GStreamer in the living room and in outer space

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Introduction
Who?

• Long-term GStreamer core developers and maintainers since 2005/6

• Founders of Centricular Ltd
  – Consultancy offering services around GStreamer, graphics and multimedia related software
What is this all about?

- What is GStreamer?
- Cool stuff people are doing with it
- The Future
GStreamer? What is it?
GStreamer

- Pipeline-based multimedia framework
- Basic building blocks: elements connected via pads
- Set of libraries with abstract API
- Plugins for specific features
  - Often wrapping other libraries, e.g. libav/ffmpeg, OpenCV, various codec libraries
GStreamer (cont'd)

- Open Source, LGPL v2.1+
  - Proprietary applications and plugins allowed
- Cross-platform
  - Linux, embedded Linux, Windows, OSX, iOS, Android, ...
  - Binary SDKs for Windows, OSX, iOS, Android
  - x86, ARM, PowerPC, SPARC, ...
- Stable GObject based C API/ABI
- Bindings for many languages
  - Python, C++, JavaScript, .NET, ...
GStreamer (cont'd)

- Not a media player or playback library
- Not a codec and protocol library
- Not a transcoding tool
- Not a streaming server

- But can be (and is) used to implement all that
GStreamer (cont'd)

• Goals
  – Flexible and extensible design
  – Easy to integrate with other software
    (in both directions)

• Large, active developer and user community

• Large commercial ecosystem
  – Users
  – Contributors
  – Consultancies
Cool stuff people are doing with GStreamer
Desktop Environments and Apps

- GNOME, Enlightenment, XFCE, KDE
  - Media players, screen capturing, camera usage, ...
  - First larger scale usage
- Qt
- OpenJDK
- Libre/OpenOffice
The Web

- WebKit
  - GTK+, EFL, Qt, Windows/Cairo ports
- Firefox
- Blink (Chrome) extension
- OpenWebRTC
  - New WebRTC client-side implementation by Ericsson
  - Available with sample apps for Linux, Android, iOS and OSX
  - Work in progress, WebKit integration planned
Server Side

● Kurento
  - WebRTC / HTML5 streaming server
● Streaming & transcoding servers
  - RTSP, DASH/HLS, etc.
  - Commercial hardware boxes
● DLNA server implementation Rygel
Video Editing
Video Editing

• PiTiVi
  – Non-linear video editor
  – Fundraiser still running: http://fundraiser.pitivi.org

• GStreamer Editing Services Library
  – Used in PiTiVi
  – Even used in commercial products
Video Editing

FAST, ACCURATE, & AUTOMATIC

With a single button, PluralEyes analyzes the audio from your cameras and audio devices and syncs them up, in seconds. No clapboards or timecode are needed.
Music Composing & Audio Editing

- Buzztrax: Sequencer, synthesizer & tracker
- Put together various instruments graphically, define control curves for properties and let them run
Music Composing & Audio Editing
Classroom Presentations

- Broadcast teacher's screen or single student screen
- Remote control of student screens
- Tablets, phones and desktops
- Video on demand
- Easy in theory, but tricky in practice
  - WiFi, lots of devices in a small area, no useful multicast, ...
Classroom Presentations
Classroom Presentations
Ingest / Playout Servers

• Live recording, broadcasting, mixing
  – Defined latency
• Scheduling of recorded shows
• Overlaying, subtitling, new ticker
• GPU usage
• Needs to run reliably 24/7
• SDI input/output, file or network
  – Blackmagic Decklink cards and many others
Ingest / Playout Servers
Set-top Boxes

- Live TV, DVB, IPTV
- Personal Video Recorder
- Catch-up and video on demand
- Low-cost embedded SoCs
- YouView/BBC, Dreambox, free.fr, ...
Set-top Boxes
TVs

• Basically the same as for set-top boxes

• LG WebOS, Samsung Tizen
TVs
Integrated Entertainment Systems

- In-flight entertainment (IFI)
- In-vehicle infotainment (IVI)
- Video-on-demand
- Sharing between users
- Public announcements
- Synchronized multi-device playback

- GENIVI Alliance
Integrated Entertainment Systems
Integrated Entertainment Systems
Video Walls & distributed speaker systems

- Frame-accurate synchronized output
  - Also for audio
- Aurena: https://github.com/thaytan/aurena

- Control & command rooms
- Video walls
- Digital signage
Video Walls & distributed speaker systems
Drones / UAV

- Most known for military and espionage use
- Increasingly non-military, civil use cases
  - Rescue & emergency
  - Law enforcement
  - Packet delivery
Drones / UAV
Augmented Reality
Home Security Systems

- Security cameras
- Motion detection
- Recording & streaming
IP Conferencing & Communication

- Low-latency, multi party conferencing
  - Also in commercial products
- WebRTC, SIP
Event Recording & Broadcasting

- Timvideos
  - e.g. used by LCA2014 for presentation recording

- Ubicast
  - Company providing services using a proprietary application
Media Management & Publishing

- Mediagoblin
  - Deploy your own YouTube, Flickr, SoundCloud
- Rdio
  - US service similar to Spotify
  - Uses GStreamer in the streaming backend
Media Management & Publishing

Caminandes: Gran Dillama

Caminandes is an independently produced short animated series, inspired by the good old Chuck Jones cartoons. Caminandes is produced using FLOSS (Free/Libre Open Source Software) such as Blender, the GIMP, Krita and GNU/Linux.

You can find out more about Caminandes at http://caminandes.com!
Mobile & Embedded Devices

- Various iOS and Android apps
  - Also integrated in some Android devices, e.g. Samsung Galaxy Xcover
- Part of many embedded Linux SDKs
  - Raspberry Pi, Freescale iMX, RDK, TI, …
- Support for lots of hardware and APIs
  - OpenGL integration, V4L2, OpenMAX, OpenSL, …
Gravitational Wave Research

- **LIGO**
  - Laser Interferometer Gravitational-Wave Observatory
  - Trying to detect gravitational waves of collisions of neutron stars
- Large scale signal processing
  - Pipelines with 1000s of filters
- Large parts free software
International Space Station

• “Hi! Over the last few months I've been working on a project for the European Space Agency that is scheduled to be launched next year for use on the International Space Station, providing astronauts with a mobile procedure viewer in the form of a slightly modified Nexus 5 smartphone.”

• Scheduled to go up in Q1/2015
The Future
Development Tools

- Tracing subsystem, better debugging facilities
- Debug log viewer
- Continuous integration
  - Automated QA and builds
- More QA tools
  - gst-validate, GstHarness
- More convenience APIs
Features

- Improved trick mode support
  - Incl. DLNA & adaptive streaming
- Stereoscopic 3D support
- Improved audio/video editing support
- DASH/HLS streaming server
  - And generic file segmenting
- More cross-platform improvements
- Better APIs and support for metadata extraction
Thanks!

Any questions?

Find more information at http://gstreamer.freedesktop.org