



Finally getting rid of TGSi?

Is it for real this time?

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What's the problem with TGSI?

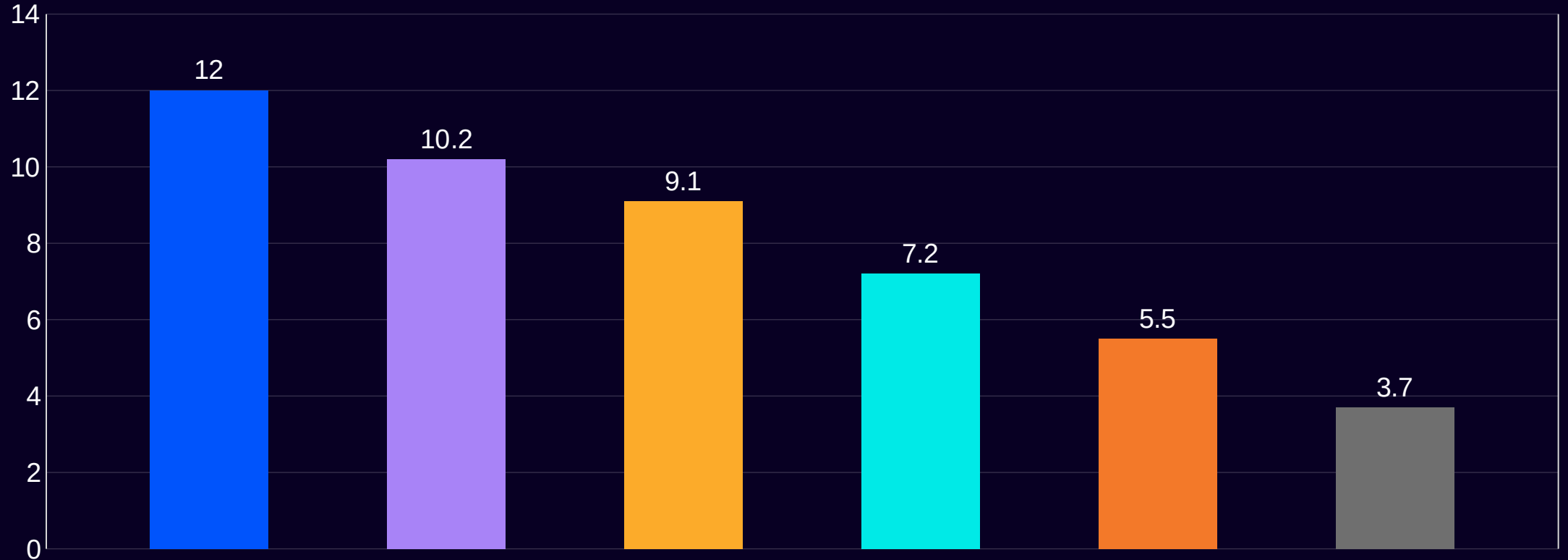
- Hahahahaha 😊
 - What's NOT the problem with TGSI?!
- SRSLY 🙄
 - We have NIR. We don't need two solutions for the same problem
 - Almost no drivers want it
 - No frontends *should* produce it
- TGSI technical debt ⚠️
 - No SSA form
 - Can't really express TES / TCS shaders
 - NTT → TTN → NIR does not roundtrip

Previous work

- Replacing TGSI with NIR has been a long journey already 💪💪💪
 - 2015: NIR, TTN, glsl_to_nir, prog_to_nir (too many authors to mention)
 - 2016: passing NIR through Gallium, starting to convert drivers (Emma Anholt and more)
 - 2020: NTT, st_mesa_to_tgsi deleted, ATI_fragment_shader emits NIR (...)
 - 2022: glsl_to_tgsi removed, NTT used more
- Recent-ish work 🔥🔥🔥
 - Fixed-function converted to nir_builder (me)
 - HUD shaders converted to nir_builder (Christian Gmeiner)
 - Freedreno blit shaders converted to nir_builder (Christian Gmeiner)
 - Gallium / Draw can always use NIR (Pavel Ondračka)
 - R600 built-in shaders converted to nir_builder (Gert Wollny)
 - RadeonSI built-in shaders converted to nir_builder (Ganesh Belgur Ramachandra)
- ...probably more that I missed! 🙄

Usage of TGSI over time

I was told slide-decks with only bullet-lists are bad



What uses TGSI?

- Utility code
 - u_simple_shaders.c
 - draw module: Uses tgsi_exec 😞
 - gallium/aux/vl: Emits TGSI shaders 🙄
 - gallvm: Mostly cleanup
- Drivers
 - Freedreno: Just a few built-in shaders
 - SVGA: Built-in shaders and shader compiler
 - VirGL: TGSI text baked into protocol 😭
 - i915g: Shader compiler
 - Nouveau / nv30: Shader compiler
 - Softpipe: tgsi_exec 😞
 - LLVMpipe: Mostly just cleanup needed
- Frontends
 - D3D10UMD: Emits TGSI shaders 🙄

Overall plan

- First approximation: remove TGSI from gallium interface 🚧
 - Use TTN before passing TGSI shaders to Gallium
 - Draft MR: https://gitlab.freedesktop.org/mesa/mesa/-/merge_requests/44715
- Convert blitter shaders to NIR 🔥
 - Write new blitter shaders in NIR
 - Draft MR: https://gitlab.freedesktop.org/mesa/mesa/-/merge_requests/42752
- ???
 - Convert more producers to NIR? 💪
 - ...would let us eventually get rid of TTN!
 - Fork TGSI into a driver-specific IR for those who need it? 🤔
 - ...might be easier to maintain in the long run?
 - nir_exec? 🤗
 - Emma Anholt has been playing with the idea...
 - Tackles the tgsi_exec usage in the draw module and Softpipe
- Slim down rest of TGSI 🏋️
 - Remove unused TGSI instructions
 - MR: https://gitlab.freedesktop.org/mesa/mesa/-/merge_requests/44716
 - ...probably more to be done

Problem: D3D10 UMD

- DirectX 10 user-mode driver
 - Lets us plug a 3rd party rasterizer into DirectX 10 🤪
 - Only works with LLVMpipe (and in **theory** Softpipe)
 - Requires Windows to use 🧑
 - Doesn't run on CI
- Added in May 2021
 - Emits shaders as TGSI 😭
 - Even admits this as a limitation in the **initial commit!** 🧑
 - Nobody cared enough to fix in the last 5.5 years... 😞
- Has requirements no other frontends or TGSI producers does!
 - Geometry shaders with **no TGSI tokens** 🤔
 - TTN support for GS in general 😐
- VMWare: please either delete or convert to NIR!
 - Draft MR: https://gitlab.freedesktop.org/mesa/mesa/-/merge_requests/44717 🤪
 - What practical benefit do we get from this frontend?

Problem: TGSi → NIR → TGSi round-trips

- TTN and NTT don't really round-trip properly
 - Mostly fine, very limited where this can happen
 - Solved in the drivers that does NTT by making sure we don't pass the TGSi back through the gallium interface
- Current MR introduce GS support to TTN because of **one** TGSi blit shader
 - `util_make_layered_clear_geometry_shader` should just emit NIR
 - Hopefully this slide is deleted before I present!

Conclusion

- Can we get rid of TGSI? 🙏
 - Unfortunately, no, not quite 😞
 - ...but we can significantly reduce it's impact
- Need some sort of decision about D3D10UMD, though 💀
 - I can't compile or run it, so...
 - VMWare, you're it!
- Lots of hard-coded shaders left to convert!
 - Join in on the party! 🎉

The future is looking better! 😎

arm

Tack

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Merci

Danke

Gracias

Grazie

谢谢

ありがとう

Asante

Thank you

감사합니다

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Kiitos

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Köszönöm