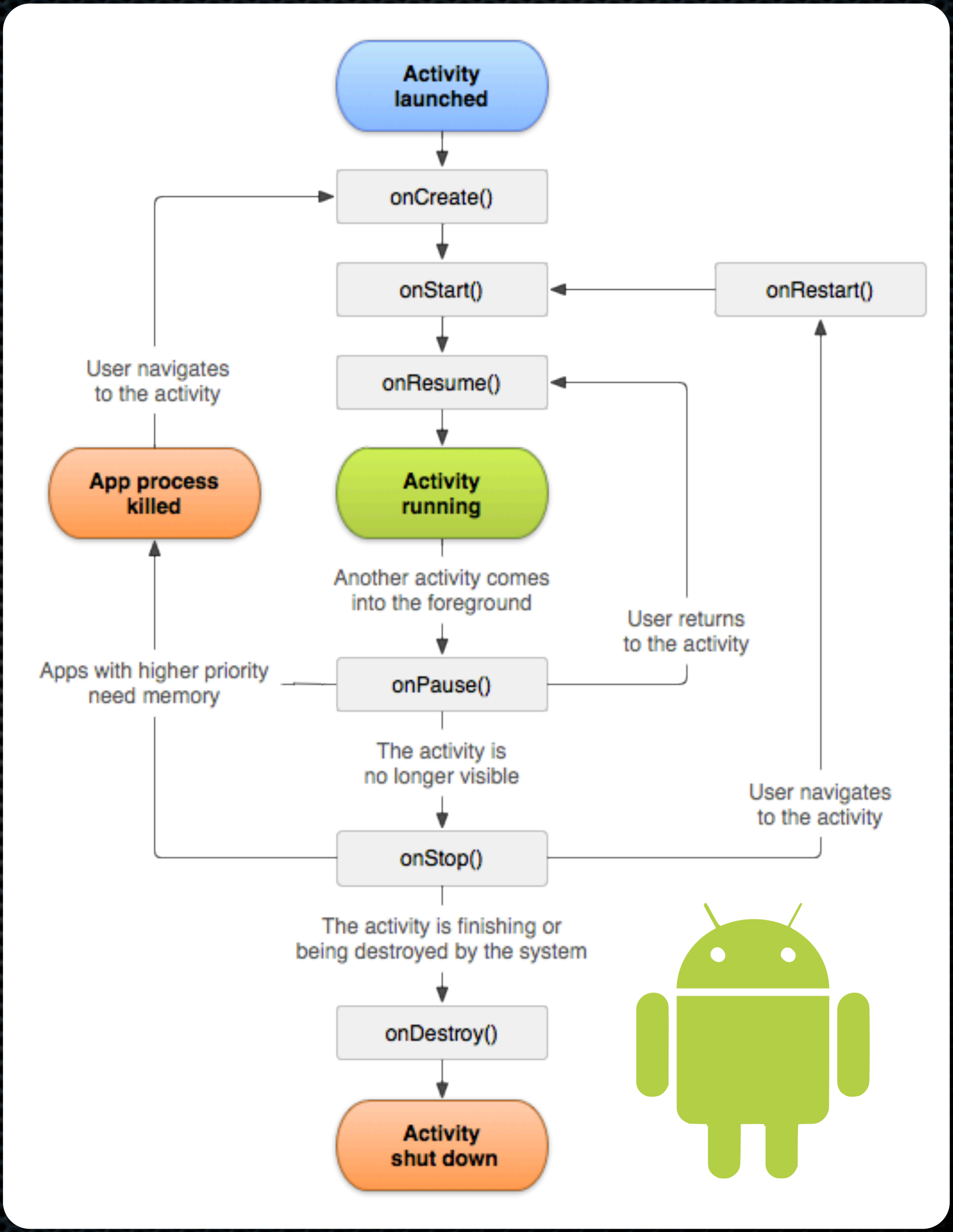
Mobile Application Programing: Android

OpenGL Environment

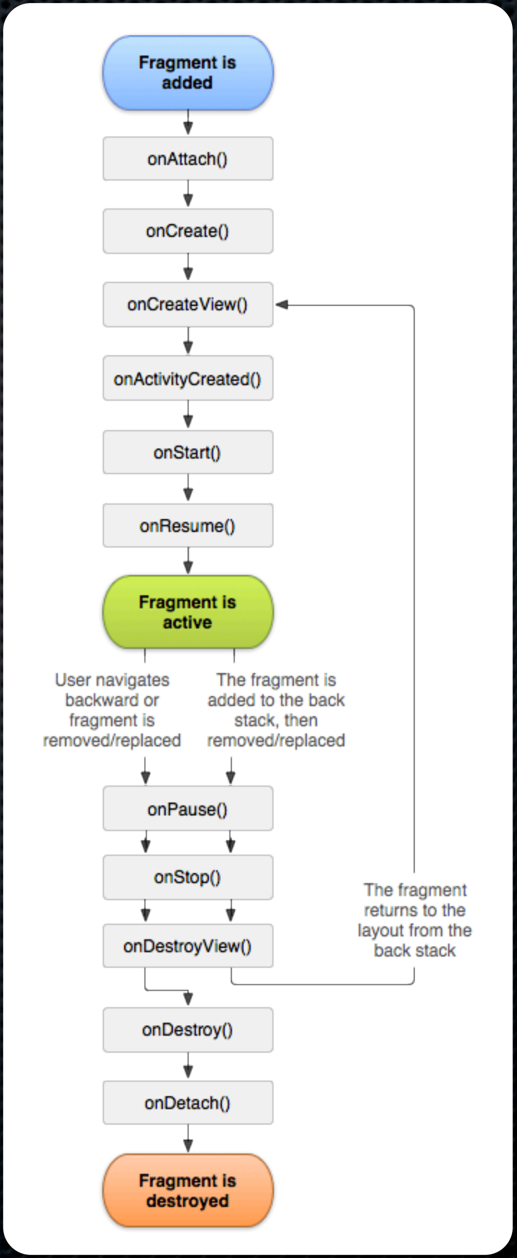
Activities

- Apps are composed of activities
- Activities are self-contained tasks made up of one screen-full of information
- Activities start one another and are destroyed commonly
- Apps can use activities belonging to another app

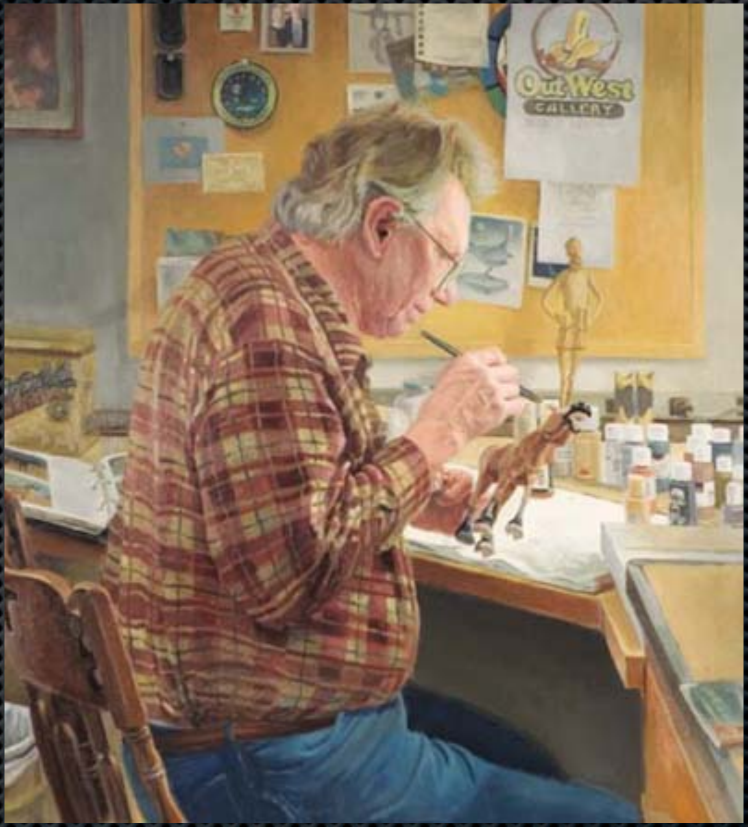

Activity launched
onCreate()
onStart()
onRestart()
User navigates to the activity
onResume()
App process killed
Activity running
Another activity comes into the foreground
User returns to the activity
Apps with higher priority need memory
onPause()
The activity is no longer visible
User navigates to the activity
onStop()
The activity is finishing or being destroyed by the system
onDestroy()
Activity shut down

Fragments

- Acts like a sub-activity
- Attached and removed from an activity using the FragmentManager
- Attachment or removal of many fragments with FragmentTransaction
- Lifecycle tied to parent activity
- Adds onAttach / onDetach and onCreateView / onDestroyView



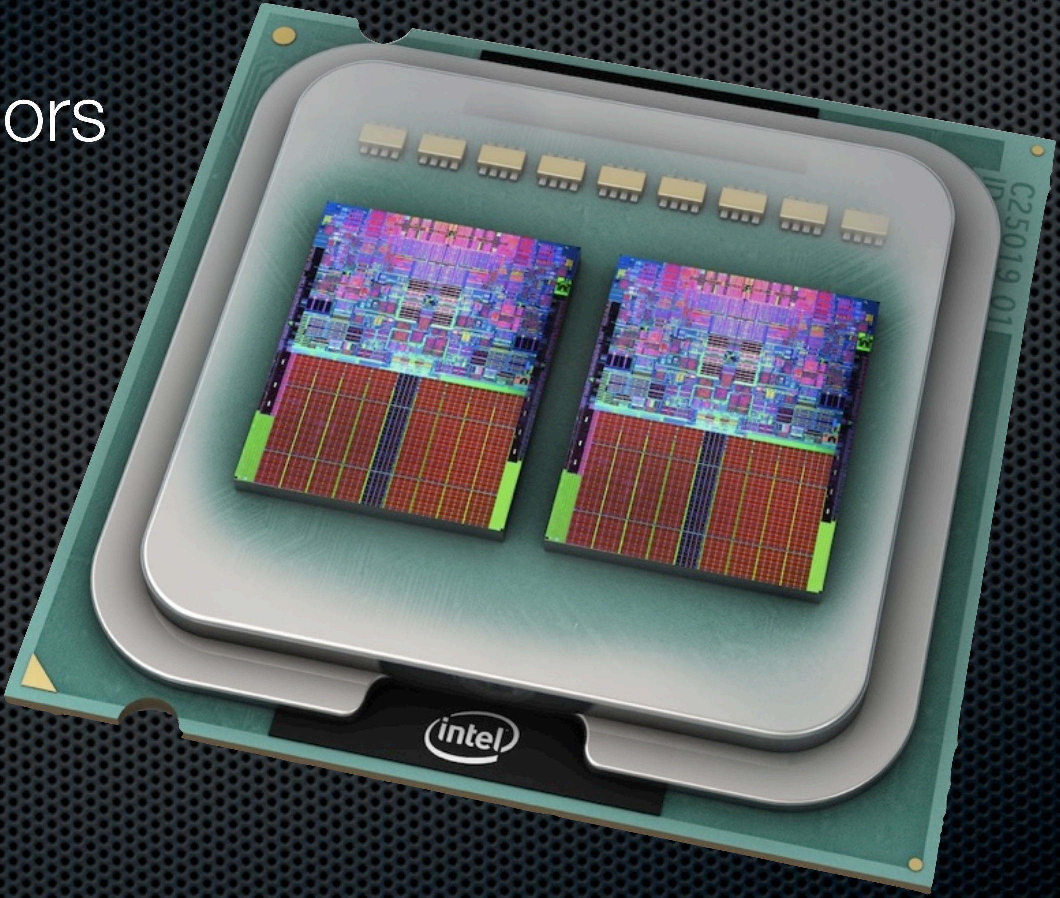
Hardware Acceleration



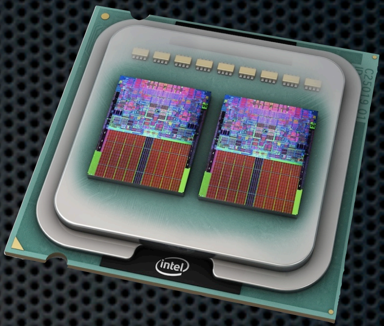
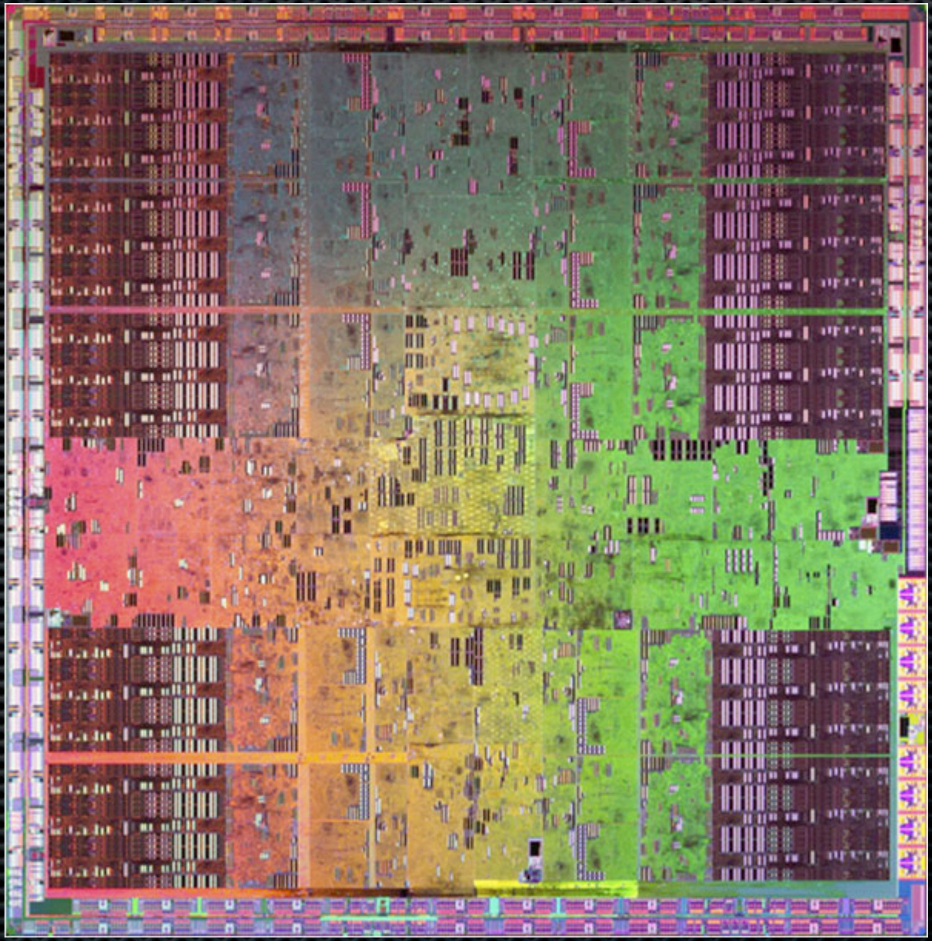
Hardware Acceleration

Hardware Acceleration

2 Processors



Hardware Acceleration

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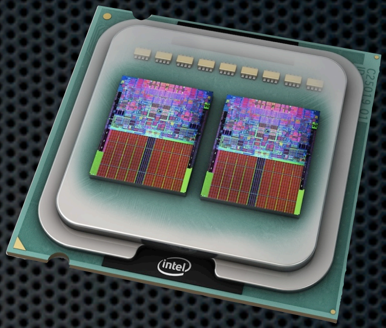
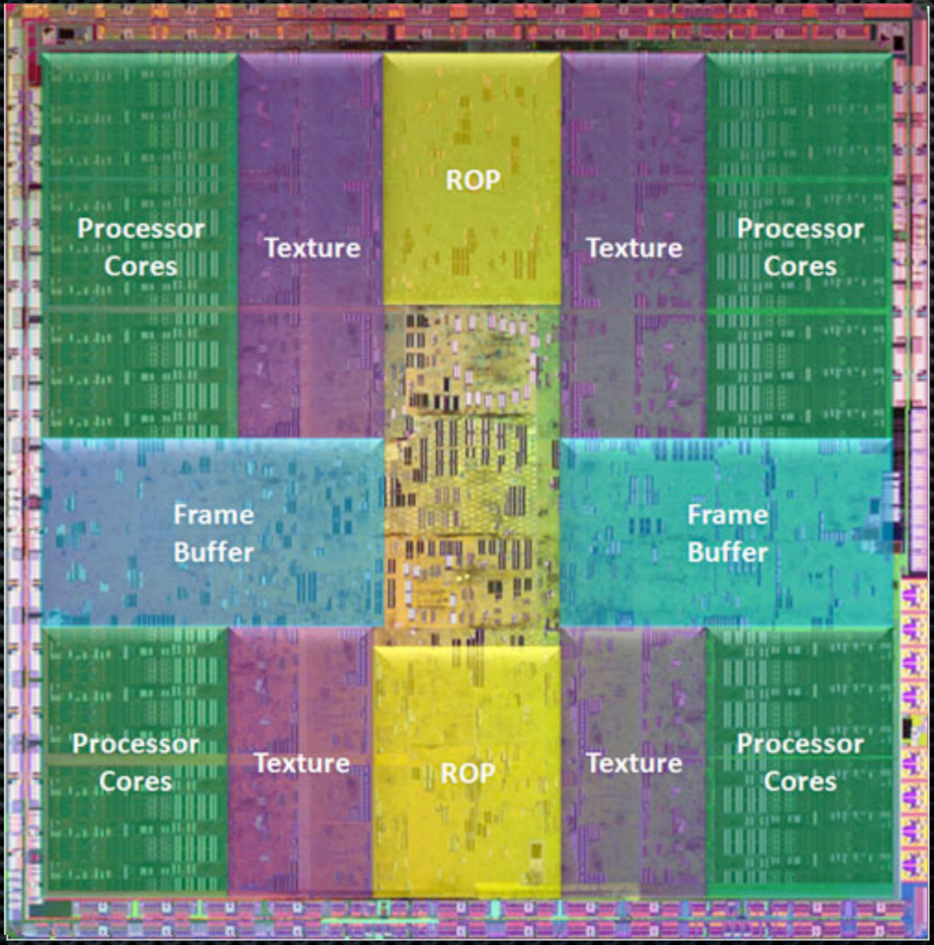
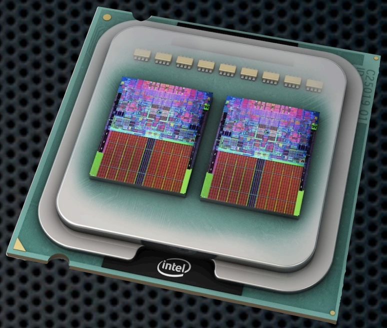
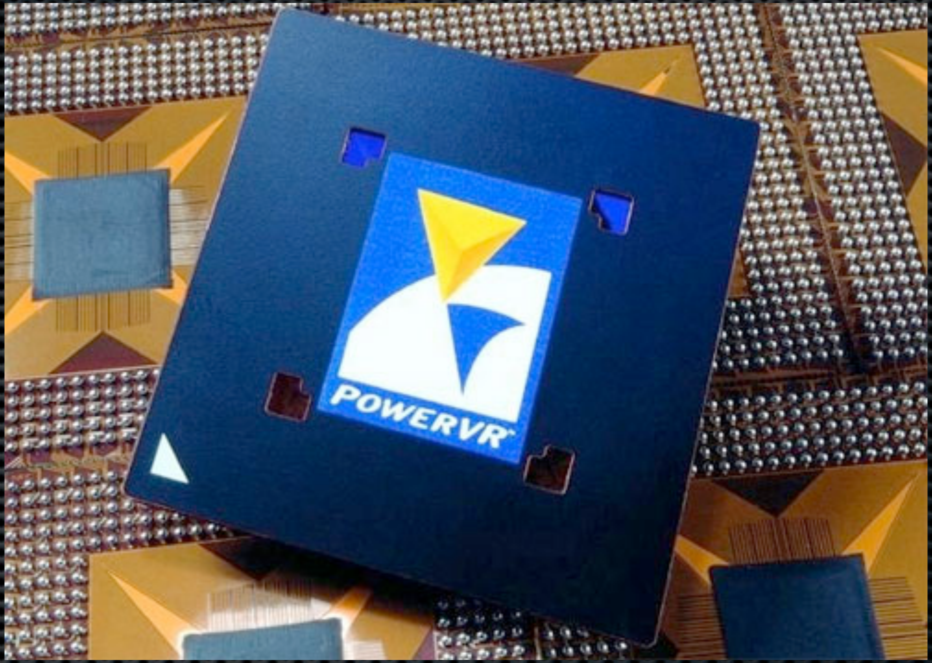


192
Processors



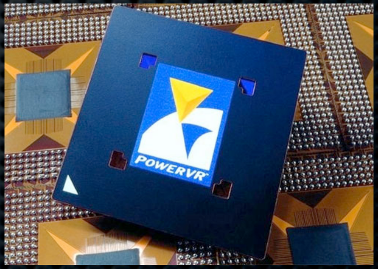
Hardware Acceleration





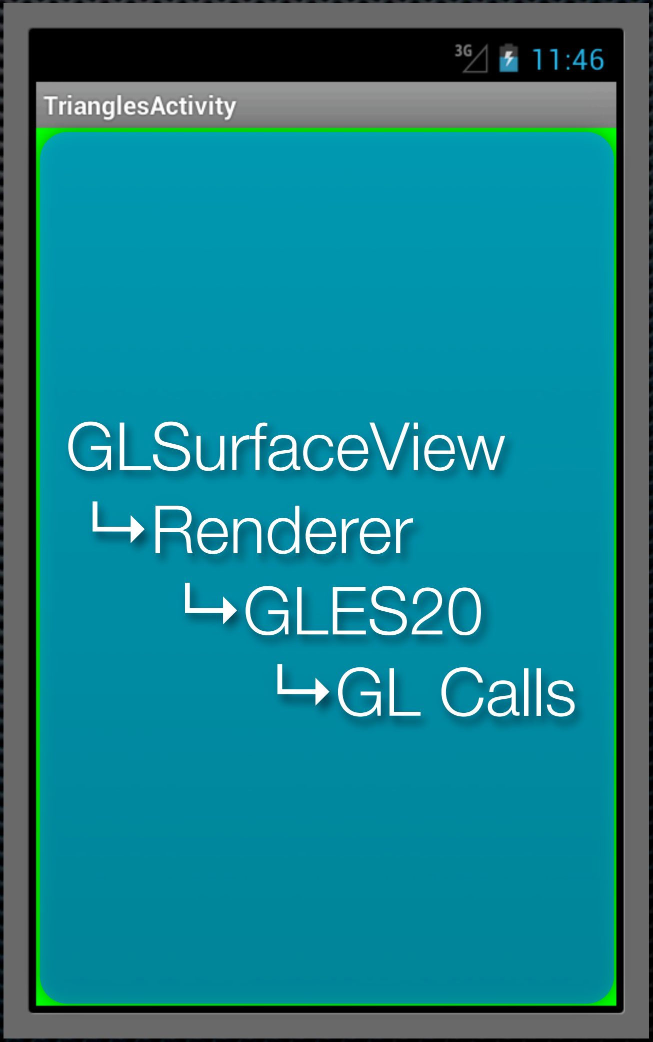
OpenGL ES

- C-Based Performance-Oriented Graphics Library
  - Wrapper libraries provided for Java, C#, etc.
- Produces 2D images from 2D or 3D geometric data
- Mobile version of OpenGL
  - Includes nearly all OpenGL functionality
  - Removes seldom-used or legacy features
  - Used by non-mobile platforms also (eg. Playstation 3)

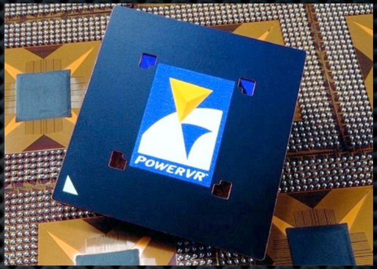


OpenGL Environment

- android.opengl.GLSurfaceView
  - GLSurfaceView.Renderer
    - GLES20 (C Library Wrapper)
      - Program
        - Vertex Shader
        - Fragment Shader
        - Uniform Variables
        - Attribute Arrays

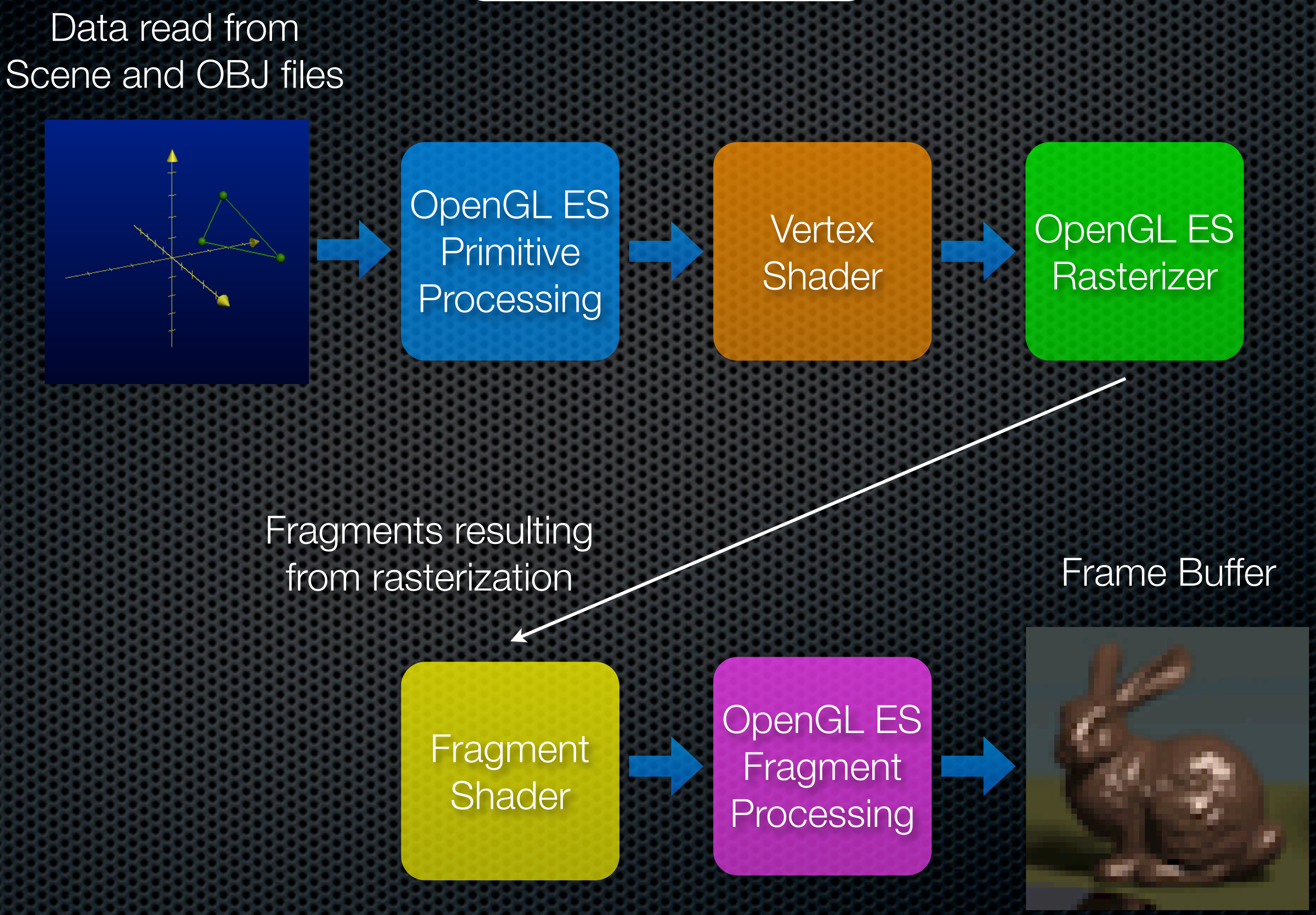


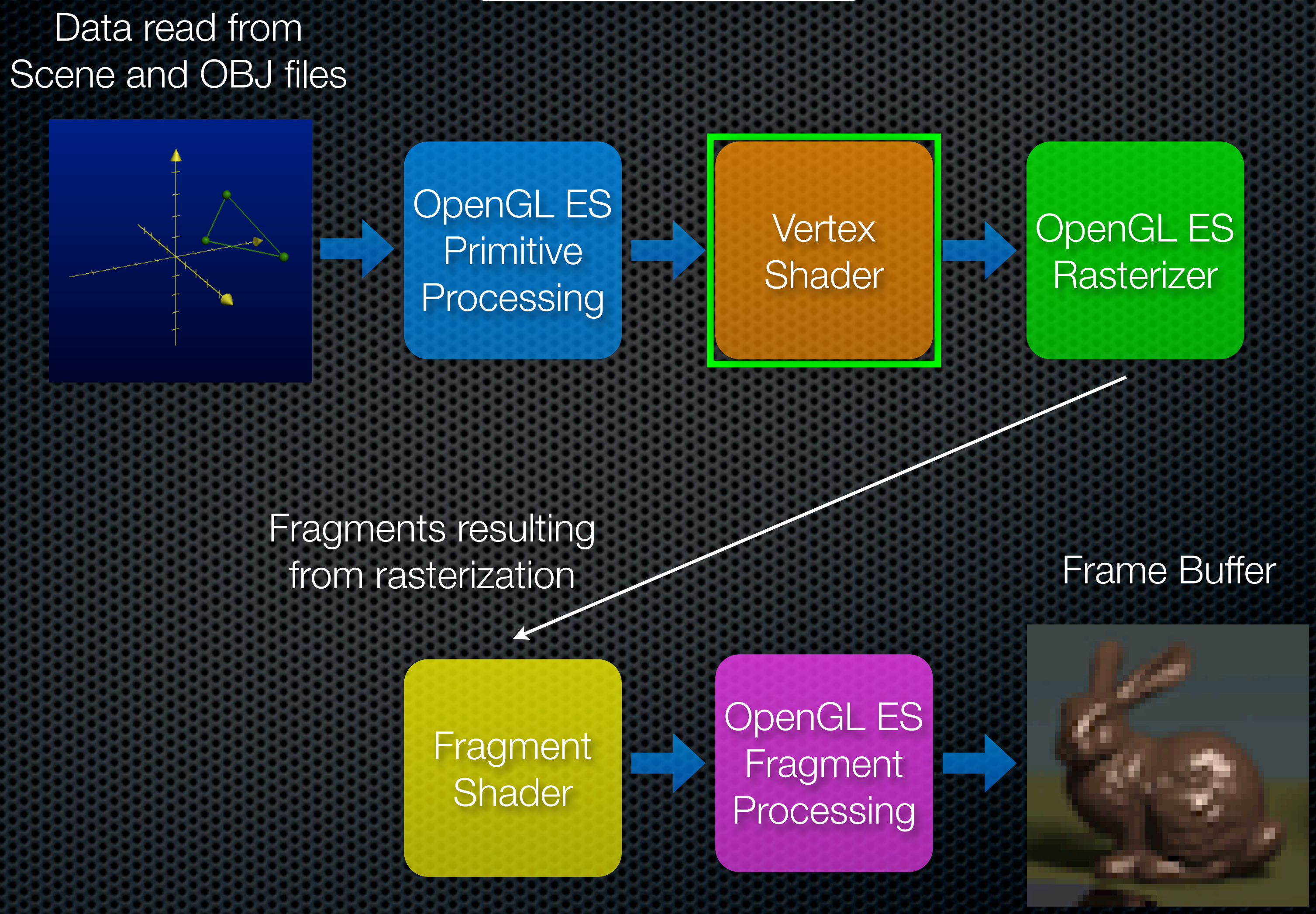
OpenGL ES 1 vs ES 2



- Fixed-Function Pipeline vs. Programmable Pipeline
- ES1 has only fixed processes, manipulating geometry and generating fragments in a standardized process
- ES2 has some fixed processes and 2 programmable processes for the data input into OpenGL
- ES2 is much simpler than ES1, but requires knowledge of the OpenGL Shader Language

OpenGL|ES


Data read from
Scene and OBJ files
OpenGL ES Primitive Processing
Vertex Shader
OpenGL ES Rasterizer
Fragments resulting from rasterization
Fragment Shader
OpenGL ES Fragment Processing
Frame Buffer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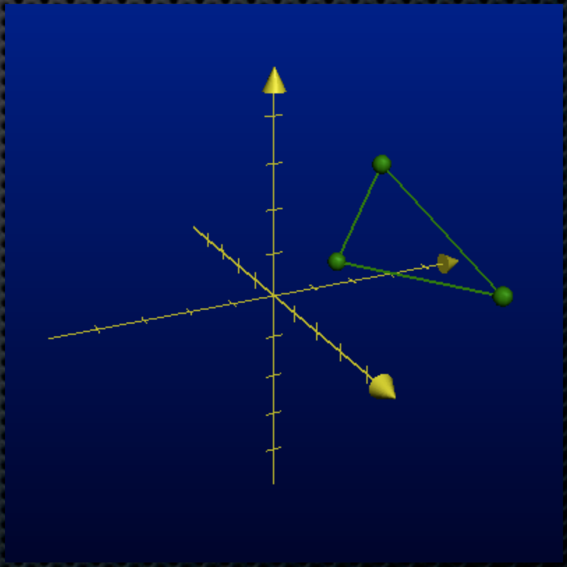
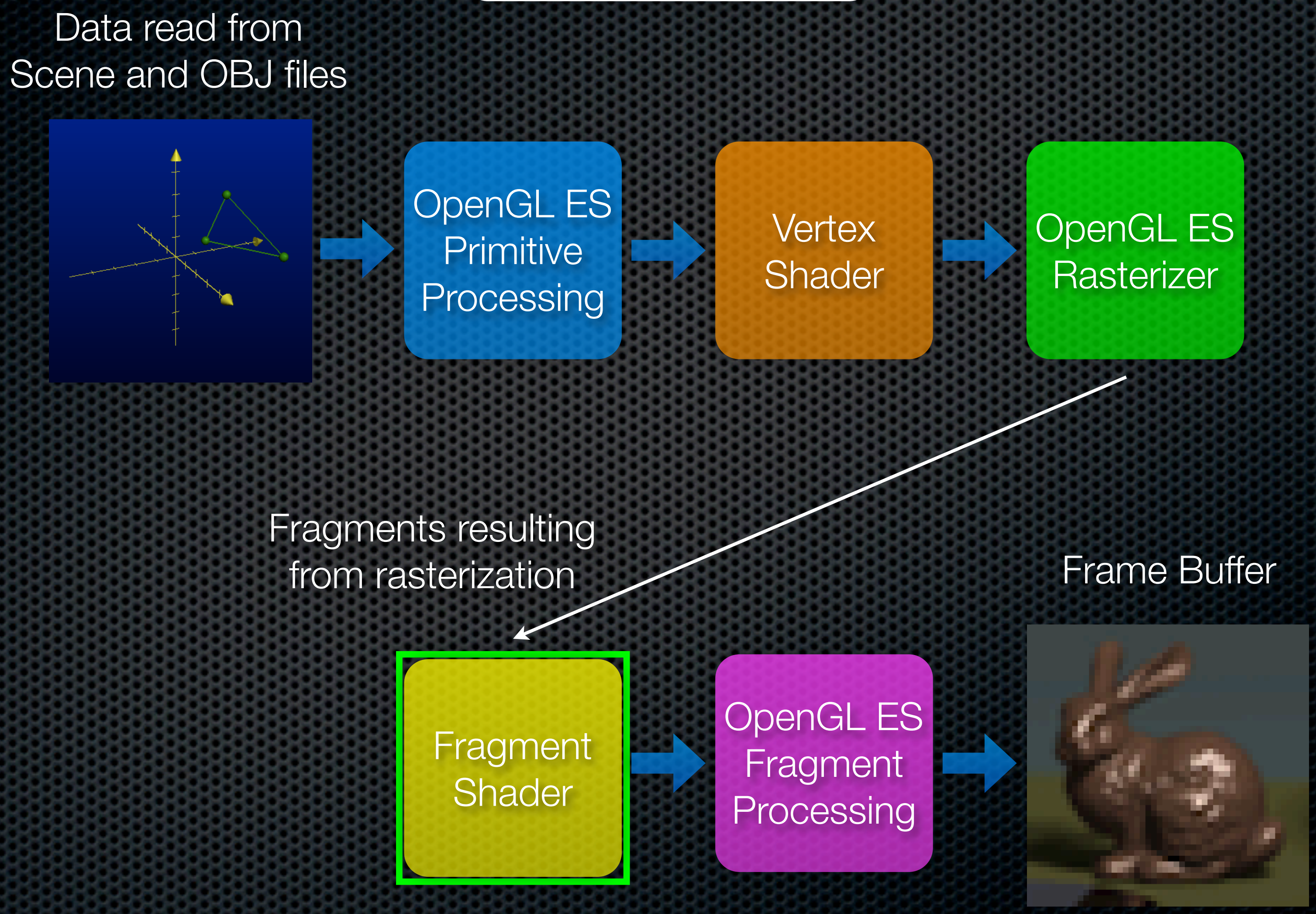
Vertex Shader

- Receives a vertex from OpenGL after minimal processing
- Modifies incoming vertex in some way using uniform variables where needed
- Outputs the vertex
- May also output additional data for the fragment shader to use

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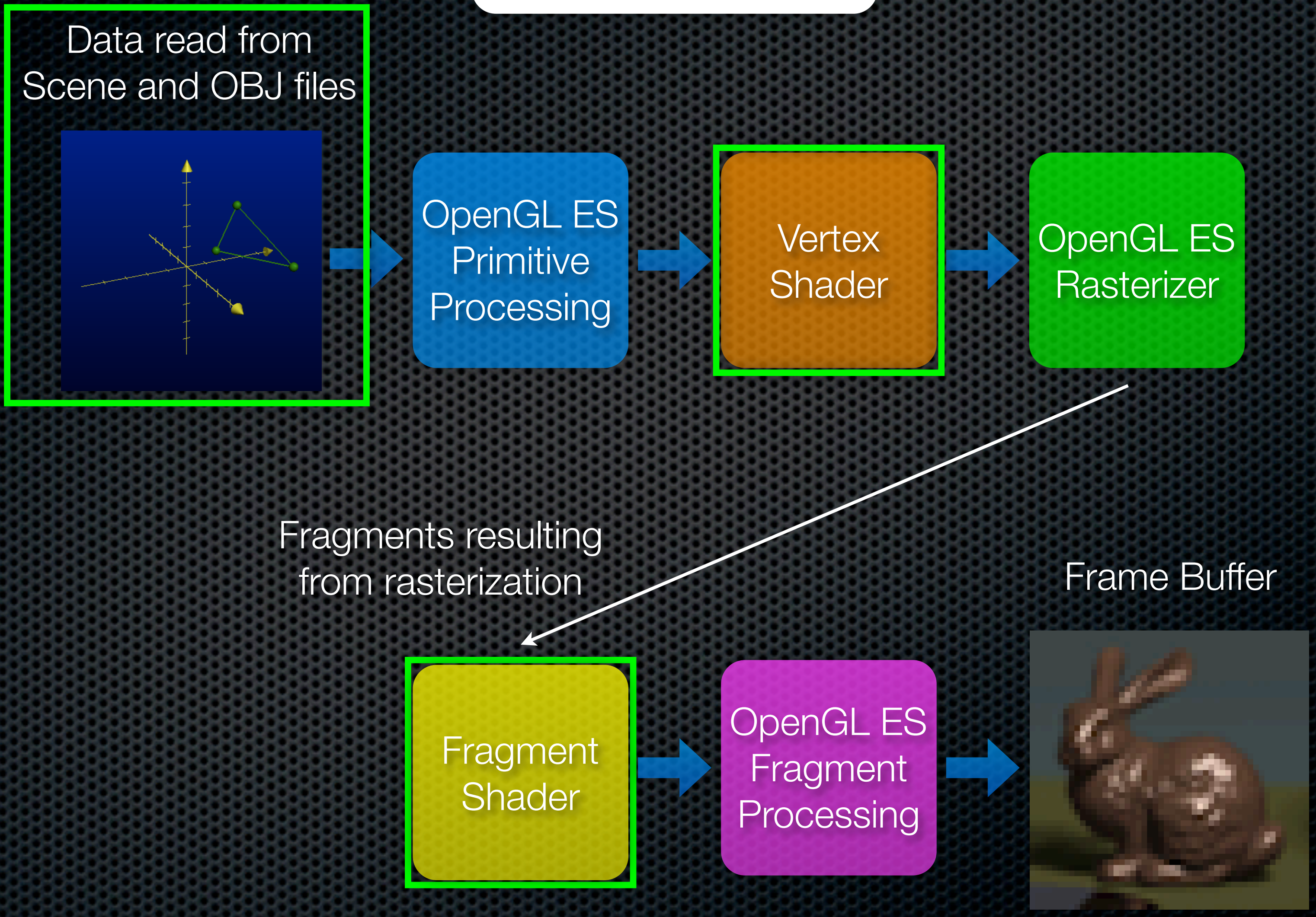
Fragments resulting from rasterization
Frame Buffer
Fragment Shader
OpenGL ES Fragment Processing

Fragment Shader

- Receives a fragment from OpenGL resulting from rasterizing a primitive
- Chooses a color for the fragment based on data given by vertex shader and uniform variables
- Outputs the fragment color

OpenGL ES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