# Gallium3D Components

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# Status of Open Source Components

## Gallium

* Graphics API Support

* Window System Bindings/APIs

* Device Drivers

## Mesa

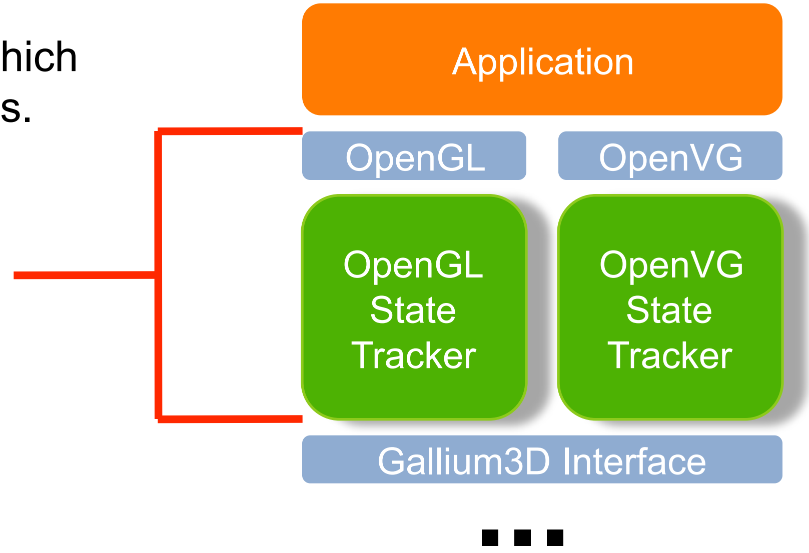
* Mesa status

# Status of Open Source Components

## Graphics API Support

“State Trackers” are the “front-ends” to Gallium which translate standard graphics APIs into Gallium calls.

Rendering APIs:
* OpenGL 2.1
* OpenGL ES 1.x
* OpenGL ES 2.x
* OpenVG



Cool thing: each new Gallium device driver will automatically support all those APIs (and more)!

Binding interfaces:
* GLX
* EGL

# Status of Open Source Components

## OpenGL 2.1 State Tracker

The Gallium OpenGL state tracker is really just core Mesa plus a “Mesa Gallium driver”.

The pieces include:

* Core Mesa: OpenGL API functions, context state management (src/mesa/main/)

* Mesa's GLSL compiler: (src/mesa/shader/)

* Vertex buffer object builder: translates OpenGL drawing commands into a uniform Vertex Buffer Object (VBO) representation (src/mesa/vbo/)

* Mesa/Gallium device driver: a Mesa device driver that targets gallium.  Implements all the ctx->Driver.Foobar() hooks.  (src/mesa/state_tracker/, but may be moved someday)

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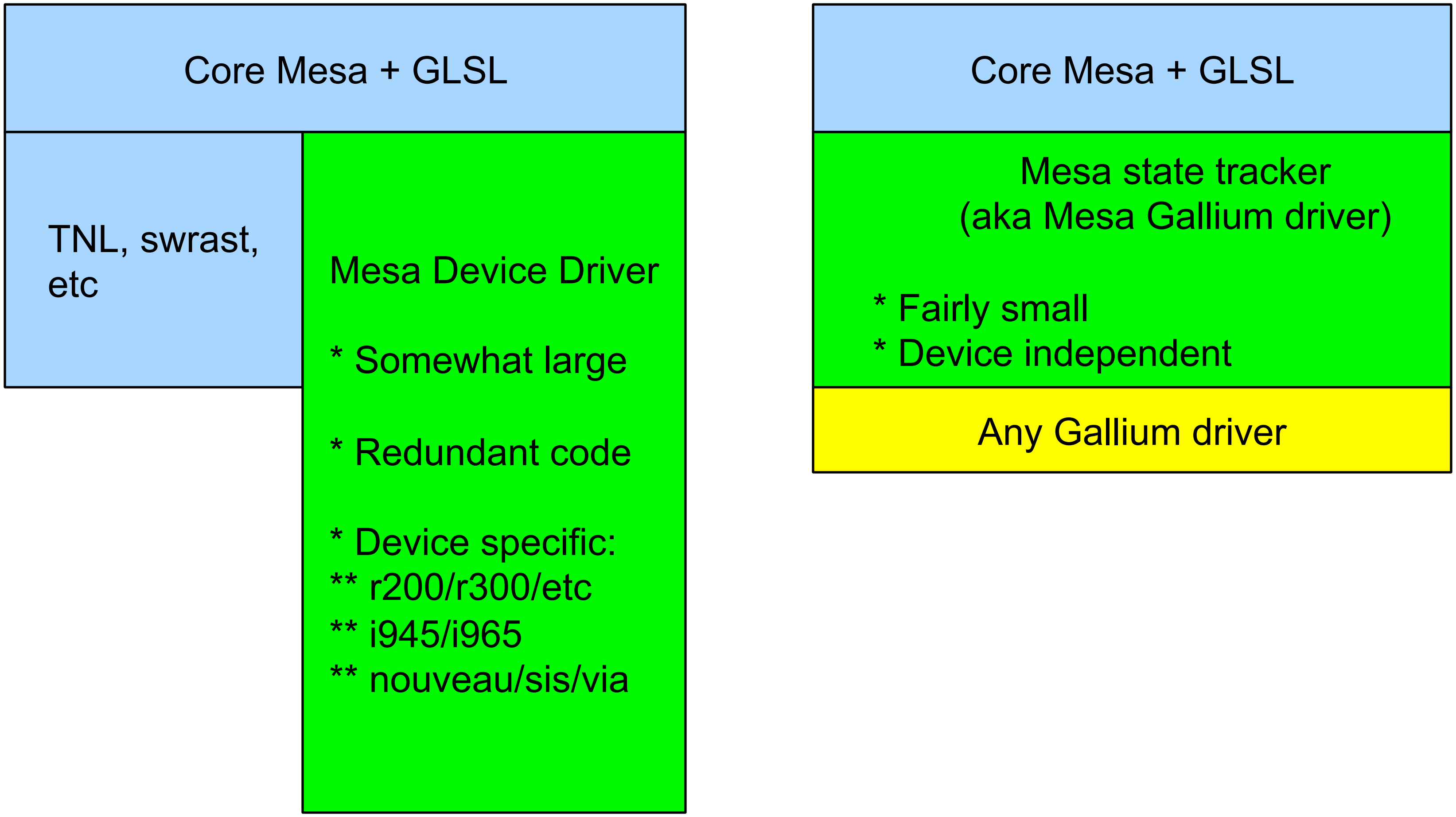

Conventional Mesa driver stack

Core Mesa + GLSL

TNL, swrast, etc

Mesa Device Driver

* Somewhat large

* Redundant code

* Device specific:
** r200/r300/etc
** i945/i965
** nouveau/sis/via

Mesa + Gallium

Core Mesa + GLSL

Mesa state tracker
(aka Mesa Gallium driver)

* Fairly small
* Device independent

Any Gallium driver

# Status of Open Source Components

## OpenGL ES and EGL State Trackers

* Support for OpenGL ES 1.0, 1.1 and OpenGL ES 2.0

* OpenGL ES implemented as a subset of Mesa

* EGL 1.0, 1.1, 1.2, 1.3 support

* Originally developed by Bob Ellison and Brian Paul at Tungsten Graphics

* Recently “taken over” by Chia-I Wu who's working on Android integration

* More details later in “OpenGL ES State Tracker Status”

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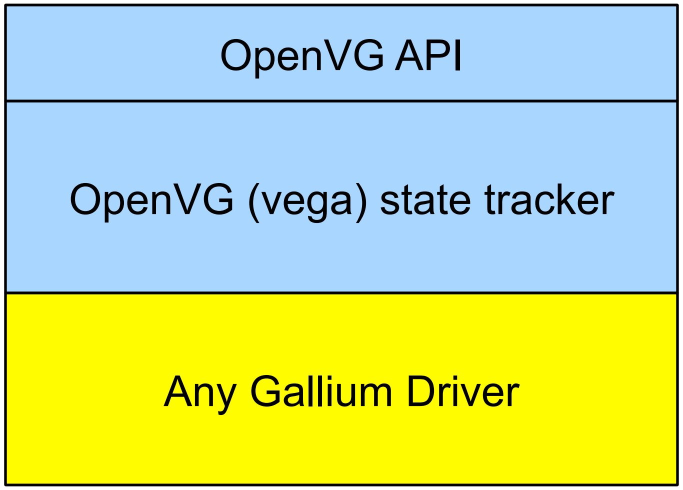
## OpenVG State Tracker

* Functional and nearly complete

* To be described in detail by Zack later.



OpenVG API

OpenVG (vega) state tracker

Any Gallium Driver

# Status of Open Source Components

## Window System Binding Interfaces

GLX
* The libGL.so library
* Dynamically loads *xxx_dri.so* drivers which may be a conventional DRI driver or a gallium-based driver.
* Also, an emulated GLX library (doesn't depend on any X server support for GLX). Useful for testing/debugging.

EGL
* The window system interface for OpenGL ES
* Also supports full OpenGL and OpenVG
* Can load new EGL-based drivers or legacy drivers with the egl_glx shim (converts EGL API calls into GLX API calls)

# Status of Open Source Components

## Gallium Device Drivers

Softpipe: The “reference driver” for Gallium.  Slow, but as correct as possible.

LLVMpipe: New, fast software driver which uses LLVM for run-time code generation (shaders triangle rendering, etc).  Only supports x86 at this time.

I915: For Intel i915/i945 hardware.  Pretty much complete

I965: Just started, spare-time project.

Cell: Software driver for the IBM/Sony/Toshiba Cell processor.  Functional, but not complete.  Not actively being developed anymore.

NV/nouveau: Under development by Ben Skeggs, Stephane Marchesin, Christoph Bumiller, et al.

AMD R300: Under development by Corbin Simpson, Cooper Yuan, Nicolai Hahnle, et al.

# Status of Open Source Components

## Future Plans for Core Mesa

* New extensions and API support: OpenGL 3.x features, Geometry Shaders, new texture formats, new rendering commands, etc. (covered in more detail later)

* New, improved GLSL compiler (Michal Krol's preprocessor + Ian Romanick's yacc-based parser + LLVM)

* Code re-factoring: Partition files and functions according to API: OpenGL 1.x/2.x vs. OpenGL 3.x vs. OpenGL ES 1.x vs. OpenGL ES 2.x, etc. (create GL building blocks)

* Move some pieces to new directories: GLSL compiler, GPU program code

* Refine data structures: Ex: unify textures and renderbuffers and add texture buffer object support

* Remove unused driver hooks (GLSL-related functions, vertex arrays, etc)

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