

Crostini: a Linux Desktop on Chrome OS

Introduction and agenda

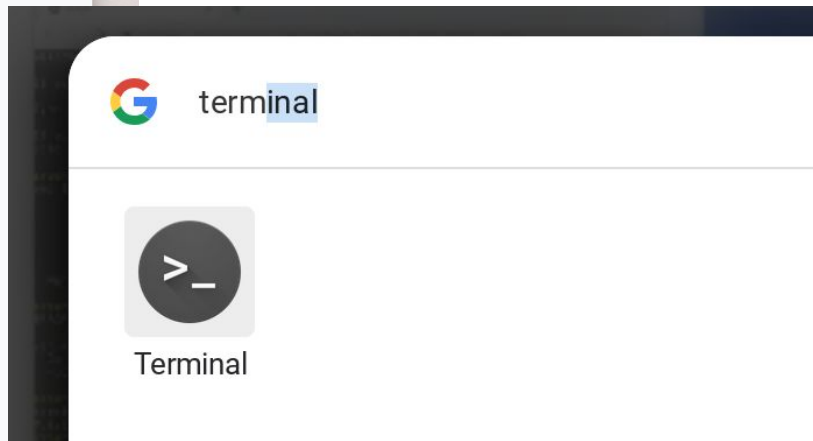
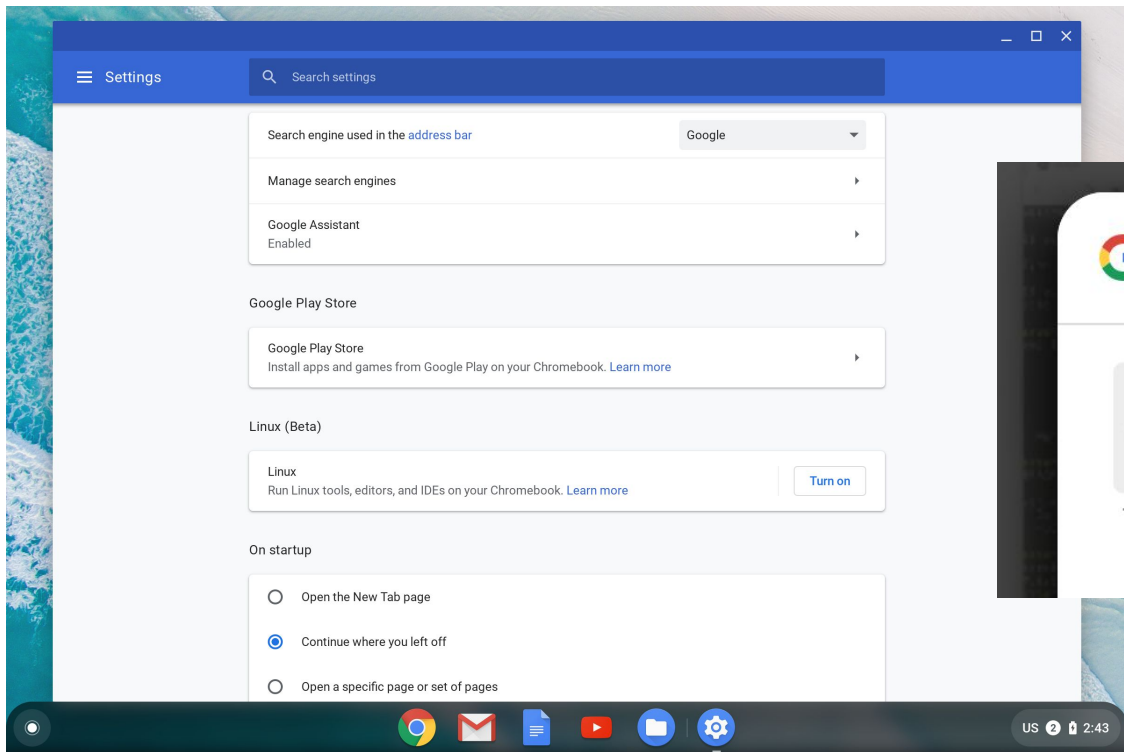
Introduction:

- Chrome OS, readily available, fast, secure, open source
- Linux on Chrome OS (Crostini)
 - Easy to get Debian container, fully integrated with Chrome OS

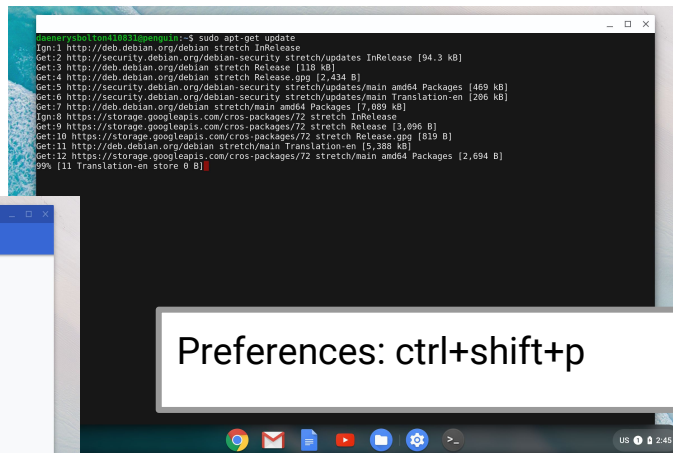
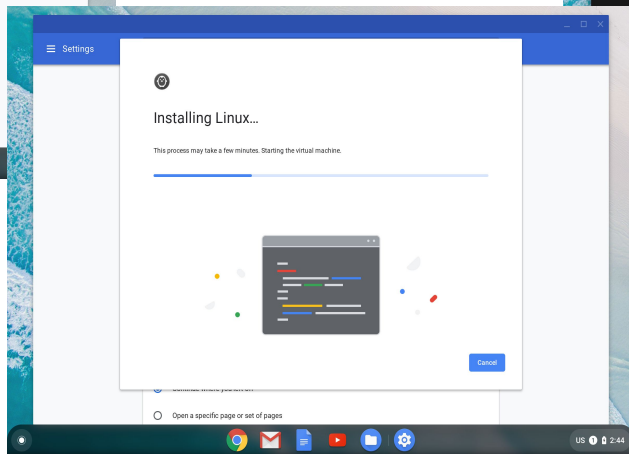
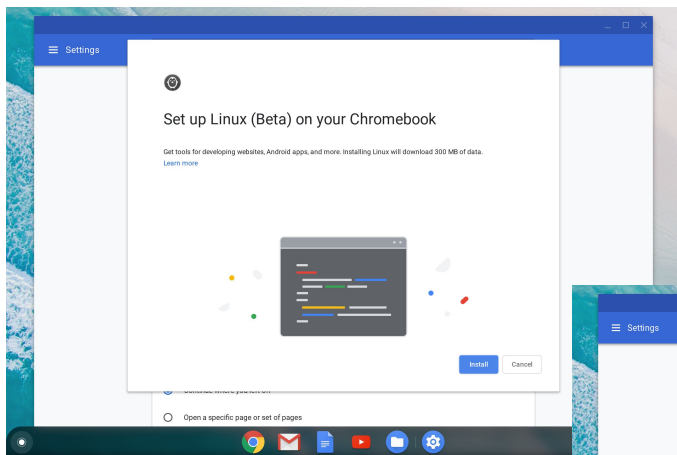
Agenda:

- Getting started with Linux on Chrome OS (crostini), integration with Chrome OS
- Architecture
- Advanced usage

Getting started: installation

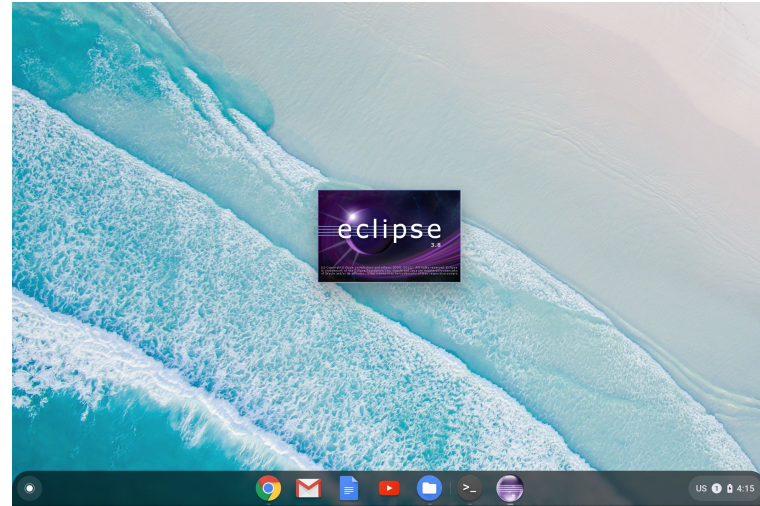
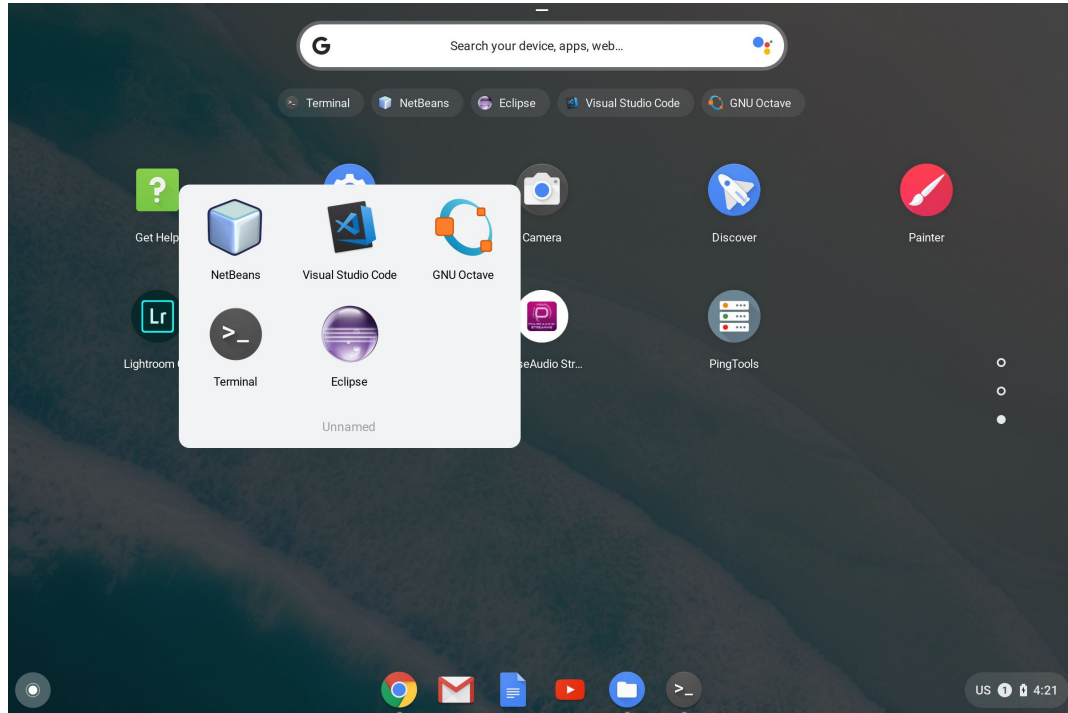


Installation



Preferences: ctrl+shift+p

Graphical apps integration

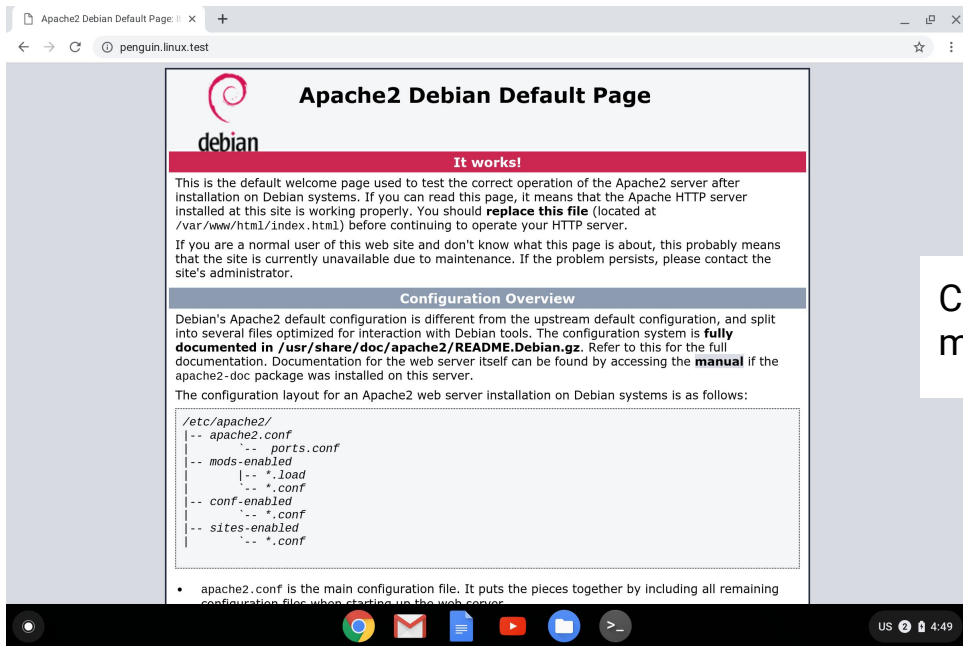


Drive and file system sharing

The image illustrates the integration of Google Drive with a Chromium OS file system. It consists of three overlapping screenshots:

- Top Left:** A Chromium browser window showing the `chrome://flags` page. Overlaid on this is a 'My Drive' window. A context menu is open for a folder named `drive_shared_with_linux`, showing options like 'Share with others', 'Manage in Drive', 'Available offline', 'Cut', 'Copy', 'Paste into folder', 'Get info', 'Rename', 'Create shortcut', 'Delete', 'Zip selection', 'Share with Linux', and 'New folder'.
- Top Right:** A screenshot of the Google Drive web interface. The view shows the `drive_shared_with_linux` folder, which contains a single file named `Untitled.png`.
- Bottom:** A screenshot of a file manager window. The 'Name' field shows `Untitled.png`. The 'Save in folder' dropdown is set to `mnt chromeos GoogleDrive MyDrive drive_shared_with_linux`. Below this, a list of places is shown, with `drive_shared_with_linux` selected. The 'Modified' column shows `14:02`. A 'Preview' pane on the right shows a question mark icon and the text 'No selection'.

Networking



Container reachable on penguin.linux.test,
many ports also forwarded from localhost

Settings

≡ Settings

🔍 Search settings

← Linux

Manage shared files & folders



USB Device preferences



Remove Linux Apps for Chromebook



Roadmap

Upcoming features:

- USB pass-through
- Audio support
- GPU integration
- FUSE

Enterprise (manageability) features:

- Device policy OFF: crostini not allowed for anybody using the device
- Device policy ON: is the user a member of the enterprise?
 - YES: User policy (on/off)
 - NO: Device policy (on/off for non-affiliated users)

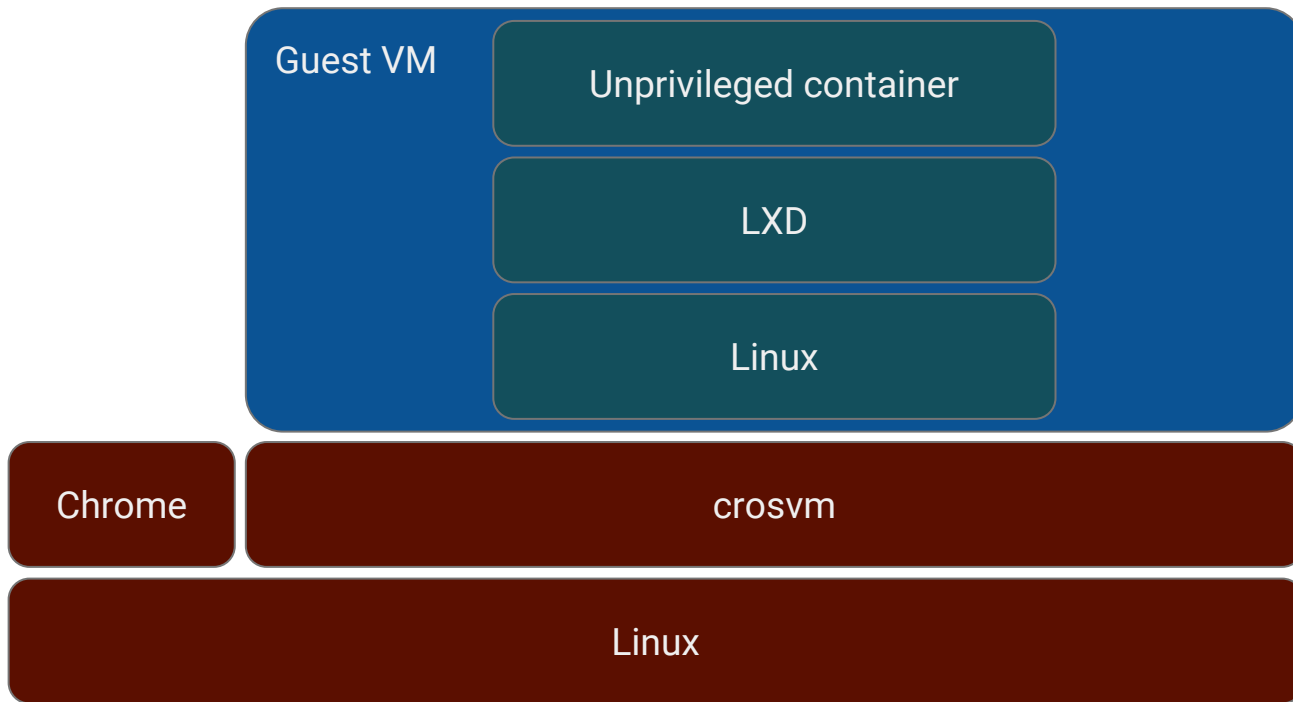
The architecture

Overall architecture



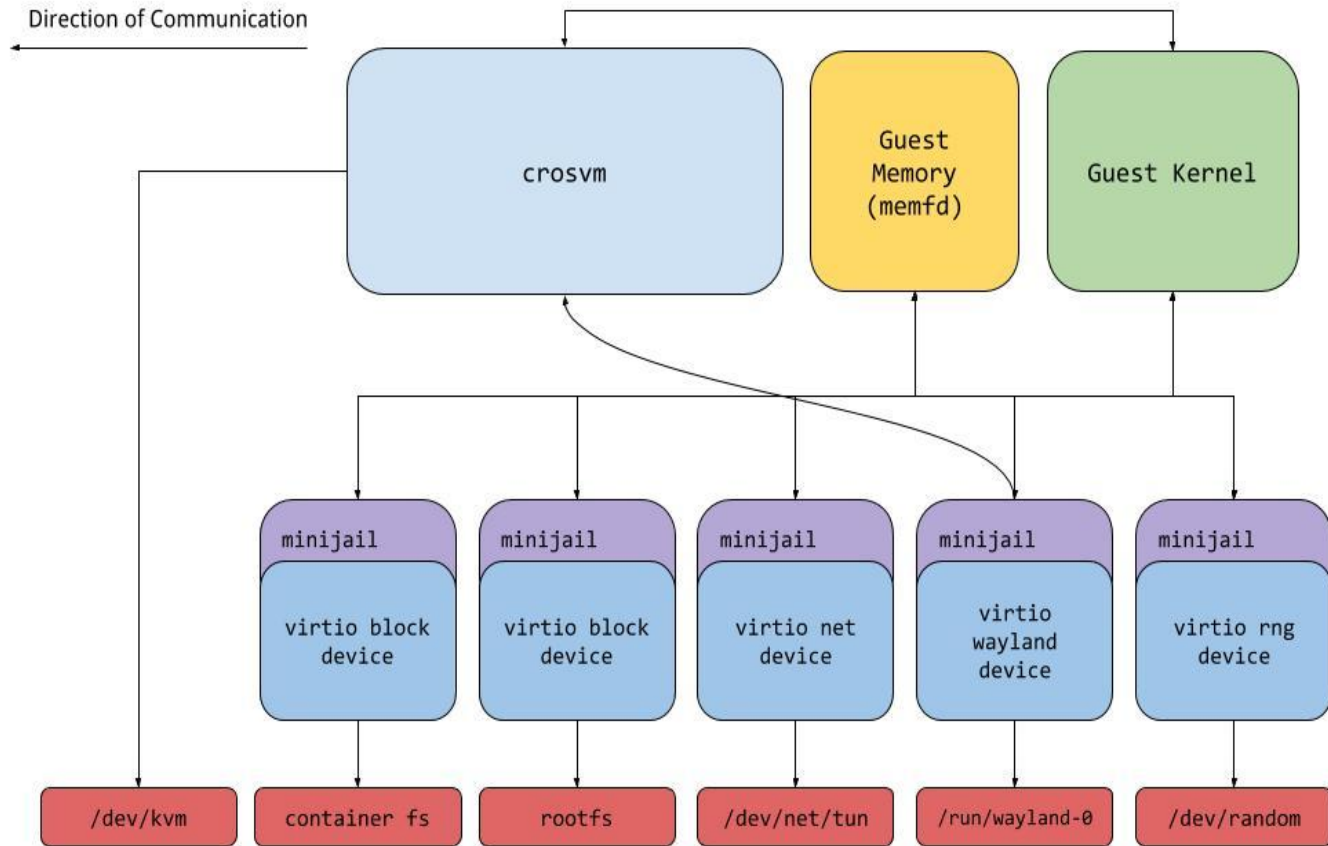
Stephen Edmonds from Melbourne, Australia [CC BY-SA 2.0](#), via Wikimedia Commons

Simplified architecture



CrosVM

- Hypervisor using KVM with a focus on security
- Written in Rust for memory safety
- By default, devices run in jailed child processes using namespaces, and seccomp.
- Only boots Linux guests on Linux hosts.
- Optimized for Chrome OS hosts, but works on common Linux desktops.



Host-side daemons

- Chrome - Wayland compositor
- Concierge - VM lifecycle manager
- Cicerone - Container lifecycle manager/guest integration
- Seneschal - 9P server factory

Termina

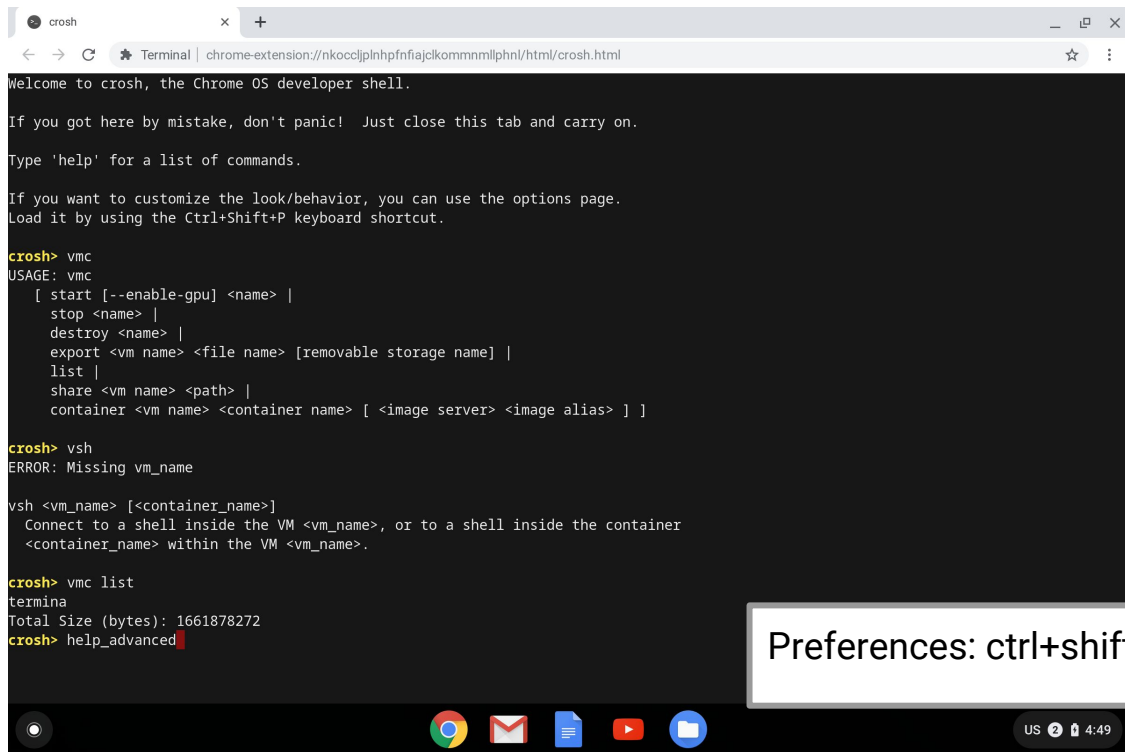
- Slimmed-down Chrome OS for running LXD containers
 - Linux 4.19
 - maitred - init system that can be controlled over gRPC
 - LXD 3.0.2
 - tremplin - exposes gRPC API to control LXD
- Read-only, dm-verity - allows state to be held only in containers

Guest-side daemons

- Sommelier - Nested Wayland compositor, supports X11 forwarding
 - 3 instances - Wayland, X11 (lowdpi), X11(highdpi)
- Garçon - container guest agent
 - Uses PackageKit to run periodic apt upgrades (for CrOS guest tools)
 - App launcher integration via parsing .desktop files
 - Allows opening URLs in host Chrome, new Terminal app windows

Advanced usage

crosh: ctrl+alt+t



```
crosh
Terminal | chrome-extension://nkoccljphhpfnfiajclkommmmlphnl/html/crosh.html
Welcome to crosh, the Chrome OS developer shell.

If you got here by mistake, don't panic! Just close this tab and carry on.

Type 'help' for a list of commands.

If you want to customize the look/behavior, you can use the options page.
Load it by using the Ctrl+Shift+P keyboard shortcut.

crosh> vmc
USAGE: vmc
  [ start [--enable-gpu] <name> |
    stop <name> |
    destroy <name> |
    export <vm name> <file name> [removable storage name] |
    list |
    share <vm name> <path> |
    container <vm name> <container name> [ <image server> <image alias> ] ]

crosh> vsh
ERROR: Missing vm_name

vsh <vm_name> [<container_name>]
  Connect to a shell inside the VM <vm_name>, or to a shell inside the container
  <container_name> within the VM <vm_name>.

crosh> vmc list
termina
Total Size (bytes): 1661878272
crosh> help_advanced
```

Preferences: ctrl+shift+p

vsh termina

```
crosh> vsh termina
```

```
(termina) chronos@localhost ~ $ lxc list
```

```
To start your first container, try: lxc launch ubuntu:18.04
```

NAME	STATE	IPV4	IPV6	TYPE	SNAPSHOTS
penguin	RUNNING	100.115.92.195 (eth0)		PERSISTENT	0

```
(termina) chronos@localhost ~ $ lxc network list
```

NAME	TYPE	MANAGED	DESCRIPTION	USED BY
eth0	physical	NO		0
lxdbr0	bridge	YES		1

```
(termina) chronos@localhost ~ $ lxc version
```

```
Client version: 3.0.2
```

```
Server version: 3.0.2
```

```
(termina) chronos@localhost ~ $ lxc profile list
```

NAME	USED BY
default	1

```
(termina) chronos@localhost ~ $
```

Running a custom container

```
(termina) chronos@localhost ~ $ lxc remote list
```

NAME	URL	PROTOCOL	AUTH TYPE	PUBLIC	STATIC
images	https://images.linuxcontainers.org	simplestreams		YES	NO
local (default)	unix://	lxd	tls	NO	YES
ubuntu	https://cloud-images.ubuntu.com/releases	simplestreams		YES	YES
ubuntu-daily	https://cloud-images.ubuntu.com/daily	simplestre			

```
(termina) chronos@localhost ~ $ #lxc image list amd64
```

```
(termina) chronos@localhost ~ $ lxc image copy images:alpine/3.8 local:
```

Image copied successfully!

```
(termina) chronos@localhost ~ $ lxc image copy images:fedora/29 local:
```

Image copied successfully!

```
(termina) chronos@localhost ~ $ lxc image copy images:archlinux local:
```

Copying the image: rootfs: 38% (5.62MB/s)

```
(termina) chronos@localhost ~ $ lxc image list
```

ALIAS	FINGERPRINT	PUBLIC	DESCRIPTION	ARCH	SIZE	UPLOAD DATE
	1d1b49848506	no	Fedora 29 amd64 (20190122_07:32)	x86_64	89.34MB	Jan 22, 2019 at 5:59pm (UTC)
	2b6d69842c46	no	Archlinux current amd64 (20190122_07:32)	x86_64	270.37MB	Jan 22, 2019 at 6:01pm (UTC)
	3a4af73775cf	no	Alpine 3.8 amd64 (20190122_13:01)	x86_64	2.34MB	Jan 22, 2019 at 5:59pm (UTC)
	e9113a553412	no	Debian stretch amd64 (20190109_12:48)	x86_64	299.99MB	Jan 22, 2019 at 3:14pm (UTC)

```
(termina) chronos@localhost ~ $ lxc launch 3a4af73775cf alpine0
```

Creating alpine0

Starting alpine0

```
(termina) chronos@localhost ~ $ lxc list
```

NAME	STATE	IPV4	IPV6	TYPE	SNAPSHOTS
	alpine0	RUNNING	100.115.92.197 (eth0)		PERSISTENT 0
	penguin	RUNNING	100.115.92.205 (eth0)		PERSISTENT 0

```
(termina) chronos@localhost ~ $
```

Running a custom container

```
(termina) chronos@localhost ~ $ #lxc exec alpine0 ash
(termina) chronos@localhost ~ $ lxc console alpine0
To detach from the console, press: <ctrl>+a q

Welcome to Alpine Linux 3.8
Kernel 4.19.16-02893-g2cf2c17c8a43 on an x86_64 (/dev/console)

alpine0 login: root
Welcome to Alpine!

The Alpine Wiki contains a large amount of how-to guides and general
information about administrating Alpine systems.
See <http://wiki.alpinelinux.org>.

You can setup the system with the command: setup-alpine

You may change this message by editing /etc/motd.

alpine0:~# apk ...
```

```
daenerys@penguin:~$ ssh root@alpine0
The authenticity of host 'alpine0 (100.115.92.194)' can't be established.
ECDSA key fingerprint is SHA256:yQqx1qktHb8vm5MUUDQ+eZkCFCdrsRtljdzc4JhcBm8.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'alpine0,100.115.92.194' (ECDSA) to the list of known hosts.
root@alpine0's password:
Welcome to Alpine!

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information about administrating Alpine systems.
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You can setup the system with the command: setup-alpine

You may change this message by editing /etc/motd.

alpine0:~#
```

Conclusion, Q & A

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