Wayland

A modern display protocol for Linux

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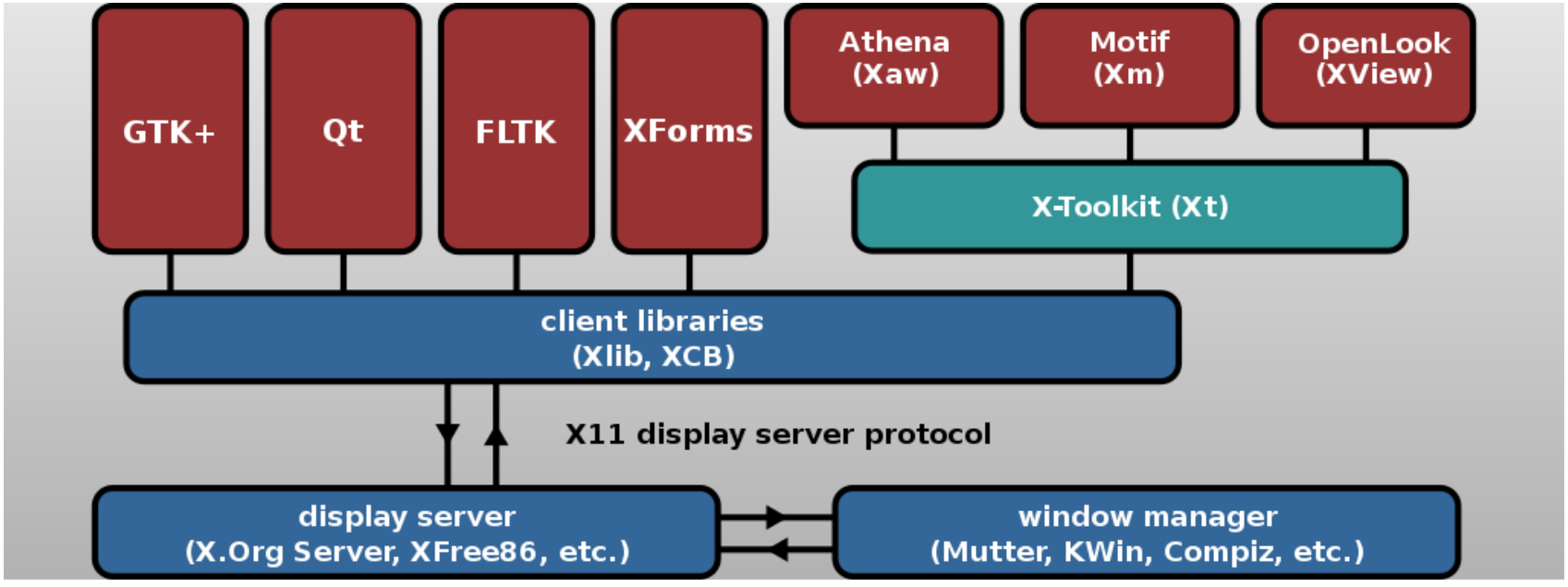
X11 – the original display protocol

- Created in 1984 as part of MIT's Project Athena
- Optimized for the low-powered PC's available at that time
- Designed to display apps running on other computers
- Based on a client-server architecture

The X11 logo

The X server

- Grants clients access to GUI resources (screen space, keyboard, etc.)
- **Many** components, like the window manager (which handles the windows' layout and title bars), are mere **clients**



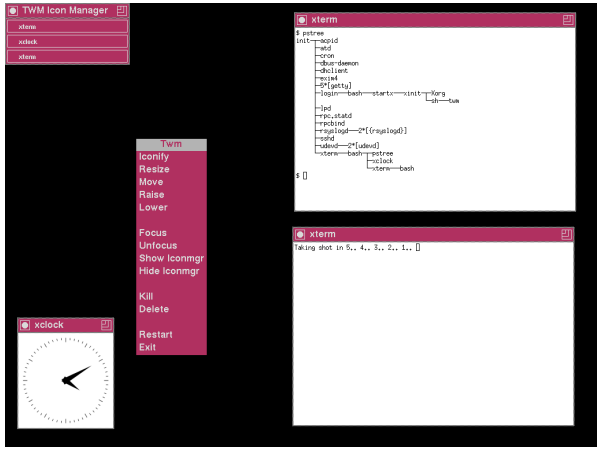
The X.Org server

- The X.Org server is the canonical X server implementation
- **Ugly code** that barely anyone wants to develop besides the Red Hat employees paid to do that
- Any X server **has** to implement a **plethora of features** and extensions to be compatible, some seldomly used
- No one wants to develop new X servers anymore

The X.Org logo

Issues of the X11 protocol

- **Not** designed with **security** in mind
- Makes some **outdated** assumptions about the **rendering process**
- Has some **inherent limitations** that can't be overcome without breaking backward compatibility
  - All monitors have to have the same DPI
  - No new modifier keys can be added – the new Apple laptops can't be fully supported



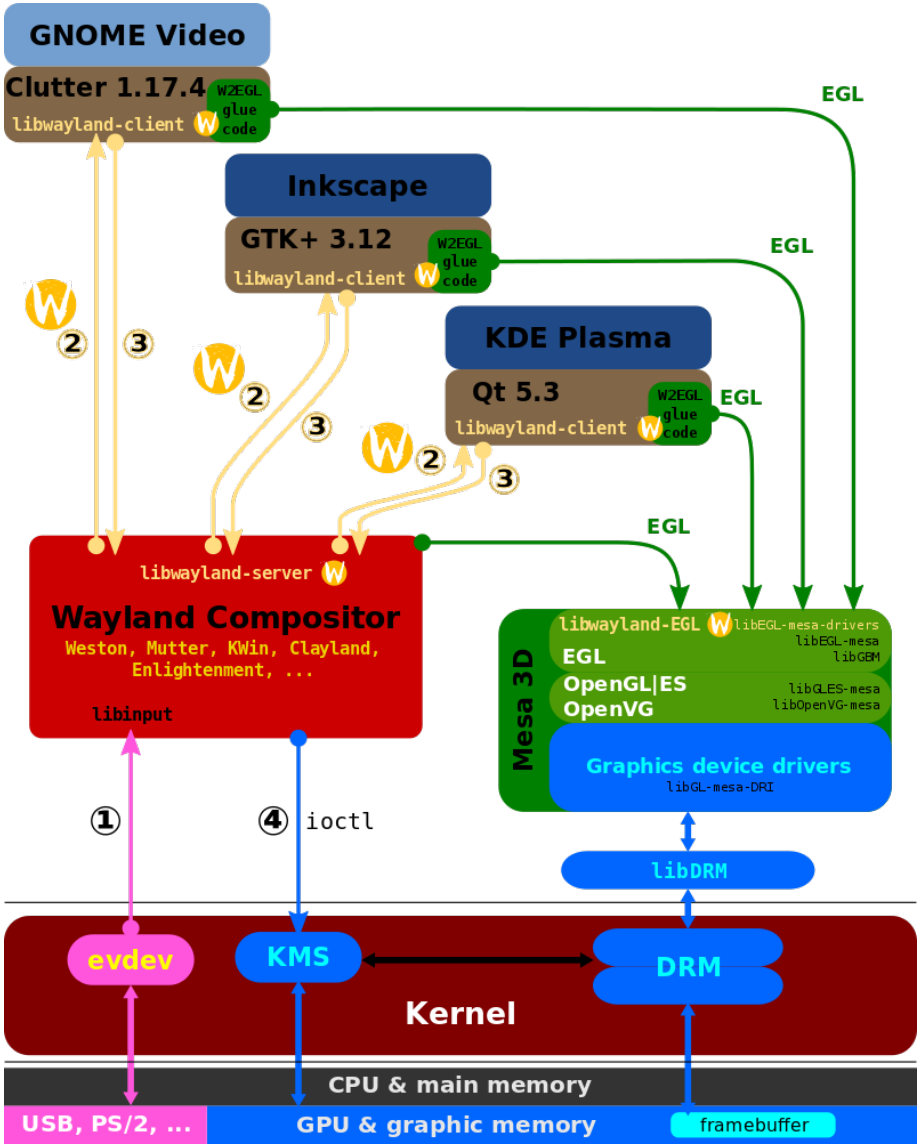
TWM – an X11 window manager

Wayland – the better display protocol

- Created in 2008 by Kristian Høgsberg
- **Addresses** many of X11's **flaws**
- **Tightly couples** the display server, compositor and window manager
- Most X.Org developers are now working on Wayland instead

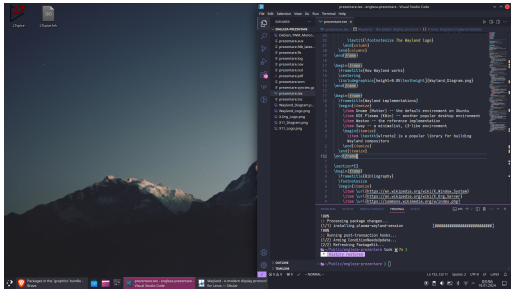
The Wayland logo

How Wayland works



Wayland implementations

- Gnome (Mutter) – the default environment on Ubuntu
- KDE Plasma (KWin) – another popular desktop environment
- Weston – the reference implementation
- Sway – a minimalist, i3-like environment
  - `wlroots` is a popular library for building Wayland compositors



KDE Plasma 5

The state of Wayland

- Many functionalities are implemented using portals
  - Global hotkeys, screen capture, etc.
  - They are designed with **security in mind**; the user can tweak the **app permissions**
  - Some things are still not fully fleshed out, but work is in progress
- Gnome, Fedora strongly favor Wayland
  - Even Ubuntu now ships with Wayland by default
- Proprietary Nvidia drivers are almost fully functional
  - Some compositors might require some tweaks

Summary

- X11 is the **old**, original Linux display protocol
  - It's **outdated**
  - It desperately needs replacement
- Wayland is the **fresh**, new Linux display protocol
  - Made for the 21st century
  - It's **the future**, and even the present

Conclusion

- Wayland is ready to be the flagship display protocol of Linux
- Fixing X11's flaws definitely requires more work that making Wayland 100% functional

Bibliography

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