Graphics Drivers for Modern Gaming

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Outline

- GPUs we care about
- Driver capabilities
- Driver reliability
- Performance
- Conclusions & way forward

GPUs

D3D Version	NVidia	AMD	Intel	
<= 7	Geforce 2		?	
8	Geforce 3/4	Radeon 8500	?	1.76 %
9	Geforce 5/6/7	Radeon 9500	i945	4.39 %
>= 10	>= Geforce 8	Radeon HD 2xxx	i965	93.85 %
Marketshare	52.22	34.00	13.32	

Source: Steam Hardware Survey, Q4 2012

Chip Sales	18.5	21.2	69.8

Source: www.guru3d.com, November 2012

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Driver Features

- Major features Wine needs are there
- Open Source drivers are behind on OpenGL 3+
- Features missing in legacy GL contexts on OSX
- Wine lacks Direct3D10 & Direct3D11 support

Driver reliability

- Do advertised features work?
  - Also: No over-advertising
- Crashes?
- Correct handling of corner cases?
- Software fallbacks?
- Developer responsiveness?

Driver reliability

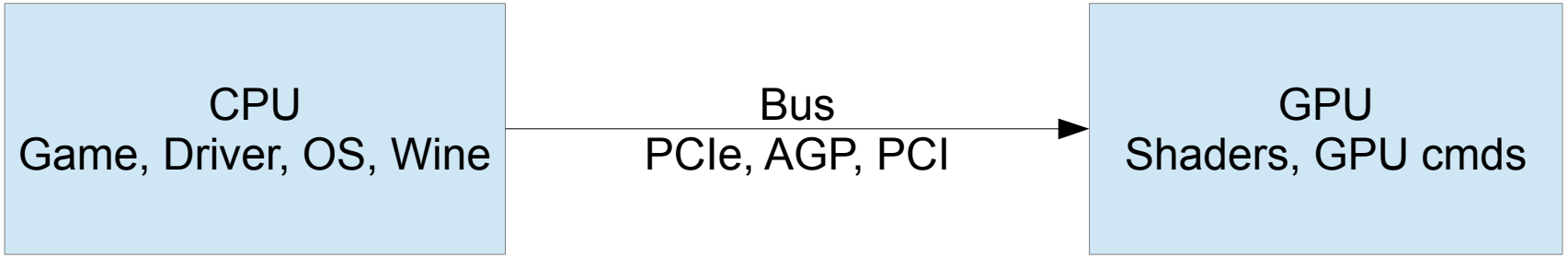
	Features work?	Crashes?	Corner cases?	Dev responsive
NVidia	Yes	No	Yes	Mixed
AMD	Yes	Some	Mostly	Mixed
Mesa	Yes	Rare	Yes	Good
Apple	Overadvertised	Some	Yes	Blargh

Source: My 2c

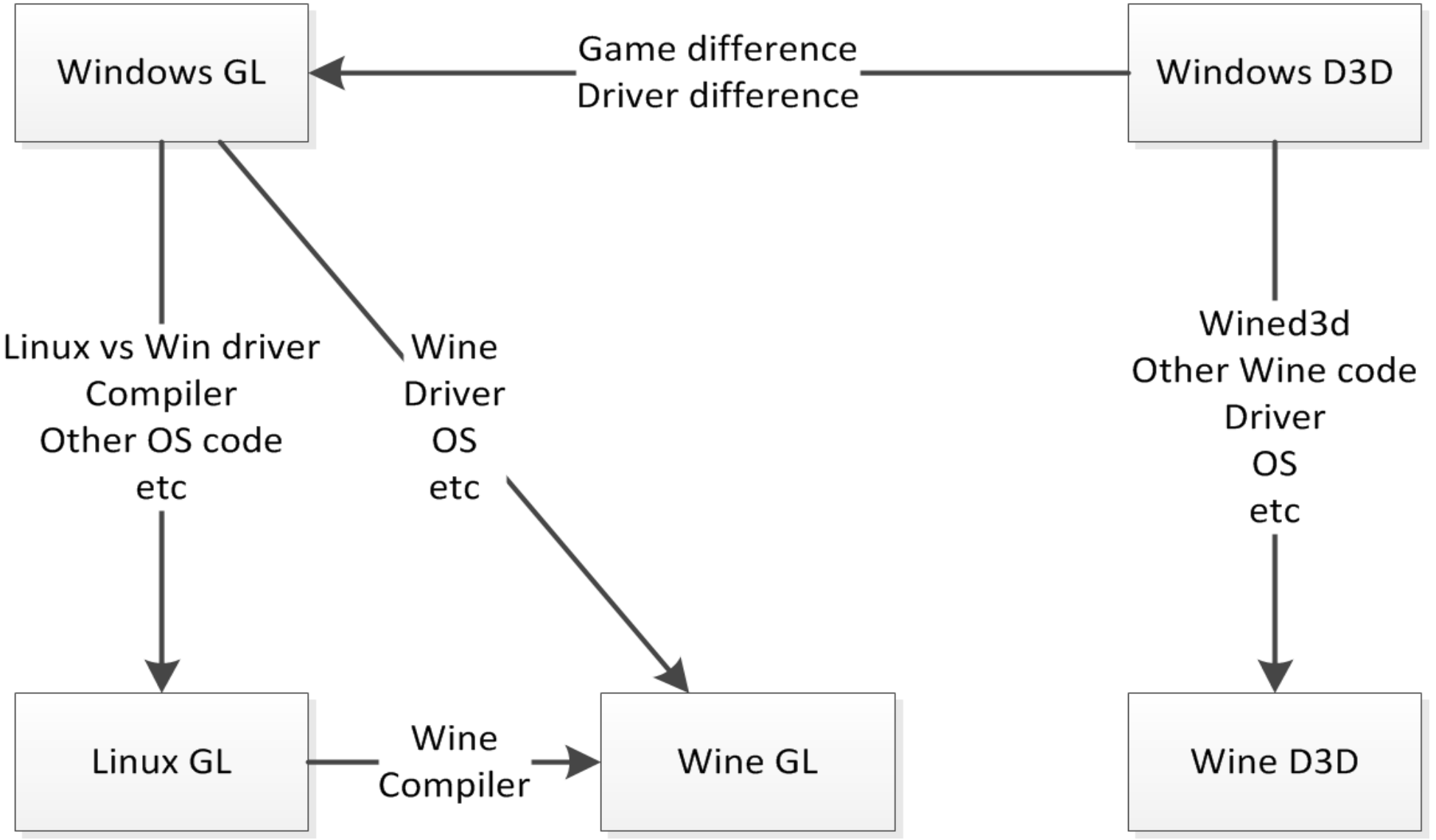
Performance

- The point where I can present data...

Benchmarking is Difficult



Game configs



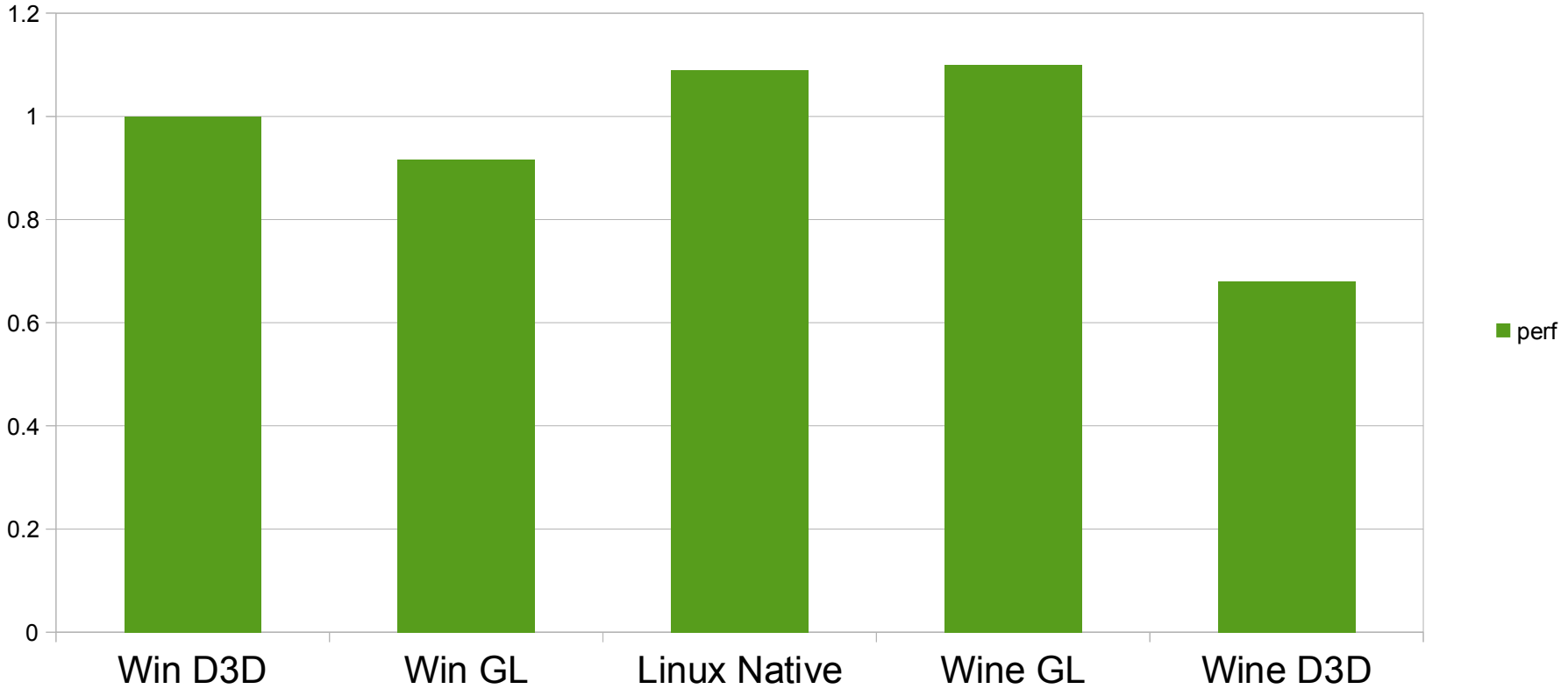
No Tweaks

- Default Wine config
  - Specifically: GLSL shaders
- No optimization hacks
- Some well-known steps to ensure good system state:
  - Clean Windows autostart
  - S3TC library for Mesa
  - No desktop compositing

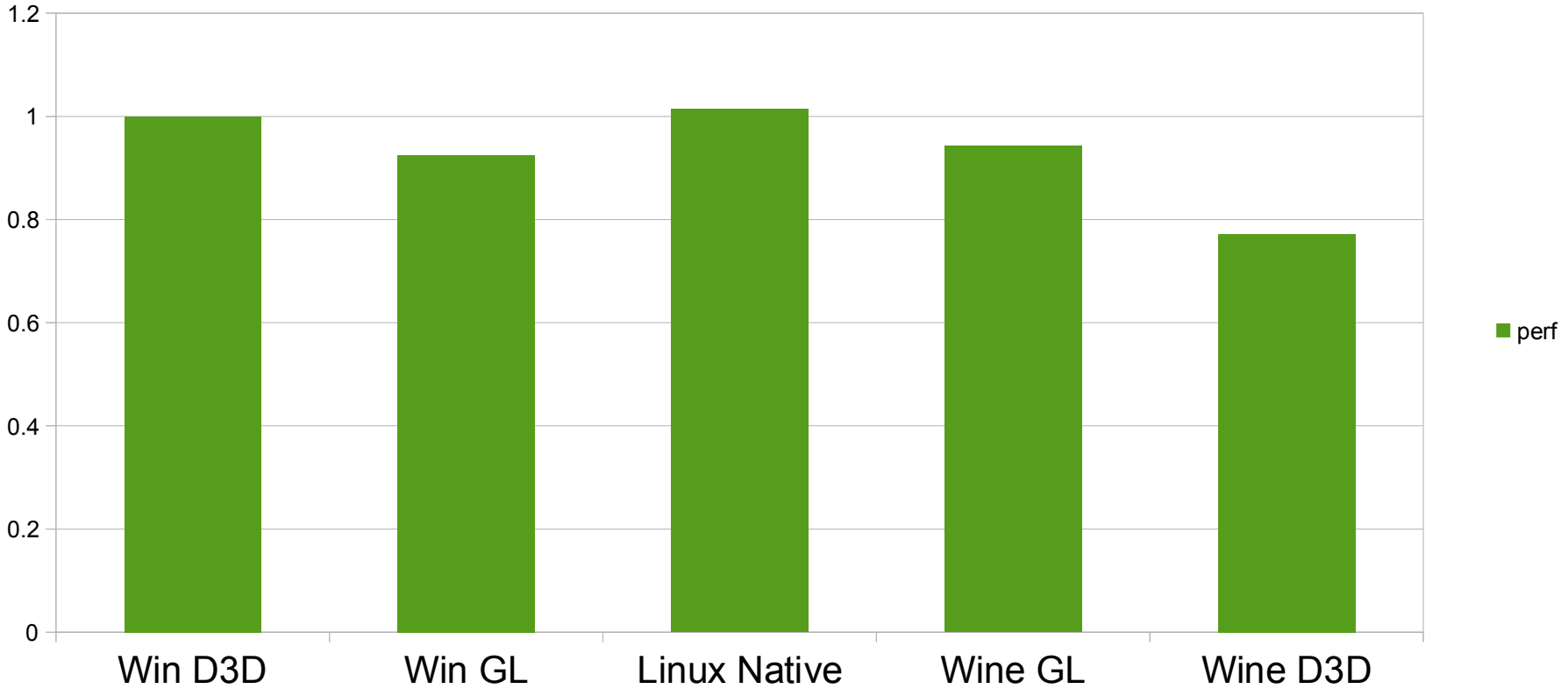
Nvidia Geforce 9600

- Macbook Pro 5,1
- Core 2 Duo, 2 GHZ
- 8 GB memory
- Windows 7 and Gentoo
- Nvidia proprietary driver
  - Sorry, no OSX or Nouveau. I ran out of time.

Nvidia Geforce 9600
CPU Limited Config



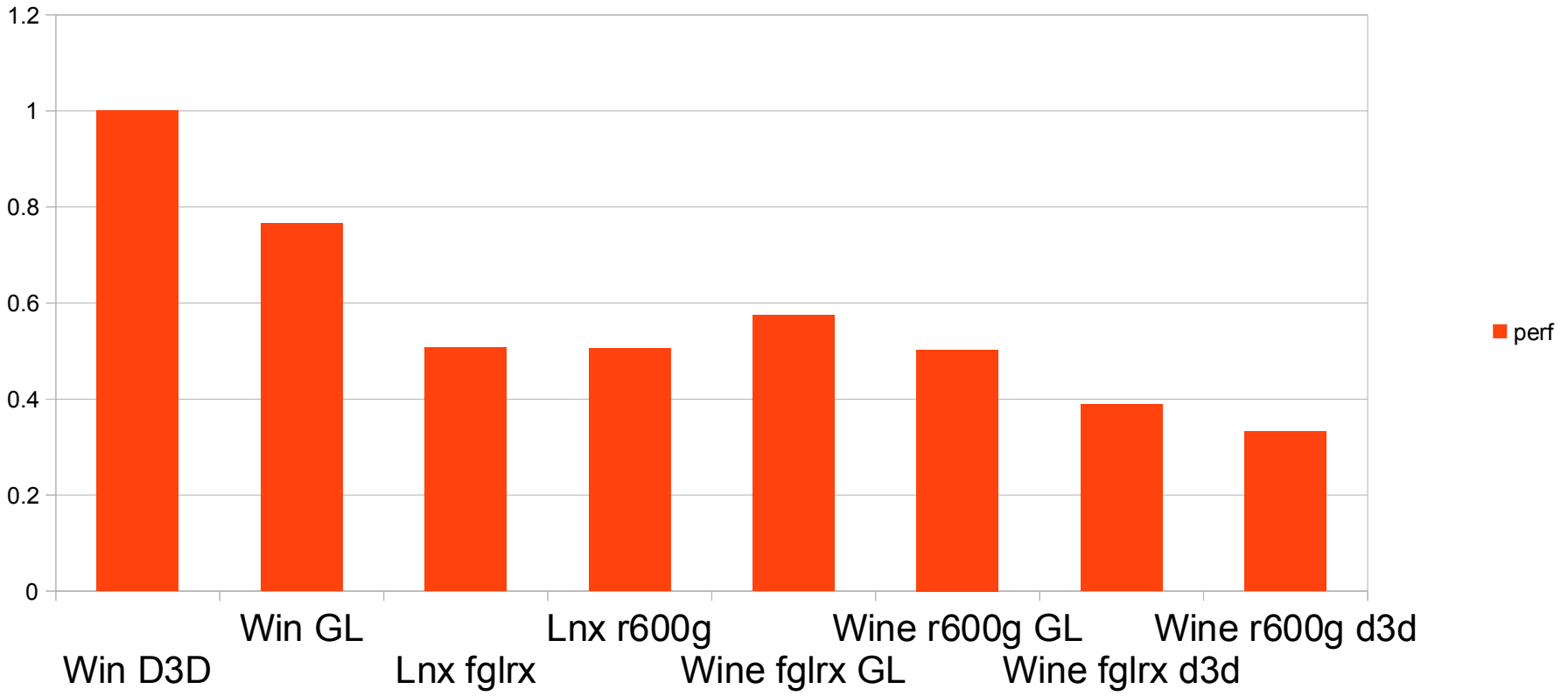
Nvidia Geforce 9600
GPU Limited Config



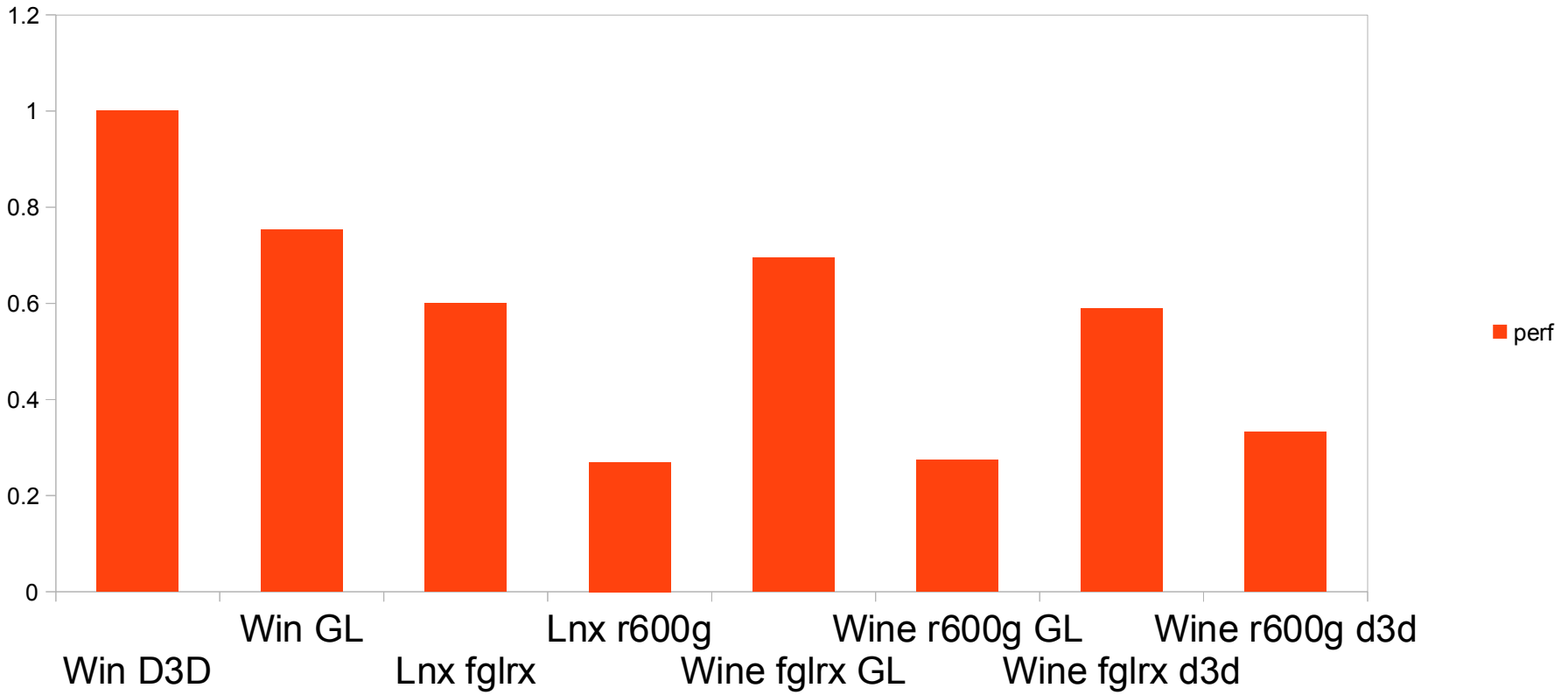
AMD Radeon HD 5770

- Intel Core i7 CPU
- 8 GB memory
- Windows 7, Gentoo
- r600g and Fglrx tested

AMD Radeon HD 5770
CPU Limited Config



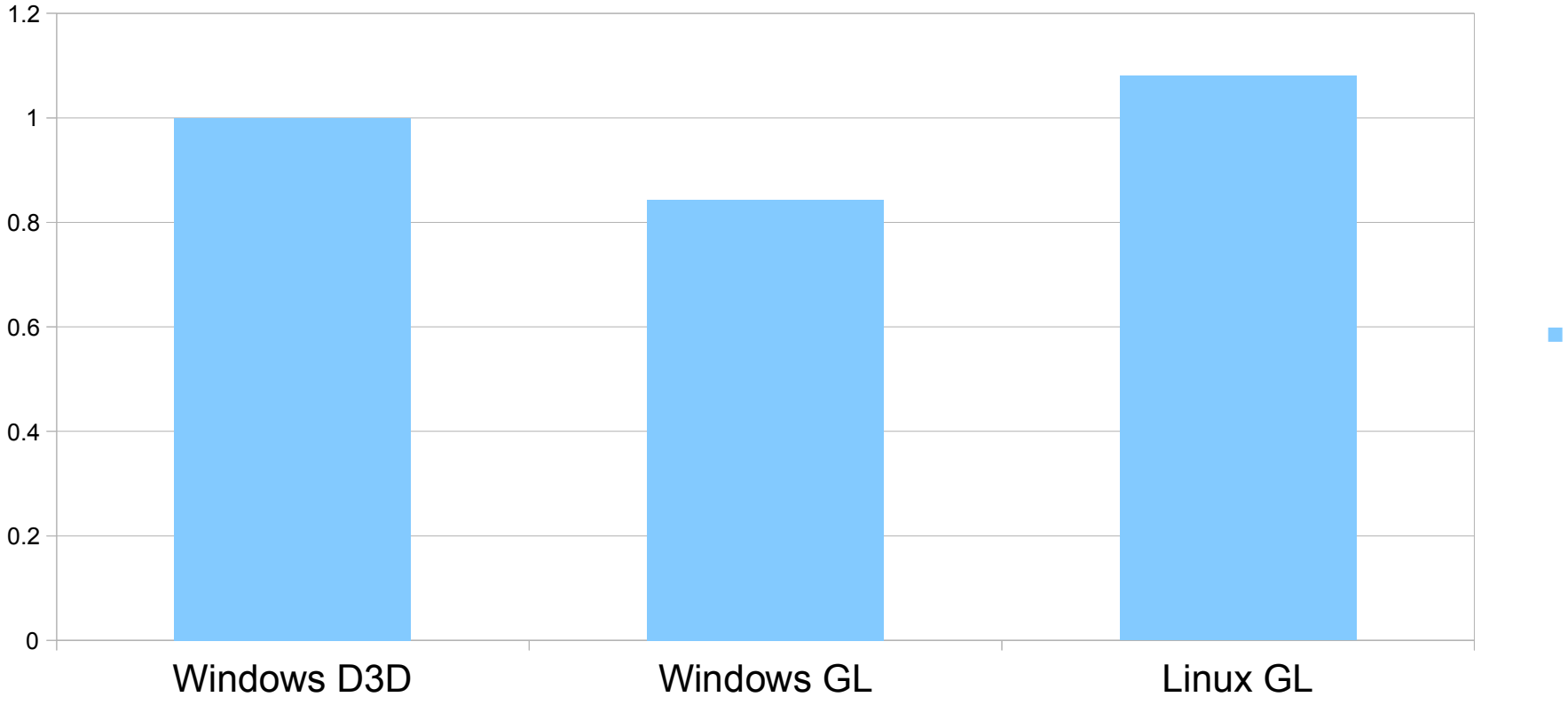
AMD Radeon HD 5770
GPU Limited Config



Intel GMA X3100 / i965

- Macbook (Model number unknown)
- Core 2 duo CPU
- 3 GB of memory
- Windows 7, Gentoo
- Mesa i965 driver
- Sorry, no OS X either :-(
  - Spoiler: It's BAAAAAD

Intel GMA X3100 / i965
(somewhat) CPU Limited Config



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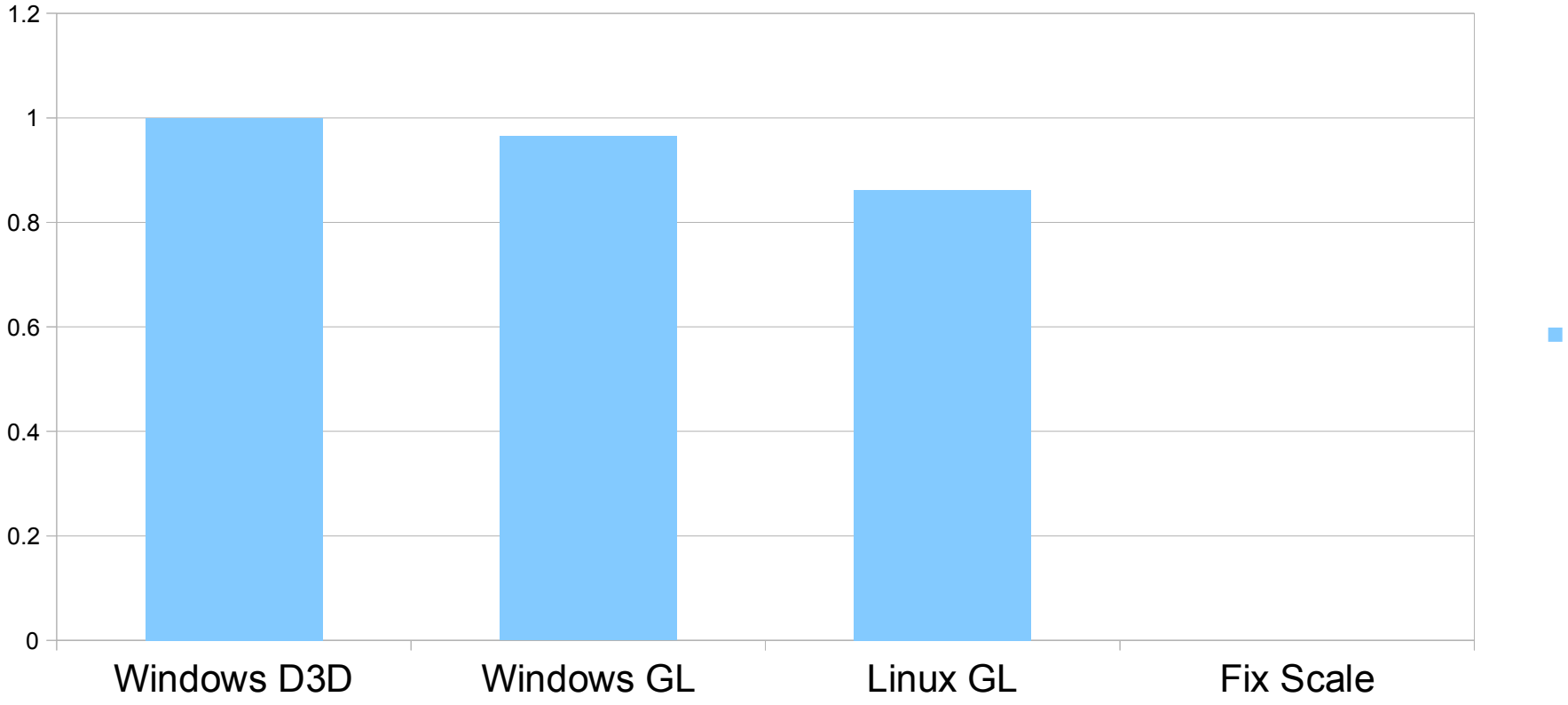
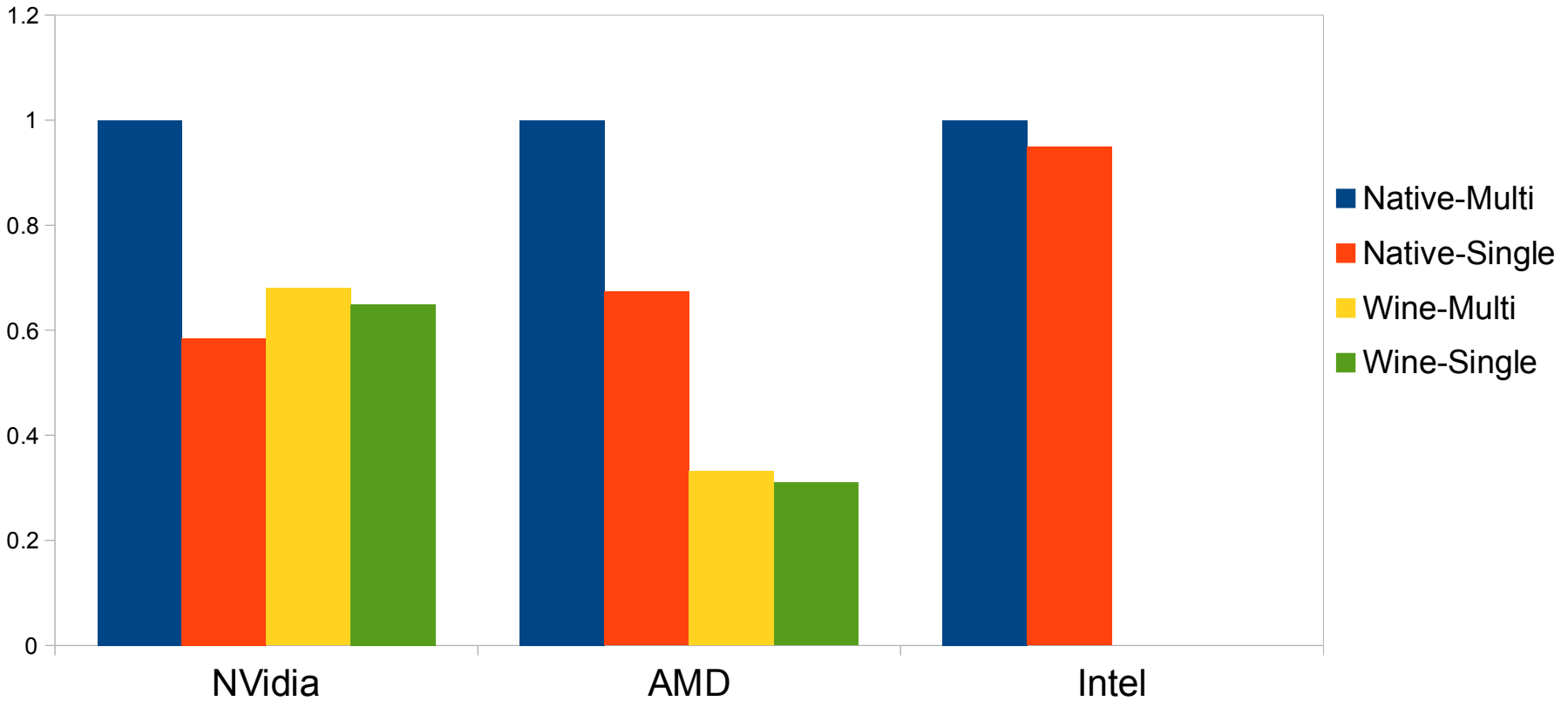
GPU Limited Config



Command Stream / Multithreading

CPU limited Configs



Conclusions 1

- Wine's D3D performance still sucks
- The rest of Wine is OK
- Nvidia driver performance is OK
- Intel driver perf probably OK
  - Crashes made testing hard
- Fglrx, r600g bad
  - Mesa devs, Phoronix.com: Don't compare r600g to Fglrx
- Too bad I didn't have time to test OSX

Conclusions 2

- D3D worker thread helps Windows
  - But it is not a magic bullet
- Keep an eye on GPU-Side performance
- Differences between GPUs of the same vendor
  - Even when using the same driver

The Way Forward

- Performance will require lots of work
  - At least it's focused on wined3d
- We want a worker thread for d3d
- Many game-specific problems
- Hunt down and fix one isolated bug after another

Threats to Validity

- Game-specific bugs
- Some game settings not properly controlled
  - Texture filtering in Trackmania Nations
  - Default settings in HL2 on i965
- Manual calculations
  - Typos, incorrect number transfer, etc.
- Needs more and better test apps

Raw Data

- http://tinyurl.com/b2fdqx8
- http://tinyurl.com/cgx89yt
- http://tinyurl.com/agwpees
- Thanks to openbenchmarking.org for automation help.

Thanks for your attention

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