i386.rpm
bash-4.2.46-19.el7.x86_64.rpm
bash-4.4.19-7.el8.x86_64.rpm
bash-4.4.19-7.el8.aarch64.rpm
bash-4.4.19-7.el8.ppc64le.rpm
bc_1.07.1-2_amd64.deb
bc_1.07.1-2_s390x.deb
```

范例: 统计rpm的架构类型及相应的包数量

```
[root@centos8 Packages]#pwd
/misc/cd/BaseOS/Packages
[root@centos8 Packages]#ls *.rpm | grep -Eo '([.])+\.rpm$' | grep -Eo
'^([.])+'|sort |uniq -c
 389 i686
 211 noarch
1061 x86_64
[root@centos8 Packages]#ls *.rpm |rev|cut -d. -f2|rev |sort |uniq -c
 389 i686
 211 noarch
1061 x86_64
[root@centos8 Packages]#ls *.rpm | grep -Eo '([.])+\.rpm$'|cut -d. -f1|sort |uniq
-c
 389 i686
 211 noarch
```



## 2.4 分类和拆包

软件包为了管理和使用的便利，会将一个大的软件分类，放在不同的子包中。

包的分类

- Application-VERSION-ARCH.rpm: 主包
- Application-devel-VERSION-ARCH.rpm 开发子包
- Application-utils-VERSION-ARCH.rpm 其它子包
- Application-libs-VERSION-ARCH.rpm 其它子包

## 2.5 包的依赖

软件包之间可能存在依赖关系，甚至循环依赖，即：A包依赖B包，B包依赖C包，C包依赖A包

安装软件包时，会因为缺少依赖的包，而导致安装包失败。

解决依赖包管理工具：

- yum：rpm包管理器的前端工具
- dnf：Fedora 18+ rpm包管理器前端管理工具，CentOS 8 版代替 yum
- apt：deb包管理器前端工具
- zypper：suse上的rpm前端管理工具

## 2.6 程序包管理器相关文件

### 1. 包文件组成 (每个包独有)

- 包内的文件
- 元数据，如：包的名称，版本，依赖性，描述等
- 可能会有包安装或卸载时运行的脚本

### 2. 数据库(公共)：/var/lib/rpm

- 程序包名称及版本
- 依赖关系
- 功能说明
- 包安装后生成的各文件路径及校验码信息

## 2.7 获取程序包的途径

软件包需要事先将源码进行编译后打包形成，获取包的途径如下：

### 2.7.1 系统发版的光盘或官方网站

CentOS 镜像：

<https://www.centos.org/download/>  
<http://mirrors.aliyun.com>  
<https://mirrors.huaweicloud.com/>  
<https://mirror.tuna.tsinghua.edu.cn/>  
<http://mirrors.sohu.com>  
<http://mirrors.163.com>

Ubuntu 镜像：

<http://cdimage.ubuntu.com/releases/>

<http://releases.ubuntu.com>

## 2.7.2 第三方组织提供

- Fedora-EPEL: Extra Packages for Enterprise Linux

<https://fedoraproject.org/wiki/EPEL>

<https://mirrors.aliyun.com/epel/>

<https://mirrors.cloud.tencent.com/epel/>

- Rpmforge: 官网: <http://repoforge.org/>, RHEL推荐, 包很全, 即将关闭
- Community Enterprise Linux Repository: <http://www.elrepo.org>, 支持最新的内核和硬件相关包

## 2.7.3 软件项目官方站点

<http://yum.mariadb.org/10.4/centos8-amd64/rpms/>

[http://repo.mysql.com/yum/mysql-8.0-community/el/8/x86\\_64/](http://repo.mysql.com/yum/mysql-8.0-community/el/8/x86_64/)

## 2.7.4 搜索引擎

<http://pkgs.org>

<http://rpmfind.net>

<http://rpm.pbone.net>

<https://sourceforge.net/>

注意: 第三方包建议要检查其合法性, 来源合法性, 程序包的完整性

## 2.7.5 自己制作

将源码文件, 利用工具, 如: rpmbuild, fpm 等工具制作成rpm包文件

# 3 rpm 包管理器

CentOS 系统上使用rpm命令管理程序包

功能:

安装、卸载、升级、查询、校验、数据库维护

## 3.1 安装

格式:

```
rpm {-i|--install} [install-options] PACKAGE_FILE...
```

选项:

**-v**: verbose

**-vv**:

**-h**: 以#显示程序包管理执行进度

常用组合:

```
rpm -ivh PACKAGE_FILE ...
```

rpm包安装[install-options]

```
--test: 测试安装, 但不真正执行安装, 即dry run模式
--nodeps: 忽略依赖关系
--replacepkgs | replacefiles
--nosignature: 不检查来源合法性
--nodigest: 不检查包完整性
--noscripts: 不执行程序包脚本
    %pre: 安装前脚本      --nopre
    %post: 安装后脚本      --nopost
    %preun: 卸载前脚本    --nopreun
    %postun: 卸载后脚本   --nopostun
```

## 3.2 升级和降级

rpm包升级

```
rpm {-U|--upgrade} [install-options] PACKAGE_FILE...
rpm {-F|--freshen} [install-options] PACKAGE_FILE...
```

对应选项:

```
upgrade: 安装有旧版程序包, 则"升级", 如果不存在旧版程序包, 则"安装"
freshen: 安装有旧版程序包, 则"升级", 如果不存在旧版程序包, 则不执行升级操作

--oldpackage: 降级
--force: 强制安装
```

常用组合

```
rpm -Uvh PACKAGE_FILE ...
rpm -Fvh PACKAGE_FILE ...
```

升级注意事项:

- (1) 不要对内核做升级操作; Linux支持多内核版本并存, 因此直接安装新版本内核
- (2) 如果原程序包的配置文件安装后曾被修改, 升级时, 新版本提供的同一个配置文件不会直接覆盖老版本的配置文件, 而把新版本文件重命名(FILENAME.rpmnew)后保留

## 3.3 包查询

```
rpm {-q|--query} [select-options] [query-options]
```

```
[select-options]
-a: 所有包
-f: 查看指定的文件由哪个程序包安装生成
-p rpmfile: 针对尚未安装的程序包文件做查询操作

[query-options]
--changelog: 查询rpm包的changelog
```

```
-c: 查询程序的配置文件
-d: 查询程序的文档
-i: information
-l: 查看指定的程序包安装后生成的所有文件
--scripts: 程序包自带的脚本
```

#和CAPABILITY相关

```
--whatprovides CAPABILITY: 查询指定的CAPABILITY由哪个包所提供
--whatrequires CAPABILITY: 查询指定的CAPABILITY被哪个包所依赖
--provides: 列出指定程序包所提供的CAPABILITY
-R: 查询指定的程序包所依赖的CAPABILITY
```

常用查询用法:

```
-qa
-q PACKAGE
-qi PACKAGE
-qc PACKAGE
-ql PACKAGE
-qd PACKAGE
-q --scripts PACKAGE
-qf FILE
-qpi PACKAGE_FILE
-qpl PACKAGE_FILE, ...
```

## 3.4 包卸载

格式:

```
rpm {-e|--erase} [--allmatches] [--nodeps] [--noscripts] [--notriggers] [--test]
PACKAGE_NAME ...
```

注意: 当包卸载时, 对应的配置文件不会删除, 以FILENAME.rpmsave形式保留

范例: 强行删除rpm包, 并恢复

```
[root@centos7 ~]#rpm -e rpm --nodeps

#重启进入rescue模式
#mkdir /mnt/cdrom
#mount /dev/sr0 /mnt/cdrom
#rpm -ivh /mnt/cdrom/Packages/rpm-4.11.3-40.el7.x86_64.rpm --root=/mnt/sysimage
#reboot
```

## 3.5 包校验

在安装包时, 系统也会检查包的来源是否是合法的

检查包的完整性和签名

```
rpm -K|--checksig rpmfile
```

在检查包的来源和完整性前, 必须导入所需要公钥

范例:

```
rpm --import /etc/pki/rpm-gpg/RPM-GPG-KEY-CentOS-7
rpm -qa "gpg-pubkey*"
```

范例: CentOS 8

```
[root@centos8 ~]#rpm -K /misc/cd/AppStream/Packages/httpd-2.4.37-
16.module_e18.1.0+256+ae790463.x86_64.rpm
/misc/cd/AppStream/Packages/httpd-2.4.37-
16.module_e18.1.0+256+ae790463.x86_64.rpm: digests SIGNATURES NOT OK
[root@centos8 ~]#cat /etc/pki/rpm-gpg/RPM-GPG-KEY-centosofficial
-----BEGIN PGP PUBLIC KEY BLOCK-----
Version: GnuPG v2.0.22 (GNU/Linux)

mQINBFZMWxkBEADHrskpBgN9OphmhRkc7P/YrsAGSvv17kfu+e9KAaU6f5MeAVyn
rIoM43syyGkgFywgjZM8/rur7EMPY2yt+2q/1ZfLVCRn9856JqTIq0XRpDUE4nKQ
8B1A7wDVZoSDxUZkSuTiYExbDf0cpw89Tcf62Mxmi8jh74vR1Py1PgjWL5494b3X
5fxDidH4bqPzyxBqPrUFuo+EfUVEqiGF94Ppq6ZUvrBG0Vo1V1+Ifm9CGEK597c
aevcGc1Rf1gxIgn84UpuDjPR9/zSndwJ7XsXYvZ6HXCKGagRKsfYDWGPkA5COL/e
f+yobOnC43yPUVpggQ4KaNJ6+SMTZOKikM8yciyBwLqwrjo8F1Jgkv8Vfag/2UR7
JINbyqHHoLUhQ2m6HXSwwK4Yjtwidf9EUKaBZWrrskYR3IRZLXLwqeOi/+ezYOW0m
vufrcvsh+TK1VVnuwmEPjJ8mwUSpsLdfPJo1DHsd8FS03SCKPaXFdb7ePfejiYk
nHPQaKE01awVSLuiygn7F7rYemGqV9Vt7tBw5pz0vqSC72a5E3zFzIIuHx6aANry
Gat3aqU3qtBXORa/dPkX9cWE+UR5wo/A2UdKJZL1Ghm2WRJ31tmGT48V9CeS6N9Y
m4CKdzvg7Ewj1T1Frd/8WJ2KoQOE91eDPeXRPncubJfJ6LLIHYG09h9kkQARAQAB
tDpDZW50T1MgKENlbmRPUyBPZmZpY2lhbCBTaWduaw5nIETleSkpPHN1Y3VyaXR5
QGN1bnRvcy5vcmc+iQI3BBMBAGAhBQJiczFsZAhsDBgJCAcDAgYVCAIJCgsDFgIB
Ah4BAheAAAJEAW1VboEg8Zdj0sP/2ygsxH9jqffOU9SKyJD1raL2gIutqZ3B8p1
Gy/Qnb9QD1EJVB4Zx0Ehcy2W9VJfIpnf3yBuAto7zvKe/G1nxH4Bt6WTJQckUjcs
N3qPwsx1Vs1sAEz7bXGihym6Ay4xF28bQ9XYIoKIQxd0T2rd3/1NGxNtORZ2bkjD
vOzYzv2h2iduY1DgGWJ11gtHFIA9CvHCw+SMPEhkckZJA051ayFBqTSSpiorVWtq
a0cB+cgmCQOI4/MY+kIvzoexfG7xhkuqe0wxmph9RQqx1TbnQDCdaxSgwbF2T+gw
byaDvks4xtR6Soj7BKjKAmcnf5fn4C5Or0KLUqMzBtDMbfQqihh62iZJN6ZZ/4dg
q4HTqyVpyuzMXsFpJ9L/FqH2DJ4exGGpBv00ba/Zauy7Gsq0c5PnNBSYahCp1y0X
407DRx51t9YwYI/ttValuehq9+gRjPOTTKp6AjZn/a5Yt3h6jDgpnfM/EyLFIY9z
V6CXqQQ/8JRvaik/JsgCf+eeLZOW4koIjZGEAg04iuyNTjhx0e/QHEVcYAqNLhXG
rCTTbCn3NSU09qxEXC+K/1m1kaXoCGA0Uw1VGZ1JsiFbbMx0yxq/brpEZPUYm+32
o8XfbocBw1jFUJ+6a1jTVZ3LQLKTSPW7TFO+GXyCAOmCGh1Xh2t1c6itc41PACqy
yy+mHmSV
=kkH7
-----END PGP PUBLIC KEY BLOCK-----

[root@centos8 ~]#rpm --import /etc/pki/rpm-gpg/RPM-GPG-KEY-centosofficial
[root@centos8 rpm-gpg]#rpm -K /misc/cd/AppStream/Packages/httpd-2.4.37-
16.module_e18.1.0+256+ae790463.x86_64.rpm
/misc/cd/AppStream/Packages/httpd-2.4.37-
16.module_e18.1.0+256+ae790463.x86_64.rpm: digests signatures OK

[root@centos8 ~]#rpm -qa "gpg-pubkey*"
gpg-pubkey-8483c65d-5ccc5b19
[root@centos8 ~]#rpm -qi gpg-pubkey-8483c65d-5ccc5b19
Name           : gpg-pubkey
Version        : 8483c65d
Release        : 5ccc5b19
Architecture   : (none)
Install Date:  wed 08 Apr 2020 10:06:20 AM CST
Group          : Public Keys
```

```

Size      : 0
License   : pubkey
Signature : (none)
Source RPM : (none)
Build Date : Fri 03 May 2019 11:15:37 PM CST
Build Host : localhost
Relocations : (not relocatable)
Packager   : CentOS (CentOS Official Signing Key) <security@centos.org>
Summary    : gpg(CentOS (CentOS Official Signing Key) <security@centos.org>)
Description :
-----BEGIN PGP PUBLIC KEY BLOCK-----
Version: rpm-4.14.2 (NSS-3)

mQINBFZMWxkBEADHrskpBgN9OphmhRkc7P/YrsAGSvv17kfu+e9KAaU6f5MeAVyn
rIoM43syyGkgFywgjZM8/rur7EMPY2yt+2q/1ZfLVCRn9856JqTIq0XRpDue4nKQ
8B1A7wDVZoSDxUZksuTiyExbDf0cpw89Tcf62Mxmi8jh74vrlPy1PgjWL5494b3X
5fxDidH4bqPzyxTBqPrUFuo+EfUVEqiGF94Ppq6ZUvrBG0Vo1V1+Ifm9CGEK597c
aevcGc1Rf1gxIgN84UpuDjPR9/zSndwJ7XsXYvZ6HXCKGagRKsfYDWGPkA5cOL/e
f+yobOnC43yPUvpggQ4KaNJ6+SMTZOKikM8yciyBwLqwrjo8F1Jgkv8Vfag/2UR7
JINbyqHHoLUhQ2m6HXSwwK4Yjtwidf9EukaBZwrrskYR3IRZLX1wqe0i/+ezYOW0m
vufrcvsh+TK1VVnuwmEPjJ8mwUSpsLdfPJo1DHsd8FS03SCKPaXfDb7ePfejiYk
nHPqAke01awVSLuiygn7F7rYemGqV9Vt7tBw5pz0vqSC72a5E3zFzIIuHx6aANry
Gat3aqU3qtBXORa/dPkX9cWE+UR5wo/A2UdKJZL1Ghm2WRJ31tmGT48V9Cs6N9Y
m4CKdzvg7EWj1T1Frd/8WJ2KoQOE91eDPeXRPncubJfJ6LLIHyG09h9kkQARAQAB
tDpDZW50T1MgKEN1bnRPUyBPZmZpY21hbCBTaWduaW5nIetleSkpPHN1Y3VyaXR5
QGN1bnRvcy5vcmc+iQI3BBMBAGAhBQJczF5ZAhsDBgsJCACDAgYVCAIJCgsDFgIB
Ah4BAheAAAJEAW1VboEG8Zdj0SP/2ygSxH9jqffOU9SKyJD1raL2gIutqZ3B8p1
Gy/Qnb9QD1EJVB4Zx0EhcY2W9VJfIpnf3yBuAto7zvke/G1nxH4Bt6WTJQckUjcs
N3qPwsx1Vs1sAEz7bXgiHym6Ay4xF28bq9XYIokIQxd0T2rD3/1NGxNtORZ2bkjD
vOzYzvH2iduIY1DgGWJ11gtHfIA9CvHcw+SMPEhkckZJA051ayFBqTSSpiorVWtq
a0cB+cgmCQOI4/MY+kIvzoexfg7xhkuqe0wxmph9RQXx1TbnQDCdaxSgwbF2T+gw
byaDvks4xtR6Soj7BKjKAmcnf5fn4C5Or0KLUqMzBtDMbfQQihn62iZJN6ZZ/4dg
q4HTqyVpyuzMXsFpJ9L/FqH2DJ4exGGpBv00ba/Zauy7Gsq0c5PnNBSYahCplY0X
407DRx51t9YwYI/ttValuehq9+gRjPOTTKp6Ajzn/a5Yt3h6jDgpnFM/EyLFIY9z
V6CXqQQ/8JRvaik/JSGcf+eeLZOW4koIjZGEAg04iuyNTjhx0e/QHEvcYAqNLhXG
rCTTbCn3NSU09qxEXC+K/1m1kaXoCGA0Uw1VGZ1JSifbbMx0yxq/brpEZPUYm+32
o8xfbocBWljFUJ+6aljTVZ3LQLKTSPW7TFO+GXyCAOmCGh1Xh2tlc6itc41PACqy
yy+mHmSV
=kkH7
-----END PGP PUBLIC KEY BLOCK-----

```

范例：校验包文件

```

[root@centos8 ~]#rpm -K /misc/cd/BaseOS/Packages/tree-1.7.0-15.el8.x86_64.rpm
/misc/cd/BaseOS/Packages/tree-1.7.0-15.el8.x86_64.rpm: digests signatures OK
[root@centos8 ~]#cp /misc/cd/BaseOS/Packages/tree-1.7.0-15.el8.x86_64.rpm /data
[root@centos8 ~]#cd /data
[root@centos8 data]#ll
total 60
-r--r--r-- 1 root root 60780 Apr  8 10:11 tree-1.7.0-15.el8.x86_64.rpm
[root@centos8 data]#echo >>tree-1.7.0-15.el8.x86_64.rpm
[root@centos8 data]#ll tree-1.7.0-15.el8.x86_64.rpm
-r--r--r-- 1 root root 60781 Apr  8 10:11 tree-1.7.0-15.el8.x86_64.rpm
[root@centos8 data]#cd
[root@centos8 ~]#rpm -K /data/tree-1.7.0-15.el8.x86_64.rpm
/data/tree-1.7.0-15.el8.x86_64.rpm: DIGESTS SIGNATURES NOT OK

```



软件在安装时，会将包里的每个文件的元数据，如：大小，权限，所有者，时间等记录至rpm相关的数据库中，可以用来检查包中的文件是否和当初安装时有所变化

```
rpm {-V|--verify} [select-options] [verify-options]
```

#示例:

```
[root@centos8 ~]#rpm -V centos-release
S.5....T. c /etc/issue
```

S file size differs

M Mode differs (includes permissions and file type)

5 digest (formerly MD5 sum) differs

D Device major/minor number mismatch

L readLink(2) path mismatch

U User ownership differs

G Group ownership differs

T mTime differs

P capabilities differ

. (点) 表示当前位置代表的字符含义一致

c 所在的位置表示文件类型

c 配置文件

d 文件数据文件

g 该文件不属于某个文件(少数情况)

l 许可证文件(license file)

r 自述文件(README)

范例:

```
[root@centos8 ~]#rpm -qf /etc/issue
centos-release-8.1-1.1911.0.8.el8.x86_64
[root@centos8 ~]#vim /var/lib/rpm^C/etc/issue
[root@centos8 ~]#vim /etc/issue
welcome to magedu
```

\S

Kernel \r on an \m

```
[root@centos8 ~]#rpm -V centos-release
S.5....T. c /etc/issue
```

```
[root@centos8 ~]#vim /etc/issue
```

```
[root@centos8 ~]#cat /etc/issue
```

\S

Kernel \r on an \m

```
[root@centos8 ~]#
```

```
[root@centos8 ~]#rpm -V centos-release
.....T. c /etc/issue
```

```
[root@centos8 ~]#rpm -ql centos-release
/etc/centos-release
/etc/centos-release-upstream
/etc/issue
```



```

/etc/issue.net
/etc/os-release
/etc/redhat-release
/etc/rpm/macros.dist
/etc/system-release
/etc/system-release-cpe
/usr/lib/systemd/system-preset/85-display-manager.preset
/usr/lib/systemd/system-preset/90-default.preset
/usr/lib/systemd/system-preset/99-default-disable.preset
/usr/share/centos-release/EULA
/usr/share/doc/centos-release/Contributors
/usr/share/doc/centos-release/GPL
/usr/share/doc/redhat-release
/usr/share/redhat-release

[root@centos8 ~]#rpm -Va
.M..... g /run/dbus
.....T.   /usr/bin/tree
.M..... c /etc/machine-id
missing c /etc/systemd/system/dbus-org.freedesktop.resolve1.service
.M..... g /var/cache/private
.M..... g /var/lib/private
.M..... g /var/log/btmp
.M..... g /var/log/private
S.5....T. c /etc/issue
.M....G.. g /var/log/lastlog
.M..... d /usr/share/info/dir.old
.M..... g /var/cache/dnf/packages.db
.M..... g /var/lib/plymouth/boot-duration
.....T. c /etc/kdump.conf
S.5....T. c /etc/ssh/ssh_config
.M..... c /etc/rc.d/rc.local
S.5....T. c /root/.bashrc
.M..... g /etc/crypto-policies/back-ends/nss.config
.M..... g /etc/udev/hwdb.bin
.M..... g /var/lib/systemd/random-seed
missing c /etc/yum.repos.d/CentOS-AppStream.repo
missing c /etc/yum.repos.d/CentOS-Base.repo
missing c /etc/yum.repos.d/CentOS-CR.repo
missing c /etc/yum.repos.d/CentOS-Debuginfo.repo
missing c /etc/yum.repos.d/CentOS-Extras.repo
missing c /etc/yum.repos.d/CentOS-HA.repo
missing c /etc/yum.repos.d/CentOS-Media.repo
missing c /etc/yum.repos.d/CentOS-PowerTools.repo
missing c /etc/yum.repos.d/CentOS-Sources.repo
missing c /etc/yum.repos.d/CentOS-Vault.repo
missing c /etc/yum.repos.d/CentOS-centosplus.repo
missing c /etc/yum.repos.d/CentOS-fasttrack.repo
.M..... /var/log/audit

```

## 3.6 数据库维护

rpm包安装时生成的信息，都放在rpm数据库中

```
/var/lib/rpm
```

可以重建数据库

```
rpm {--initdb|--rebuilddb}
```

initdb: 初始化, 如果事先不存在数据库, 则新建之, 否则, 不执行任何操作

rebuilddb: 重建已安装的包头的数据库索引目录

## 4 yum和dnf

CentOS 使用 yum, dnf 解决rpm的包依赖关系

YUM: Yellowdog Update Modifier, rpm的前端程序, 可解决软件包相关依赖性, 可在多个库之间定位软件包, up2date的替代工具, CentOS 8 用dnf 代替了yum, 不过保留了和yum的兼容性, 配置也是通用的

### 4.1 yum/dnf 工作原理

yum/dnf 是基于C/S 模式

- yum 服务器存放rpm包和相关包的元数据库
- yum 客户端访问yum服务器进行安装或查询等

#### yum 实现过程

先在yum服务器上创建 yum repository (仓库), 在仓库中事先存储了众多rpm包, 以及包的相关的元数据文件 (放置于特定目录repodata下), 当yum客户端利用yum/dnf工具进行安装时包时, 会自动下载repodata中的元数据, 查询远数据是否存在相关的包及依赖关系, 自动从仓库中找到相关包下载并安装。

### 4.2 yum客户端配置

#### yum客户端配置文件

```
/etc/yum.conf
```

#为所有仓库提供公共配置

```
/etc/yum.repos.d/*.repo:
```

#为每个仓库的提供配置文件

帮助参考: man 5 yum.conf

repo仓库配置文件指向的定义:

```
[repositoryID]
name=Some name for this repository
baseurl=url://path/to/repository/
enabled={1|0}
gpgcheck={1|0}
gpgkey=URL
enablegroups={1|0}
failovermethod={roundrobin|priority}
    roundrobin: 意为随机挑选, 默认值
    priority: 按顺序访问
cost= 默认为1000
```

yum服务器的baseurl形式:

```
file:// 本地路径
http://
https://
ftp://
```

**注意：** yum仓库指向的路径一定必须是repodata目录所在目录

### 相关变量

yum的repo配置文件中可用的变量：

**\$releasever**：当前OS的发行版的主版本号，如： 8, 7, 6  
**\$arch**：CPU架构，如： aarch64, i586, i686, x86\_64等  
**\$basearch**：系统基础平台； i386, x86\_64  
**\$contentdir**：表示目录，比如： centos-8, centos-7  
**\$YUM0-\$YUM9**：自定义变量

范例：

```
http://server/centos/$releasever/$basearch/
http://server/centos/7/x86_64
http://server/centos/6/i386
```

范例：CentOS 8 配置文件

```
[root@centos8 ~]# ll /etc/yum.conf
lrwxrwxrwx. 1 root root 12 May 14 2019 /etc/yum.conf -> dnf/dnf.conf

[root@centos8 ~]# cat /etc/yum.conf
[main]
gpgcheck=1                #安装前要做包的合法和完整性校验
installonly_limit=3        #同时可以安装3个包，最小值为2，如设为0或1，为不限制
clean_requirements_on_remove=True  #删除包时，是否将不再使用的包删除
best=True                  #升级时，自动选择安装最新版，即使缺少包的依赖
```

范例：CentOS 7的配置文件

```
[root@centos7 ~]# ll /etc/yum.conf
-rw-r--r--. 1 root root 970 Aug 8 19:57 /etc/yum.conf

[root@centos7 ~]# cat /etc/yum.conf
[main]
cachedir=/var/cache/yum/$basearch/$releasever  #缓存路径
keepcache=0  #如果为1,则下载rpm并缓存下来,不删除,默认安装rpm后会删除rpm包
debuglevel=2
logfile=/var/log/yum.log
exactarch=1
obsoletes=1
gpgcheck=1
plugins=1
installonly_limit=5
bugtracker_url=http://bugs.centos.org/set_project.php?
project_id=23&ref=http://bugs.centos.org/bug_report_page.php?category=yum
distroverpkg=centos-release
```

```
# This is the default, if you make this bigger yum won't see if the metadata
# is newer on the remote and so you'll "gain" the bandwidth of not having to
# download the new metadata and "pay" for it by yum not having correct
# information.
# It is esp. important, to have correct metadata, for distributions like
# Fedora which don't keep old packages around. If you don't like this checking
# interrupting your command line usage, it's much better to have something
# manually check the metadata once an hour (yum-updatesd will do this).
# metadata_expire=90m

# PUT YOUR REPOS HERE OR IN separate files named file.repo
# in /etc/yum.repos.d
```

## baseurl 指向的路径

阿里云提供了写好的CentOS和ubuntu的仓库文件下载链接

```
http://mirrors.aliyun.com/repo/
```

## CentOS系统的yum源

```
#阿里云
https://mirrors.aliyun.com/centos/$releasever/

#腾讯云
https://mirrors.cloud.tencent.com/centos/$releasever/

#华为云
https://repo.huaweicloud.com/centos/$releasever/

#清华大学
https://mirrors.tuna.tsinghua.edu.cn/centos/$releasever/
```

## EPEL的yum源

```
#阿里云
https://mirrors.aliyun.com/epel/$releasever/x86_64

#腾讯云
https://mirrors.cloud.tencent.com/epel/$releasever/x86_64

#华为云
https://mirrors.huaweicloud.com/epel/$releasever/x86_64

#清华大学
https://mirrors.tuna.tsinghua.edu.cn/epel/$releasever/x86_64
```

## 阿里巴巴开源软件

```
https://opsx.alibaba.com/
```

范例：为CentOS7用系统安装光盘作的本地yum仓库

```
#挂载光盘至某目录,如/mnt/cdrom
mount /dev/cdrom /mnt/cdrom
```

#创建配置文件

```
[root@centos7 ~]#vim /etc/yum.repos.d/centos7.repo
[CentOS7]
name=CentOS 7
baseurl=file:///mnt/cdrom
gpgcheck=0
enabled=1
```

范例：为CentOS 8 配置 yum 的系统和EPEL源仓库

```
[root@centos8 ~]#cat /etc/yum.repos.d/base.repo
[BaseOS]
name=BaseOS
baseurl=file:///misc/cd/BaseOS
gpgcheck=1
gpgkey=/etc/pki/rpm-gpg/RPM-GPG-KEY-centosofficial

[AppStream]
name=AppStream
baseurl=file:///misc/cd/AppStream
gpgcheck=0

[epel]
name=EPEL
baseurl=http://mirrors.aliyun.com/epel/$releasever/Everything/$basearch
gpgcheck=0
enabled=1

[extras]
name=extras
baseurl=https://mirrors.aliyun.com/centos/$releasever/extras/$basearch/os
gpgcheck=0
```

注意：与之前的版本不同，CentOS 8 系统有两个yum 源：BaseOS和AppStream，需要分别设置两个仓库

范例：用脚本实现创建yum仓库配置文件

```
[root@centos7 ~]# cat yum.sh
#!/bin/bash
mkdir /etc/yum.repos.d/backup
mv /etc/yum.repos.d/*.repo /etc/yum.repos.d/backup
cat > /etc/yum.repos.d/base.repo <<EOF
[base]
name=base
baseurl=https://mirrors.aliyun.com/centos/$releasever/os/$basearch
gpgcheck=0
EOF
```

## yum-config-manager命令

可以生成yum仓库的配置文件及启用或禁用仓库，来自于yum-utils包

格式：

```
#增加仓库
yum-config-manager --add-repo URL或file
#禁用仓库
yum-config-manager --disable "仓库名"
#启用仓库
yum-config-manager --enable "仓库名"
```

范例：创建仓库配置

```
[root@centos8 ~]#rpm -qf `which yum-config-manager`
dnf-utils-4.0.2.2-3.el8.noarch

[root@centos8 ~]#yum-config-manager --add-repo
https://mirrors.aliyun.com/docker-ce/linux/centos/docker-ce.repo
Adding repo from: https://mirrors.aliyun.com/docker-ce/linux/centos/docker-
ce.repo
[root@centos8 ~]#ls /etc/yum.repos.d/
backup base.repo docker-ce.repo
```

范例：创建仓库配置

```
#生成172.16.0.1_cobbler_ks_mirror_8_.repo
[root@centos8 ~]#yum-config-manager --add-
repo=http://172.16.0.1/cobbler/ks_mirror/8/
Adding repo from: http://172.16.0.1/cobbler/ks_mirror/8/

[root@centos8 ~]#cat /etc/yum.repos.d/172.16.0.1_cobbler_ks_mirror_8_.repo
[172.16.0.1_cobbler_ks_mirror_8_]
name=created by dnf config-manager from http://172.16.0.1/cobbler/ks_mirror/8/
baseurl=http://172.16.0.1/cobbler/ks_mirror/8/
enabled=1
```

范例：创建仓库配置

```
[root@centos8 ~]#ls /etc/yum.repos.d/
backup base.repo
[root@centos8 ~]#yum-config-manager --add-repo /data/docker-ce.repo
Adding repo from: file:///data/docker-ce.repo
[root@centos8 ~]#ls /etc/yum.repos.d/
backup base.repo docker-ce.repo
```

范例：启用和禁用仓库

```
[root@centos8 ~]#yum repolist
[root@centos8 ~]#yum-config-manager --disable epel
[root@centos8 ~]#cat /etc/yum.repos.d/base.repo
[BaseOS]
name=BaseOS
baseurl=file:///misc/cd/BaseOS
```

```

gpgcheck=0
[AppStream]
name=AppStream
baseurl=file:///misc/cd/AppStream
gpgcheck=0
[epel]
name=EPEL
baseurl=http://mirrors.aliyun.com/epel/$releasever/Everything/$basearch
        http://mirrors.huaweicloud.com/epel/$releasever/Everything/$basearch
gpgcheck=0
enabled=0
[extras]
name=extras
baseurl=https://mirrors.aliyun.com/centos/$releasever/extras/$basearch/os
        http://mirrors.huaweicloud.com/centos/$releasever/extras/$basearch/os
gpgcheck=0
enabled=1
[root@centos8 ~]#yum repolist
BaseOS                        3.8 MB/s | 3.9 kB      00:00
AppStream                    4.2 MB/s | 4.3 kB      00:00
extras                      10 kB/s | 1.5 kB      00:00
repo id                      repo name
status
AppStream                    AppStream              4,755
BaseOS                        BaseOS                  1,659
extras                        extras                  12
[root@centos8 ~]#yum-config-manager --disable extras
[root@centos8 ~]#yum repolist
BaseOS                        3.8 MB/s | 3.9 kB      00:00
AppStream                    4.2 MB/s | 4.3 kB      00:00
repo id                      repo name              status
AppStream                    AppStream              4,755
BaseOS                        BaseOS                  1,659
[root@centos8 ~]#yum-config-manager --enable extras
[root@centos8 ~]#yum repolist
BaseOS                        3.8 MB/s | 3.9 kB      00:00
AppStream                    4.2 MB/s | 4.3 kB      00:00
extras                      12 kB/s | 1.5 kB      00:00
repo id                      repo name              status
AppStream                    AppStream              4,755
BaseOS                        BaseOS                  1,659
extras                        extras                  12

```

## 4.3 yum命令

yum命令的用法：

```
yum [options] [command] [package ...]
```

yum的命令行选项：



-y	#自动回答为"yes"
-q	#静默模式
--nogpgcheck	#禁止进行gpg check
--enablerepo=repoidglob	#临时启用此处指定的repo, 支持通配符, 如: "*"
--disablerepo=repoidglob	#临时禁用此处指定的repo, 和上面语句同时使用, 放在后面的生效

### 4.3.1 显示仓库列表

```
yum repolist [all|enabled|disabled]
```

范例:

```
[root@centos8 ~]#yum repolist
[root@centos8 ~]#yum repolist --disabled
repo id
repo name
epel
[root@centos8 ~]#yum repolist all
Last metadata expiration check: 0:01:32 ago on Sun 29 Dec 2019 12:13:10 AM CST.
repo id           repo name          status
AppStream          AppStream
enabled: 4,681
BaseOS             BaseOS
enabled: 1,655
epel               EPEL
disabled
extras             extras
disabled
[root@centos8 ~]#yum --enablerepo=ep* --disablerepo=A* repolist
Last metadata expiration check: 0:01:18 ago on Sun 29 Dec 2019 12:13:27 AM CST.
repo id           repo name
status
BaseOS            BaseOS
1,657
epel              EPEL
3,733
```

范例: 显示仓库的详细信息

```
[root@centos8 ~]#yum repolist -v
Loaded plugins: builddep, changelog, config-manager, copr, debug, debuginfo-
install, download, generate_completion_cache, needs-restarting, playground,
repoclosure, repodiff, repograph, repomanage, reposync
YUM version: 4.2.17
cachedir: /var/cache/dnf
User-Agent: constructed: 'libdnf (CentOS Linux 8; generic; Linux.x86_64)'
repo: downloading from remote: BaseOS
BaseOS
77 MB/s | 2.2 MB    00:00
BaseOS: using metadata from Tue 09 Jun 2020 06:06:00 AM CST.
repo: downloading from remote: AppStream
```

AppStream

97 MB/s | 5.7 MB 00:00

AppStream: using metadata from Tue 09 Jun 2020 06:06:04 AM CST.

repo: downloading from remote: epel

EPEL

13 MB/s | 7.2 MB 00:00

epel: using metadata from Fri 03 Jul 2020 08:21:13 AM CST.

repo: downloading from remote: extras

extras

28 kB/s | 6.7 kB 00:00

extras: using metadata from Fri 05 Jun 2020 08:15:26 AM CST.

Last metadata expiration check: 0:00:01 ago on Sat 04 Jul 2020 12:17:23 PM CST.

Completion plugin: Generating completion cache...

Repo-id : AppStream  
Repo-name : AppStream  
Repo-revision : 8.2.2004  
Repo-distro-tags : [cpe:/o:centos:centos:8]: , 8, C, O, S, e, n, t  
Repo-updated : Tue 09 Jun 2020 06:06:04 AM CST  
Repo-pkgs : 5,326  
Repo-available-pkgs: 4,901  
Repo-size : 6.0 G  
Repo-baseurl : file:///misc/cd/AppStream,  
https://mirrors.aliyun.com/centos/8/AppStream/x86\_64/os/  
Repo-expire : 172,800 second(s) (last: Sat 04 Jul 2020 12:17:20 PM CST)  
Repo-filename : /etc/yum.repos.d/base.repo

Repo-id : BaseOS  
Repo-name : BaseOS  
Repo-revision : 8.2.2004  
Repo-distro-tags : [cpe:/o:centos:centos:8]: , 8, C, O, S, e, n, t  
Repo-updated : Tue 09 Jun 2020 06:06:00 AM CST  
Repo-pkgs : 1,674  
Repo-available-pkgs: 1,672  
Repo-size : 1.0 G  
Repo-baseurl : file:///misc/cd/BaseOS,  
https://mirrors.aliyun.com/centos/8/BaseOS/x86\_64/os/  
Repo-expire : 172,800 second(s) (last: Sat 04 Jul 2020 12:17:19 PM CST)  
Repo-filename : /etc/yum.repos.d/base.repo

Repo-id : epel  
Repo-name : EPEL  
Repo-revision : 1593735642  
Repo-updated : Fri 03 Jul 2020 08:21:13 AM CST  
Repo-pkgs : 5,931  
Repo-available-pkgs: 5,930  
Repo-size : 7.7 G  
Repo-baseurl : https://mirrors.aliyun.com/epel/8/Everything/x86\_64  
Repo-expire : 172,800 second(s) (last: Sat 04 Jul 2020 12:17:21 PM CST)  
Repo-filename : /etc/yum.repos.d/base.repo

Repo-id : extras  
Repo-name : extras  
Repo-revision : 1591316131  
Repo-updated : Fri 05 Jun 2020 08:15:26 AM CST

```
Repo-pkgs           : 20
Repo-available-pkgs: 20
Repo-size           : 236 k
Repo-baseurl        : https://mirrors.aliyun.com/centos/8/extras/x86_64/os
Repo-expire         : 172,800 second(s) (last: Sat 04 Jul 2020 12:17:23 PM CST)
Repo-filename       : /etc/yum.repos.d/base.repo
Total packages: 12,951
[root@centos8 ~]#
```

## 4.3.2 显示程序包

```
yum list
yum list [all | glob_exp1] [glob_exp2] [...]
yum list {available|installed|updates} [glob_exp1] [...]
```

范例:

```
[root@centos8 data]#dnf list mariadb-server
Last metadata expiration check: 0:05:03 ago on Sun 08 Dec 2019 04:11:17 PM CST.
Available Packages
mariadb-server.x86_64                               3:10.3.11-2.module_el8.0.0+35+6f2527ed
AppStream

[root@centos8 data]#dnf list mariadb-server --showduplicates
Last metadata expiration check: 0:05:11 ago on Sun 08 Dec 2019 04:11:17 PM CST.
Available Packages
mariadb-server.x86_64                               3:10.3.11-2.module_el8.0.0+35+6f2527ed
AppStream

[root@centos8 data]#dnf list mariadb-server --disablerepo=AppStream
Last metadata expiration check: 0:05:23 ago on Sun 08 Dec 2019 04:11:17 PM CST.
Available Packages
MariaDB-server.x86_64                               10.4.10-1.el8
mariadb2

[root@centos8 data]#dnf list mariadb-server --showduplicates --
disablerepo=AppStream
Last metadata expiration check: 0:05:41 ago on Sun 08 Dec 2019 04:11:17 PM CST.
Available Packages
MariaDB-server.x86_64                               10.3.17-1.el8
mariadb
MariaDB-server.x86_64                               10.3.18-1.el8
mariadb
MariaDB-server.x86_64                               10.3.20-1.el8
mariadb
MariaDB-server.x86_64                               10.4.7-1.el8
mariadb2
MariaDB-server.x86_64                               10.4.8-1.el8
mariadb2
MariaDB-server.x86_64                               10.4.10-1.el8
mariadb2
[root@centos8 ~]#yum --disablerepo="A*" --disablerepo="B*" --disablerepo="e*"
list available
```

范例: 只查看已经安装的包

```
[root@centos8 ~]#yum list installed|head
Installed Packages
NetworkManager.x86_64                1:1.22.8-4.e18
@anaconda
NetworkManager-libnm.x86_64          1:1.22.8-4.e18
@anaconda
NetworkManager-team.x86_64           1:1.22.8-4.e18
@anaconda
NetworkManager-tui.x86_64            1:1.22.8-4.e18
@anaconda
acl.x86_64                           2.2.53-1.e18
@anaconda
at.x86_64                            3.1.20-11.e18
@BaseOS
audit.x86_64                         3.0-0.17.20191104git1c2f876.e18
@anaconda
audit-libs.x86_64                   3.0-0.17.20191104git1c2f876.e18
@anaconda
authselect.x86_64                   1.1-2.e18
@anaconda
```

范例: 查看可安装的包

```
[root@centos8 ~]#yum list available |head
Last metadata expiration check: 2:14:14 ago on Sun 26 Jul 2020 10:28:24 AM CST.
Available Packages
3proxy.x86_64                        0.8.13-1.e18
                                         epe1
BackupPC.x86_64                     4.4.0-1.e18
                                         epe1
BackupPC-XS.x86_64                   0.62-1.e18
                                         epe1
BibTool.x86_64                      2.68-1.e18
                                         epe1
CCfits.x86_64                       2.5-13.e18
                                         epe1
CCfits-devel.x86_64                 2.5-13.e18
                                         epe1
CCfits-doc.noarch                   2.5-13.e18
                                         epe1
CGSI-gSOAP.x86_64                   1.3.11-7.e18
                                         epe1
```

范例: 查看可以升级的包

```
[root@centos8 ~]#yum list updates
Last metadata expiration check: 2:16:44 ago on Sun 26 Jul 2020 10:28:24 AM CST.
Available Upgrades
exim.x86_64
```

范例: 查看指定的包

```
[root@centos8 ~]#yum list exim
Last metadata expiration check: 2:15:35 ago on Sun 26 Jul 2020 10:28:24 AM CST.
```

```

Installed Packages
exim.x86_64                                4.93-3.el8
                                           @epel

Available Packages
exim.x86_64                                4.94-1.el8
                                           epel

#支持通配符
[root@centos8 ~]#yum list exim*
Last metadata expiration check: 2:15:47 ago on Sun 26 Jul 2020 10:28:24 AM CST.
Installed Packages
exim.x86_64                                4.93-3.el8
                                           @epel

Available Packages
exim.x86_64                                4.94-1.el8
                                           epel
exim-greylist.x86_64                      4.94-1.el8
                                           epel
exim-mon.x86_64                           4.94-1.el8
                                           epel
exim-mysql.x86_64                         4.94-1.el8
                                           epel
exim-pgsql.x86_64                         4.94-1.el8
                                           epel

```

### 4.3.3 安装程序包

```

yum install package1 [package2] [...]
yum reinstall package1 [package2] [...] #重新安装

--downloadonly #只下载相关包默认至/var/cache/yum/x86_64/7/目录下,而不执行
install/upgrade/erase
--downloadaddir=<path>, --destdir=<path> #--downloadaddir选项来指定下载的目录,如果不存在
自动创建

```

#### 4.3.3.1 安装epel源包

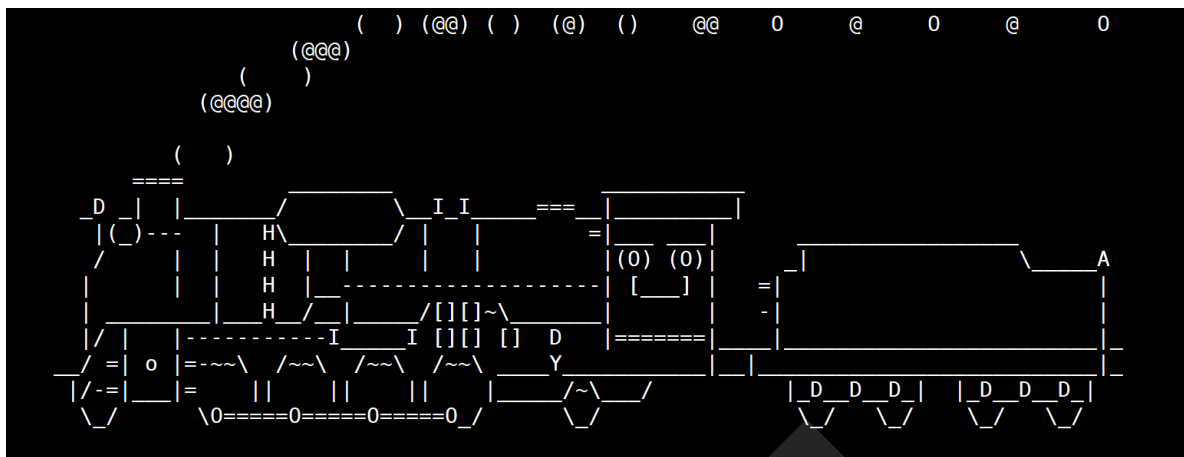
范例：安装epel源

```

[root@centos7 ~]#yum -y install epel-release
[root@centos7 ~]#yum -y install s1
[root@centos7 ~]#rpm -ql s1
/usr/bin/s1
/usr/share/doc/s1-5.02
/usr/share/doc/s1-5.02/LICENSE
/usr/share/doc/s1-5.02/README.ja.md
/usr/share/doc/s1-5.02/README.md
/usr/share/man/ja/man1/s1.1.ja.gz
/usr/share/man/man1/s1.1.gz

#运行安装s1程序, 可以看到下面火车, 这标志着我们可以当老司机了
[root@centos7 ~]#s1 -a

```



```
[root@centos8 ~]#dnf -y install cowsay
```



#### 4.3.3.2 升级最新内核

范例：利用elrepo源在CentOS 7 安装新版内核

说明： The difference is that **kernel-lt** is based on a **long term support** branch and **kernel-ml** is based on the **mainline stable** branch.

北京- 2020/10/13 15:55:53

大佬们， centos7.6异常重启， 有知道原因的没？

内核版本： vmlinuz-4.19.12-1.el7.elrepo.x86\_64

```
[root@centos7 ~]#yum install https://www.elrepo.org/elrepo-release-7.0-4.el7.elrepo.noarch.rpm
[root@centos7 ~]#rpm -ql elrepo-release-7.0-4.el7.elrepo
/etc/pki/elrepo
/etc/pki/elrepo/SECURE-BOOT-KEY-elrepo.org.der
/etc/pki/rpm-gpg
/etc/pki/rpm-gpg/RPM-GPG-KEY-elrepo.org
/etc/yum.repos.d
/etc/yum.repos.d/elrepo.repo
[root@centos7 ~]#yum repolist
yum repolist
Loaded plugins: fastestmirror
```

Loading mirror speeds from cached hostfile

\* elrepo: mirrors.tuna.tsinghua.edu.cn

repo id	status	repo name
base	10,019	CentOS
elrepo	139	ELRepo.org Community Enterprise Linux Repository
- el7		
epel/7/x86_64	13,501	EPEL
extras/7/x86_64	307	extras
repolist:	23,966	

[root@centos7 ~]#cat /etc/yum.repos.d/elrepo.repo

# Name: ELRepo.org Community Enterprise Linux Repository for el7

# URL: http://elrepo.org/

[elrepo]

name=ELRepo.org Community Enterprise Linux Repository - el7

baseurl=http://elrepo.org/linux/elrepo/el7/\$basearch/

http://mirrors.coreix.net/elrepo/elrepo/el7/\$basearch/

http://mirror.rackspace.com/elrepo/elrepo/el7/\$basearch/

http://repos.lax-noc.com/elrepo/elrepo/el7/\$basearch/

mirrorlist=http://mirrors.elrepo.org/mirrors-elrepo.el7

enabled=1

gpgcheck=1

gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-elrepo.org

protect=0

[elrepo-testing]

name=ELRepo.org Community Enterprise Linux Testing Repository - el7

baseurl=http://elrepo.org/linux/testing/el7/\$basearch/

http://mirrors.coreix.net/elrepo/testing/el7/\$basearch/

http://mirror.rackspace.com/elrepo/testing/el7/\$basearch/

http://repos.lax-noc.com/elrepo/testing/el7/\$basearch/

mirrorlist=http://mirrors.elrepo.org/mirrors-elrepo-testing.el7

enabled=0

gpgcheck=1

gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-elrepo.org

protect=0

[elrepo-kernel]

name=ELRepo.org Community Enterprise Linux Kernel Repository - el7

baseurl=http://elrepo.org/linux/kernel/el7/\$basearch/

http://mirrors.coreix.net/elrepo/kernel/el7/\$basearch/

http://mirror.rackspace.com/elrepo/kernel/el7/\$basearch/

http://repos.lax-noc.com/elrepo/kernel/el7/\$basearch/

mirrorlist=http://mirrors.elrepo.org/mirrors-elrepo-kernel.el7

enabled=0

gpgcheck=1

gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-elrepo.org

protect=0

[elrepo-extras]

name=ELRepo.org Community Enterprise Linux Extras Repository - el7

baseurl=http://elrepo.org/linux/extras/el7/\$basearch/

http://mirrors.coreix.net/elrepo/extras/el7/\$basearch/



```
http://mirror.rackspace.com/elrepo/extras/el7/$basearch/
http://repos.lax-noc.com/elrepo/extras/el7/$basearch/
mirrorlist=http://mirrors.elrepo.org/mirrors-elrepo-extras.el7
enabled=0
gpgcheck=1
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-elrepo.org
protect=0
```

```
[root@centos7 ~]#yum --disablerepo="*" --enablerepo="elrepo-kernel" list
available
```

```
Loaded plugins: fastestmirror
```

```
Loading mirror speeds from cached hostfile
```

```
* elrepo-kernel: mirrors.tuna.tsinghua.edu.cn
```

```
Available Packages
```

kernel-lt.x86_64	4.4.207-1.el7.elrepo
elrepo-kernel	
kernel-lt-devel.x86_64	4.4.207-1.el7.elrepo
elrepo-kernel	
kernel-lt-doc.noarch	4.4.207-1.el7.elrepo
elrepo-kernel	
kernel-lt-headers.x86_64	4.4.207-1.el7.elrepo
elrepo-kernel	
kernel-lt-tools.x86_64	4.4.207-1.el7.elrepo
elrepo-kernel	
kernel-lt-tools-libs.x86_64	4.4.207-1.el7.elrepo
elrepo-kernel	
kernel-lt-tools-libs-devel.x86_64	4.4.207-1.el7.elrepo
elrepo-kernel	
kernel-ml.x86_64	5.4.6-1.el7.elrepo
elrepo-kernel	
kernel-ml-devel.x86_64	5.4.6-1.el7.elrepo
elrepo-kernel	
kernel-ml-doc.noarch	5.4.6-1.el7.elrepo
elrepo-kernel	
kernel-ml-headers.x86_64	5.4.6-1.el7.elrepo
elrepo-kernel	
kernel-ml-tools.x86_64	5.4.6-1.el7.elrepo
elrepo-kernel	
kernel-ml-tools-libs.x86_64	5.4.6-1.el7.elrepo
elrepo-kernel	
kernel-ml-tools-libs-devel.x86_64	5.4.6-1.el7.elrepo
elrepo-kernel	
perf.x86_64	5.4.6-1.el7.elrepo
elrepo-kernel	
python-perf.x86_64	5.4.6-1.el7.elrepo
elrepo-kernel	

```
[root@mag.edu ~]#yum -y --enablerepo="elrepo-kernel" install kernel-ml
```

```
[root@centos7 ~]#ls /boot
```

config-3.10.0-957.el7.x86_64	symvers-3.10.0-
957.el7.x86_64.gz	
config-5.4.6-1.el7.elrepo.x86_64	symvers-5.4.6-
1.el7.elrepo.x86_64.gz	
efi	System.map-3.10.0-
957.el7.x86_64	
grub	System.map-5.4.6-
1.el7.elrepo.x86_64	

```

grub2                                                                vmlinuz-0-rescue-
907ef8572fc24762bcbac846dd46fcc
initramfs-0-rescue-907ef8572fc24762bcbac846dd46fcc.img vmlinuz-3.10.0-
957.el7.x86_64
initramfs-3.10.0-957.el7.x86_64.img                             vmlinuz-5.4.6-
1.el7.elrepo.x86_64
initramfs-5.4.6-1.el7.elrepo.x86_64.img
[root@centos7 ~]#ls /lib/modules
3.10.0-957.el7.x86_64  5.4.6-1.el7.elrepo.x86_64
[root@centos7 ~]#reboot
[root@centos7 ~]#uname -r
5.4.6-1.el7.elrepo.x86_64

```

### 4.3.3.3 只下载相关的依赖包,而不安装

```

#/data/目录如果不存在,会自动创建
[root@centos8 ~]#yum -y install --downloadonly --downloadaddir=/data/httpd httpd
[root@centos8 ~]#ls /data/httpd/
apr-1.6.3-9.el8.x86_64.rpm          httpd-2.4.37-
16.module.el8.1.0+256+ae790463.x86_64.rpm
apr-util-1.6.1-6.el8.x86_64.rpm    httpd-filesystem-2.4.37-
16.module.el8.1.0+256+ae790463.noarch.rpm
apr-util-bdb-1.6.1-6.el8.x86_64.rpm httpd-tools-2.4.37-
16.module.el8.1.0+256+ae790463.x86_64.rpm
apr-util-openssl-1.6.1-6.el8.x86_64.rpm mailcap-2.1.48-3.el8.noarch.rpm
centos-logos-httpd-80.5-2.el8.noarch.rpm mod_http2-1.11.3-
3.module.el8.1.0+213+acce2796.x86_64.rpm

```

注意: 下载包也可以通过启用配置文件实现

```

[root@centos7 ~]# cat /etc/yum.conf
[main]
cachedir=/var/cache/yum/$basearch/$releasever #缓存路径
keepcache=1 #如果为1,则下载rpm并缓存下来,不删除,默认安装rpm后会删除rpm包

```

### 4.3.4 卸载程序包

```

yum remove | erase package1 [package2] [...]

```

### 4.3.5 升级和降级

检查可用升级:

```

yum check-update

```

升级和降级

```

yum upgrade|update [package1] [package2] [...]
yum upgrade-minimal #最小化升级
yum downgrade package1 [package2] [...] (降级)

```

范例:

```
[root@centos7 ~]# cat /etc/yum.repos.d/base.repo
[base]
name=aliyun base
baseurl=https://mirrors.aliyun.com/centos/$releasever/os/$basearch
gpgcheck=1
gpgkey=https://mirrors.aliyun.com/centos/$releasever/os/x86_64/RPM-GPG-KEY-
CentOS-$releasever
enabled=1

[update]
name=aliyun update
baseurl=https://mirrors.aliyun.com/centos/7/updates/x86_64/
gpgcheck=0

[root@centos7 ~]# yum --disablerepo=* --enablerep=updates list available
[root@centos7 ~]# yum info samba
Loaded plugins: fastestmirror
Repository 'updates' is missing name in configuration, using id
Loading mirror speeds from cached hostfile
* base:
* elrepo: elrepo.0m3n.net
Available Packages
Name       : samba
Arch       : x86_64
Version    : 4.9.1
Release    : 10.el7_7
Size       : 685 k
Repo       : updates
Summary    : Server and Client software to interoperate with windows machines
URL        : http://www.samba.org/
License    : GPLv3+ and LGPLv3+
Description : Samba is the standard windows interoperability suite of programs
for Linux and
           : Unix.

[root@centos7 ~]# yum info samba --showduplicates
Loaded plugins: fastestmirror
Repository 'updates' is missing name in configuration, using id
Loading mirror speeds from cached hostfile
* base:
* elrepo: elrepo.0m3n.net
Available Packages
Name       : samba
Arch       : x86_64
Version    : 4.9.1
Release    : 6.el7
Size       : 685 k
Repo       : base/7/x86_64
Summary    : Server and Client software to interoperate with windows machines
URL        : http://www.samba.org/
License    : GPLv3+ and LGPLv3+
Description : Samba is the standard windows interoperability suite of programs
for Linux and
           : Unix.

Name       : samba
Arch       : x86_64
```

```
Version      : 4.9.1
Release      : 10.el7_7
Size         : 685 k
Repo         : updates
Summary      : Server and Client software to interoperate with windows machines
URL          : http://www.samba.org/
License      : GPLv3+ and LGPLv3+
Description  : Samba is the standard windows interoperability suite of programs
              for Linux and
              : Unix.
```

```
[root@centos7 ~]#yum install samba --disablerepo=updates
[root@centos7 ~]#yum update samba
[root@centos7 ~]#yum update
```

### 4.3.6 查询

查看程序包information:

```
yum info [...]
```

查看指定的特性(可以是某文件)是由哪个程序包所提供:

```
yum provides | whatprovides feature1 [feature2] [...]
```

**注意: 文件要写全路径, 而不只是文件名, 否则可能无法查询到**

范例:

```
[root@centos8 ~]# ll /etc/vsftpd/vsftpd.conf
ls: cannot access '/etc/vsftpd/vsftpd.conf': No such file or directory

#注意要写文件全路径才能查询到
[root@centos8 ~]#yum provides vsftpd.conf
Last metadata expiration check: 0:56:45 ago on Fri 10 Apr 2020 11:24:00 AM CST.
Error: No Matches found

[root@centos8 ~]# yum provides /etc/vsftpd/vsftpd.conf
Last metadata expiration check: 0:33:13 ago on Fri 27 Dec 2019 03:47:34 PM CST.
vsftpd-3.0.3-28.el8.x86_64 : Very Secure Ftp Daemon
Repo                        : AppStream
Matched from:
Filename                   : /etc/vsftpd/vsftpd.conf

#使用通配符
[root@centos8 ~]#yum provides */vsftpd.conf
[root@centos8 ~]#yum provides */updatedb*
```

以指定的关键字搜索程序包名及summary信息

```
yum search string1 [string2] [...]
```

查看指定包所依赖的capabilities:

```
yum deplist package1 [package2] [...]
```

范例:

```
[root@centos8 ~]#dnf info bash
Last metadata expiration check: 0:25:44 ago on Sun 22 Dec 2019 01:56:36 PM CST.
Installed Packages
Name           : bash
Version        : 4.4.19
Release        : 7.el8
Arch           : x86_64
Size           : 6.6 M
Source         : bash-4.4.19-7.el8.src.rpm
Repo           : @System
From repo      : anaconda
Summary        : The GNU Bourne Again shell
URL            : https://www.gnu.org/software/bash
License        : GPLv3+
Description    : The GNU Bourne Again shell (Bash) is a shell or command language
                : interpreter that is compatible with the Bourne shell (sh). Bash
                : incorporates useful features from the Korn shell (ksh) and the C
                : shell
                : (csh). Most sh scripts can be run by bash without modification.
```

范例:

```
[root@centos8 ~]#dnf list bash*
Last metadata expiration check: 0:27:28 ago on Sun 22 Dec 2019 01:56:36 PM CST.
Installed Packages
bash.x86_64                                     4.4.19-7.el8
                                                @anaconda
bash-completion.noarch                         1:2.7-5.el8
                                                @BaseOS
Available Packages
bash-doc.x86_64                                4.4.19-7.el8
                                                BaseOS
```

范例:

```
[root@centos8 ~]#dnf provides /bin/lis
Last metadata expiration check: 0:26:44 ago on Sun 22 Dec 2019 01:56:36 PM CST.
coreutils-8.30-6.el8.x86_64 : A set of basic GNU tools commonly used in shell
scripts
Repo           : @System
Matched from:
Provide        : /bin/lis
```

范例:

```
[root@centos8 ~]#rpm -ivh /misc/cd/AppStream/Packages/httpd-2.4.37-
16.module_el8.1.0+256+ae790463.x86_64.rpm
error: Failed dependencies:
```

```
/etc/mime.types is needed by httpd-2.4.37-
16.module_el8.1.0+256+ae790463.x86_64
httpd-filesystem is needed by httpd-2.4.37-
16.module_el8.1.0+256+ae790463.x86_64
httpd-filesystem = 2.4.37-16.module_el8.1.0+256+ae790463 is needed by httpd-
2.4.37-16.module_el8.1.0+256+ae790463.x86_64
httpd-tools = 2.4.37-16.module_el8.1.0+256+ae790463 is needed by httpd-
2.4.37-16.module_el8.1.0+256+ae790463.x86_64
libapr-1.so.0()(64bit) is needed by httpd-2.4.37-
16.module_el8.1.0+256+ae790463.x86_64
libaprutil-1.so.0()(64bit) is needed by httpd-2.4.37-
16.module_el8.1.0+256+ae790463.x86_64
mod_http2 is needed by httpd-2.4.37-16.module_el8.1.0+256+ae790463.x86_64
system-logos-httpd is needed by httpd-2.4.37-
16.module_el8.1.0+256+ae790463.x86_64
```

```
[root@centos8 ~]#yum provides /etc/mime.types
```

```
Last metadata expiration check: 0:43:08 ago on Wed 08 Apr 2020 03:15:02 PM CST.
mailcap-2.1.48-3.el8.noarch : Helper application and MIME type associations for
file types
```

```
Repo          : BaseOS
Matched from:
Filename      : /etc/mime.types
```

```
[root@centos8 ~]#yum deplist httpd
```

```
Last metadata expiration check: 0:41:15 ago on Wed 08 Apr 2020 03:15:02 PM CST.
package: httpd-2.4.37-16.module_el8.1.0+256+ae790463.x86_64
```

```
dependency: /bin/sh
provider: bash-4.4.19-10.el8.x86_64
dependency: /etc/mime.types
provider: mailcap-2.1.48-3.el8.noarch
dependency: httpd-filesystem
provider: httpd-filesystem-2.4.37-16.module_el8.1.0+256+ae790463.noarch
dependency: httpd-filesystem = 2.4.37-16.module_el8.1.0+256+ae790463
provider: httpd-filesystem-2.4.37-16.module_el8.1.0+256+ae790463.noarch
dependency: httpd-tools = 2.4.37-16.module_el8.1.0+256+ae790463
provider: httpd-tools-2.4.37-16.module_el8.1.0+256+ae790463.x86_64
dependency: libapr-1.so.0()(64bit)
provider: apr-1.6.3-9.el8.x86_64
dependency: libaprutil-1.so.0()(64bit)
provider: apr-util-1.6.1-6.el8.x86_64
dependency: libbrotlienc.so.1()(64bit)
provider: brotli-1.0.6-1.el8.x86_64
dependency: libc.so.6(GLIBC_2.14)(64bit)
provider: glibc-2.28-72.el8.x86_64
dependency: libcrypt.so.1()(64bit)
provider: libxcrypt-4.1.1-4.el8.x86_64
dependency: libcrypt.so.1(XCRYPT_2.0)(64bit)
provider: libxcrypt-4.1.1-4.el8.x86_64
dependency: libdl.so.2()(64bit)
provider: glibc-2.28-72.el8.x86_64
dependency: libexpat.so.1()(64bit)
provider: expat-2.2.5-3.el8.x86_64
dependency: liblua-5.3.so()(64bit)
provider: lua-libs-5.3.4-11.el8.x86_64
dependency: libm.so.6()(64bit)
provider: glibc-2.28-72.el8.x86_64
```

```

dependency: libpcre.so.1()(64bit)
provider: pcre-8.42-4.el8.x86_64
dependency: libpthread.so.0()(64bit)
provider: glibc-2.28-72.el8.x86_64
dependency: libpthread.so.0(GLIBC_2.2.5)(64bit)
provider: glibc-2.28-72.el8.x86_64
dependency: libselinux.so.1()(64bit)
provider: libselinux-2.9-2.1.el8.x86_64
dependency: libsystemd.so.0()(64bit)
provider: systemd-libs-239-18.el8.x86_64
dependency: libsystemd.so.0(LIBSYSTEMD_209)(64bit)
provider: systemd-libs-239-18.el8.x86_64
dependency: libz.so.1()(64bit)
provider: zlib-1.2.11-10.el8.x86_64
dependency: mod_http2
provider: mod_http2-1.11.3-3.module_el8.1.0+213+acce2796.x86_64
dependency: rtld(GNU_HASH)
provider: glibc-2.28-72.el8.i686
provider: glibc-2.28-72.el8.x86_64
dependency: system-logos-httpd
provider: centos-logos-httpd-80.5-2.el8.noarch
dependency: systemd-units
provider: systemd-239-18.el8.i686
provider: systemd-239-18.el8.x86_64

```

范例: CentOS 8 查看未安装包的文件列表

```

[root@centos8 ~]#rpm -q memcached
package memcached is not installed
[root@centos8 ~]#dnf repoquery -l memcached
Last metadata expiration check: 2:35:45 ago on Tue 14 Jul 2020 08:56:26 AM CST.
/etc/sysconfig/memcached
/usr/bin/memcached
.....

```

范例: CentOS 7 查看未安装包的文件列表

```

[root@centos7 ~]#rpm -q memcached
package memcached is not installed
[root@centos7 ~]#yum -y install yum-utils
[root@centos7 ~]#repoquery -ql memcached
/etc/sysconfig/memcached
/usr/bin/memcached
.....

```

## 4.3.7 仓库缓存

清除目录/var/cache/yum/缓存

```
yum clean [ packages | metadata | expire-cache | rpmdb | plugins | all ]
```

构建缓存:



```
yum makecache
```

范例：管理yum缓存

```
[root@centos7 ~]#du -sh /var/cache/yum
93M /var/cache/yum
[root@centos7 ~]#ls /var/cache/yum/x86_64/7/
base epel extras timedhosts timedhosts.txt
[root@centos7 ~]#yum clean all
Loaded plugins: fastestmirror
Cleaning repos: base epel extras
Cleaning up list of fastest mirrors
[root@centos7 ~]#du -sh /var/cache/yum
4.0K /var/cache/yum
[root@centos7 ~]#yum makecache
.....
Metadata Cache Created
[root@centos7 ~]#du -sh /var/cache/yum
276M /var/cache/yum
```

### 4.3.8 查看yum事务历史

yum 执行安装卸载命令会记录到相关日志中

日志文件：

#CentOS 7以前版本日志

/var/log/yum.log

#CentOS 8 版本日志

/var/log/dnf.rpm.log

/var/log/dnf.log

日志命令

```
yum history [info|list|packages-list|packages-info|summary|addon-
info|redo|undo|rollback|new|sync|stats]
```

范例：

```
[root@centos8 ~]#dnf history
ID      | Command line          | Date and time   | Action(s)      | Altered
-----|-----|-----|-----|-----
 22 | install yum-utils     | 2019-12-22 13:44 | Install        | 1
 21 | remove vsftpd         | 2019-12-22 13:39 | Removed        | 1
 20 | install vsftpd        | 2019-12-22 13:39 | Install        | 1
 19 | install python3       | 2019-12-22 12:26 | Install        | 3
 18 | install perl          | 2019-12-22 12:25 | Install        | 156
 17 | install httpd -y      | 2019-12-21 20:21 | Install        | 10
...省略...
[root@centos8 ~]#dnf history info 22
Transaction ID : 22
Begin time     : Sun 22 Dec 2019 01:44:08 PM CST
Begin rpmdb    : 607:35cd823ff347e56ceb688a9f72715eabb3c53d41
End time       : Sun 22 Dec 2019 01:44:08 PM CST (0 seconds)
```

```
End rpmdb      : 608:24139ec38fc131c182b75fdaad0626692045da94
User          : root <root>
Return-Code   : Success
Releasever    : 8
Command Line  : install yum-utils
Packages Altered:
    Install dnf-utils-4.0.2.2-3.el8.noarch @BaseOS
[root@centos8 ~]#dnf history undo 22 -y
Removed:
    dnf-utils-4.0.2.2-3.el8.noarch
Complete!
[root@centos8 ~]#dnf history redo 22 -y
```

### 4.3.9 安装及升级本地程序包

```
yum localinstall|install rpmfile1 [rpmfile2] [...]
yum localupdate|update rpmfile1 [rpmfile2] [...]
```

### 4.3.10 查看包的安全警报

```
yum updateinfo --summary|--list|--info
```

范例:

```
[root@centos8 ~]#yum updateinfo summary
Repository AppStream is listed more than once in the configuration
Repository extras is listed more than once in the configuration
Last metadata expiration check: 0:07:29 ago on Sun 14 Jun 2020 10:01:18 AM CST.
Updates Information Summary: available
    1 Security notice(s)
        1 Moderate Security notice(s)

[root@centos8 ~]#yum updateinfo
Repository AppStream is listed more than once in the configuration
Repository extras is listed more than once in the configuration
Last metadata expiration check: 0:07:34 ago on Sun 14 Jun 2020 10:01:18 AM CST.
Updates Information Summary: available
    1 Security notice(s)
        1 Moderate Security notice(s)

[root@centos8 ~]#yum updateinfo all
Repository AppStream is listed more than once in the configuration
Repository extras is listed more than once in the configuration
Last metadata expiration check: 0:07:48 ago on Sun 14 Jun 2020 10:01:18 AM CST.
Updates Information Summary: all
    1 Security notice(s)
        1 Moderate Security notice(s)
    1 Bugfix notice(s)

[root@centos8 ~]#yum updateinfo list
Repository AppStream is listed more than once in the configuration
Repository extras is listed more than once in the configuration
Last metadata expiration check: 0:07:41 ago on Sun 14 Jun 2020 10:01:18 AM CST.
FEDORA-EPEL-2020-2056b1c4a9 Moderate/Sec. exim-4.93-3.el8.x86_64
```

```
[root@centos8 ~]#yum updateinfo info
Repository AppStream is listed more than once in the configuration
Repository extras is listed more than once in the configuration
Last metadata expiration check: 0:07:57 ago on Sun 14 Jun 2020 10:01:18 AM CST.
=====
exim-4.93-3.el8
=====
Update ID: FEDORA-EPEL-2020-2056b1c4a9
Type: security
Updated: 2020-06-12 02:27:55
Bugs: 1836362 - CVE-2020-12783 exim: out-of-bounds read in the SPA
authenticator can lead to SPA/NTLM authentication bypass in auths/spa.c and
auths/auth-spa.c
      : 1836364 - CVE-2020-12783 exim: out-of-bounds read in the SPA
authenticator can lead to SPA/NTLM authentication bypass in auths/spa.c and
auths/auth-spa.c [epel-all]
Description: This is an update fixing out-of-bounds read in the SPA
authenticator.
Severity: Moderate
```

#### 4.3.11 包组管理的相关命令

```
yum grouplist [hidden] [groupwildcard] [...]
yum groupinstall group1 [group2] [...]
yum groupupdate group1 [group2] [...]
yum groupremove group1 [group2] [...]
yum groupinfo group1 [...]
```

范例：最小化安装的系统安装图形环境

```
[root@centos8 ~]#yum grouplist
Last metadata expiration check: 0:21:21 ago on Sun 22 Dec 2019 01:56:36 PM CST.
Available Environment Groups:
  Server with GUI
  Server
  Workstation
  KDE Plasma Workspaces
  Virtualization Host
  Custom Operating System
Installed Environment Groups:
  Minimal Install
Available Groups:
  Container Management
  .NET Core Development
  RPM Development Tools
  Smart Card Support
  Development Tools
  Graphical Administration Tools
  Headless Management
  Legacy UNIX Compatibility
  Network Servers
  Scientific Support
  Security Tools
```

```
System Tools
Fedora Packager
[root@centos8 ~]#yum groupinfo "Server with GUI"
Last metadata expiration check: 0:32:00 ago on Wed 08 Apr 2020 04:35:02 PM CST.
Environment Group: Server with GUI
Description: An integrated, easy-to-manage server with a graphical interface.
no group 'dns-server' from environment 'graphical-server-environment'
Mandatory Groups:
  Common NetworkManager submodules
  Container Management
  Core
  Fonts
  GNOME
  Guest Desktop Agents
  Hardware Monitoring Utilities
  Hardware Support
  Headless Management
  Internet Browser
  Multimedia
  Printing Client
  Server product core
  Standard
  base-x
Optional Groups:
  Basic Web Server
  Debugging Tools
  FTP Server
  File and Storage Server
  Guest Agents
  Infiniband Support
  Mail Server
  Network File System Client
  Network Servers
  Performance Tools
  Remote Desktop Clients
  Remote Management for Linux
  Virtualization Client
  Virtualization Hypervisor
  Virtualization Tools
  windows File Server
[root@centos8 ~]#dnf groupinstall GNOME -y
[root@centos8 ~]#init 5
```

## 4.3.12 实现私用 yum 仓库

下载所有yum仓库的相关包和meta 数据

```
#CentOS 8 dnf 工具集成
dnf reposync --help #查看帮助

#默认只下载rpm包，不下载 meta数据，需要指定--download-metadata 才能下载 meta
dnf reposync --repoid=REPOID --download-metadata -p /path

#CentOS 7 以前版本，reposync工具来自于yum-utils包
reposync --repoid=REPOID --download-metadata -p /path
```

创建私有yum仓库:

```
createrepo [options] <directory>
```

范例: 创建局域网的基于Base的私有yum源

```
#仓库服务器配置
[root@repo-server ~]#yum -y install httpd
[root@repo-server ~]#systemctl enable --now httpd
[root@repo-server ~]#mkdir /var/www/html/centos/8 -pv
[root@repo-server ~]#mount /dev/sr0 /mnt/
[root@repo-server ~]#cp -a /mnt/* /var/www/html/centos/8

#yum客户端配置
[root@repo-client ~]#cat /etc/yum.repos.d/test.repo
[BaseOS]
name=BaseOS
baseurl=http://10.0.0.8/centos/8/BaseOS
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-centosofficial
[AppStream]
name=Appstream
baseurl=http://10.0.0.8/centos/8/AppStream/
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-centosofficial
```

范例: 下载阿里云的extras源, 制作私有yum源

```
[root@repo-server ~]#yum repolist
Last metadata expiration check: 0:10:14 ago on Wed 08 Apr 2020 05:42:07 PM CST.
repo id                repo name                status
AppStream               AppStream                4,755
BaseOS                  BaseOS                   1,659
epel                    EPEL                     5,206
extras

[root@repo-server ~]#dnf reposync --repoid=extras --download-metadata -p
/var/www/html/centos

[root@repo-server ~]#ls /var/www/html/centos/
8  extras
[root@repo-server ~]#ls /var/www/html/centos/extras/
Packages  repodata

[root@repo-client ~]#yum repolist
Last metadata expiration check: 0:02:31 ago on Wed 08 Apr 2020 06:01:20 PM CST.
repo id                repo name                status
AppStream               Appstream                4,755
BaseOS                  BaseOS                   1,659
extras                  extras                   12

[root@repo-client ~]#cat /etc/yum.repos.d/test.repo
[BaseOS]
```

```

name=BaseOS
baseurl=http://10.0.0.8/centos/8/BaseOS
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-centosofficial
[AppStream]
name=Appstream
baseurl=http://10.0.0.8/centos/8/AppStream/
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-centosofficial

[extras]
name=extras
baseurl=http://10.0.0.8/centos/extras/

[root@repo-client ~]#yum --disablerepo=* --enablerepo=extras list available
[root@repo-client ~]#yum -y install epel-release

```

范例：下载阿里云的EPEL源，制作私有yum源

```

[root@centos8 ~]#cat /etc/yum.repos.d/base.repo
[epel]
name=EPEL
baseurl=https://mirrors.aliyun.com/epel/8/Everything/x86_64/
gpgcheck=0

[root@centos8 ~]#dnf repolist
Last metadata expiration check: 0:07:40 ago on Sun 22 Dec 2019 03:14:16 PM CST.
repo id          repo name          status
AppStream        AppStream          4,681
BaseOS           BaseOS             1,655
epel             EPEL               3,707

#下载相关仓库包和元数据
[root@centos8 ~]#dnf reposync --repoid=epel --download-metadata -p
/var/www/html
#--download-metadata 加此选项可以下载元数据
#下载相关的key文件
[root@repo-server ~]#wget -P /var/www/html/epel/
https://mirrors.aliyun.com/epel/RPM-GPG-KEY-EPEL-8

#下面两个步骤只有没meta数据才需要执行
#[root@centos8 ~]#dnf -y install createrepo httpd
#[root@centos8 ~]#createrepo /var/www/html/epel/

[root@centos8 ~]#ls /var/www/html/epel/
Packages repodata
[root@centos8 ~]#systemctl start httpd

[root@repo-client ~]#cat /etc/yum.repos.d/test.repo
[BaseOS]
name=BaseOS
baseurl=http://10.0.0.8/centos/8/BaseOS
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-centosofficial
[AppStream]
name=Appstream

```

```
baseurl=http://10.0.0.8/centos/8/AppStream/  
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-centosofficial
```

```
[extras]  
name=extras  
baseurl=http://10.0.0.8/centos/extras/
```

```
[epel]  
name=epel  
baseurl=http://10.0.0.8/epel/  
gpgkey=http://10.0.0.8/epel/RPM-GPG-KEY-EPEL-8
```

```
[root@repo-client ~]#yum repolist  
extras                1.6 MB/s | 4.9 kB      00:00  
epel                  88 MB/s | 6.2 MB      00:00  
repo id               repo name              status  
AppStream             Appstream              4,755  
BaseOS                BaseOS                 1,659  
epel                  epel                   5,206  
extras                extras                  12  
  
[root@repo-client ~]#dnf install openvpn
```

### 4.3.13 DNF 介绍

DNF，即DaNdiFied，是新一代的RPM软件包管理器。DNF发行日期是2015年5月11日，DNF包管理器采用Python编写，发行许可为GPL v2，首先出现在Fedora 18发行版中。在RHEL 8.0版本正式取代了YUM，DNF包管理器克服了YUM包管理器的一些瓶颈，提升了包括用户体验，内存占用，依赖分析，运行速度等

配置文件：

```
/etc/dnf/dnf.conf
```

仓库文件：

```
/etc/yum.repos.d/*.repo
```

日志：

```
/var/log/dnf.rpm.log  
/var/log/dnf.log
```

DNF 使用帮助：man dnf

dnf 用法与yum一致



```
dnf [options] <command> [<arguments>...]
dnf --version
dnf repolist
dnf reposync
dnf install httpd
dnf remove httpd
dnf clean all
dnf makecache
dnf list installed
dnf list available
dnf search nano
dnf history undo 1
```

CentOS 7 使用 dnf，下载并安装下面包

```
wget http://springdale.math.ias.edu/data/puias/unsupported/7/x86_64/dnf-conf-0.6.4-2.sd17.noarch.rpm
wget http://springdale.math.ias.edu/data/puias/unsupported/7/x86_64/dnf-0.6.4-2.sd17.noarch.rpm
wget http://springdale.math.ias.edu/data/puias/unsupported/7/x86_64/python-dnf-0.6.4-2.sd17.noarch.rpm
wget https://mirrors.aliyun.com/centos/7/extras/x86_64/Packages/python2-libcomps-0.1.8-12.el7.x86_64.rpm
wget https://mirrors.aliyun.com/centos/7/extras/x86_64/Packages/libcomps-0.1.8-12.el7.x86_64.rpm
```

### 4.3.14 yum Troubleshooting

yum 和 dnf 失败最主要原因：

- yum的配置文件格式或路径错误  
解决方法：检查/etc/yum.repos.d/\*.repo文件格式
- yum cache  
解决方法：yum clean all
- 网络不通：  
解决方法：网卡配置

## 5 程序包编译

---

HAPPY Birthday!

25岁生日快乐!  
Linux



欧买噶，现在的粉丝们越来越感人了

这么大的蛋糕，太客气了~~~



我擦





不要难过，其实现在已经友好多了。你还记得





## 5.1 源码编译介绍

程序包编译安装：

源代码-->预处理-->编译-->汇编-->链接-->执行

多文件：文件中的代码之间，很可能存在跨文件依赖关系

虽然有很多开源软件将软件打成包，供人们使用，但并不是所有源代码都打成包，如果想使用开源软件，可能需要自己下载源码，进行编译安装。另外即使提供了包，但是生产中需要用于软件的某些特性，仍然需要自行编译安装。但是利用源代码编译安装是比较繁琐的，庆幸的是有相关的项目管理工具可以大大减少编译过程的复杂度

## 5.2 开源程序源代码的获取

项目官方自建站点：

[apache.org](http://apache.org) (ASF: Apache Software Foundation)

[mariadb.org](http://mariadb.org)

...

代码托管：

[Github.com](https://github.com)

[gitee.com](https://gitee.com)



## 5.3 编译源码的项目工具

- C、C++的源码编译: 使用 make 项目管理器  
configure脚本 --> Makefile.in --> Makefile  
相关开发工具:  
autoconf: 生成configure脚本  
automake: 生成Makefile.in
- java的源码编译: 使用 maven

## 5.4 C 语言源代码编译安装过程

利用编译工具, 通常只需要三个大的步骤

- ./configure
  - (1) 通过选项传递参数, 指定安装路径、启用特性等; 执行时会参考用户的指定以及Makefile.in文件生成Makefile
  - (2) 检查依赖到的外部环境, 如依赖的软件包
- make 根据Makefile文件, 会检测依赖的环境, 进行构建应用程序
- make install 复制文件到相应路径

注意: 安装前可以通过查看README, INSTALL获取帮助

### 5.4.1 编译安装准备

准备: 安装相关的依赖包

- 开发工具: make, gcc (c/c++编译器GNU C Compiler)
- 开发环境: 开发库 (glibc: 标准库), 头文件, 可安装开发包组 Development Tools
- 软件相关依赖包

生产实践: 基于最小化安装的系统建议安装下面相关包

```
yum install gcc make autoconf gcc-c++ glibc glibc-devel pcre pcre-devel openssl  
openssl-devel systemd-devel zlib-devel vim lrzsz tree tmux lsof tcpdump wget  
net-tools iotop bc bzip2 zip unzip nfs-utils man-pages
```

### 5.4.2 编译安装

第一步: 运行 configure 脚本, 生成 Makefile 文件

其选项主要功能:

- 可以指定安装位置
- 指定启用的特性

获取其支持使用的选项

```
./configure --help
```

选项分类:

- 安装路径设定
  - prefix=/PATH: 指定默认安装位置,默认为/usr/local/
  - sysconfdir=/PATH: 配置文件安装位置
  - System types: 支持交叉编译
- 软件特性和相关指定:
  - Optional Features: 可选特性
    - disable-FEATURE
    - enable-FEATURE[=ARG]
  - Optional Packages: 可选包
    - with-PACKAGE[=ARG] 依赖包
    - without-PACKAGE 禁用依赖关系

注意: 通常被编译操作依赖的程序包, 需要安装此程序包的"开发"组件, 其包名一般类似于name-devel-VERSION

第二步: make

第三步: make install

### 5.4.3 安装后的配置

1. 二进制程序目录导入至PATH环境变量中  
编辑文件/etc/profile.d/NAME.sh

```
export PATH=/PATH/TO/BIN:$PATH
```

2. 相关用户及文件

有些开源软件编译完成后, 还需要创建相关的用户及文件

3. 导入帮助手册

编辑/etc/man.config|man\_db.conf文件,添加一个MANPATH

### 5.4.4 编译安装实战案例

#### 5.4.4.1 官网下载并编译安装新版 tree

范例: CentOS 7 编译安装 tree1.8

#1 安装相关的依赖包

```
[root@centos7 ~]#yum install gcc make
```

#2 下载源码并解压

```
[root@centos7 ~]#tar xvf tree-1.8.0.tgz
```

#3 进入解压缩的目录, README和INSTALL

```
[root@centos7 ~]#cd tree-1.8.0/
```

```
[root@centos7 tree-1.8.0]#cat README
```

```
[root@centos7 tree-1.8.0]#cat INSTALL
```

#4 修改源码的版本号

```
[root@centos7 tree-1.8.0]#sed -i 's#v1\.8\.0#v.8.8.8#' tree.c
```

#5 编译准备

```
[root@centos7 tree-1.8.0]#vim Makefile
```

```
prefix = /apps/tree
```

#6 编译



```
[root@centos7 tree-1.8.0]#make
```

#### #7 安装

```
[root@centos7 tree-1.8.0]#make install
```

#### #8 修改PATH变量

#默认无法直接运行tree

```
[root@centos7 ~]#tree
```

```
-bash: tree: command not found
```

```
[root@centos7 ~]#echo 'PATH=/apps/tree/bin:$PATH' > /etc/profile.d/tree.sh  
./etc/profile.d/tree.sh
```

#或者利用软链接实现

```
[root@centos7 ~]#ln -s /apps/tree/bin/tree /usr/local/bin
```

#### #9 验证结果

```
[root@centos7 ~]#tree --version
```

```
tree v8.8.8 (c) 1996 - 2018 by Steve Baker, Thomas Moore, Francesc Rocher,  
Florian Sesser, Kyosuke Tokoro
```

#### #10 添加man帮助

#默认无法查看man

```
[root@centos7 ~]#man tree
```

```
No manual entry for tree
```

```
[root@centos7 ~]#vim /etc/man_db.conf
```

```
MANDATORY_MANPATH /apps/tree/man
```

```
[root@centos7 ~]#man tree
```

#### #11 运行tree查看生成的文件列表

```
[root@centos7 ~]#tree /apps/tree
```

```
/apps/tree  
├── bin  
│   └── tree  
└── man  
    ├── man1  
    └── tree.1
```

```
3 directories, 2 files
```

### 5.4.4.2 编译安装 cmatrix



范例：CentOS 8 编译安装 cmatrix

#### #1 安装相关包

```
[root@centos8 ~]#dnf install gcc make autoconf ncurses-devel
```

#### #2 下载并解压缩包

```
[root@centos8 ~]#cd /usr/local/src
```

```
[root@centos8 src]#wget
```

```
https://github.com/abishekvashok/cmatrix/releases/download/v2.0/cmatrix-v2.0-Butterscotch.tar
```

```
[root@centos8 src]#tar xvf cmatrix-v2.0-Butterscotch.tar
```

#### #3 配置

```
[root@centos8 ~]#cd cmatrix
```

```
[root@centos8 cmatrix]#./configure --prefix=/apps/cmatrix
```

#### #4 编译并安装

```
[root@centos8 cmatrix]#make && make install
```

#### #5 配置环境

```
[root@centos8 ~]#echo 'PATH=/apps/cmatrix/bin:$PATH' > /etc/profile.d/cmatrix.sh
```

```
[root@centos8 ~]#. /etc/profile.d/cmatrix.sh
```

#### #或者用软链接实现

```
[root@centos8 ~]#ln -sv /apps/cmatrix/bin/cmatrix /usr/local/bin/
```

#### #6运行

```
[root@centos8 ~]#cmatrix -a -b -C yellow
```

#### 7#帮助

```
[root@centos8 ~]#vim /etc/man_db.conf
```

```
MANDATORY_MANPATH
```

```
/apps/cmatrix/share/man
```

```
[root@centos8 ~]#man cmatrix
```

### 5.4.4.3 编译安装 httpd 2.4

范例：centos8 编译安装 httpd-2.4.46

#### #安装前准备：关闭防火墙和SELinux

#### #1 安装相关包

```
[root@centos8 ~]#dnf install gcc make autoconf apr-devel apr-util-devel pcre-devel openssl-devel redhat-rpm-config
```

## #2 下载并解压缩包

```
[root@centos8 ~]#wget https://mirror.bit.edu.cn/apache//httpd/httpd-2.4.46.tar.bz2
[root@centos8 ~]#tar xvf httpd-2.4.46.tar.bz2 -C /usr/local/src
```

## #3 配置

```
[root@centos8 ~]#cd /usr/local/src/httpd-2.4.43/
[root@centos8 httpd-2.4.46]#./configure --prefix=/apps/httpd --sysconfdir=/etc/httpd --enable-ssl
```

## #4 编译并安装

```
[root@centos8 httpd-2.4.46]#make -j 4 && make install
```

## #5 配置环境

```
[root@centos8 ~]#echo 'PATH=/apps/httpd/bin:$PATH' > /etc/profile.d/httpd.sh
[root@centos8 ~]#./etc/profile.d/httpd.sh
```

## #6 运行

```
[root@centos8 ~]#apachectl start
```

## #7 指定用apache用户运行

```
[root@centos8 ~]#useradd -r -s /sbin/nologin -d /var/www -c Apache -u 48 apache
[root@centos8 ~]#vim /etc/httpd/httpd.conf
user apache
group apache
```

## #8 配置生效和验证

```
[root@centos8 ~]#apachectl restart
```

## #9 查看进程

```
[root@centos8 ~]#ps aux
```

## #10 用浏览器打开以下地址，可以看下面页面



# 6 Ubuntu 软件管理

Debian软件包通常为预编译的二进制格式的扩展名".deb"，类似rpm文件，因此安装快速，无需编译软件。包文件包括特定功能或软件所必需的文件、元数据和指令

- dpkg: package manager for Debian，类似于rpm，dpkg是基于Debian的系统的包管理器。可以安装，删除和构建软件包，但无法自动下载和安装软件包或其依赖项
- apt: Advanced Packaging Tool，功能强大的软件管理工具，甚至可升级整个Ubuntu的系统，基于客户/服务器架构，类似于yum

## 6.1 APT工作原理

在服务器上先复制所有DEB包，然后用APT的分析工具genbasedir根据每个DEB包的包头（Header）信息对所有的DEB包进行分析，并将该分析结果记录在文件夹base内的一个DEB索引清单文件中，一旦APT服务器内的DEB有所变动，要使用genbasedir产生新的DEB索引清单。客户端在进行安装或升级时先要查询DEB索引清单，从而获知所有具有依赖关系的软件包，并一同下载到客户端以便安装。当客户端需要安装、升级或删除某个软件包时，客户端计算机取得DEB索引清单压缩文件后，会将其解压置于 /var/cache/apt/，而客户端使用apt-get install或apt-get upgrade命令的时候，就会将这个文件夹内的数据和客户端计算机内的DEB数据库比对，知道哪些DEB已安装、未安装或是可以升级的

## 6.2 dpkg 包管理器

帮助参看：man dpkg

dpkg 常见用法

```
#安装包
dpkg -i package.deb

#删除包，不建议，不自动卸载依赖于它的包
dpkg -r package

#删除包（包括配置文件）
dpkg -P package

#列出当前已安装的包，类似rpm -qa
dpkg -l

#显示该包的简要说明
dpkg -l package

#列出该包的状态，包括详细信息，类似rpm -qi
dpkg -s package

#列出该包中所包含的文件，类似rpm -ql
dpkg -L package

#搜索包含pattern的包，类似rpm -qf
dpkg -S <pattern>

#配置包，-a 使用，配置所有没有配置的软件包
dpkg --configure package

#列出 deb 包的内容，类似rpm -qpI
dpkg -c package.deb

#解开 deb 包的内容
dpkg --unpack package.deb
```

范例：

```
#列出系统上安装的所有软件包
dpkg -l

#列出软件包安装的文件
dpkg -L bash

#查看/bin/bash来自于哪个软件包
```

```
dpkg -S /bin/bash

#安装本地的 .deb 文件
dpkg -i /mnt/cdrom/pool/main/z/zip/zip_3.0-11build1_amd64.deb

#卸载软件包
dpkg -r zip
```

注意：一般建议不要使用dpkg卸载软件包。因为删除包时，其它依赖它的包不会卸载，并且可能无法再正常运行

## 6.3 apt

Debian 使用apt 工具集来管理包系统，apt-get 是其中一个常用的命令行工具，另外一款较为流行的命令行与 GUI 兼顾的工具是 aptitude，之前最常用的 Linux 包管理命令都被分散在了 apt-get、apt-cache 和 apt-config 这三条命令中

在 2014 年apt 命令发布第一个稳定版，Ubuntu 16.04 引入新特性之一便是 apt 命令，apt 命令解决了命令过于分散的问题，它包括 apt-get 命令出现以来使用最广泛的功能选项，以及 apt-cache 和 apt-config 命令中很少用到的功能。在使用 apt 命令时，用户不必再由 apt-get 转到 apt-cache 或 apt-config，提供管理软件包所需的必要选项

apt 相当于 apt-get、apt-cache 和 apt-config 中最常用命令选项的集合

apt 具有更精简但足够的命令选项，而且参数选项的组织方式更为有效。此外，启用的几个特性也非常有帮助。例如：可以在使用 apt 命令安装或删除程序时看到进度条,apt 还会在更新存储库数据库时提示用户可升级的软件包个数

apt 与 apt-get 有一些类似的命令选项，但它并不能完全向下兼容 apt-get 命令,也可用 apt 替换部分 apt-get 系列命令，但不是全部

apt 命令用法

查看帮助：apt help

### apt与apt-get命令对比

apt 命令	被取代的命令	命令的功能
apt install	apt-get install	安装软件包
apt remove	apt-get remove	移除软件包
apt purge	apt-get purge	移除软件包及配置文件
apt update	apt-get update	刷新存储库索引
apt upgrade	apt-get upgrade	升级所有可升级的软件包
apt autoremove	apt-get autoremove	自动删除不需要的包
apt full-upgrade	apt-get dist-upgrade	在升级软件包时自动处理依赖关系
apt search	apt-cache search	搜索应用程序
apt show	apt-cache show	显示安装细节

apt 特有的命令

<code>apt list</code>	列出包含条件的包（已安装，可升级等）
<code>apt edit-sources</code>	编辑源列表

## APT包索引配置文件

```
/etc/apt/sources.list  
/etc/apt/sources.list.d
```

可以修改上面文件为国内的安装源，提高速度

参考链接：<https://developer.aliyun.com/mirror/ubuntu?spm=a2c6h.13651102.0.0.53322f70fghx56>

范例: 修改阿里云的APT源为清华源

```
root@ubuntu2004:~# sed -i 's/mirrors.aliyun.com/mirrors.tuna.tsinghua.edu.cn/'  
/etc/apt/sources.list
```

apt命令操作（如安装和删除软件包）日志文件

```
/var/log/dpkg.log
```

范例:

```
#安装包:  
apt install tree zip  
#安装图形桌面  
apt install ubuntu-desktop  
  
#删除包:  
apt remove tree zip  
#说明: apt remove中添加--purge选项会删除包配置文件, 谨慎使用  
#更新包索引, 相当于yum clean all;yum makecache  
apt update  
#升级包: 要升级系统, 请首先更新软件包索引, 再升级  
apt upgrade  
  
#apt列出仓库软件包, 等于yum list  
apt list  
#搜索安装包  
apt search nginx  
#查看某个安装包的详细信息  
apt show apache2  
  
#在线安装软件包  
apt install apache2  
  
#卸载单个软件包但是保留配置文件  
apt remove apache2  
  
#删除安装包并解决依赖关系  
apt autoremove apache2  
  
#更新本地软件包列表索引, 修改了apt仓库后必须执行  
apt update
```

#卸载单个软件包删除配置文件

```
apt purge apache2
```

#升级所有已安装且可升级到新版本的软件包

```
apt upgrade
```

#升级整个系统，必要时可以移除旧软件包。

```
apt full-upgrade
```

#编辑source源文件

```
apt edit-sources
```

#查看仓库中软件包有哪些版本可以安装

```
apt-cache madison nginx
```

#安装软件包的时候指定安装具体的版本

```
apt install nginx=1.14.0-0ubuntu1.6
```

#查看文件来自于哪个包,类似redhat中的yum provides <filename>

```
apt-file search 'string' #默认是包含此字符串的文件
```

```
apt-file search -x '正则表达式'
```

```
apt-file search -F /path/file
```

## 6.4 软件管理案例

### 6.4.1 案例1: 查看文件来自于哪个包

范例: 查找存在的文件来自于哪个包

#dpkg -S filename : 在当前安装的包里查找文件

```
[root@ubuntu1804 ~]#dpkg -S /bin/ls
coreutils: /bin/ls
```

范例: 查找不存在的文件存在于哪个包

```
[root@ubuntu1804 ~]#apt -y install apt-file
[root@ubuntu1804 ~]#apt update
[root@ubuntu1804 ~]#apt-file search -x '/s1$'
espeak-data: /usr/lib/x86_64-linux-gnu/espeak-data/voices/test/s1
espeak-ng-data: /usr/lib/x86_64-linux-gnu/espeak-ng-data/lang/zls/s1
language-pack-s1-base: /var/lib/locales/supported.d/s1
python-langdetect: /usr/lib/python2.7/dist-packages/langdetect/profiles/s1
python3-langdetect: /usr/lib/python3/dist-packages/langdetect/profiles/s1
qemu-system-common: /usr/share/qemu/keymaps/s1
rdesktop: /usr/share/rdesktop/keymaps/s1
s1: /usr/games/s1
virtualbox: /usr/share/virtualbox/rdesktop-vrdp-keymaps/s1
```

```
[root@ubuntu1804 ~]#apt-file search -F /usr/games/s1
s1: /usr/games/s1
```



## 6.4.2 案例2: 查看包相关信息

#显示系统安装包的统计信息,可以统计已经安装包的数量,大小,占用空间等

#apt-cache stats

```
[root@ubuntu1804 ~]#apt-cache stats
Total package names: 84873 (1,697 k)
Total package structures: 126998 (5,588 k)
  Normal packages: 91623
  Pure virtual packages: 2648
  Single virtual packages: 10275
  Mixed virtual packages: 5110
  Missing: 17342
Total distinct versions: 115114 (9,209 k)
Total distinct descriptions: 182818 (4,388 k)
Total dependencies: 905746/262881 (22.3 M)
Total ver/file relations: 39954 (959 k)
Total Desc/File relations: 51746 (1,242 k)
Total Provides mappings: 44540 (1,069 k)
Total globbed strings: 188808 (4,354 k)
Total slack space: 25.8 k
Total space accounted for: 51.3 M
Total buckets in PkgHashTable: 50503
  Unused: 9337
  Used: 41166
  Utilization: 81.512%
  Average entries: 3.08502
  Longest: 60
  Shortest: 1
Total buckets in GrpHashTable: 50503
  Unused: 9337
  Used: 41166
  Utilization: 81.512%
  Average entries: 2.06173
  Longest: 12
  Shortest: 1
```

#显示xxx包的信息,可以看到某个包的源、版本等信息

#apt-cache show xxx #更详细

#apt show xxx

```
[root@ubuntu1804 ~]#apt show keepalived
Package: keepalived
Version: 1:1.3.9-1ubuntu0.18.04.2
Priority: optional
Section: admin
Origin: Ubuntu
Maintainer: Ubuntu Developers <ubuntu-devel-discuss@lists.ubuntu.com>
Original-Maintainer: Alexander wirt <formorer@debian.org>
Bugs: https://bugs.launchpad.net/ubuntu/+filebug
Installed-Size: 844 kB
Depends: iproute2, libc6 (>= 2.27), libglib2.0-0 (>= 2.26.0), libip4tc0 (>= 1.6.0+snapshot20161117), libip6tc0 (>= 1.6.0+snapshot20161117), libnl-3-200 (>= 3.2.27), libnl-genl-3-200 (>= 3.2.7), libnl-route-3-200 (>= 3.2.7), libsnmp30 (>= 5.7.3+dfsg-1.8ubuntu3.1~dfsg), libssl1.1 (>= 1.1.0), libxtables12 (>= 1.6.0+snapshot20161117)
```

Recommends: ipvsadm  
Homepage: <http://keepalived.org>  
Supported: 5y  
Download-Size: 244 kB  
APT-Manual-Installed: yes  
APT-Sources: <http://mirrors.aliyun.com/ubuntu bionic-security/main amd64 Packages>

Description: Failover and monitoring daemon for LVS clusters  
keepalived is used for monitoring real servers within a Linux Virtual Server (LVS) cluster. keepalived can be configured to remove real servers from the cluster pool if it stops responding, as well as send a notification email to make the admin aware of the service failure.

.

In addition, keepalived implements an independent Virtual Router Redundancy Protocol (VRRPV2; see rfc2338 for additional info) framework for director failover.

.

You need a kernel >= 2.4.28 or >= 2.6.11 for keepalived.  
See README.Debian for more information.

N: There is 1 additional record. Please use the '-a' switch to see it

[root@ubuntu1804 ~]#apt-cache show keepalived

Package: keepalived

Architecture: amd64

Version: 1:1.3.9-1ubuntu0.18.04.2

Priority: optional

Section: admin

Origin: Ubuntu

Maintainer: Ubuntu Developers <ubuntu-devel-discuss@lists.ubuntu.com>

Original-Maintainer: Alexander wirt <formorer@debian.org>

Bugs: <https://bugs.launchpad.net/ubuntu/+filebug>

Installed-Size: 824

Depends: iproute2, libc6 (>= 2.27), libglib2.0-0 (>= 2.26.0), libip4tc0 (>= 1.6.0+snapshot20161117), libip6tc0 (>= 1.6.0+snapshot20161117), libnl-3-200 (>= 3.2.27), libnl-genl-3-200 (>= 3.2.7), libnl-route-3-200 (>= 3.2.7), libsnmp30 (>= 5.7.3+dfsg-1.8ubuntu3.1~dfsg), libssl1.1 (>= 1.1.0), libxtables12 (>= 1.6.0+snapshot20161117)

Recommends: ipvsadm

Filename: pool/main/k/keepalived/keepalived\_1.3.9-1ubuntu0.18.04.2\_amd64.deb

Size: 243520

MD5sum: 27586893f35660b2a130f344c4b7fcff

SHA1: 36b232cb39ff9179e7197d02c0bd252e32543e97

SHA256: fedef32d748fd4c5180531d1076b254f4705b46523ed61d51eb789f2441dfd56

Homepage: <http://keepalived.org>

Description-en: Failover and monitoring daemon for LVS clusters  
keepalived is used for monitoring real servers within a Linux Virtual Server (LVS) cluster. keepalived can be configured to remove real servers from the cluster pool if it stops responding, as well as send a notification email to make the admin aware of the service failure.

.

In addition, keepalived implements an independent Virtual Router Redundancy Protocol (VRRPV2; see rfc2338 for additional info) framework for director failover.

.

```
You need a kernel >= 2.4.28 or >= 2.6.11 for keepalived.
See README.Debian for more information.
Description-md5: e2d2506352721e77c2c351de4714ddd6
Supported: 5y

Package: keepalived
Architecture: amd64
Version: 1:1.3.9-1build1
Priority: optional
Section: admin
Origin: Ubuntu
Maintainer: Ubuntu Developers <ubuntu-devel-discuss@lists.ubuntu.com>
Original-Maintainer: Alexander wirt <formorer@debian.org>
Bugs: https://bugs.launchpad.net/ubuntu/+filebug
Installed-Size: 824
Depends: iproute2, libc6 (>= 2.17), libglib2.0-0 (>= 2.26.0), libip4tc0 (>=
1.6.0+snapshot20161117), libip6tc0 (>= 1.6.0+snapshot20161117), libnl-3-200 (>=
3.2.27), libnl-genl-3-200 (>= 3.2.7), libnl-route-3-200 (>= 3.2.7), libsnmp30
(>= 5.7.3+dfsg-1.8ubuntu1~dfsg), libssl1.1 (>= 1.1.0), libxtables12 (>=
1.6.0+snapshot20161117)
Recommends: ipvsadm
Filename: pool/main/k/keepalived/keepalived_1.3.9-1build1_amd64.deb
Size: 243368
MD5sum: 9998fcf3c2769effd8664b838f144bd6
SHA1: 1f22181adff9f47fdd9b08691817df4ac5d486bc
SHA256: 3d72f7e6cd09b7b903faf07c06c3c0d0883a33648a9e33af27b1909aeaf2b77f
Homepage: http://keepalived.org
Description-en: Failover and monitoring daemon for LVS clusters
keepalived is used for monitoring real servers within a Linux
Virtual Server (LVS) cluster. keepalived can be configured to
remove real servers from the cluster pool if it stops responding,
as well as send a notification email to make the admin aware of
the service failure.
.
In addition, keepalived implements an independent Virtual Router
Redundancy Protocol (VRRPv2; see rfc2338 for additional info)
framework for director failover.
.
You need a kernel >= 2.4.28 or >= 2.6.11 for keepalived.
See README.Debian for more information.
Description-md5: e2d2506352721e77c2c351de4714ddd6
Supported: 5y

[root@ubuntu1804 ~]#
```

### 6.4.3 案例3: 查看仓库中的指定软件的所有版本

```
[root@ubuntu1804 ~]#apt-cache madison docker-ce
docker-ce | 5:19.03.13~3-0~ubuntu-bionic | https://mirrors.aliyun.com/docker-
ce/linux/ubuntu bionic/stable amd64 Packages
docker-ce | 5:19.03.12~3-0~ubuntu-bionic | https://mirrors.aliyun.com/docker-
ce/linux/ubuntu bionic/stable amd64 Packages
docker-ce | 5:19.03.11~3-0~ubuntu-bionic | https://mirrors.aliyun.com/docker-
ce/linux/ubuntu bionic/stable amd64 Packages
docker-ce | 5:19.03.10~3-0~ubuntu-bionic | https://mirrors.aliyun.com/docker-
ce/linux/ubuntu bionic/stable amd64 Packages
```

#安装指定版本

```
[root@ubuntu1804 ~]#apt -y install docker-ce=5:19.03.13~3-0~ubuntu-bionic
```

## 6.4.4 案例4: 查看文件的依赖

#查询软件xxx依赖哪些包

#apt depends xxx

#apt-cache depends xxx

```
[root@ubuntu1804 ~]#apt depends keepalived
keepalived
Depends: iproute2
       iproute2:i386
Depends: libc6 (>= 2.27)
Depends: libglib2.0-0 (>= 2.26.0)
Depends: libip4tc0 (>= 1.6.0+snapshot20161117)
Depends: libip6tc0 (>= 1.6.0+snapshot20161117)
Depends: libnl-3-200 (>= 3.2.27)
Depends: libnl-genl-3-200 (>= 3.2.7)
Depends: libnl-route-3-200 (>= 3.2.7)
Depends: libsnmp30 (>= 5.7.3+dfsg-1.8ubuntu3.1~dfsg)
Depends: libssl1.1 (>= 1.1.0)
Depends: libxtables12 (>= 1.6.0+snapshot20161117)
Recommends: ipvsadm
[root@ubuntu1804 ~]#
```

#查询软件xxx被哪些包依赖

#apt rdepends xxx

#apt-cache rdepends xxx

```
[root@ubuntu1804 ~]#apt rdepends bash
bash
Reverse Depends:
Depends: bash-builtins (= 4.4.18-2ubuntu1.2)
       bash:i386
Recommends: plasma-sdk (>= 4.3)
       bash:i386
PreDepends: foomatic-db-engine (>= 2.05)
       bash:i386
Replaces: bash-doc (<< 4.3-2)
Depends: chromium-browser (>= 4)
       bash:i386
Depends: gdm3 (>= 4.3)
       bash:i386
Depends: votca-csg-tutorials (>= 4)
       bash:i386
```

```
Depends: votca-csg-scripts (>= 4)
bash:i386
Depends: uck (>= 3.0)
bash:i386
Depends: txt2regex (> 2.04)
bash:i386
```

## 6.5 ubuntu建议安装的常用包

```
[root@ubuntu1804 ~]#apt purge ufw lxd lxd-client lxcfs liblxc-common
[root@ubuntu1804 ~]#apt install iproute2 ntpdate tcpdump telnet traceroute nfs-
kernel-server nfs-common lrzsz tree openssl libssl-dev libpcre3 libpcre3-dev
zlib1g-dev gcc openssh-server iotop unzip zip
```

### 练习

- 1、查询命令java来自于哪个rpm包
- 2、yum的配置和使用,包括yum仓库的创建
- 3、编写系统初始化脚本 reset.sh, 包括别名, 提示符颜色, yum仓库配置文件,安装tree,ftp,lftp,telnet等包
- 4、在CentOS 8上编译安装 apache 2.4.43 源码包,并启动此服务



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祝大家学业有成

谢 谢

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