Crostini: a Linux Desktop on Chrome OS

Google

Introduction and agenda

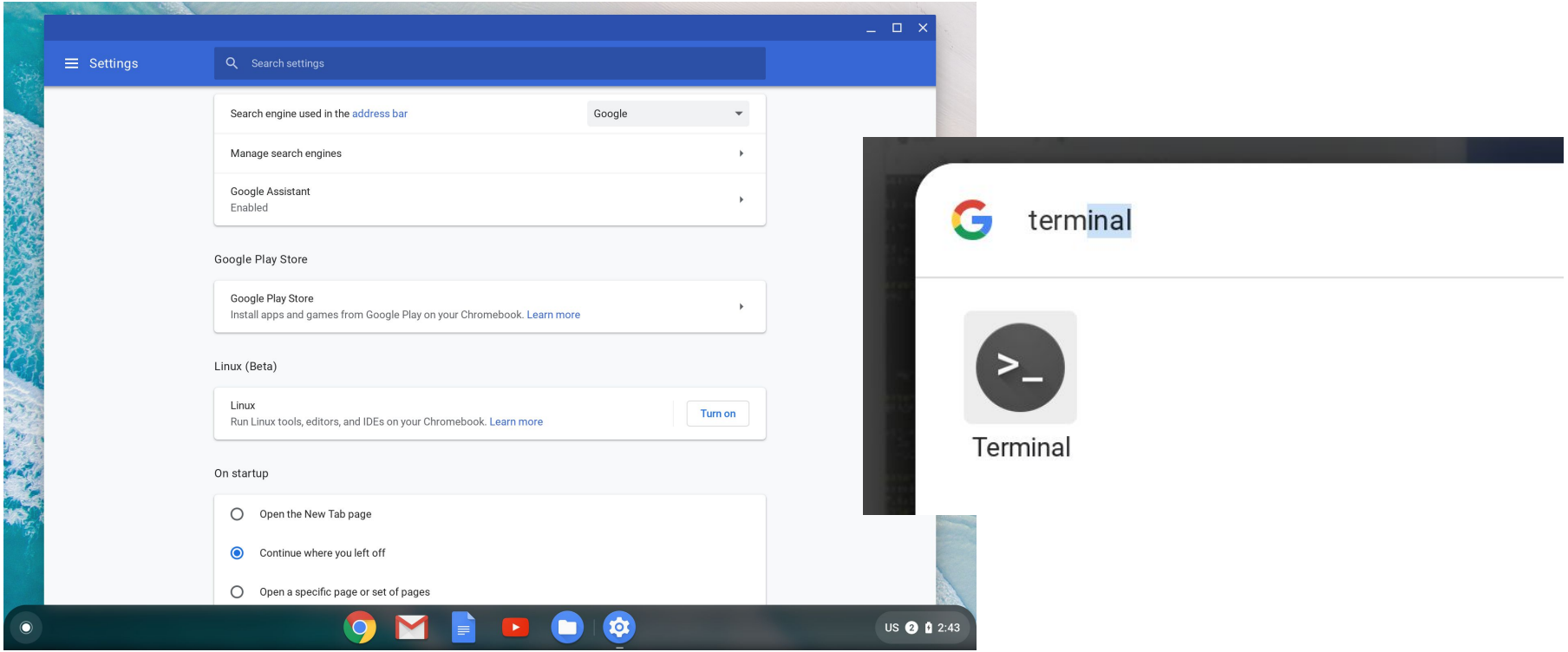
Introduction:

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

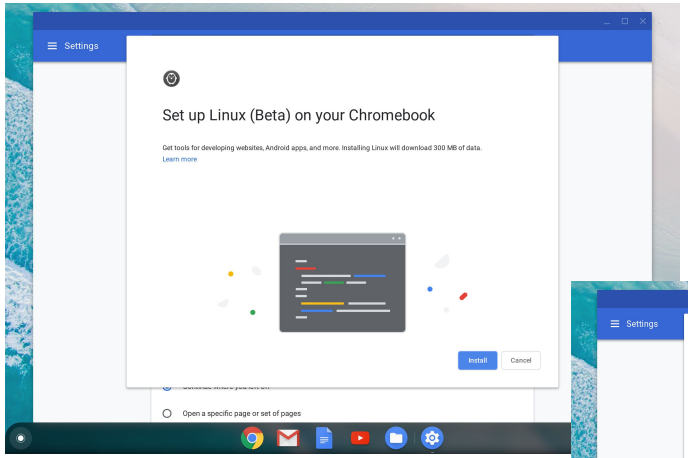
Agenda:

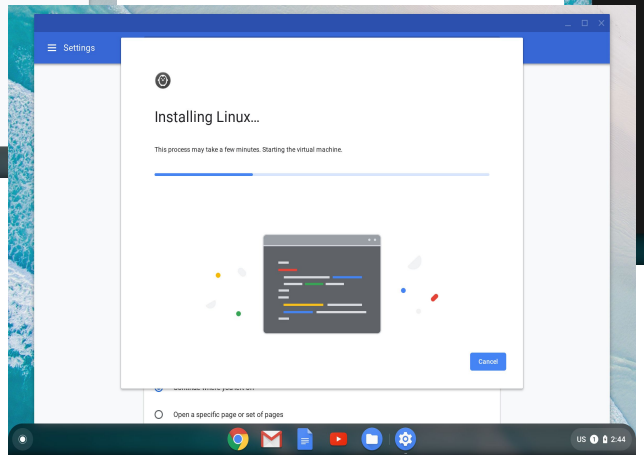
- Getting started with Linux on Chrome OS (crostini), integration with Chrome OS
- Architecture
- Advanced usage

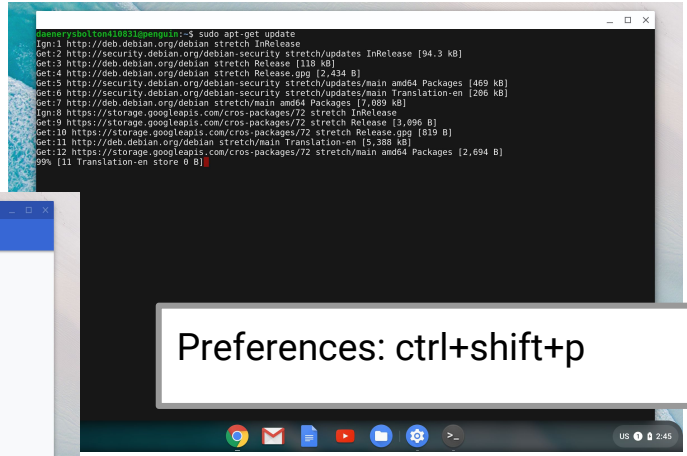
Getting started: installation



Installation

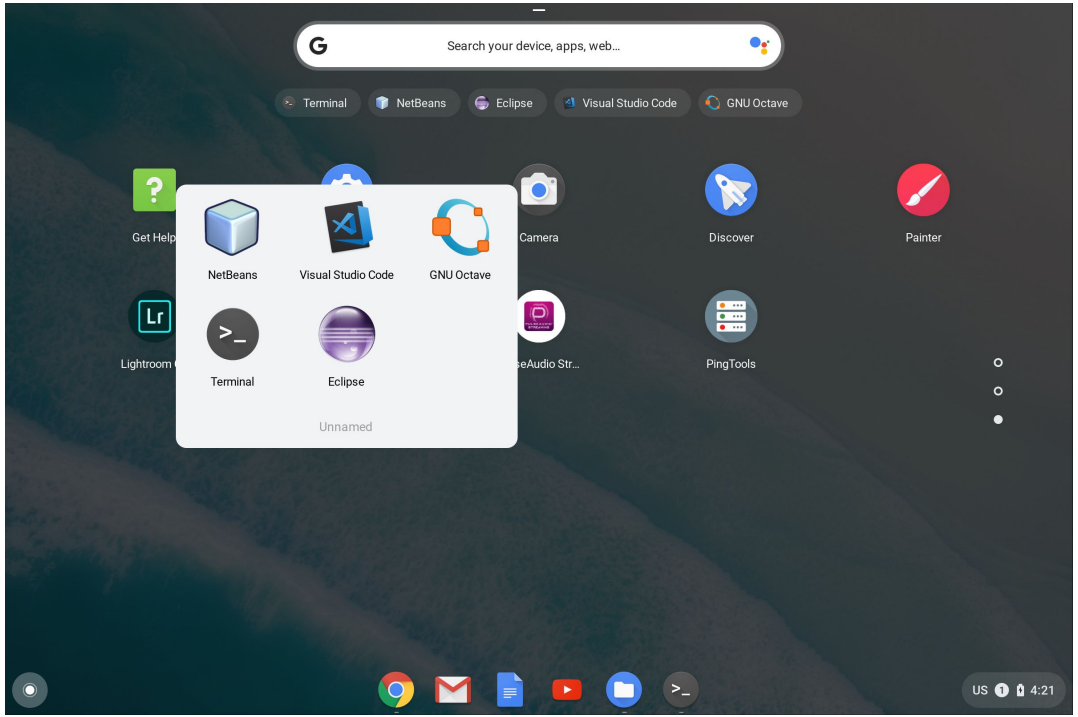


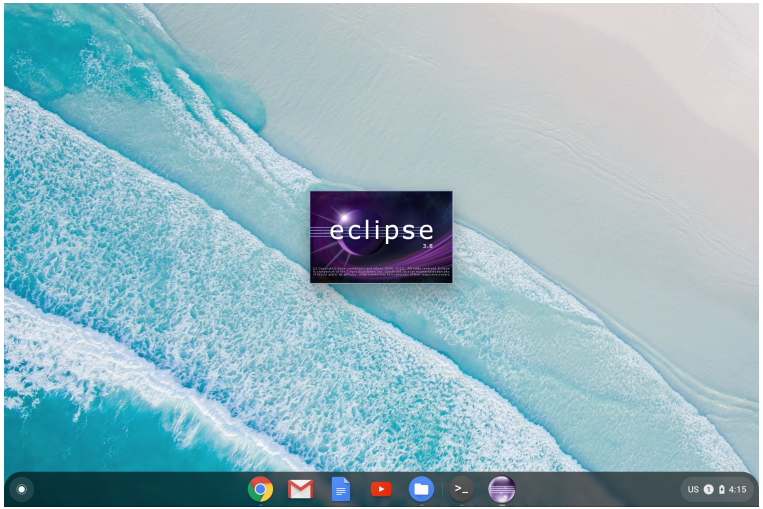




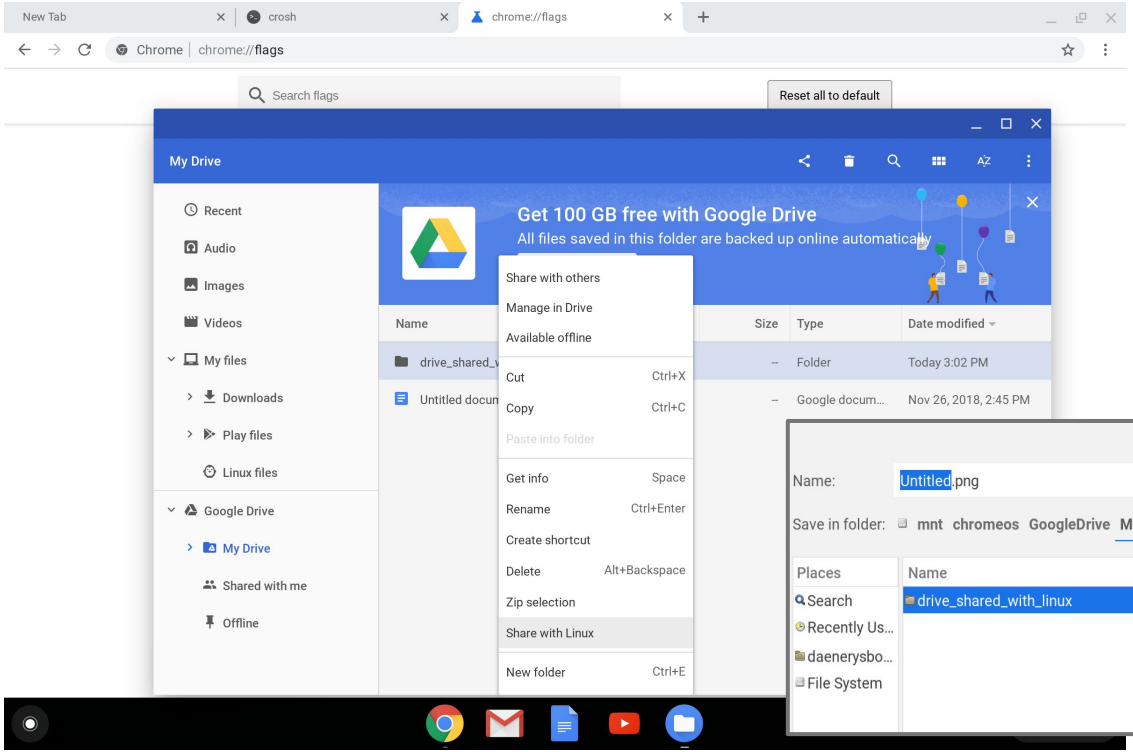
Preferences: ctrl+shift+p

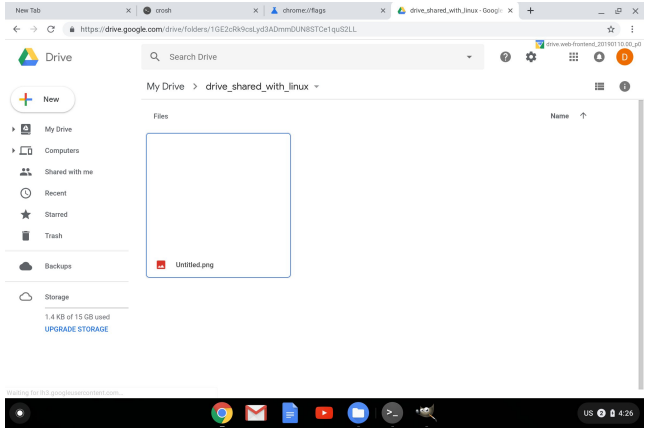
Graphical apps integration

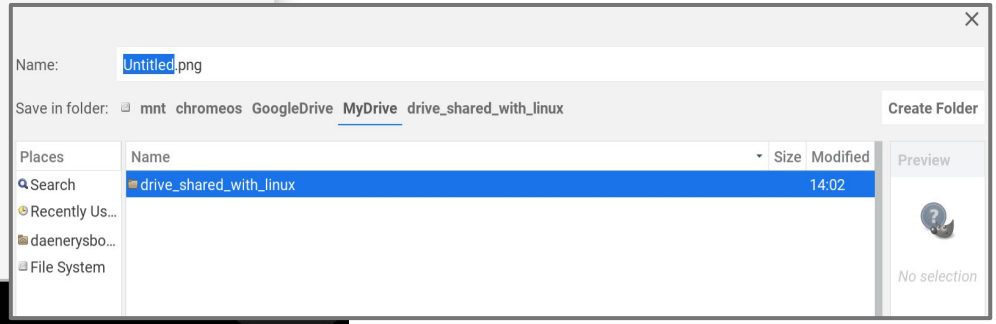




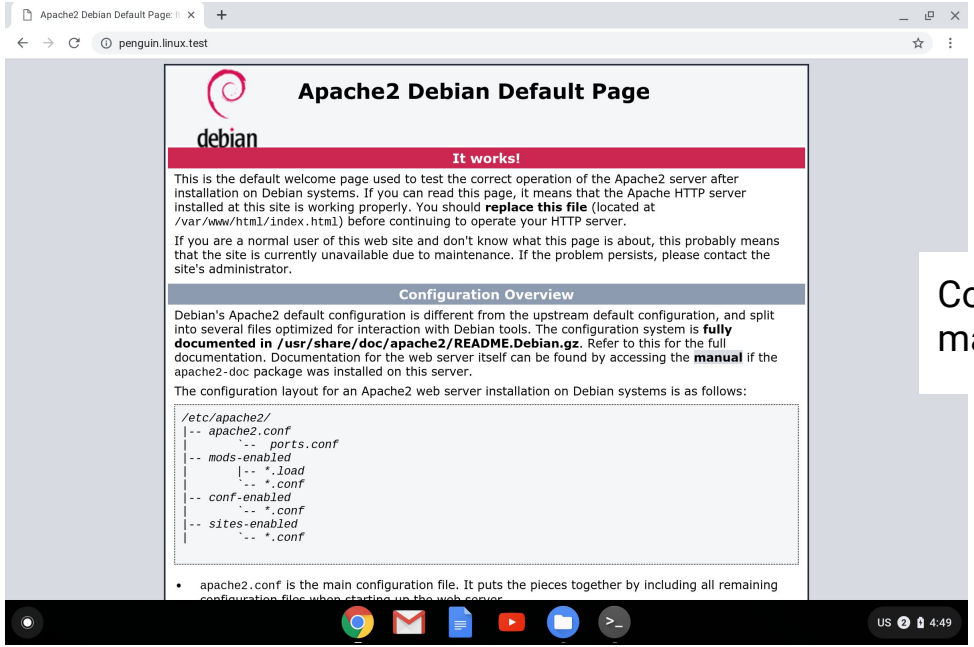
Drive and file system sharing





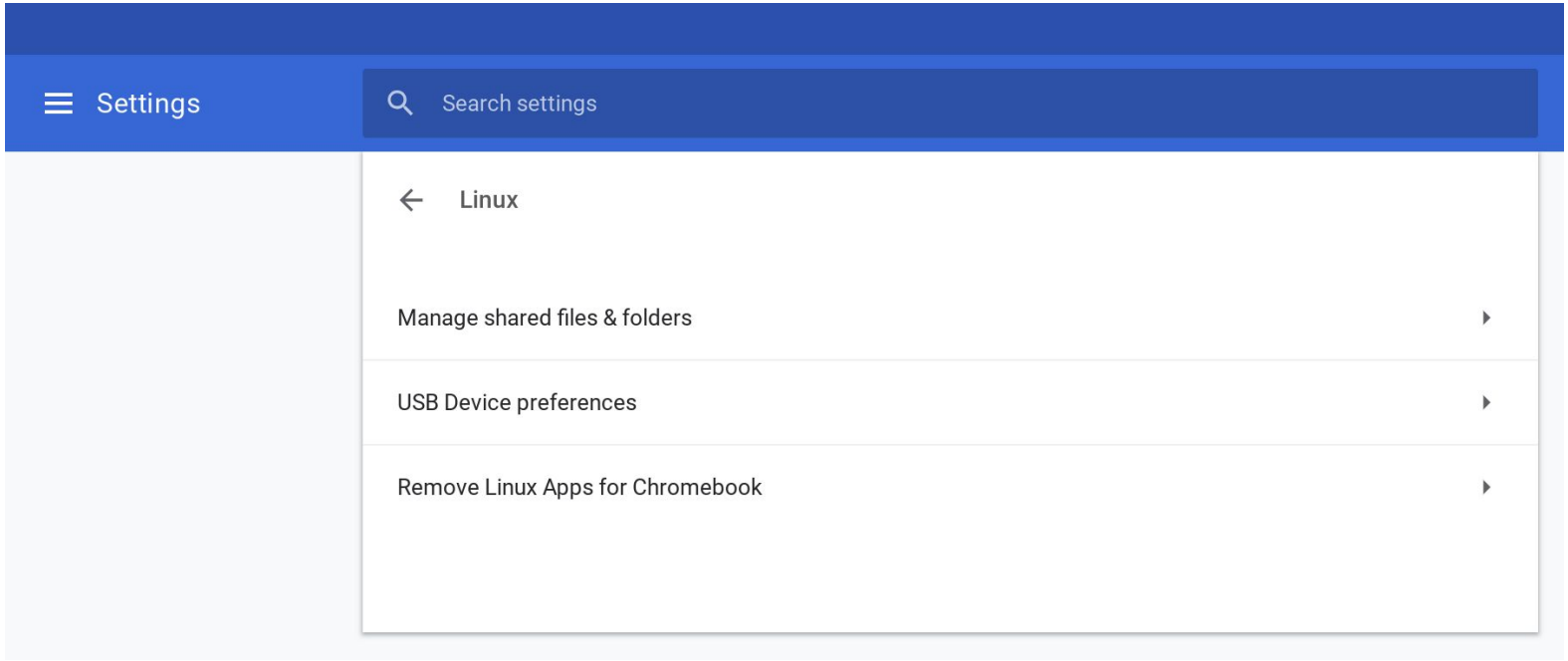


Networking



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:

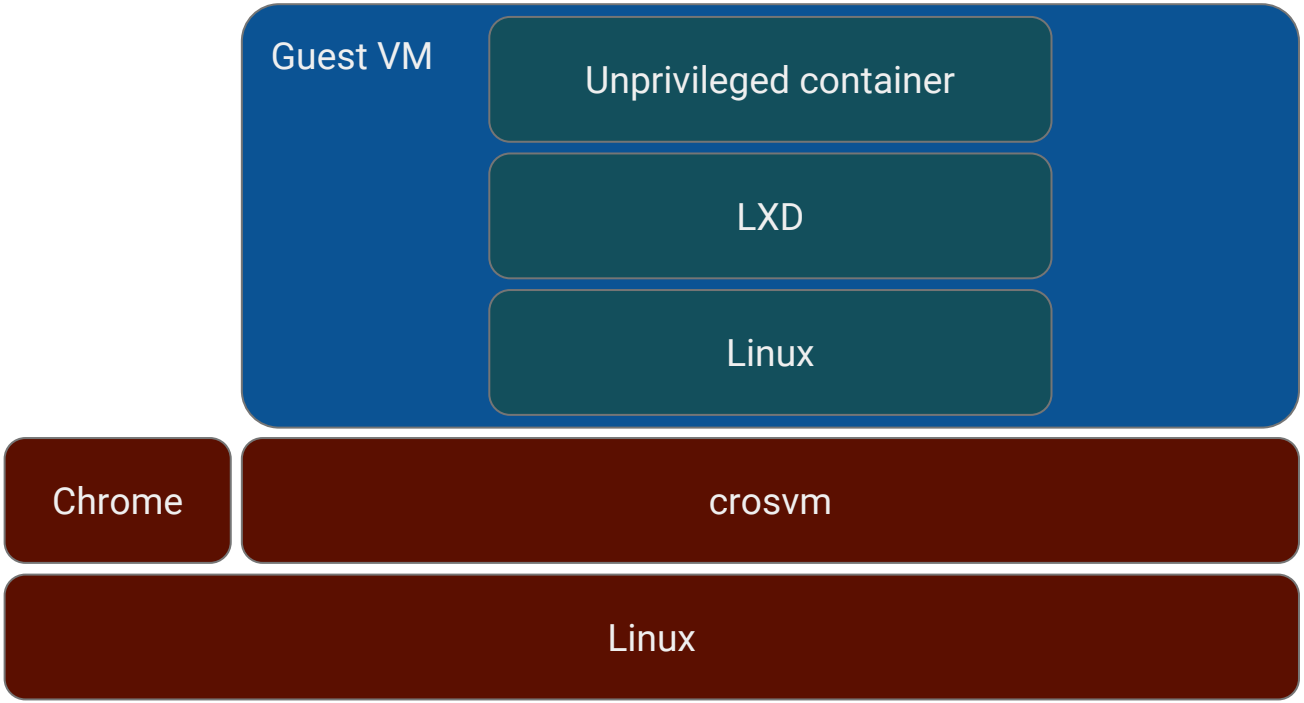
- Device policy OFF: crostini not allowed for anybody using the device
- Device policy ON: is the user a member of the enterprise?
  - YES: User policy (on/off)
  - NO: Device policy (on/off for non-affiliated users)

The architecture

Overall architecture

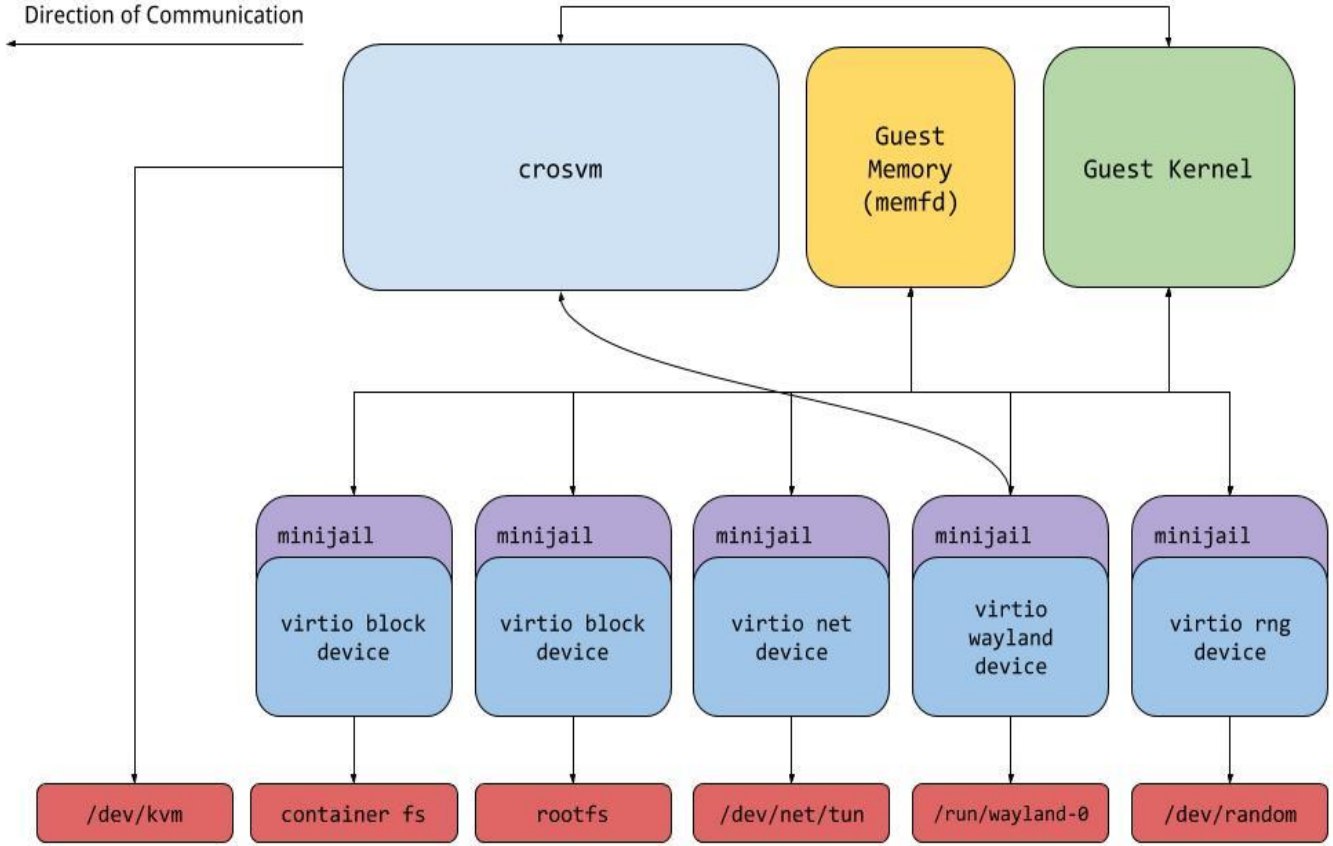
Stephen Edmonds from Melbourne, Australia CC BY-SA 2.0, via Wikimedia Commons

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

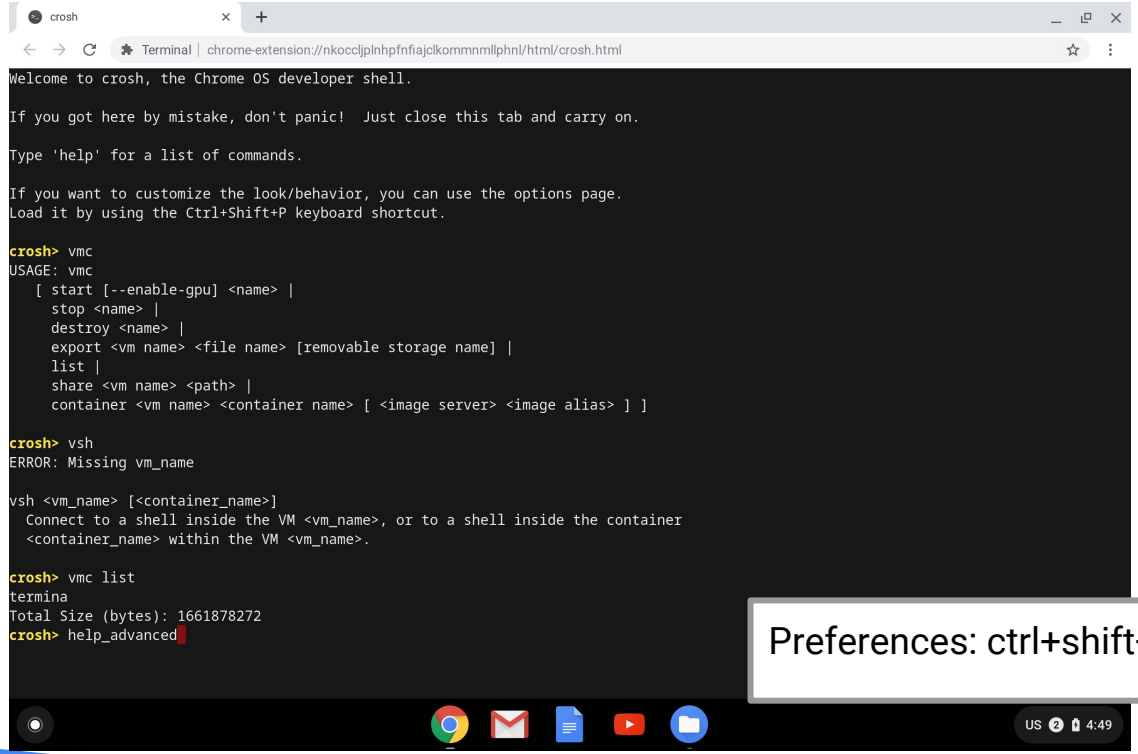
- Slimmed-down Chrome OS for running LXD containers
  - Linux 4.19
  - maitred - init system that can be controlled over gRPC
  - LXD 3.0.2
  - tremplin - exposes gRPC API to control LXD
- Read-only, dm-verity - allows state to be held only in containers

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



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 ...
```

```
daenerysbolton410831@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 may change this message by editing /etc/motd.

alpine0:~#
```

Conclusion, Q & A

Guido: ultrotter@google.com
Dylan: dgreid@chromium.org
ML contact: chromium-os-dev@chromium.org