Choose the Right Hardware

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

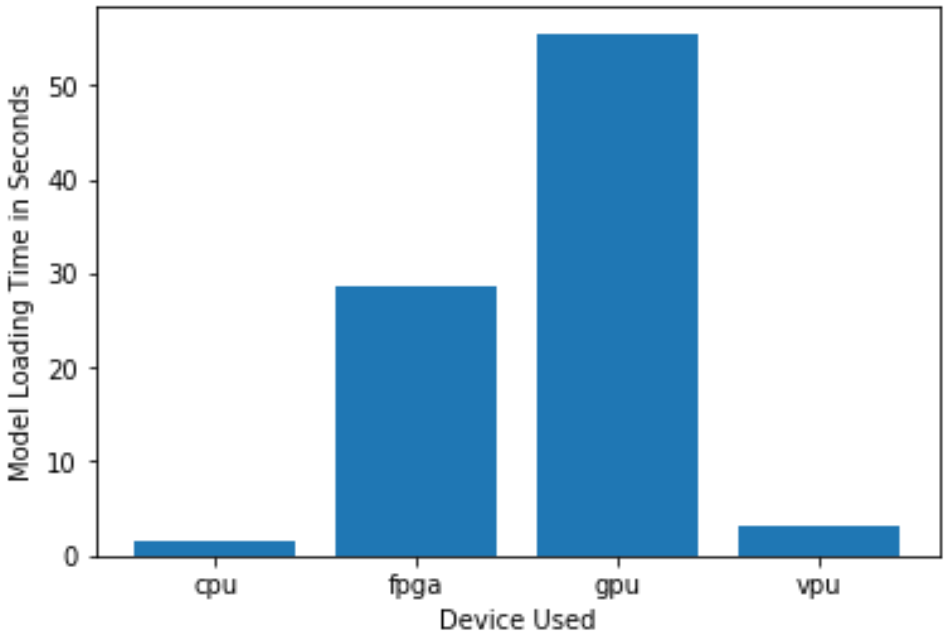
Requirement Observed (Include at least two.)	**How does the chosen hardware meet this requirement?**
The Client need to improve the entire process time by 6 – 8 weeks	FPGA is high performance and low latency. This performance comes from the ability to run many sections of the FPGA in parallel and flow data from one layer to the next
The system should monitor the number of people in the factory line. Each installed camera record 30-35 FPS and the client would like the image processing task to be completed five times per second.	*FPGA perform well with large network*
The client need to be able to repurpose the system to address a second issue.	*Flexibility: FPGA is field-programmable. Can be reprogrammed to address new issue*
Detect flaw prior to packaging	*FPGA is configurable after manufacturing and good for prototyping.*
The system would also need to be flexible so that it can be reprogrammed and optimized to quickly detect flaws in different chip designs	*FPGA is field reprogrammable and flexible*
The need to be able to run inference on the video stream very quickly	*FPGA have the ability to run many sections in parallel*
The client would like the system to last for at least 5-10 years.	*FPGA is long Lifespan (at least 10 years)*

Queue Monitoring Requirements

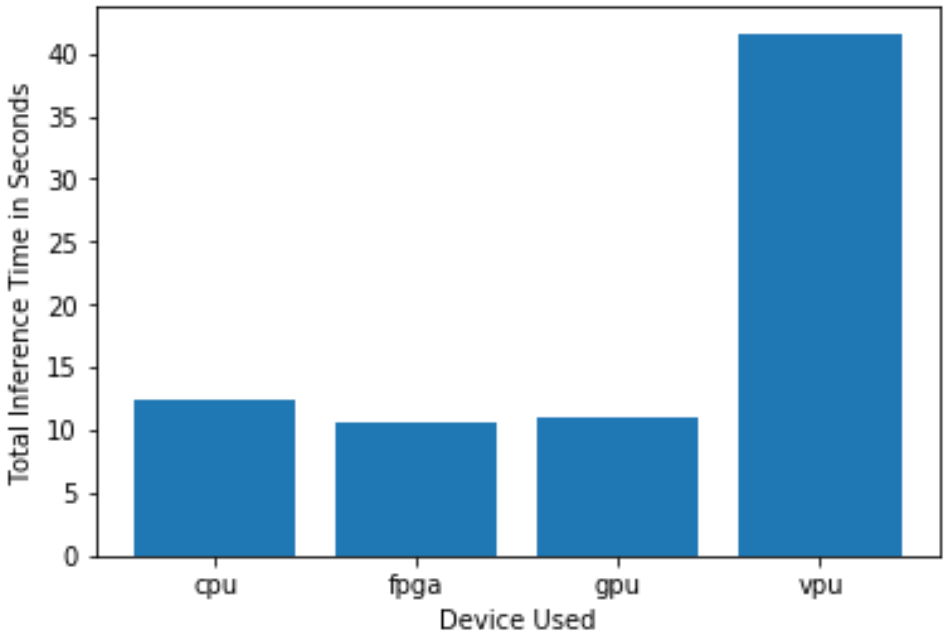
Maximum number of people in the queue	*2*
Model precision chosen (FP32, FP16, or Int8)	*FP16*

Test Results

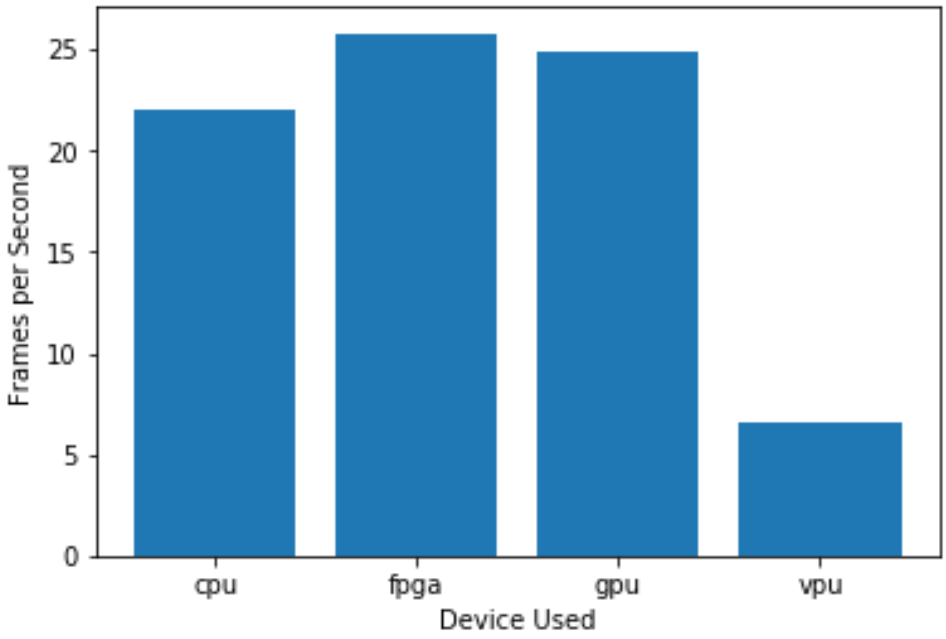
After you've tested your application on all four hardware types (CPU, IGPU, VPU, and FPGA), copy the matplotlib output showing the comparison into the spaces below. You should have three graphs (for model load time, inference time, and FPS).



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
FPGA takes a little longer to load the model. But once that is done, it is able to record up to 25 frames per second and the inference on the video stream is very quick. The FPGA specifications address the others requirements.

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	*Intel i7 already have and IGPU, no need to buy additional hardware.*
The client would like to save as much as possible on his electric bill.	*IGPUs are Configurable Power Consumption.*
The client has pre-existing systems with each an Intel i7 core processor	*CPU and IGPU Shared Components share the system memory*

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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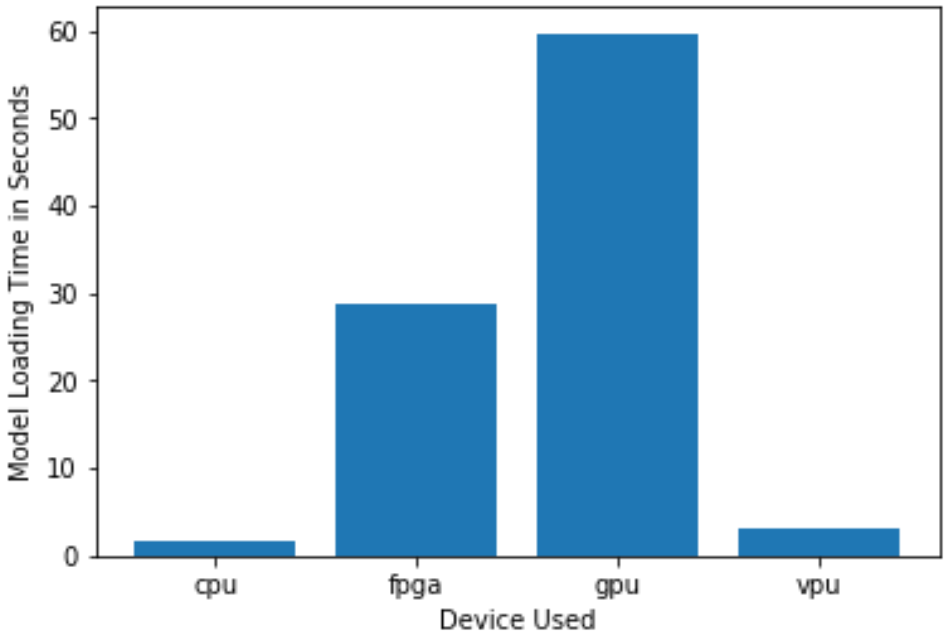
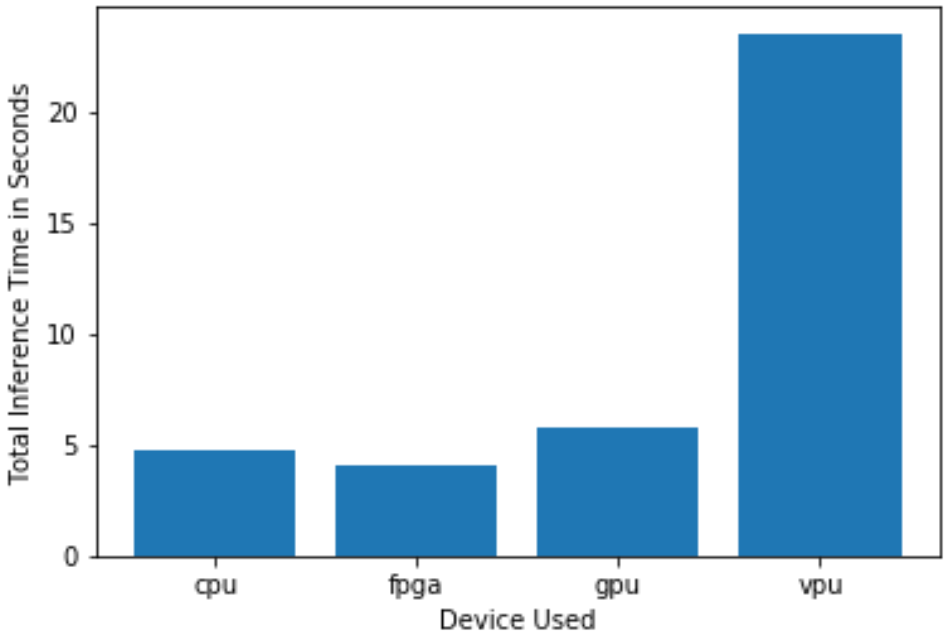
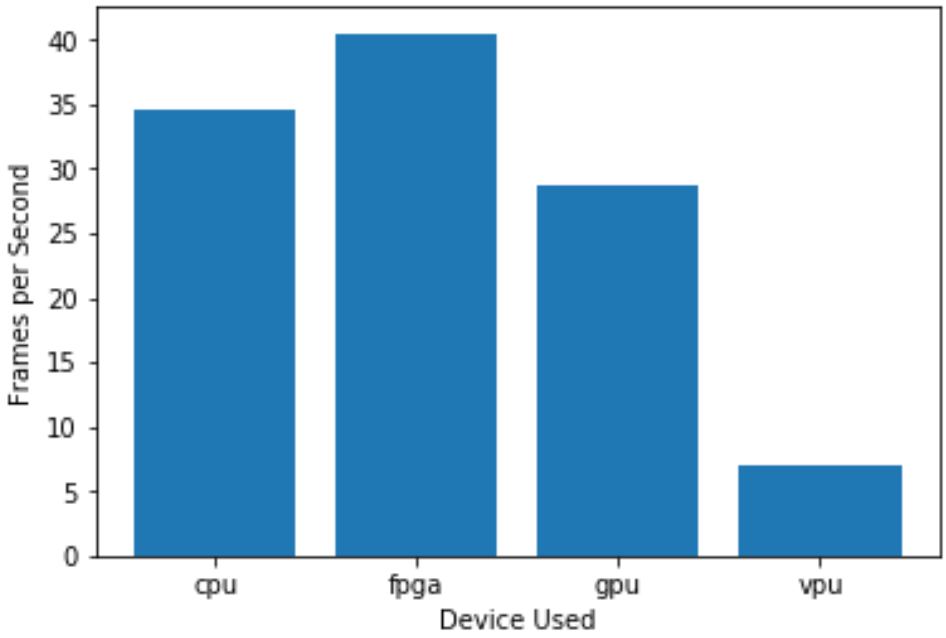


Model Load Time



Inference Time



FPS

Final Hardware Recommendation

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
IGPU is the best for this choice for this scenario. The client doesn't have much money to buy additional device, it already have intel i7 with IGPU. As you can see in the screenshots IGPU records 30 frames per second and the total inference time is 5s which is rather acceptable considering that customers put on average wait time of 230s on checkout.

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 requires an Edge AI system that would monitor the queues in real-time and quickly direct the crowd in the right manner. Their budget is only about $300 per machine	VPUs would fit in the price range.
The client would like to save as much as possible both on hardware and future power requirements.	*VPUs provide a cost-efficient way to add performance to a pre-existing system*

Queue Monitoring Requirements

Maximum number of people in the queue	*7*
Model precision chosen (FP32, FP16, or Int8)	*FP16*

Test Results

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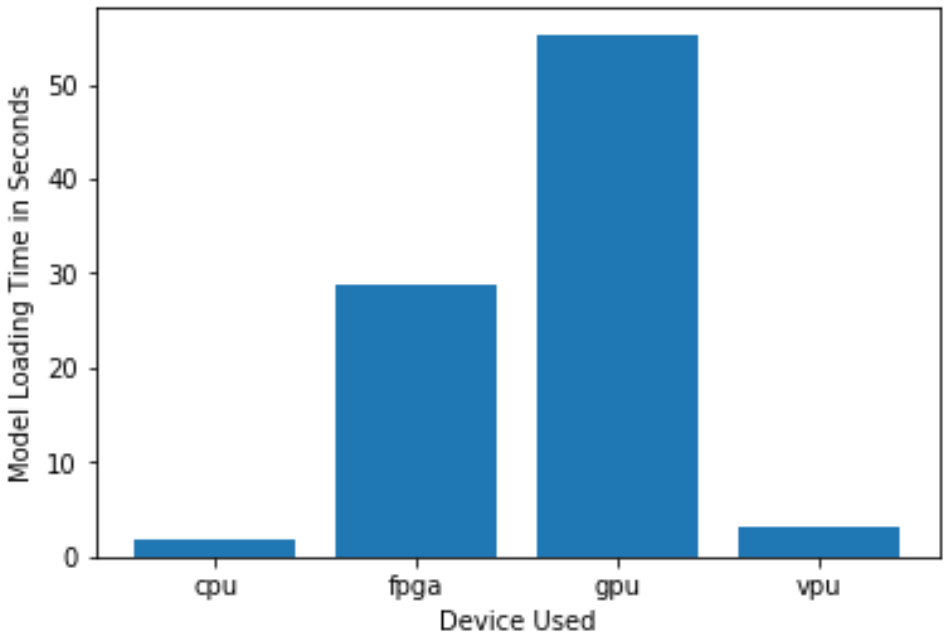
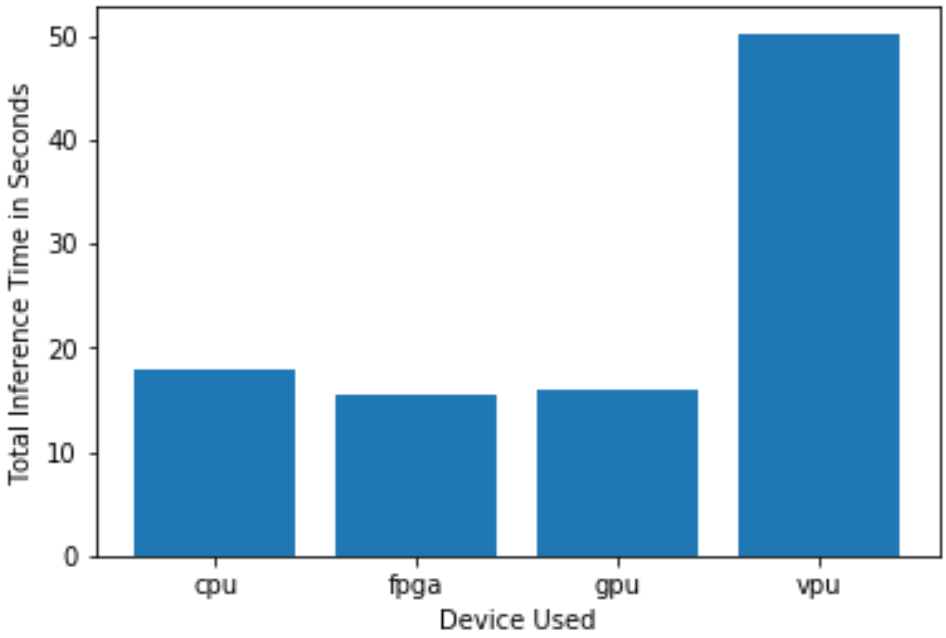
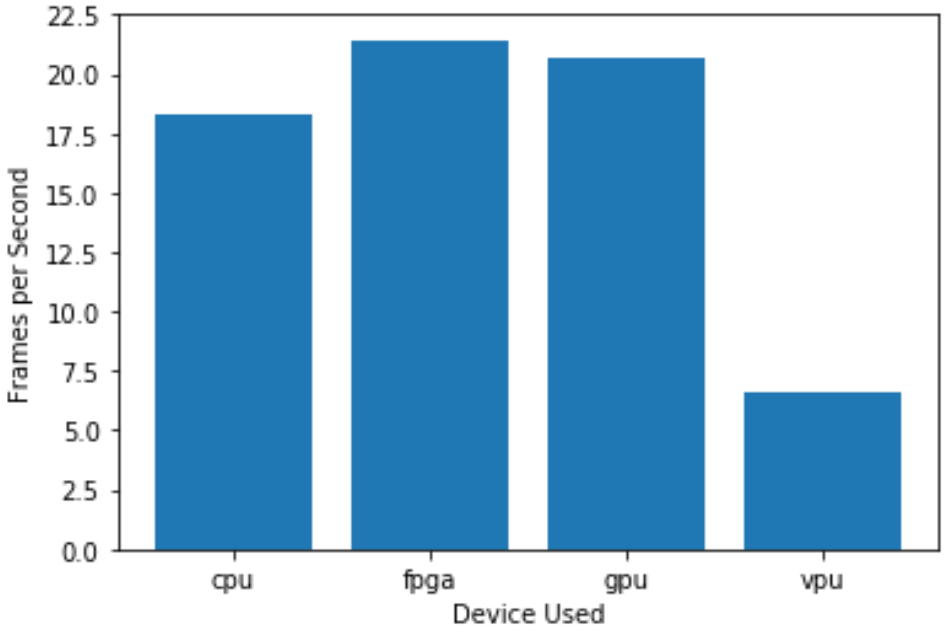


Model Load Time



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

VPUs are the best choice to meet the client requirements. As you can see its performance is not the best but its cost is around $300.