

# Choose the Right Hardware

## Proposal Template

### Scenario 1: Manufacturing

#### Client Requirements and Potential Hardware Solution

Look through the scenario and find any relevant client requirements. Then, suggest a potential hardware type and explain how this hardware would satisfy each of the requirements.

| Which hardware might be most appropriate for this scenario?<br>(CPU / IGPU / VPU / FPGA) |
|--|
| FPGAs  |

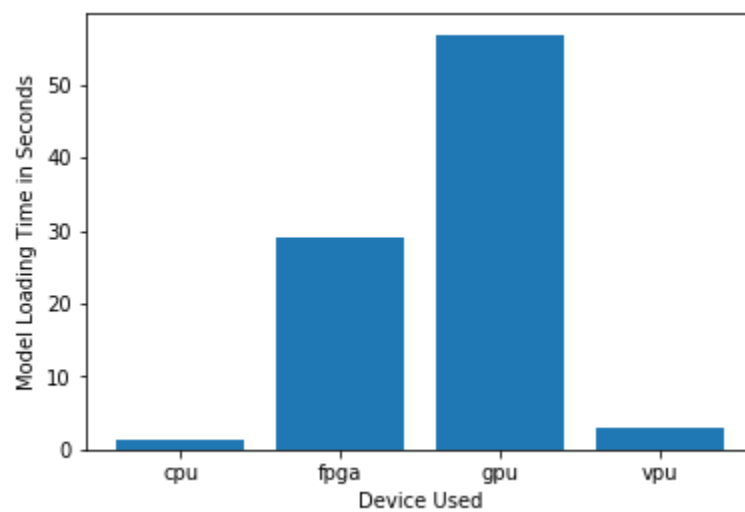
| Requirement Observed<br>(Include at least two.)  | How does the chosen hardware meet this requirement?   |
|--|---|
| <i>Example requirement:</i><br>The client requires a tiny device to be connected to their CPU—and their budget is only about \$100 for each device.  | <i>Example explanation:</i><br>VPU or NCS2 is only about 27.40 mm in size and would fit in the price range.   |
| <i>The client wants a system to monitor the number of people in the factory line. The client would like the image processing task to be completed five times per second, using the vision camera installed at every belt recording at 30-35 FPS.</i>                                       | <i>FPGAs can execute neural networks with high performance and very little latency.</i>   |
| <i>The client requires repurpose the system to be able to run inference on the video stream very quickly to detect semiconductor with flaws. The system would also need to be flexible so that it can be reprogrammed and optimized to quickly detect flaws in different chip designs.</i> | <i>FPGAs are flexible in a few different ways: They are field-programmable; they can be reprogrammed to adapt to new, evolving, and custom networks</i> |
| <i>The client requires a system with a duration at least 5-10 years.</i>   | <i>FPGAs have a long lifespan.</i>  |

## Queue Monitoring Requirements

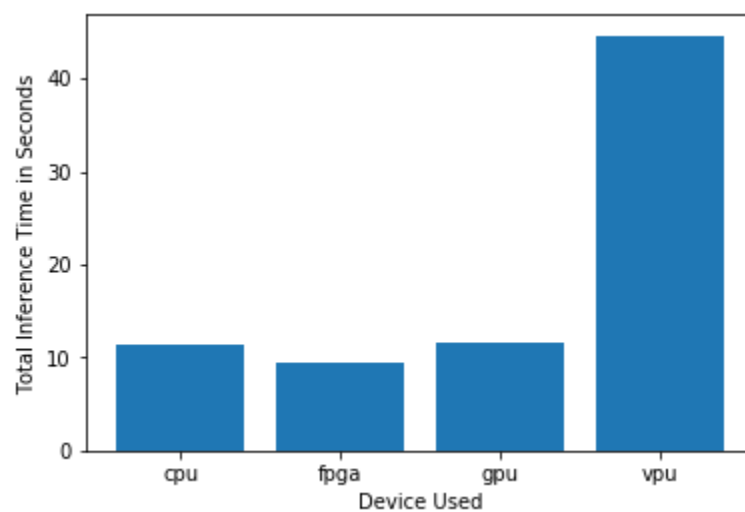
|  |                            |
|--|----------------------------|
| Maximum number of people in the queue        | Queue 1 = 1<br>Queue 2 = 2 |
| Model precision chosen (FP32, FP16, or Int8) | F16                        |

## Test Results

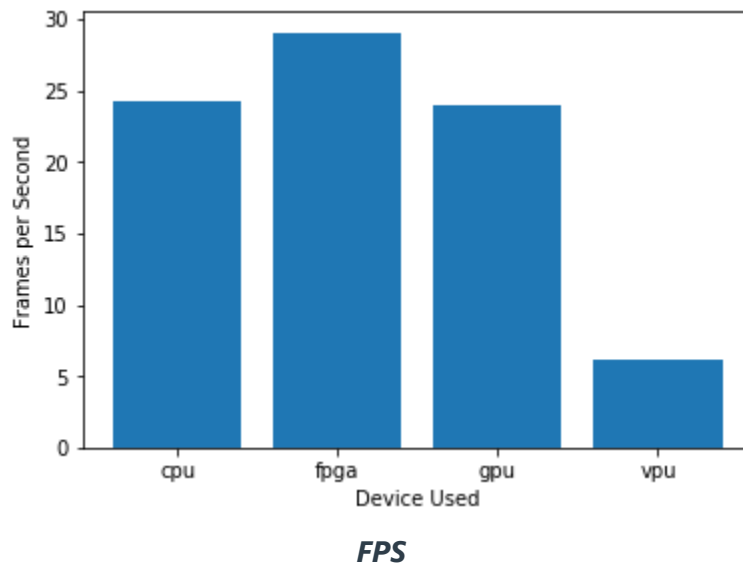
After you've tested your application on all four hardware types (CPU, IGPU, VPU, and FPGA), copy the matplotlib output showing the comparison into the spaces below. You should have three graphs (for model load time, inference time, and FPS).



**Model Load Time**



**Inference Time**



## Final Hardware Recommendation

Now synthesize your points from above and provide a brief write-up describing why the chosen hardware is the best choice for this scenario. Be sure to discuss the client's requirements, the test results, and how these relate to one another (e.g., perhaps one of the devices performed better than the rest but does not meet one of the client's requirements).

### Write-up: Final Hardware Recommendation

*The FPGs hardware provide flexibility with new scenarios and can be reprogrammed to adapt a new one, provide accurate results and long lifespan.*

## Scenario 2: Retail

### Client Requirements and Potential Hardware Solution

Look through the scenario and find any relevant client requirements. Then, suggest a potential hardware type and explain how this hardware would satisfy each of the requirements.

### Which hardware might be most appropriate for this scenario? (CPU / IGPU / VPU / FPGA)

*IGPU*

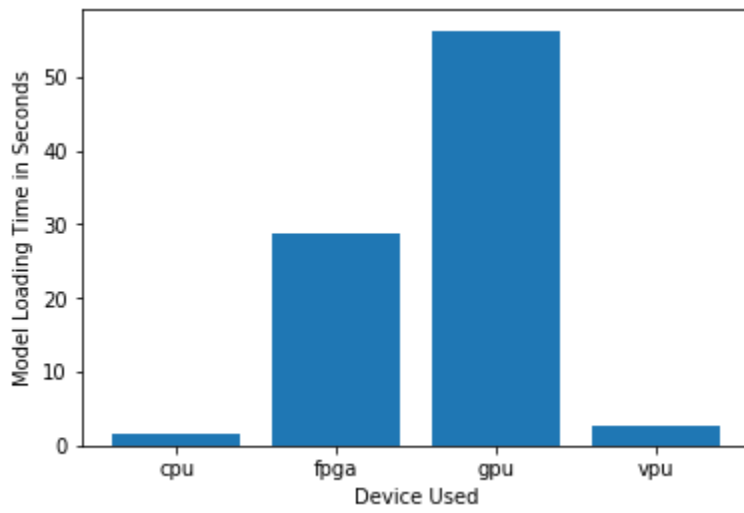
| Requirement Observed<br>(Include at least two.)   | How does the chosen hardware meet this requirement?   |
|---|---|
| <i>Example requirement:</i><br>The client requires a tiny device to be connected to their CPU—and their budget is only about \$100 for each device. | <i>Example explanation:</i><br>VPU or NCS2 is only about 27.40 mm in size and would fit in the price range.   |
| <i>The client requires direct people to less-congested queues in the store.</i>   | <i>It's offered the GPUs solution who has the next characteristics:</i> <ul style="list-style-type: none"> <li>• Configurable Power Consumption</li> <li>• Model Precision and Speed</li> </ul> |
| <i>The client requires use the modern computer present in the store, each of which has an Intel i7 core processor.</i>                              | <i>All Intel processors contain a GPU—and since this GPU is located on the same chip and shares the same memory with the CPUs, it is referred to as an Integrated GPU</i>                       |
| <i>The client requires not invest to much in additional hardware.</i>   | <i>It's not necessary.</i>  |

## Queue Monitoring Requirements

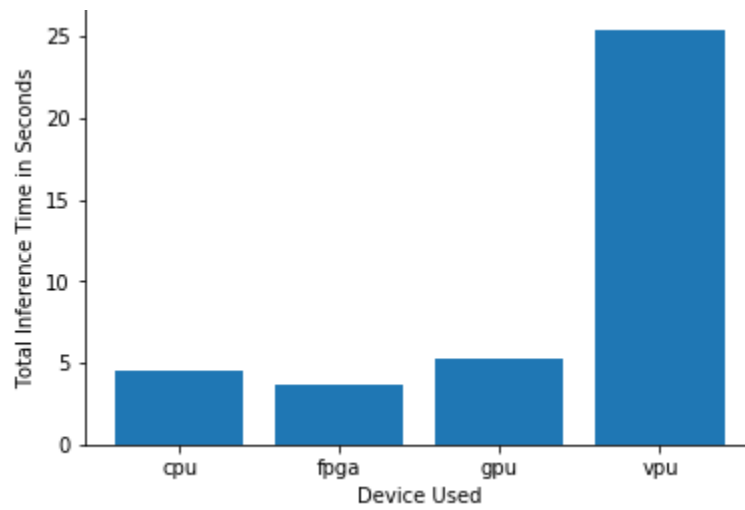
|  |                            |
|--|----------------------------|
| Maximum number of people in the queue        | Queue 1 = 2<br>Queue 2 = 1 |
| Model precision chosen (FP32, FP16, or Int8) | F32                        |

## Test Results

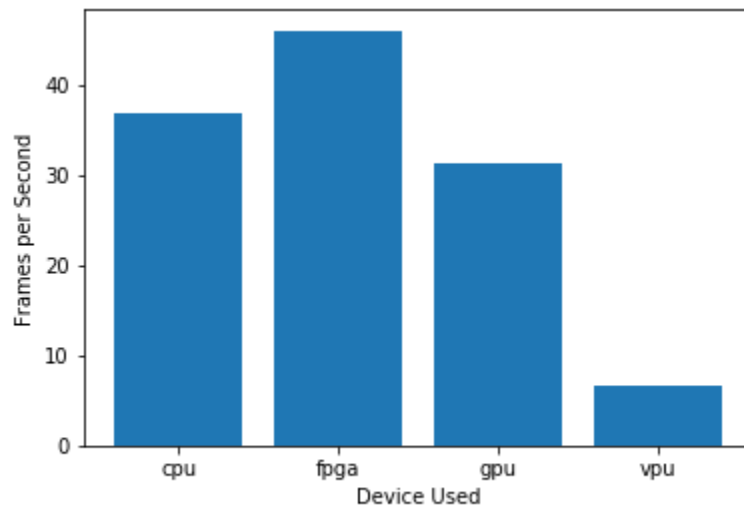
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***Model Load Time***



***Inference Time***



**FPS**

## Final Hardware Recommendation

Now synthesize your points from above and provide a brief write-up describing why the chosen hardware is the best choice for this scenario. Be sure to discuss the client's requirements, the test results, and how these relate to one another (e.g., perhaps one of the devices performed better than the rest, but does not meet one of the client's requirements).

### Write-up: Final Hardware Recommendation

*Using the IGPU present in the machines used for the checkout counters can provide the necessary hardware requirements for the solution.*

## Scenario 3: Transportation

### Client Requirements and Potential Hardware Solution

Look through the scenario and find any relevant client requirements. Then, suggest a potential hardware type and explain how this hardware would satisfy each of the requirements.

### Which hardware might be most appropriate for this scenario? (CPU / IGPU / VPU / FPGA)

VPU

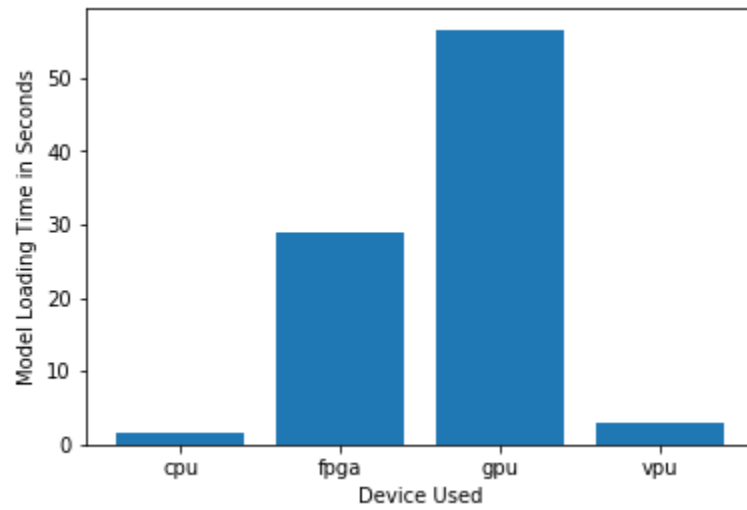
| Requirement Observed<br>(Include at least two.)   | How does the chosen hardware meet this requirement?   |
|---|---|
| <i>Example requirement:</i><br>The client requires a tiny device to be connected to their CPU—and their budget is only about \$100 for each device. | <i>Example explanation:</i><br>VPU or NCS2 is only about 27.40 mm in size and would fit in the price range.   |
| <i>The client requires monitor the queues in real-time and quickly direct the crowd in the right manner.</i>  | Intel Neural Compute Stick 2 <ul style="list-style-type: none"> <li>• Start quickly with plug and play simplicity</li> <li>• Develop on common frameworks and using out-of-the-box sample applications</li> <li>• Prototype on any platform equipped with a USB port</li> <li>• Operate without cloud compute dependence</li> <li>• Performance improvements over the previous generation Intel® Movidius™ Neural Compute Stick (NCS).</li> </ul> |
| <i>The client requires use the All-In-One PCs, no significant additional processing power is available to run inference</i>                         | VPUs are small, low-cost, low-power devices that can dramatically improve the performance of a system without the need to upgrade the other hardware.   |
| <i>The client requires use a budget of \$300 per machine and save as much as possible both on hardware and future power requirements.</i>           | Neural Compute Stick 2 with Myriad X Vision Processing Unit, with a price of \$108.67 in Amazon.  |

## Queue Monitoring Requirements

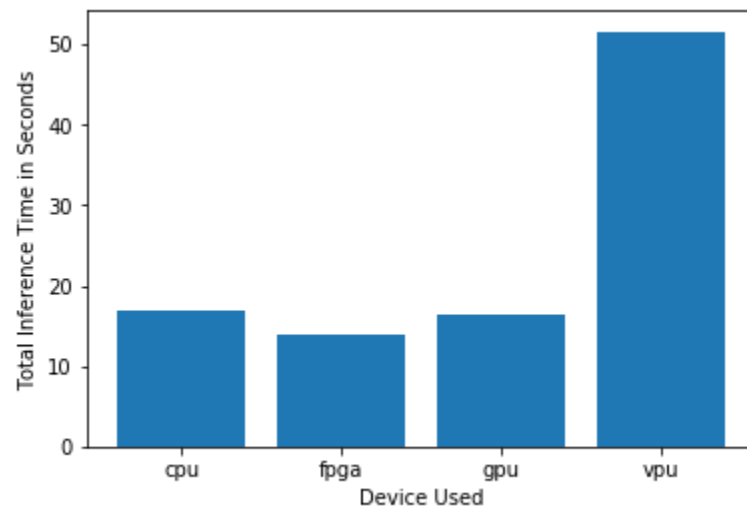
|  |                            |
|--|----------------------------|
| Maximum number of people in the queue        | Queue 1 = 5<br>Queue 2 = 3 |
| Model precision chosen (FP32, FP16, or Int8) | F16                        |

## Test Results

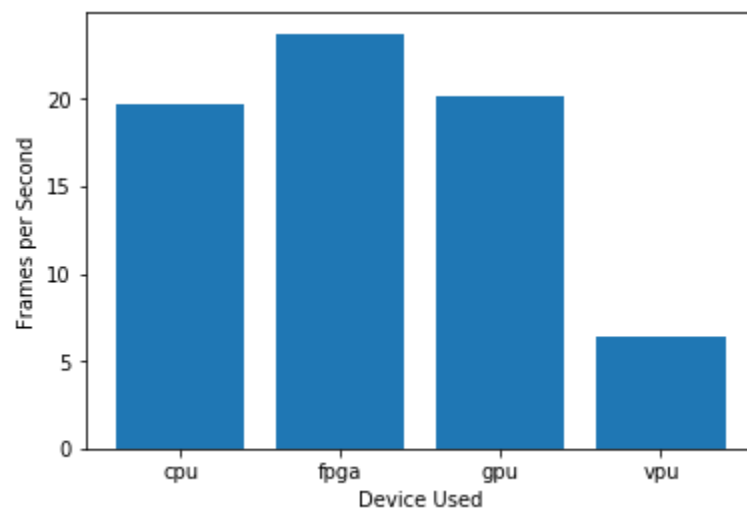
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***Model Load Time***



***Inference Time***



***FPS***



## Final Hardware Recommendation

Now synthesize your points from above and provide a brief write-up describing why the chosen hardware is the best choice for this scenario. Be sure to discuss the client's requirements, the test results, and how these relate to one another (e.g., perhaps one of the devices performed better than the rest, but does not meet one of the client's requirements).

### Write-up: Final Hardware Recommendation

*According to the budget the VPU is the perfect hardware solution, it is a low-power device.*