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# Logical Devices

Oregon State University
Mike Bailey
mjb@cs.oregonstate.edu



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Computer Graphics



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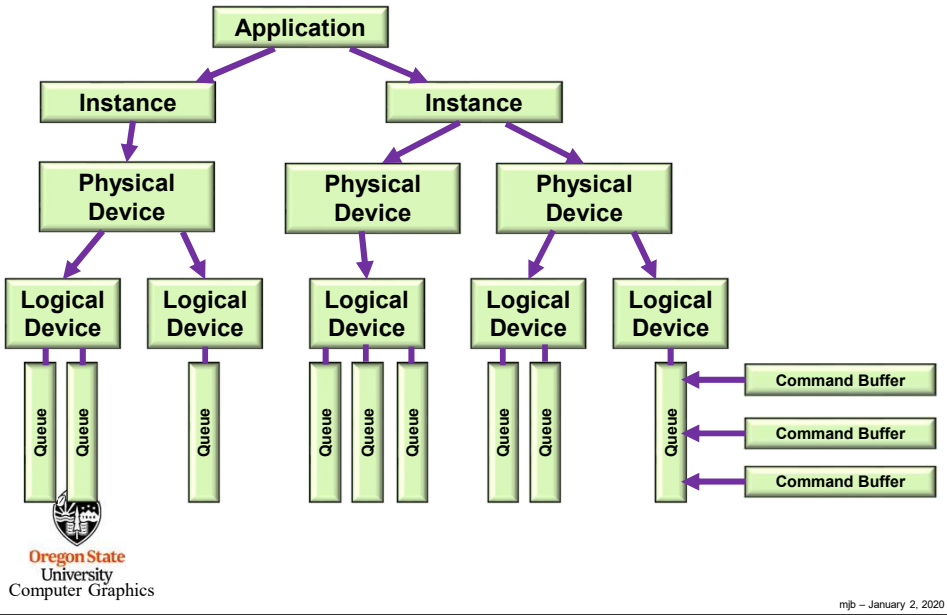
## Vulkan: Overall Block Diagram

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## Vulkan: a More Typical (and Simplified) Block Diagram

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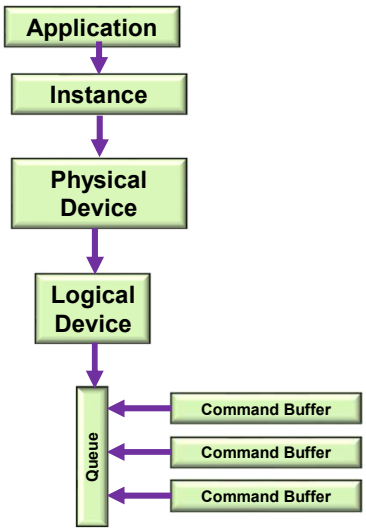


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## Looking to See What Device Layers are Available

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```
const char * myDeviceLayers[ ] =
{
	// "VK_LAYER_LUNARG_api_dump",
	// "VK_LAYER_LUNARG_core_validation",
	// "VK_LAYER_LUNARG_image",
	"VK_LAYER_LUNARG_object_tracker",
	"VK_LAYER_LUNARG_parameter_validation",
	// "VK_LAYER_NV_optimus"
};

const char * myDeviceExtensions[ ] =
{
	"VK_KHR_surface",
	"VK_KHR_win32_surface",
	"VK_EXT_debug_report"
	// "VK_KHR_swapchains"
};

// see what device layers are available:

uint32_t  layerCount;
vkEnumerateDeviceLayerProperties(PhysicalDevice, &layerCount, (VkLayerProperties *)nullptr);

VkLayerProperties * deviceLayers = new VkLayerProperties[layerCount];

result = vkEnumerateDeviceLayerProperties( PhysicalDevice, &layerCount, deviceLayers);
```

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## Looking to See What Device Extensions are Available

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```
// see what device extensions are available:

uint32_t  extensionCount;
vkEnumerateDeviceExtensionProperties(PhysicalDevice, deviceLayers[i].layerName,
                                     &extensionCount, (VkExtensionProperties *)nullptr);

VkExtensionProperties * deviceExtensions = new VkExtensionProperties[extensionCount];

result = vkEnumerateDeviceExtensionProperties(PhysicalDevice, deviceLayers[i].layerName,
                                     &extensionCount, deviceExtensions);
```

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## What Device Layers and Extensions are Available

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```
4 physical device layers enumerated:


0x004030cd   1  'VK_LAYER_NV_optimus'  'NVIDIA Optimus layer'
        160 device extensions enumerated for 'VK_LAYER_NV_optimus':

0x00400033   1  'VK_LAYER_LUNARG_core_validation'  'LunarG Validation Layer'
        0 device extensions enumerated for 'VK_LAYER_LUNARG_core_validation':

0x00400033   1  'VK_LAYER_LUNARG_object_tracker'  'LunarG Validation Layer'
        160 device extensions enumerated for 'VK_LAYER_LUNARG_object_tracker':

0x00400033   1  'VK_LAYER_LUNARG_parameter_validation'  'LunarG Validation Layer'
        160 device extensions enumerated for 'VK_LAYER_LUNARG_parameter_validation':
```

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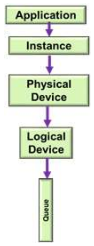
## Vulkan: Creating a Logical Device



```
float   queuePriorities[1] =
{
            1.
};
VkDeviceQueueCreateInfo  vdqci;
        vdqci.sType = VK_STRUCTURE_TYPE_DEVICE_QUEUE_CREATE_INFO;
        vdqci.pNext = nullptr;
        vdqci.flags = 0;
        vdqci.queueFamiltyIndex = 0;
        vdqci.queueCount = 1;
        vdqci.pQueueProperties = queuePriorities;
```




```
VkDeviceCreateInfo  vdci;
            vdci.sType = VK_STRUCTURE_TYPE_DEVICE_CREATE_INFO;
            vdci.pNext = nullptr;
            vdci.flags = 0;
            vdci.queueCreateInfoCount = 1;              // # of device queues
            vdci.pQueueCreateInfos = IN vdqci;          // array of VkDeviceQueueCreateInfo's
            vdci.enabledLayerCount = sizeof(myDeviceLayers) / sizeof(char *);
            vdci.enabledLayerCount = 0;
            vdci.ppEnabledLayerNames = myDeviceLayers;
            vdci.enabledExtensionCount = sizeof(myDeviceExtensions) / sizeof(char *);
            vdci.ppEnabledExtensionNames = myDeviceExtensions;
            vdci.pEnabledFeatures = IN &PhysicalDeviceFeatures;

      result = vkCreateLogicalDevice( PhysicalDevice, IN &vdci, PALLOCATOR, OUT &LogicalDevice );
```

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## Vulkan: Creating the Logical Device's Queue



```
// get the queue for this logical device:

vkGetDeviceQueue( LogicalDevice, 0, 0,  OUT &Queue );          // 0, 0 = queueFamilyIndex, queueIndex
```

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