

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.
The Client wants a system to monitor the number of people present in factory line. There is camera installed which records video at 30-35 Frames Per Seconds and this video stream can be used to monitor the persons present on the factory line. Client wants the image processing task to be completed five times per second.	FPGA can execute neural networks with maximum performance and with very less latency when it is programmed with the suitable bitstream. Many sections of FPGA work in parallel which increases its performance. When a neural network runs on FPGA everything stays on chip and it saves the time required to send the output back to CPU with PCI bus.
After completing the first task client wants to re-use the hey system to address a second issue. There are many chip designs and hey the designs get improved hey show the system would also need to be flexible so that it can be reprogrammed and optimized to quickly detect flaws in different shape and designs of chips.	FPGA is different from the other processing systems because it can be used by reprogramming which makes it flexible. It is called field programmable so that it can be adapt to new, improved and custom networks.

The company wants the system to run for a long time of 5 to 10 years.

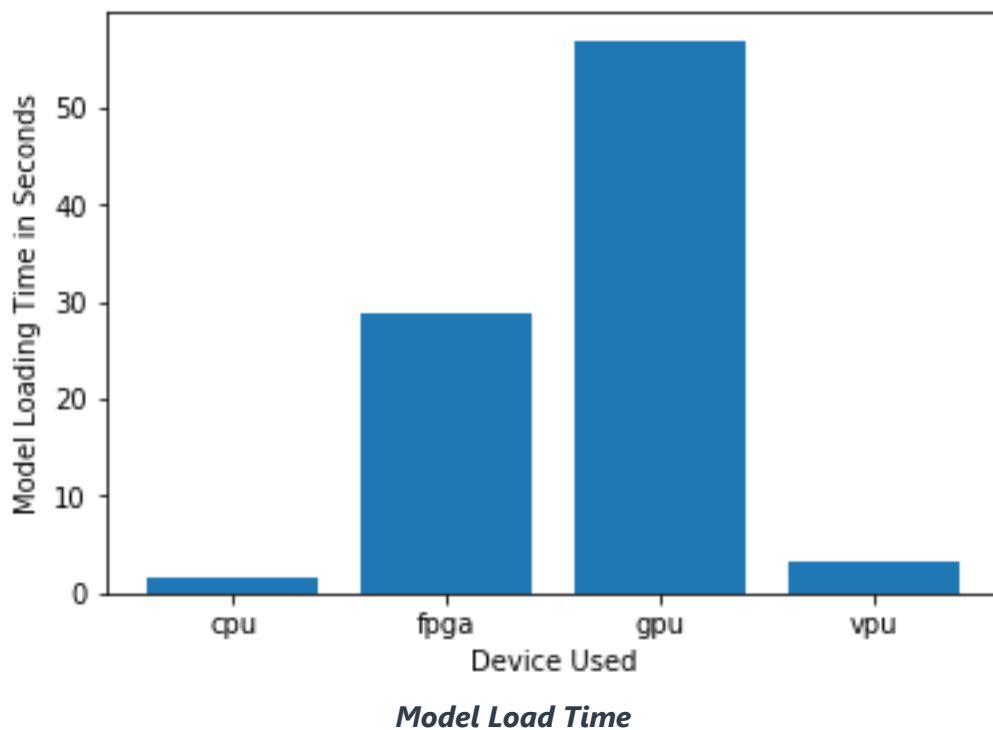
FPGAs have long lifespan. The manufacturer of FPGA also guarantee the availability of 10 years from the start of production.

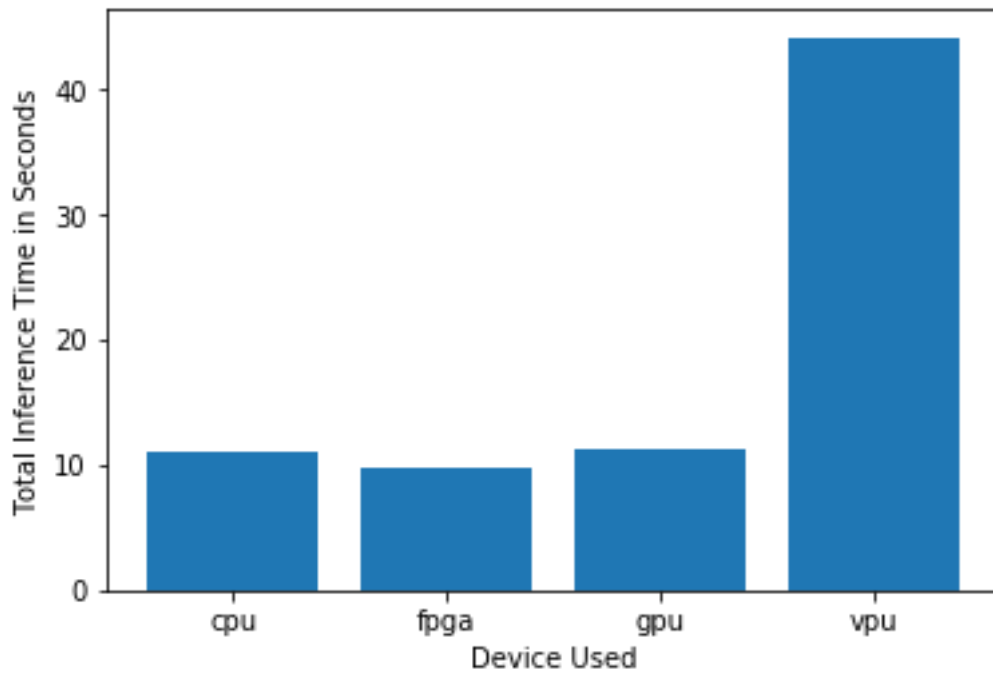
Queue Monitoring Requirements

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

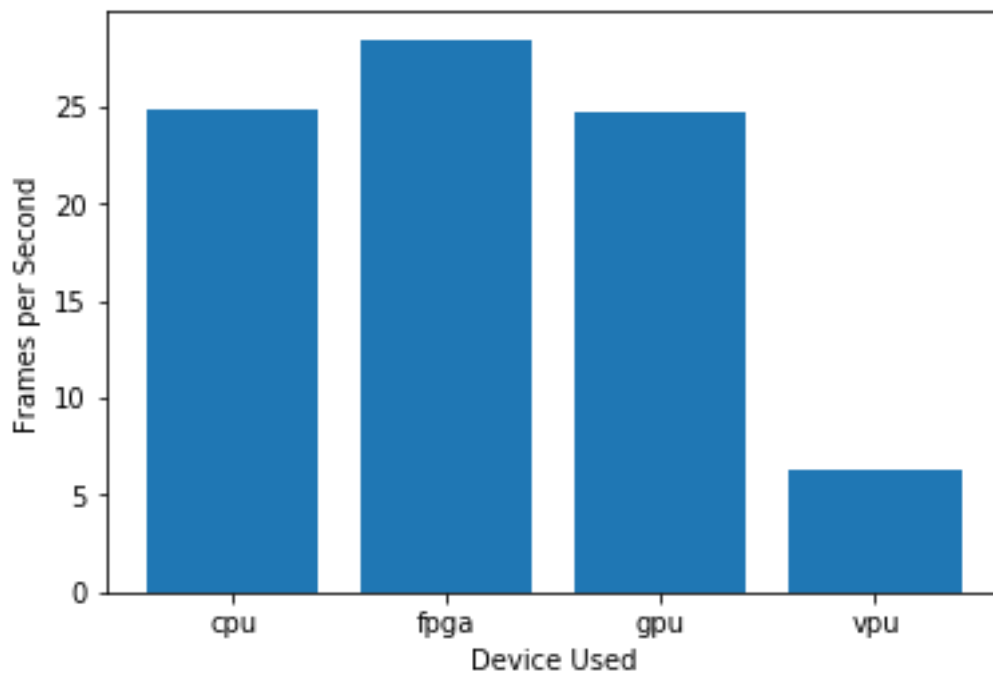
Test Results

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).





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

FPGA is the suggestion from our side because it meet with all the client's requirements like performance, reusability and longer lifespan. FPGA allows the image processing task to be completed above the five times per second. It can be reprogrammed and optimized to adapt to new task. And the lifespan is also of 5 to 10 years same as the need of the client.

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

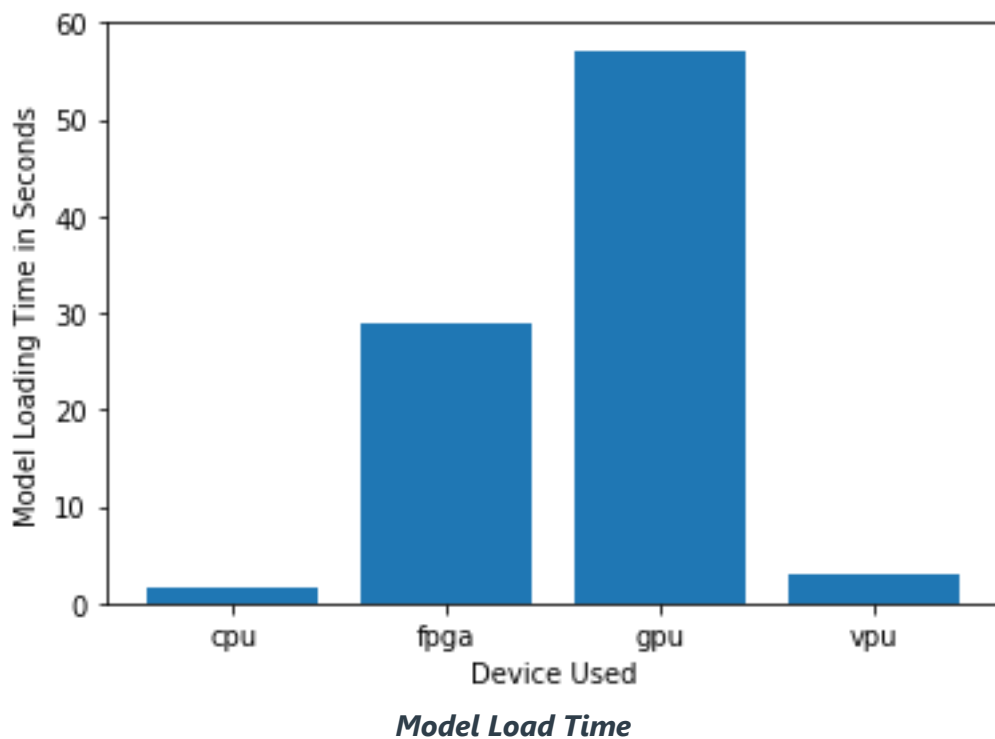
Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
<i>Example requirement:</i> The client requires a tiny device to be connected to their CPU—and their budget is only about \$100 for each device.	<i>Example explanation:</i> VPU or NCS2 is only about 27.40 mm in size and would fit in the price range.
The Checkout counters have modern computers equipped with intel i7 processor. Currently these processors are used to do small and less computational tasks.	The client already has the better performance computers at checkout counter. These computers are used for minimal task, we can use the CPU to meet the hardware requirements for processing the videos.
The budget of client does not allow him to invest in additional hardware, and would like to save as much as possible on the electric bill.	Taking the budget of client in consideration we can easily use the checkout counters CPU for developing the smart queuing system to direct people to less congested queues.

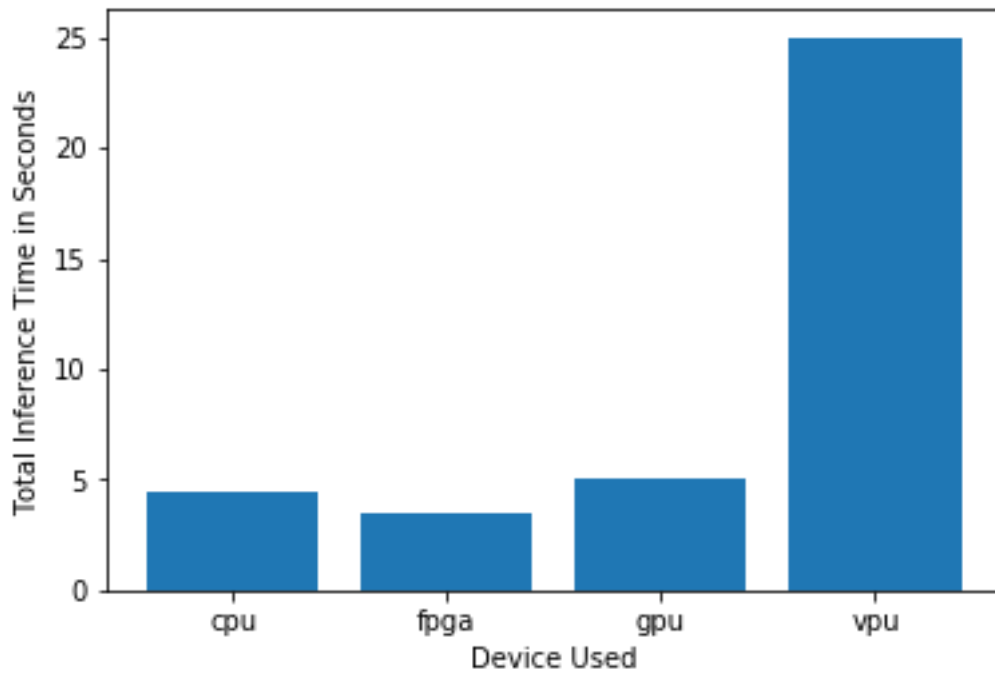
Queue Monitoring Requirements

Maximum number of people in the queue	During normal days the total number of people present in the queue are 2 person per queue and during rush hour it gets increased to 5 persons per queue.
Model precision chosen (FP32, FP16, or Int8)	FP32

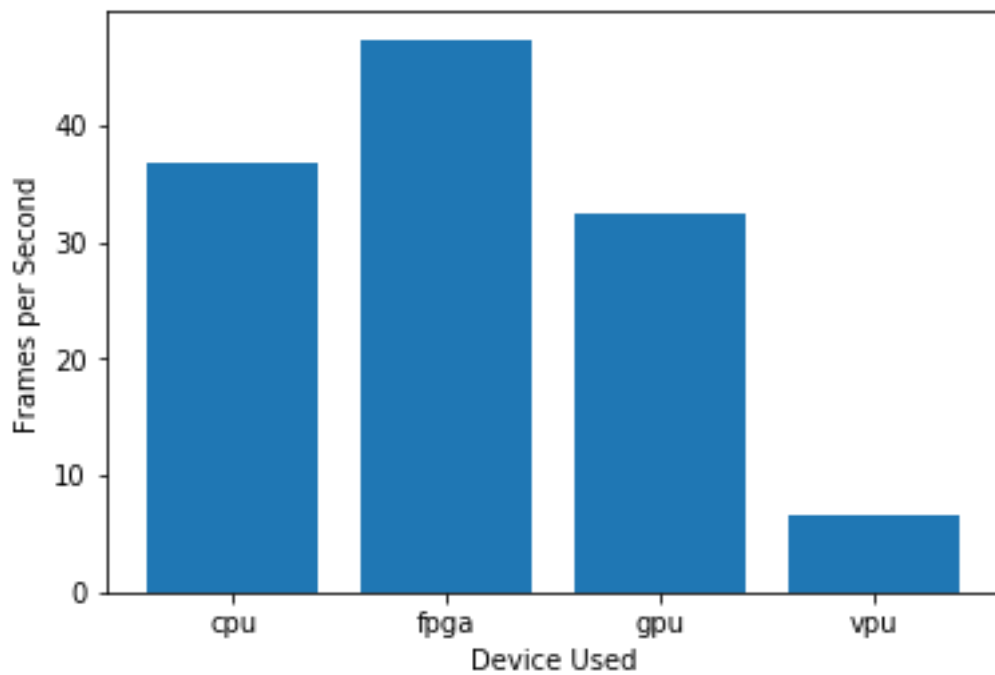
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one another (e.g., perhaps one of the devices performed better than the rest, but does not meet one of the client's requirements).

Write-up: Final Hardware Recommendation

CPU is the final recommendation for the scenario of the retail shop. This is because it has the power capacity to handle the smart-queuing system-based model according to inference time, model loading time and frames per second. The important part is that client is already using the intel i7 core processor in each computer at checkout counter, hence the CPU is the ideal choice.

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?
<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.
There are 7 CCTV cameras that gets monitored for security purpose. No additional processing power is available to run the inference.	VPU (NCS2) might be suitable for this situation because it is a plug and play device. It is in a form of USB drive that provide the processing power. NCS2 supports both USB2 and USB3 ports but if it is used on USB2 port the inference will run slower due to the reading and writing throttling.
The Budget of client allows to go upto \$300 per machine. They also like to save as much as possible	A simple VPU or Neural Compute Stick 2 costs only \$100 each, and the VPU require extremely low power.

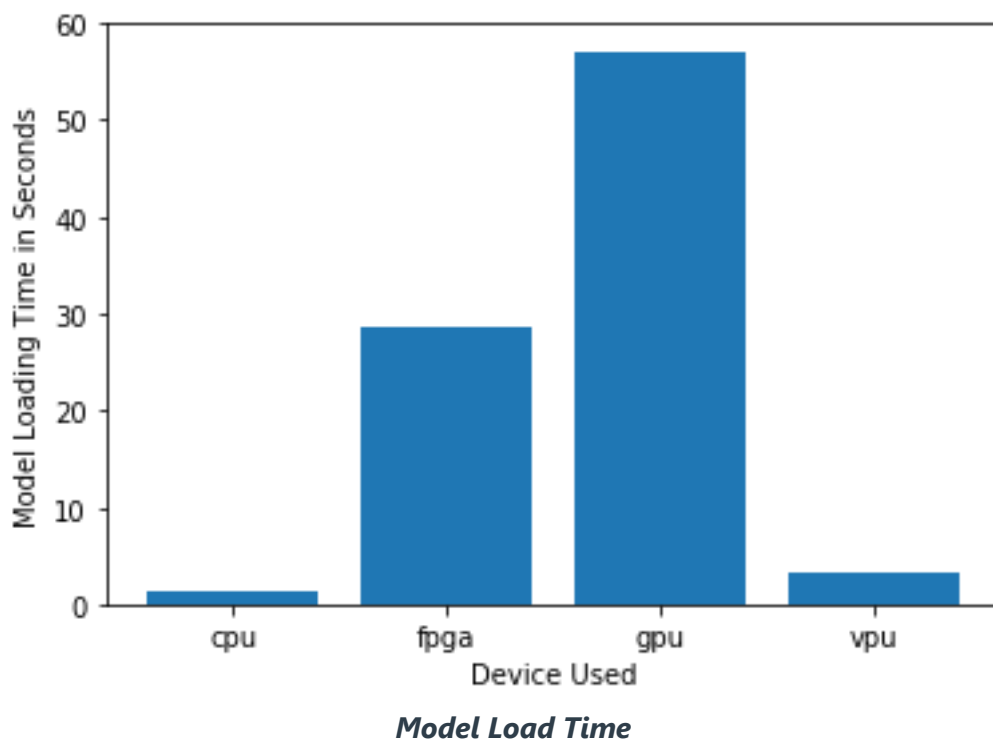
both on the hardware as well as on future power requirements.	
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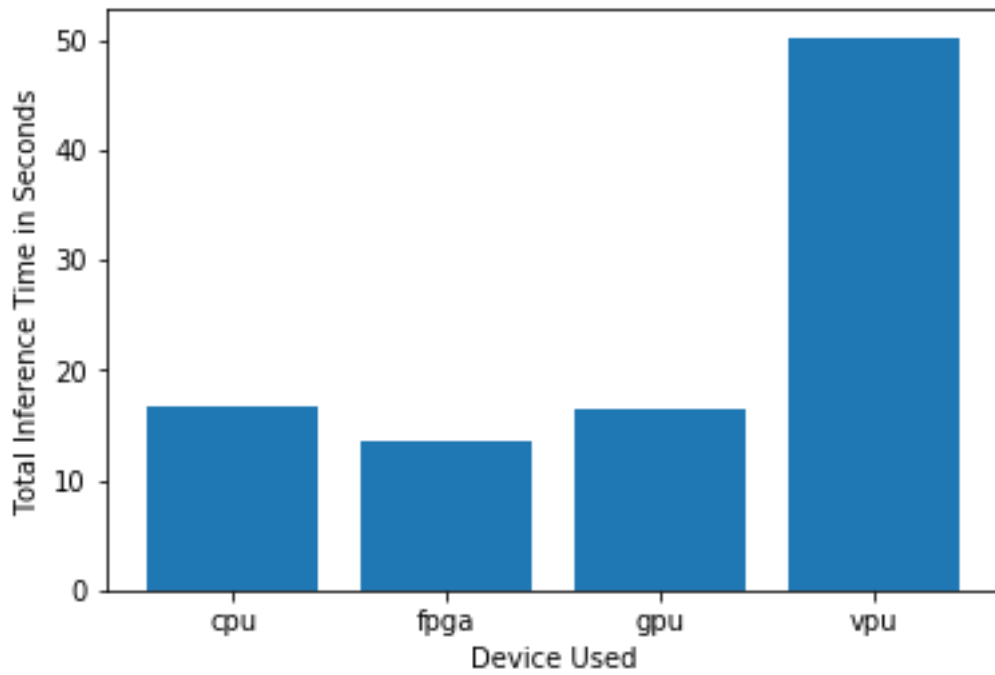
Queue Monitoring Requirements

Maximum number of people in the queue	The queue is present on each side of the door. There are about 3 persons per queue. During the peak hour there are 15 people on average in a single queue outside every door. During normal hours the number of persons decreases to 7 persons in a single queue.
Model precision chosen (FP32, FP16, or Int8)	FP16

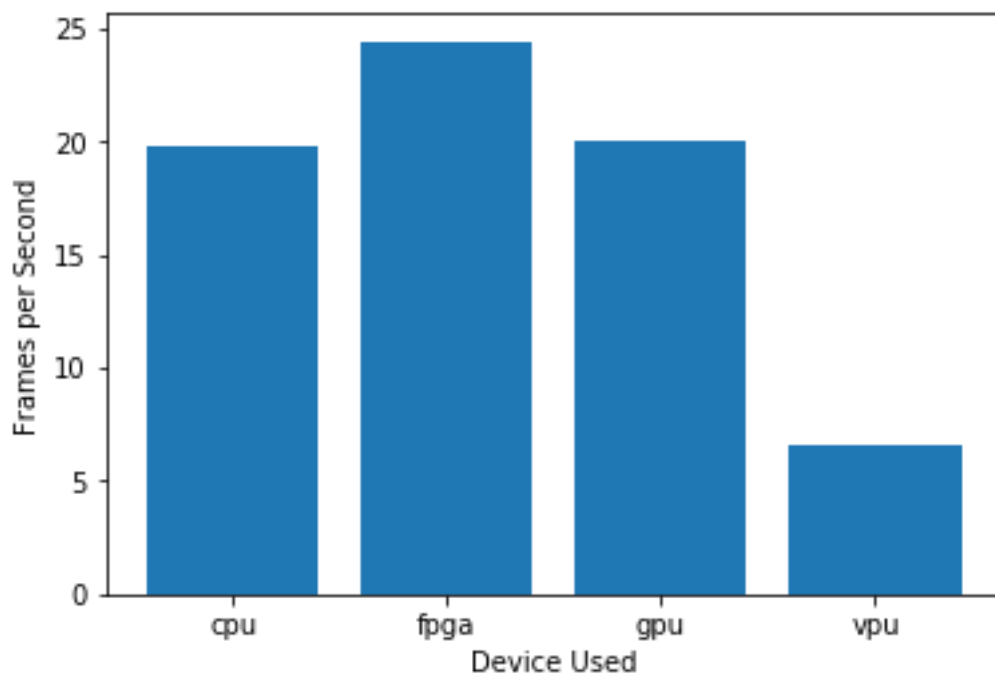
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one another (e.g., perhaps one of the devices performed better than the rest, but does not meet one of the client's requirements).

Write-up: Final Hardware Recommendation

VPU is the final recommendation for the scenario of transportation. It does the job of implementation of smart queue system while satisfying the cost requirements of the customer but on the downside, it performed poorly on inference time and FPS. If we take everything in consideration, then VPU is perfect hardware for the scenario.