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

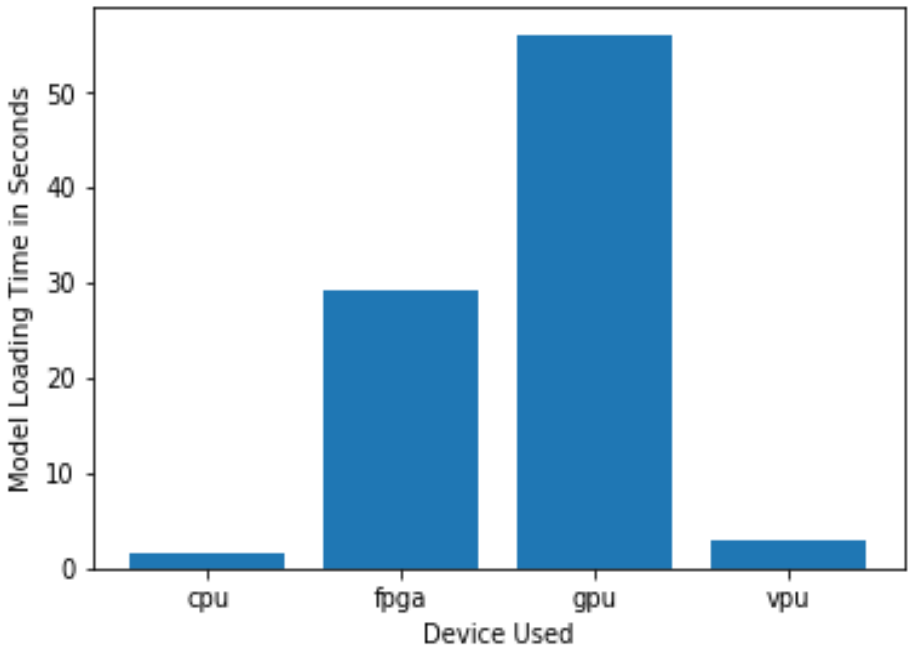
Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
The client requires the image processing task to be completed 5 times per second.	FPGA can able to accomplish this task using parallelism. Also, the performance metrics shows that FPGA has fastest inference time than other devices.
The client requires the system should be flexible to reprogrammed and optimized quickly.	FPGA can be easily reprogrammed for different tasks by loading appropriate Bitstream for that task.
The client requires good quality system.	According to the documentation FPGA has good quality than other devices.
The client requires the system last for at least 5-10 years as this is a significant investment.	FPGAs have a longer life span.

Queue Monitoring Requirements

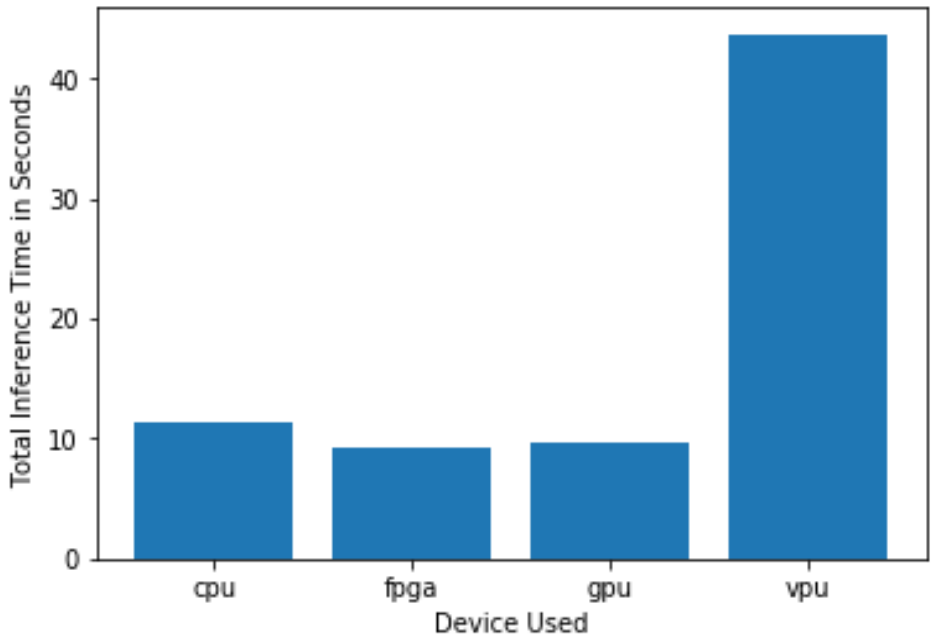
Maximum number of people in the queue	2
Model precision chosen (FP32, FP16, or Int8)	FP16

Test Results

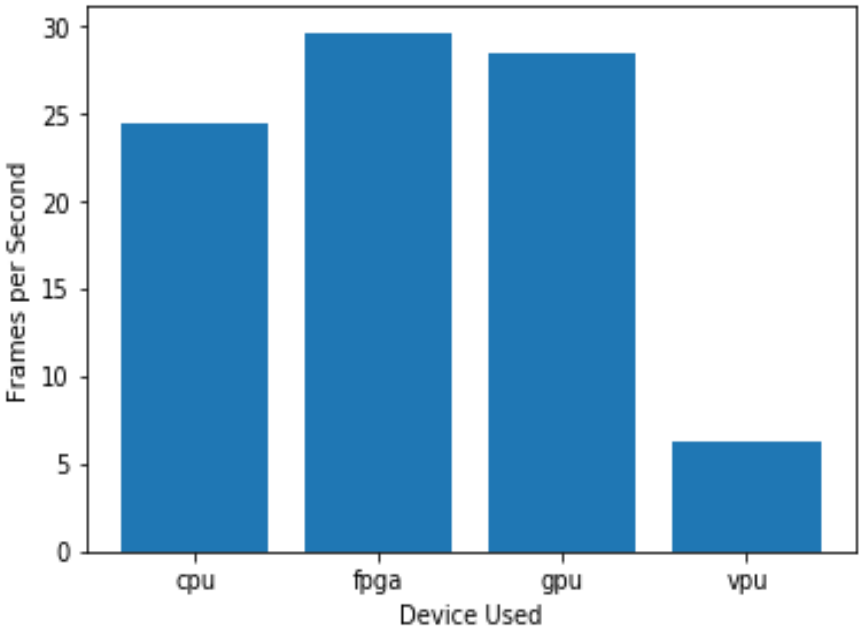
After you've tested your application on all four hardware types (CPU, IGPU, VPU, and FPGA), copy the matplotlib output showing the comparison into the spaces below. You should have three graphs (for model load time, inference time, and FPS).



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
*The inference time of FPGA is less than the other devices. This device is faster in inference. Also, FPGA device processes a greater number of frames per second almost 30 FPS. Though the model loading of FPGA takes more time than CPU and VPU, but it will not affect the client's requirements. As per the client's requirement **FPGA** is best suitable, as it also has longer life span.*

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

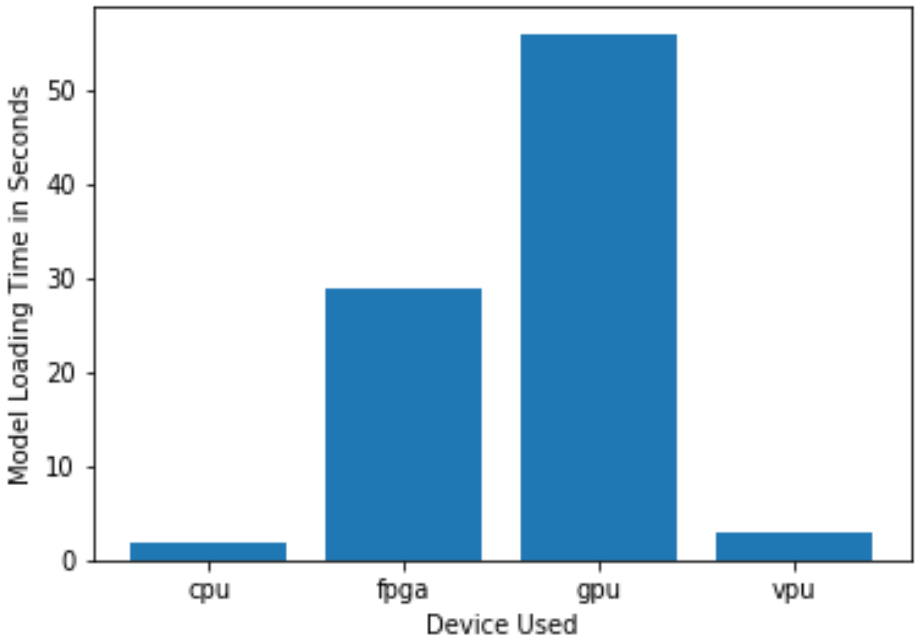
Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
The client does not have much money to invest in additional hardware.	The client already has Intel i7 core processor computers which are not used for computationally expensive tasks. Since this is already has IGPU we can utilize it without any additional investments.
The client would like to save as much as possible on electric bill.	Using IGPU will not add any extra electric cost that the client is currently paying.

Queue Monitoring Requirements

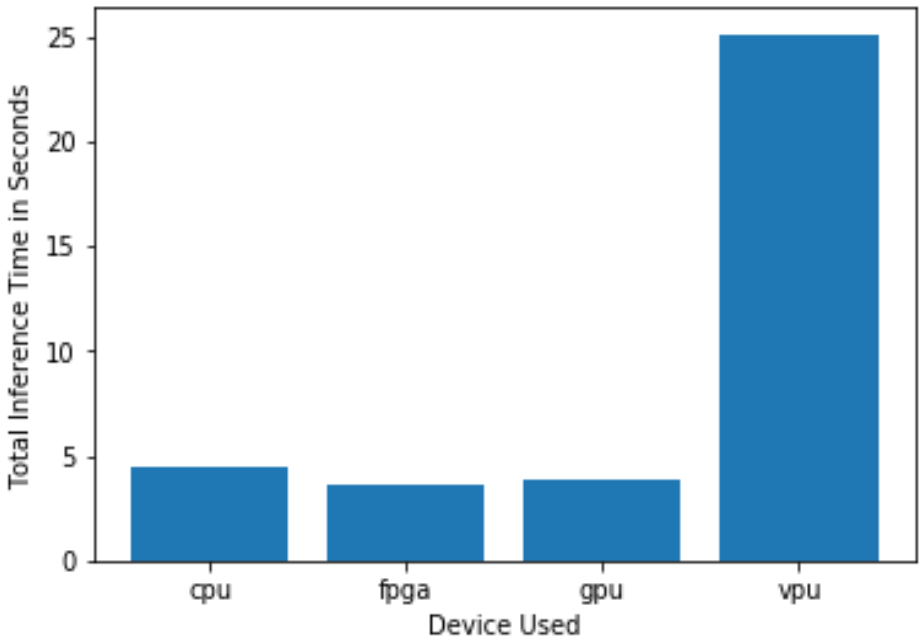
Maximum number of people in the queue	2 per queue (during normal daily hours) to 5 per queue (during rush hours)
Model precision chosen (FP32, FP16, or Int8)	FP16

Test Results

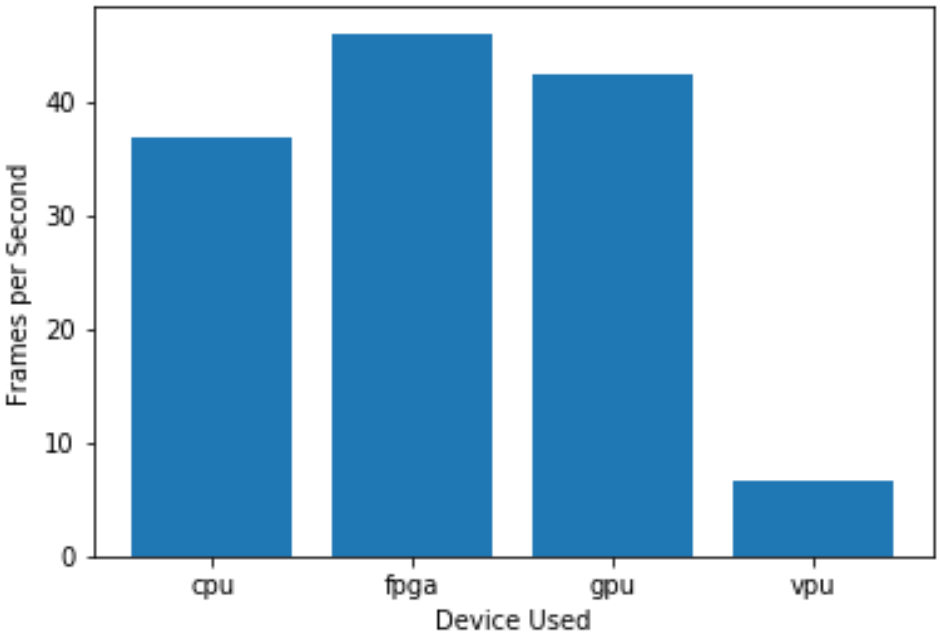
After you've tested your application on all four hardware types (CPU, IGPU, VPU, and FPGA), copy the matplotlib output showing the comparison into the spaces below. You should have three graphs (for model load time, inference time, and FPS).



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
*The device IGPU has inference time almost equal to FPGA and lower than CPU and VPU. It also processes more than 40 frames per second. The major requirement of the client is to minimize investments on additional devices and electric consumption. As the client already have computers with Intel i7 processors and GPU they can use IGPU without any additional cost also with no extra electric cost. FPGA is good for this purpose, but it is costlier. So **IGPU** is the best suitable device for the client.*

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?
The client's budget allows maximum of $300 for each device.	VPU is a good choice for the client and would fit in the price range, as it typically costs around $70 to $100.
The client also has a concern on future power requirements.	VPU is an extremely low power usage device and this is a perfect choice for the client's requirements.

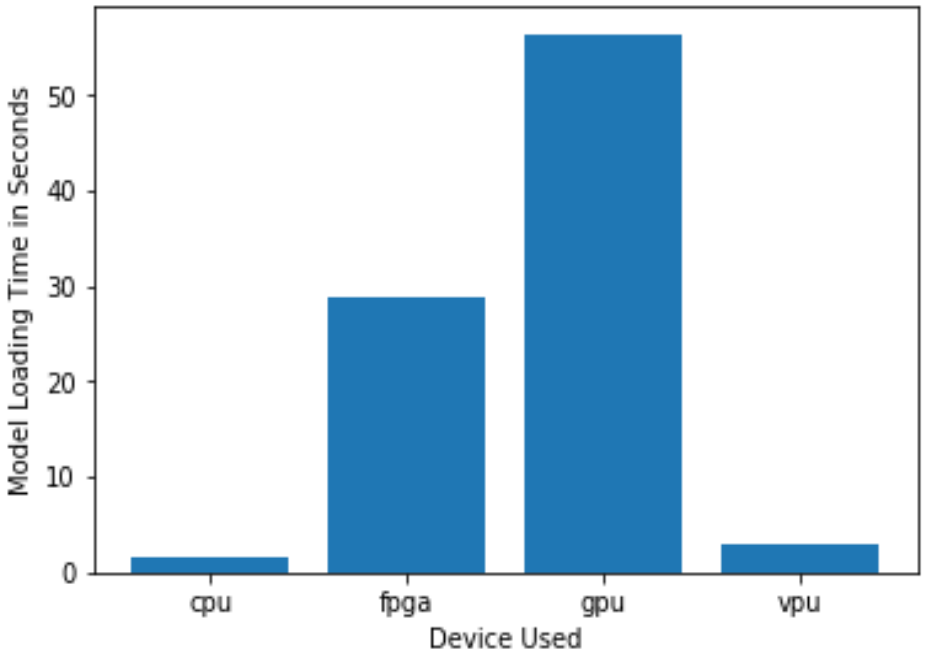
The client has 7 CCTV cameras on the platform are connected to all-in-one PCs. The CPUs of these devices are used to process and view CCTV footage for security purposes and no significant additional processing power is available to run inference.	VPU an external device can be used to run the inference on the video streams, and this will not have any burden on CPUs of All-in-one PCs.

Queue Monitoring Requirements

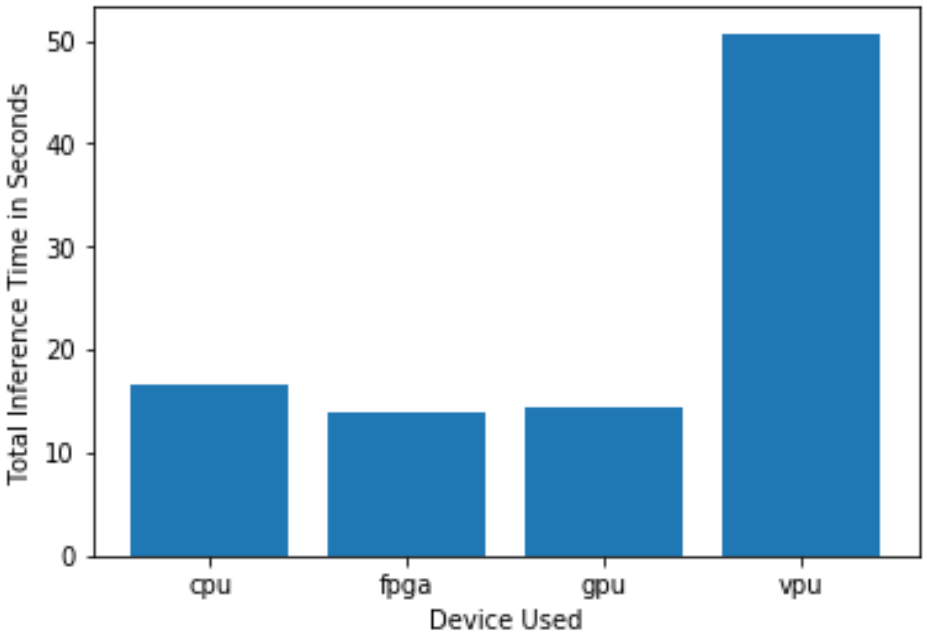
Maximum number of people in the queue	7 people at non-peak hours and 15 people at peak-hours.
Model precision chosen (FP32, FP16, or Int8)	FP16

Test Results

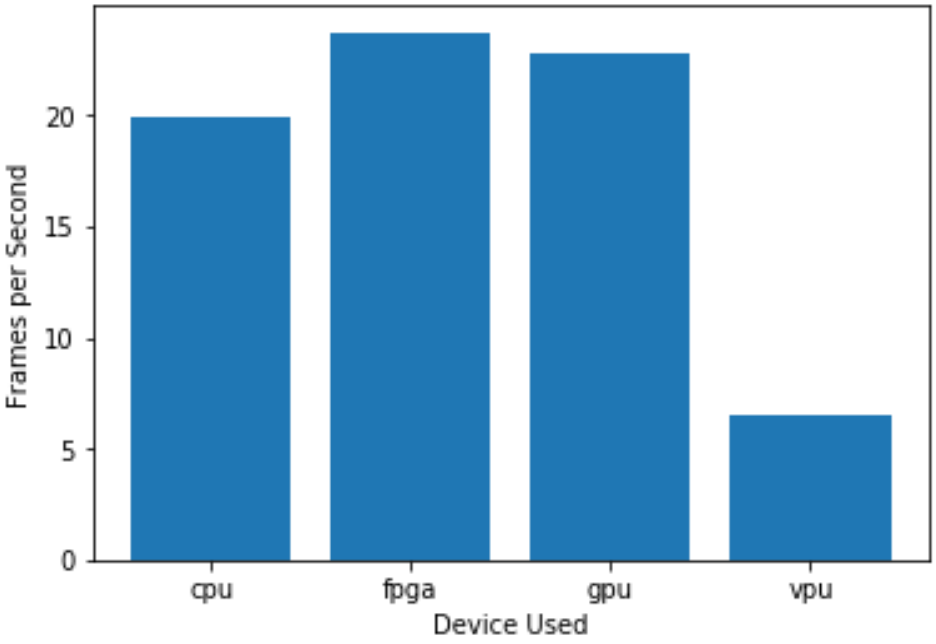
After you've tested your application on all four hardware types (CPU, IGPU, VPU, and FPGA), copy the matplotlib output showing the comparison into the spaces below. You should have three graphs (for model load time, inference time, and FPS).



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
*FPGA and GPU are best as they are with lowest inference time and process highest frames per second. But FPGA or IGPU costs more than $300 which client cannot afford. Then CPU is next choice but, the client fully using CPU to process and view CCTV footage for security purposes and there is no additional processing power available to run the inference. So VPU is next choice and it also costs around $70-$100 which within the budget of the client. Also, client is concerned about the electricity usage. VPU also uses very less power. Considering this scenarios **VPU** is the best choice for the client.*