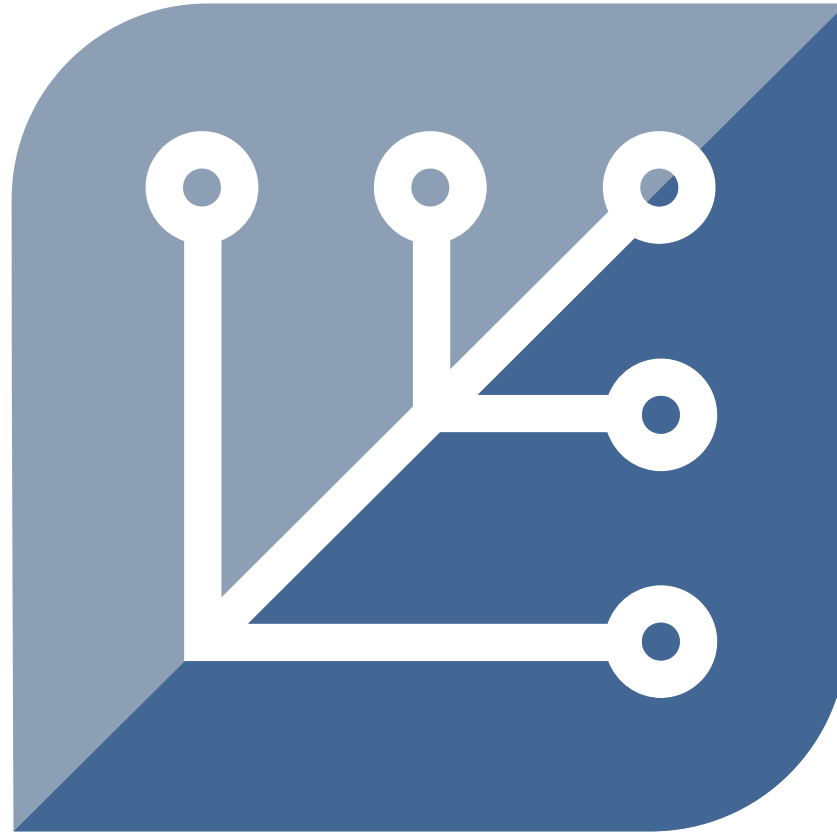




Modernizing the Linux Desktop

By Joshua Stone



SILVERBLUE

Traditional Update Model

- New packages are uploaded to mirrors
- Client downloads package list from mirror
- Compares package list to installed versions
- Downloads packages that match minimum version
- Verifies and extracts package contents
- Install files and run pre/post-install scripts

Introducing Silverblue

- Fedora-based distro built around immutability
- Uses rpm-ostree instead of dnf/yum
 - \$ rpm-ostree status
 - \$ rpm-ostree update
 - \$ rpm-ostree install \${PACKAGE}
 - \$ rpm-ostree deploy \${COMMIT}
- Uses a hybrid of images and package overlays
- /usr is mounted read-only



Benefits of Silverblue


- A/B updates, similar to Android
- Built-in protection from power loss
- Commits updates to new `/sysroot`
- Extra packages layers on top of base OS
- Broken updates can be rolled back
- Updates do not alter state of running system



```
[user@localhost ~]$ rpm -q fedora-release-workstation
fedora-release-workstation-31-2.noarch
[user@localhost ~]$ findmnt /
TARGET SOURCE FSTYPE OPTIONS
/ /dev/mapper/fedora-root[/ostree/overlay/efi/efi] ext4 rw,relatime,seclabel
[user@localhost ~]$ findmnt /usr
TARGET SOURCE FSTYPE OPTIONS
/usr /dev/mapper/fedora-root[/ostree/overlay/efi/efi] ext4 ro,relatime,seclabel
[user@localhost ~]$ rpm-ostree status
State: idle
AutomaticUpdates: disabled
Deployments:
• ostree://fedora:fedora/31/x86_64/silverblue
  Version: 31.20191125.0 (2019-11-25T01:23:42Z)
  Commit: 172c1f4a27f0e420f847512b641ecbc89115f61ddfe34003486171dbbd09f82d
  GPGSignature: Valid signature by 7D22D5867F2A4236474BF7B850CB390B3C3359C4

  ostree://fedora:fedora/31/x86_64/silverblue
  Version: 31.20191125.0 (2019-11-25T01:23:42Z)
  Commit: 172c1f4a27f0e420f847512b641ecbc89115f61ddfe34003486171dbbd09f82d
  GPGSignature: Valid signature by 7D22D5867F2A4236474BF7B850CB390B3C3359C4
```

```
[user@localhost ~]$ rpm-ostree install krita
Checking out tree 172c1f4... done
Enabled rpm-md repositories: updates fedora
rpm-md repo 'updates' (cached); generated: 2019-11-24T01:53:14Z
rpm-md repo 'fedora' (cached); generated: 2019-10-23T22:52:47Z
Importing rpm-md... done
Resolving dependencies... done
Will download: 33 packages (94.9 MB)
Downloading from 'updates'... done
Downloading from 'fedora'... done
Importing packages... done
Checking out packages... done
Running pre scripts... done
Running post scripts... done
Running posttrans scripts... done
Writing rpmdb... done
Writing OSTree commit... done
Staging deployment... done
Freed: 1.3 GB (pkgcache branches: 0)
Added:
  LibRaw-0.19.5-1.fc31.x86_64
  OpenColorIO-1.1.1-4.fc31.x86_64
  OpenEXR-libs-2.3.0-4.fc31.x86_64
  breeze-icon-theme-5.61.0-1.fc31.noarch
  fftw-libs-double-3.3.8-6.fc31.x86_64
  gsl-2.5-2.fc31.x86_64
  ilmbase-2.3.0-3.fc31.x86_64
  kde-filesystem-4-62.fc31.x86_64
  kde-settings-31.0-1.fc31.noarch
  kf5-filesystem-5.61.0-1.fc31.x86_64
  kf5-karchive-5.61.0-1.fc31.x86_64
  kf5-kcompletion-5.61.0-1.fc31.x86_64
  kf5-kconfig-core-5.61.0-1.fc31.x86_64
  kf5-kconfig-gui-5.61.0-1.fc31.x86_64
  kf5-kcoreaddons-5.61.0-1.fc31.x86_64
  kf5-kcrash-5.61.0-1.fc31.x86_64
  kf5-kguiaddons-5.61.0-1.fc31.x86_64
  kf5-ki18n-5.61.0-1.fc31.x86_64
  kf5-kitemviews-5.61.0-1.fc31.x86_64
  kf5-kwidgetsaddons-5.61.0-1.fc31.x86_64
  kf5-kwindowsystem-5.61.0-1.fc31.x86_64
  krita-4.2.3-1.fc31.x86_64
  krita-libs-4.2.3-1.fc31.x86_64
  openal-soft-1.19.1-3.fc31.x86_64
  poppler-qt5-0.73.0-14.fc31.x86_64
  python-qt5-rpm-macros-5.13.1-1.fc31.noarch
  python3-pyqt5-sip-4.19.19-1.fc31.x86_64
  python3-qt5-base-5.13.1-1.fc31.x86_64
  qt5-qtmultimedia-5.12.5-1.fc31.x86_64
  qt5-qtsvg-5.12.5-1.fc31.x86_64
  quazip-qt5-0.7.6-4.fc31.x86_64
  tinyxml-2.6.2-19.fc31.x86_64
  yaml-cpp-0.6.3-1.fc31.x86_64
Run "systemctl reboot" to start a reboot
```



```
Fedora 31.1.9 (Workstation Edition) (ostree:0)
Fedora 31.1.9 (Workstation Edition) (ostree:1)
Fedora 31.1.9 (Workstation Edition) (ostree:0)
Fedora 31.1.9 (Workstation Edition) (ostree:1)
```

```
Use the ↑ and ↓ keys to change the selection.
Press 'e' to edit the selected item, or 'c' for a command prompt.
```




TOOLBOX



Introducing Toolbox

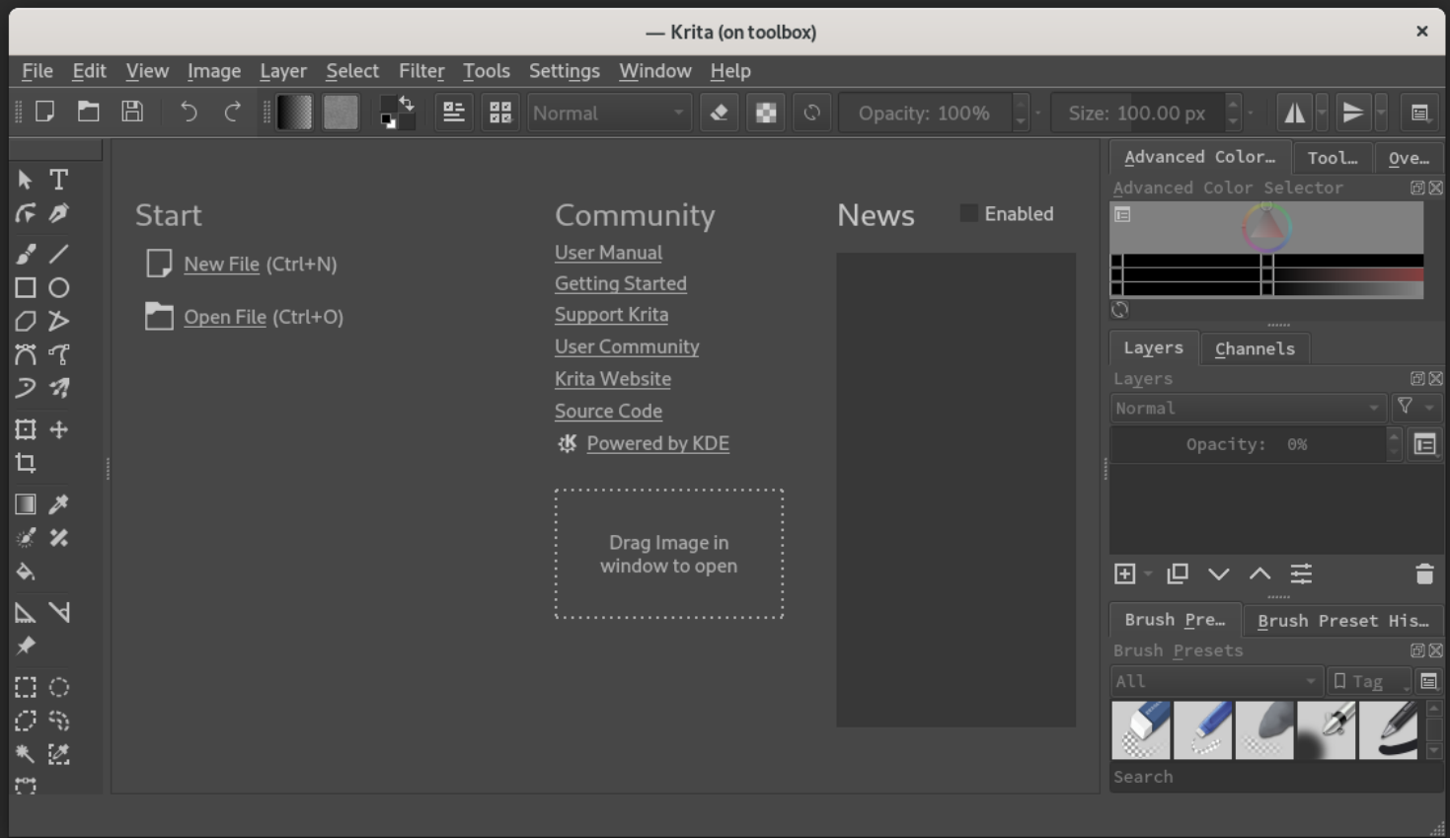
- Unprivileged development environment
- Use OCI images containing a minimal rootfs
- Environments can be switched around
- Package manager can run without root
- Isolate development tools from host

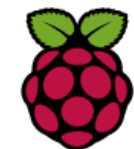
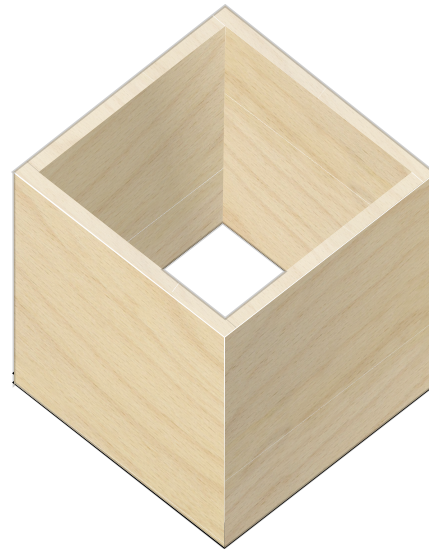
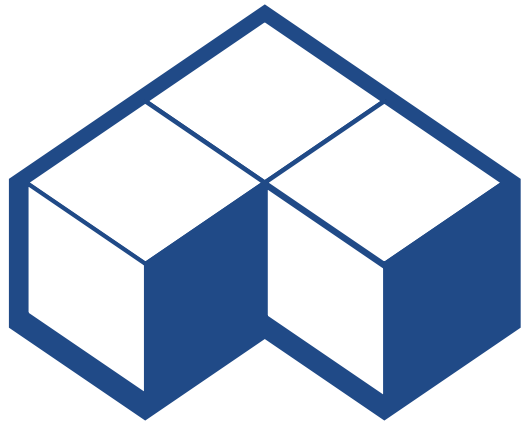
```
[user@localhost ~]$ krita
bash: krita: command not found
[user@localhost ~]$ toolbox --assumeeyes create --container test --release 31
Created container: test
Enter with: toolbox enter --container test
[user@localhost ~]$ toolbox enter --container test
[user@toolbox ~]$ sudo dnf --assumeeyes --quiet install krita
```

We trust you have received the usual lecture from the local System Administrator. It usually boils down to these three things:

- #1) Respect the privacy of others.
- #2) Think before you type.
- #3) With great power comes great responsibility.

```
[user@toolbox ~]$ krita
QObject::startTimer: Timers cannot have negative intervals
Traceback (most recent call last):
  File "<string>", line 1, in <module>
ModuleNotFoundError: No module named 'sip'
/usr/lib64/krita-python-libs/krita added to PYTHONPATH
```





How do we get to Year of the Linux Desktop?

“One of the things none of the distributions have ever gotten right is application packaging, right? And now somebody will say “Hey, dpkg is way improved, and much better than RPM”, and that's not at all what I'm talking about. I'm talking about actual application writers that want to make a package of their application for Linux.”

- Linus Torvalds, DebConf 2014, <https://youtu.be/5PmHRSeA2c8?t=284>



Introducing flatpak

- Cross-distro app deployment method
- Builds and runs applications inside a sandbox
- Splits code into “apps” and “runtimes”
- Uses ostree to deduplicate files like Silverblue
- Deploy apps from repository or as bundles
- Integrates into desktop environments
- Deploys apps without going through distros

```
[jstone@jstone-laptop ~]$ flatpak --assumeeyes install krita
```

```
Looking for matches...
```

```
org.kde.krita permissions:
```

```
ipc network pulseaudio x11 dri file access [1] dbus access [2]
```

```
[1] host, xdg-config/kdeglobals:ro, xdg-run/dconf, ~/.config/dconf:ro
```

```
[2] com.canonical.AppMenu.Registrar
```

	ID	Arch	Branch	Remote	Download
1.	[✓] org.kde.krita	x86_64	stable	flathub	111.6 MB / 116.0 MB
2.	[✓] org.kde.krita.Locale	x86_64	stable	flathub	5.6 kB / 5.2 MB

```
Installation complete.
```

What happens if a program misbehaves?

“Moved ~/.local/share/steam. Ran steam. It deleted everything on system owned by user.”

<https://github.com/ValveSoftware/steam-for-linux/issues/3671>

“GIANT BUG... causing /usr to be deleted... so sorry....”

<https://github.com/MrMEEE/bumblebee-Old-and-abbandoned/commit/a047be85247755cdbe0acce6f1dafc8beb84f2ac>

“Warning: Amarok 2.9.0 Can Wipe your Home RECURSIVELY”

https://old.reddit.com/r/linux/comments/ad1s7w/warning_amarok_290_can_wipe_your_home_recursively/

Package vs flatpak

Get the latest stable version of Clementine for your operating system.

- | | |
|------------------------------------|------------------------------------|
| Fedora 21 32-bit 1.31 | Fedora 21 64-bit 1.31 |
| Fedora 22 32-bit 1.31 | Fedora 22 64-bit 1.31 |
| Fedora 23 32-bit 1.31 | Fedora 23 64-bit 1.31 |
| OS X Mountain Lion 1.31 | Raspberry Pi 1.31 |
| Source code 1.31 | Ubuntu Precise (12.04) 32-bit 1.31 |
| Ubuntu Precise (12.04) 64-bit 1.31 | Ubuntu Trusty (14.04) 32-bit 1.31 |
| Ubuntu Trusty (14.04) 64-bit 1.31 | Ubuntu Vivid (15.04) 32-bit 1.31 |
| Ubuntu Vivid (15.04) 64-bit 1.31 | Ubuntu Wily (15.10) 32-bit 1.31 |
| Ubuntu Wily (15.10) 64-bit 1.31 | Ubuntu Xenial (16.04) 32-bit 1.31 |
| Ubuntu Xenial (16.04) 64-bit 1.31 | Windows 1.31 |

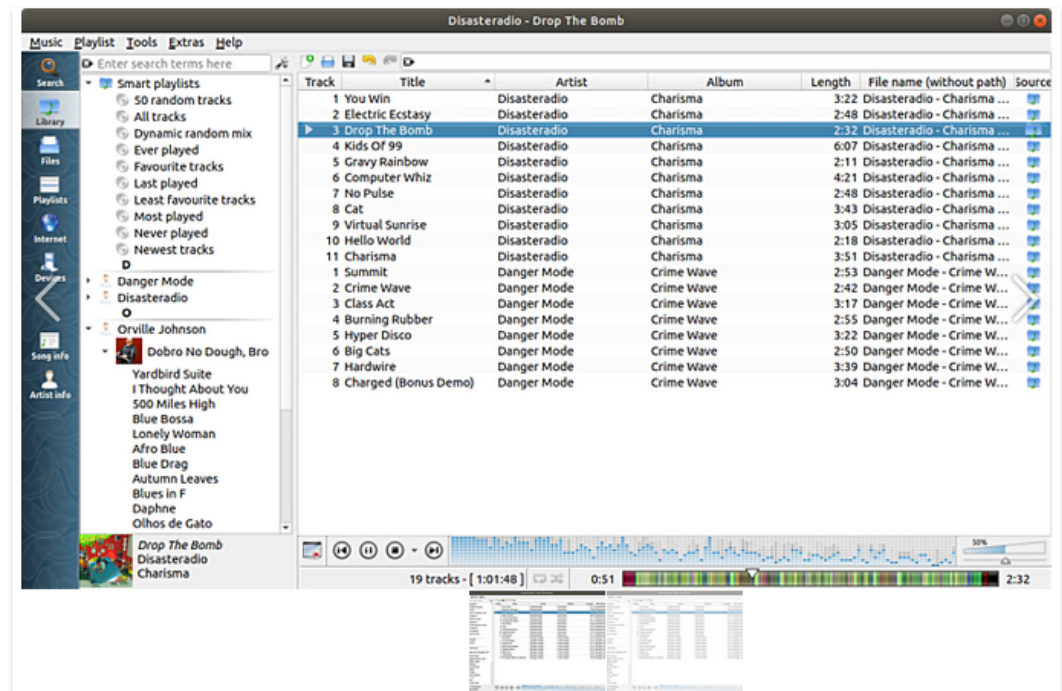


Clementine Music Player

Plays music files and Internet radio

INSTALL

Make sure to follow the [setup guide](#) before installing



Anatomy of a Flatpak Manifest

```
1  app-id: io.itch.marvellous-inc
2  base: org.love2d.BaseApp
3  base-version: '11.3'
4  runtime: org.freedesktop.Platform
5  runtime-version: '19.08'
6  sdk: org.freedesktop.Sdk
7  command: marvellous-inc
8  finish-args:
9      - --socket=x11
10     - --socket=wayland
11     - --socket=pulseaudio
12     - --device=dri
13  modules:
14     - name: marvinc
15       buildsystem: simple
16       build-commands:
17         - cd marv && zip -r /app/bin/marvellous-inc.love *
18         - cp marvellous-inc /app/bin/marvellous-inc
19       sources:
20         - type: git
21           url: https://github.com/MarvellousSoft/MarvInc
22           tag: 1.3.3-2
23           commit: 65ea335d001637b330b490b6ac2ea195eec983b9
24         - type: script
25           dest-filename: marvellous-inc
26           commands:
27             - /app/bin/love /app/bin/marvellous-inc.love
28
```



Resources:

- <https://silverblue.fedoraproject.org/>
- <https://docs.fedoraproject.org/en-US/fedora-silverblue/toolbox/>
- <https://www.flatpak.org/>
- <https://flathub.org/home>
- <https://github.com/joshua-stone/io.itch.marvellous-inc>
- <https://github.com/joshua-stone/nl.zevv.Duc>
- <https://youtu.be/5PmHRSeA2c8?t=284>