Red Hat Enterprise Linux 7

Desktop Migration and Administration Guide

A guide to the GNOME 3 Desktop migration planning and administration on Red Hat Enterprise Linux 7.
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Abstract

The Desktop Migration and Administration Guide documents the GNOME 3 Desktop migration planning, deployment, configuration, and administration on Red Hat Enterprise Linux 7. It is oriented towards system administrators with a basic understanding of the Red Hat Enterprise Linux system.
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CHAPTER 1. INTRODUCING THE GNOME 3 DESKTOP

1.1. WHAT IS GNOME 3?

In Red Hat Enterprise Linux 7, GNOME 3 is the default desktop environment. It is the next major version of the GNOME Desktop, which introduces a new user interface and substantial feature improvements over the previous GNOME 2 Desktop shipped with Red Hat Enterprise Linux 5 and 6.

![ GNOME 3 Desktop (GNOME Classic) ]

Figure 1.1. The GNOME 3 Desktop (GNOME Classic)

GNOME 3 provides a focused working environment that encourages productivity. A powerful search feature lets you access all your work from one place. For example, you can turn off notifications when you need to concentrate on the task in hand. GNOME 3 is built on a number of powerful components:

**GNOME Shell**

GNOME Shell is a modern and intuitive graphical user interface. It provides quality user experience, including visual effects and hardware acceleration support. For more information, see Section 1.2, “What Is GNOME Shell?”.

**GNOME Classic**

GNOME Classic combines old and new; it keeps the familiar look and feel of GNOME 2, but adds the powerful new features and 3-D capabilities of GNOME Shell. GNOME Classic is the default GNOME session and GNOME Shell mode in Red Hat Enterprise Linux 7. For more information, read the section Section 1.3, “What Is GNOME Classic?”.

**GSettings**
**GSettings** is a configuration storage system, replacing **GConf** found in older GNOME versions. For more information about the transition from **GConf** to **GSettings**, see Chapter 3, **GSettings and dconf**. To learn more about configuring your desktop with **GSettings**, read Chapter 9, **Configuring Desktop with GSettings and dconf**.

**GVFS**
GVFS provides complete virtual file system infrastructure and handles storage in the GNOME Desktop in general. Through GVFS, GNOME 3 integrates well with online document-storage services, calendars, and contact lists, so all your data can be accessed from the same place. Read more about GVFS in Chapter 15, **Virtual File Systems and Disk Management**.

**GTK+**
GTK+, a multi-platform toolkit for creating graphical user interfaces, provides a highly-useful feature-rich API. Thanks to GTK+, GNOME 3 is able to change the look of an application or provide smooth appearance of graphics. In addition, GTK+ contains a number of features such as object-oriented programming support (GObject), wide support of international character sets and text layouts (Pango), or a set of accessibility interfaces (ATK).

### 1.2. WHAT IS GNOME SHELL?

GNOME Shell is the user interface of the GNOME Desktop, the crucial technology of GNOME 3. It provides basic user interface functions such as switching windows, launching applications, or displaying notifications.

GNOME Shell introduces innovative user interface concepts to provide quality user experience, including hardware acceleration on systems with modern graphics hardware.

Some of the major components of the GNOME Shell user interface include:

**The top bar.**
The horizontal bar at the top of the screen provides access to some of the basic functions of GNOME Shell, such as the Activities Overview, clock and calendar, system status icons, and the system menu at the top-left corner of the screen.

**The system menu.**
The system menu is in the top right corner. You can update some of your settings, find information about your Wi-Fi connection, switch user, log out, and turn off your computer from this menu.

**The Activities Overview.**
The Activities Overview features windows and applications views that let the user run applications and windows and switch between them.

**The search entry** at the top allows for searching various items available on the desktop, including applications, documents, files, and configuration tools.

**The vertical bar on the left side is called dash**, and it contains a list of favorite and running applications.

**The workspace list** is displayed on the right side, and allows the user to switch between multiple workspaces, or move applications and windows from one workspace to another.

**The message tray.**
The **message tray** is a horizontal bar near the bottom of the screen, and shows when the user presses **Super+M**. It provides access to pending notifications.

**Components specific to GNOME Classic.**

**GNOME Classic** is the default GNOME Shell mode in Red Hat Enterprise Linux 7. It changes some of the aspects of GNOME Shell behavior as well as the GNOME Shell appearance. That includes the bottom bar with the window list, and the **Applications** and **Places** menus on the top bar. For detailed information on GNOME Classic, see Section 1.3, “What Is GNOME Classic?”.

### 1.2.1. Hardware Acceleration and Software Rendering

GNOME Shell features visual effects and makes use of hardware acceleration support provided by **Clutter**, an OpenGL-based graphics library.

For hardware acceleration to function properly, the graphics driver has to support GL 1.2 and the multi-texturing extension, or GL 1.3. Alternatively, the driver has to provide support for GLES 1.1 or GLES 2.0. Keep in mind that many GPU models and drivers do not properly implement support for GL or GLES, so hardware acceleration on systems with those GPUs and drivers may not be available.

On systems, including virtual machines, that do not meet the GPU and driver requirements, software rendering is used to provide the GNOME 3 user experience identical to that with supported hardware acceleration. Software rendering is provided by the **llvmpipe** driver.

To determine whether the system is using software rendering and the **llvmpipe** driver, you can run the `glxinfo` command:

```
$ glxinfo | grep renderer
OpenGL renderer string: Gallium 0.4 on llvmpipe (LVVM 3.3, 128 bits)
```

Note that because the software renderer does not provide a fully compliant OpenGL implementation, some programs may not function properly if they rely on the X server having a consistent view of GLX state across applications. Consider upgrading your hardware, or run these programs on systems with GPUs and drivers that fully support hardware acceleration.

### 1.3. WHAT IS GNOME CLASSIC?

** GNOME Classic** is a GNOME Shell feature and mode for users who prefer a more traditional desktop experience. While GNOME Classic is based on GNOME 3 technologies, it provides a number of changes to the user interface:

**The Applications and Places menus.**

The **Applications** menu is displayed at the top left of the screen. It gives the user access to applications organized into categories. The user can also open the **Activities Overview** from that menu.

The **Places** menu is displayed next to the **Applications** menu on the **top bar**. It gives the user quick access to important folders, for example **Downloads** or **Pictures**.

**The taskbar.**

The taskbar is displayed at the bottom of the screen, and features:

- a window list,
• a notification icon displayed next to the window list,
• a short identifier for the current workspace and total number of available workspaces displayed next to the notification icon.

Four available workspaces.
In GNOME Classic, the number of workspaces available to the user is by default set to 4.

Minimize and maximize buttons.
Window titlebars in GNOME Classic feature the minimize and maximize buttons that let the user quickly minimize the windows to the window list, or maximize them to take up all of the space on the desktop.

A traditional Super+Tab window switcher.
In GNOME Classic, windows in the Super+Tab window switcher are not grouped by application.

The system menu.
The system menu is in the top right corner. You can update some of your settings, find information about your Wi-Fi connection, switch user, log out, and turn off your computer from this menu.

Figure 1.2. GNOME Classic with the Calculator application and the Accessories submenu of the Applications menu

1.3.1. The GNOME Classic Extensions
GNOME Classic is distributed as a set of **GNOME Shell extensions**. The GNOME Classic extensions are installed as dependencies of the `gnome-classic-session` package, which provides components required to run a GNOME Classic session. Because the GNOME Classic extensions are enabled by default on Red Hat Enterprise Linux 7, GNOME Classic is the default Red Hat Enterprise Linux 7 desktop user interface.

- AlternateTab ([alternate-tab@gnome-shell-extensions.gcampax.github.com](http://alternate-tab@gnome-shell-extensions.gcampax.github.com)),
- Applications Menu ([apps-menu@gnome-shell-extensions.gcampax.github.com](http://apps-menu@gnome-shell-extensions.gcampax.github.com)),
- Launch new instance ([launch-new-instance@gnome-shell-extensions.gcampax.github.com](http://launch-new-instance@gnome-shell-extensions.gcampax.github.com)),
- Places Status Indicator ([places-menu@gnome-shell-extensions.gcampax.github.com](http://places-menu@gnome-shell-extensions.gcampax.github.com)),
- Window List ([window-list@gnome-shell-extensions.gcampax.github.com](http://window-list@gnome-shell-extensions.gcampax.github.com)).

### 1.3.2. Switching from GNOME Classic to GNOME and Back

The user can switch from GNOME Classic to GNOME by logging out and clicking on the cogwheel next to **Sign In**. The cogwheel opens a drop-down menu, which contains GNOME Classic.

To switch from GNOME Classic to GNOME from within the user session, run the following command:

```
$ gnome-shell --mode=user -r &
```

To switch back to GNOME Classic from within the same user session, run the following command:

```
$ gnome-shell --mode=classic -r &
```

### 1.3.3. Disabling GNOME Classic as the Default Session

For all newly created users on Red Hat Enterprise Linux 7, GNOME Classic is set as the default session. To override that setting for a specific user, you need to modify the user’s account service in the `/var/lib/AccountsService/users/username` file. See Section 14.3.2, “Configuring a User Default Session” for details on how to do that.

**Getting More Information**

Users can find more information on using GNOME 3, GNOME Shell, or GNOME Classic in GNOME Help, which is provided by the `gnome-user-docs` package. To access GNOME Help, press the **Super** key to enter the **Activities Overview**, type `help`, and then press **Enter**.

### 1.4. NOTE ON ACCESSIBILITY

The GNOME desktop includes assistive technologies to support users with various impairments and special needs, and to interact with common assistive devices. The **Universal access menu** provides a quick set up for users with various disabilities. The icon is placed on the top bar and looks like a person surrounded by a circle:

![Universal Access Icon](http://example.com/icon.png)

All the accessibility features are documented in **GNOME Help**, which can be easily accessed by opening the **Activities overview** and typing `help`. From the **GNOME Help** menu, select **Universal access**.

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NOTE

To access GNOME as a visually impaired person, press the Super+Alt+S key combination, which switches on the screen reader. You can find more details on using Orca screen reader on its help page.
PART I. MIGRATION PLANNING

Migration Planning focuses on the shift of the default Red Hat Enterprise Linux desktop environment from GNOME 2, shipped with Red Hat Enterprise Linux 5 and 6, to GNOME 3. One by one, this part of the guide briefly mentions the changes certain components have gone through and describes the new features the components possess.

This guide only refers to changes to the GNOME Desktop environment. For changes to the other parts of Red Hat Enterprise Linux 7 refer to:

- Red Hat Enterprise Linux 7 System Administrator’s Guide, for components such as the GRUB 2 boot loader, package management, systemd, or printer configuration.

- Red Hat Enterprise Linux 7 Migration Planning Guide for an overview of major changes in behavior and compatibility between Red Hat Enterprise Linux 6 and Red Hat Enterprise Linux 7. The Migration Planning Guide also introduces the tools provided by Red Hat to assist with upgrades to Red Hat Enterprise Linux 7.

- Red Hat Enterprise Linux 7 Installation Guide for detailed information about installing Red Hat Enterprise Linux 7 and using the Anaconda installer.

These documents can be found at http://access.redhat.com/site/documentation/Red_Hat_Enterprise_Linux/.
CHAPTER 2. LOGIND

**logind** (or more specifically **systemd-logind**) is a system service that manages user logins. This service is responsible for the following:

- keeping track of users and sessions, their processes and their idle states,
- creating control groups for user processes,
- providing PolicyKit-based access for users to operations such as system shutdown or sleep,
- implementing a shutdown/sleep inhibition logic for applications,
- handling of power/sleep hardware keys,
- multi-seat management, session switch management, and device access management for users,
- automatic spawning of text logins (gettys) on virtual terminal (console) activation and user runtime directory management.

The **logind** service is deeply integrated with **systemd**, the new initialization system in Red Hat Enterprise Linux 7, and replaces the **upstart** initialization system from Red Hat Enterprise Linux 6. With this change comes a number of new features and functions. The following is a summary of those most significant:

**ConsoleKit**

The **ConsoleKit** framework is deprecated in Red Hat Enterprise Linux 7. Equivalent functionality is now provided by **systemd**. Both **ConsoleKit** and **logind** are services for tracking the currently running user sessions.

**NOTE**

**ConsoleKit** had the ability to run arbitrary shell scripts any time the active session on the system changed (using virtual terminal switching). This functionality is no longer provided.

the **/var/log/ConsoleKit/history** file

Previously, **ConsoleKit** was sending log files to **/var/log/ConsoleKit/history**, which the present **logind** does not support. The file has been replaced by the traditional **wtmp** and **utmp** files which now keep track of all logins and logouts on the system. **/var/log/ConsoleKit/history** provided similar information as the **wtmp** file, though in a different format. Given the overlap in functionality, **logind** only adopted the **wtmp** file's role.

**seat.d** scripts

Since **ConsoleKit** is no longer in use, **seat.d** scripts no longer complement the **ConsoleKit** framework, and have been replaced by **systemd-logind**.

the **ck-list-sessions** command

**ConsoleKit** provided the **ck-list-sessions** command, which returned extended information about recent users, not only regular users but also GUI access with **GDM**. The comparable result can now be reached by running the **loginctl** command:

```
$ loginctl list-sessions
```
multi-seat support

logind along with GDM provide the multi-seat feature with which the user can attach another monitor, mouse, or keyboard to their machine. Doing so, an additional login screen appears and the user can log in as if they were using another machine.

To list seats that are available on the system, run the following command:

```
$ loginctl list-seats
```

To show the status of a specific seat on the system, run the following command:

```
$ loginctl seat-status seat
```

where seat is the name of the seat, for example seat0.

To assign specific hardware to a particular seat, run the following command:

```
# loginctl attach seat device
```

where seat is the name of the seat, for example seat1, and device is the device name specified with the /sys device path, for example /sys/devices/pci0000:00/0000:00:02.0/drm/card0.

To change the assignment, assign the hardware to a different seat, or use the loginctl flush-devices command.

GETTING MORE INFORMATION

systemd-logind.service(8) – The man page for logind provides more information on the logind usage and features. It also covers the APIs systemd-logind provides (logind D-Bus API documentation).

logind.conf(5) – The man page for logind.conf discusses the login manager configuration file.

loginctl(1) – The man page for the systemd login manager includes more information on the multi-seat feature.
CHAPTER 3. GSETTINGS AND DCONF

One of the major changes in Red Hat Enterprise Linux 7 is the transition from GConf (for storing user preferences) to the combination of the GSettings high-level configuration system and the dconf back end.

GConf

As mentioned above, the GConf configuration system has been replaced by two systems:

- the GSettings API, and
- the dconf back end which serves as a low-level configuration system and program that collects system hardware and software configuration details in a single compact binary format.

Both the gsettings command-line tool and the dconf utility are used to view and change user settings. The gsettings utility does so directly in the terminal, while the dconf utility uses the dconf-editor GUI for editing a configuration database. See Chapter 9, Configuring Desktop with GSettings and dconf for more information on dconf-editor and the gsettings utility.

gconf
tool

The gconf tool has been replaced by gsettings and dconf. Likewise, gconf-editor has been replaced by dconf-editor.

Overriding

The concept of keyfiles has been introduced in Red Hat Enterprise Linux 7: the dconf utility allows the system administrator to override the default settings by directly installing defaults overrides. For example, setting the default background for all users is now executed by using a dconf override placed in a keyfile in the keyfile directory, such as /etc/dconf/db/local.d/). To learn more about default values and overriding, see Section 9.5, “Configuring Custom Default Values”.

Locking the Settings

The dconf system now allows individual settings or entire settings subpaths to be locked down to prevent user customization. For more information on how to lock settings, see Section 9.5.1, “Locking Down Specific Settings”.

NFS and dconf

Using the dconf utility on home directories shared over NFS requires additional configuration. See Section 9.7, “Storing User Settings Over NFS” for information on this topic.

GETTING MORE INFORMATION

See Chapter 9, Configuring Desktop with GSettings and dconf for more information on using GSettings and dconf to configure user settings.
CHAPTER 4. POLICYKIT

The PolicyKit utility is a framework that provides an authorization API used by privileged programs (also called mechanisms) offering services to unprivileged programs (also called subjects). The following are details on the changes PolicyKit, or its system name polkit, has undergone.

4.1. POLICY CONFIGURATION

As far as the new features are concerned, authorization rules are now defined in JavaScript .rules files. This means that the same files are used for defining both the rules and the administrator status. Previously, this information was stored in two different file types - *.pkla and *.conf, which used key/value pairs to define additional local authorizations.

These new .rules files are stored in two locations; whereas polkit rules for local customization are stored in the /etc/polkit-1/rules.d/ directory, the third party packages are stored in /usr/share/polkit-1/rules.d/.

The existing .conf and .pkla configuration files have been preserved and exist side by side with .rules files. polkit has been upgraded for Red Hat Enterprise Linux 7 with the compatibility issue in mind.

The logic in precedence in rules has changed. polkitd now reads .rules files in lexicographic order from the /etc/polkit-1/rules.d and /usr/share/polkit-1/rules.d directories. If two files are named identically, files in /etc are processed before files in /usr. In addition, existing rules are applied by the /etc/polkit-1/rules.d/49-polkit-pkla-compat.rules file. They can therefore be overridden by .rules files in either /usr or /etc with a name that comes before 49-polkit-pkla-compat in lexicographic order. The simplest way to ensure that your old rules are not overridden is to begin the name of all other .rules files with a number higher than 49.

Here is an example of a .rules file. It creates a rule that allows mounting a file system on a system device for the storage group. The rule is stored in the /etc/polkit-1/rules.d/10-enable-mount.rules file:

```
Example 4.1. Allow Mounting a File system on a System device

polkit.addRule(function(action, subject) {
    if (action.id == "org.freedesktop.udisks2.filesystem-mount-system" &&
        subject.isInGroup("storage")) {
        return polkit.Result.YES;
    }

});
```

For more information, see:

- **polkit**(8) – The man page for the description of the JavaScript rules and the precedence rules.
- **pkla-admin-identities**(8) and **pkla-check-authorization**(8) – The man pages for documentation of the .conf and .pkla file formats, respectively.

4.2. DEFAULT POLICY

The default configuration now allows members of the wheel group to authenticate for administrative actions using their own password instead of asking for the root password. The default policy is defined in /etc/polkit-1/rules.d/50-default.rules.
In the users panel of GNOME Settings, you can configure an account to an Administrator. When you first create the user during the GNOME Initial Setup, by default, you will create an Administrator account (a member of the wheel group).

**NOTE**

While `sudo` users are allowed to run programs with the security privileges of another user, **Administrator** is a member of the wheel group providing additional special system privileges that empower a user to execute restricted commands.

### 4.3. CHECKING PERMISSIONS FROM SCRIPTS

The `pkcheck` utility, which checks whether a process is authorized for action, now supports a new format for parameters specified by the `--process` option. This makes running `pkcheck` safer by avoiding a race condition. The new format looks as follows:

```bash
$ pkcheck --process pid,start-time,uid
```

**IMPORTANT**

Do not use the bare `pid` or `pid,start-time` formats for the `--process` option. All scripts that invoke `pkcheck` need to use the new format `pid,start-time,uid` to avoid a race condition.

For more information, see the `pkcheck(1)` man page.

### 4.4. EXTENDING POLKIT CONFIGURATION

Support for replacing the back-end authority implementation has been removed. A similar level of flexibility can be achieved by writing a JavaScript `.rules` file that calls an external program.

Support for replacing the `PolkitBackendActionLookup` implementation (the interface used to provide data to authentication dialogs) has also been removed from `polkit` in Red Hat Enterprise Linux 7.

For more information on `polkit`, see the `polkit(8)` man page.
CHAPTER 5. GDM

GDM is the GNOME Display Manager, which provides a graphical login environment. After the transition from GNOME 2 to GNOME 3, configuring GDM is only possible through systemd as it no longer supports other init systems.

the gdm package

The gdm package has replaced xorg-x11-xdm, which provided a legacy display login manager for the X Window System. As mentioned before, the gdm package provides the graphical login screen, shown shortly after boot up, log out, and when user-switching.

GDM and logind

GDM now uses logind for defining and tracking users. For more information, see Chapter 2, logind. System administrators can also set up automatic login manually in the GDM custom configuration file: /etc/gdm/custom.conf.

custom.conf

GDM configuration is now found in /etc/gdm/custom.conf. However for backwards compatibility, if /etc/gdm/gdm.conf is found it will be used instead of custom.conf. When upgrading, Red Hat recommends removing your old gdm.conf file and migrating any custom configuration to custom.conf.

GETTING MORE INFORMATION

For more information on GDM, see Section 14.1, “What Is GDM?”.

For information on configuring and managing user sessions, see Section 14.3, “User Sessions”.

For information on customizing the login screen appearance, see Section 10.4, “Customizing the Login Screen”.
CHAPTER 6. GNOME SHELL EXTENSIONS

GNOME Shell in Red Hat Enterprise Linux 7 does not support applets, which were used to customize the default GNOME 2 interface in Red Hat Enterprise Linux 5 and 6. GNOME 3 replaces applets with GNOME Shell extensions. Extensions can modify the default GNOME Shell interface and its parts, such as window management and application launching.

6.1. REPLACEMENT FOR THE CLOCK APPLET

GNOME 2 in Red Hat Enterprise Linux 5 and 6 featured the Clock applet, which provided access to the date, time, and calendar from the GNOME 2 Panel. In Red Hat Enterprise Linux 7, that applet is replaced by the Clocks application, which is provided by the gnome-clocks package. The user can access that application by clicking the calendar on GNOME Shell’s top bar and selecting Open Clocks.

Figure 6.1. Open Clocks

Getting More Information
See Section 11.1, “What Are GNOME Shell Extensions?” for more detailed information on what GNOME Shell extensions are and how to configure and manage them.
CHAPTER 7. GNOME-SESSION

The `gnome-session` program has also been updated in Red Hat Enterprise Linux 7. It starts the GNOME Desktop as it used to; nonetheless, some of its components have changed.

`gnome-session-properties`

The `gnome-session-properties` application is still part of the `gnome-session` package. However, its functionality has been limited to managing startup programs for individual users, and saving currently running applications when logging out. The latter functionality has been kept from Red Hat Enterprise Linux 6.

`named session`

The `Save now` button is able to save a session in a specific time and to name it. The saved sessions are restored on login. When you click **Automatically remember running applications when logging out** in `gnome-session-properties`, the list of saved applications is shown on login as well.

With this update, it is also possible to create multiple layouts and rename them, or to be able to select multiple user sessions for one user account.

GETTING MORE INFORMATION

For detailed information on session management, see Chapter 14, Session Management.

For information on how to manage startup (autostart) applications for all users, see Section 14.3.5, “Adding an Autostart Application for All Users”.

CHAPTER 8. INTERNATIONALIZATION

8.1. INPUT METHODS

The default input framework for the GNOME Desktop in Red Hat Enterprise Linux 7 is **IBus** (Intelligent Input Bus). It integrates with GNOME 3 and includes a user interface for input method selection.

8.1.1. Configuring and Switching Input Methods

Users can use the **Region & Language** panel in the GNOME Settings to configure their input methods. More information on using input methods can be found in GNOME Help. To access it, press the **Super** key to enter the **Activities Overview**, type **help**, and then press **Enter**.

For non-GNOME sessions, IBus can configure both XKB layouts and input methods in the **ibus-setup** tool and switch them with a shortcut.

The default shortcut to switch input sources is **Super+Space**. In Red Hat Enterprise Linux 6, the shortcut was **Ctrl+Space**.

8.1.2. Predictive Input Method for IBus

**ibus-typing-booster** is a predictive input method for the IBus platform. It predicts complete words based on partial input, allowing for faster and more accurate text input. Users can select the required word from a list of suggestions. **ibus-typing-booster** can also use Hunspell dictionaries to make suggestions for a language.

8.1.3. IBus in the GNOME Desktop Replaces **im-chooser**

Because IBus is now integrated with the GNOME Desktop, **im-chooser** is deprecated except for using non-IBus input methods.

8.2. CHANGED FILE LOCATIONS

In Red Hat Enterprise Linux 7, the following changes have been made to the location of the input method and font configuration files, and directories:

- The `.xinputrc` file has been moved from the user's home directory to the `~/.config/imsettings/` directory.
- The `.imsettings.log` file has been moved from the user's home directory and can now be found in `~/.cache/imsettings/log`.
- The `~/.fonts.conf` file has been deprecated. Users are encouraged to move the file to the `~/.config/fontconfig/` directory.
- The `~/.fonts.conf.d` directory has been deprecated. Users are encouraged to move the directory to the `~/.config/fontconfig/` directory.
- All disabled fontconfig configuration files in the `/etc/fonts/conf.avail/` directory have been moved to the `/usr/share/fontconfig/conf.avail/` directory. If you have any local symbolic links pointing to the old location, remember to update them.
PART II. CONFIGURATION AND ADMINISTRATION

The second part of *Red Hat Enterprise Linux 7 Desktop Migration and Administration Guide* describes and explains various ways the GNOME Desktop can be configured and administered.
CHAPTER 9. CONFIGURING DESKTOP WITH GSETTINGS AND DCONF

9.1. TERMINOLOGY EXPLAINED: GSETTINGS, GSETTINGS, AND DCONF

This section defines several terms that are easily confused.

dconf

dconf is a key-based configuration system which manages user settings. It is the back end for
GSettings used in Red Hat Enterprise Linux 7. dconf manages a range of different settings, including
GDM, application, and proxy settings.

dconf

The dconf command-line utility is used for reading and writing individual values or entire directories
from and to a dconf database.

GSettings

GSettings is a high-level API for application settings, front end for dconf.

gsettings

The gsettings command-line tool is used to view and change user settings.

9.2. USER AND SYSTEM SETTINGS

dconf allows system administrators and users several levels of control over configuration.

- Administrators can define default settings that apply to all users.
- Users can override the defaults with their own settings.
- Optionally, administrators can also lock settings to prevent users from overriding them. For
  more information, see Section 9.5.1, “Locking Down Specific Settings”.

9.3. BROWSING GSETTINGS VALUES FOR DESKTOP APPLICATIONS

There are two tools you can use to view and edit GSettings values:

- The dconf-editor GUI tool.
- The gsettings command-line utility.

NOTE

You may not have dconf-editor installed on the system by default. To install it, run the
following command:

```
# yum install dconf-editor
```
Both `dconf-editor` and the `gsettings` utility let you browse and change options for system and application preferences. You can even use them to change preferences that do not exist in the graphical user interface.

`dconf-editor` provides a GUI for the browsing and editing of settings. It presents the hierarchy of settings in a tree-view and also displays additional information about each setting, including the description, type and default value. `gsettings` can be used to display and set `dconf` values. It also includes Bash completion for commands and settings. `gsettings` can be used to automate configuration in shell scripts.

Note that both `dconf-editor` and the `gsettings` utility are intended to browse and modify the current user’s GSettings database. This means that you should always run these tools as a normal user.

Figure 9.1. dconf-editor showing org.gnome.desktop.background GSettings Keys

Getting More Information
For more information on the `dconf-editor` tool, see the `dconf-editor(1)` man page.

For more information on the `gsettings` utility, see the `gsettings(1)` man page.

9.4. WHAT ARE DCONF PROFILES?

A profile is a list of system’s hardware and software configuration databases, which the `dconf` system collects. `dconf` profiles allow you to compare identical systems to troubleshoot hardware or software problems.
The `dconf` system stores its profiles in text files. The `$DCONF_PROFILE` environment variable can specify a relative path to the file from the `/etc/dconf/profile/` directory, or an absolute path, such as in a user’s home directory.

Key pairs which are set in a `dconf` profile will override the default settings unless there is a problem with the value that you have set.

### 9.4.1. Selecting a dconf Profile

On startup, `dconf` consults the `$DCONF_PROFILE` environment variable whether the variable is set. If set, `dconf` attempts to open the named profile and aborts if this step fails.

As long as the environment variable is not set, `dconf` attempts to open the profile named `user`. Provided this step still fails, `dconf` falls back to an internal hard-wired configuration.

Each line in a profile specifies one `dconf` database. The first line indicates the database used to write changes whereas the remaining lines show read-only databases. The following is a sample profile stored in `/etc/dconf/profile/user`:

```
user-db:user
system-db:local
system-db:site
```

This sample profile specifies three databases: `user` is the name of the user database which can normally be found in `~/.config/dconf`, and `local` and `site` are system databases, located in `/etc/dconf/db/`.

**IMPORTANT**

The `dconf` profile for a session is determined at login, so users will have to log out and log in to apply a new `dconf` user profile to their session.

### 9.5. CONFIGURING CUSTOM DEFAULT VALUES

Machine-wide default settings can be set by providing a default for a key in a `dconf` profile. These defaults can be overridden by the user.

To set a default for a key, the `user` profile must exist and the value for the key must be added to a `dconf` database.

**Example 9.1. Set the Default Background**

1. If it does not already exist, create the `user` profile in `/etc/dconf/profile/user`:

   ```
   user-db:user
   system-db:local
   ```

   where `local` is the name of a `dconf` database.

2. Create a `keyfile` for the local database in `/etc/dconf/db/local.d/01-background`, which contains the following default settings:

   ```
   # dconf path
   [org/gnome/desktop/background]
   ```
# GSettings key names and their corresponding values
picture-uri='file:///usr/local/share/backgrounds/wallpaper.jpg'
picture-options='scaled'
primary-color='000000'
secondary-color='FFFFFF'

In the default setting of the keyfile, the following GSettings keys are used:

## Table 9.1. org.gnome.desktop.background schemas GSettings Keys

<table>
<thead>
<tr>
<th>Key Name</th>
<th>Possible Values</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>picture-options</td>
<td>&quot;none&quot;, &quot;wallpaper&quot;, &quot;centered&quot;, &quot;scaled&quot;, &quot;stretched&quot;, &quot;zoom&quot;, &quot;spanned&quot;</td>
<td>Determines how the image set by wallpaper_filename is rendered.</td>
</tr>
<tr>
<td>picture-uri</td>
<td>filename with the path</td>
<td>URI to use for the background image. Note that the backend only supports local (file://) URIs.</td>
</tr>
<tr>
<td>primary-color</td>
<td>default: 000000</td>
<td>Left or Top color when drawing gradients, or the solid color.</td>
</tr>
<tr>
<td>secondary-color</td>
<td>default: FFFFFFF</td>
<td>Right or Bottom color when drawing gradients, not used for solid color.</td>
</tr>
</tbody>
</table>

3. Edit the keyfile according to your preferences. For more information, see Section 9.3, "Browsing GSettings Values for Desktop Applications".

4. Update the system databases:

```bash
# dconf update
```

**IMPORTANT**

When the user profile is created or changed, the user will need to log out and log in again before the changes will be applied.

If you want to avoid creating a user profile, you can use the `dconf` command-line utility to read and write individual values or entire directories from and to a dconf database. For more information, see the `dconf(1)` man page.

### 9.5.1. Locking Down Specific Settings

The lockdown mode in dconf is a useful tool for preventing users from changing specific settings.

To lock down a GSettings key, you will need to create a locks subdirectory in the keyfile directory (for instance, `/etc/dconf/db/local.d/locks/`). The files inside this directory contain a list of keys to lock, and you may add any number of files to this directory.
IMPORTANT

If you do not enforce the system settings using a lockdown, users can easily override the system settings with their own. Any settings users have made will take precedence over the system settings unless there is a lockdown enforcing the system settings.

The example below demonstrates how to lock settings for the default wallpaper. Follow the procedure for any other setting you need to lock.

Example 9.2. Locking Down the Default Wallpaper

1. Set a default wallpaper by following steps in Section 10.5.1, “Customizing the Default Desktop Background”.

2. Create a new directory named `/etc/dconf/db/local.d/locks/`.

3. Create a new file in `/etc/dconf/db/local.d/locks/00-default-wallpaper` with the following contents, listing one key per line:

   # Prevent users from changing values for the following keys:
   /org/gnome/desktop/background/picture-uri
   /org/gnome/desktop/background/picture-options
   /org/gnome/desktop/background/primary-color
   /org/gnome/desktop/background/secondary-color

4. Update the system databases:

   # dconf update

9.6. GSETTINGS KEYS PROPERTIES

You can set a GSettings key in a `dconf` database only once. If you set the same key to different values in different places in the `dconf` database, only one of them will take effect. In other words, you will override one key setting with another.

In each `dconf` system database, each key can only have one value. Values for some keys are of an array type. For this value type, the value can be specified as a list of multiple elements separated by a comma. An example of an array value is shown below:

key=[‘option1’, ‘option2’]

Example 9.3. The `org.gnome.desktop.input-sources.xkb-options` GSettings Key

Setting the `org.gnome.desktop.input-sources.xkb-options` GSettings key works as follows. It can only be set once, so if you want two elements in the value you need to specify them in the same configuration file. Since this value is an array type, it can have several elements:

```
[org/gnome/desktop/input-sources]
# Enable Ctrl-Alt-Backspace for all users
# Set the Right Alt key as the Compose key and enable it
xkb-options=[‘terminate:ctrl_alt_bksp’, ‘compose:ralt’]
```
9.7. STORING USER SETTINGS OVER NFS

For `dconf` to work correctly when using Network File System (NFS) home directories, the `dconf keyfile back end` must be used.

Note that the glib2-fam package must be installed on the system when using the `dconf keyfile back end`. Otherwise notifications on configuration changes made on remote machines will not work properly.

Procedure 9.1. Setting the dconf Keyfile Back End

1. Verify that the glib2-fam package is installed on the system.
   a. The system must be subscribed to the Optional channel. To learn how to subscribe the system to the Optional channel, read this resource: How to access Optional and Supplementary channels, and -devel packages using Red Hat Subscription Management (RHSM)?
   b. Install the glib2-fam package by running the following command:

   ```
   # yum install glib2-fam
   ```

2. Create or edit the `/etc/dconf/profile/user` file on every client.

3. At the very beginning of this file, add the following line:

   ```
   service-db:keyfile/user
   ```

The dconf keyfile back end will only take effect the next time that the user logs in. It polls the keyfile to determine whether updates have been made, so settings may not be updated immediately.
CHAPTER 10. DEFAULT APPEARANCE

The appearance and functionality of the GNOME 3 Desktop can be customized both by individual users and by system administrators for all users. System administrators can provide a customized default desktop configuration to all users and even lock down those features to prevent user changes.

This chapter describes how to customize the installation program (Anaconda), the system boot utilities (GRUB, Plymouth), the login screen, fonts, keyboard layouts, the screen shield, and desktop backgrounds.

10.1. BRANDING ANACONDA

If you are building your own customized distribution at your company, you can change the brand graphics and product name used in the Red Hat Enterprise Linux 7 installer, Anaconda.

For more information on changing the Anaconda graphics and product name, see the Anaconda Customization Guide for Red Hat Enterprise Linux 7.

10.2. BOOT LOADER SCREEN

The Red Hat Enterprise Linux 7 boot loader is GRUB 2. You can change several parts of GRUB 2's appearance. The following sections show you how to change the distribution name, menu colors, and the background image.

10.2.1. Distribution Name

By default, GRUB 2 displays a title containing the distribution name. You can change the title by customizing the GRUB_DISTRIBUTOR variable in the /etc/default/grub file.

Procedure 10.1. Setting the Distribution Name

1. As root, open the /etc/default/grub file.

2. Use the GRUB_DISTRIBUTOR variable to specify your own distribution name. The following is the excerpt of the /etc/default/grub file. Update the second line with the GRUB_DISTRIBUTOR variable:

   GRUB_TIMEOUT=5
   GRUB_DISTRIBUTOR=Our Corporate Distro V1.2
   GRUB_DEFAULT=saved
   GRUB_DISABLE_SUBMENU=true
   ...

3. Run the following command as root to ensure the changes take effect:

   grub2-mkconfig -o /boot/grub2/grub.cfg

   NOTE

   You need to update the /etc/default/grub directory after every change you make in there.
Also, you can change the colors or the font of the text displayed at the GRUB 2 screen by modifying the /etc/grub.d/40_custom plain text file or by adding another file in the /etc/grub.d/ directory. You can choose from the following directives:

- set color_normal=foreground/background
- set color_highlight=foreground/background
- set menu_color_normal=foreground/background
- set menu_color_highlight=foreground/background

See the grub(8) man page for more information on the semantics and accepted values for these variables.

### 10.2.2. GRUB 2 Background

There is no GRUB background configured in the default setup. Nevertheless, it is possible to add an image to the boot loader screen.

Before you configure a background image for GRUB 2, it is necessary to have a GRUB 2 Unicode font installed for the gfxterm graphical terminal. No font is provided by default, so the prerequisite is to convert an existing TTF or OTF file to the PF2 format used by GRUB 2:

By running the grub2-mkfont command, convert an existing TTF or OTF file to the PF2 format. Name the output file unicode.pf2 to work correctly with the default configuration as written by grub2-mkconfig.

#### Example 10.1. Converting a TTF File to PF2 Format

This example demonstrates the conversion from the LiberationSerif-Bold.ttf to the .pf2 format. The new .pf2 format file is called unicode2 so as not to be confused with the existing unicode.pf2 in the /grub2/fonts/ directory.

```
grub2-mkfont --output=/boot/grub2/fonts/unicode2.pf2 --size=24 /usr/share/fonts/liberation/LiberationSerif-Bold.ttf
```

Now, you can configure a background image for GRUB 2. The image file can reside outside of the boot/ directory.

#### Procedure 10.2. Adding an Image to the Boot Loader Screen

1. Open the /etc/default/grub file as root.

2. Edit the following configuration variables in the file:

   GRUB_TERMINAL=gfxterm
   GRUB_BACKGROUND= path_to_the_image.png

   Supported formats are PNG, JPG, JPEG, and TGA.

3. Create a new configuration file with a background image:

   grub2-mkconfig -o /boot/grub2/grub.cfg
4. Reboot your system.

If necessary, the image will be scaled to fit the screen.

10.3. PLYMOUTH

**Plymouth** is a graphical boot system and logger for Red Hat Enterprise Linux 7, which makes use of the kernel-based mode setting (KMS) and Direct Rendering Manager (DRM). Plymouth also handles user interaction during boot.

You can customize the boot screen appearance by choosing from various static or animated graphical themes. New themes can be created based on the existing ones.

10.3.1. Branding the Theme

Each theme for Plymouth is composed of a theme data file and a compiled `splash plugin module`. The data file has a `.plymouth` extension, and is installed in the `/usr/share/plymouth/themes/` directory.

The configuration data is specified under the `[Plymouth Theme]` section, in the key-value format. Valid keys for this group are `Name`, `Description`, and `ModuleName`. While the first two keys are self-explanatory, the third specifies the name of a Plymouth splash plugin module. Different plugins provide different animations at boot time and the underlying implementation of the various themes:

```plaintext
Example 10.2. A .plymouth File Specimen

[Plymouth Theme]
Name=Charge
Description=A theme that features the shadowy hull of my logo charge up and finally burst into full form.
ModuleName=two-step

```

Procedure 10.3. Changing the Plymouth Theme

1. Search for the existing Plymouth themes and choose the most preferable one. Run the following command:

   ```bash
   # yum search plymouth-theme
   ```

   Or run the `plymouth-set-default-theme --list` command to view the installed themes.

   You can also install all the themes when installing all the Plymouth packages. However, you will install a number of unnecessary packages as well.

   ```bash
   # yum install plymouth*
   ```

2. Set the new theme as default with the `plymouth-set-default-theme theme_name` command.

   ```plaintext
   Example 10.3. Set "spinfinity" as the Default Theme
   You have chosen the spinfinity theme, so you run:
   ```
3. Rebuild the `initrd` daemon after editing otherwise your theme will not show in the boot screen. Do so by running:

```
# dracut -f
```

### 10.3.2. Creating a New Plymouth Theme

If you do not want to choose from the given list of themes, you can create your own. The easiest way is to copy an existing theme and modify it.

**Procedure 10.4. Creating Your Own Theme from an Existing Theme**

1. Copy an entire content of a `plymouth/` directory. As a template directory, use, for example, the default theme for Red Hat Enterprise Linux 7, `/usr/share/plymouth/themes/charge/charge.plymouth`, which uses a two-step splash plugin (*two-step* is a popular boot load feature of a two phased boot process that starts with a progressing animation synced to boot time and finishes with a short, fast one-shot animation):

   ```
   [Plymouth Theme]
   Name=Charge
   Description=A theme that features the shadowy hull of my logo charge up and finally burst into full form.
   ModuleName=two-step
   
   [two-step]
   ImageDir=/usr/share/plymouth/themes/charge
   HorizontalAlignment=.5
   VerticalAlignment=.5
   Transition=none
   TransitionDuration=0.0
   BackgroundStartColor=0x202020
   BackgroundEndColor=0x202020
   ```

2. Save the `charge.plymouth` file with a new name in the `/usr/share/plymouth/themes/newtheme/` directory, in the following format:

   ```
   newtheme.plymouth
   ```

3. Update the settings in your `/usr/share/plymouth/themes/newtheme/newtheme.plymouth` file according to your preferences, changing color, alignment, or transition.

4. Set your `newtheme` as default by running the following command:

   ```
   # plymouth-set-default-theme newtheme
   ```

5. Rebuild the `initrd` daemon after changing the theme by running the command below:

   ```
   # dracut -f
   ```
10.3.2.1. Using Branded Logo

Some of the plugins show a branded logo as part of the splash animation. If you wish to add your own logo into your theme, follow the short procedure below.

**IMPORTANT**

Keep in mind that the image format of your branded logo must be of the .png format.

**Procedure 10.5. Add Your Logo to the Theme**

1. Create an image file named `logo.png` with your logo.

2. Edit the `/usr/share/plymouth/themes/newtheme.plymouth` file by updating the `ImageDir` key to point to the directory with the `logo.png` image file you created in step 1:

   ```
   ImageDir=/usr/share/plymouth/themes/newtheme
   ```

For more information on Plymouth, see the `plymouth`(8) man page.

10.4. CUSTOMIZING THE LOGIN SCREEN

The GNOME Login Screen has several elements that can be customized. These changes can only be performed by a system administrator and affect all users. This section describes how to customize the greeter text, logo, keyboard layout, and user list.

10.4.1. Adding a Greeter Logo

The greeter logo on the login screen is controlled by the `org.gnome.login-screen.logo` GSettings key. Since GDM uses its own dconf profile, you can add a greeter logo by changing the settings in that profile.

For more information about GSettings and dconf, see Chapter 9, Configuring Desktop with GSettings and dconf.

When choosing an appropriate picture for the logo to your login screen, consider the following picture requirements:

- All the major formats are supported: ANI, BPM, GIF, ICNS, ICO, JPEG, JPEG 2000, PCX, PNM, PBM, PGM, PPM, GTIFF, RAS, TGA, TIFF, XBM, WBMP, XPM, and SVG.

- The size of the picture scales proportionally to the height of 48 pixels. So, if you set the logo to 1920x1080, for example, it changes into an 85x48 thumbnail of the original picture.

**Procedure 10.6. Adding a logo to the login screen**

1. Create or edit the `gdm` profile in `/etc/dconf/profile/gdm` which contains the following lines:

   ```
   user-db:user
   system-db:gdm
   file-db:/usr/share/gdm/greeter-dconf-defaults
   ```

   `gdm` is the name of a dconf database.
2. Create a `gdm` database for machine-wide settings in `/etc/dconf/db/gdm.d/01-logo`:

```plaintext
[org/gnome/login-screen]
logo= '/usr/share/pixmaps/logo/greeter-logo.png'
```

Replace `/usr/share/pixmaps/logo/greeter-logo.png` with the path to the image file you want to use as the greeter logo.

3. Update the system databases:

```
# dconf update
```

Next time you log in, the screen will show with the new login logo.

**NOTE**

What if the Logo Does Not Update?

Make sure that you have run the `dconf update` command as root to update the system databases. In case the logo does not update, try restarting GDM. For more information, see Section 14.1.1, "Restarting GDM".

### 10.4.2. Displaying a Text Banner

The text banner on the login screen is controlled by the following GSettings keys (for more information about GSettings, see Chapter 9, Configuring Desktop with GSettings and dconf):

- `org.gnome.login-screen.banner-message-enable`
  - enables showing the banner message.

- `org.gnome.login-screen.banner-message-text`
  - shows the text banner message in the login window.

Note that since GDM uses its own dconf profile, you can configure the text banner by changing the settings in that profile.

**Procedure 10.7. Displaying a Text Banner on the Login Screen**

1. Create or edit the `gdm` profile in `/etc/dconf/profile/gdm` which contains the following lines:

```
user-db:user
system-db:gdm
file-db:/usr/share/gdm/greeter-dconf-defaults
```

   gdm is the name of a dconf database.

2. Create a `gdm` database for machine-wide settings in `/etc/dconf/db/gdm.d/01-banner-message`:

```plaintext
[org/gnome/login-screen]
banner-message-enable=true
banner-message-text= 'Type the banner message here'
```
NOTE

There is no character limit for the banner message. GNOME Shell autodetects longer stretches of text and enters two column mode. However, the banner message text cannot be read from an external file.

3. Update the system databases:

```bash
# dconf update
```

The banner text appears when you have selected yourself from the user list or when you start typing into the box. The next time you log in you will see the text when inserting the password.

10.4.2.1. What if the Banner Message Does Not Update?

If the banner message does not show, make sure you have run the `dconf update` command.

In case the banner message does not update, try restarting GDM. For more information, see Section 14.1.1, “Restarting GDM”.

10.4.3. Displaying Multiple Keyboard Layouts

You can add alternative keyboard layouts for users to chose from on the login screen.

This can be helpful for users who normally use different keyboard layouts from the default and who want to have those keyboard layouts available at the login screen. Nevertheless, the selection only applies when using the login screen. Once you are logged in your own user settings take over.

Procedure 10.8. Changing the System Keyboard Layout Settings

1. Find the codes of the required language layouts in the `/usr/share/X11/xkb/rules/base.lst` file under the section named `! layout`.

2. Use the `localectl` tool to change the system keyboard layout settings as follows:

```bash
$ localectl set-x11-keymap layout
```

You can specify multiple layouts as a comma-separated list. For example, to set `es` as the default layout, and `us` as the secondary layout, run the following command:

```bash
$ localectl set-x11-keymap es,us
```

3. Log out to find that the defined layouts are available at the top bar on the login screen.

Note that you can also use the `localectl` tool to specify the machine-wide default keyboard model, variant, and options. See the `localectl(1)` man page for more information.

10.4.4. Disabling the Login Screen User List

You can disable the user list shown on the login screen by setting the `org.gnome.login-screen.disable-user-list` GSettings key.
When the user list is disabled, users need to type their user name and password at the prompt to log in.

Procedure 10.9. Setting the org.gnome.login-screen.disable-user-list Key

1. Create or edit the `gdm` profile in `/etc/dconf/profile/gdm` which contains the following lines:

   ```
   user-db:user
   system-db:gdm
   file-db:/usr/share/gdm/greeter-dconf-defaults
   ```

   `gdm` is the name of a `dconf` database.

2. Create a `gdm` database for machine-wide settings in `/etc/dconf/db/gdm.d/00-login-screen`:

   ```
   [org/gnome/login-screen]
   # Do not show the user list
   disable-user-list=true
   ```

3. Update the system databases by updating the `dconf` utility:

   ```
   # dconf update
   ```

10.5. CUSTOMIZING DESKTOP BACKGROUNDS

Using the `dconf` utility, you can configure the default background, add extra backgrounds, or add multiple backgrounds.

If the users of the system will not be permitted to change these settings from the defaults, then system administrators need to lock the settings using the locks directory. Otherwise each user will be able to customize the setting to suit their own preferences. For more information, see Section 9.5.1, “Locking Down Specific Settings”.

10.5.1. Customizing the Default Desktop Background

You can configure the default desktop background and its appearance by setting the relevant `GSettings` keys in the `org.gnome.desktop.background` schema.

For more information about `GSettings`, see Chapter 9, Configuring Desktop with `GSettings` and `dconf`.

Procedure 10.10. Setting the Default Background

1. Create a `local` database for machine-wide settings in `/etc/dconf/db/local.d/00-background`:

   ```
   # Specify the dconf path
   [org/gnome/desktop/background]
   # Specify the path to the desktop background image file
   picture-uri='file:///usr/local/share/backgrounds/wallpaper.jpg'
   # Specify one of the rendering options for the background image:
   # 'none', 'wallpaper', 'centered', 'scaled', 'stretched', 'zoom', 'spanned'
   picture-options='scaled'
   # Specify the left or top color when drawing gradients or the solid color
   ```
2. Override the user's setting to prevent the user from changing it in

/etc/dconf/db/local.d/locks/background:

```bash
# List the keys used to configure the desktop background
/org/gnome/desktop/background/picture-uri
/org/gnome/desktop/background/picture-options
/org/gnome/desktop/background/primary-color
/org/gnome/desktop/background/secondary-color
```

For more information, see Section 9.5.1, “Locking Down Specific Settings”.

3. Update the system databases:

```bash
# dconf update
```

4. Users must log out and back in again before the system-wide settings take effect.

### 10.5.2. Adding Extra Backgrounds

You can make extra backgrounds available to users on your system.

1. Create a `filename`.xml file (there are no requirements for file names) specifying your extra background's appearance using the `org.gnome.desktop.background` schemas. Here is a list of the most frequently used schemas:

#### Table 10.1. `org.gnome.desktop.background` schemas GSettings Keys

<table>
<thead>
<tr>
<th>Key Name</th>
<th>Possible Values</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>picture-options</td>
<td>&quot;none&quot;, &quot;wallpaper&quot;,</td>
<td>Determines how the image set by <code>wallpaper_filename</code> is rendered.</td>
</tr>
<tr>
<td></td>
<td>&quot;centered&quot;, &quot;scaled&quot;,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&quot;stretched&quot;, &quot;zoom&quot;,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&quot;spanned&quot;</td>
<td></td>
</tr>
<tr>
<td>color-shading-type</td>
<td>&quot;horizontal&quot;, &quot;vertical&quot;, and</td>
<td>How to shade the background color.</td>
</tr>
<tr>
<td></td>
<td>&quot;solid&quot;</td>
<td></td>
</tr>
<tr>
<td>primary-color</td>
<td>default: #023c88</td>
<td>Left or Top color when drawing gradients, or the solid color.</td>
</tr>
<tr>
<td>secondary-color</td>
<td>default: #5789ca</td>
<td>Right or Bottom color when drawing gradients, not used for solid color.</td>
</tr>
</tbody>
</table>

The full range of options is to be found in the `dconf-editor` GUI or `gsettings` command-line utility. For more information, see Section 9.3, “Browsing GSettings Values for Desktop Applications”.

2. Store the `filename`.xml file in the `/usr/share/gnome-background-properties/` directory.
When the user clicks their name in the top right corner, chooses Settings, and in the Personal section of the table selects Background, they will see the new background available.

Look at the example and see how `org.gnome.desktop.background` GSettings keys are implemented practically:

**Example 10.4. Extra Backgrounds File**

```xml
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE wallpapers SYSTEM "gnome-wp-list.dtd">
<wallpapers>
  <wallpaper deleted="false">
    <name>Company Background</name>
    <name xml:lang="de">Firmenhintergrund</name>
    <filename>/usr/local/share/backgrounds/company-wallpaper.jpg</filename>
    <options>zoom</options>
    <shade_type>solid</shade_type>
    <pcolor>#ffffff</pcolor>
    <scolor>#000000</scolor>
  </wallpaper>

  <wallpaper deleted="false">
    <name>Company Background</name>
    <filename>/usr/local/share/backgrounds/company-wallpaper.jpg</filename>
    <options>zoom</options>
    <shade_type>solid</shade_type>
    <pcolor>#ffffff</pcolor>
    <scolor>#000000</scolor>
  </wallpaper>
</wallpapers>
```

In one configuration file, you can specify multiple `<wallpaper>` elements to add more backgrounds.

See the following example which shows an .xml file with two `<wallpaper>` elements, adding two different backgrounds:

**Example 10.5. Extra Backgrounds File with Two Wallpaper Elements**

```xml
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE wallpapers SYSTEM "gnome-wp-list.dtd">
<wallpapers>
  <wallpaper deleted="false">
    <name>Company Background</name>
    <name xml:lang="de">Firmenhintergrund</name>
    <filename>/usr/local/share/backgrounds/company-wallpaper.jpg</filename>
    <options>zoom</options>
    <shade_type>solid</shade_type>
    <pcolor>#ffffff</pcolor>
    <scolor>#000000</scolor>
  </wallpaper>

  <wallpaper deleted="false">
    <name>Company Background 2</name>
    <name xml:lang="de">Firmenhintergrund 2</name>
    <filename>/usr/local/share/backgrounds/company-wallpaper-2.jpg</filename>
    <options>zoom</options>
    <shade_type>solid</shade_type>
    <pcolor>#ff0000</pcolor>
    <scolor>#00ffff</scolor>
  </wallpaper>
</wallpapers>
```
10.5.3. Setting the Screen Shield

Screen Shield is the screen that quickly slides down when the system is locked. It is controlled by the `org.gnome.desktop.screensaver.picture-uri` GSettings key. Since GDM uses its own dconf profile, you can set the default background by changing the settings in that profile.

For more information about GSettings and dconf, see Chapter 9, Configuring Desktop with GSettings and dconf.

Procedure 10.11. Adding a Logo to the Screen Shield

1. Create a gdm database for machine-wide settings in `/etc/dconf/db/gdm.d/01-screensaver`:

```
[org/gnome/desktop/screensaver]
picture-uri=file:///opt/corp/background.jpg
```

Replace `/opt/corp/background.jpg` with the path to the image file you want to use as the Screen Shield.

Supported formats are PNG, JPG, JPEG, and TGA. The image will be scaled if necessary to fit the screen.

2. Update the system databases:

```
# dconf update
```

3. You must log out before the system-wide settings take effect.

Next time you lock the screen, the new Screen Shield will show in the background. In the foreground, time, date and the current day of the week will be displayed.

10.5.3.1. What If the Screen Shield Does Not Update?

Make sure that you have run the `dconf update` command as root to update the system databases.

In case the background does not update, try restarting GDM. For more information, see Section 14.1.1, “Restarting GDM”.

10.6. CONFIGURING FONTS

Red Hat Enterprise Linux 7 uses the fontconfig utility for font management and customization. fontconfig simplifies font management and provides display features, such as anti-aliasing. This section describes the following font management tasks:

- adding new fonts (both for one user and for all users)
- specifying fonts to use in place of missing fonts
- configuring font aliases
- defining font preferences per language
- customizing font properties
To compile a list of fonts available on the system, `fontconfig` searches directories that are by default listed in the `/etc/fonts/fonts.conf` configuration file.

To list all fonts installed on the system that are known to `fontconfig`, you can use the `fc-list` command:

```
$ fc-list : file
```

For more information on `fc-list`, see the `fc-list(1)` man page.

For more information on `fontconfig` and its configuration, see the `fonts-conf(5)` man page.

### 10.6.1. Adding Extra Fonts for All Users

You can install an extra font which will be available to users in applications that use `fontconfig` for font handling.

#### Procedure 10.12. Installing an Extra Font

1. To install the font, copy it to the `/usr/local/share/fonts/` directory. If that directory does not exist, create it.

2. Create a subdirectory for each font-family you are installing as some fonts have multiple files for bold, italic, and so on.

3. Make sure that the font cache is updated by running the following command:

```
$ fc-cache /usr/local/share/fonts/
```

#### IMPORTANT

`fontconfig` will detect the new fonts and make them available. Unlike user sessions, some applications might need to be restarted before they will allow you to use the new fonts, though.

#### Using Alternative Directories

Alternatively, you can also install fonts in another system directory than `/usr/local/share/fonts/` if that directory is listed in the `/etc/fonts/fonts.conf` file. If it is not, then you need to create your own machine-wide configuration file in `/etc/fonts/local.conf` containing the directory you want to use. See the `fonts-conf(5)` man page for more information.

If you are using an alternative directory, remember to specify the directory name when updating the font cache with the `fc-cache` command:

```
$ fc-cache directory_name
```

### 10.6.2. Adding Extra Fonts for Individual Users

You can install an extra font which will be available to a specific user on your system in applications that use `fontconfig` for font handling.

#### Procedure 10.13. Installing an Extra Font

1. Copy the font to the `~/.local/share/fonts/` directory to install it.
2. Make sure that the font cache is updated by running the following command:

```
$ fc-cache ~/.local/share/fonts
```

**IMPORTANT**

`fontconfig` will detect the new fonts and make them available. You may need to restart running applications to see the changes. User sessions do not need to be restarted.

### 10.6.3. Substituting Fonts

When an application requests a font that is not available on the system, `fontconfig` reads the `/etc/fonts/fonts.conf` configuration file to determine the most similar available font to substitute for the requested font. Individual characters can also be substituted if they are not present in the requested font.

To configure a font substitution for a specific font, you can use the **Fonts Tweak Tool**. Note that the tool can only be used for per-user configuration.

![Figure 10.1. Substituting Fonts with Fonts Tweak Tool](image)

**Fonts Tweak Tool** may not be installed by default on the system, to install it, run the following command:

```
# yum install fonts-tweak-tool
```

1. Start the Fonts Tweak Tool by pressing the Super key to enter the Activities Overview, type Fonts Tweak Tool, and then press Enter.

2. Click the Font Substitutions tab.

3. Click the + button at the bottom left of the left pane, select or type the name of the font you want to substitute, and then click Add.

4. Click the + button at the bottom left of the right pane, select the name of the font you want to use to substitute for the first font, and then click Add.

5. Click Close.

Now, you have substituted an old font with your favourite which is now available to you.

10.6.4. Configuring Font Aliases

For each locale, Fonts Tweak Tool allows the individual users to configure different font aliases:

- Sans Serif,
- Serif,
- Monospace,
- Cursive, and
- Fantasy.

These aliases are used to represent common types of fonts, such as the serif and monospace types. Applications as well as users can then refer to these aliases instead of having to specify a particular font installed on the system.

Users can override system default fonts by selecting a custom font for each of these aliases.

Fonts Tweak Tool may not be installed by default on the system, to install it, run the following command:

```
# yum install fonts-tweak-tool
```
Figure 10.2. Configuring a Font Alias with Fonts Tweak Tool

Procedure 10.15. Configuring a Font Alias

1. Start the Fonts Tweak Tool by pressing the Super key to enter the Activities Overview, type Fonts Tweak Tool, and then press Enter.

2. Click the Font Aliases tab.

3. Click the + button at the bottom left of the left pane, select or type the name of the locale you want to configure the font aliases for, and then click Add.

   To configure default font aliases regardless of the used locale, select Default from the list of locales.

4. At the right pane, locate the font alias you want to override the system defaults for, and select the custom font from the drop-down list.

5. Click Close.

Now, you have overridden the system default alias and selected a new custom font.

10.6.5. Multiple Language Ordering

Fonts Tweak Tool allows users who have multiple languages configured for the user interface to change the order in which the languages are displayed in applications. This feature is especially useful for users who use both Latin and non-Latin based fonts and do not want to use the non-Latin based fonts to display Latin characters.
For example, if you have Japanese and English configured as your languages, and you want to avoid displaying English Latin characters with your Japanese non-Latin based fonts, configure English as the primary language, and Japanese as secondary. The Latin-based fonts will then be used to display English characters, and the non-Latin based fonts will only be used to display Japanese characters.

Fonts Tweak Tool may not be installed by default on the system, to install it, run the following command:

```bash
# yum install fonts-tweak-tool
```

Procedure 10.16. Configuring Multiple Languages

1. Start the Fonts Tweak Tool by pressing the Super key to enter the Activities Overview, type Fonts Tweak Tool, and then press Enter.

2. Click the Language Ordering tab.

3. Click the + button at the bottom left of the window, select or type the name of the language you want to configure as primary, and then click Add.

4. To add another language, click the + button at the bottom left of the window, select the name of the language you want to configure as secondary, and then click Add.

   Repeat this step to add more languages.

5. Click Close.

   **IMPORTANT**

   For the user interface, you have now set your preferences in the order in which the languages are displayed in applications.

   When multiple languages are configured, some applications (such as xterm and other Xft applications) may not display all characters for the user's languages properly. This is due to the lack of support for fallback fonts in those applications, or in the rendering libraries the applications are using.

10.6.6. Configuring Font Properties

Fonts Tweak Tool lets users change various font properties, allowing for fine-grained per-user font configuration.

Fonts Tweak Tool may not be installed by default on the system, to install it, run the following command:

```bash
# yum install fonts-tweak-tool
```

Procedure 10.17. Changing the Font Properties

1. Start the Fonts Tweak Tool by pressing the Super key to enter the Activities Overview, type Fonts Tweak Tool, and then press Enter.

2. Click the Fonts Properties tab.
3. Click the + button at the bottom left of the window, select or type the name of the font you want to change the properties for, and then click Add.

Repeat this step to add more fonts.

4. Change the font properties as needed.

5. Click Close.

Depending on the added font, some of the font properties that the user can configure in the Fonts Properties tab include:

**Use the embedded bitmap font if available.**

This is useful for users who prefer bitmap fonts over outline fonts. To use the embedded bitmap font, add a suitable font and click Use embedded bitmap font if any.

**Use the JIS X 2013:2004 glyphs.**

To use Japanese glyphs from the JIS X 2013:2004 standard, rather than from JIS X 2013:2000 or older, add a font that supports JIS X 2013:2004, and then click on jp04 in the Features list.
CHAPTER 11. GNOME SHELL EXTENSIONS

This chapter introduces system-wide configuration of GNOME Shell Extensions. You will learn how to view the extensions, how to enable them, how to lock a list of enabled extensions or how to set up several extensions as mandatory for the users of the system.

You will be using `dconf` when configuring GNOME Shell Extensions, setting the following two GSettings keys:

- `org.gnome.shell.enabled-extensions`
- `org.gnome.shell.development-tools`

For more information on `dconf` and `GSettings`, see Chapter 9, Configuring Desktop with GSettings and dconf.

11.1. WHAT ARE GNOME SHELL EXTENSIONS?

GNOME Shell extensions allow for the customization of the default GNOME Shell interface and its parts, such as window management and application launching.

Each GNOME Shell extension is identified by a unique identifier, the uuid. The uuid is also used for the name of the directory where an extension is installed. You can either install the extension per-user in `~/.local/share/gnome-shell/extensions/uuid`, or machine-wide in `/usr/share/gnome-shell/extensions/uuid`.

The uuid identifier is globally-unique. When choosing it, remember that the uuid must possess the following properties to prevent certain attacks:

- Your uuid must not contain Unicode characters.
- Your uuid must not contain the gnome.org ending as it must not appear to be affiliated with the GNOME Project.
- Your uuid must contain only alphanumerical characters, the period (.), the at symbol (@), and the underscore (_).

**IMPORTANT**

Before deploying third-party GNOME Shell extensions on Red Hat Enterprise Linux, make sure to read the following document to learn about the Red Hat support policy for third-party software:

- How does Red Hat Global Support Services handle third-party software, drivers, and/or uncertified hardware/hypervisors?

To view installed extensions, you can use **Looking Glass**, GNOME Shell’s integrated debugger and inspector tool.

**Procedure 11.1. View installed extensions**

1. Press `Alt+F2`.
2. Type in `lg` and press `Enter` to open **Looking Glass**.
3. On the top bar of **Looking Glass**, click **Extensions** to open the list of installed extensions.

![Figure 11.1. Viewing Installed extensions with Looking Glass](image)

### 11.2. ENABLING MACHINE-WIDE EXTENSIONS

To make extensions available to all users on the system, install them in the `/usr/share/gnome-shell/extensions` directory.

You need to set the `org.gnome.shell.enabled-extensions` key in order to set the default enabled extensions. However, there is currently no way to enable additional extensions for users who have already logged in. This does not apply for existing users who have installed and enabled their own GNOME extensions.

**Procedure 11.2. Enabling machine-wide extensions**

1. Create a **local** database file for machine-wide settings in `/etc/dconf/db/local.d/00-extensions`:

   ```
   [org/gnome/shell]
   # List all extensions that you want to have enabled for all users
   enabled-extensions=['myextension1@myname.example.com', 'myextension2@myname.example.com']
   ```

   The `enabled-extensions` key specifies the enabled extensions using the extensions' uuid (myextension1@myname.example.com and myextension2@myname.example.com).

2. Update the system databases:
# dconf update

3. Users must log out and back in again before the system-wide settings take effect.

## 11.3. LOCKING DOWN ENABLED EXTENSIONS

In GNOME Shell, you can prevent the user from enabling or disabling extensions by locking down the `org.gnome.shell.enabled-extensions` and `org.gnome.shell.development-tools` keys.

Locking down the `org.gnome.shell.development-tools` key ensures that the user cannot use GNOME Shell's integrated debugger and inspector tool (Looking Glass) to disable any mandatory extensions.

**Procedure 11.3. Locking down enabled extensions**

1. Create a local database file for machine-wide settings in `/etc/dconf/db/local.d/00-extensions`:

   ```
   [org/gnome/shell]
   # List all extensions that you want to have enabled for all users
   enabled-extensions="['myextension1@myname.example.com', 'myextension2@myname.example.com']"
   # Disable access to Looking Glass
   development-tools=false
   
   The `enabled-extensions` key specifies the enabled extensions using the extensions' uuid (myextension1@myname.example.com and myextension2@myname.example.com).
   
   The `development-tools` key is set to false to disable access to Looking Glass.
   
   2. Override the user's setting and prevent the user from changing it in `/etc/dconf/db/local.d/locks/extensions`:

   ```
   # Lock the list of mandatory extensions and access to Looking Glass
   /org/gnome/shell/enabled-extensions
   /org/gnome/shell/development-tools
   
   3. Update the system databases:

   ```

   # dconf update

4. Users must log out and back in again before the system-wide settings take effect.

After locking down the `org.gnome.shell.enabled-extensions` and `org.gnome.shell.development-tools` keys, any extensions installed in `~/.local/share/gnome-shell/extensions` or `/usr/share/gnome-shell/extensions` that are not listed in the `org.gnome.shell.enabled-extensions` key will not be loaded by GNOME Shell, thus preventing the user from using them.

## 11.4. SETTING UP MANDATORY EXTENSIONS

In GNOME Shell, you can provide a set of extensions that the user has to use. To do so, install the extensions in the `/usr/share/gnome-shell/extensions` directory and then lock down the `org.gnome.shell.enabled-extensions` and `org.gnome.shell.development-tools` keys.
Locking down the org.gnome.shell.development-tools key ensures that the user cannot use GNOME Shell’s integrated debugger and inspector tool (Looking Glass) to disable any mandatory extensions.

Procedure 11.4. Setting up mandatory extensions

1. Create a local database file for machine-wide settings in /etc/dconf/db/local.d/00-extensions-mandatory:

```ini
[org/gnome/shell]
# List all mandatory extensions
enabled-extensions=['myextension1@myname.example.com', 'myextension2@myname.example.com']
# Disable access to Looking Glass
development-tools=false
```

The enabled-extensions key specifies the enabled extensions using the extensions’ uuid (myextension1@myname.example.com and myextension2@myname.example.com).

The development-tools key is set to false to disable access to Looking Glass.

2. Override the user’s setting and prevent the user from changing it in /etc/dconf/db/local.d/locks/extensions-mandatory:

```ini
# Lock the list of mandatory extensions and access to Looking Glass
/org/gnome/shell/enabled-extensions
/org/gnome/shell/development-tools
```

3. Update the system databases:

```bash
# dconf update
```

4. Users must log out and back in again before the system-wide settings take effect.
CHAPTER 12. INTEGRATING APPLICATIONS

When integrating an application with the GNOME Desktop, the system administrator usually performs tasks related to customizing the Applications menu structure, and MIME types, such as:

- Add or modify a menu item for the application, or customize the Applications menu structure by creating or modifying submenus. See Section 12.1, “Customizing Menus” for more information on menu customization.

- Customize the default favorite applications visible on the GNOME Shell dash in the Activities Overview. See Section 12.2, “Customizing Default Favorite Applications” for more information on how to do that.

- Add or modify a MIME type for the application, and associate the application with a specific MIME type. See Section 12.3, “Configuring File Associations” for more information on configuring MIME types.

12.1. CUSTOMIZING MENUS

The GNOME menu system is based on the freedesktop.org Desktop Menu Specification and consists of three major sets of configuration and data files:

Desktop Entry Files (.desktop)

The .desktop files provide data about each menu item such as its name, command to run, and its icon. The .desktop entry files also specify the location of the menu item in the menu hierarchy, and keywords used for application search in the Activities Overview.

The system .desktop files are located in the /usr/share/applications/ directory. User-specific .desktop files are located in the ~/.local/share/applications/ directory.

The following is a sample .desktop file named ~/.local/share/applications/myapplication1.desktop:

```plaintext
[Desktop Entry]
Type=Application
Name=My Application 1
Icon=myapplication1
Exec=myapplication1
Categories=Network;WebBrowser;
MimeType=application/x-newtype
```

The file above specifies the application’s name (My Application 1), the application’s icon (myapplication1), and the command to run the application (myapplication1). It also places the application in a specified category (Network;WebBrowser;), and associates the application with the application/x-newtype MIME type.

Menu Definition Files (.menu)

The .menu files are XML configuration files that specify the order, hierarchy, and merging of both menus and menu items.

The machine-wide .menu files are located in the /etc/xdg/menus/ directory. User-specific .menu files are located in the ~/.config/menus/ directory and can be used to override the values specified in the machine-wide .menu files.
In particular, the `/etc/xdg/menus/applications.menu` file contains the definition of the Applications menu layout.

Directory Entry Files (.directory)

The `.directory` files provide data about each menu such as its name, and are located in the `/usr/share/desktop-directories/`.

Getting More Information

For more information describing the Desktop Entry Files, see the Desktop Entry Specification located at the freedesktop.org website:

- [http://freedesktop.org/wiki/Specifications/desktop-entry-spec](http://freedesktop.org/wiki/Specifications/desktop-entry-spec)

For detailed information describing the implementation of the GNOME menus system, see the Desktop Menu Specification located at the freedesktop.org website:

- [http://standards.freedesktop.org/menu-spec/latest](http://standards.freedesktop.org/menu-spec/latest)

12.1.1. Removing a Menu Item for Individual Users

The Applications menu customization for a given user is by default stored in the `~/.config/menus/gnome-applications.menu` definition file. The location of that file can be overridden by setting the `$XDG_DATA_HOME` environment variable.

To override the Applications menu defaults, you first need to create a `gnome-applications.menu` file. Note that removing an item from the Applications menu and its submenus also removes it from the Applications view in the Activities Overview, thus preventing the user from searching for that item from within the Activities Overview.

**Procedure 12.1. Example: Remove the Calculator menu item from the Accessories submenu**

1. Consult the contents of the `/usr/share/applications/` directory and determine a `.desktop` file that corresponds to the menu item you want to remove:

   ```
   $ grep -r "Name=Calculator" /usr/share/applications/
   /usr/share/applications/gcalctool.desktop:Name=Calculator
   
   As shown above, the Calculator menu item corresponds to the `/usr/share/applications/gcalctool.desktop` file.
   
2. Create a `~/.config/menus/gnome-applications.menu` file:

   ```
   <!DOCTYPE Menu PUBLIC "-//freedesktop//DTD Menu 1.0//EN"
   "http://www.freedesktop.org/standards/menu-spec/1.0/menu.dtd">
   
   <Menu>
   <Name>Applications</Name>
   <MergeFile type="parent">/etc/xdg/menus/gnome-applications.menu</MergeFile>
   
   <!-- Removes the Calculator from the Accessories submenu -->
   <Menu>
   <Name>Accessories</Name>
   <Exclude>
   <Filename>gcalctool.desktop</Filename>
   
   <!--/-->
   ```
As shown above, the file contains a `<Menu>` section that specifies the name of the submenu (Accessories), the name of the `.desktop` file (`gcalctool.desktop`), and includes the `<Exclude>` element.

12.1.2. Removing a Menu Item for All Users

The Applications menu customization for all users is by default stored in the `/etc/xdg/menus/applications.menu` definition file. The location of that file can be overridden by setting the `$XDG_CONFIG_DIRS` environment variable.

To override the Applications menu defaults, you need to edit that `.menu` file. Note that removing an item from the Applications menu and its submenus also removes it from the Applications view in the Activities Overview, thus preventing the user from searching for that item from within the Activities Overview.

Procedure 12.2. Example: Remove the Calculator menu item from the Accessories submenu

1. Consult the contents of the `/usr/share/applications/` directory and determine a `.desktop` file that corresponds to the menu item you want to remove:

   ```
   $ grep -r "Name=Calculator" /usr/share/applications/
   /usr/share/applications/gcalctool.desktop:Name=Calculator
   ```

   As shown above, the Calculator menu item corresponds to the `/usr/share/applications/gcalctool.desktop` file.

2. Edit the `/etc/xdg/menus/applications.menu` file and add a new `<Menu>` section before the final `<Menu>` tag at the end of that `.menu` file using the `<Exclude>` element as shown below:

   ```
   <!-- Removes the Calculator from the Accessories submenu -->
   <Menu>
    <Name>Accessories</Name>
    <Exclude>
     <Filename>gcalctool.desktop</Filename>
    </Exclude>
   </Menu>
   <!-- END of Calculator removal content -->
   ```

12.1.3. Removing a Submenu for Individual Users

The Applications menu customization for a given user is by default stored in the `~/.config/menus/gnome-applications.menu` definition file. The location of that file can be overridden by setting the `$XDG_DATA_HOME` environment variable.

To override the Applications menu defaults, you first need to create a `gnome-applications.menu` file.
To override the Applications menu defaults, you first need to create a `gnome-applications.menu` file. Note that removing a submenu from the Applications menu also removes all menu items contained within that submenu from the Applications view in the Activities Overview, thus preventing the user from searching for those items from within the Activities Overview.

**Example 12.1. Remove the System Tools submenu from the Applications menu**

Create a `~/.config/menus/gnome-applications.menu` file:

```xml
<![DOCTYPE Menu PUBLIC "-//freedesktop//DTD Menu 1.0//EN" "http://www.freedesktop.org/standards/menu-spec/1.0/menu.dtd">

<Menu>
  <Name>Applications</Name>
  <MergeFile type="parent">/etc/xdg/menus/gnome-applications.menu</MergeFile>
</Menu>

<!-- Removes the System Tools submenu from the Applications menu-->

<Menu>
  <Name>System Tools</Name>
  <Deleted/>
</Menu>

<!-- END of System Tools removal content -->

</Menu>
```

As shown above, the file contains a `<Menu>` section that specifies the name of the submenu (System Tools), and includes the `<Deleted/>` tag.

### 12.1.4. Removing a Submenu for All Users

The Applications menu customization for all users is by default stored in the `/etc/xdg/menus/applications.menu` definition file. The location of that file can be overridden by setting the `$XDG_CONFIG_DIRS` environment variable.

To override the Applications menu defaults, you need to edit that `.menu` file. Note that removing a submenu from the Applications menu also removes all menu items contained within that submenu from the Applications view in the Activities Overview, thus preventing the user from searching for those items from within the Activities Overview.

**Example 12.2. Remove the System Tools submenu from the Applications menu**

Edit a `/etc/xdg/menus/applications.menu` file and add a new `<Menu>` section before the final `</Menu>` tag at the end of that `.menu` file using the `<Deleted/>` element as shown below:

```xml
<!-- Removes the System Tools submenu from the Applications menu-->

<Menu>
  <Name>System Tools</Name>
  <Deleted/>
</Menu>
```

CHAPTER 12. INTEGRATING APPLICATIONS
12.2. CUSTOMIZING DEFAULT FAVORITE APPLICATIONS

Favorite applications are those visible on the GNOME Shell dash in the Activities Overview. You can use dconf to set the favorite applications for an individual user, or to set the same favorite applications for all users.

12.2.1. Setting Different Favorite Applications for Individual Users

You can set the default favorite applications for an individual user by modifying their user database file found in ~/.config/dconf/user. The following sample uses dconf to set gedit, Terminal, and Nautilus as the default favorites for a user. The example code allows users to modify the list later, if they wish to do so.

```
Example 12.3. Contents of /etc/dconf/profile:

# This line allows the user to change the default favorites later
user-db:user

Example 12.4. Contents of ~/.config/dconf/user:

# Set gedit, terminal and nautilus as default favorites
[org/gnome/shell]
favorite-apps = ["gedit.desktop", "gnome-terminal.desktop", "nautilus.desktop"]
```

NOTE

You can also lock down the above settings to prevent users from changing them. See Section 9.5.1, “Locking Down Specific Settings” for more information.

12.2.2. Setting the Same Favorite Applications for All Users

In order to have the same favorites for all users, you must modify system database files using dconf keyfiles. The following sample edits the dconf profile and then create a keyfile to set the default favorite applications for all employees in the first floor of an organization.

```
Example 12.5. Contents of /etc/dconf/profile:

user-db:user

# This line defines a system database called first_floor
system-db:floor
```
NOTE

Settings from the user database file will take precedence over the settings in the first_floor database file, but locks introduced in the first_floor database file will take priority over those present in user. For more information about locks, see Section 9.5.1, “Locking Down Specific Settings”.

Example 12.6. Contents of /etc/dconf/db/first_floor.d/00_floor1_settings:

# This sample sets gedit, terminal and nautilus as default favorites
# for all users in the first floor
[org/gnome/shell]
favorite-apps = ['gedit.desktop', 'gnome-terminal.desktop', 'nautilus.desktop']

Incorporate your changes into the system databases by running the dconf update command.

Users must log out and back in again before the system-wide settings take effect.

12.3. CONFIGURING FILE ASSOCIATIONS

12.3.1. What Are MIME Types?

In GNOME, MIME (Multipurpose Internet Mail Extension) types are used to identify the format of a file. The GNOME Desktop uses MIME types to:

- Determine which application should open a specific file format by default.
- Register other applications that can also open a specific file format.
- Provide a string describing the type of a file, for example, in a file properties dialog of the Files application.
- Provide an icon representing a specific file format, for example, in a file properties dialog of the Files application.

MIME type names follow a given format:

```
media-type/subtype-identifier
```

Example 12.7. MIME Types Format

image/jpeg is an example of a MIME type where image is the media type, and jpeg is the subtype identifier.

 GNOME follows the freedesktop.org Shared MIME Info specification to determine:

- The machine-wide and user-specific location to store all MIME type specification files.
- How to register a MIME type so that the desktop environment knows which applications can be used to open a specific file format.
How the user can change which applications should open what file formats.

12.3.1.1. What Is the MIME Database?

The MIME database is a collection of all MIME type specification files that GNOME uses to store information about known MIME types.

The most important part of the MIME database from the system administrator’s point of view is the /usr/share/mime/packages/ directory where the MIME type related files specifying information on known MIME types are stored. One example of such a file is /usr/share/mime/packages/freedesktop.org.xml, specifying information about the standard MIME types available on the system by default. That file is provided by the shared-mime-info package.

Getting More Information
For detailed information describing the MIME type system, see the freedesktop.org Shared MIME Info specification located at the freedesktop.org website:

http://www.freedesktop.org/wiki/Specifications/shared-mime-info-spec/

12.3.2. Adding a Custom MIME Type for All Users

To add a custom MIME type for all users on the system and register a default application for that MIME type, you need to create a new MIME type specification file in the /usr/share/mime/packages/ directory and a .desktop file in the /usr/share/applications/ directory.

Procedure 12.3. Adding a Custom application/x-newtype MIME Type for All Users

1. Create the /usr/share/mime/packages/application-x-newtype.xml file:

```xml
<?xml version="1.0" encoding="UTF-8"?>
<mime-info xmlns="http://www.freedesktop.org/standards/shared-mime-info">
  <mime-type type="application/x-newtype">
    <comment>new mime type</comment>
    <glob pattern="*.xyz"/>
  </mime-type>
</mime-info>
```

The sample application-x-newtype.xml file above defines a new MIME type application/x-newtype and assigns file names with the .xyz extension to that MIME type.

2. Create a new .desktop file named, for example, myapplication1.desktop, and place it in the /usr/share/applications/ directory:

```plaintext
[Desktop Entry]
Type=Application
MimeTypes=application/x-newtype
Name=My Application 1
Exec=myapplication1
```

The sample myapplication1.desktop file above associates the application/x-newtype MIME type with an application named My Application 1, which is run by a command myapplication1.

3. As root, update the MIME database for your changes to take effect.
# update-mime-database /usr/share/mime

4. As root, update the application database:

   # update-desktop-database /usr/share/applications

5. To verify that you have successfully associated *.xyz files with the application/x-newtype MIME type, first create an empty file, for example test.xyz:

   $ touch test.xyz

   Then run the `gvfs-info` command:

   $ gvfs-info test.xyz | grep "standard::content-type"
   standard::content-type: application/x-newtype

6. To verify that `myapplication1.desktop` has been correctly set as the default registered application for the application/x-newtype MIME type, run the `gvfs-mime --query` command:

   $ gvfs-mime --query application/x-newtype
   Default application for 'application/x-newtype': myapplication1.desktop
   Registered applications:
   myapplication1.desktop
   Recommended applications:
   myapplication1.desktop

### 12.3.3. Adding a Custom MIME Type for Individual Users

To add a custom MIME type for individual users and register a default application for that MIME type, you need to create a new MIME type specification file in the `~/.local/share/mime/packages/` directory and a .desktop file in the `~/.local/share/applications/` directory.

#### Procedure 12.4. Adding a Custom application/x-newtype MIME Type for Individual Users

1. Create the `~/.local/share/mime/packages/application-x-newtype.xml` file:

   ```xml
   <?xml version="1.0" encoding="UTF-8"?>
   <mime-info xmlns="http://www.freedesktop.org/standards/shared-mime-info">
   <mime-type type="application/x-newtype">
     <comment>new mime type</comment>
     <glob pattern="*.*xyz"/>
   </mime-type>
   </mime-info>
   ```

   The sample `application-x-newtype.xml` file above defines a new MIME type `application/x-newtype` and assigns file names with the `.xyz` extension to that MIME type.

2. Create a new `.desktop` file named, for example, `myapplication1.desktop`, and place it in the `~/.local/share/applications/` directory:

   `[Desktop Entry]
   Type=Application`
The sample `myapplication1.desktop` file above associates the `application/x-newtype` MIME type with an application named *My Application 1*, which is run by a command `myapplication1`.

3. Update the MIME database for your changes to take effect:
   ```
   $ update-mime-database ~/.local/share/mime
   ```

4. Update the application database:
   ```
   $ update-desktop-database ~/.local/share/applications
   ```

5. To verify that you have successfully associated `*.xyz` files with the `application/x-newtype` MIME type, first create an empty file, for example `test.xyz`:
   ```
   $ touch test.xyz
   ```

   Then run the `gvfs-info` command:
   ```
   $ gvfs-info test.xyz | grep "standard::content-type"
   standard::content-type: application/x-newtype
   ```

6. To verify that `myapplication1.desktop` has been correctly set as the default registered application for the `application/x-newtype` MIME type, run the `gvfs-mime --query` command:
   ```
   $ gvfs-mime --query application/x-newtype
   Default application for 'application/x-newtype': myapplication1.desktop
   Registered applications:
   myapplication1.desktop
   Recommended applications:
   myapplication1.desktop
   ```

### 12.3.4. Overriding the Default Registered Application for All Users

The `/usr/share/applications/mimeapps.list` and `/usr/share/applications/[desktop environment name]-mimeapps.list` file are the package-installed defaults, which specify which application is registered to open specific MIME types by default.

To override the system defaults for all users on the system, system administrators need to create the `/etc/xdg/mimeapps.list` or `/etc/xdg/[desktop environment name]-mimeapps.list` file with a list of MIME types for which they want to override the default registered application.

The order in which the configurations are applied is as follows:

1. `/usr/share/applications/`

2. `/etc/xdg/`

Within a particular location, the configurations are applied in this order:
1. mimeapps.list

2. [desktop environment name]-mimeapps.list

System administrator's configuration thus takes precedence over package configuration. And within each, desktop-specific configuration takes precedence over the configuration that does not specify the desktop environment.

NOTE

Red Hat Enterprise Linux versions prior to 7.5 used the defaults.list file instead of the mimeapps.list file.

Procedure 12.5. Overriding the Default Registered Application for All Users

1. Consult the /usr/share/applications/mimeapps.list file to determine the MIME types for which you want to change the default registered application. For example, the following sample of the mimeapps.list file specifies the default registered application for the text/html and application/xhtml+xml MIME types:

```
[Default Applications]
text/html=firefox.desktop
application/xhtml+xml=firefox.desktop
```

The default application (Firefox) is defined by specifying its corresponding .desktop file (firefox.desktop). The default location for other applications’ .desktop files is /usr/share/applications/.

2. Create the /etc/xdg/mimeapps.list file. In the file, specify the MIME types and their corresponding default registered applications:

```
[Default Applications]
text/html=myapplication1.desktop
application/xhtml+xml=myapplication2.desktop
```

This sets the default registered application for the text/html MIME type to myapplication1.desktop, and the default registered application for the application/xhtml+xml MIME type to myapplication2.desktop.

For these settings to function properly, ensure that both the myapplication1.desktop and myapplication2.desktop files are placed in the /usr/share/applications/ directory.

3. You can use the gvfs-mime query command to verify that the default registered application has been set correctly:

```
$gvfs-mime query text/html
Default application for 'text/html': myapplication1.desktop
Registered applications:
  myapplication1.desktop
  firefox.desktop
Recommended applications:
  myapplication1.desktop
  firefox.desktop
```
12.3.5. Overriding the Default Registered Application for Individual Users

The /usr/share/applications/mimeapps.list and /usr/share/applications/[desktop environment name]-mimeapps.list file are the package-installed defaults, which specify which application is registered to open specific MIME types by default.

To override the system defaults for individual users, you need to create the ~/.local/share/applications/mimeapps.list or ~/.local/share/applications/[desktop environment id]-mimeapps.list file with a list of MIME types for which you want to override the default registered application.

The order in which the configurations are applied is as follows:

1. /usr/share/applications/
2. /etc/xdg/
3. ~/.local/share/application/

Within a particular location, the configurations are applied in this order:

1. mimeapps.list
2. [desktop environment name]-mimeapps.list

User’s configuration thus takes precedence over system administrator’s configuration, and system administrator’s configuration takes precedence over package configuration. And within each, desktop-specific configuration takes precedence over the configuration that does not specify the desktop environment.

NOTE

Red Hat Enterprise Linux versions prior to 7.5 used the defaults.list file instead of the mimeapps.list file.

Procedure 12.6. Overriding the Default Registered Application for Individual Users

1. Consult the /usr/share/applications/mimeapps.list file to determine the MIME types for which you want to change the default registered application. For example, the following sample of the mimeapps.list file specifies the default registered application for the text/html and application/xhtml+xml MIME types:

```
[Default Applications]
text/html=firefox.desktop
application/xhtml+xml=firefox.desktop
```

The default application (Firefox) is defined by specifying its corresponding .desktop file (firefox.desktop). The system default location for other applications’ .desktop files is /usr/share/applications/. Individual users’ .desktop files can be stored in ~/.local/share/applications/.

2. Create the ~/.local/share/applications/mimeapps.list file. In the file, specify the MIME types and their corresponding default registered applications:
This sets the default registered application for the text/html MIME type to myapplication1.desktop, and the default registered application for the application/xhtml+xml MIME type to myapplication2.desktop.

For these settings to function properly, ensure that both the myapplication1.desktop and myapplication2.desktop files are placed in the /usr/share/applications/ directory.

3. You can use the gvfs-mime --query command to verify that the default registered application has been set correctly:

```bash
$ gvfs-mime --query text/html
Default application for 'text/html': myapplication1.desktop
Registered applications:
  myapplication1.desktop
  firefox.desktop
Recommended applications:
  myapplication1.desktop
  firefox.desktop
```
CHAPTER 13. CUSTOMIZING GNOME DESKTOP FEATURES

This chapter mentions three key desktop features. After reading, you will know how to quickly terminate the X server by default for all users, how to enable the Compose key or how to disable command line access for the users.

To make sure the changes you have made take effect, you need to update the dconf utility. The users will experience the difference when they log out and log in again.

13.1. ALLOWING AND DISALLOWING ONLINE ACCOUNTS

The GNOME Online Accounts (GOA) are used for setting personal network accounts which are then automatically integrated with the GNOME Desktop and applications. The user can add their online accounts, such as Google, Facebook, Flickr, ownCloud, and others using the Online Accounts application.

As a system administrator, you can

- enable all online accounts;
- selectively enable a few online accounts;
- disable all online accounts.

Procedure 13.1. Configuring Online Accounts

1. If you do not have the gnome-online-accounts package on your system, install it by running the following command as root:

   # yum install gnome-online-accounts

2. Create a keyfile for the local database in /etc/dconf/db/local.d/goa, which contains the following configuration:

   - For selectively enabling a few providers only:
     
     [org/gnome/online-accounts]
     whitelisted-providers = ['google', 'facebook']

   - For disabling all providers:
     
     [org/gnome/online-accounts]
     whitelisted-providers = ['']

   - For allowing all available providers:
     
     [org/gnome/online-accounts]
     whitelisted-providers = ['all']

3. Lock down the settings to prevent users from overriding them.

   a. If it does not exist, create a new directory named /etc/dconf/db/local.d/locks/.
b. Create a new file in `/etc/dconf/db/local.d/locks/goa` with the following contents:

```ini
# Prevent users from changing values for the following key:
/org/gnome/online-accounts
```

4. Update the system databases for the changes to take effect:

```bash
# dconf update
```

5. Users must log out and back in again before the system-wide settings take effect.

### 13.2. ENABLING THE CTRL+ALT+BACKSPACE SHORTCUT

The **Ctrl+Alt+Backspace** shortcut key combination is used for terminating the X server. You might want to terminate the X server especially when:

- a program caused the X server to stop working.
- you need to switch from your logged-in session quickly.
- you have launched a program that failed.
- you cannot operate in the current session for various reason.
- your screen freezes.

To enable the **Ctrl+Alt+Backspace** shortcut to forcibly terminate the X server by default for all users, you need to set the `org.gnome.desktop.input-sources.xkb-options` GSettings key. (For more information on GSettings keys, see Section 9.6, “GSettings Keys Properties”.)

**Procedure 13.2. Enabling the Ctrl-Alt-Backspace Shortcut**

1. Create a **local** database for machine-wide settings in `/etc/dconf/db/local.d/00-input-sources`:

   ```
   [org/gnome/desktop/input-sources]
   # Enable Ctrl-Alt-Backspace for all users
   xkb-options=\["terminate:ctrl_alt_bksp"]
   ```

2. Override the user’s setting and prevent the user from changing it in

   ```
   /etc/dconf/db/local.d/locks/input-sources
   ```

   ```bash
   # Lock the list of enabled XKB options
   /org/gnome/desktop/input-sources/xkb-options
   ```

3. Update the system databases for the changes to take effect:

   ```bash
   # dconf update
   ```

4. Users must log out and back in again before the system-wide settings take effect.

The **Ctrl+Alt+Backspace** key combination is now enabled. All users can terminate the X server quickly and easily and doing so bring themselves back to the login prompt.
13.3. ENABLING THE COMPOSE KEY

The **Compose key** is a feature that enables you to type special symbols or characters not found on your keyboard. In GNOME Desktop, you can define one of the existing keys on your keyboard as the **Compose key**. The **Compose key** is used in combination with other keys, known as Compose key sequences, to enter special characters you type frequently.

Example 13.1. Using Compose Key

If you press and release the **Compose key**, then type AE (in capitals), you will get “Æ”. If you type the letters in lower case, you get “æ”.

To enable the **Compose key** and configure a certain key on your keyboard as the **Compose key**, set the `org.gnome.desktop.input-sources.xkb-options` GSettings key. That way, the setting will be enabled by default for all users on your system. (For more information on GSettings keys, see Section 9.6, “GSettings Keys Properties”.)

Procedure 13.3. Setting the Right Alt Key as the Compose Key

1. Create a local database for machine-wide settings in `/etc/dconf/db/local.d/00-input-sources`:

   ```plaintext
   [org/gnome/desktop/input-sources]
   # Set the Right Alt key as the Compose key and enable it
   xkb-options=['compose:ralt']
   ```

   If you want to set a different key than Right `Alt`, replace `ralt` with the name of that key as specified in the `xkeyboard-config(7)` man page, section `Compose key position`.

2. Override the user’s setting and prevent the user from changing it in `/etc/dconf/db/local.d/locks/input-sources`:

   ```plaintext
   # Lock the list of enabled XKB options
   /org/gnome/desktop/input-sources/xkb-options
   ```

3. Update the system databases for the changes to take effect:

   ```plaintext
   # dconf update
   ```

4. Users must log out and back in again before the system-wide settings take effect.

   Now, you can start using the Right `Alt` key as the **Compose key**. Just press and release the **Compose key** and then type the key combination to get the specific symbol.

   **NOTE**

   If you, as a system administrator, set the lock on after editing the local database, users will not be able to add other xkb options. The lock prevents users from setting a key combination like `Alt+Shift` to switch keyboard layouts.

13.4. DISABLING COMMAND-LINE ACCESS

To disable command-line access for your desktop user, you need to make configuration changes in a
Set the `org.gnome.desktop.lockdown.disable-command-line` GSettings key, which prevents the user from accessing the terminal or specifying a command line to be executed (the `Alt+F2` command prompt).

- Disable switching to virtual terminals (VTs) with the `Ctrl+Alt+function key` shortcuts by modifying the X server configuration.

- Remove `Terminal` and any other application that provides access to the terminal from the `Applications` menu and `Activities Overview` in GNOME Shell. This is done by removing menu items for those applications. For detailed information on how to remove a menu item, see Section 12.1.2, “Removing a Menu Item for All Users”.

### 13.4.1. Setting the `org.gnome.desktop.lockdown.disable-command-line` Key

1. Create a local database for machine-wide settings in `/etc/dconf/db/local.d/00-lockdown`:

```
[org/gnome/desktop/lockdown]
# Disable command-line access
disable-command-line=true
```

2. Override the user’s setting and prevent the user from changing it in `/etc/dconf/db/local.d/locks/lockdown`:

```
# Lock the disabled command-line access
/org/gnome/desktop/lockdown
```

3. Update the system databases:

```
# dconf update
```

4. Users must log out and back in again before the system-wide settings take effect.

### 13.4.2. Disabling Virtual Terminal Switching

Users can normally use the `Ctrl+Alt+function key` shortcuts (for example `Ctrl+Alt+F2`) to switch from the GNOME Desktop and X server to a virtual terminal. You can disable access to all virtual terminals by adding a `DontVTSwitch` option to the `Serverflags` section in an X configuration file in the `/etc/X11/xorg.conf.d/` directory.

Procedure 13.4. Disabling Access to Virtual Terminals

1. Create or edit an X configuration file in the `/etc/X11/xorg.conf.d/` directory:

```
```

NOTE
By convention, these host-specific configuration file names start with two digits and a hyphen and always have the .conf extension. Thus, the following file name can be `/etc/X11/xorg.conf.d/10-xorg.conf`.

---

number of different contexts. Bear in mind that the following steps do not remove the desktop user’s permissions to access a command line, but rather remove the ways that the desktop user could access command line.
13.5. LOCKING DOWN PRINTING

You can disable the print dialog from being shown to users. This can be useful if you are giving temporary access to a user or you do not want the user to print to network printers.

**IMPORTANT**

This feature will only work in applications which support it. Not all GNOME and third party applications have this feature enabled. These changes will have no effect on applications which do not support this feature.

You prevent applications from printing by locking down the `org.gnome.desktop.lockdown.disable-printing` key. Follow the procedure.

**Procedure 13.5. Locking Down the `org.gnome.desktop.lockdown.disable-printing` Key**

1. Create the user profile if it already does not exist (`/etc/dconf/profile/user`):

   ```
   user-db:user
   system-db:local
   ```

2. Create a **local** database for machine-wide settings in `etc/dconf/db/local.d/00-lockdown`:

   ```
   [org/gnome/desktop/lockdown]
   # Prevent applications from printing
   disable-printing=true
   ```

3. Override the user’s setting and prevent the user from changing it in `/etc/dconf/db/local.d/locks/lockdown`:

   ```
   # List the keys used to configure lockdown
   /org/gnome/desktop/lockdown/disable-printing
   ```

4. Update the system databases by running

   ```
   # dconf update
   ```

Having followed these steps, applications supporting this lockdown key will disable printing. Among such applications there are **Evolution**, **Evince**, **Eye of GNOME**, **Epiphany**, and **Gedit**.

13.6. LOCKING FILE SAVING ON DISK
You can disable the Save and Save As dialogs. This can be useful if you are giving temporary access to a user or you do not want the user to save files to the computer.

**IMPORTANT**

This feature will only work in applications which support it. Not all GNOME and third party applications have this feature enabled. These changes will have no effect on applications which do not support this feature.

You prevent applications from file saving by locking down the `org.gnome.desktop.lockdown.disable-save-to-disk` key. Follow the procedure:

**Procedure 13.6. Locking Down the `org.gnome.desktop.lockdown.disable-save-to-disk` Key**

1. Create the user profile in `/etc/dconf/profile/user` unless it already exists:

   ```
   user-db:user
   system-db:local
   ```

2. Create a local database for machine-wide settings in the `/etc/dconf/db/local.d/00-lockdown` file.

   ```ini
   [org/gnome/desktop/lockdown]
   # Prevent the user from saving files on disk
   disable-save-to-disk=true
   ```

3. Override the user's setting and prevent the user from changing it in `/etc/dconf/db/local.d/locks/lockdown`:

   ```ini
   # Lock this key to disable saving files on disk
   /org/gnome/desktop/lockdown/disable-save-to-disk
   ```

4. Update the system databases by running

   ```sh
   # dconf update
   ```

Having followed these steps, applications supporting this lockdown key, for example Videos, Image Viewer, Evolution, Document Viewer, or GNOME Shell will disable their “Save As” dialogs.

**13.7. LOCKING REPARTITIONING**

`polkit` enables you to set permissions for individual operations. For `udisks2`, the utility for disk management services, the configuration is located at `/usr/share/polkit-1/actions/org.freedesktop.udisks2.policy`. This file contains a set of actions and default values, which can be overridden by system administrator.

**IMPORTANT**

Remember that `polkit` configuration stored in `/etc` overrides the configuration shipped by packages in `/usr/share/`. 
Procedure 13.7. To Prevent Users from Changing Disks Settings

1. Create a file with the same content as in `/usr/share/polkit-1/actions/org.freedesktop.udisks2.policy`

   ```
   cp /usr/share/polkit-1/actions/org.freedesktop.udisks2.policy /etc/share/polkit-1/actions/org.freedesktop.udisks2.policy
   ```

   Do not change the `/usr/share/polkit-1/actions/org.freedesktop.udisks2.policy` file, your changes will be overwritten by the next package update.

2. Delete the action you do not need and add the following lines to the `/etc/polkit-1/actions/org.freedesktop.udisks2.policy` file:

   ```
   <action id="org.freedesktop.udisks2.modify-device">
   <message>Authentication is required to modify the disks settings</message>
   <defaults>
   <allow_any>no</allow_any>
   <allow_inactive>no</allow_inactive>
   <allow_active>yes</allow_active>
   </defaults>
   </action>
   ```

   Replace `no` by `auth_admin` if you want to ensure only the root user is able to carry out the action.

3. Save the changes.

When the user tries to change the disks settings, the following message is returned:

```
Authentication is required to modify the disks settings
```

13.8. LOCKING DOWN USER LOGOUT AND USER SWITCHING

Follow these steps to prevent the user from logging out.

1. Create the `/etc/dconf/profile/user` profile which contains the following lines:

   ```
   user-db:user
   system-db:local
   ```

   `local` is the name of a `dconf` database.

2. Create the directory `/etc/dconf/db/local.d/` if it does not already exist.

3. Create the key file `/etc/dconf/db/local.d/00-logout` to provide information for the `local` database:

   ```
   [org/gnome/desktop/lockdown]
   # Prevent the user from user switching
   disable-log-out=true
   ```

4. Override the user’s setting and prevent the user from changing it in `/etc/dconf/db/local.d/locks/lockdown:`
Procedure 13.8. Prevent the User from Switching to a Different User Account

1. Create the `/etc/dconf/profile/user` profile which contains the following lines:

   user-db:user
   system-db:local

   `local` is the name of a `dconf` database.

2. Create the directory `/etc/dconf/db/local.d/` if it does not already exist.

3. Create the key file `/etc/dconf/db/local.d/00-user-switching` to provide information for the `local` database:

   ```
   [org/gnome/desktop/lockdown]
   # Prevent the user from user switching
   disable-user-switching=true
   ```

4. Override the user’s setting and prevent the user from changing it in `/etc/dconf/db/local.d/locks/lockdown`:

   ```
   # Lock this key to disable user switching
   /org/gnome/desktop/lockdown/disable-user-switching
   ```

5. Update the system databases:

   ```
   # dconf update
   ```

6. Users must log out and back in again before the system-wide settings take effect.

### IMPORTANT

Users can evade the logout lockdown by switching to a different user, which can thwart system administrator’s intentions. That is the reason why it is recommended to disable "user switching" as well to prevent this scenario from occurring.

13.9. SINGLE-APPLICATION MODE

Single-application mode is a modified shell which reconfigures the shell into an interactive kiosk. The administrator locks down some behavior to make the standard desktop more restrictive for the user, letting them focus on selected features.
Set up single-application mode for a wide range of functions in a number of fields (from communication to entertainment or education) and use it as a self-serve machine, event manager, registration point, etc.


1. Lock down settings to prevent printing, terminal access, and so on. See:
   - Section 13.4, “Disabling Command-Line Access”
   - Section 13.5, “Locking Down Printing”
   - Section 13.6, “Locking File Saving on Disk”
   - Section 13.7, “Locking Repartitioning”

2. Configure automatic login in the /etc/gdm/custom.conf file for the user.
   See Section 14.3.6, “Configuring Automatic Login”.

3. Create a new user with a name, which follows typical naming conventions (no space or special characters, do not start with a digit or a dash). Also, make sure the user name matches with the related names, such as when referring to a session. A good example is kiosk-user.

4. Create a session with a name matching your user name (for example, for our kiosk-user, kiosk is a good match) by writing a /usr/share/xsessions/kiosk.desktop file and setting the Exec line to be:

   Exec=gnome-session --session kiosk

5. Set the default session for kiosk-user by adding the following line to the /var/lib/AccountsService/users/kiosk-user file.

   XSession=kiosk

6. Define the kiosk session by writing a custom session definition, containing the following line:

   RequiredComponents=kiosk-app;gnome-settings-daemon;kiosk-shell;

   This creates a session that runs three programs: kiosk-app (a sample application), gnome-settings-daemon (standard component in the GNOME session), and kiosk-shell (which is a customized version of gnome-shell).

7. Create a desktop file for kiosk-shell, /usr/share/applications/kiosk-shell.desktop, which will contain:

   Exec=gnome-shell --mode=kiosk

8. Create a mode definition called /usr/share/gnome-shell/modes/kiosk.json. This is a small json file defining the available GNOME Shell UI. (Look at classic.json and initial-setup.json in the same directory as the starting point.)
13.10. PREVENTING THE COMPUTER FROM SUSPENDING WHEN CLOSING THE LID

When closing the lid of your laptop, your computer suspends in order to save power. You can prevent the computer from suspending when closing the lid by changing the setting for that behavior.

WARNING

Some laptops can overheat if they are left running with the lid closed, especially if they are in a confined place like a backpack. Therefore, consider if changing the default setting (suspend) is the best option in your case.

Procedure 13.10. Configuring the lid switch

1. Open the `/etc/systemd/logind.conf` file for editing.

2. Find the `HandleLidSwitch=suspend` line in the file. If it is quoted out with the `#` character at the start, unquote it. If the line is not present in the file, add it.

3. Replace the default `suspend` parameter with
   - `lock` for the screen to lock;
   - `ignore` for nothing to happen;
   - `poweroff` for the computer to switch off.

   For example:

   ```
   [Login]
   HandleLidSwitch=lock
   ```

4. Save your changes and close the editor.

5. Run the following command so that your changes preserve the next restart of the system:

   ```
   # systemctl restart systemd-logind.service
   ```

WARNING

Keep in mind that restarting the service forcibly interrupts any currently running GNOME session of any desktop user who is logged in. This can result in users losing unsaved data.
For more information on the `/etc/systemd/logind.conf` file, see the `logind.conf(5)` man page.

### 13.11. CHANGING BEHAVIOR WHEN PRESSING THE POWER BUTTON IN GRAPHICAL TARGET MODE

When the machine is booted to a graphical login screen or user session, hitting the **power** button makes the machine suspend by default. This happens both in cases when the user presses the **power** button physically or when pressing a virtual **power** button from a remote console. To achieve a different behavior when pressing the **power** button, set the function of this button with dconf.

For example, if you want the system to shutdown after pressing the **power** button, use the following procedure:

**Procedure 13.11. Using dconf to configure the system to shutdown after pressing the power button**

1. Create a local database for system-wide settings in the `/etc/dconf/db/local.d/01-power` file:

   ```
   [org/gnome/settings-daemon/plugins/power]
   power-button-action='interactive'
   ```

2. Override the user’s setting and prevent the user from changing it in the `/etc/dconf/db/local.d/locks/01-power` file:

   ```
   /org/gnome/settings-daemon/plugins/power/power-button-action
   ```

3. Update the system databases:

   ```
   # dconf update
   ```

4. Log out and back in again before the system-wide settings take effect.

This configuration initiates a system shutdown after pressing the **power** button. To configure the system differently, you can set the behavior of particular buttons.

**Options for particular buttons**

- **nothing**
  - does nothing

- **suspend**
  - suspends the system

- **hibernate**
  - hibernates the system

- **interactive**
  - shows a pop-up query asking the user what to do

  With interactive mode, the system powers off automatically after 60 seconds when hitting the power button.
However, you can choose a different behavior from the pop-up query as shown in the figure below.

![Power Off Screen](image)

**Figure 13.1.** Pop-up query for interactive mode
CHAPTER 14. SESSION MANAGEMENT

14.1. WHAT IS GDM?

The GNOME Display Manager (GDM) is a graphical login program running in the background that runs and manages the X servers for both local and remote logins.

GDM is a replacement for XDM, the X Display Manager. However, GDM is not derived from XDM and does not contain any original XDM code. In addition, there is no support for a graphical configuration tool in GDM, so editing the /etc/gdm/custom.conf configuration file is necessary to change the GDM settings.

14.1.1. Restarting GDM

When you make changes to the system configuration such as setting up the login screen banner message, login screen logo, or login screen background, you need to restart GDM for your changes to take effect.

WARNING
Keep in mind that restarting the service forcibly interrupts any currently running GNOME session of any desktop user who is logged in. This can result in users losing unsaved data.

To restart the GDM service, run the following command:

```
# systemctl restart gdm.service
```

For more information about managing services on Red Hat Enterprise Linux 7, see the System Administrator’s Guide.

14.1.2. Displaying results of GDM configuration

To display results of the GDM configuration, run the following command:

```
$ DCONF_PROFILE=gdm gsettings list-recursively org.gnome.login-screen
```

14.2. AUTHENTICATION

14.2.1. Using Enterprise Credentials to Log into GNOME

If your network has an Active Directory or Identity Management domain available, and you have a domain account, you can use your domain credentials to log into GNOME.

If the machine has been successfully configured for domain accounts, users can log into GNOME using their accounts. At the login prompt, type the domain user name followed by an @ sign, and then your domain name. For example, if your domain name is example.com and the user name is User, type:
In cases where the machine is already configured for domain accounts, you should see a helpful hint describing the login format.

14.2.1.1. Choosing to Use Enterprise Credentials During Welcome Screens

If you have not yet configured the machine for enterprise credentials, you can do so at the Welcome screens that are part of the GNOME Initial Setup program.

Procedure 14.1. Configuring Enterprise Credentials

1. At the Login welcome screen, choose Use Enterprise Login.
2. Type the name of your domain in the Domain field if it is not already prefilled.
3. Type your domain account user and password in the relevant fields.
4. Click Next.

Depending on how the domain is configured, a prompt may show up asking for the domain administrator’s name and password in order to proceed.

14.2.1.2. Changing to Use Enterprise Credentials to Log into GNOME

If you have already completed initial setup, and wish to start a domain account to log into GNOME, then you can accomplish this from the Users panel in the GNOME Settings.

Procedure 14.2. Configuring Enterprise Credentials

1. Click your name on the top bar and select Settings from the menu.
2. From the list of items, select Users.
3. Click the Unlock button and type the computer administrator’s password.
4. Click the + button in the lower left of the window.
5. Select the Enterprise Login pane.
6. Enter the domain, user, and password for your Enterprise account, and click Add.

Depending on how your domain is configured, a prompt may show up asking for the domain administrator’s name and password in order to proceed.

14.2.1.3. Troubleshooting and Advanced Setup

The realm command and its various subcommands can be used to troubleshoot the enterprise login feature. For example, to see whether the machine has been configured for enterprise logins, run the following command:

```
$ realm list
```

Network administrators are encouraged to pre-join workstations to a relevant domain. This can be done using the kickstart realm join command, or running realm join in an automated fashion from a script.
14.2.2. Enabling Smart Card Authentication

Enabling smart card authentication requires two consecutive steps:

1. Configuration of GDM to allow prompting for smart cards

2. Configuration of the operating system to allow using smart cards to login

1. Configuration of GDM to allow prompting for smart cards

You can use two ways to configure the GDM to allow prompting for smart card authentication:

*dconf editor GUI*

Procedure 14.3. Enabling smart card authentication using *dconf editor GUI*

1. Uncheck the box for the `org.gnome.login-screen enable-password-authentication` dconf key.

2. Check the box for the `org.gnome.login-screen enable-smartcard-authentication` dconf key.

*dconf-tool*

Procedure 14.4. Enabling smart card authentication using *dconf-tool*

1. Create a keyfile in the `/etc/dconf/db/gdm.d` directory.

2. Add the following content to this keyfile:

```
[org/gnome/login-screen]
enable-password-authentication='false'
enable-smartcard-authentication='true'
```

3. Update the system dconf databases:

```
# dconf update
```

2. Configuration of the operating system to allow using smart cards to login

After GDM has been configured for smart card authentication, use the *system-config-authentication* tool to configure the system to allow users to use smart cards, making their use available to GDM as a valid authentication method for the graphical environment. The tool is provided by the authconfig-gtk package.

To learn more about configuring the system to allow smart card authentication, and to learn more about the *system-config-authentication* tool, see the Red Hat Enterprise Linux 7 System-Level Authentication Guide.

14.2.3. Enabling Fingerprint Authentication

To allow users to log in using their enrolled fingerprints, use the *system-config-authentication* tool to enable fingerprint authentication. The tool is provided by the authconfig-gtk package.
To learn more about fingerprint authentication and the `system-config-authentication` tool, see the Red Hat Enterprise Linux 7 System-Level Authentication Guide.

14.3. USER SESSIONS

14.3.1. What Are Typical Processes in User Sessions?

In a stock GNOME session, programs called daemons run on the system as background processes. You should find the following daemons running by default:

**dbus-daemon**

The `dbus-daemon` provides a message bus daemon which programs can use to exchange messages with one another. `dbus-daemon` is implemented with the D-Bus library which provides one-to-one communication between any two applications.

For extended information, see the `dbus-daemon(1)` man page.

**gnome-keyring-daemon**

Credentials such as user name and password for various programs and websites are stored securely using the `gnome-keyring-daemon`. This information is written into an encrypted file called the keyring file and saved in the user's home directory.

For extended information, see the `gnome-keyring-daemon(1)` man page.

**gnome-session**

The `gnome-session` program is responsible for running the GNOME Desktop environment with help of a display manager, such as GDM. The default session for the user is set at the time of system installation by the system administrator. `gnome-session` typically loads the last session that ran successfully on the system.

For extended information, see the `gnome-session(1)` man page.

**gnome-settings-daemon**

The `gnome-settings-daemon` handles settings for a GNOME session and for all programs that are run within the session.

For extended information, see the `gnome-settings-daemon(1)` man page.

**gnome-shell**

`gnome-shell` provides the core user interface functionality for GNOME, such as launching programs, browsing directories, viewing files and so on.

For extended information, see the `gnome-shell(1)` man page.

**pulseaudio**

PulseAudio is a sound server for Red Hat Enterprise Linux that lets programs output audio using the Pulseaudio daemon.

For extended information, see the `pulseaudio(1)` man page.

Depending on the user's setup, you may also see some of the following, among others:
- dconf-service
- ibus
- at-spi2 dbus-launcher
- at-spi2-registryd
- gnome-shell-calendar-server
- goa-daemon
- gsd-printer
- various Evolution factory processes
- various GVFS processes

14.3.2. Configuring a User Default Session

The default session is retrieved from a program called AccountsService. AccountsService stores this information in the /var/lib/AccountsService/users/ directory.

NOTE

In GNOME 2, the .dmrc file in the user home directory was used to create default sessions. This .dmrc file is no longer used.

Procedure 14.5. Specifying a Default Session for a User

1. Make sure that you have the gnome-session-xsession package installed by running the following command:

   # yum install gnome-session-xsession

2. Navigate to the /usr/share/xsessions directory where you can find .desktop files for each of the available sessions. Consult the contents of the .desktop files to determine the session you want to use.

3. To specify a default session for a user, update the user’s account service in the /var/lib/AccountsService/users/username file:

   [User]
   Language=
   XSession=gnome

   In this sample, GNOME has been set as the default session, using the /usr/share/xsessions/gnome.desktop file. Note that the system default in Red Hat Enterprise Linux 7 is GNOME Classic (the /usr/share/xsessions/gnome-classic.desktop file).

After specifying a default session for the user, that session will be used the next time the user logs in, unless the user selects a different session from the login screen.

14.3.3. Creating a Custom Session
To create your own session with customized configuration, follow these steps:

1. Create a .desktop file in /etc/X11/sessions/new-session.desktop. Make sure that the file specifies the following entries:

```
[Desktop Entry]
Encoding=UTF-8
Type=Application
Name=Custom Session
Comment=This is our custom session
Exec=gnome-session --session=new-session
```

The Exec entry specifies the command, possibly with arguments, to execute. You can run the custom session with the `gnome-session --session=new-session` command.

For more information on the parameters that you can use with `gnome-session`, see the `gnome-session(1)` man page.

2. Create a custom session file in /usr/share/gnome-session/sessions/new-session.session where you can specify the name and required components for the session:

```
[GNOME Session]
Name=Custom Session
RequiredComponents=gnome-shell-classic;gnome-settings-daemon;
```

Note that any item that you specify in RequiredComponents needs to have its corresponding .desktop file in /usr/share/applications/.

After configuring the custom session files, the new session will be available in the session list on the GDM login screen.

### 14.3.4. Viewing User Session Logs

If you want to find more information about a problem in a user session, you can view the systemd journal. Because Red Hat Enterprise Linux 7 is a systemd-based system, the user session log data is stored directly in the systemd journal in a binary format.

**NOTE**

In Red Hat Enterprise Linux 6, the user session log data was stored in the ~/.xsession-errors file, which is no longer used.

#### Procedure 14.6. Viewing User Session Logs

1. Determine your user ID (uid) by running the following command:

   ```bash
   $ id --user
   1000
   ```

2. View the journal logs for the user ID determined above:

   ```bash
   $ journalctl _UID=1000
   ```
Getting More Information
The `journalctl` man page provides more information on the `systemd` journal usage.

For further information about using the `systemd` journal on Red Hat Enterprise Linux 7, see the Red Hat Enterprise Linux 7 System-Level Authentication Guide.

14.3.5. Adding an Autostart Application for All Users

To start an application automatically when the user logs in, you need to create a `.desktop` file for that application in the `/etc/xdg/autostart/` directory.

To manage autostart (startup) applications for individual users, use the `gnome-session-properties` application.

**Procedure 14.7. Adding an Autostart (Startup) Application for All Users**

1. Create a `.desktop` file in the `/etc/xdg/autostart/` directory:

   ```
   [Desktop Entry]
   Type=Application
   Name=Files
   Exec=nautilus -n
   OnlyShowIn=GNOME;
   AutostartCondition=GSettings org.gnome.desktop.background show-desktop-icons
   ```

2. Replace `Files` with the name of the application.

3. Replace `nautilus -n` with the command you wish to use to run the application.

4. You can use the `AutostartCondition` key to check for a value of a GSettings key.
   
   The session manager runs the application automatically if the key’s value is true. If the key’s value changes in the running session, the session manager starts or stops the application, depending on what the previous value for the key was.

14.3.6. Configuring Automatic Login

A user with an Administrator account type can enable Automatic Login from the Users panel in the GNOME Settings. System administrators can also set up automatic login manually in the GDM custom configuration file, as follows.

**Example 14.1. Configuring Automatic Login for a user john**

Edit the `/etc/gdm/custom.conf` file and make sure that the `[daemon]` section in the file specifies the following:

```
[daemon]
AutomaticLoginEnable=True
AutomaticLogin=john
```

Replace `john` with the user that you want to be automatically logged in.

14.3.7. Configuring Automatic Logout
User sessions that have been idle for a specific period of time can be ended automatically. You can set different behavior based on whether the machine is running from a battery or from mains power by setting the corresponding GSettings key, then locking it.

**WARNING**
Keep in mind that users can potentially lose unsaved data if an idle session is automatically ended.

### Procedure 14.8. Setting Automatic Logout for a Mains Powered Machine

1. Create a local database for machine-wide settings in `/etc/dconf/db/local.d/00-autologout`

   ```
   [org/gnome/settings-daemon/plugins/power]
   # Set the timeout to 900 seconds when on mains power
   sleep-inactive-ac-timeout=900
   # Set action after timeout to be logout when on mains power
   sleep-inactive-ac-type='logout'
   ```

2. Override the user's setting and prevent the user from changing it in `/etc/dconf/db/local.d/locks/autologout`

   ```
   # Lock automatic logout settings
   /org/gnome/settings-daemon/plugins/power/sleep-inactive-ac-timeout
   /org/gnome/settings-daemon/plugins/power/sleep-inactive-ac-type
   ```

3. Update the system databases:

   ```
   # dconf update
   ```

4. Users must log out and back in again before the system-wide settings take effect.

The following GSettings keys are of interest:

- **org.gnome.settings-daemon.plugins.power.sleep-inactive-ac-timeout**
  
The number of seconds that the computer needs to be inactive before it goes to sleep if it is running from AC power.

- **org.gnome.settings-daemon.plugins.power.sleep-inactive-ac-type**
  
  What should happen when the timeout has passed if the computer is running from AC power.

- **org.gnome.settings-daemon.plugins.power.sleep-inactive-battery-timeout**
  
  The number of seconds that the computer needs to be inactive before it goes to sleep if it is running from power.

- **org.gnome.settings-daemon.plugins.power.sleep-inactive-battery-type**
What should happen when the timeout has passed if the computer is running from battery power.

You can run the `gsettings range` command on a key for a list of values which you can use. For example:

```
$ gsettings range org.gnome.settings-daemon.plugins.power.sleep-inactive-ac-type
enum
'blank'
'suspend'
'shutdown'
'hibernate'
'interactive'
'nothing'
'logout'
```

14.3.8. Setting Screen Brightness and Idle Time

By setting the following GSettings keys, you can configure the drop in the brightness level, and set brightness level and idle time.

**Example 14.2. Setting the Drop in the Brightness Level**

To set the drop in the brightness level when the device has been idle for some time, create a local database for machine-wide settings in `/etc/dconf/db/local.d/00-power`, as in the following example:

```
[org/gnome/settings-daemon/plugins/power]
idle-dim=true
```

**Example 14.3. Setting Brightness Level**

To change the brightness level, create a local database for machine-wide settings in `/etc/dconf/db/local.d/00-power`, as in the following example, and replace 30 with the integer value you want to use:

```
[org/gnome/settings-daemon/plugins/power]
idle-brightness=30
```

**Example 14.4. Setting Idle Time**

To set the idle time after which the screen must be blanked and the default screensaver displayed, create a local database for machine-wide settings in `/etc/dconf/db/local.d/00-session`, as in the following example, and replace 900 with the integer value you want to use:

```
[org/gnome/desktop/session]
idle-delay=uint32 900
```

You must include the `uint32` along with the integer value as shown.

Incorporate your changes into the system databases by running the `dconf update` command as root.
Users must log out and back in again before the system-wide settings take effect.

**NOTE**

You can also lock down the above settings to prevent users from changing them. For more information about locks, see Section 9.5.1, "Locking Down Specific Settings".

### 14.3.9. Locking the Screen When the User Is Idle

If you want to enable the screensaver and make the screen lock automatically when the user is idle, you need to create a dconf profile, set the GSettings key pairs and then lock it to prevent users from editing it.

**Procedure 14.9. Enabling the Screensaver and Locking the Screen**

1. Create a **local** database for system-wide settings in `/etc/dconf/db/local.d/00-screensaver`:

   ```
   [org/gnome/desktop/session]
   # Set the lock time out to 180 seconds before the session is considered idle
   idle-delay=uint32 180
   
   [org/gnome/desktop/screensaver]
   # Set this to true to lock the screen when the screensaver activates
   lock-enabled=true
   # Set the lock timeout to 180 seconds after the screensaver has been activated
   lock-delay=uint32 180
   ```

   You must include the **uint32** along with the integer key values as shown.

2. Override the user’s setting and prevent the user from changing it in the `/etc/dconf/db/local.d/locks/screensaver` file:

   ```
   # Lock desktop screensaver settings
   /org/gnome/desktop/session/idle-delay
   /org/gnome/desktop/screensaver/lock-enabled
   /org/gnome/desktop/screensaver/lock-delay
   ```

3. Update the system databases:

   ```
   # dconf update
   ```

4. Users must log out and back in again before the system-wide settings take effect.

### 14.3.10. Screencast Recording

GNOME Shell features a built-in screencast recorder that allows users to record desktop or application activity during their session and distribute the recordings as high-resolution video files in the **webm** format.

**Procedure 14.10. Making a Screencast**

1. To start the recording, press **Ctrl+Alt+Shift+R**.
When the recorder is capturing the screen activity, it displays a red circle in the bottom-right corner of the screen.

2. To stop the recording, press Ctrl+Alt+Shift+R. The red circle in the bottom-right corner of the screen disappears.

3. Navigate to the ~/Videos folder where you can find the recorded video with a file name that starts with Screencast and includes the date and time of the recording.

Note that the built-in recorder always captures the entire screen, including all monitors in multi-monitor setups.
CHAPTER 15. VIRTUAL FILE SYSTEMS AND DISK MANAGEMENT

15.1. GVFS

**GVFS** (**GNOME Virtual File System**) is an extension of the virtual file system interface provided by the libraries the GNOME Desktop is built on. **GVFS** provides complete virtual file system infrastructure and handles storage in the GNOME Desktop.

**GVFS** uses addresses for full identification based on the URI (Uniform Resource Identifier) standard, syntactically similar to URL addresses used in web browsers. These addresses in form of `schema://user@server/path` are the key information determining the kind of service.

15.2. BACK ENDS FOR GVFS

There is a number of back ends in **GVFS**, which provide access to a specific type of resource. The following is a list of available **GVFS** back ends and their specifications:

<table>
<thead>
<tr>
<th>Back end</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>afc</td>
<td>Similar to MTP (Media Transfer Protocol), exposes files on your Apple iDevice (connected through USB).</td>
</tr>
<tr>
<td>afp</td>
<td>Apple Filing Protocol (AFP) client to access file services of Mac operation system X and original Mac operation system.</td>
</tr>
<tr>
<td>archive</td>
<td>Handles various archiving files (ZIP, TAR) in read-only way.</td>
</tr>
<tr>
<td>burn</td>
<td>A virtual back end used by burning applications as a temporary storage for new CD/DVD/BD medium contents.</td>
</tr>
<tr>
<td>cdda</td>
<td>Exposes Audio CD through separate Waveform Audio File Format (WAV) files.</td>
</tr>
<tr>
<td>computer</td>
<td>Virtual back end consolidating active mounts and physical volumes. Acts similarly to a signpost. Previously used by Nautilus for its Computer view.</td>
</tr>
<tr>
<td>dav, davs</td>
<td>WebDAV client, including secure variant. Authentication is possible only during mount, does not support later re-authentication on per-folder basis.</td>
</tr>
<tr>
<td>dns-sd</td>
<td>DNS Service Discovery – Avahi client, used during network browsing, forms persistent URLs to discovered services.</td>
</tr>
<tr>
<td>ftp</td>
<td>A fully featured FTP (File Transfer Protocol) client, without FTPS support for the time being. Supports passive transfers by default.</td>
</tr>
<tr>
<td>gphoto2</td>
<td>A Picture Transfer Protocol (PTP) client to access your camera attached by USB or FireWire.</td>
</tr>
<tr>
<td>Back end</td>
<td>Description</td>
</tr>
<tr>
<td>----------</td>
<td>-------------</td>
</tr>
<tr>
<td>http</td>
<td>Handles all HTTP requests; useful for easy downloading files from web in client applications.</td>
</tr>
<tr>
<td>locatest</td>
<td>Simple testing back end proxying file:/// URI; with error injection support.</td>
</tr>
<tr>
<td>mtp</td>
<td>Media Transfer Protocol back end for accessing media player and smart phones memory.</td>
</tr>
<tr>
<td>network</td>
<td>For browsing the network, showing nearby Avahi and Samba servers.</td>
</tr>
<tr>
<td>obexftp</td>
<td>A Bluetooth client.</td>
</tr>
<tr>
<td>recent</td>
<td>A back end used in GtkFileChooser to list recent files used by GNOME applications.</td>
</tr>
<tr>
<td>sftp</td>
<td>A fully-featured SFTP (SSH File Transfer Protocol) client.</td>
</tr>
<tr>
<td>smb</td>
<td>Access Samba and Windows shares.</td>
</tr>
<tr>
<td>trash</td>
<td>A trash back end which allows to restore deleted files.</td>
</tr>
</tbody>
</table>

**NOTE**

Some back ends are packaged separately and not installed by default. For installing additional back ends, use the **yum** package manager.

To use services of a back end, an URI string must be formed. This string is a basic identifier used in GVFS, which carries all necessary information needed for unique identification, such as type of service (back end ID), absolute path and user name if needed. You can see this information in the Nautilus address bar and GTK+ open or save file dialogs.

The example below is a very basic form of the URI string and points to a root directory (/) of the FTP (File Transfer Protocol) server running at ftp.myserver.net domain:

**Example 15.1. URI String Pointing to the Root Directory**

```
ftp://ftp.myserver.net/
```

The following example points to a text file in a specified path using authentication:

**Example 15.2. URI String Pointing to a Text File**

```
ssh://joe@ftp.myserver.net/home/joe/todo.txt
```

### 15.3. MOUNTING, UNMOUNTING AND EJECTING
In virtual file systems, particular resources are set to be mounted automatically, but a most common way is to trigger mounts manually.

**Procedure 15.1. Manual Mounting**

1. Open a file in **Nautilus** (that is, the **Files** application).

2. In the location bar at the top of your screen, enter a well-formed URI string. If the location bar does not display, press **Ctrl+L**.

   Alternatively, **Nautilus** provides **Connect to server** dialog, which you find by going into **Files → Connect to server**.

3. When asked for login credentials, type your name and password into the relevant entry boxes.

4. Once the mounting process is finished, you are allowed to work with files.

When you need to unmount the resource, follow the simple procedure below.

**Procedure 15.2. Unmounting**

1. Click the eject icon on the chosen mount.

2. Wait until the mount disappears or notification about safe removal is displayed.

**IMPORTANT**

Data may be cached or being slowly written in the background for performance reasons. To deliver the data safely on the device or remote resource, never unplug or disconnect the device or remote resource.

Mounts are shared between applications and are tracked globally within the running desktop session, which means that even if you quit an application that triggered the mount, it continues to be available for any other application. The same way multiple applications may access the mount at the same time, unless it was limited by a back end (some protocols permit only single channel due to their design).

**IMPORTANT**

**GVFS** mounts, (and physical volumes as well, are restricted to their owner only, no other user is permitted to exploit your privacy.

### 15.4. MANAGING BOOKMARKS

You can save a reference to a location by bookmarking it.

**Procedure 15.3. To bookmark a Location:**

1. Select the folder or file you want to bookmark.

2. Press **Ctrl+D**.

The first time a bookmark is activated, the **GVFS** subsystem looks for existing mounts and spawns a new one if not already present. This way you are able to authenticate even within the open or save dialog.
**Bookmarks** are well integrated in GTK+ and the GNOME Desktop: every application that presents a standard GTK+ open or save dialog (technically called **GtkFileChooser**) lists bookmarks in the left panel of the dialog. Also **Nautilus** and its clones present bookmarks in a sidebar or, more universally, in the **Files** menu.

**NOTE**

If you have no pages bookmarked yet, the **Bookmarks** label does not display.

Besides **Bookmarks**, all other available **GVFS** volumes and mounts are listed in the **GtkFileChooser** sidebar. Sometimes a bookmark and a **GVFS** volume combine into a single item to prevent duplication and confusion. **Bookmarks** then can have eject icon just like **GVFS** mounts.

**Bookmarks** are located in the `~/.config/gtk-3.0/bookmarks` file. In the example below, the bookmarked locations are `~/Music`, `~/Pictures`, `~/Videos`, `~/Downloads`, and `~/bin`, so the content of the `~/.config/gtk-3.0/bookmarks` file looks as follows:

**Example 15.3. The ~/.config/gtk-3.0/bookmarks File**

```
file:///home/username/Music
file:///home/username/Pictures
file:///home/username/Videos
file:///home/username/Downloads
file:///home/username/bin
```

Replace `username` with the user name you want to use.

**Procedure 15.4. To edit Bookmarks:**

1. Open the **Files** menu on the top bar.
2. Click **Bookmark** to open the bookmark editor.

**15.5. CONFIGURING A DEFAULT SERVER LIST**

From the system administrator’s point of view, it is not possible to set a group of bookmarks for all users at once. Nevertheless, the system administrator can allow access to file shares for their users.

**Nautilus** stores a list of file-sharing servers in the `~/.config/nautilus/servers` file in the **XBEL** format. It is possible to add the list of file-sharing servers to that file to make file shares easily accessible to your users.

**NOTE**

**XBEL** (XML Bookmark Exchange Language) is an XML standard that lets you share URIs (Uniform Resource Identifiers). In GNOME, XBEL is used to share desktop bookmarks in applications such as **Nautilus**.

In the example below, **Nautilus** creates a bookmark titled **GNOME FTP** with the URI `ftp://ftp.gnome.org/` in the `~/.config/nautilus/servers` file.
Example 15.4. The ~/.config/nautilus/servers File

<?xml version="1.0" encoding="UTF-8"?>
<xbel version="1.0"
     xmlns:bookmark="http://www.freedesktop.org/standards/desktop-bookmarks"
     xmlns:mime="http://www.freedesktop.org/standards/shared-mime-info">
  <bookmark href="<input>ftp://ftp.gnome.org/</input>">
    <title><input>GNOME FTP</input></title>
  </bookmark>
</xbel>

15.6. EXPOSING GNOME VIRTUAL FILE SYSTEMS TO ALL OTHER APPLICATIONS

In addition to applications built with the GIO library being able to access GVFS mounts, GVFS also provides a FUSE daemon which exposes active GVFS mounts. This means that any application can access active GVFS mounts using the standard POSIX APIs as though they were regular filesystems.

Nevertheless, there are applications in which additional library dependency and new VFS subsystem specifics may be unsuitable or too complex. For such reasons and to boost compatibility, GVFS provides a FUSE (Filesystem in Userspace) daemon, which exposes active mounts through its mount for standard POSIX (Portable Operating System Interface) access. This daemon transparently translates incoming requests to imitate a local file system for applications.

IMPORTANT

The translation coming from the different design is not 100% feature-compatible and you may experience difficulties with certain combinations of applications and GVFS back ends.

The FUSE daemon starts automatically with the GVFS master daemon and places its mount either in the /run/user/UID/gvfs or ~/.gvfs files as a fallback. Manual browsing shows that there individual directories for each GVFS mount. When you are opening documents from GVFS locations with non-native applications, a transformed path is passed as an argument. Note that native GIO applications automatically translate this path back to a native URI.

15.7. PASSWORD MANAGEMENT OF GVFS MOUNTS

A typical GVFS mount asks for credentials on its activation unless the resource allows anonymous authentication or does not require any at all. Presented in a standard GTK+ dialog, the user is able to choose whether the password should be saved or not.

Procedure 15.5. Example: Authenticated Mount Process

1. Open Files and activate the address bar by pressing Ctrl+L.

2. Enter a well-formed URI string of a service that needs authentication (for example, sftp://localhost/).

3. The credentials dialog is displayed, asking for a user name, password and password store options.
4. Fill in the credentials and confirm.

In case the persistent storage is selected, the password is saved in the user keyring. **GNOME Keyring** is a central place for secrets storage. It is encrypted and automatically unlocked on desktop session start using the password provided on login by default. If it is protected by a different password, the password is set at the first use.

To manage the stored password and **GNOME Keyring** itself, the **Seahorse** application is provided. It allows individual records to be removed or passwords changed. For more information on **Seahorse**, consult the help manual for Seahorse embedded directly in the desktop.

### 15.8. GVFS TOOLS AND XDG-UTILS IN GNOME

**GVFS** ships with several commands that may come useful for scripting or testing. A set of POSIX commands counterparts is offered:

- `gvfs-cat`
- `gvfs-less`
- `gvfs-mkdir`
- `gvfs-mount`
- `gvfs-rename`
- `gvfs-set-attribute`
- `gvfs-copy`
- `gvfs-ls`
- `gvfs-move`
- `gvfs-rm`
- `gvfs-trash`
- `gvfs-info`
- `gvfs-save`
- `gvfs-tree`

Some more additional commands are provided for more control of **GVFS** specifics:

- `gvfs-monitor-dir`
- `gvfs-monitor-file`
- `gvfs-mime`
- `gvfs-open`

All these commands are native GIO clients, there is no need for the fallback **FUSE** daemon to be running. Their purpose is not to be drop-in replacements for POSIX commands, in fact, a very little range of switches is supported. In their basic form, an URI string (instead of a local path) is taken as an
argument.

This all allows GNOME to be well-supported within xdg-tools (a freedesktop.org interoperability project). For example, the commonly used xdg-open actually calls gvfs-open when a running GNOME session is detected, reading file type associations from the correct location.

The following are a few examples of the GVFS commands usage:

- To lists all files in /tmp on a local file system, execute:
  
  $ gvfs-ls file:///tmp

- The command below lists contents of a text file from a remote machine:
  
  $ gvfs-cat ssh://joe@ftp.myserver.net/home/joe/todo.txt

- To copy the referenced text file to a local /tmp directory, run:
  
  $ gvfs-copy ssh://joe@ftp.myserver.net/home/joe/todo.txt /tmp/

**NOTE**

For user convenience, bash completion is provided as a part of the package.

### 15.9. USING GVFS METADATA

GVFS has its metadata storage implemented as a set of simple key/value pairs information bound to a particular file. Thus, there is a tool for a user or application to save small data designed for runtime information such as icon position, last-played location, position in a document, emblems, notes, and so on.

Whenever a file or directory is moved, metadata is moved accordingly so that it stays connected to the respective file. GVFS stores all metadata privately so it is available only on the machine. However, GVFS mounts and removable media are tracked as well.

**NOTE**

Removable media are now mounted in the /run/media/ instead of the /media directory.

To view and manipulate with metadata, you can use:

- the `gvfs-info` command;
- the `gvfs-set-attribute` command;
- or any other native GIO way of working with attributes.

In the following example, a custom metadata attribute is set. Notice the differences between particular `gvfs-info` calls and data persistence after a move or rename (note the `gvfs-info` command output):

**Example 15.5. Setting Custom Metadata Attribute**
15.10. TROUBLESHOOTING

15.10.1. Active VFS Mounts Are Invisible

If your active VFS mounts are invisible, it means that your application is not a native GIO client. Native
GIO clients are typically all GNOME applications using GNOME libraries (glib, gio). There is a service,
gvfs-fuse, provided as a fallback for non-GIO clients.

To find the cause of an active but invisible VFS mount, check whether the gvfs-fuse process is running.
Since gvfs-fuse runs automatically and it is not recommended to start it by yourself, try logging out and
logging in as a first option.

Alternatively, you can start the VFS compatibility mount manually in the terminal:

1. Find the UID (system user ID) for the /run/user/UID/gvfs/ path by running the id command (the
gvfsd-fuse daemon requires a path it is supposed to expose its services at).

   Or, when the /run/user/UID/gvfs/ path is unavailable, gvfsd-fuse uses a .gvfs path in your home
directory.

2. Start the gvfsd-fuse daemon by running the /usr/libexec/gvfsd-fuse -f /run/user/
   UID/gvfs command.

3. Now, the VFS mount is available and you can manually browse for the path in your application.

15.10.2. Connected USB Disk Is Invisible

Under certain circumstances, when you connect a flash drive, the GNOME Desktop may not display it. If
the drive is invisible, it means that:

- You cannot see the device in the Disks application.

- You have run the udisksctl dump command, which lists the current state of the udisks
daemon and shows information about all objects, but your flash drive is not among them.

- You have run the dmesg command. Towards the end of the log, there are messages related to
  USB device detection and a list of detected partitions, but your flash drive is not among them.

If your flash drive is not visible, you can attempt to set the Show in user interface flag in Disks:
1. Open **Disks** by pressing the **Super** key to enter the **Activities Overview**, typing **Disks**, and then pressing **Enter**.

2. In the **Volumes** actions menu, click **Edit Mount Options**...  

3. Click **Show in user interface**.

4. Confirm by clicking **OK**.

If the flash drive is still not visible, you may try to remove the drive and try connecting it again.

For more information about the storage, see the .

### 15.10.3. Nautilus Shows Unknown or Unwanted Partitions

Check whether the device is listed in the `/etc/fstab` file as the devices are not shown in the user interface by default. The `/etc/fstab` file typically lists disk partitions that are intended to be used in the operating system, and indicates how they are mounted. Certain mount options may allow or prevent displaying the volume in the user interface.

One of the solutions to hide a volume is to uncheck **Show in user interface** in the **Mount Options** window in the **Disks** application:

1. Open **Disks** by pressing the **Super** key to enter the **Activities Overview**, typing **Disks**, and then pressing **Enter**.

2. In the **Volumes** actions menu, click **Edit Mount Options**...  

3. Uncheck **Show in user interface** and confirm by clicking **OK**.

### 15.10.4. Connection to Remote File System Is Unavailable

There is a number of situations in which the client is unexpectedly and unwillingly disconnected from a virtual file system (or a remote disk) mount, afterwards is not reconnected automatically, and error messages are returned. Several causes trigger these situations:

- The connection is interrupted (for example, your laptop is disconnected from the Wi-Fi).
- The user is inactive for some time and is disconnected by the server (idle timeout).
- The computer is resumed from sleeping mode.

The solution is to unmount and mount again the file system, which reconnects the resource.

**NOTE**

Should the connection be disabled more often, check the settings in the **Network** panel in the GNOME **Settings**.

### 15.10.5. What to Do If the Disk Is Busy?

If you receive a notification about your disk being busy, determine the programs that are accessing the disk. Then, you may regularly end the programs you are running. Or, you can use the **System Monitor** to kill the programs forcefully.
Where and How to View System Processes?

- Run the `ls/of` command to get the list of open files alongside with processes. If `ls/of` is not available, run the `ps ax` command that also provides the list of running processes.

- Alternatively, you can use the `System Monitor` application to display the running processes in a GUI.

- Make sure that you have `iотop` installed by running the following command:

  ```
  # yum install iотop
  ```

  Then run `iотop` as root to view the system processes.

When you have determined the programs, end or kill them as follows:

- On the command line, execute the `kill` command.

- In the `System Monitor`, right-click the line with the program process name, and click the `End Process` or `Kill Process` drop-down menu item.
CHAPTER 16. HARDWARE CONFIGURATION

16.1. TABLETS

16.1.1. Adding Support for a New Tablet

**libwacom** is a tablet information client library storing data about Wacom models. This library is used by both the **gnome-settings-daemon** component and the **Wacom Tablet** settings panel in GNOME.

To add support for a new tablet into **libwacom**, a new tablet definition file must be created. Tablet definition files are included in the libwacom-data package. If this package is installed, the tablet definition files are then locally available in the `/usr/share/libwacom/` directory.

To use the screen mapping correctly, support for your tablet must be included in the **libwacom** database and **udev** rules file.

**IMPORTANT**

A common indicator that a device is not supported by **libwacom** is that it works normally in a GNOME session, but the device is not correctly mapped to the screen.

Procedure 16.1. How to add tablet descriptions

1. Use the **libwacom-list-local-devices** tool to list all local devices recognized by **libwacom**.
   
   If your device is not listed, but it is available as an event device in the kernel (see `/proc/bus/input/devices`) and in the X session (see xinput list), the device is missing from **libwacom**'s database.

2. Create a new tablet definition file. Use data/wacom.example below and edit the respective lines.

   **NOTE**

   The new .tablet file may already be available, so check the upstream repository first at [https://sourceforge.net/p/linuxwacom/libwacom/ci/master/tree/](https://sourceforge.net/p/linuxwacom/libwacom/ci/master/tree/). If you find your tablet model on the list, it is sufficient to copy the file to the local machine.

```ini
# Example model file description for a tablet
[Device]

# The product is the product name announced by the kernel
Product=Intuos 4 WL 6x9

# Vendor name of this tablet
Vendor=Wacom

# DeviceMatch includes the bus (usb, serial), the vendor ID and the actual # product ID
DeviceMatch=usb:056a:00bc

# Class of the tablet. Valid classes include Intuos3, Intuos4, Graphire, Bamboo, Cintiq
Class=Intuos4
```

CHAPTER 16. HARDWARE CONFIGURATION

93
# Exact model of the tablet, not including the size.
Model=Intuos 4 Wireless

# Width in inches, as advertised by the manufacturer
Width=9

# Height in inches, as advertised by the manufacturer
Height=6

# Optional features that this tablet supports
# Some features are dependent on the actual tool used, e.g. not all styli
# have an eraser and some styli have additional custom axes (e.g. the
# airbrush pen). These features describe those available on the tablet.
#
# Features not set in a file default to false/0

[Features]
# This tablet supports styli (and erasers, if present on the actual stylus)
Stylus=true

# This tablet supports touch.
Touch=false

# This tablet has a touch ring (Intuos4 and Cintiq 24HD)
Ring=true
# This tablet has a second touch ring (Cintiq 24HD)
Ring2=false

# This tablet has a vertical/horizontal scroll strip
VStrip=false
HStrip=false

# Number of buttons on the tablet
Buttons=9

# This tablet is built-in (most serial tablets, Cintiqs)
BuiltIn=false

3. Add and install the new file with the .tablet suffix:

    cp the-new-file.tablet /usr/share/libwacom/

Once installed, the tablet is part of libwacom's database. The tablet is then available through libwacom-list-local-devices.

4. Create a new file /etc/udev/rules/99-libwacom-override.rules with the following content so that your settings are not overwritten:

    ACTION="add|change", GOTO="libwacom_end"
    KERNEL!="event[0-9]***", GOTO="libwacom_end"

    [new tablet match entries go here]

    LABEL="libwacom_end"
5. Reboot your system.

16.1.2. Where Is the Wacom Tablet Configuration Stored?

Configuration for your Wacom tablet is stored in GSettings in the `/org/gnome/settings-daemon/peripherals/wacom/machine-id-device-id` key, where `machine-id` is a D-Bus machine ID, and `device-id` is a tablet device ID. The configuration schema for the tablet is `org.gnome.settings-daemon.peripherals.wacom`.

Similarly, stylus configuration is stored in the `/org/gnome/settings-daemon/peripherals/wacom/device-id/tool-id` key, where `tool-id` is the identifier for the stylus used for professional ranges. For the consumer ranges with no support for `tool-id`, a generic identifier is used instead. The configuration schema for the stylus is `org.gnome.settings-daemon.peripherals.wacom.stylus`, and for the eraser `org.gnome.settings-daemon.peripherals.wacom.eraser`.

To get the full list of tablet configuration paths used on a particular machine, you can use the `gsd-list-wacom` tool, which is provided by the `gnome-settings-daemon-devel` package.

To verify that the `gnome-settings-daemon-devel` package is installed on the system, make sure that the system is subscribed to the `Optional` channel, and run the following command:

```
# yum install gnome-settings-daemon-devel
```

To learn how to subscribe the system to the `Optional` channel, read the following resource:

- [https://access.redhat.com/solutions/392003](https://access.redhat.com/solutions/392003)

After verifying that the package is installed, run the following command:

```
$ /usr/libexec/gsd-list-wacom
```

Note that using `machine-id`, `device-id`, and `tool-id` in configuration paths allows for shared home directories with independent tablet configuration per machine.

16.1.3. When Sharing Home Directories Between Machines, the Wacom Settings Only Apply to One Machine

This is because the D-Bus machine ID (`machine-id`) for your Wacom tablet is included in the configuration path of the `/org/gnome/settings-daemon/peripherals/wacom/machine-id-device-id` GSettings key, which stores your tablet settings.
APPENDIX A. KDE PLASMA WORKSPACES

As an alternative to the default GNOME desktop environment, Red Hat Enterprise Linux 7 provides version 4 of KDE Plasma Workspaces (previously known as K Desktop Environment) to match different work styles and preferences.

Refer to the Red Hat Enterprise Linux 7 Installation Guide on setting KDE Plasma Workspaces as the default desktop during the installation process or changing your current desktop environment to KDE Plasma Workspaces. For more information on KDE Plasma Workspaces, see its upstream websites, such as https://www.kde.org/ and https://docs.kde.org/.
APPENDIX B. ACCESSING RED HAT DOCUMENTATION

B.1. PRODUCT DOCUMENTATION

Red Hat Product Documentation located at https://access.redhat.com/site/documentation/ serves as a central source of information. It is currently translated in 22 languages and for each product, it provides different kinds of books from release and technical notes to installation, user, and reference guides in HTML, PDF, and EPUB formats.

The following is a brief list of documents that are directly or indirectly relevant to this book:


B.2. RED HAT ACCESS GUI

Another highly recommended source of information is a desktop application **Red Hat Access GUI** which lets you find help, answers, and utilize diagnostic services using Red Hat Knowledgebase, resources, and functionality. If you have an active account on the **Red Hat Customer Portal**, you can access additional information and tips of the Knowledgebase easily browsable by keywords. **Red Hat Access GUI** is already installed if you select to have the GNOME Desktop installed.

For more information on the benefits, installation, and usage of this tool, see **Red Hat Access GUI**.
APPENDIX C. ACKNOWLEDGEMENTS

Certain portions of this text first appeared in the GNOME Desktop System Administration Guide. Copyright © 2014 The GNOME Project, Michael Hill, Jim Campbell, Jeremy Bicha, Ekaterina Gerasimova, minnie_eg, Aruna Sankaranarayanan, Sindhu S, Shobha Tyagi, Shaun McCance, David King, and others. Licensed under a Creative Commons Attribution-ShareAlike 3.0 Unported License.

The editors of the Red Hat Enterprise Linux 7 Desktop Migration and Administration Guide would like to thank the GNOME community members for their valuable contributions to the GNOME Desktop System Administration Guide.
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<td>Mon Oct 17 2016</td>
<td>Marie Doleželová</td>
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<td>Fri 01 Apr 2016</td>
<td>Jana Heves</td>
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