PipeWire

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What is it

Multimedia sharing and processing engine
The multimedia stack

Browser  Skype  GStreamer  VLC  Ardour

App

Pulseaudio  JACK  wayland

V4l2  bluetooth  alsa  va-api  DRM

Kernel
PipeWire
Features

- Exchange media with devices and other apps
  - Zero copy, shared memory, memfd, dmabuf, eventfd
- Security per application
  - Visible objects (R), methods (WX), ..
- RT capable, low latency (<1.5ms)
- All media types + generic control streams
- Simple JACK-like scheduler + feedback loops
- Extensible: types, protocol, ...
- External session manager implements policy
Session manager

- Setup of devices
  - DSP processing, effects, mixers, ..
- Security of clients
  - What they can see, default permissions
- Management of links/nodes in the graph
  - What nodes and effects to link to (profiles, roles, ..)
  - Suspend of idle devices, volume restore, ...
- The things you want to configure
V4l2 capture/sharing

Client1

PipeWire-0

Client2

... To screen

Kernel

V4l2 bluetooth alsa

va-api DRM
Video capture

- Systemd socket activation in Fedora 29
- Gstreamer pipewiresrc
- Device Monitor
- Autovideosrc → Should work in cheese
Wayland screen sharing

Mutter → Screen Recording → Remote Desktop

Portal

PipeWire-0
Audio Support

- Pro Audio model like JACK is chosen
  - 1 format (float32)
  - 1 buffer size (but is dynamic in PipeWire)
  - Channels are split into mono streams
  - All nodes are woken up in each cycle in turn
  - Sinks have an audio adapter in front to mix, merge, resample, split and convert the channels
  - Sinks are created/destroyed dynamically
    - Multiple sinks/sources
    - Automatic clock slaving
Audio setup

PipeWire-0

Hw:0

Hw:1

Hw:0

a2dp

V4l2  bluetooth  alsa  va-api  DRM  Kernel

Session Manager
Pro audio
Audio stream

- Takes input from client (asynchronously)
- Does conversion
  - Resample
  - channelmix/volume
  - Format conversion
  - Channel splitting into DSP
  - Decouples server buffer size from client requested latency
- Flush/drain
Audio server

- Media player
- Alsa app
- JACK app

PipeWire-0

Hw:0

Session Manager
API support

• PulseAudio apps
  • Replacement libpulse.so, libpulse-mainloop-glib.so
  • Built with streams API

• ALSA apps
  • PipeWire plugin
  • Built with streams API
JACK support

• Integration with device reservation API
  • When JACK claims device, replace our device with JACK client and we simply become a jack client.

• For sandboxed apps
  • Replacement libjack.so
  • Built on top of native PipeWire
Latest changes (work branch)

- Unit tests + benchmarks + api cleanups
- Client permission API
- MIT relicensed
- DLL for resampling and audio timing in devices
- Cursor and bitmap metadata
- Device objects + profiles
- Work on pavucontrol (peaks resampler, profiles, volumes,...)
Future plans

- More Latency/timing handling between nodes
- More session policy (dynamic samplerate, compressed formats, ...)
- Merging devices/clock slaving
- Transport
- Video path/effects…
- JACK handover
- Implement missing pulseaudio features
  - See https://github.com/PipeWire/pipewire/wiki/TODO
http://pipewire.org
https://github.com/PipeWire/pipewire

Questions?