GStreamer in the living room and in outer space

FOSDEM 2015, Brussels
Open Media Devroom
31 January 2015

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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, …

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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*

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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

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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
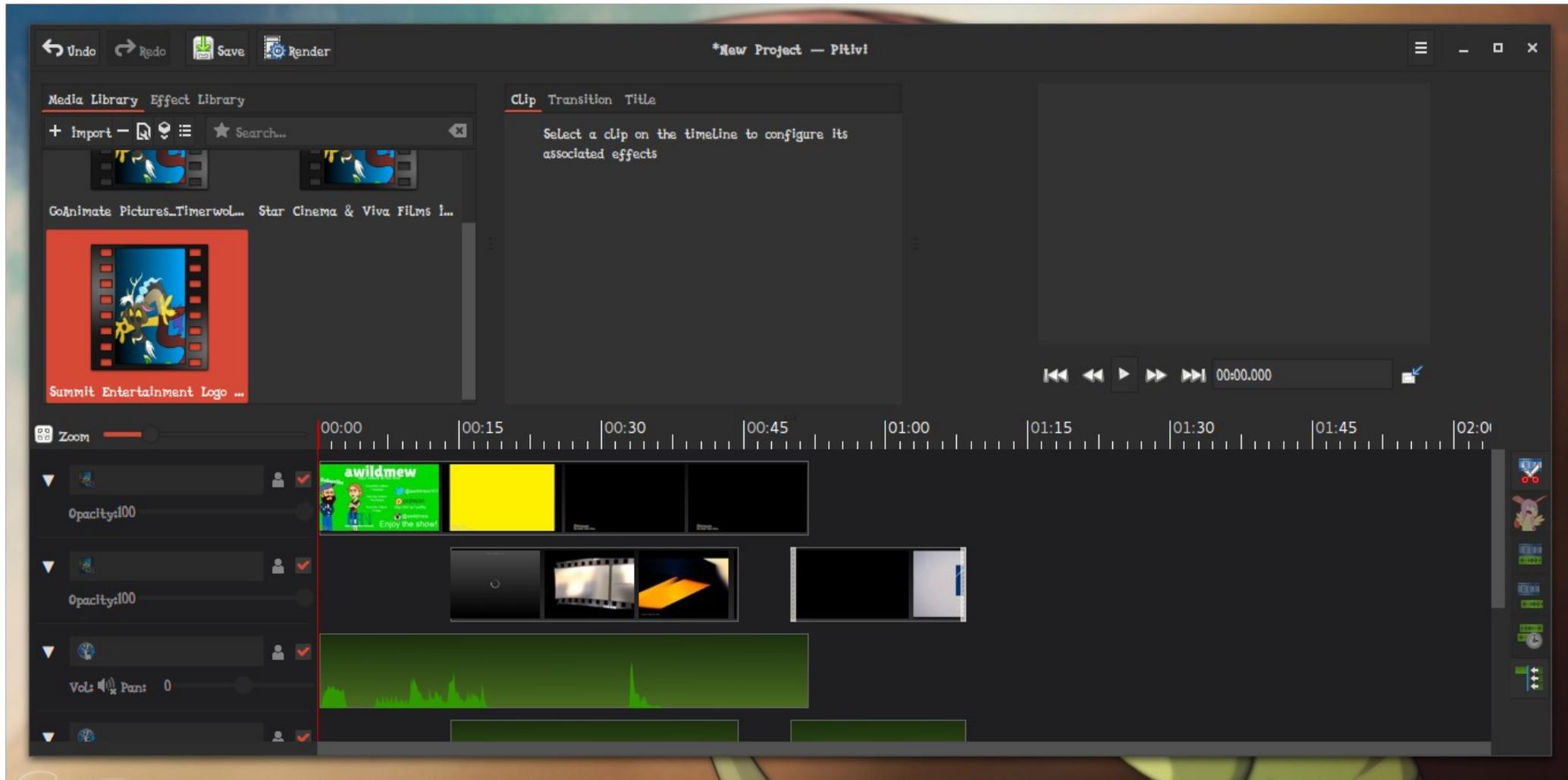
Video Editing

- PiTiVi

  - Non-linear video editor

  - Fundraiser still running: http://fundraiser.pitivi.org

- GStreamer Editing Services Library

  - Used in PiTiVi

  - Even used in commercial products

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Video Editing

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, ...

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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, ...

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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

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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

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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

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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

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Media Management & Publishing

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, …

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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

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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

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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