What's new in the GPU virtual world?

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Summary

- What is virgl?
- Virgl through the year.
- Infrastructure, GitLab and CI.
- Plan for the future.
- Q&A and discussion.
What is virgl?
History

- Dave Airlie side project.
- Virtual 3D GPU for QEMU.
- Security in mind.
- Base on Gallium architecture.

- https://www.youtube.com/watch?v=rPeMrmeLTig
IRs

Host
- QEMU
  - virtio-gpu
  - virglrenderer
- OpenGL

Guest
- Kernel
  - virtio-gpu
- Mesa
  - virgl
- Application
Memory allocation (simplify)

- Guest allocates and creates resource.
- QEMU or virglrenderer creates host resource.
- QEMU creates a iovec for the guest resource.

- Guest writes data to the resource.
- Guest request a transfer.
- QEMU or virglrenderer copy data from guest to host resource.
- Guest can use the resource.
Virgil through the year.
Last year status

• OpenGL 3.0 support.

• OpenGL backend only.
Current status

- OpenGL 4.3 support.
- OpenGL ES 3.2 support.

- OpenGL and OpenGL ES backend.
  - Require SDL to create the GLES context.
Current status

- GLES2: NotSupported 25
- GLES3: NotSupported 162
- GLES32: NotSupported 1314
How did we achieve these results?

- Heavy use of host GPU features inside the guest
  - Caps initialized at launch
- Workaround for OpenGL ES
  - Modifying shader header.
  - GLES doesn’t support glDrawBuffer.
- Add format support
Debugging

• Where the f*&% is my issue?
Performance on Kabylake

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Host</th>
<th>QEMU</th>
<th>Vtest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unigine Heaven 1024x768 fullscreen Quality high 2x AA</td>
<td>27.9FPS (19.1 - 53.1)</td>
<td>14.6FPS 2.1FPS in September</td>
<td>18.4FPS (7.3 - 38.1)</td>
</tr>
<tr>
<td>Unigine Valley 1024x768 fullscreen Quality high 2x AA</td>
<td>24.6FPS (14.6 – 41.3)</td>
<td>13.9FPS 1.0FPS in September</td>
<td>16.4FPS (10.1 – 23.9)</td>
</tr>
</tbody>
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Infrastructure, GitLab and CI.
Infrastructure

- Still have some discussion over the ML.
- Eavy use of Freedesktop GitLab.
  - Pull requests.
  - Bug reports.
  - Wiki.
  - CI.
CI

• Merged few months ago.
• Use softpipe.
  – But llvmpipe and GPU are available
• Run the CTS.
  – Can run Piglit too.
Plan for the future.
Future

- Increase the GL version.
- Improving GL on top of GLES.
- Performance.
  - Coherent memory.
  - Caching.
Future

• Vulkan support.
  - Started by Nathan Gauer, GSoC student.
  - https://github.com/Keenuts/vulkan-virgl
Demo.
Join the party

- https://gitlab.freedesktop.org/virgl/virglrenderer
- #virgil3d on Freenode
- virglrenderer-devel@lists.freedesktop.org
Q&A and discussion.
We are hiring!
Thank you!