



TOOLBX

Developing applications on OSTree based OSes

DEBARSHI RAY

Principal Software Engineer,
Red Hat

✉ rishi@fedoraproject.org

🌐 debarshiray.wordpress.com

[m] [@rishi:gnome.org](https://matrix.to/#/!rishi:gnome.org)

I am ...

- rishi
- Red Hat Desktop Team
- Silverblue
- Workstation
- GNOME
- Flatpak



OSTree based OSes

- <https://ostree.readthedocs.io/>
- Next-generation Linux operating systems
- Robust upgrades and easy to roll back
- Operating system is separate from applications
- OS is an OSTree image that's hard to modify
- Applications are Flatpaks



OSTree based OSes

- <https://os.gnome.org/>
 - Nightly reference builds of GNOME
- <https://endlessos.com/>



OSTree based OSes

- <https://silverblue.fedoraproject.org/>
- <https://kinoite.fedoraproject.org/>
 - Next-generation Fedora Workstation and KDE
- No DNF
- Read-only /usr



OSTree based OSes

- How do you set up a development environment?
- How do you install your compilers, debuggers, editors, SDKs, and so on?





```
rishi@svoboda:~  
[rishi@svoboda ~]$ cat /etc/fedora-release  
Fedora release 35 (Thirty Five)  
[rishi@svoboda ~]$  
[rishi@svoboda ~]$ which dnf  
/usr/bin/which: no dnf in (/var/home/rishi/opt/bin:/opt/bin:/var/home/rishi/.local/bin:/var/home/rishi/bin:/usr/local/bin:/usr/local/sbin:/usr/bin:/usr/sbin)  
[rishi@svoboda ~]$  
[rishi@svoboda ~]$ rpm-ostree status --version  
rpm-ostree:  
Version: '2022.2'  
Git: 1e62f2bb60bc39b443dac0c00d40124ef002bb73  
Features:  
- rust  
- compose  
- fedora-integration  
[rishi@svoboda ~]$
```

OSTree based OSes

- GNOME Builder as a Flatpak
- GNOME Builder is a container-native IDE
 - It can be installed in a container, usually a Flatpak
 - Development environment in a container, which can be a Flatpak SDK or a Podman/Toolbx container
 - Build a Flatpak with the application as an artifact



OSTree based OSes

- What if you are working on plumbing, not an application?
- Lots of development tools not available as Flatpak runtime extensions



OSTree based OSes

- What about other IDEs?
- What about good old Emacs, Vim and the usual command-line?



Fedora Silverblue

- Package layering with rpm-ostree
 - Locally built OSTree images with custom content
 - `rpm-ostree install strace`
- Need to reboot can be annoying
- Too much use negates some of the benefits of an OSTree based OS





toolbox



Toolbx

- <https://containertoolbx.org/>
- Makes it trivial to get a mutable package-based development environment
- Decoupled from the operating system

- Formerly Toolbox or Fedora Toolbox.



```
rishi@toolbox:~ — toolbox enter
[rishi@svoboda ~]$ toolbox enter
[rishi@toolbox ~]$
[rishi@toolbox ~]$ cat /etc/fedora-release
Fedora release 35 (Thirty Five)
[rishi@toolbox ~]$
[rishi@toolbox ~]$ which dnf
/usr/bin/dnf
[rishi@toolbox ~]$
[rishi@toolbox ~]$ sudo dnf install strace
Last metadata expiration check: 0:04:31 ago on Fri Apr 29 00:20:28 2022.
Dependencies resolved.
=====
Package                Architecture  Version          Repository      Size
=====
Installing:
strace                 x86_64       5.16-1.fc35     updates        1.4 M
Transaction Summary
=====
Install 1 Package

Total download size: 1.4 M
Installed size: 2.8 M
Is this ok [y/N]: █
```



Toolbx

- Containers



Toolbx

- Based on the Open Containers Initiative (or OCI)
- <https://podman.io/>
- Removes the cognitive overhead of thinking about containers by providing a seamless integration with the host environment
 - No need to figure out why the SSH agent or the display server isn't working inside the container



Toolbx – primary goal

- Bring back the usual command-line on OSTree based operating systems for debugging and development
- Crucial for adoption of these OSes



Toolbx – non goals

- Application distribution format
 - Flatpak is great, use Flatpak
- Secure development environment
 - Containers or OSTree don't automatically imply security



Toolbx – non goals

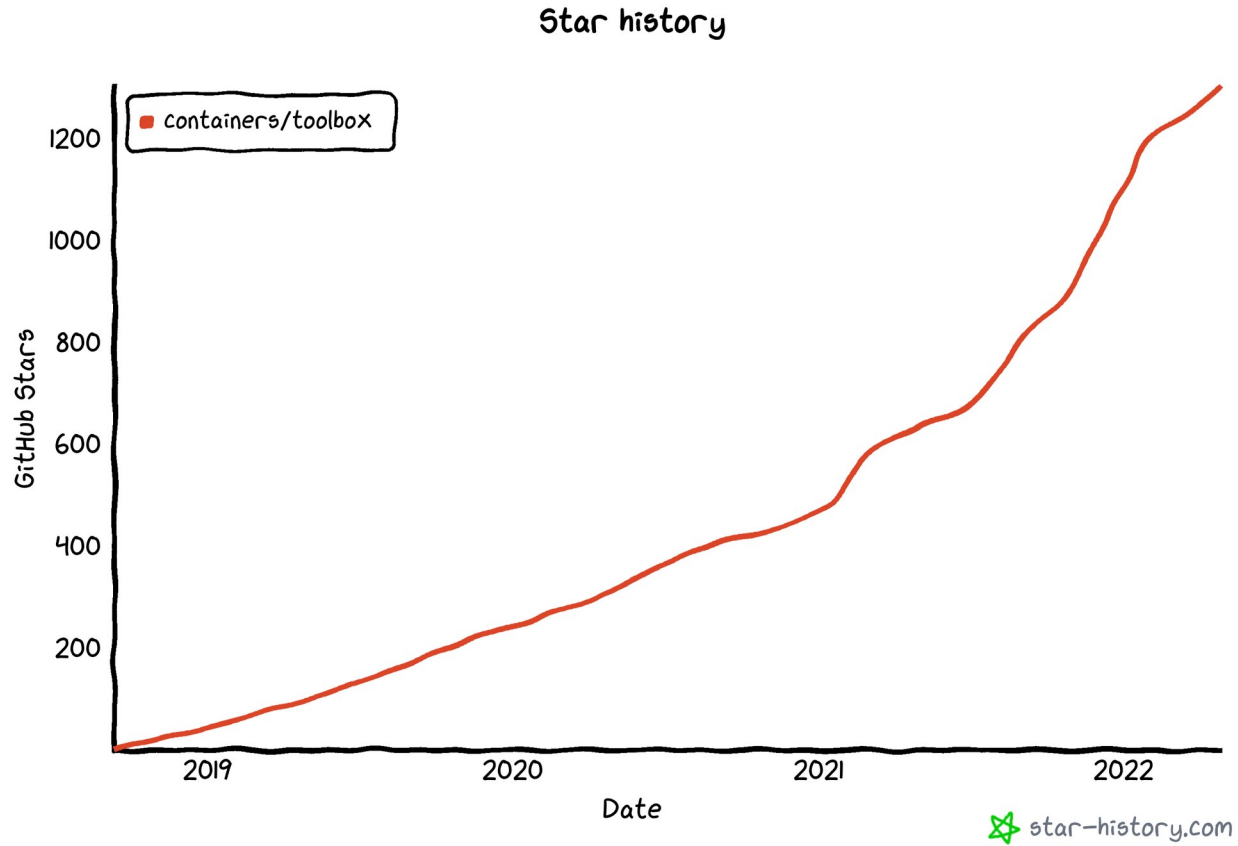
- Different container engines
- Using every single OCI image out there
 - `podman run` works



Toolbx

- <https://github.com/containers/toolbox>
- 31st August, 2018 — first commit
- Two months after rootless Podman
 - <https://github.com/containers/podman/pull/871>
- Written in Go





Toolbx – what works ...

- Wayland and X applications
- SSH agent



Toolbx – what works ...

- User D-Bus clients and daemons
- Networking, including Avahi, DNS, VPN, etc
- Nmap
- ping(8)



Toolbx – what works ...

- Timezones
 - /etc/localtime and /etc/timezone

- Removable devices



Toolbx – what works ...

- Kerberos
- PC/SC smart card daemon
- locate(1),
- ulimits



Toolbx – what works ...

- libvirt, including the system instance
- <https://minikube.sigs.k8s.io/>



Toolbx – what doesn't work yet

- NVIDIA proprietary driver
 - <https://github.com/containers/toolbox/issues/116>
- Running a full Wayland session with logind, etc.
 - <https://github.com/containers/podman/issues/6140>
 - <https://github.com/containers/toolbox/issues/992>



Toolbx – what doesn't work yet

- Some rough edges with locales
- CA certificates
 - <https://github.com/containers/toolbox/issues/626>



Toolbx – environments

- Fedora
- Red Hat Enterprise Linux



Toolbx – environments

- Arch
 - <https://github.com/containers/toolbox/pull/861>
- Ubuntu
 - <https://github.com/containers/toolbox/pull/483>



Toolbx – without OSTree

- Doesn't require an OSTree based operating system
- Works just fine on package based operating systems like Fedora Workstation
- Value in keeping the OS pristine
- Easy access to different toolchain and library versions
 - Reduces the need for a virtual machine



<https://containertoolbx.org/>

