1. Introduction

1.1. Purpose
This document presents basic concepts of software management on Fedora systems. It outlines the major functions of yum, the recommended software management tool for Fedora.

1.2. Audience
This document is intended for Fedora users of all levels of experience.

1.3. Using This Document
This document is a reference for using yum. You may wish to read some or all of the sections, depending upon your needs and level of experience. If you are a new user, read the Section 2, "Software Management Concepts" before using yum for the first time. Experienced Linux users should start with Section 4, "Managing Software with yum".
**Previous Versions of Fedora Core**
This document describes the configuration of **yum** on Fedora Core 4 systems. You must perform the additional step noted in Section 7.2, “Manually Authorizing Package Sources” to enable **yum** on Fedora Core 3.

Most of the examples in this document use the package **tsclient**, which is included with Fedora Core. The **tsclient** package provides an application for remote desktop access. If you install it successfully you may start the application by choosing **Applications → Internet → Terminal Server Client**. To use the examples, substitute the name of the relevant package for **tsclient**. The example commands for Fedora package groups use the **MySQL Database** group.

**Avoid Logging in with the Root Account**
You do not need to log in with the **root** account in order to manage your Fedora system. All of the commands shown in this tutorial that require **root** access will prompt you for the **root** password. The example terminal commands use **su -c** to provide this facility.

**1.4. Additional Resources**
The **yum** utility has features and options not discussed in this document. Read the **man** pages for **yum**(8) and **yum.conf**(5) to learn more, using the following commands:

```
man yum  man yum.conf
```

Other useful **yum** resources on the Internet include:

- **Project web site**
  

- **Users mailing list**
  
  [https://lists.dulug.duke.edu/mailman/listinfo/yum/](https://lists.dulug.duke.edu/mailman/listinfo/yum/)

- **Development mailing list**
  
  [https://lists.dulug.duke.edu/pipermail/yum-devel/](https://lists.dulug.duke.edu/pipermail/yum-devel/)

**Check Bugzilla First**
If you encounter a persistent error with a specific operation, visit [http://bugzilla.redhat.com](http://bugzilla.redhat.com) and review the bug reports for the package or packages involved. An error in a package may cause all **yum** operations that rely on that package to fail. Please file bug reports for Fedora packages, including **yum**, on this Bugzilla web site.
2. Software Management Concepts

2.1. About Packages
Fedora software and documentation is supplied in the form of files called RPM packages. Each package is a compressed archive containing product information, program files, icons, documentation and management scripts. Management applications use these files to safely locate, install, update and remove software. For example, the Fedora installation process uses the packages supplied with Fedora Core to build or upgrade a system to your requirements.

Packages also include a digital signature to prove their source. Software management utilities verify this digital signature by using a GPG public key. The yum and rpm utilities share a common keyring that stores all of the public keys for approved package sources. The system administrator configures these approved package sources.

All Fedora Packages are Open Source Software
All of the software provided by the Fedora Project is open source software. You may download and install Fedora packages on as many systems as desired.

2.2. About Repositories
A repository is a prepared directory or web site that contains software packages and index files. Software management utilities such as yum automatically locate and obtain the correct RPM packages from these repositories. This method frees you from having to manually find and install new applications or updates. You may use a single command to update all system software, or search for new software by specifying criteria.

A network of servers provide several repositories for each version of Fedora Core. The package management utilities in Fedora Core are already configured to use three of these repositories:

Base
The packages that make up a Fedora Core release, as it is on disc

Updates
Updated versions of packages that are provided in Base

Extras
Packages for a large selection of additional software

Previous Versions of Fedora Core
Fedora Core 4 automatically supports the three repositories listed above. You must manually configure Fedora Core 3 systems to use Fedora Extras, as noted in Section 7, “Using Other Software Repositories”.

Fedora Development Repositories
Fedora Core also includes settings for several alternative repositories. These provide packages for various types of test system, and replace one or more of the standard
Third-party software developers also provide repositories for their Fedora compatible packages. To learn how to configure your Fedora system to use third-party repositories, read Section 7, “Using Other Software Repositories”.

You may also use the package groups provided by the Fedora repositories to manage related packages as sets. Some third-party repositories add packages to these groups, or provide their packages as additional groups.

Use repositories to ensure that you always receive current versions of software. If several versions of the same package are available, your management utility automatically selects the latest version.

2.3. About Dependencies

Some of the files installed on a Fedora distribution are libraries which may provide functions to multiple applications. When an application requires a specific library, the package which contains that library is a dependency. To properly install a package, Fedora must first satisfy its dependencies. The dependency information for a RPM package is stored within the RPM file.

The yum utility uses package dependency data to ensure that all of requirements for an application are met during installation. It automatically installs the packages for any dependencies not already present on your system. If a new application has requirements that conflict with existing software, yum aborts without making any changes to your system.

2.4. Understanding Package Names

Each package file has a long name that indicates several key pieces of information. For example, this is the full name of a tsclient package:

tsclient-0.132-6.i386.rpm

Management utilities commonly refer to packages with one of three formats:
Managing software with yum

- Package name: tsclient
- Package name with version and release numbers: tsclient-0.132-6
- Package name with hardware architecture: tsclient.i386

For clarity, yum lists packages in the format name.architecture. Repositories also commonly store packages in separate directories by architecture. In each case, the hardware architecture specified for the package is the minimum type of machine required to use the package.

- i386
  Suitable for any current Intel-compatible computer
- noarch
  Compatible with all computer architectures
- ppc
  Suitable for PowerPC systems, such as Apple Power Macintosh
- x86_64
  Suitable for 64-bit Intel-compatible processors, such as Opterons

Some software may be optimized for particular types of Intel-compatible machine. Separate packages may be provided for i386, i586, i686 and x86_64 computers. A machine with at least an Intel Pentium, VIA C3 or compatible CPU may use i586 packages. Computers with an Intel Pentium Pro and above, or a current model of AMD chip, may use i686 packages.

Use the short name of the package for yum commands. This causes yum to automatically select the most recent package in the repositories that matches the hardware architecture of your computer.

Specify a package with other name formats to override the default behavior and force yum to use the package that matches that version or architecture. Only override yum when you know that the default package selection has a bug or other fault that makes it unsuitable for installation.

Package Names

You may use any of the following formats to specify a package in a yum operation: name, name.architecture, name-version, name-version-release, name-version-release.architecture, and epoch:name-version-release.architecture.

3. Software Management Tools in Fedora Core

The yum utility is a complete software management system. Fedora Core also includes several other applications that can supplement yum.

On your desktop is an Alert Icon that keeps you informed about package updates. Until your system is updated the icon appears as a red circle with a flashing exclamation mark. The Alert Icon is part of the up2date application, which enables you to easily install system updates.

Fedora Core also includes system-config-packages. To run this application from the graphical interface, select Desktop → System Settings → Add/Remove Applications. Unlike up2date and yum, system-config-packages installs software packages from your Fedora Core installation discs.
only, and does not use repositories. This application is used on systems that do not have a network connection.

The **rpm** command-line utility has many functions for working with individual RPM packages. You may use it to manually install and remove packages from your system. If you install software with the **rpm** utility, you must manually check and install any dependencies. For this reason, **yum** is the recommended method for installing software.

### Current Package Versions

The **up2date** and **yum** utilities ensure that you have the most recent version of software packages. Other methods do not guarantee that the packages are current.

### 4. Managing Software with yum

Use the **yum** utility to modify the software on your system in four ways:

- To install new software from package repositories
- To install new software from an individual package file
- To update existing software on your system
- To remove unwanted software from your system

#### Installing Software from a Package File

The **yum** commands shown in this section use repositories as package sources. Refer to **Section 8, “Installing Software from an Isolated Package”** for details of using **yum** to install software from an individual package file.

To use **yum**, specify a function and one or more packages or package groups. Each section below gives some examples.

For each operation, **yum** downloads the latest package information from the configured repositories. If your system uses a slow network connection **yum** may require several seconds to download the repository indexes and the header files for each package.

The **yum** utility searches these data files to determine the best set of actions to produce the required result, and displays the transaction for you to approve. The transaction may include the installation, update, or removal of additional packages, in order to resolve software dependencies.

This is an example of the transaction for installing **tsclient**:

```
Package Arch Version Repository Size
Installing:
tsclient i386 0.132-6 base 247 k
Installing for dependencies:	rdesktop i386 1.4.0-2 base 107 k
```

Transaction Summary

```
=============================================================================
Package Arch Version Repository Size
=============================================================================
Installing:
tsclient i386 0.132-6 base 247 k
Installing for dependencies:	rdesktop i386 1.4.0-2 base 107 k
```

---

---
Managing software with yum

Install 2 Package(s)
Update 0 Package(s)
Remove 0 Package(s)
Total download size: 355 k
Is this ok [y/N]:

Example 1. Format of yum Transaction Reports
Review the list of changes, and then press y to accept and begin the process. If you press N or Enter, yum does not download or change any packages.

Package Versions
The yum utility only displays and uses the newest version of each package, unless you specify an older version.

The yum utility also imports the repository public key if it is not already installed on the rpm keyring.

This is an example of the public key import:

warning: rpmts_HdrFromFdno: Header V3 DSA signature: NOKEY, key ID 4f2a6fd2
public key not available for tsclient-0.132-6.i386.rpm
Retrieving GPG key from file:///etc/pki/rpm-gpg/RPM-GPG-KEY-fedora
Importing GPG key 0x4F2A6FD2 "Fedora Project <fedora@redhat.com>"
Is this ok [y/N]:

Example 2. Format of yum Public Key Import
Check the public key, and then press y to import the key and authorize the key for use. If you press N or Enter, yum stops without installing any packages.

To ensure that downloaded packages are genuine, yum verifies the digital signature of each package against the public key of the provider. Once all of the packages required for the transaction are successfully downloaded and verified, yum applies them to your system.

Every completed transaction records the affected packages in the log file /var/log/yum.log. You may only read this file with root access.

Downloads are Cached
The yum utility keeps downloaded data files and packages for reuse. You may copy packages from the repository cache directories under /var/cache/yum/, and use them elsewhere if you wish. If you remove a package from the cache, you do not affect the copy of the software installed on your system.

4.1. Installing New Software with yum
To install the package tsclient, enter the command:

su -c 'yum install tsclient'

Enter the password for the root account when prompted.

To install the package group MySQL Database, enter the command:
4.2. Updating Software with yum

To update the tsclient package to the latest version, type:

```
su -c 'yum update tsclient'
```

Enter the password for the root account when prompted.

New Software Versions Require Reloading

If a piece of software is in use when you update it, the old version remains active until the application or service is restarted. Kernel updates take effect when you reboot the system.

To update all of the packages in the package group MySQL Database, enter the command:

```
su -c 'yum groupupdate "MySQL Database"'
```

Enter the password for the root account when prompted.

Updating the Entire System

To update all of the packages on your Fedora system, use the commands described in Section 6, “Updating Your System with yum”.

4.3. Removing Software with yum

To remove software, yum examines your system for both the specified software, and any software which claims it as a dependency. The transaction to remove the software deletes both the software and the dependencies.

To remove the tsclient package from your system, use the command:

```
su -c 'yum remove tsclient'
```

Enter the password for the root account when prompted.

To remove all of the packages in the package group MySQL Database, enter the command:
Managing software with yum

su -c 'yum groupremove "MySQL Database"'

Enter the password for the root account when prompted.

Data and Configuration File Retention
The removal process leaves user data in place but may remove configuration files in some cases. If a package removal does not include the configuration file, and you reinstall the package later, it may reuse the old configuration file.

5. Searching for Packages with yum

Use the search features of yum to find software that is available from the configured repositories, or already installed on your system. Searches automatically include both installed and available packages.

The format of the results depends upon the option. If the query produces no information, there are no packages matching the criteria.

5.1. Searching by Package Name and Attributes
To search for a specific package by name, use the list function. To search for the package tsclient, use the command:

su -c 'yum list tsclient'

Enter the password for the root account when prompted.

To make your queries more precise, specify packages with a name that include other attributes, such as version or hardware architecture. To search for version 0.132 of the application, use the command:

su -c 'yum list tsclient-0.132'

Valid Package Attributes
Refer to Section 2.4, "Understanding Package Names" for information on package name formats and the attributes that they include.

5.2. Advanced Searches
If you do not know the name of the package, use the search or provides options. Alternatively, use wild cards or regular expressions with any yum search option to broaden the search criteria.

The search option checks the names, descriptions, summaries and listed package maintainers of all of the available packages to find those that match. For example, to search for all packages that relate to PalmPilots, type:
Enter the password for the root account when prompted.

The provides function checks both the files included in the packages and the functions that the software provides. This option requires yum to download and read much larger index files than with the search option.

To search for all packages that include files called libneon, type:

```
su -c 'yum provides libneon'
```

To search for all packages that either provide a MTA (Mail Transport Agent) service, or include files with mta in their name:

```
su -c 'yum provides MTA'
```

For each command, at the prompt enter the password for the root account.

Use the standard wildcard characters to run any search option with a partial word or name: ? to represent any one character, and * to mean zero or more characters. Always add the escape character (\) before wildcards.

To list all packages with names that begin with tsc, type:

```
su -c 'yum list tsc\*' 
```

**Regular Expressions**

Use Perl or Python regular expressions to carry out more complex queries.

### 5.3. Understanding Matches

Searches with yum show all of the packages that match your criteria. Packages must meet the terms of the search exactly to be considered matches, unless you use wildcards or a regular expression.

For example, a search query for shadowutils or shadow-util would not produce the package shadow-utils. This package would match and be shown if the query was shadow-util\?, or shadow\*.

### 6. Updating Your System with yum

Use the update option to upgrade all of your Fedora system software to the latest version with one operation.

To perform a full system update, type this command:

```
su -c 'yum update'
```
At the prompt, enter the *root* password.

### 6.1. Automatically Updating Your System

The *yum* package supplied with Fedora Core includes scripts to perform full system updates every day. To activate automatic daily updates, enter this command:

```
su -c '/sbin/chkconfig --level 345 yum on; /sbin/service yum start'
```

At the prompt, enter the password for the *root* account.

**How Daily Updates are Run**

There is no separate *yum* service that runs on your system. The command given above enables the control script `/etc/rc.d/init.d/yum`. This control script activates the script `/etc/cron.daily/yum.cron`, which causes the *cron* service to perform the system update automatically at 4am each day.

### 7. Using Other Software Repositories

Fedora systems automatically use the Fedora Project repositories. These include Fedora Extras, the default source of packages for software that is not included with Fedora Core.

**Fedora Extras Repositories for Previous Versions of Fedora Core**


If the Fedora Project does not supply packages for a product, the manufacturer may provide or recommend a separate repository. Members of the community also maintain repositories to provide packages for Fedora systems. For example, [http://www.jpackage.org/](http://www.jpackage.org/) distributes popular Java software as packages.

### 7.1. Adding a Repository as a Package Source

To add an extra repository, place a definition file in the `/etc/yum.repos.d/` directory on your system. Package providers make the definition files for their repositories available on their web sites.

**Definition File Extension**

The names of repository definition files end with `.repo`.

You must have root access to add a file to the definitions directory. To copy the definition file `example.repo`, type this command:
su -c 'cp example.repo /etc/yum.repos.d/

At the prompt, enter the password for the root account.

The configuration file for each repository should include a gpgkey setting. This setting specifies the location of a public key that verifies the packages provided by that repository. This public key is automatically imported the first time that you install software from the repository. If the configuration file provided does not include this setting, refer to Section 7.2, “Manually Authorizing Package Sources”.

Repositories and up2date Channels
Starting with Fedora Core 4, yum repositories are automatically used as up2date channels. On Fedora Core 3 and earlier systems, you must manually configure up2date to use these channels. To do so, edit the /etc/sysconfig/rhn/sources file.

7.2. Manually Authorizing Package Sources
To manually add a public key to your rpm keyring, use the import feature of the rpm utility. To import the file GPG-PUB-KEY.asc, type the following command:

su -c 'rpm --import GPG-PUB-KEY.asc'

At the prompt, enter the password for the root account.

You may also import public keys directly from a web site. For example, to import the file GPG-PUB-KEY.asc on the web site www.therepository.com use this command:

su -c 'rpm --import http://www.therepository.com/GPG-PUB-KEY.asc'

At the prompt, enter the root password.

Importing the Fedora Key on Fedora Core 3
To add the Fedora public key to the rpm keyring on Fedora Core 3 systems, run the command su -c 'rpm --import /usr/share/rhn/RPM-GPG-KEY-fedora'.

7.3. Understanding Repository Compatibility
The Fedora Extras repository provides packages which are built to the same standards as Fedora Core packages. Third-party packages should be compatible with these Fedora Project packages, unless the provider specifically states otherwise.

Always read the web site of the repository for information on package compatibility before you add it as a package source. Separate repository providers may offer different and incompatible versions of the same software. Third-party repositories may also provide alternative packages for software that is included in Fedora repositories.

Alternative packages may contain versions of the software that function differently from the version in the Fedora Project packages. Determine the benefits and potential incompatibilities before replacing Fedora Project packages with alternative versions.
Incompatible Repositories
If you configure your system to use incompatible repositories `yum` operations may fail.

Packages built for one version of Fedora are usually not compatible with other versions of Fedora. The web site of the provider should specifically state which versions of Fedora they support.

Old Versions of `yum` and Current Repositories
The data format for repository indexes changed with version 2.1 of `yum`. This was the version supplied with Fedora Core 3. Repository providers should specify the versions of Fedora Core that they support. To confirm that an unlabeled repository is compatible with current versions of `yum`, check that it has a sub-directory called `repodata/`.

8. Installing Software from an Isolated Package
Use repositories and the standard `yum` commands to locate and install new software, unless the software package is not available from any repository. In these cases, use the `localinstall` function to install the software from the package file.

Public Key is Required
Ensure that the public key for the package source has been imported before you install a package without a repository. Refer to Section 7.2, “Manually Authorizing Package Sources”.

Enter this command to install the package `tsclient-0.132-4.i386.rpm`:

```
su -c 'yum localinstall tsclient-0.132-4.i386.rpm'
```

At the prompt, enter the `root` password.

Previously Installed Software is Updated
If the package provides a later version of software that is already installed on your system, `yum` updates the installed software.

If the package requires software that is not installed on your system, `yum` attempts to meet the dependencies with packages from the configured repositories. You may need to manually download and install additional packages in order to satisfy all of the dependencies.

Maintaining Manually Installed Software
If you install software that is not provided by a repository, `yum update` cannot automatically upgrade it as new versions become available. To ensure that you have the...
latest packages, subscribe to e-mail or RSS services that notify you when new versions are released.

9. Maintaining yum
The **yum** system does not require any routine maintenance. To ensure that **yum** operations are carried out at optimal speed, disable or remove repository definitions which you no longer require. You may also clear the files from the **yum** caches in order to recover disk space.

9.1. Disabling or Removing Package Sources
Set `enable=0` in a definition file to prevent **yum** from using that repository. The **yum** utility ignores any definition file with this setting.

To completely remove access to a repository:

1. Delete the relevant file from `/etc/yum.repos.d/`.
2. Delete the cache directory from `/var/cache/yum/`.

9.2. Clearing the **yum** Caches
By default, **yum** retains the packages and package data files that it downloads, so that they may be reused in future operations without being downloaded again. To purge the package data files, use this command:

```
su -c 'yum clean headers'
```

Run this command to remove all of the packages held in the caches:

```
su -c 'yum clean packages'
```

When using these commands, at the prompt, enter the password for the `root` account.

Purging cached files causes those files to downloaded again the next time that they are required. This increases the amount of time required to complete the operation.

10. Using **yum** with a Proxy Server
By default, **yum** accesses network repositories with HTTP. All **yum** HTTP operations use HTTP/1.1, and are compatible with web proxy servers that support this standard. You may also access FTP repositories, and configure **yum** to use an FTP proxy server. The **squid** package provides a proxy service for both HTTP/1.1 and FTP connections.

Modifying **yum** for Network Compatibility
Refer to the `man` page for **yum.conf** for information on HTTP settings that may be modified for compatibility with nonstandard web proxy servers. Alternatively, configure
10.1. Configuring Proxy Server Access

To enable all `yum` operations to use a proxy server, specify the proxy server details in `/etc/yum.conf`. The `proxy` setting must specify the proxy server as a complete URL, including the TCP port number. If your proxy server requires a username and password, specify these by adding `proxy_username` and `proxy_password` settings.

The settings below enable `yum` to use the proxy server `mycache.mydomain.com`, connecting to port 3128, with the username `yum-user` and the password `qwerty`.

```
# The proxy server - proxy server:port number
proxy=http://mycache.mydomain.com:3128
# The account details for yum connections
proxy_username=yum-user
proxy_password=qwerty
```

Example 3. Configuration File Settings for Using A Proxy Server

Global Settings

If you define a proxy server in `/etc/yum.conf`, all users connect to the proxy server with those details when using `yum`.

10.2. Configuring Proxy Server Access for a Single User

To enable proxy access for a specific user, add the lines in the example box below to the user's shell profile. For the default `bash` shell, the profile is the file `~/.bash_profile`. The settings below enable `yum` to use the proxy server `mycache.mydomain.com`, connecting to port 3128.

```
# The Web proxy server used by this account
http_proxy="http://mycache.mydomain.com:3128"
export http_proxy
```

Example 4. Profile Settings for Using a Proxy Server

If the proxy server requires a username and password, add these to the URL. To include the username `yum-user` and the password `qwerty`, add these settings:

```
# The Web proxy server, with the username and password for this account
http_proxy="http://yum-user:qwerty@mycache.mydomain.com:3128"
export http_proxy
```

Example 5. Profile Settings for a Secured Proxy Server

The `http_proxy` Environment Variable

The `http_proxy` environment variable is also used by `curl` and other utilities. Although `yum` itself may use `http_proxy` in either upper-case or lower-case, `curl` requires the name of the variable to be in lower-case.
11. Acknowledgements
Paul Frields edited this document. Timothy Murphy reviewed the beta release.

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