

Beyond complex cameras: Complex video graphs using PipeWire

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Who am I?

- Principal multimedia engineer @ Collabora
- GStreamer, PipeWire, ...
- WirePlumber maintainer

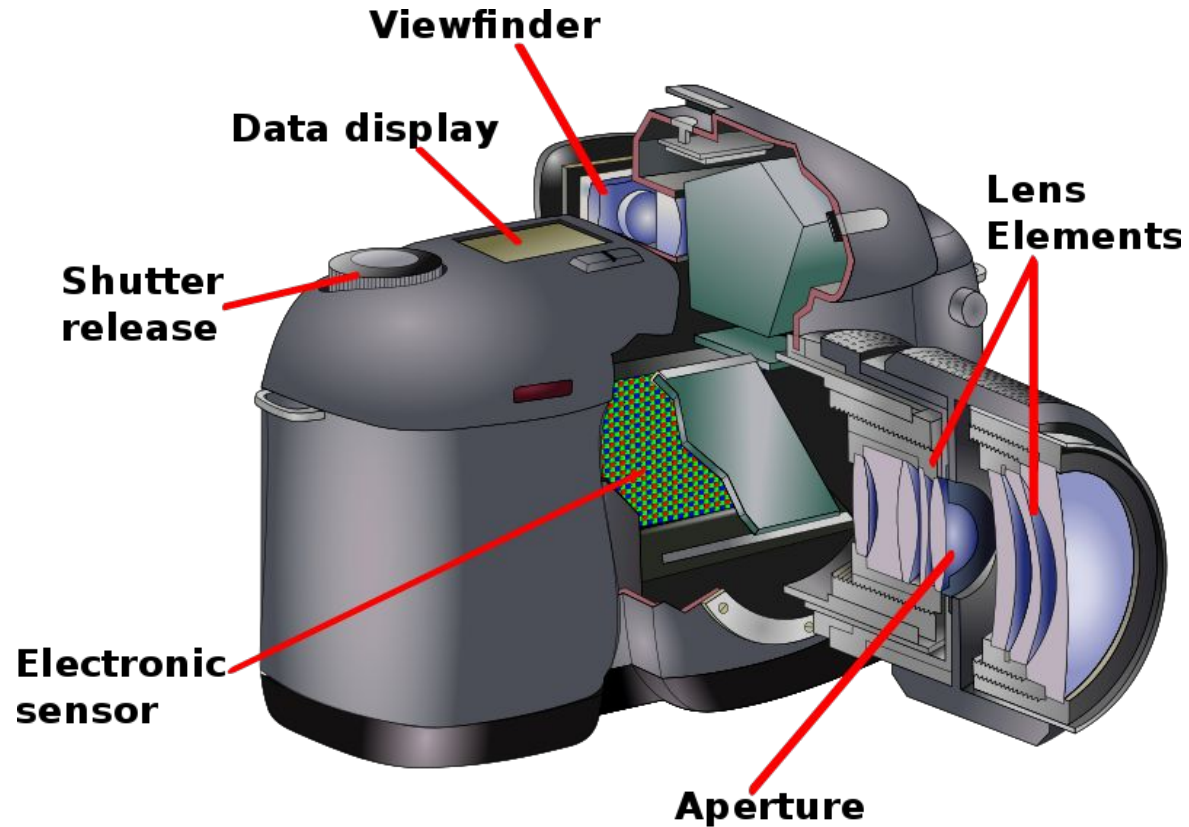




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Cameras

Cameras ...



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Cameras ...



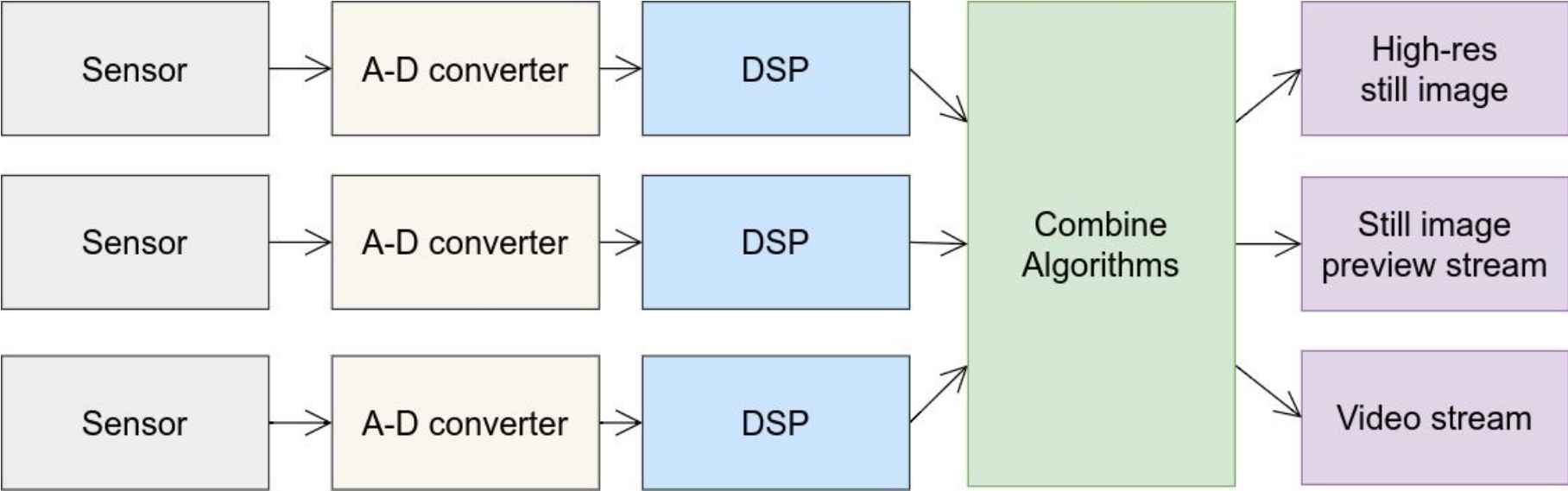
Complex cameras ...



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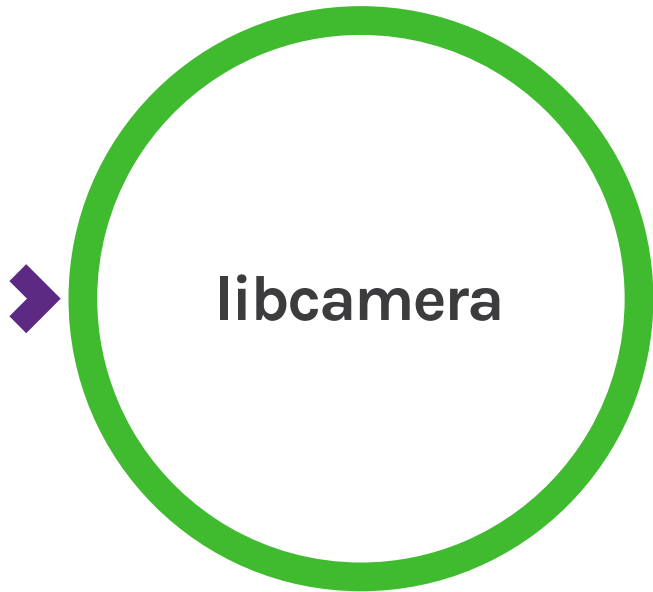
Complex cameras ...



Complex cameras ...

- Very different images captured from different sensors
- High computational requirements for combining
- Camera MCU, ISP & host CPU sharing the workload
 - Blurry boundary
 - Now also AI accelerators
- Images going back and forth between processing “blocks”
- Need software to manage the processing pipeline





- Manages devices, sensors
- Manages processing pipeline
- Runs (proprietary) algorithms, sandboxed
- Device-agnostic / Device-specific components
- Abstract API for userspace





Multiple sensors → Multiple devices

- How to combine data from **separate devices** ?
- Can we separate processing between userspace **processes**
 - and secure them in separate **containers**?
- As **complexity** increases, we need
 - Separation of responsibility: “Divide and conquer”
 - Versatility

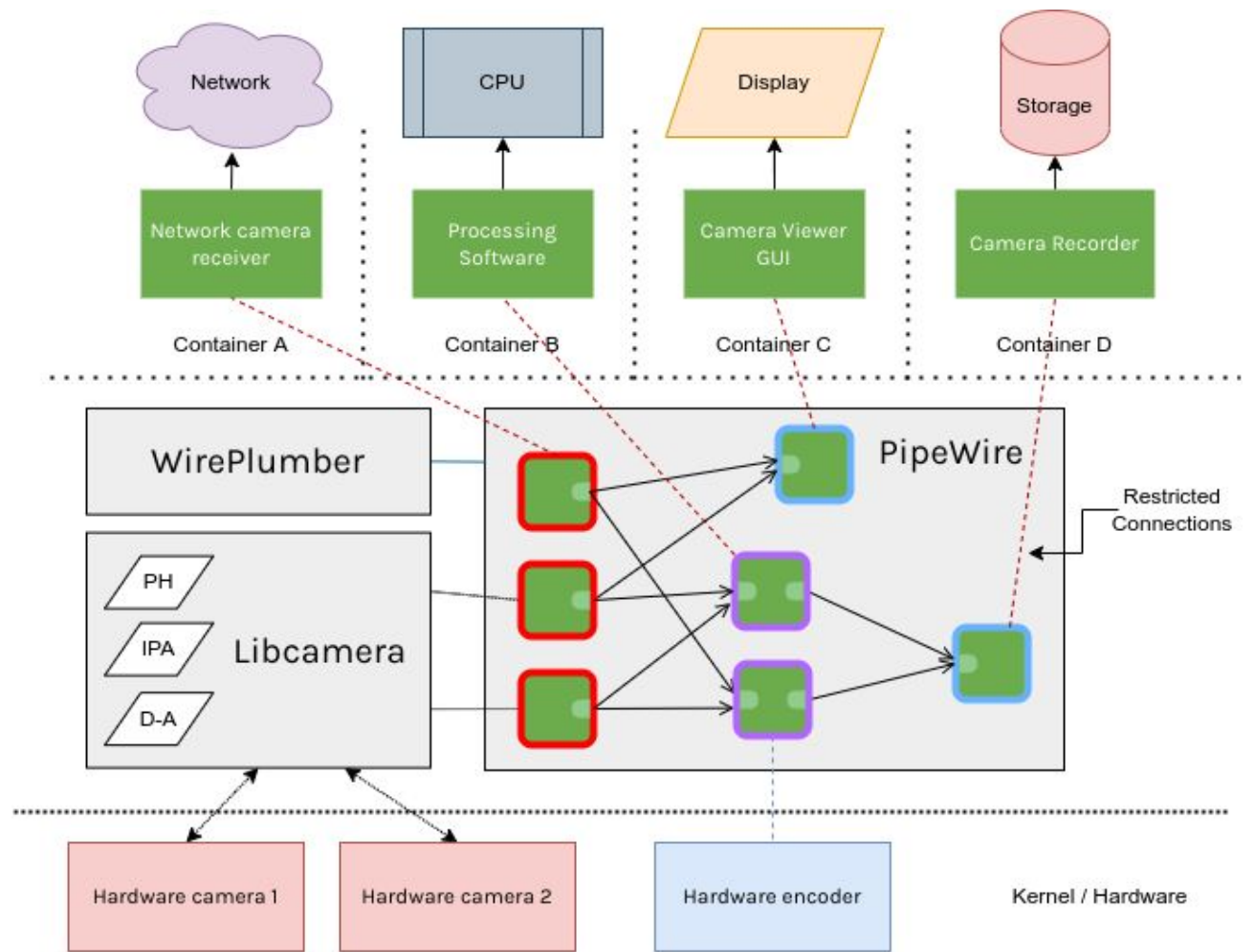


PipeWire

- Multimedia **bus**
- Multi-process MM graphs
- Resource sharing
- Low latency
- Low resource consumption
- External management component:
WirePlumber



PipeWire



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Applications

- Automotive (cameras, sensors, AI processing, ...)
- Cloud processing
- Mobile multimedia
- Many many more ...

Let's not forget audio

- PipeWire: default audio daemon on Linux desktop
 - Replaces PulseAudio & JACK
 - Also on Steam Deck & other devices
- State of the art Bluetooth audio infrastructure
- Complex audio graphs made possible





Best described with a demo ...



Next steps: your call !



Thank you!



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