Dynamic State Variables

Oregon State University

Mike Bailey

mjb@cs.oregonstate.edu

Oregon State University
Computer Graphics

Creating a Pipeline with Dynamically Changeable State Variables

The graphics pipeline is full of state information, and, as previously-discussed, is immutable, that is, the information contained inside it is fixed, and can only be changed by creating a new graphics pipeline with new information.

That isn't quite true. To a certain extent, you can declare parts of the pipeline state changeable. This allows you to change pipeline information on the fly.

This is useful for managing state information that needs to change frequently. This also creates possible optimization opportunities for the Vulkan driver.

Which Pipeline State Variables can be Changed Dynamically

The possible uses for dynamic variables are shown in the **VkDynamicState** enum:

VK_DYNAMIC_STATE_VIEWPORT
VK_DYNAMIC_STATE_SCISSOR
VK_DYNAMIC_STATE_LINE_WIDTH
VK_DYNAMIC_STATE_DEPTH_BIAS
VK_DYNAMIC_STATE_BLEND_CONSTANTS
VK_DYNAMIC_STATE_DEPTH_BOUNDS
VK_DYNAMIC_STATE_STENCIL_COMPARE_MASK
VK_DYNAMIC_STATE_STENCIL_WRITE_MASK
VK_DYNAMIC_STATE_STENCIL_REFERENCE

Creating a Pipeline


```
VkDynamicState                              vds[ ] =
{
        VK_DYNAMIC_STATE_VIEWPORT,
        VK_DYNAMIC_STATE_LINE_WIDTH
};


VkPipelineDynamicStateCreateInfo            vpdsci;
        vpdsci.sType =  VK_STRUCTURE_TYPE_PIPELINE_DYNAMIC_STATE_CREATE_INFO;
        vpdsci.pNext = nullptr;
        vpdsci.flags = 0;
        vpdsci.dynamicStateCount = sizeof(vds) / sizeof(VkDynamicState);
        vpdsci.pDynamicStates = &vds;


VkGraphicsPipelineCreateInfo                vgpci;
        . . .
        vgpci.pDynamicState = &vpdsci;
        . . .


vkCreateGraphicsPipelines( LogicalDevice, pipelineCache, 1, &vgpci, PALLOCATOR, &GraphicsPipeline );
```

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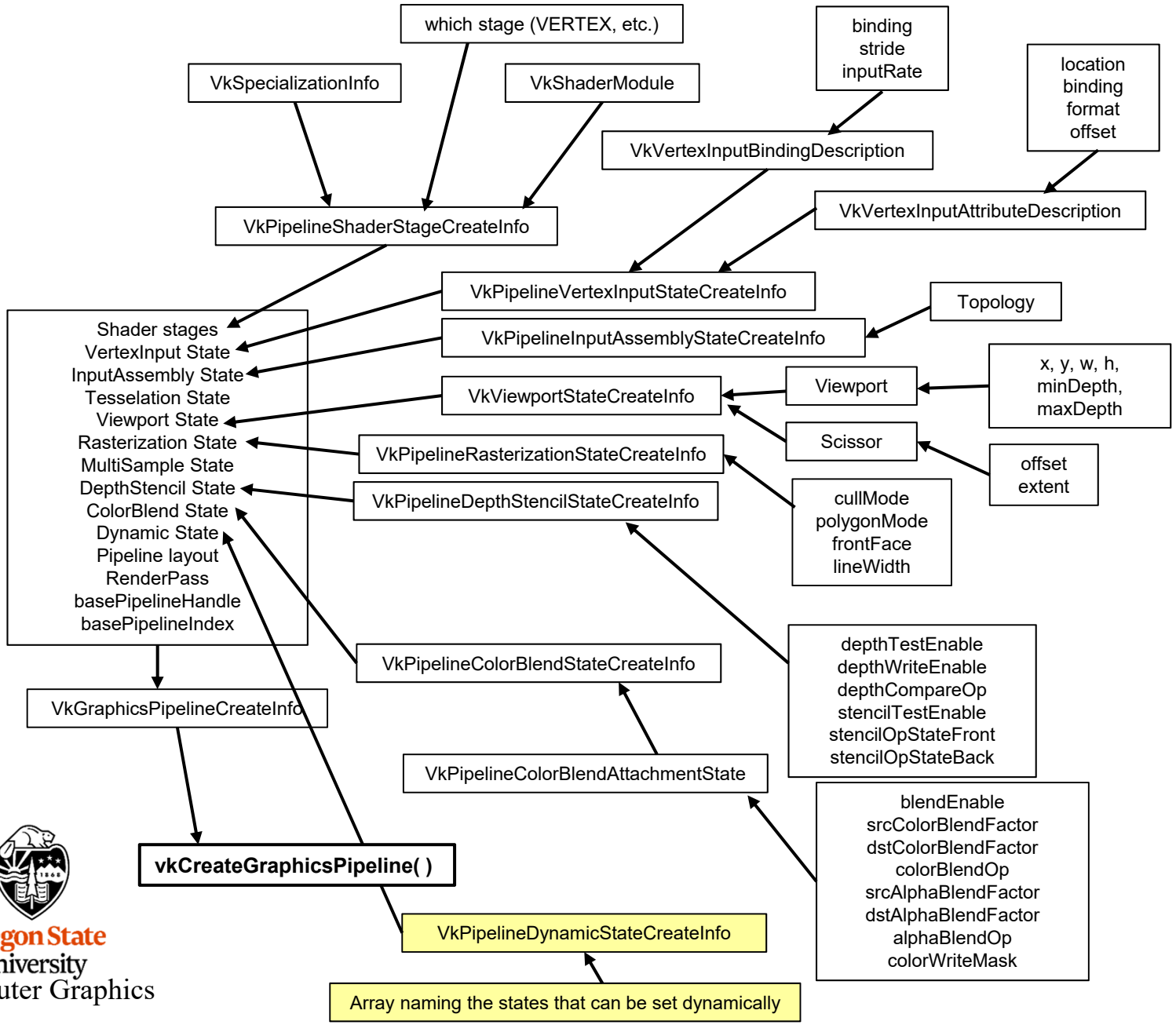
If you declare certain state variables to be dynamic like this, then you *must* fill them in the command buffer! Otherwise, they are ***undefined*** and bad things are likely to happen.

Creating a Pipeline



Filling State Variables in the Command Buffer

The command buffer-bound function calls to set these dynamic states are:

```
vkCmdSetViewport( commandBuffer, firstViewport, viewportCount, pViewports );
vkCmdSetScissor( commandBuffer, firstScissor, scissorCount, pScissors );
vkCmdSetLineWidth( commandBuffer, linewidth );
vkCmdSetDepthBias( commandBuffer, depthBiasConstantFactor, depthBiasClamp, depthBiasSlopeFactor );
vkCmdSetBlendConstants( commandBuffer, blendConstants[4] );
vkCmdSetDepthBounds( commandBuffer, minDepthBounds, maxDepthBounds );
vkCmdSetStencilCompareMask( commandBuffer, faceMask, compareMask );
vkCmdSetStencilWriteMask( commandBuffer, faceMask, writeMask );
vkCmdSetStencilReference( commandBuffer, faceMask, reference );
```