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

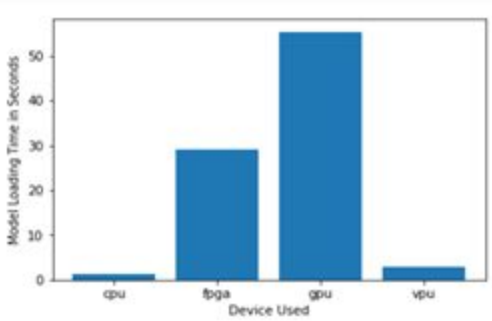
Requirement Observed (Include at least two.)	**How does the chosen hardware meet this requirement?**
Example requirement: The client requires a tiny device to be connected to their CPU—and their budget is only about $100 for each device.	*Example explanation:* VPU or NCS2 is only about 27.40 mm in size and would fit in the price range.
The client requires multiple chip designs and new designs are created regularly. The system would also need to be flexible so that it can be reprogrammed and optimized to quickly detect flaws in different chip designs. Each camera records video at 30-35 FPS (FramesPer Second) and this video stream can be used to monitor the number of people in the factory lin	FPGAs are flexible in a few different ways:●They are field-programmable; they can be reprogrammed to adapt to new, evolving,and custom networks●Various precision options (FP16, 11 and 9bit) are supported—allowing developers a balance between speed and accuracy.●The bitstreams being used can be updated without changing the hardware. This allows you to improve the performance of your system without replacing the FPG
Workers alternate shifts to keep the floor running 24 hours a day so that packaging continues nonstop	FPGAs are designed to have 100% on-time performance, meaning they can be continuously running 24 hours a day, 7 days a week, 365 days a year
Clients requires would ideally like it to last for at least 5-10 years	PGAs have a long lifespan. For example, FPGAsthat use devices from Intel's Internet of ThingsGroup have a guaranteed availability of 10 years,from start of production

Queue Monitoring Requirements

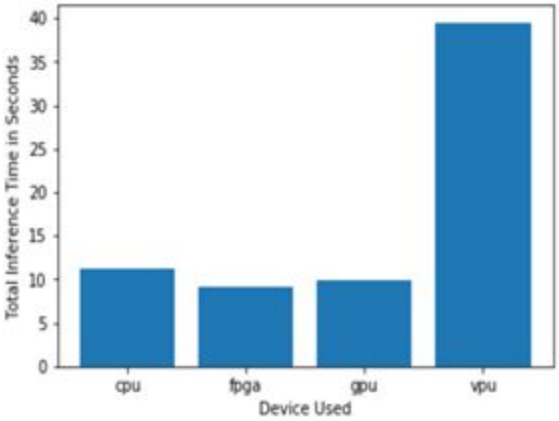
Maximum number of people in the queue	*5*
Model precision chosen (FP32, FP16, or Int8)	*FP16*

Test Results

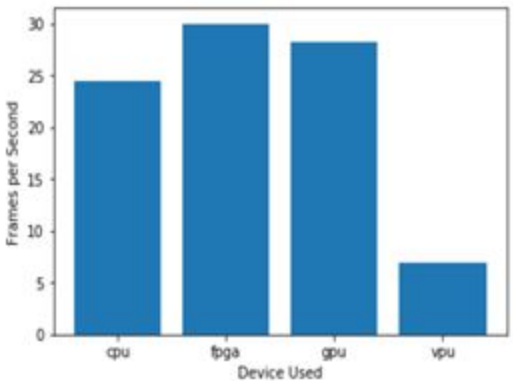
After you've tested your application on all four hardware types (CPU, IGPU, VPU, and FPGA), copy the matplotlib output showing the comparison into the spaces below. You should have three graphs (for model load time, inference time, and FPS).



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
As the result shown above, the FPGA meets the client's requirement of 30~35 FPS. Although it takes a bit moremodel load time than CPU and VPU, but it has the fastest inference time than other scenario. Besides, it withflexibility and long lifespan. Thus, FPGA would be the best choice for client in this scenario.

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

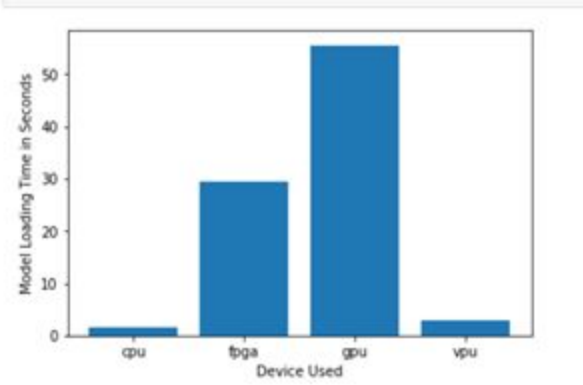
Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
Example requirement: The client requires a tiny device to be connected to their CPU—and their budget is only about $100 for each device.	*Example explanation:* VPU or NCS2 is only about 27.40 mm in size and would fit in the price range.
The client wants to save as much as possible on his electric bill.	For IGPU, unused sections can be shut down to reduce power consumption. Configurable PowerConsumption. The clock rate for the slice and unslice can be controlled separately. This means that unused sections in a GPU can be powered down to reduce power consumption.
The store's checkout counters already have a modern computer each of which has an Intel i7 core processor. The client does not have much money to invest in additional hardware	CPU with Intel i7 which has IGPU. Making use of the IGPU to reduce the budget of invest in additional hardware

Queue Monitoring Requirements

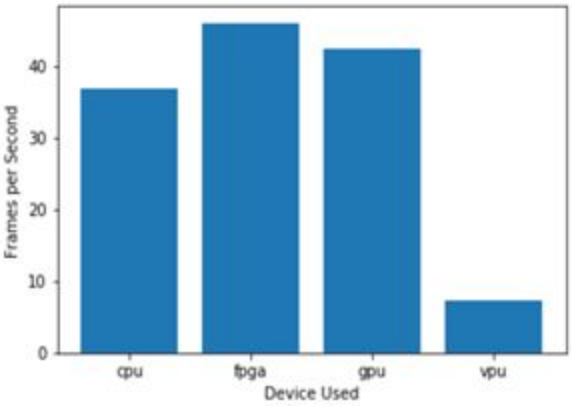
Maximum number of people in the queue	*3*
Model precision chosen (FP32, FP16, or Int8)	*FP16*

Test Results

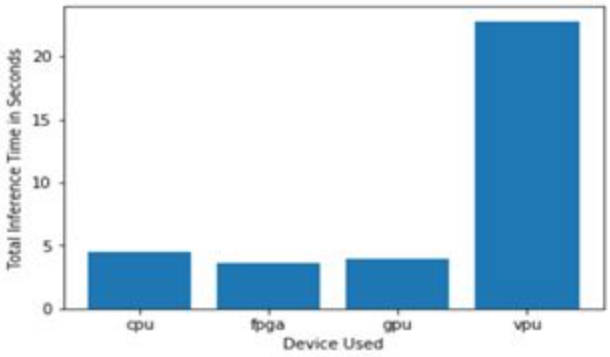
After you've tested your application on all four hardware types (CPU, IGPU, VPU, and FPGA), copy the matplotlib output showing the comparison into the spaces below. You should have three graphs (for model load time, inference time, and FPS).



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
As the results depict above, the inference time and FPS are almost as good as FPGA which is better than other choices even though the model load time takes longer than others. Remember that it only load once during the launching time. For CPU with Intel i7 which has IGPU. Making use of the IGPU to reduce the budget of invest in additional hardware. Moreover, unused sections can be shut down to reduce power consumption forIGPU and it with configurable Power Consumption. Thus, IGPU is the best choice in this scenario

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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 would like to save as much as possible both on hardware and future power requirements.	VPU or NCS2 are low-power devices. (e.g. The MyriadX has a very low power consumption of only 1-2watts.)
The CPUs in these machines are currently being used to process and view CCTV footage for security purposes and no significant additional processing power is available to run inference	VPU is an accelerator, meaning it accelerates the performance of the pre-existing CPU. The CPUdoesn’t need to be a powerful one, since it will not actually be doing any calculations

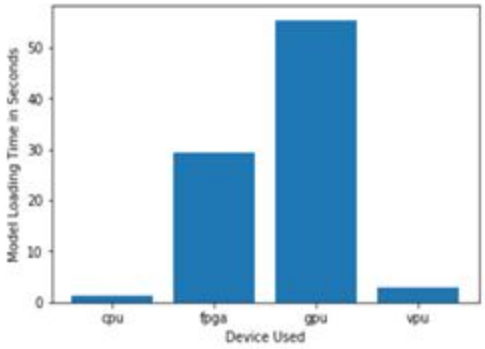
The client's budget allows for a maximum of$300 per machine	VPU or NCS2 only cost around $100 which would fit in the price range. VPUs are small, low-cost, low-power devices that can dramatically improve the performance of a system without the need to upgrade the other hardware

Queue Monitoring Requirements

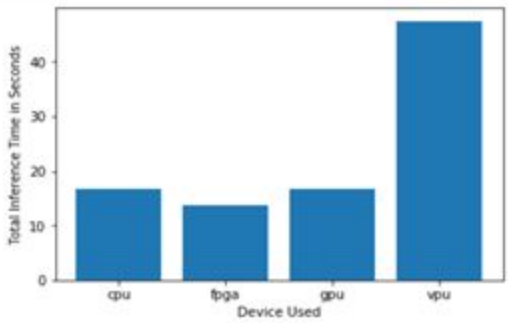
Maximum number of people in the queue	*15*
Model precision chosen (FP32, FP16, or Int8)	*FP16*

Test Results

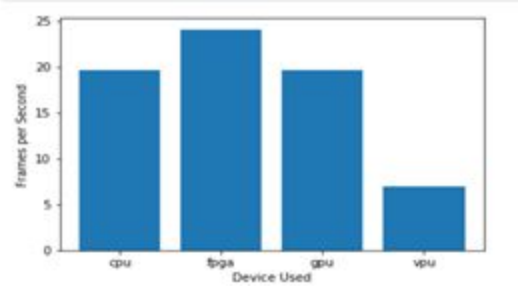
After you've tested your application on all four hardware types (CPU, IGPU, VPU, and FPGA), copy the matplotlib output showing the comparison into the spaces below. You should have three graphs (for model load time, inference time, and FPS).



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
As results indicated above, VPU with the second lowest model load time, longest inference time and lowest FPS. ACPU or FPGA would be identical choices in this scenario. Due to the client wants to save budget and cost of power. So, VPU would be more reasonable in this scenario with these constraints.