

DRI megadrivers

Eric Anholt
Intel Open Source Technology Center

History

- DRI drivers used to each link a copy of mesa in themselves
 - Did you know the linker doesn't garbage collect symbols?
- Christopher James Halse Rogers added the dricore option in Feb 2011
 - “This saves about 30MB on disc with a full complement of classic DRI drivers.”
- Made mandatory for classic Mesa drivers in Jan 2012

Problems

- All mesa core symbols become public
 - Most mesa symbols are “_mesa_Whatever”
 - Some mesa symbols are “_vbo_Whatever”
 - Some mesa symbols are just “Whatever”
 - Notably hash_table_insert().
- Performance hit due to library interface
- Never extended to gallium

A possible solution:

- Build all the drivers together with Mesa core
 - Only the driver entrypoints are public
 - No performance loss
 - Even less disk space

The downside

- Single driver extension symbol no longer sufficient
 - Loaders get updated to use a `__driDriverGetExtensions_DRIVERNAME()` instead of the `__driDriverExtensions` table.
- Multiple drivers exposing the same global symbol conflict
 - i915 vs i965 (`intel_miptree_create()`)
 - radeon vs r200 (`radeon_miptree_create()`)
- dri/common reaches back into the driver
 - for now driDriverAPI just gets smashed by the driver at `__driDriverGetExtensions()` time

Dealing with symbol conflicts

- Compare:

```
- 144: 000000000000029d0    516 FUNC    GLOBAL HIDDEN    1 intel_miptree_map
- 6: 0000000000000090    161 FUNC    LOCAL  DEFAULT    1 intel_miptree_slice_resolve
```

- Pre-link the drivers to resolve references to global symbols.
- Use libelf to demote GLOBAL HIDDEN symbols to LOCAL.
 - code still to be written!

Size comparison

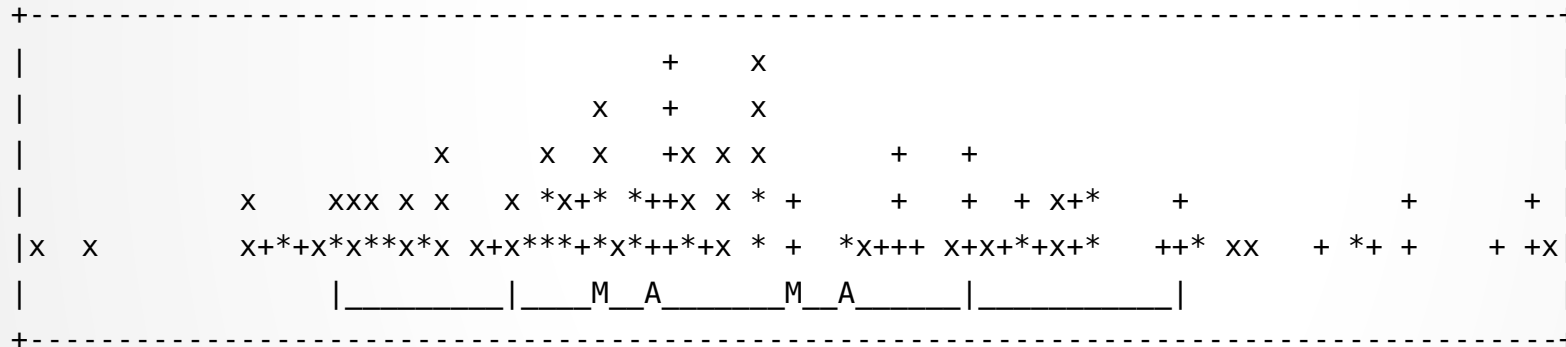
non-dricore	110368k
dricore	95708k
megadriver i965/nouveau	98624k
ubuntu's libgl1-mesa-dri	15852k

CPU overhead change

GLB 2.7 t-rex FPS with INTEL_NO_HW=1

x before

+ after



	N	Min	Max	Median	Avg	Stddev
x	60	294.06	348.5	314.4	316.123	11.323674
+	60	302.33	347.85	321.45	323.1565	11.998666

Difference at 95.0% confidence

7.0335 +/- 4.17464

2.22493% +/- 1.32058%

(Student's t, pooled s = 11.6661)

Next steps

- Build the symbol conflict avoidance ELF tool
- Convert the remaining classic drivers
- Convert gallium drivers