Post-processing effects

Computer Graphics Seminar

by Viktor Mysko
What is POST-PROCESSING?

Post-processing is a work that is done after the initial frame is rendered.

Post-processing is the process of applying full-screen filters and effects to a camera’s image buffer before it is displayed to screen.

It can improve the visuals of any product with little setup time.
The Standard Graphics Pipeline

- Data
- Vertex transformations
  - Vertex shader
  - Culling & Clipping
- Rasterization
- Fragment shading
  - Fragment shader
  - Visibility tests & Blending
- Post-processing effects

Mathematical expression:

\[ M = M_1 \cdot M_2 \cdot M_3 \cdots \]

\[ P \cdot V \cdot M \cdot v = \left( \frac{v_x}{v_w}, \frac{v_y}{v_w}, \frac{v_z}{v_w} \right) \]

- Light Source
  - \( L_{amb} \)
  - \( L_{diff} \)
  - \( L_{spec} \)
Using post-processing

Anti-aliasing, ambient occlusion, screen space reflection, depth of field, motion blur, eye adaption, bloom, color grading, chromatic aberration, vignette
Post-Processing
The Anti-aliasing effect offers a set of algorithms designed to prevent aliasing and give a smoother appearance to graphics.
The most popular **Anti-aliasing** algorithms are:
- Fast Approximate Anti-aliasing (FXAA)
- Temporal Anti-aliasing (TAA)
Temporal Anti-aliasing is a more advanced anti-aliasing technique where frames are accumulated over time in a history buffer to be used to smooth edges more effectively.
Ambient Occlusion
Screen Space Reflection

WITH

WITHOUT
<table>
<thead>
<tr>
<th>Property:</th>
<th>Function:</th>
</tr>
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<tbody>
<tr>
<td>Blend Type</td>
<td>How the reflections are blended into the render.</td>
</tr>
<tr>
<td>Reflection Quality</td>
<td>The size of the buffer used for resolve. Half resolution SSR is much faster, but less accurate.</td>
</tr>
<tr>
<td>Max Distance</td>
<td>Maximum reflection distance in world units.</td>
</tr>
<tr>
<td>Iteration Count</td>
<td>Maximum raytracing length.</td>
</tr>
<tr>
<td>Width Modifier</td>
<td>Typical thickness of columns, walls, furniture, and other objects that reflection rays might pass behind.</td>
</tr>
<tr>
<td>Reflection Blur</td>
<td>Blurriness of reflections.</td>
</tr>
<tr>
<td>Reflect Backfaces</td>
<td>Renders the <strong>scene</strong> by culling all front faces and uses the resulting texture for estimating what the backfaces might look like when a point on the depth map is hit from behind.</td>
</tr>
<tr>
<td>Reflection Multiplier</td>
<td>Nonphysical multiplier for the SSR reflections. 1.0 is physically based.</td>
</tr>
</tbody>
</table>
Fog

WITH

WITHOUT
Depth of Field

WITH

WITHOUT
Blur and Motion Blur

WITH

WITHOUT
Eye Adaptation
Bloom

WITH LENS DIRT BLOOM

WITHOUT
Color Grading

WITH CONTRAST AND GASTROPIPING

WITHOUT
User LUT (look-up texture)

WITH + FILTER MODE "POINT" (NO FILTERS)  WITHOUT
Chromatic Aberration

WITH + FILTER MODE “POINT” (NO FILTERS)  WITHOUT
Dithering

WITH

WITHOUT
Monitors
Post processing in … ARCHEOLOGY

WITH

RAW DATA

(a)  (b)  (c)  (d)  (e)  (f)

(a)  (b)
Customer effects

VIA KIASMET

VIA UNREALSCRIPT
Materials that I used:

2. Unity documentation [https://docs.unity3d.com/Manual/PostProcessingWritingEffects.html](https://docs.unity3d.com/Manual/PostProcessingWritingEffects.html)
3. Unreal Engine 4 Documentation [https://docs.unrealengine.com/en-us/](https://docs.unrealengine.com/en-us/)
THANK YOU FOR ATTENTION!

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