

GStreamer

State of the Union

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Welcome to London!

Nice to see everyone again!

What have we been up to?

Stats

- 2650 commits in the Monorepo
- 875 commits in the Rust plugins
- 415 commits in the Rust bindings
- 440 commits in Cerbero
- **4380 commits total**
- **33% in Rust!**

... since the last conference

Releases

- 1.20: February 2022
- 1.22: January 2023
- 1.24: March 2024
- 1.26: March 2025
- 1.28: ??

1.26 stable series

- **7 bug-fix releases** since March
- 325 backported merge requests
- 650 commits
- **every ~3-4 weeks**

Upcoming 1.28 stable

- Target: **December 2025**
- On track so far
 - Had **several 1.27 development snapshots**
- Next step: **feature freeze**, then **API freeze**

Let's look at some things
people have been
working on

Codecs

- H.266 / VVC
- Low Complexity Enhancement Video Coding
 - H.265 + H.266, decoding + encoding
- AV1, VP9 SVC handling improvements
- AV1 improvements
- HAP video

Closed Captions

H.264 + H.265 caption extractors and inserters

Lots of miscellaneous fixes and improvements

MPEG-TS

- Custom mapping for VP9
- Custom mapping for AV1
- SMPTE 302M audio muxing
- mpegtslivesrc for UDP, SRT, DVB
- Can disable skew correction in demuxer

Adaptive streaming

- HLS, CMAF muxing improvements
- hlsmultivariantsink for multi-variant playlists
 - S3 variant pending
- New DASH CMAF sink (in gitlab)

Speech, Text, Translations

- Speech to Text
- Text to Speech, incl. pacing
- Translations
- Voice cloning
- deepgram speech-to-text transcription
- elevenlabs text-to-speech

Analytics

- New hardware support in ONNX
- LiteRT inference element
- More relation metas
- More tensor decoders
- Batch meta to batch buffers from one or more streams
- analytics combiner and splitter elements

WebRTC

- janus video room signaller for webrtcsrc
- WHEP client signaller
- old WHEP/WHIP plugin is obsolete now

Vulkan

- H.264 encoder
- H.265/HEVC decoder 10-bit support
- VP9 decode + encode
- **lots** of other improvements

Direct3D12

- d3d12 deinterlace element
- d3d12 screencapturesrc HDR capture
- too much to mention, go see Seungha's talk!

Wayland

Basic colorimetry support

Parse and set the HDR10 metadata

Other colour management improvements

VA-API

- gstreamer-vaapi module is gone!
- replaced by va plugin
- encoders now have a rank
- H.266 decoder
- VP8 encoder
- VP8/VP9 alpha decodebin

Qt/QML

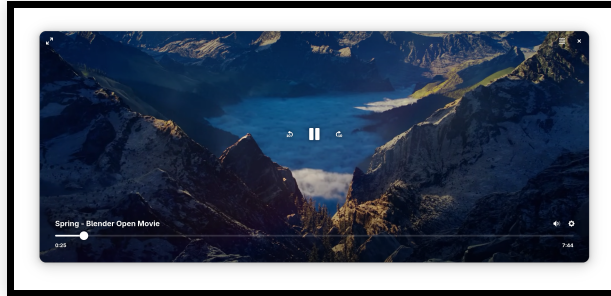
qml6glovoverlay

supports a direct QQuickItem for the render scene
(in addition to the existing text description)

GTK4 paintable sink

- YUV (8/10/12/16 bit) support
- colorimetry support
- **lots** of other improvements
- used in ShowTime

ShowTime replaces Totem



GTK4 rendering is hardware accelerated with
OpenGL and Vulkan

GstPlay

improved stream selection API/implementation

AMD HIP plugin

AMD's GPU programming API for portable, CUDA-like development on both AMD and NVIDIA platforms

Runs natively via the ROCm stack on AMD GPUs

Thin translation layer using CUDA runtime on
NVIDIA GPUs

Cuda

CUDA compositor

Lots of other improvements

Skia compositor

Bindings

- **New C++ bindings** in the works
- **Go bindings**

Bindings

- **Python bindings** improvements
 - pygobject minioobject writability issues partially fixed
 - iterator for AnalyticsRelationMeta
- **Rust bindings** improvements
 - gst-vulkan rust bindings
 - gst-d3d12 rust bindings

1:N pipeline splitting

- **unixfd** works out of the box in most scenarios now
- **inter** improvements
 - more properties

fallbacksrc

Now has multi-stream support via the Streams API

GstLogContext API

Allows fixing of debug log spam

Editing Services

Has seen lots of active development recently

Pipewire integration

Existing plugins were in poor shape for a long time

GStreamer pipewire elements are being improved

Cross platform

- **Windows** has been top tier for a long time
- **macOS** has received some more love recently
 - audio and vtenc/vtdec

Cross platform

- **Android** media improvements for modern versions
 - cmake build integration
- Rust plugin size improvements on all platforms

Performance

- **Lower latency** (audio + video)
- **dmabuf handling improvements** and integration for zero-copy
- Better **scalability** via threadshare
- Downstream pool support in dav1ddec

The Future ...

moar Rust

Media over QUIC (MoQ)

- Builds on top of QUIC (d'oh)
- WebTransport (server-client model)
- Simpler replacement for WebRTC for certain low-latency use cases
- MoQ publisher and subscribe in plugins-rs MR

WebRTC goes Rust

- ICE: librice
- drive RTP stack further
- more RTP (de)payloader rewrites coming up
- improve scalability

MPEG-TS goes Rust

More Rust rewrites?

- Demuxers
- Parsers
- RTSP server?

More Analytics

- Tensor decodebin
- caps definition refinement
- more image formats for science / geoint
 - signed integer
 - floating point
 - complex numbers

More speech + translation

Got support for lots of cloud services

Would be nice to have things that also work offline

More formats

- MPEG-H support pending
- HDR10+ support
- AV2

Playback stack improvements

- multi URI inputs
- Playsink
- GstPlay API
- Allow decoder selection tweaking
- Stream selection improvements
 - for variants and enhancement streams

Re-organise modules?

Update and simplify our module story. Some day.

Continuous Integration

- Run tests and integration testsuite on Windows + macOS
- Test hardware acceleration support in upstream CI
- More sanitisers (ASAN, USBSAN etc)
- improve flakiness

Nightly builds

- Has been on the list for a while
- More infrastructure work required
- Goal: create release binaries on the CI
- Signing of binaries would be nice too

Tracing + Debugging (evergreen)

- more tracers
- nicer UIs
- improve output side (common log/trace formats)

Thank You!

Questions?

Enjoy the Conference!