TransGaming Portability Overview

Binary and Source Level Enablement

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TransGaming Overview

- Deep technology expertise for migrating content to different platforms
- Technology that has been developed over the last 10+ years
- Enabled hundreds of games originally developed for Windows on Linux, MacOS, and Smart TV platforms
Portability Technology

- Core technology bridges gap between DirectX® and OpenGL® APIs
Top Titles Brought To Mac

- Dragon Age II
- The Sims 3 Deluxe
- Max Payne 3
- Guild Wars 2
- Spore
- The Bureau: XCOM Declassified
- FIFA Soccer 12
- EVE Online
- 2142 Battlefield
- Star Trek Online
- Grand Theft Auto: San Andreas
- Prince of Persia
- Toy Story 3
- Command & Conquer: Red Alert 3
Binary Portability Approach

“Wrapper” Method

Target OS App Wrapper

Win32 EXE Within

Transgaming
Binary Portability Benefits

- Short Dev Cycle
- New Distribution Targets
But what about...?
Source Level Portability

```cpp
int main(int argc, char **argv)
{
    IDirect3D9 *d3d9_ptr = NULL;
    IDirect3DDevice9 *device_ptr = NULL;
    HRESULT hr;

    // Initialize the D3D objects
    if (!init_d3d9(&d3d9_ptr, &device_ptr))
        return 1;

    cout << "D3D9 initialized successfully." << endl;

    // Clear the screen to all red and fade to black
    for (DWORD clearcol = 0xff; clearcol > 0; clearcol -= 0x1)
    {
        IDirect3DSurface9* rendertarget;
        IDirect3DSwapChain9* swapchain;
        DWORD color_to_use = 0xff000000;

        rendertarget = pBackBuffer0;
        swapchain = pSwapChain0;
        color_to_use |= clearcol << 16;

        device_ptr->SetRenderTarget(0, rendertarget);
        device_ptr->BeginScene();
        device_ptr->Clear(0, NULL, D3DCLEAR_TARGET, color_to_use, 0, 0);
        device_ptr->EndScene();
        swapchain->Present(NULL, NULL, NULL, NULL, 0);
    }
}
```
Demo Time
Technology Capabilities

D3D9, FixedFunc → OpenGL ES 1.1
D3D9, SM2 → OpenGL ES 2.0
D3D9, SM3 → OpenGL 4.x, OpenGL ES 3.0
D3D11 → Under development

Plus: XAudio, XInput, D3DX, DSound, DInput, etc.
Shader Translation

Adjust position for fragment offset differences, or just use ARB_fragment_coord_conventions
Hardware Capabilities

- Detailed runtime capability detection on startup
  - GL Extensions => D3D Device Caps
  - Texture / Render-target texture format detection
- ES Targets often lack S3TC texture compression
  - Best avoided app-side
  - Alternatives via D3D extensions: ETC, PVR
Creating GL Contexts - TG3D

● Managing GL contexts is very device-dependent:
  ○ Desktop Linux + X11/GLX
  ○ Desktop Linux + X11/EGL
  ○ Embedded Linux + libdrm/libgbm/EGL
  ○ Desktop Mac + Cocoa/CGL
  ○ Android/EGL
  ○ ...

● Solution: abstract GL context / device interface, TG3D
TG3D Driver/Context Interfaces

**ITG3DDriver Interface Methods (partial list):**

- GetProcAddress() - Get address of GL function
- CreateContext() - Creates a GL context for the target device/format
- CreateWindowDrawable() - [optional] Used for rendering to multiple windows
- SetSwapInterval() - Enable or Disable Vsync (platform specific)

**ITG3DContext Interface Methods (partial list):**

- Bind()/Unbind() - Associates a GL Context with a Window
- Lock()/Unlock() - Locks the context for rendering (multi-thread support)
- Flip() - Present the contents of the GL_BACK draw buffer to the screen/window
Shader Tricks and Cool Stuff

- Inverted rendering to texture rendertargets via vertex shader y-coordinate flip
- Handling of undefined D3D shader behaviour:
  - NaNs, Infinities, ‘default’ (0,0,0,1) vector for unassigned inputs
- D3D clip planes provided via fragment shader discards
- Multiple paths for supporting sRGB textures: extension or fragment shader emulation via pow, etc.
One More Thing...

The burning question:

Tegra K1 is great, but can it run Crysis?

Yes, it can!
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