

Wayland in IVI systems

weston, wayland ivi extension, waltham

FOSDEM 2019 Eugen Friedrich

- **Who I am and what is my daily business?**
- **High level overview of the Linux graphics stack**
- **Why we need something different in ivi as on desktop**
- **How weston is used for ivi?**
 - ◆ Weston overview
 - ◆ ivi-shell
 - ivi-application protocol
 - ivi-wm protocol
- **What's next?**
 - ◆ ID agent
 - ◆ Distributed HMI

Who I am and what is my daily business?

■ Eugen Friedrich

1984 born in Ukraine, since 1999 in Germany

school, army, master degree in applied computer science, married

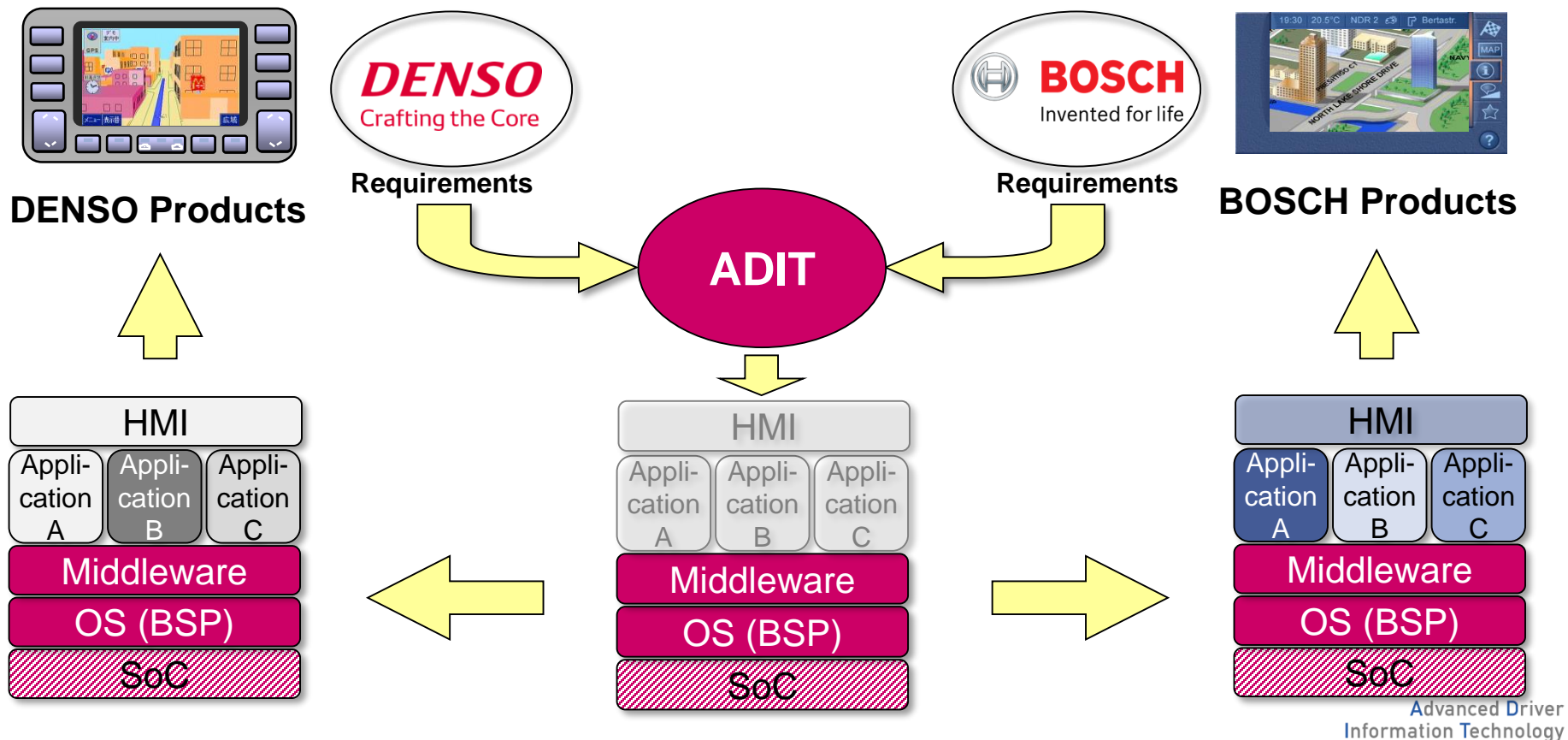
since 2010 till today employee at ADIT

Responsible for graphics stack in ivi platform including display pipeline, GPU, video-in, input handling.

Graphics domain lead

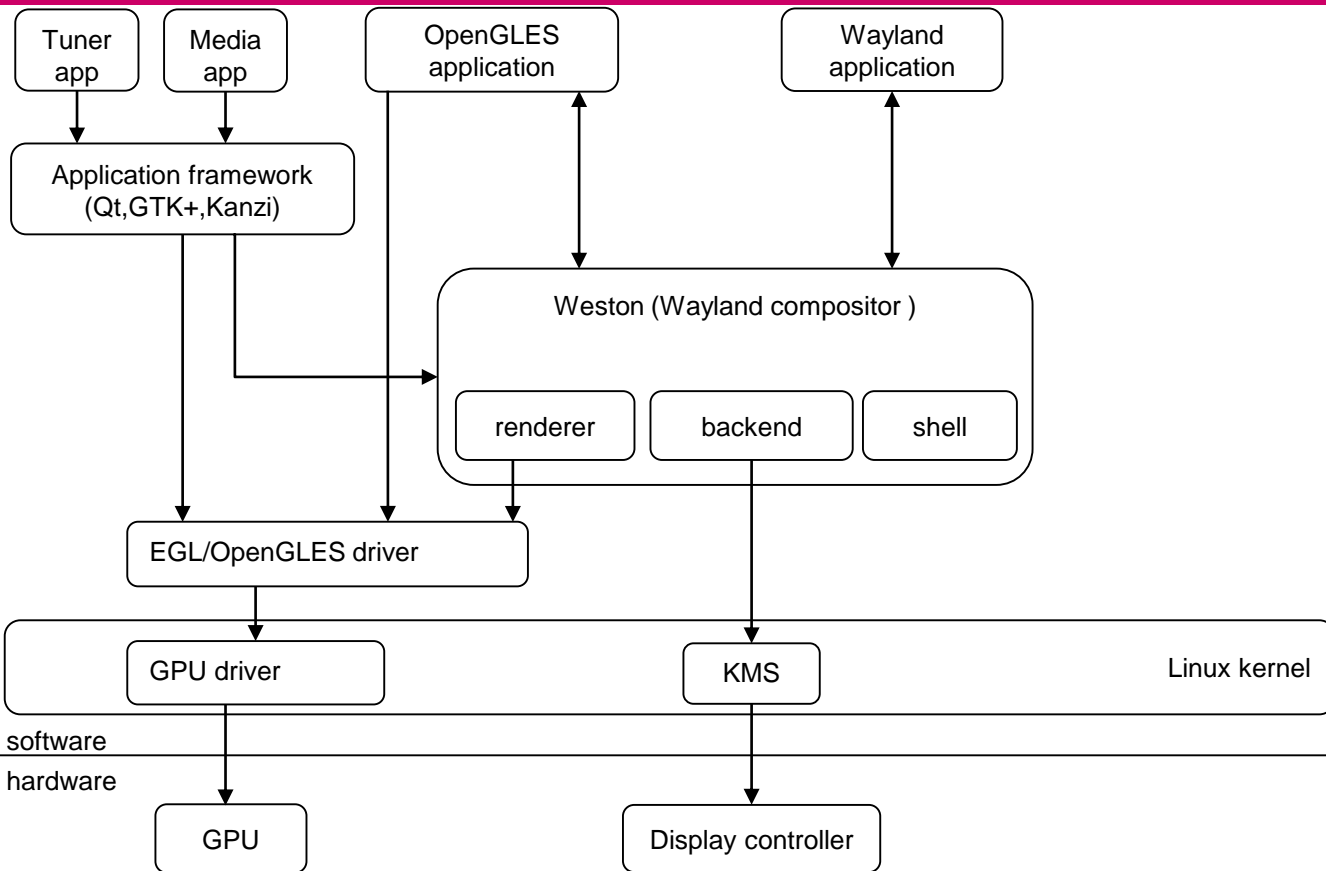
Private favourite activities: mountains, marathons, mathematics

Who I am and what is my daily business?



High level overview of the Linux graphics stack

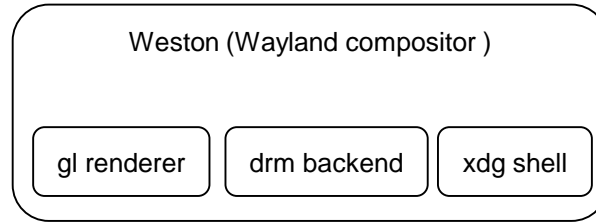
wayland case



Why we need something different in ivi as on desktop?

window management: user controlled vs system controlled

- **Wayland architecture suggests to implements the display server, compositor and window manager in single component wayland server -> Weston follows this suggestion**
 - ◆ Weston provides well defined plugin infrastructure

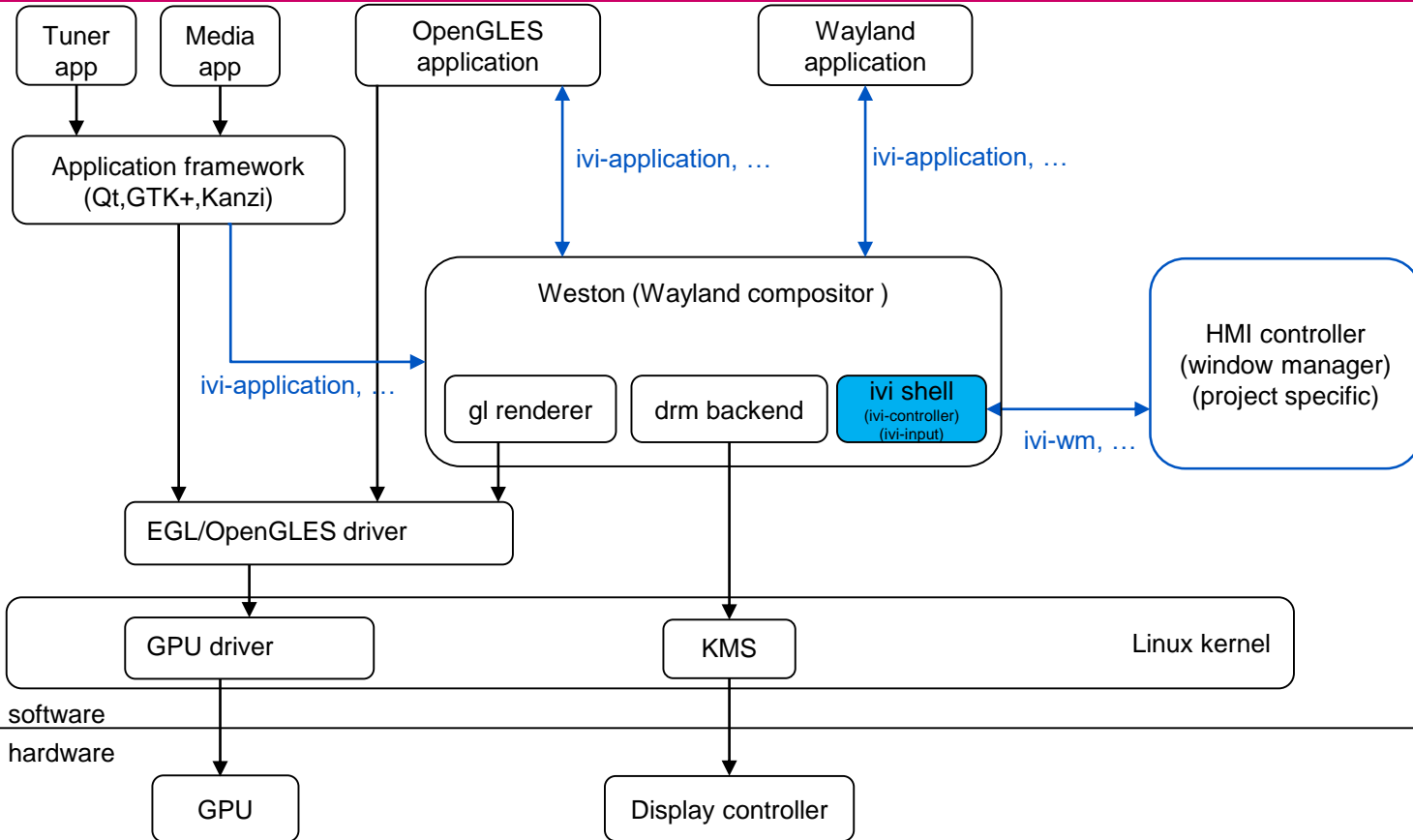


- **Main difference in ivi projects is the window management (shell plugin) and the applications**
 - ◆ Window management is project specific and typically user has less explicit control in ivi systems
 - ◆ Every OEM* has a set of applications or develops new applications for the particular project
- **Particular IVI project could implement own shell with own logic and implement applications accordingly, but this has far-reaching consequences:**
 - Applications are less portable
 - Harder to update Weston core since window management is implemented as plugin of weston

*Original Equipment Manufacturer: here some car manufacturer

How weston is used for ivi?

Graphical architecture with ivi-shell

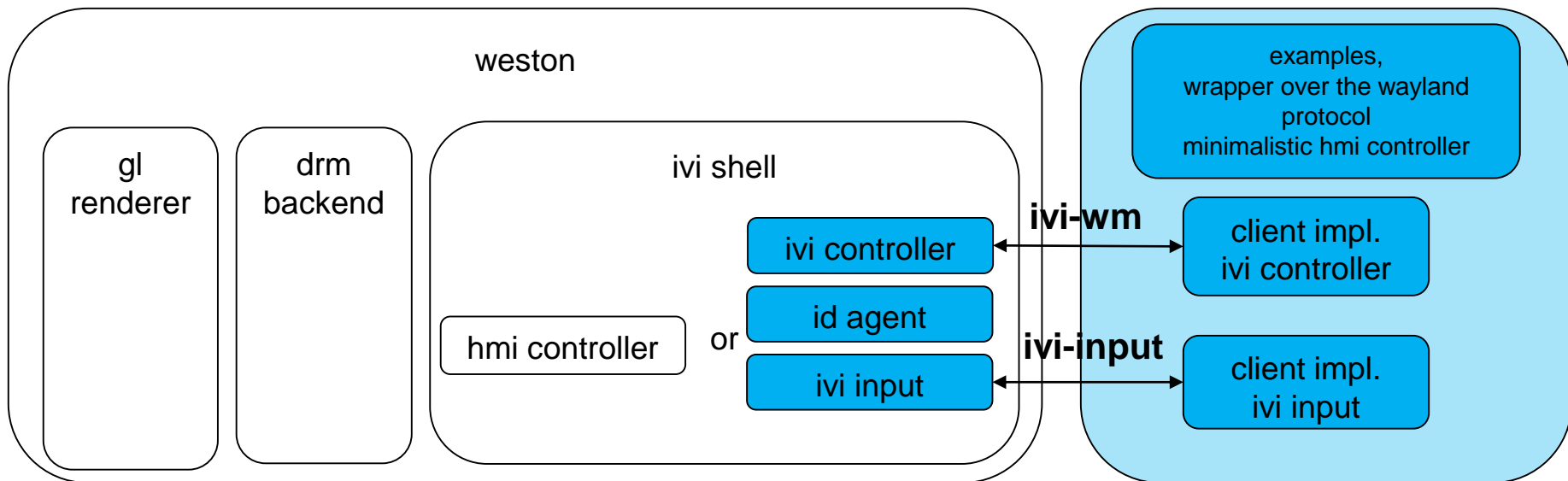


How weston is used for ivi?

wayland-ivi-extension

weston
repository

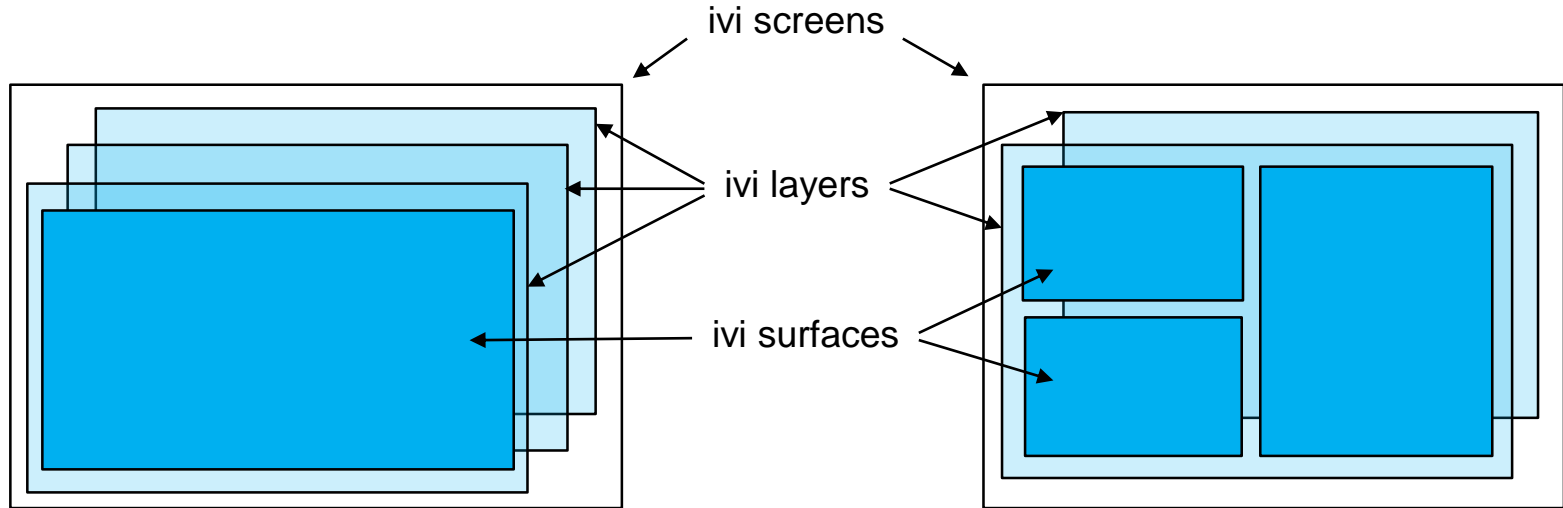
wayland ivi extension
repository



How weston is used for ivi?

ivi-wm protocol

- **ivi-wm protocol allow to build scene graph from 3 types of objects**



- **ivi-wm protocol provides events for object creation and deletion and also changes of the object properties**

■ Motivation

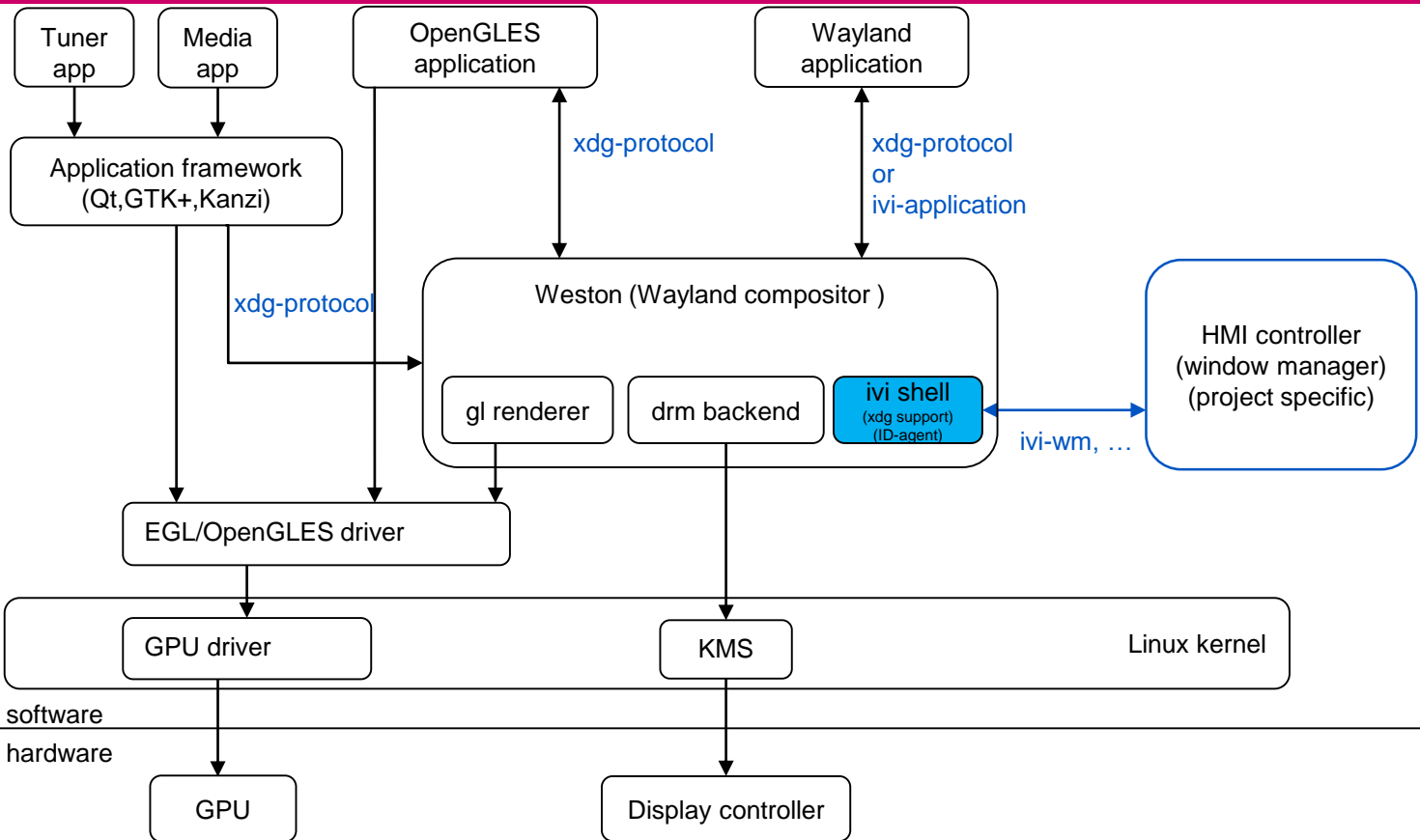
- ◆ avoid requirement to use ivi-application protocol in applications and frameworks
- ◆ add support for xdg protocol in the ivi-shell
- ◆ xdg protocol is designed to support desktop use cases and is supported also by many frameworks and even other wayland compositors (mir, gnome)

■ Solution: ID agent

- ◆ additional plugin for Weston (for ivi-shell) to generate and assign the ivi-id inside of the ivi-shell
 - Policy for id generation is decided by the concrete ID agent implementation, e.g. it can use some configuration which will map window-name attribute from xdg protocol to some ivi-id
- ◆ application can still use the xdg protocol and their visibility and e.g. position will be controlled by the ivi-wm protocol
- ◆ not all of the xdg protocol request can be full field as expected, e.g. dimensions of the client will be always limited by the ivi-layer

What's next?

ID agent



What's next?

distributed hmi, waltham

■ Distributed HMI use-case

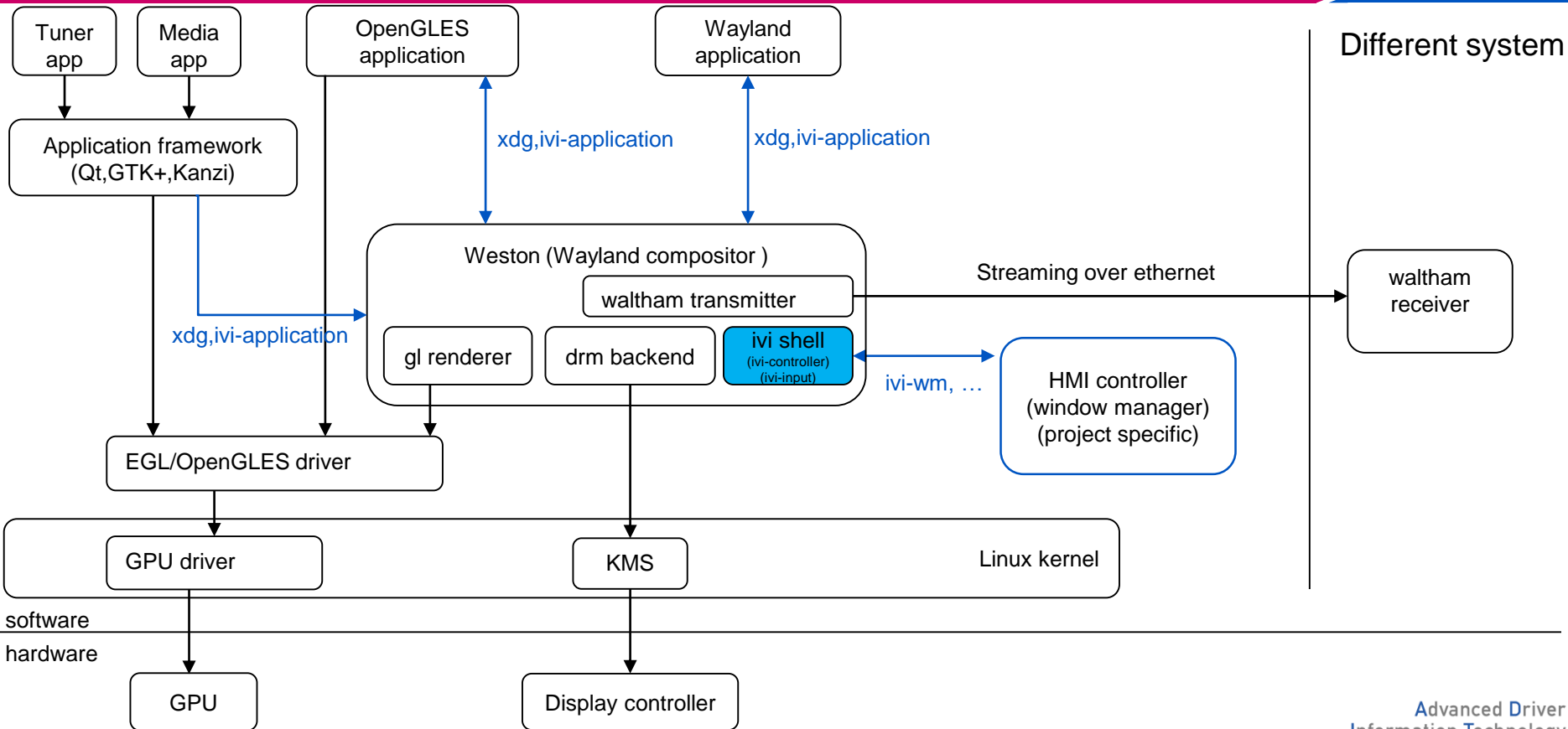
- ◆ Graphical content is generated on one device and displayed on another
- ◆ Systems can run on same or on different hardware
- ◆ Systems can be very different
 - mix of Android, Linux, QNX, Integrity

■ Idea: implement additional Weston plugin 😊

- ◆ Waltham plugin should use Waltham communication protocol for...
 - Negotiation of the sharing mechanism
 - Sharing meta data
 - Forward input events

What's next?

distributed hmi, waltham



What's next?

- **Write set of Waltham plugins for OS's and sharing mechanism**
- **Virtualization**
 - ◆ Needs performant implementation for memory sharing and standard protocol for communication about the changes and new content
- **Animation support in the compositor?**
- **Gesture support in the compositor?**

Do you have some?

■ Wayland

- ◆ <https://wayland.freedesktop.org/>

■ Wayland ivi extension

- ◆ <https://github.com/GENIVI/wayland-ivi-extension>

■ Waltham

- ◆ <https://github.com/waltham/waltham>

■ Genivi

- ◆ <https://www.genivi.org/>

■ AGL

- ◆ <https://www.automotivelinux.org/>

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