GeeXboX Enna: Embedded Media Center

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The GeeXboX team focus on multimedia oriented projects:

- **GeeXboX** itself, an embedded multimedia Linux distribution, for both standalone Set Top Boxes and HTPC.
- **Enna**, EFL-based low resources Media Center interface.
- **uShare**, a free UPnP A/V and DLNA Media Server.
- **libdlna**, reference DLNA protocol OSS implementation.
- **libplayer**, a multimedia A/V abstraction layer framework.
- **libvalhalla**, a tiny media information scanning library.
- A few (yet) minor other projects ...
GeeXboX
Embedded Multimedia Linux Distribution
http://www.geexbox.org/
GeeXboX Enna: Embedded Media Center
Embedded Multimedia Distribution

- Major Live-CD multimedia distribution since 2003.
- Designed both for full blown HTPC and embedded devices.

- Turns your computer into a full-featured Set-Top-Box:
  - Play any kind of multimedia content (audio, video, photos …)
  - From various locations: Disk, NFS, Samba, WebRadios, UPnP/DLNA …
  - Supports CDDA, DVD, Analog TV and DVB playback.
  - Fully controlable through LIRC-compatible remote.

- Ready-to-be-used by end-user: minimalistic configuration.
- Available as a LiveCD, OS for USB key, multi-boot on HDD …
GeeXboX Enna: Embedded Media Center
What's under the hood

- Bare-metal Linux distribution, completely built from scratch:
  - Not related/forked from any other distribution.
  - Based on its own shell-based cross-compilation framework, (similar to Buildroot, OpenEmbedded, OpenWRT …)
- Supported architectures: ARM, PowerPC (32 and 64 bits) and x86 (32 and 64 bits)
- Supports GLIBC, eGLIBC and uClibc.
- Up to 350 packages with build dependencies management.

- **System footprint**: 8-64 MB, depending on build options.
- **Low RAM usage**: 128 MB typical, 256 MB for LiveCD.
- **Distribution goal**: ready to be used, booted as fast as possible.
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Customizable Build Flavours

- Versatile toolchain and build flags:
  - Can generate generic code to support once and every PC.
  - Or be optimized to your exact device's SoC instruction set.

- 100% free or using proprietary:
  - Packages: SGX OpenGL libraries, MAME ...
  - Drivers: nVidia X.Org driver, MADwifi ...
  - Firmwares: for WiFi and DVB chipsets ...

- Optional support for WiFi, TV/DVB and Networking services.
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Runtime Features

- Select between video stacks:
  - Console/framebuffer only mode with VIDIX enhancements.
  - Bleeding-edge X.Org with Kernel Mode Settings (KMS) support.

- System init through UpStart:
  - Modularized and highly configurable.
  - Event-based with parallelized services.

- Video Decoding capabilities:
  - **Soft**: optimized for multi-core H.264 and VC-1 decoding.
  - **Hard**: support VDPAU, soon to add VA-API, CrystalHD, and OpenMAX.
Enna
EFL Media Center Interface

http://enna.geexbox.org/
Enna is an embedded Media Center application.

Meant to run on low-resources embedded devices (phones, STB) as well as HTPC.

Small footprint: 250 kB binary only + theme data.

Written in pure C.

GUI relies on Enlightenment Foundation Libraries (EFL).

Multimedia playback capabilities and metadata information retrieval rely on GeeXboX libplayer and libvalhalla projects.
Main modules are:

- Music Player
- Movies & TV Shows Player
- Photos Viewer
- Weather forecast
- Online eBook Reader from various online content providers.
- Digital TV through VDR (VideoDisk Recorder) frontend
- Games Aggregator (e.g MAME, Emulators ... )
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User Centric

- Designed with embedded considerations in mind (low footprint).
- Meant to be user convenient and plug-and-play.
- Controllable through keyboard, mouse, touchscreen and remote.
- Modularized and skinnable.
- Available for:
  - GeeXboX v2.x.
  - GNU/Linux distributions (Ubuntu 10.04 LTS ...)
  - Mac OS X (in progress)
  - Windows (in progress)
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Supported Protocols

- Dynamic media detection through:
  - mtab
  - HAL
  - UDEV

- Media Browsing protocols:
  - Local disks
  - CDDA
  - DVD
  - Media Database
  - SHOUTcast
  - Podcasts
  - UPnP A/V and DLNA
  - Bluray, some day...
GeeXboX: An Introduction to Enna Media Center
Software Architecture

- Built on Enlightenment Foundation Libraries (EFL) and GeeXboX multimedia libraries (libplayer and libvalhalla).
- Enna is presentation-level only: provides many abstraction layers.
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EFL

Enlightenment Foundation Libraries

http://www.enlightenment.org/
EFL are "a whole suite of libraries to help you create beautiful user interfaces with much less work than doing it the old fashioned way and fighting with traditional toolkits".

- **Eina** provides optimized data types and useful tools.
- **Evas** is the canvas display layer.
- **Ecore** is a tiny event loop library.
- **Edje** is a graphical design and layout library which allows extremely flexible dynamic layouts and animations.
- **Elementary** is a widget set.
libplayer is a multimedia A/V abstraction layer framework.

Provides a generic API to control various multimedia players:

- MPlayer, through FIFO-based slave-mode.
- Xine
- VLC (requires to-be-released v1.1 API)
- GStreamer (preliminary, yet experimental)

Fully thread-safe.

Player controls and notification are offloaded to frontend.

Supports most of currently available A/V renderers:

- **Audio:** ALSA, OSS, PulseAudio
- **Video:** Framebuffer, OpenGL, SDL, VDPAU, X11, XVideo
libvalhalla
Tiny Media Information Scanning Library
http://libvalhalla.geexbox.org/
libvalhalla is a tiny media scanner library:

- High-performances multi-threaded implementation.
- Supports both background and on-demand operations.
- Stores information in SQLite database.
- Parses A/V stream properties through FFmpeg.
- Features many on-line grabbers for automatic retrieval of covers, lyrics, synopsis, list of actors …

Currently supported grabbers:

- **Offline**: EXIF, FFmpeg and NFO.
- **Online**: Allocine, Amazon, ChartLyrics, ImDB, Last.fm, LyricWiki, TheMovieDB, TheTVDB and TVRage.
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libvalhalla Architecture

Valhalla internals
2009.12.24

Front-end

OnDemand

Newfile to check
Insert, Update or End

Scanner

DBManager

Dispatcher

Dispatcher

Database

Parser(s)

Step parsing

Grabber(s)

Step grabbing

Metadata "parser"

Step downloading

Metadata "grabber"

Reviewer:

FFmpeg

FFmpeg

Grabber 1

Grabber 2

Grabber n

libxml2

"Grabber" and "Downloader" threads are optional at the compilation. Libvalhalla can be used with only two steps on the dispatcher: PARSING and ENDING, if the grabber support is not complied.

SQLite

Images, ...
Status & Roadmap

Pinky: "Gee, Brain, what do you want to do tonight?"

The Brain: "The same thing we do every night, Pinky—try to take over the world!"
Enna first release (0.4.0) was made on 2nd January 2010.
- First users feedback was quite impressive.
- Mature code, part of most famous distros a few weeks later.
- Will be key part of GeeXboX 2.0 release (alpha2 released in March).

Still many competitors:
- XBMC / Boxee, Moovida, Meedio, Win MCE …
- But not targeting embedded device field

Port to ARM-based devices in progress:
*Beagleboard, Nokia N900 mobile phone, TouchBook …*

Next step/targets: ISP STB, connected TVs …
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Expected features

- Seamless TV support through VDR skin.
- Additional online content connections: *Picasa, Flickr, YouTube browsing ...*
- Provide Video On Demand (VOD): *Apple Trailers, Amazon.com, Netflix ...*
- Instant Messaging (through *Telepathy* framework).
- VoIP Telephony, Video Conference and TelePresence.
- Get use of more and more hardware accelerators:
  - Additional ARM VFP and NEON optimizations.
  - OpenMAX DSP access for video playback
  - OpenGL|ES 3D GPU Acceleration
  - Flash 10 decoder