# State of the Intel Kernel Graphics Driver

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# overview

- review of the past year: features, driver internals, testing & documentation

- highlights of upcoming platforms: broadwell, baytrail & cherryview

- future work

# feature work, GEM

- real per-process isolation, still disabled
- improved gpu turbo boost/deboost

# feature work, display

- 4k displays, unfortunately not yet DP MST
- 3D in the kernel, stack enabling ongoing
- displayless supprt for servers

# driver internals

- massive refactoring: irq, GTT, display ...
- i915.ko is a toolbox to build a Intel GFX driver

# driver internals

- lots more shared driver helper libraries
- hdmi infoframes, DP aux (for MST support), ...

# testing with intel-gpu-tools

- automated tests are a merge requirement
- over 700 testcases, zarro tests 2 years ago
- supplements full-stack testing

# i-g-t infrastructure

- ioctl wrappers, libraries for testing techniques, ...
- NIH testing framework
- piglit as testrunner

# testing techniques

- error path testing with signals
- prefault disabling, force slowpaths in debugfs
- gpu hangman
- pipe CRC based display tests

# in-kernel infrastructure

- enormous amounts of asserts in display code
- modeset/pipe configuration tracking/checking
- fifo underrun reporting

# testing resources

- i-g-t: http://cgit.freedesktop.org/xorg/app/intel-gpu-tools/

- piglit: http://piglit.freedesktop.org/

- i-g-t overview: http://blog.ffwll.ch/2013/09/more-drmi915-testsuite-infrastructure.html

- testing requirements: http://blog.ffwll.ch/2013/11/testing-requirements-for-drmi915.html

# documentation

- DRM Developer's Guide
  http://people.freedesktop.org/~danvet/drm/

- intel-gpu-tools test API reference
  http://people.freedesktop.org/~danvet/igt/

# broadwell

- gen8 render core: execlists, 48bit ppgtt
- completely new irq routing
- display close match to haswell

# baytrail

- frankenstein display with gen7 render core
- display goes back to ... gma500, i915, i8xx
- plus hdmi, DP, MIPI-DSI

# cherryview

- gen8 render core
- baytrail display
- 3rd display pipe

# outlook: features

- runtime PM for Si0x
- atomic modeset/pageflips
- fastboot for everyone

# outlook: non-features

- can't talk about new platforms
- driver documentation
- new crazy test techniques
- integrate and exploit gen8 features

# summary

- lots of work under the hood
- testing, testing, testing
- 3 pre-production platforms in upstream
- more of the same, but a lot more

# statistics: patches

| | |
|---|---|
| 2013 | 2211 |
| 2012 | 1498 |
| 2011 | 856 |
| 2010 | 985 |
| 2009 | 534 |
| 2008 | 243 |

# regression fix latency [days]

|        | 25% | 50% | 75% |
|--------|-----|-----|-----|
| 2011H1 | 14  | 44  | 288 |
| 2011H2 | 15  | 64  | 241 |
| 2012H1 | 12  | 43  | 117 |
| 2012H2 | 15  | 54  | 83  |
| 2013H1 | 13  | 51  | 113 |
| 2013H2 | 3   | 22  | 89  |