

Is Chromium OS favorable for IOT Devices ?

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**Linaro
connect**
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Background and Introduction



IOT device - UX and benefits to user is important

If and only if these components are integrated to the finest possible :



Connection



Security



Power requirements



AI and ML



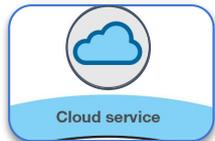
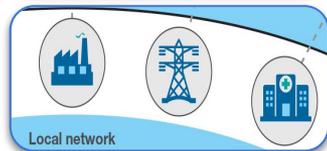
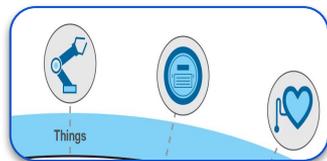
Processing power



Standards, Regulations and Certifications

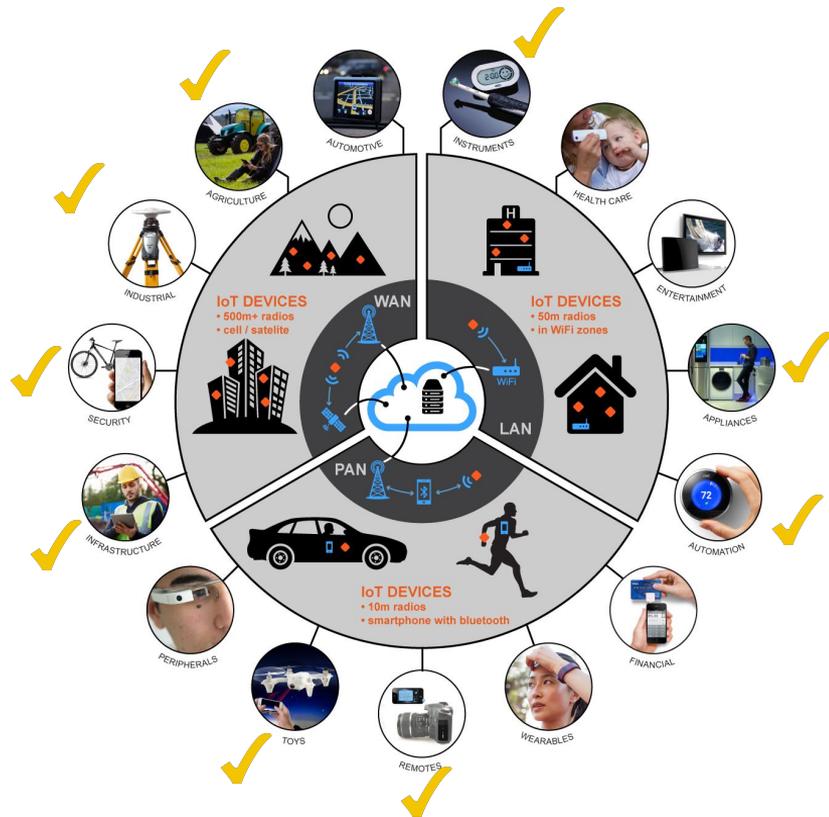
*Perfectly
Blended
Software
stack*

Where exactly Chromium OS in IOT ?



Interest : Chromium OS to run on the actual IOT devices.

No we are not talking about Chromium OS on Controlling device.



Summarizing - Get things clear

We Generally tend to compare Chromium OS with ubuntu™ or Google's Android™.

- In the question - “**What are the best Linux distributions for desktops?**” **Ubuntu** is ranked 5th while **Chromium OS** is ranked 42nd.
- In comparison - “**Chromium OS vs Android™**”, the Android market share in mobile is incomparable to chromium OS market share in notebook world.

We **aren't** talking about Chromium OS on “desktops or laptops or controlling device”

We are interested in running chromium OS on IOT device :

- With or Without Display
- Security enabled
- Faster Connectivity with boot time
- Microprocessor based
- Running first level AI/ML algo
- Next Gen Web technologies like WebNFC, WebBT, WebUSB, Progressive WebApp, etc.

chromium OS ?

- Though there are other alternatives available for high end IOT devices :
 - **Free Linux distros** : Yocto/OE based Open Source or Free Linux distros
 - **Commercial Linux distros** : Windriver, etc
 - **Non Linux distributions** : Windows 10, VxWorks, etc.

Chromium OS built on mainline Linux Kernel - a perfect combination of security, networking, easy app development stack and libraries with optimized Power management and boot time, best fits the requirements of next generation, high end IOT devices

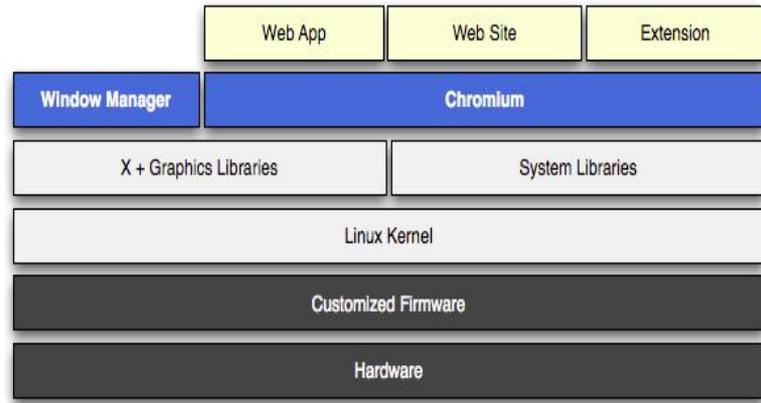
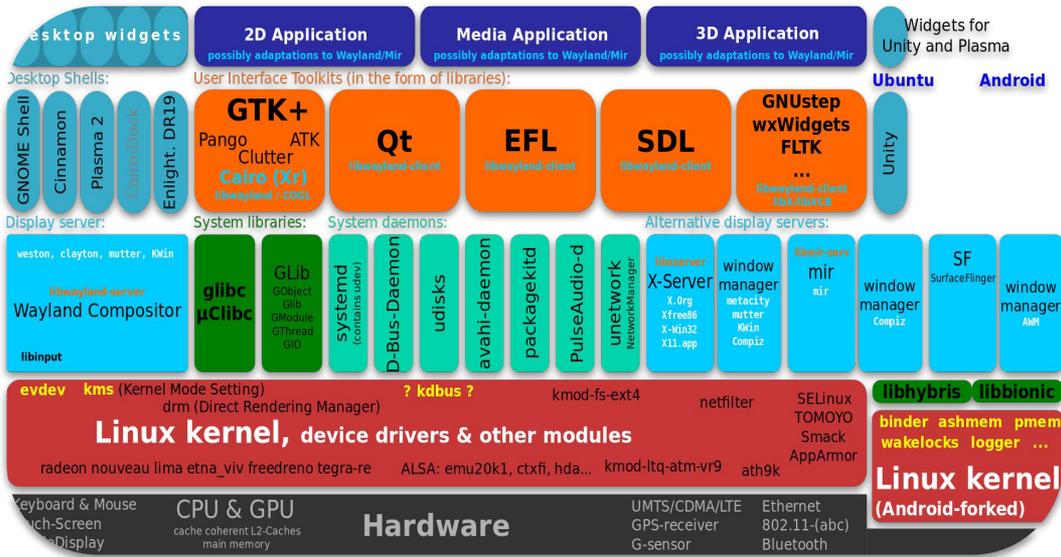
Imagine

your next IOT device

with Chromium OS

with Chromium OS

Faster prototyping and development cycle



Chromium OS architecture

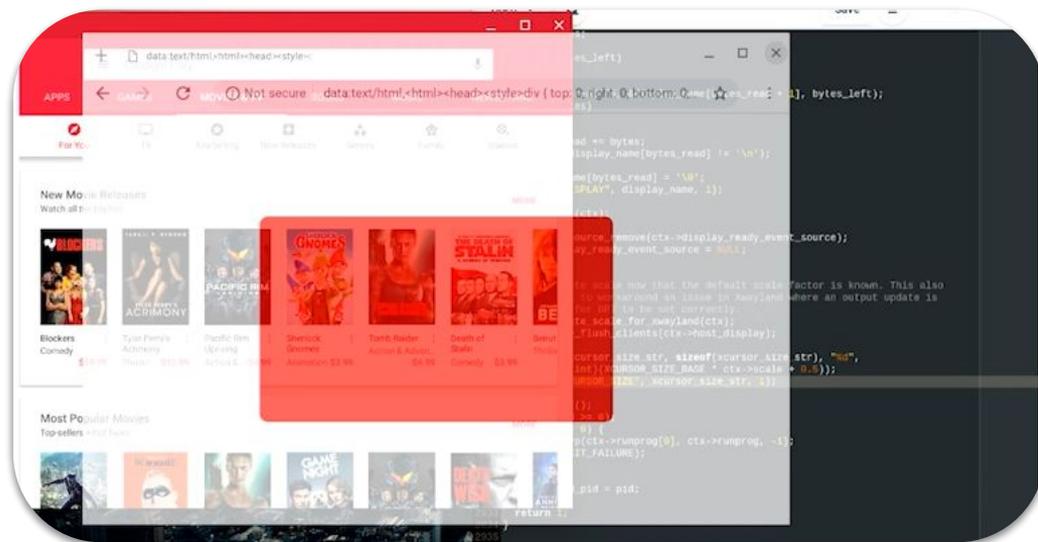


Linux Distro architecture

Graphics stack

The chromium OS graphics stack is built on Linux DRM API and display compositing happens in Chromium OS

- As the X-Window dependency is eliminated we get better performance and lower power consumption and memory usage compared to other distros.
- Implement RICH UI features like half translucent effect in your apps with ease.
- Multi window graphics and orientation changes is possible.
- Latency of Touch and Stylus is significantly reduced



Network and Bluetooth stack

Chromium OS network stack supports wired and wireless LAN and newblue - an all new bluetooth stack provides drop less bluetooth experience.

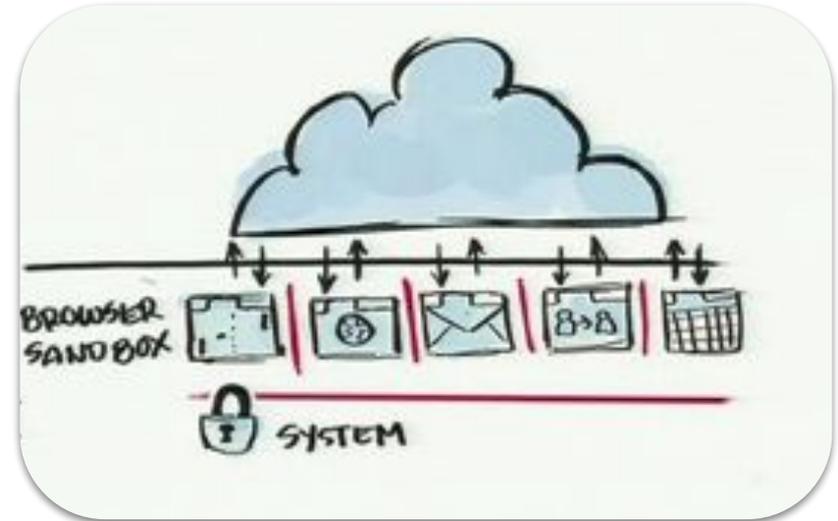
- In an industrial setup, configure the devices like in a class room and allow multiple instances of webapp communicating with each other or cloud.
- Experience no connection drops, no stutters, no odd pointer movements or audio warbles with latest newblue bluetooth stack.
- Bring USB, Bluetooth, NFC devices to Web and interact with devices through an webapp.



Multi-layer Security

Chromium OS uses the principle of "defense in depth" to provide multiple layers of protection, so if any one layer is bypassed, others are still in effect. All apps are web apps, the OS does not trust any app.

- **Sandboxing** : Each web page and application runs in a restricted environment called a "sandbox."
- **Verified Boot** : Every time the Chromium OS starts up, it does a self-check called "Verified Boot."
- **Data Encryption** : Chromium OS can encrypt the data on device using the hardware, making it very difficult for anyone to access the critical files.
- **Recovery Mode** : If anything goes wrong, you can simply push a button to enter recovery mode.



Storage on Cloud

Chromium OS allows user to store data on the device or push runtime on cloud. Supports LevelDB, SQLite and Filesystem management for keystore, database and files respectively.

For Database : SQLite is used, it's a C-language library that implements a small, fast, self-contained, high-reliability, full-featured, SQL database engine.

For Filesystem : A drive currently contains at least three partitions, One partition for state resident on the drive called the "stateful partition." Two partition for the root file system.

For Keystore : LevelDB is used which is a fast key-value storage library written at Google that provides an ordered mapping from string keys to string values.

Storage is always difficult

01

Slow access to data

02

Power failures

03

Data corruption

webapps

Chrome Apps let you use HTML5, CSS, and JavaScript to deliver an experience comparable to a native application.

Progressive Web Apps : Provide an installable, app-like experience on desktop and mobile that are built and delivered directly via the web. They're web apps that are fast and reliable. And most importantly, they're web apps that work in any browser.

Chrome apps for device manufacturer : The cross platform nature of Chrome Apps makes writing device drivers less painful. A device manufacturer only needs to write one application for configuring their device and it will run on any device.



Developer friendly

There are plenty of resources out there to help developer start using chromium or develop products on chromium OS, some of the key links are :

- <https://www.chromium.org/chromium-os>
- <https://www.chromium.org/chromium-os/chromiumos-design-docs>
- <https://www.youtube.com/playlist?list=PL9ioqAuyI6UIFAdsM5KU6P-hRJdh-BPmm>



Conclusion

-  We must move the IOT device user from a standalone fixed app to dynamic feature rich, graphics enabled, always connected app environment.
-  Chromium OS on IOT Devices will bring in a new dimension to the user experience, imagine the user experience of an IOT running Progress web app, in built AI / ML algo, etc .
-  We must enable developer to innovate on applications specifics rather than spending time on integrating multiple software libraries and validation.
-  Secured software stack, Secured data communication overall a secured product.
-  Can we not do all of these on other OS and Linux distros ? Yes, but Chromium OS will be faster development.

Thank you

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9Boards is a range of specifications with boards and peripherals offering different performance levels and features in a standard footprint.



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