Choose the Right Hardware

Proposal

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.

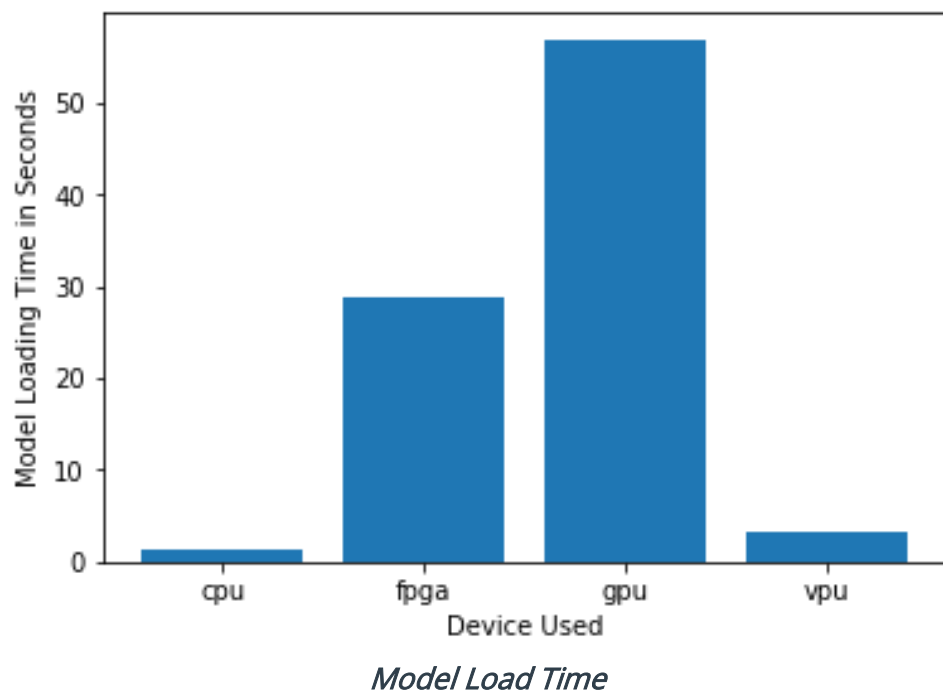| Which hardware might be most appropriate for this scenario? (CPU / IGPU / VPU / FPGA) |
| --- |
| *FPGA* |

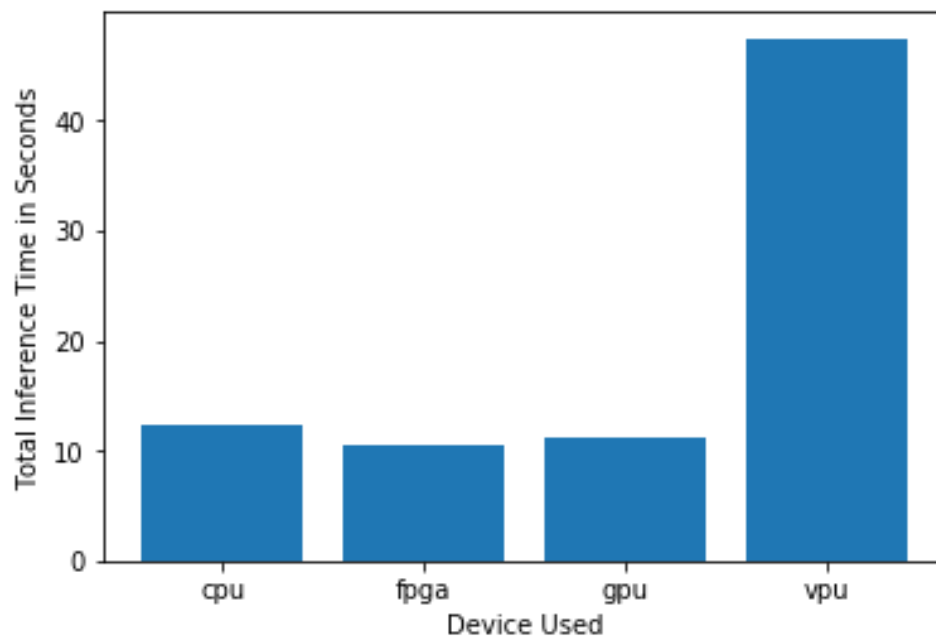| Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
Example requirement: The client requires a tiny device to be connected to their CPU—and their budget is only about $100 for each device.	*Example explanation:* VPU or NCS2 is only about 27.40 mm in size and would fit in the price range.
The client requires a system that image processing task to be completed five times per second - and each camera records video at 30-35 FPS.	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. FPGAs can run the model with very high performance and give a very low latency.
The client requires a system that can be flexible so that it can be reprogrammed and optimized to quickly detect flaws in different chip designs.	FPGAs are highly flexible, they are field programmable and can be reprogrammed as needed
The client would ideally like system to last for at least 5-10 years.	FPGAs have a lifespan of 10 years

Queue Monitoring Requirements

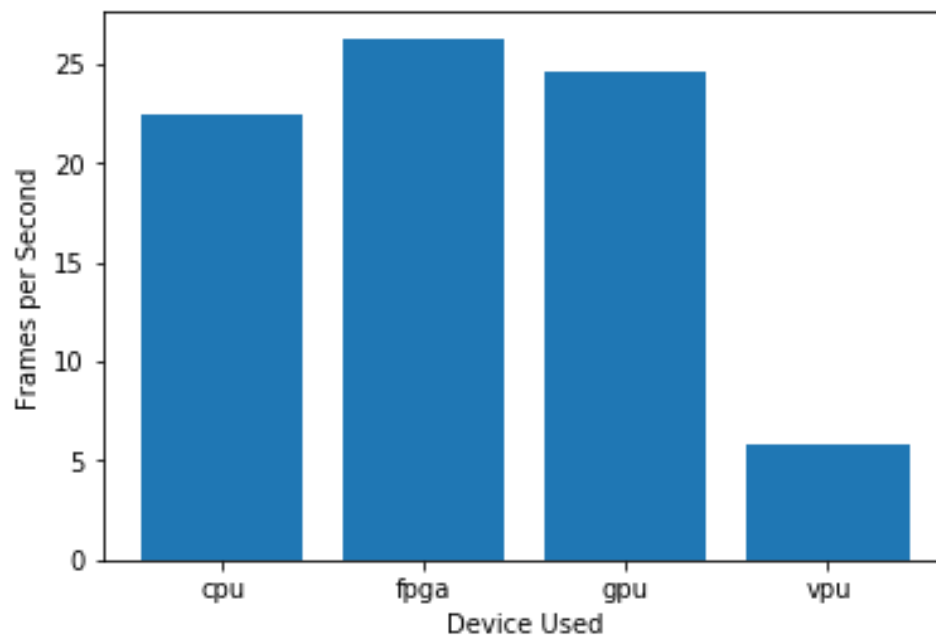| Maximum number of people in the queue	2
Model precision chosen (FP32, FP16, or Int8)	FP16

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

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
For the current scenario, the recommended hardware is FPGA, because it can process the highest framerate. It can work at 30 FPS and is reprogrammable for the future usage. It has a long lifespan of 10 years.

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.

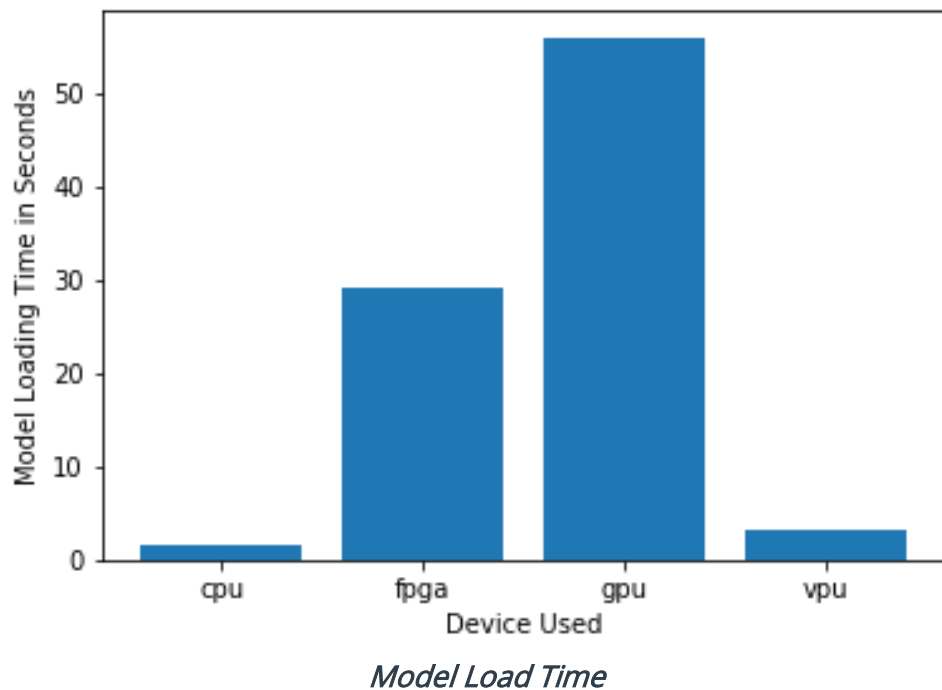| Which hardware might be most appropriate for this scenario? (CPU / IGPU / VPU / FPGA) |
| --- |
| *CPU* |

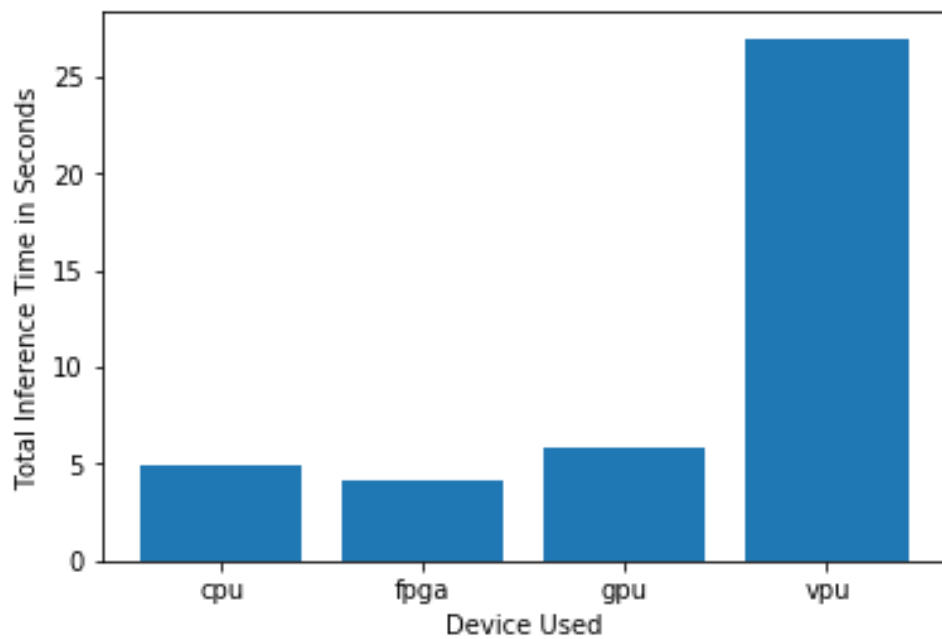| Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
Example requirement: The client requires a tiny device to be connected to their CPU—and their budget is only about $100 for each device.	*Example explanation:* VPU or NCS2 is only about 27.40 mm in size and would fit in the price range.
The client does not have much money to invest in additional hardware - and also would like to save as much as possible on his electric bill.	The usage of the existing hardware will reduce the cost of the overall implementation
The client already have the modern computers, each of which has an Intel i7 core processor	The client already has some modern computers at the store's checkout counters. These processors are currently only used to perform some minimal tasks that are not computationally expensive, such that we can use these existing CPUs to meet the hardware requirement

Queue Monitoring Requirements

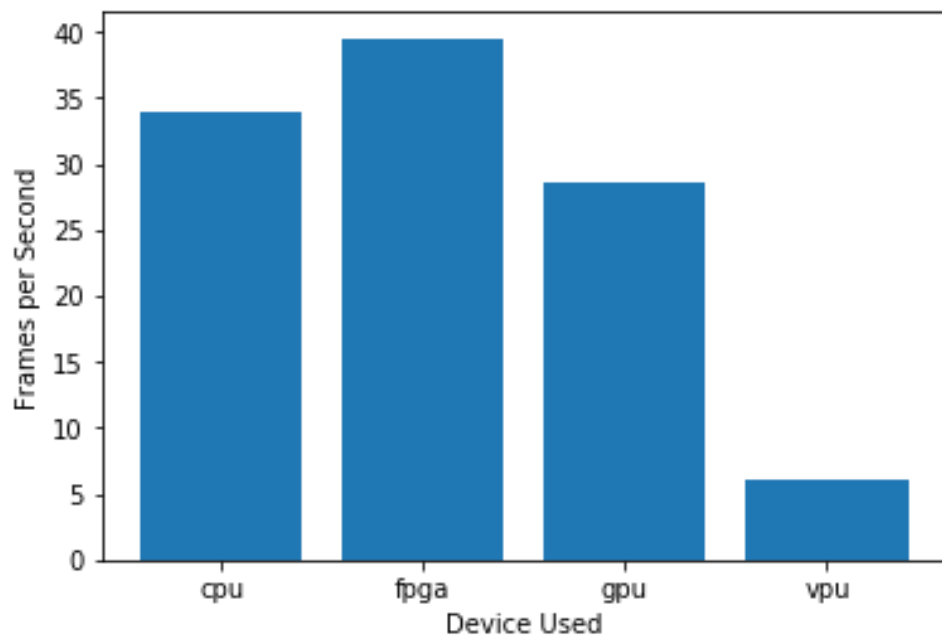| Maximum number of people in the queue	5
Model precision chosen (FP32, FP16, or Int8)	FP32

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

FPS

Final Hardware Recommendation

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Write-up: Final Hardware Recommendation
For this second scenario, CPU would be a good choice. CPU make inferences on good enough FPS, that helps to save costs and electricity bill as requested by the client. CPU also has a comparatively lower inference time than a GPU and FPGA.

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.

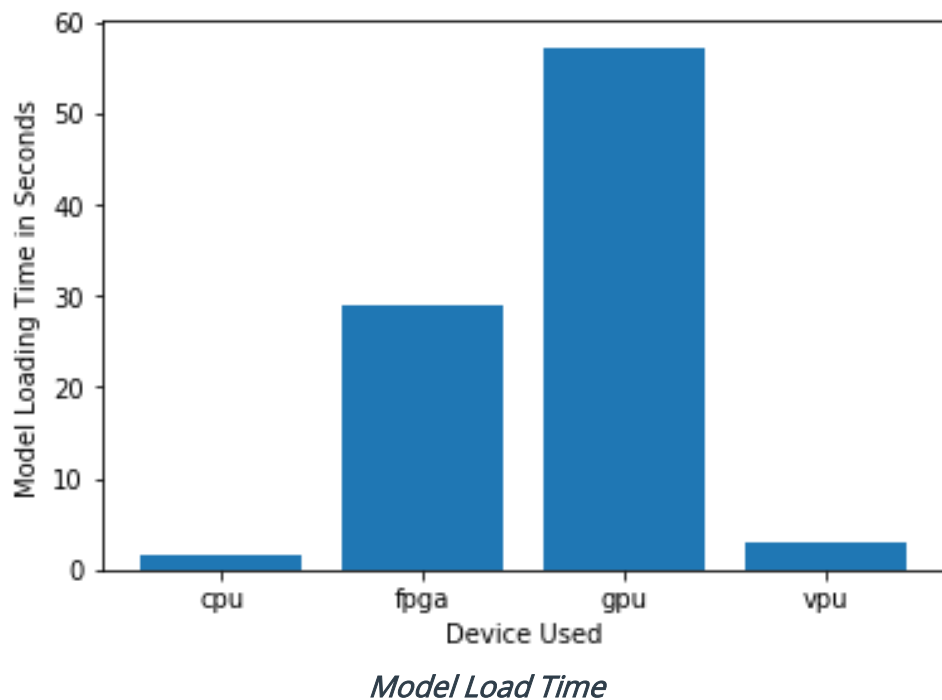| Which hardware might be most appropriate for this scenario?
(CPU / iGPU / VPU / FPGA) |
| --- |
| *VPU* |

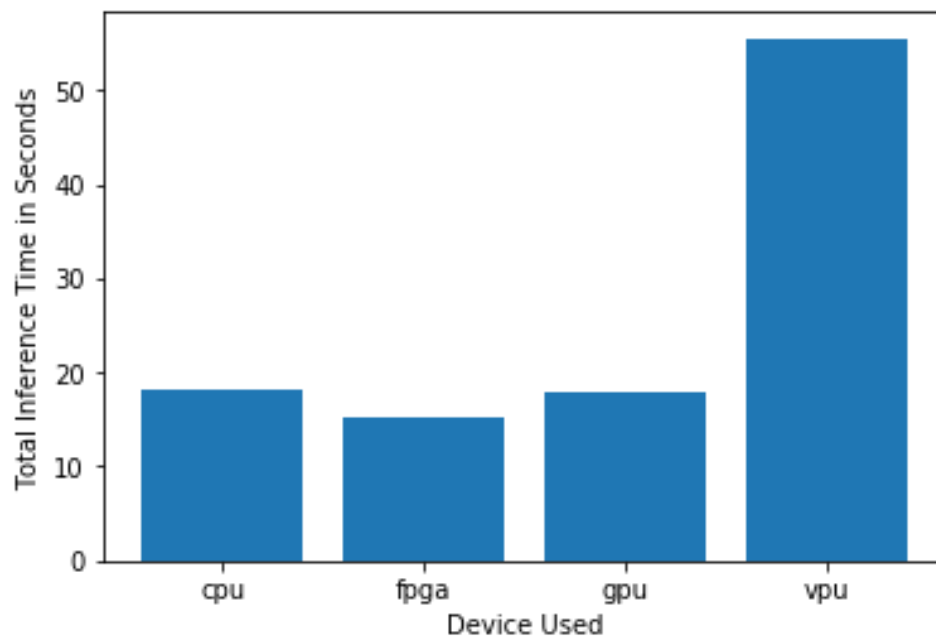| Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
Example requirement: The client requires a tiny device to be connected to their CPU—and their budget is only about $100 for each device.	*Example explanation:* VPU or NCS2 is only about 27.40 mm in size and would fit in the price range.
The client's budget allows for a maximum of $300 per machine, and she would like to save as much as possible both on hardware and future power requirements.	VPU costs around $100 which easily fits the budget, and has extremely low power consumption of only 1 W
The client has existing All-in-one PCs that do not have significant additional processing power.	VPU fits in here as it doesn't require additional power or processing, as it works in plug and play manner using USB port. Though due to I/O CPU will throttle and result in higher inference time of around 50 seconds, which is under the constraint.

Queue Monitoring Requirements

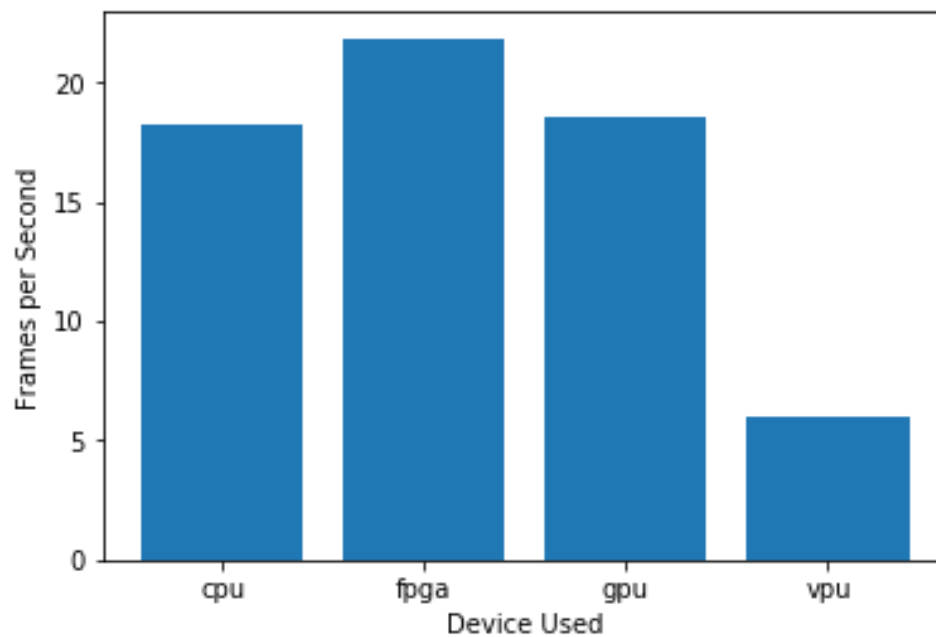| Maximum number of people in the queue	15
Model precision chosen (FP32, FP16, or Int8)	FP16

Test Results

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Final Hardware Recommendation

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UDACITY

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.