How to embrace wayland for Tizen

TIZEN™
DEVELOPER CONFERENCE
2013
SAN FRANCISCO

developers’ prove of concept demo

Agenda

- Wayland introduction
- Embracing wayland for tizen
- Performance enhancement

Wayland Introduction

Usage scope

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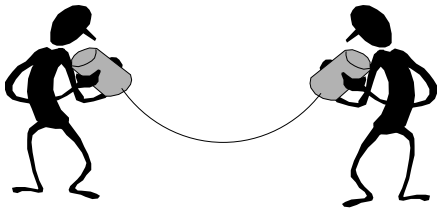
What is wayland

- **Protocols**



server client

- Wayland is a protocol for a compositor to talk to its clients as well as a C library implementation of that protocol. (Kristensen, Kristian)
- Weston is one compositor (Kristensen, Kristian)

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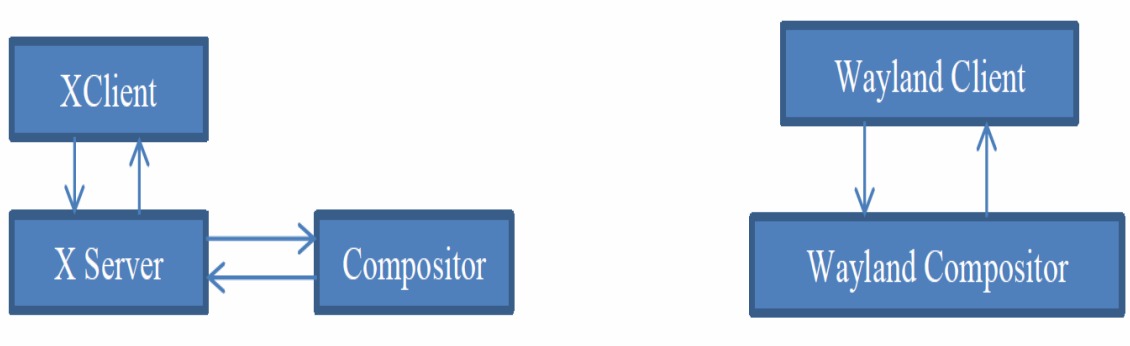
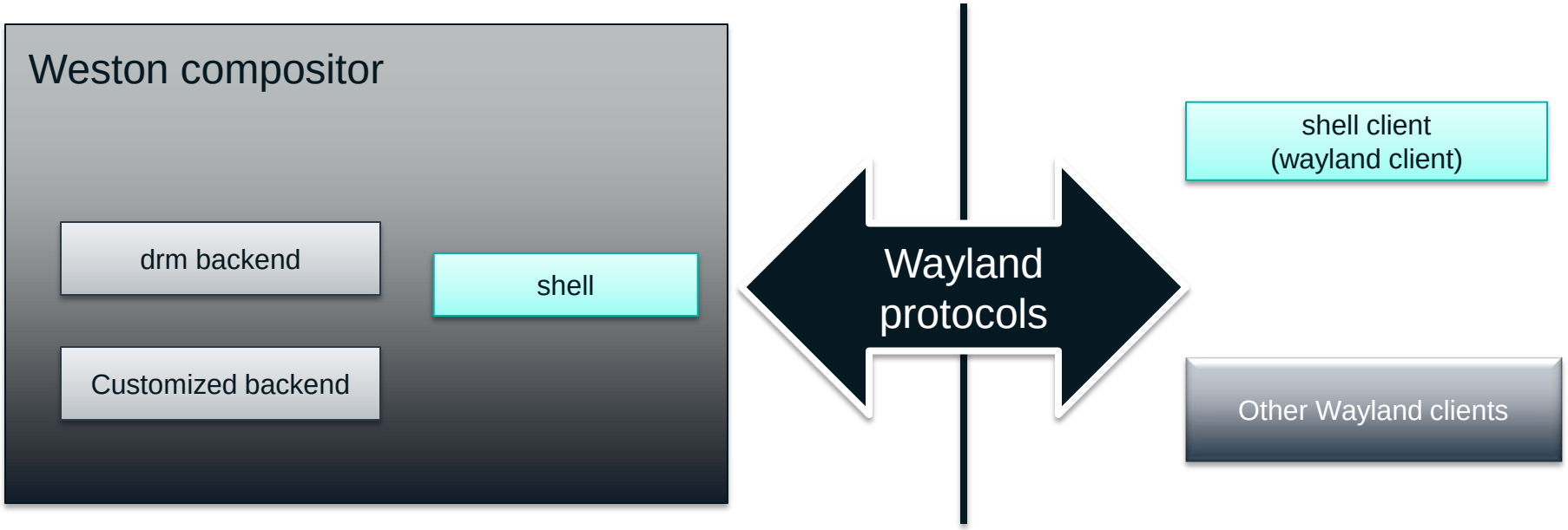
Xorg & Wayland architecture



Less IPC In wayland

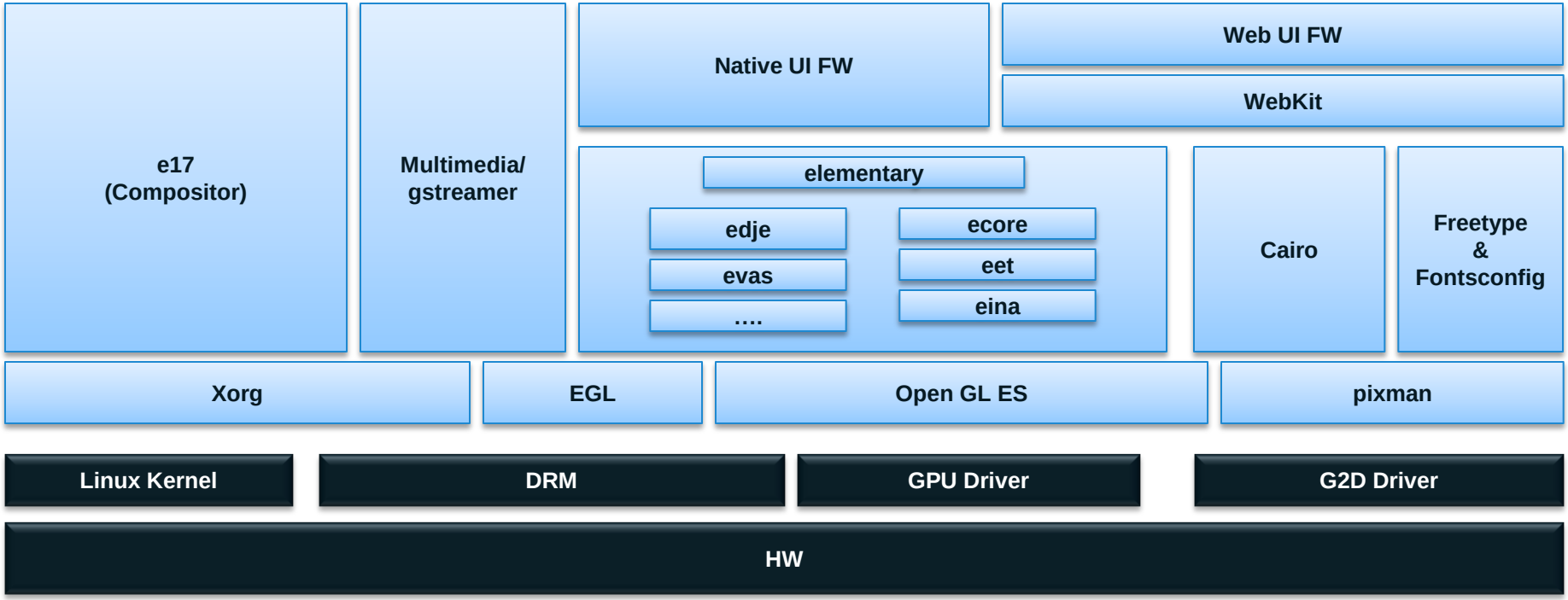
How does wayland/weston work?



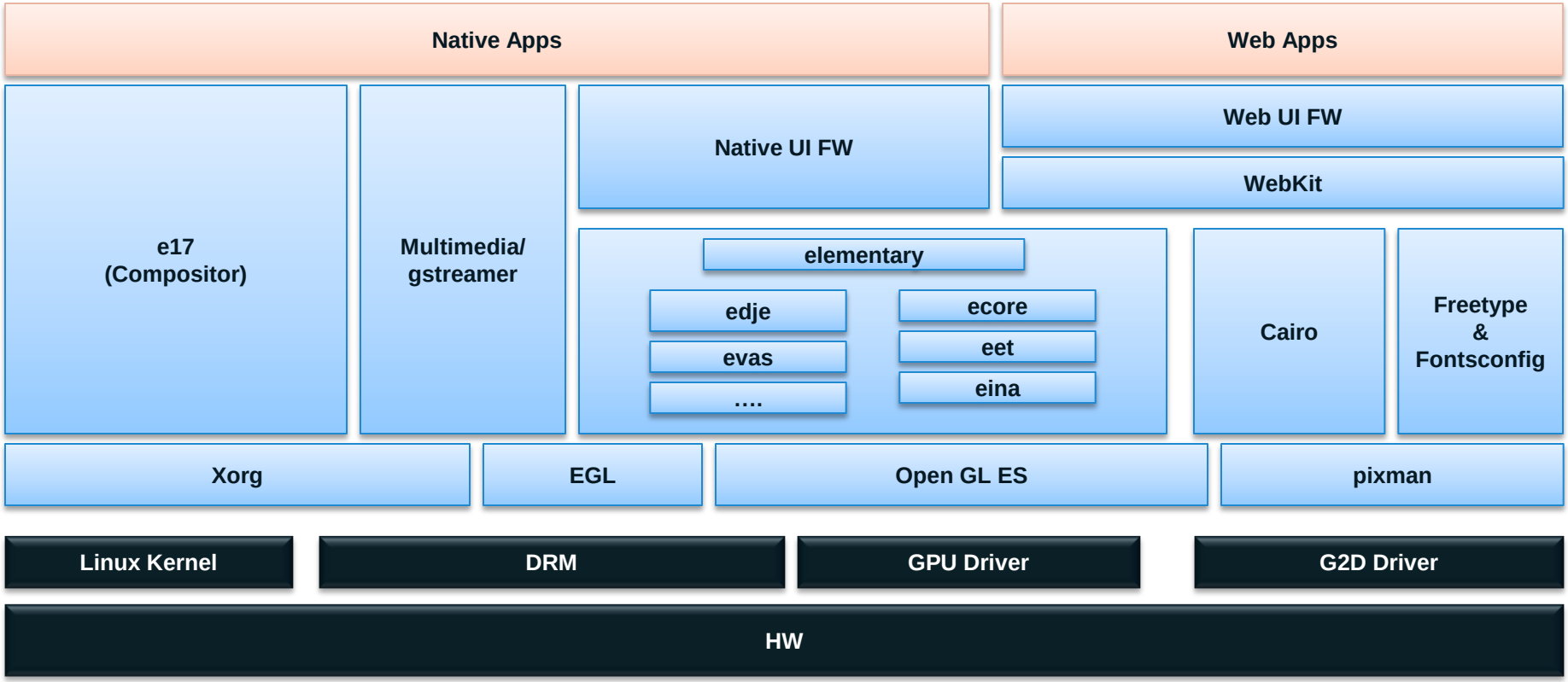
Embracing wayland for Tizen

Tizen graphics stack with Xorg

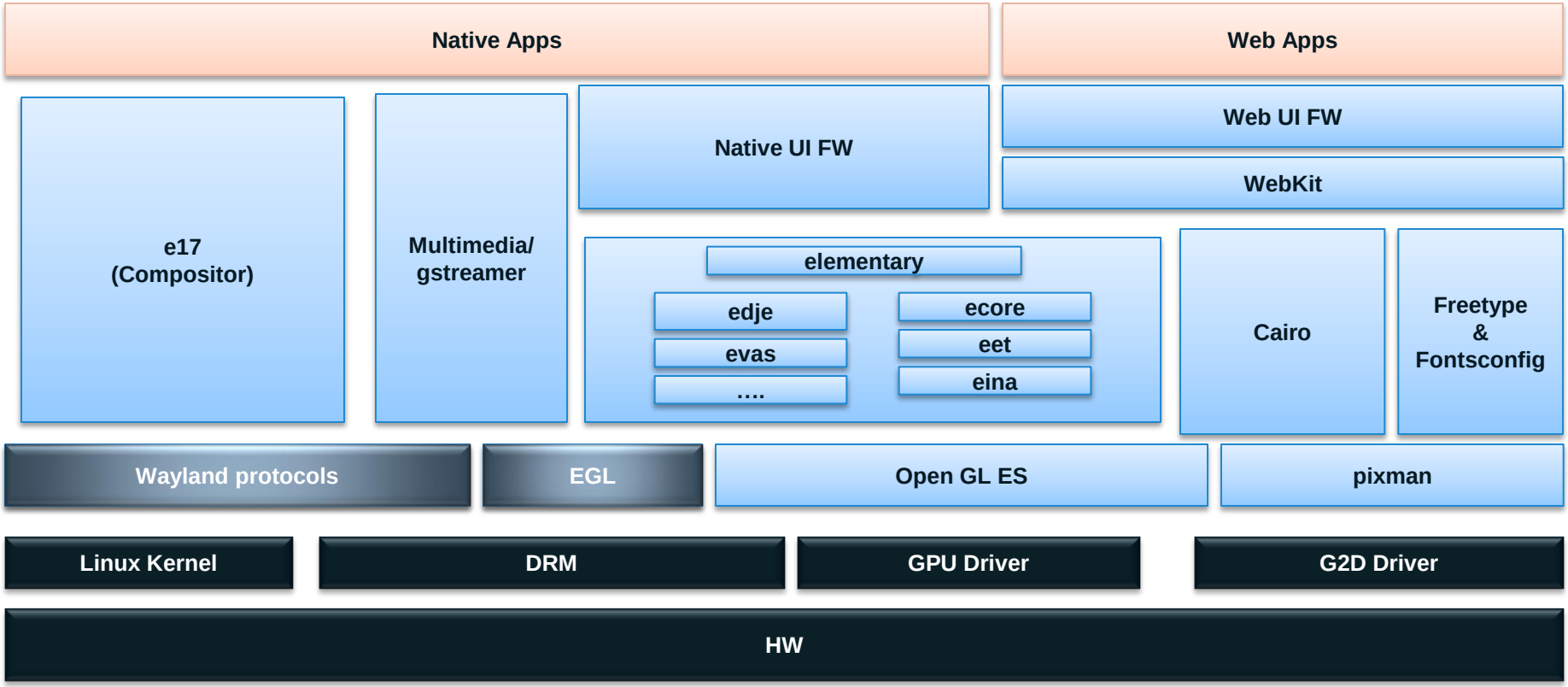
Tizen graphics stack with Xorg



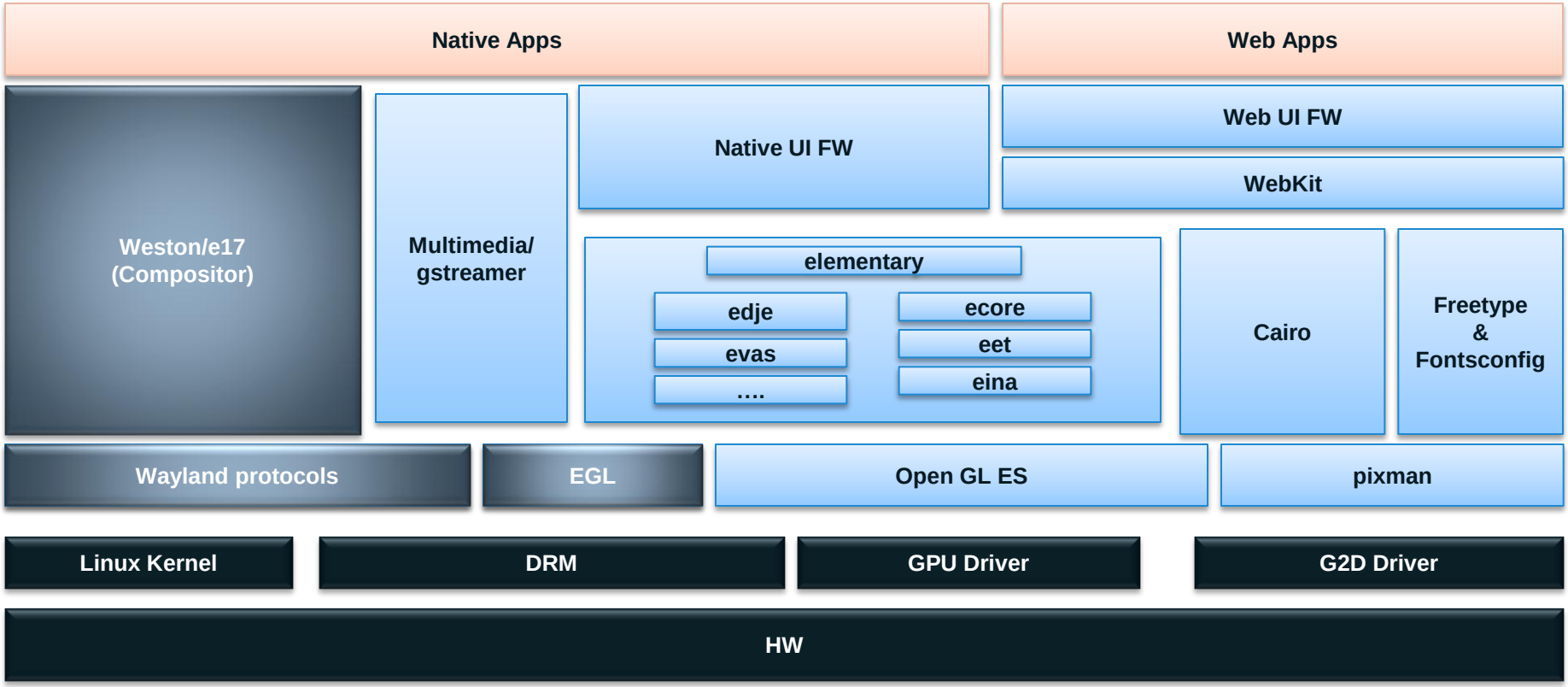
Tizen graphics stack with Xorg



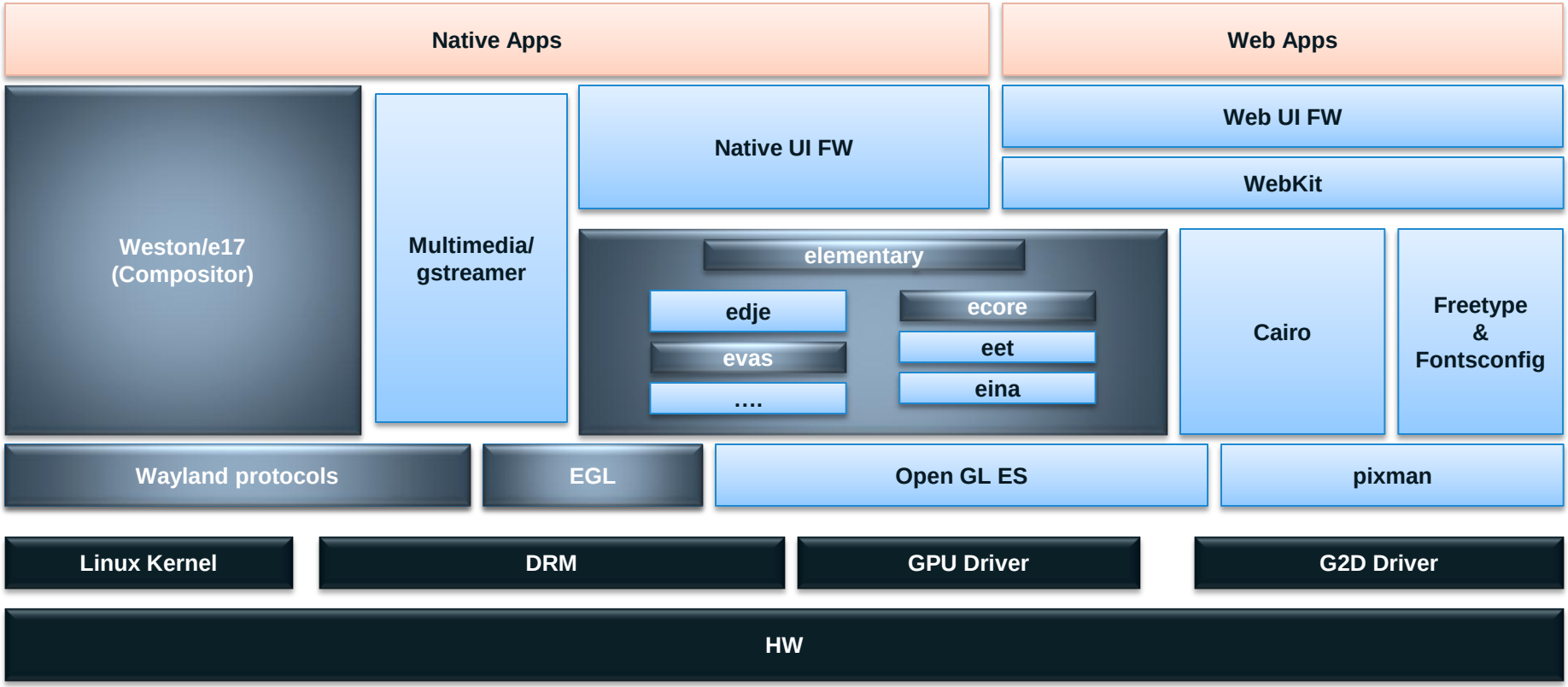
Tizen graphics stack with Wayland



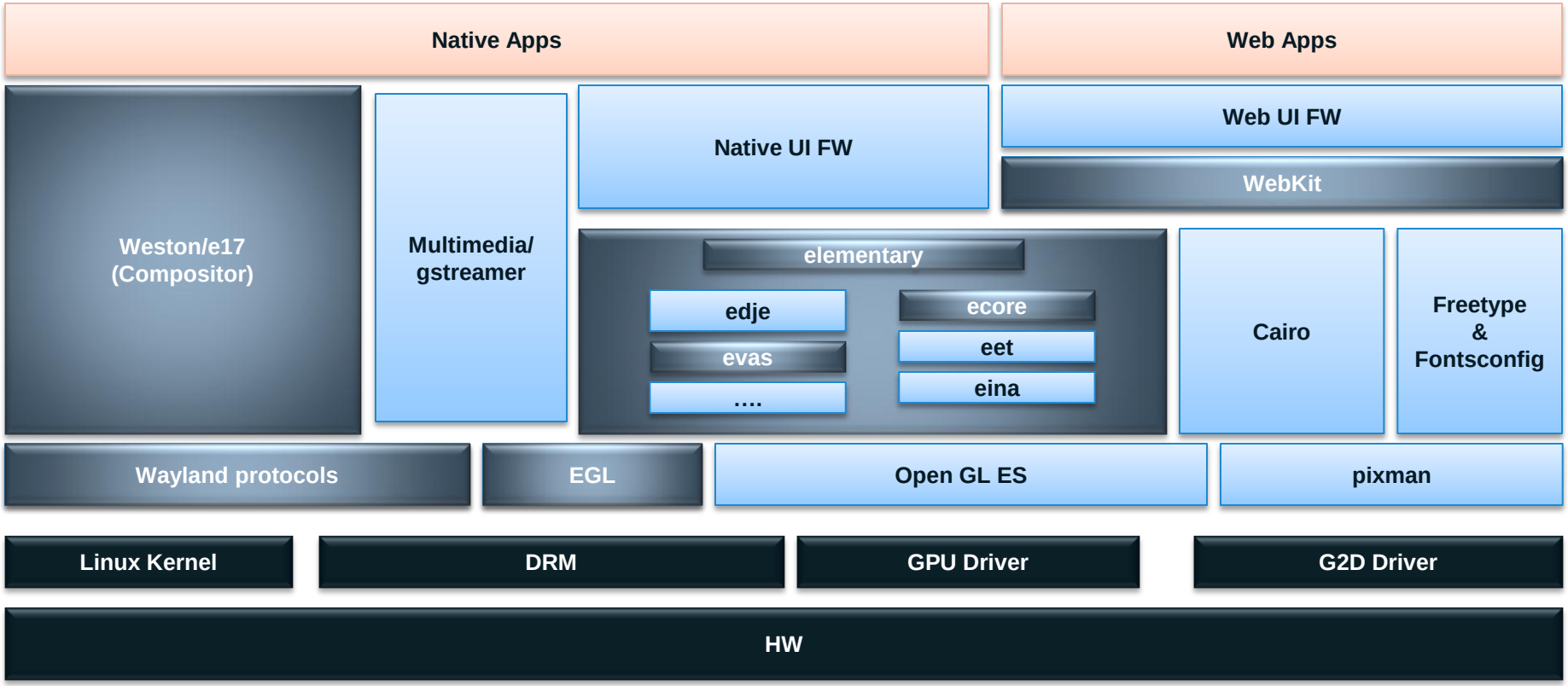
Tizen graphics stack with Wayland



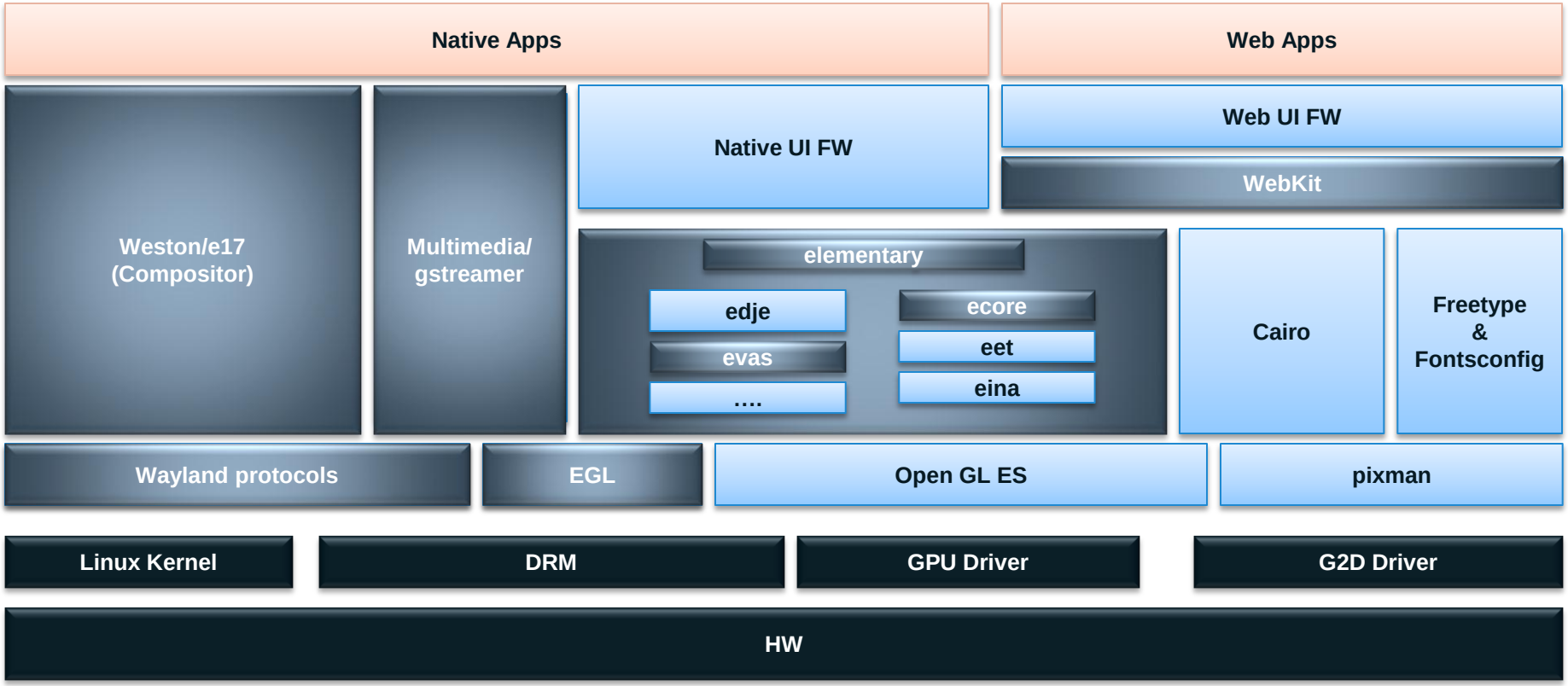
Tizen graphics stack with Wayland



Tizen graphics stack with Wayland



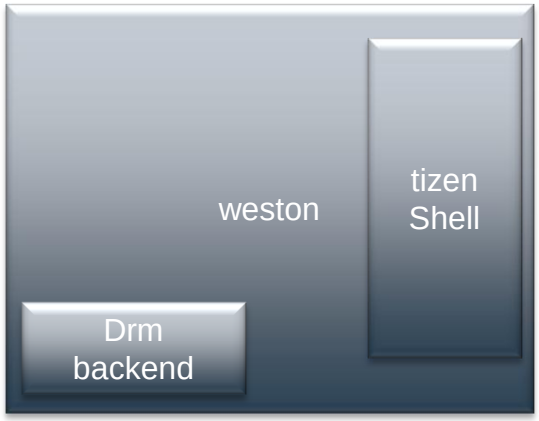
Tizen graphics stack with Wayland



Changes in general

- **Remove hardcoded Xorg dependency**
- **Add wayland protocol**
- **Extend EGL**
- **Add compositor**
- **Upgrade EFL**
- **Tizen Frameworks porting to Wayland**
  - App FW, Multimedia FW, Webkit/WRT…

Weston compositor

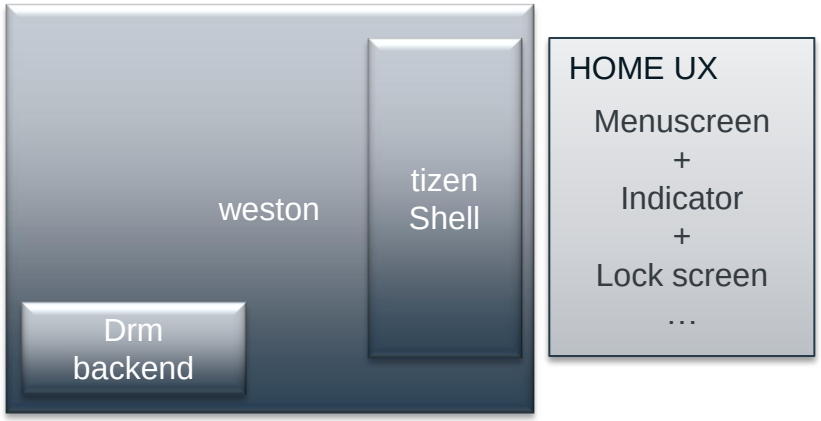


HOME UX

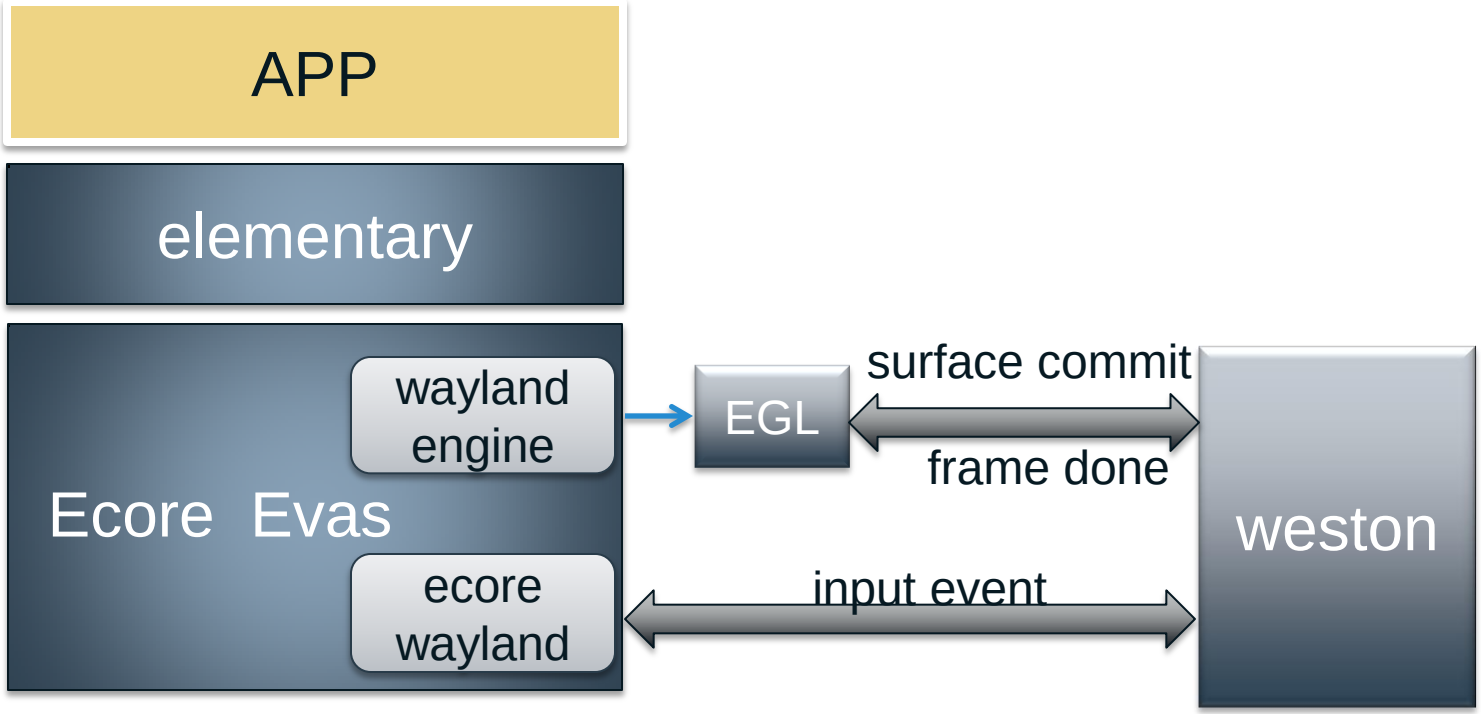
KMS **Wayland server** **Wayland clients**

gles+egl

Weston compositor



EFL with Wayland support



Native Applications

- **EFL**
  - Add the patches from upstream
- **APPFW**
  - Hide/show/Rotation to be re-implemented
- **Remove X Related API dependencies**

Webkit2

- **Buffer sharing between web and browser process**
  - wl surface (with dummy wayland egl window) to fake X pixmap

MultiMedia (with libva)

- **Driver render to wayland buffer**
- **Libva wayland backend**
  - setting up bridge between server and client
- **Gstreamer vaapi video sink**
  - Attach wl_buffer to wl_surface

Video driver

Libva wayland backend

wl_buffer

Video driver

Libva wayland backend

gstreamer vaapi

wl_surface

wl_buffer

attach

Video driver

gstreamer vaapi

wl_surface

Benefits

- **Memory saving in video**
  - Flexible buffer type(RGB/YUV), direction and size for composition
  - Inherent all benefits for overlay
- **Thin architecture for performance tuning**

Performance

Wayland’s thin architecture makes it possible and easier

Performance

- **Frame Rate**
  - 60 FPS(Frames Per Second)
  - 16ms for one frame from client to compositor

Performance: tool

- **E-Graph**

  We developed a tool to visualize log information and draw FPS curve

  Open source project hosted at https://gitorious.org/e-graph/e-graph

Live Demo for E-graph

Original state

- Fps curve and timing of critical events (drawn by E-Graph)
- For the scroll animation for org.tizen.Settings

The famous Triple buffering

- Add one buffer for the client and compositor to draw when the resource is blocked by waiting VSync

Triple buffering

- **Before**

  ~40fps

- **After**

  ~48fps

Triple buffering

- **Before**

  ~40fps

- **After**

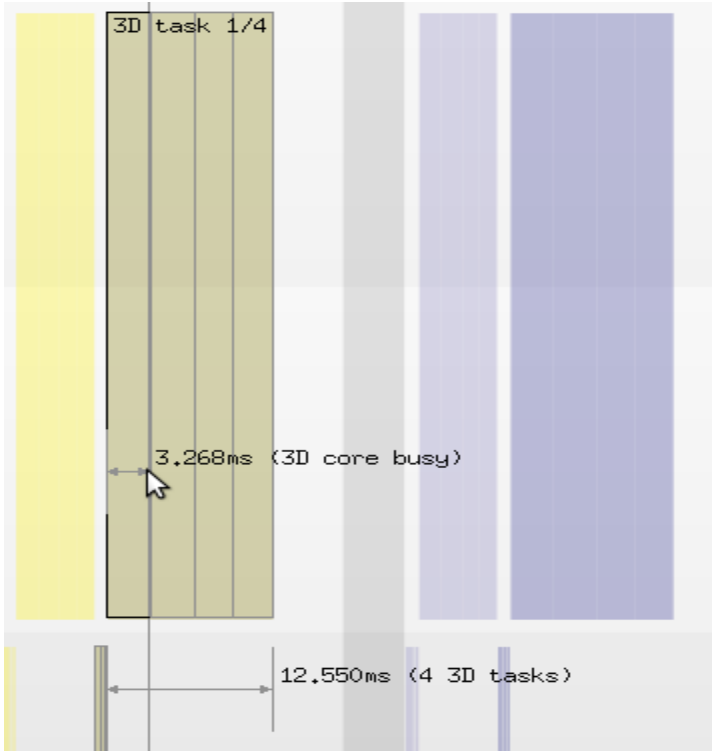
  ~48fps

Far away from 60fps

GPU usage

Time spend on composition

~13ms!



Opaque region

- **Weston needs opaque region information to do more efficient compositing**

Surface B will not be drawn

Root cause

- **No opaque region set for surface**

- **Weston redraw the overlapped surface**

- **Heavy work load during composition**

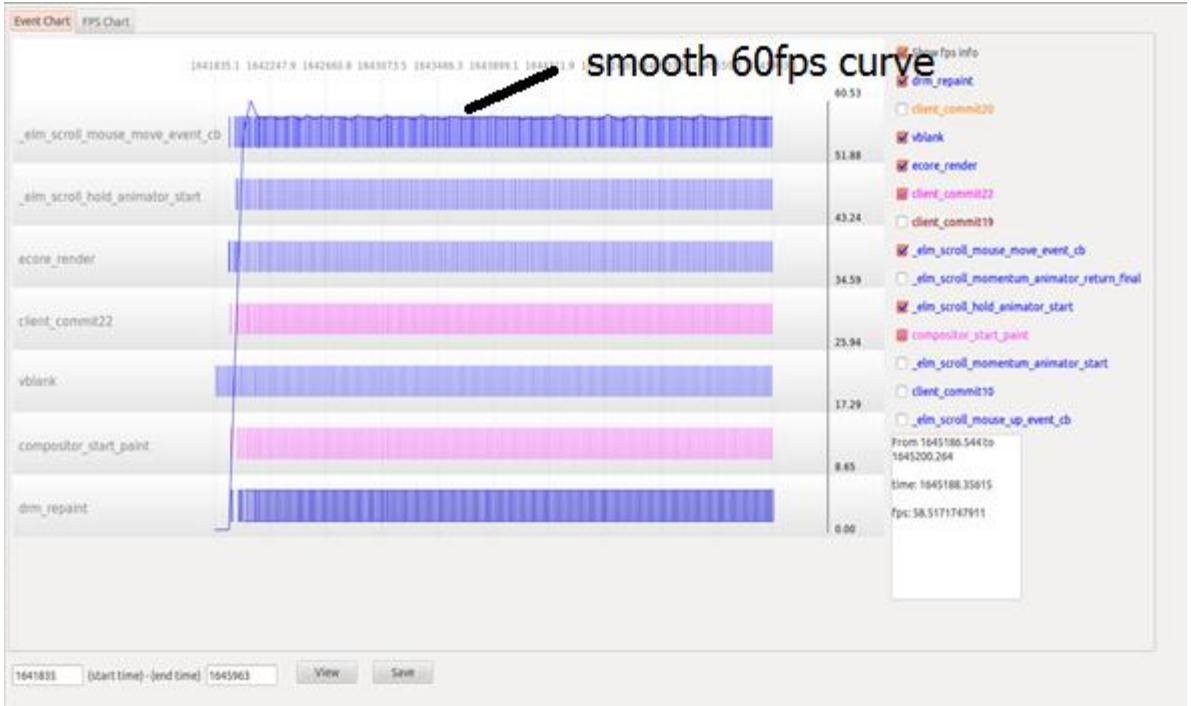
Action

to set the opaque region for wayland surface in ecore

Opaque region

- **Compositing time**
  ~13ms → ~5ms

- **FPS**
  40fps → 60fps



Summary

Embracing wayland

- Prove of Concept result: it’s Doable
- Wayland brings thin architecture for compositor and clients
- Easier to get to the performance goal

Wayland Upstream Resources

- **Maillist: wayland-devel@lists.freedesktop.org**
- **Wiki Page: wayland.freedesktop.org**
- **E-graph: https://gitorious.org/e-graph/e-graph**

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