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Abstract

A new implementation of the MPEG-4 Systems standard has been released in July 2003 - code-named GPAC. It is made available to the public under the terms of the GNU General Public License. This contribution explains what the project is about, its history and what parts of the MPEG-4 Systems standard it covers.

I What is GPAC ?

I.1 Overview

GPAC stands for "GPAC Project on Advanced Content", following the obscure reasons that made the open-source community addicted to recursive acronyms. The goal of this project is to provide a complete framework for rich media authoring, distribution and consumption using the MPEG-4 standard.

GPAC is written entirely in C ANSI, is designed to be as flexible as possible, light, configurable and hopefully easily portable.

GPAC is truly open-source (GPL license) and is hosted on the SourceForge site (http://gpac.sourceforge.net). It is currently not intended for end users and is badly needed some porting efforts!

I.2 Another Implementation

The GPAC project has been developed over 2 years with one goal in mind: implementing the MPEG-4 Systems standard in ANSI C to ensure the best portability possible and a decent memory footprint. Releasing it as an open-source project was decided for several reasons:

- Alternate implementations are always good to check and verify standards, open-source ones are even better for people to deeply understand specifications,
- have people play with the MPEG-4 standard and become more familiar with it, its capabilities and its applications,
- provide a simple and light multimedia framework for people and universities to easily test and integrate tools without having to reinvent the wheel,
- bring the open-source community to MPEG-4 systems after having introduced MPEG-4 video and audio.

As most universities, we believe in open-source as the best way to avoid effort duplication and provide good quality software for the research community (and hopefully good documented software soon ☺). Moreover, software media players for computers being usually not a heaven for venture capitalists, the open-source is probably the most viable way to deal with such a huge project as a complete MPEG-4 framework.

1.3 Another Osmo4

As said above, implementing a complete MPEG-4 framework takes quite some time and everything that can help reduce the amount of work is always welcome. Thanks to the media lab of ENST, the GPAC framework has been granted with a good and well-tested 2D renderer developed for the Osmo4 player. After porting to C and code clean-up, the result was obvious: the Osmo4 work had been extremely useful. Hence the decision to call the player provided in the GPAC framework Osmo4 as its famous ancestor, and restart versioning to match the GPAC releases.

In other words, “Osmo4 est mort, vive Osmo4!”

II GPAC Tools

The current release of the GPAC framework (version 0.1.0) implements a very complete subset of the MPEG-4 standard, mostly focused on 2D applications. You will find in GPAC:

- MPEG-4 File Format (MP4) providing reading, writing/capturing, edition with configurable interleaving of media data, RTP hint track and Movie Fragments.
- Object Descriptor Framework providing OD codec and OCI codec.
- BIFS and Scene Graph with BIFS Command Decoder, quantization, common interactivity (events and routes, interpolators, conditionals and valuators), ECMAScript support through SpiderMonkey engine and PROTO support.
- Media Stream Management with native support for any scalable codecs (including BIFS), spatial and temporal scalability (including frame reordering), streams synchronization, media management/scheduling, stream control and segment descriptors (media control, media sensor), OD commands and inline scene support (local or remote).
- 2D Scene Renderer with direct and indirect rendering, support for most 2D nodes defined in BIFS and most of the new amendment to the standard (Advanced Text and Graphics), audio rendering and software mixing (this is the worst part of GPAC).

- SDP, RTP and RTSP library still under development

Most of GPAC subsystems are implemented are dynamic plugins, the current version provides modules for:

- 2D rasterization (GDIplus, ANSI C software renderer)
- Font abstraction (GDIplus, FreeType)
- Media Decoding (FAAD, XVID, MAD, PNG, JPEG)
- File downloads (HTTP)
- MP4 reading (from disk or from network)
- RTP/RTSP streaming compatible with Apple's streaming servers (QTSS, DSS) and the latest IETF draft for MPEG4 transport of IP, supporting RTP over RTSP and HTTP tunnelling
- Audio and video hardware abstractions (currently only for windows)

GPAC does not have a BIFS Encoder yet, hence its authoring capabilities are quite limited. However an MP4 file manipulation tool is provided and supports file information retrieval, file interleaving, RTP hinting and natural BIFS frame dumping (eg BIFS streams without textures or audio).

Future Work

There is a lot of things planned in the (near?) future for GPAC, including of course a BIFS encoder, 3D support, hardware accelerated rasterizer, ….

The very near future tasks will however be the least interesting, and will resume to this single word: porting.

Currently a port to Windows CE (PocketPC 2002) is underway (only the graphical UI is missing) as well as a Linux port, and other platforms ports will be welcomed if anyone wishes to help. We especially look for people with knowledge on video and audio hardware interfaces for any OS ☺

How to Get It and Contribute

All details about GPAC can be found at

http://gpac.sourceforge.net

Currently only a CVS version can be found, we are waiting for the Linux and PocketPC2002 ports to be operational before releasing a complete source package.

Demonstration

If there is a demo session on Monday night in the Systems room, we will demo Osmo4-GPAC with:

- Some ATG demos for technophages, including some pretty good text!
- DVD-like content with skins: “home theatre skin” and “super flashy skin”
- Cartoons: Butch Cassidy (on order from Olivier’s son)
- News: content for mobiles
- Games: Othello, Mines, Brickwall

Conclusion

We are extremely glad to release the GPAC framework and will be even happier if people wish to help us and extend it.

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