

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? (CPU / IGPU / VPU / FPGA)
FPGA

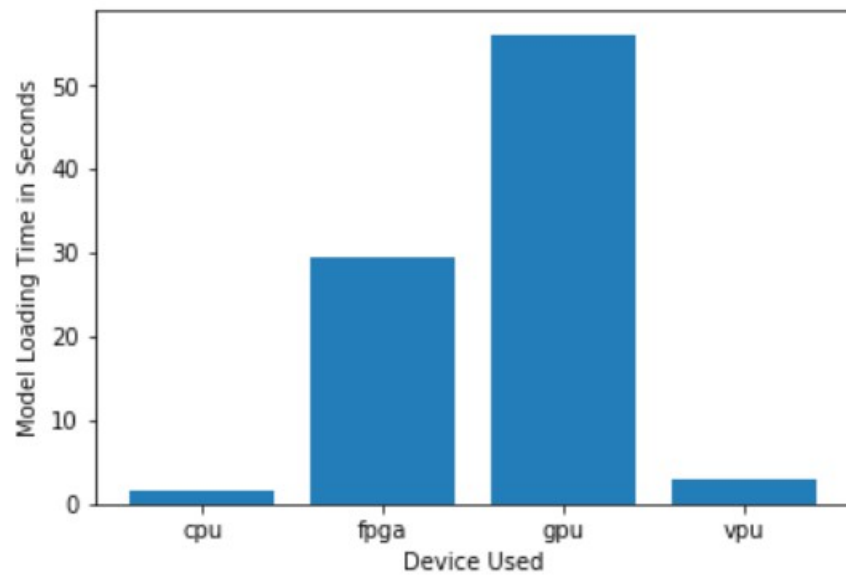
Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
<i>Example requirement:</i> The client requires a tiny device to be connected to their CPU—and their budget is only about \$100 for each device.	<i>Example explanation:</i> VPU or NCS2 is only about 27.40 mm in size and would fit in the price range
<i>The client requires a system that can run fast inference on a moving conveyor belt (30 -35 FPS for 2 cameras)</i>	<i>FPGAs can be converted into an AI accelerator optimized for the specific model. Several processes can be run in parallel, according to the used bitstream. They can have a very high throughput because they run on the chip and do not transfer data back to the CPU.</i>
<i>The client requires a system that can easily be reprogrammed and used for different requirements</i>	<i>FPGAs are versatile and can be reprogrammed in the field</i>
<i>The system should be running for 5 – 10 years</i>	<i>FPGAs have a lifespan of 10 years</i>

Queue Monitoring Requirements

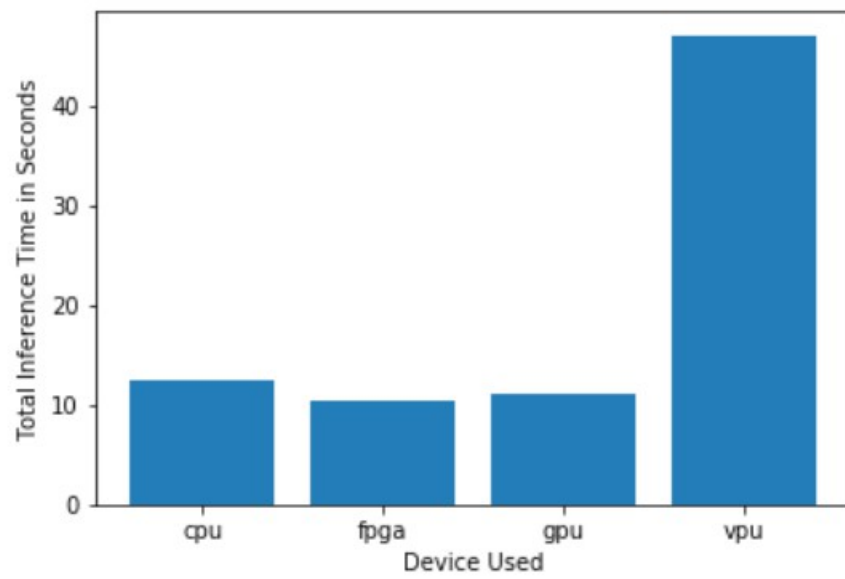
Maximum number of people in the queue	2
Model precision chosen (FP32, FP16, or Int8)	FP16

Test Results

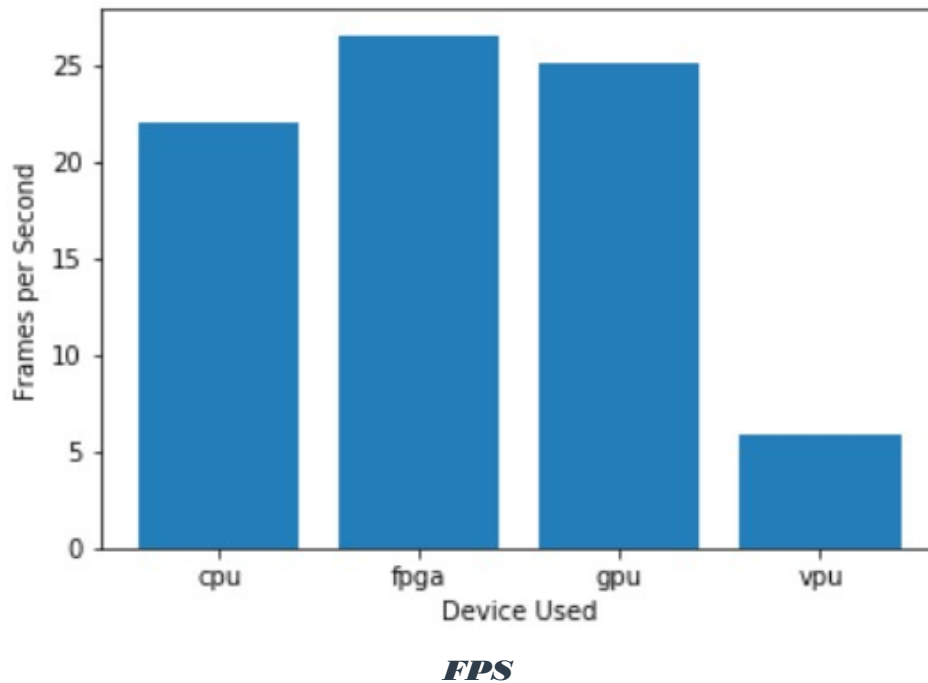
After you've tested your application on all four hardware types (CPU, IGPU, VPU, and FPGA), copy the matplotlib output showing the comparison into the spaces below. You should have three graphs (for model load time, inference time, and FPS).



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 recommended hardware is FPGA, because it can process the highest framerate. It is also the most versatile hardware, so it can be easily reused for the other use cases intended by the customer.

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)

CPU

Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
<p><i>Example requirement:</i></p> <p>The client requires a tiny device to be connected to their CPU—and their budget is only about \$100 for each device.</p>	<p><i>Example explanation:</i></p> <p>VPU or NCS2 is only about 27.40 mm in size and would fit in the price range.</p>

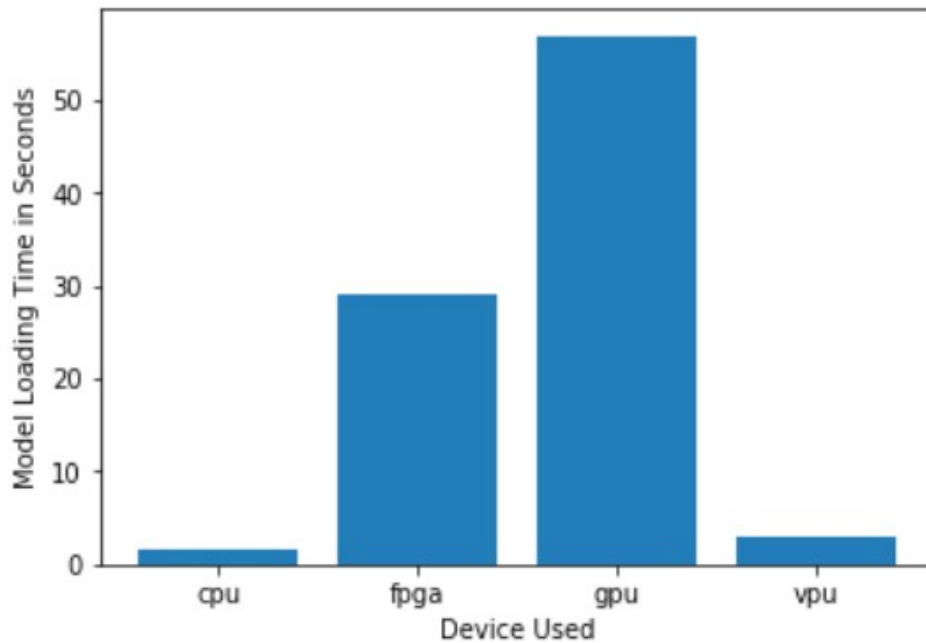
<i>Most of the client's checkout counters are already equipped with Intel i7 core processors, which are currently running a minimal workload</i>	<i>The existing hardware can be used, the other checkout counters should be upgraded to newer CPUs</i>
<i>The client has a minimal budget</i>	<i>The usage of the exiting hardware will reduce the cost of the overall implementation</i>
<i>The client wants to keep electricity costs down</i>	<i>Using exisiting hardware will only increase the power costs slightly.</i>

Queue Monitoring Requirements

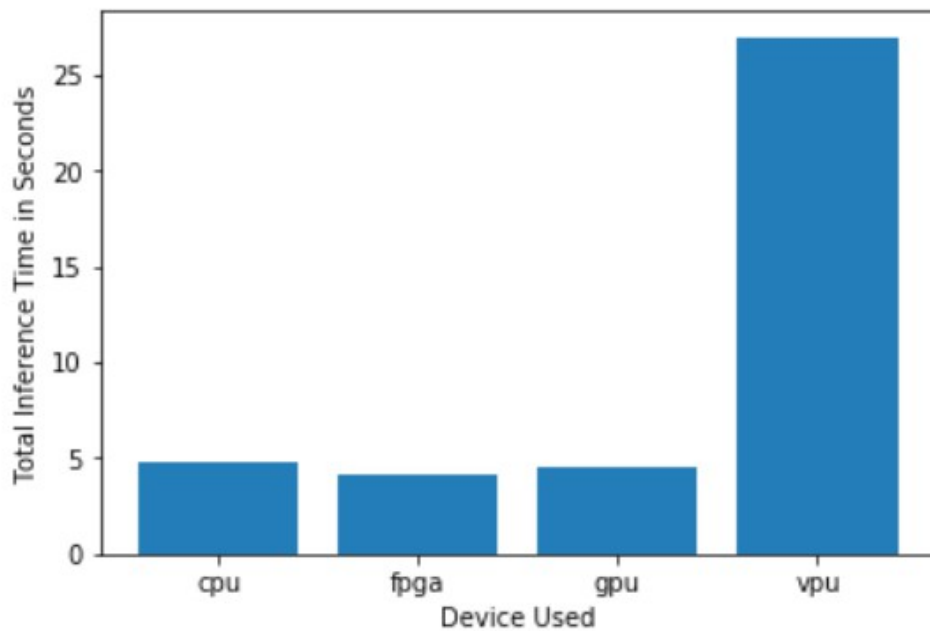
Maximum number of people in the queue	5
Model precision chosen (FP32, FP16, or Int8)	FP32

Test Results

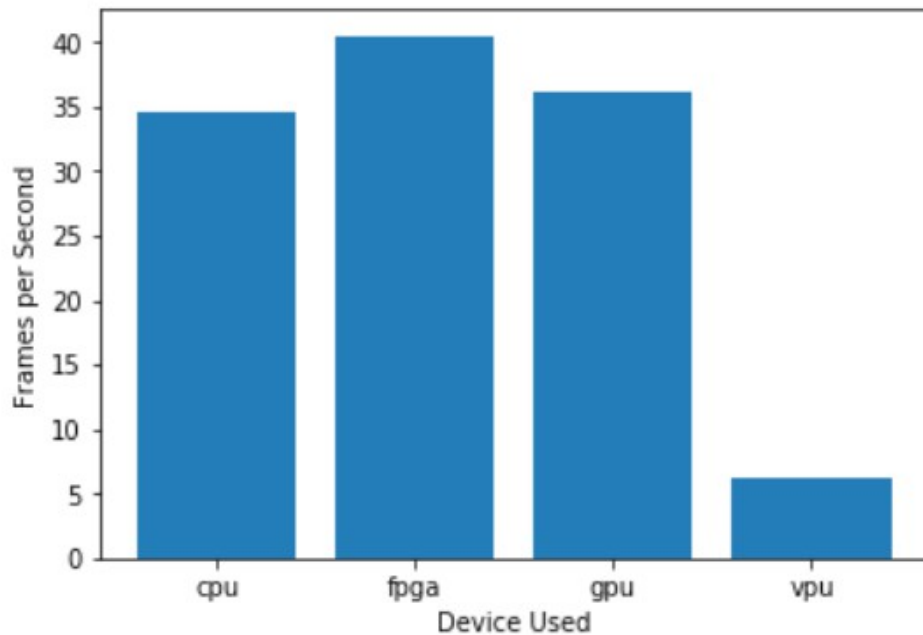
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Model Load Time



Inference Time



FPS

Final Hardware Recommendation

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Write-up: Final Hardware Recommendation

The recommended hardware for this scenario is CPU. As most of the checkout counters are already equipped with Intel i7 core processors that have enough computational capacity, it is best to reuse this hardware. This helps the client to keep

costs down and only slightly increase the power consumption cost.

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 or NCS2

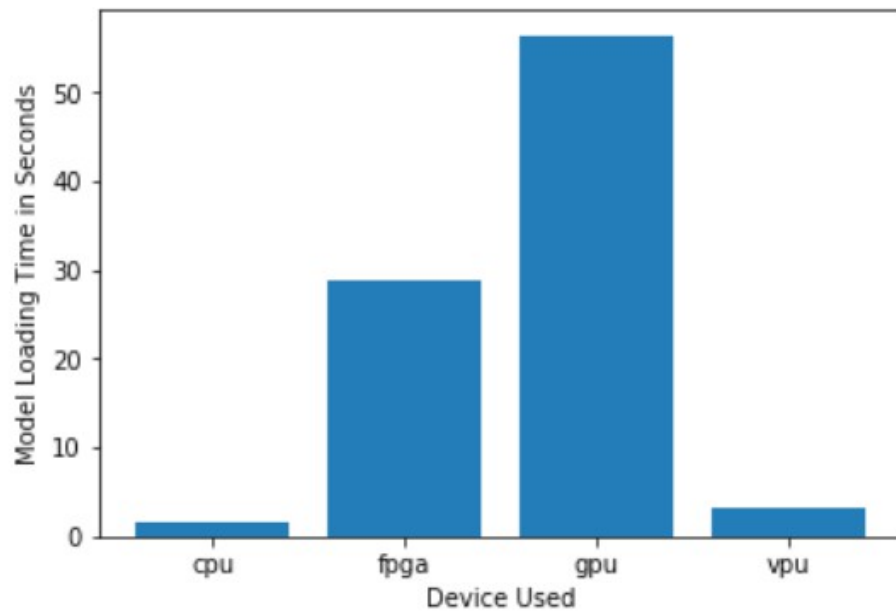
Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
<i>Example requirement:</i> The client requires a tiny device to be connected to their CPU—and their budget is only about \$100 for each device.	<i>Example explanation:</i> VPU or NCS2 is only about 27.40 mm in size and would fit in the price range.
<i>The client has existing All-in-one PCs that do not have significant additional processing power</i>	<i>NCS2 is the easiest way to add AI acceleration to an existing system</i>
<i>The client has a limited budget of 300\$ per machine.</i>	<i>The cost for an NCS2 is approx. 90 USD</i>
<i>The client wants to save on power.</i>	<i>The NCS2 is designed for low power consumption and has a power consumption of only 1 W</i>

Queue Monitoring Requirements

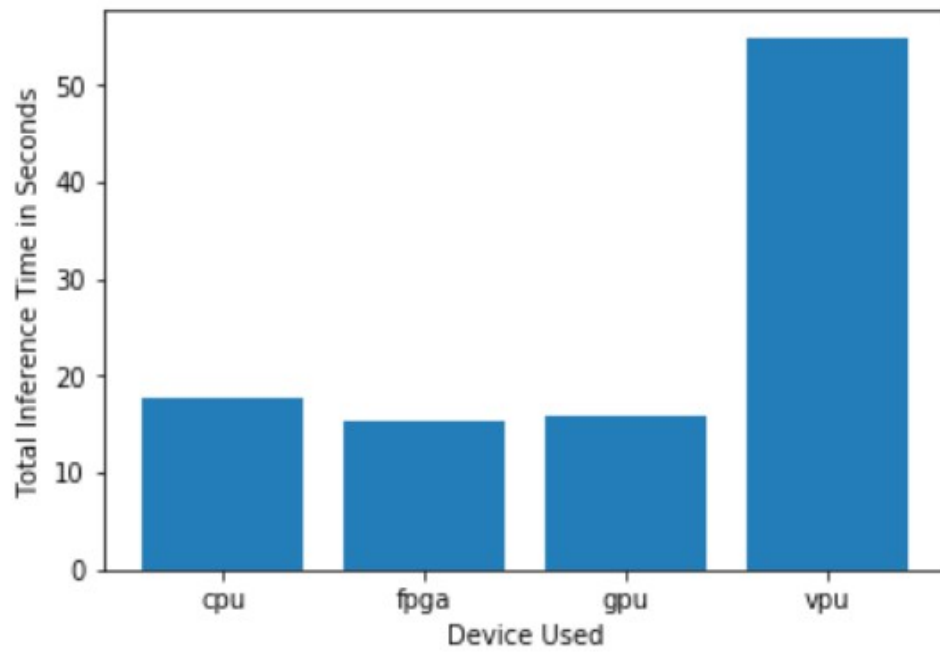
Maximum number of people in the queue	<i>15</i>
Model precision chosen (FP32, FP16, or Int8)	<i>FP16</i>

Test Results

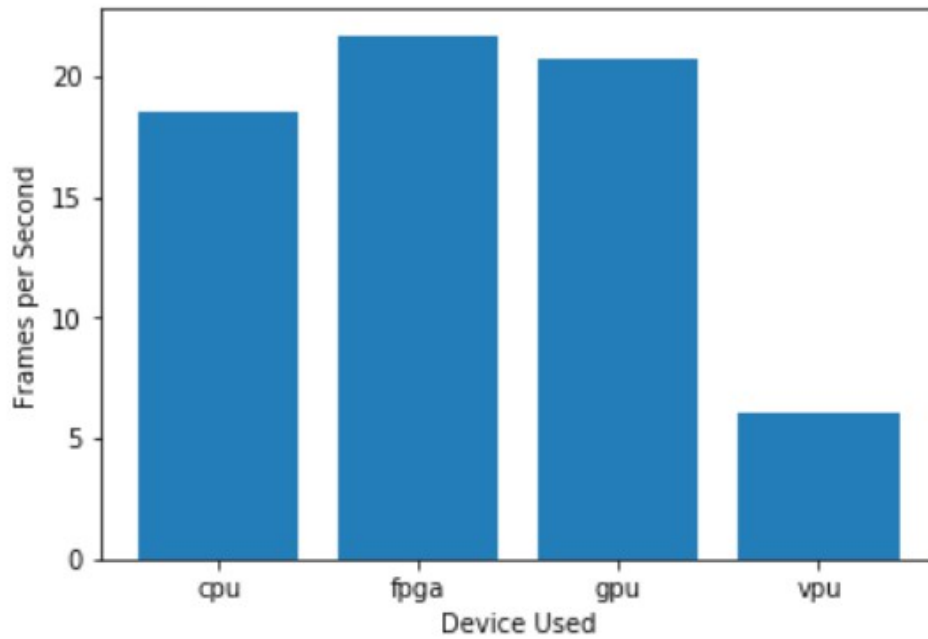
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Inference Time



FPS

Final Hardware Recommendation

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Write-up: Final Hardware Recommendation

The VPU has very high inference time and a very low FPS, therefore it would be better to run on CPU or GPU. Due to the restricted budget and the requirements for minimal power consumption, the VPU might be the best alternative.