

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)
CPU + FPGA

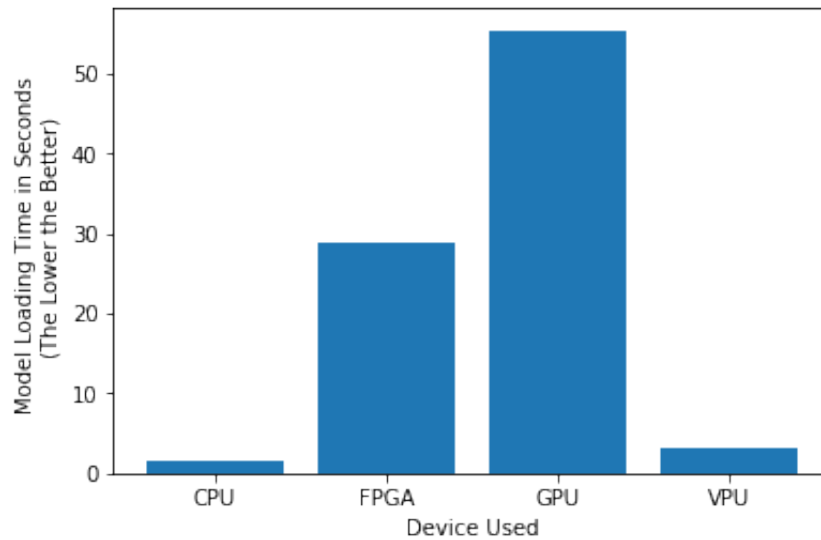
Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
Flexibility Mr. Vishwas needs a system that is flexible so that it can be reprogrammed and optimized to quickly detect flaws in different chip designs.	FPGAs can be reprogrammed to adapt to different networks based on the application’s needs.
Robustness The shop floor of the factory line needs to be running 24 hours a day so that packaging continues nonstop.	FPGAs are designed to have 100% on-time performance (24/7/365).
Cost Naomi Semiconductors already has good revenue and would like to maximize their revenue in next venture.	Naomi Semiconductors has plenty of revenue to install a quality system and the cost of FPGAs can be afforded by the factory.
Lifespan Naomi Semiconductors would like the system to last for at least 5-10 years.	FPGAs have guaranteed long lifespan of ~10 years.

Queue Monitoring Requirements

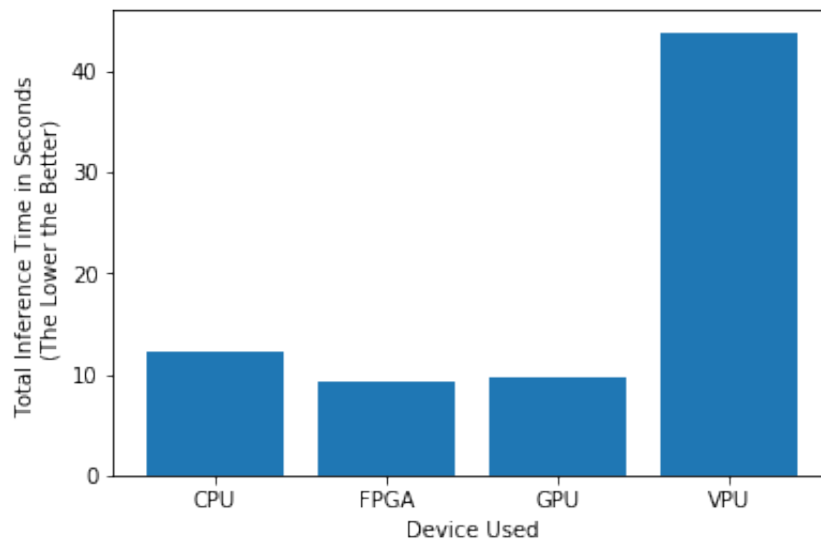
Maximum number of people in the queue	2
Model precision chosen (FP32, FP16, or Int8)	FP16

Test Results

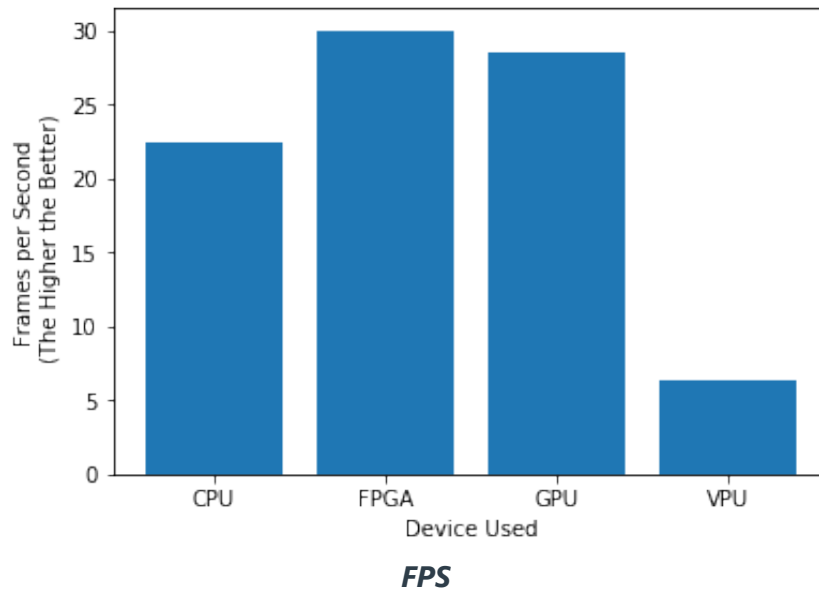
After you've tested your application on all four hardware types (CPU, IGPU, VPU, and FPGA), copy the matplotlib output showing the comparison into the spaces below. You should have three graphs (for model load time, inference time, and FPS).



Model Load Time



Inference Time



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

Among the hardware, FPGA has the lowest inference time and highest FPS. Considering the most crucial requirements like flexibility, robustness and lifespan, FPGA is the most cost-effective solution in the long run.

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 + IGPU

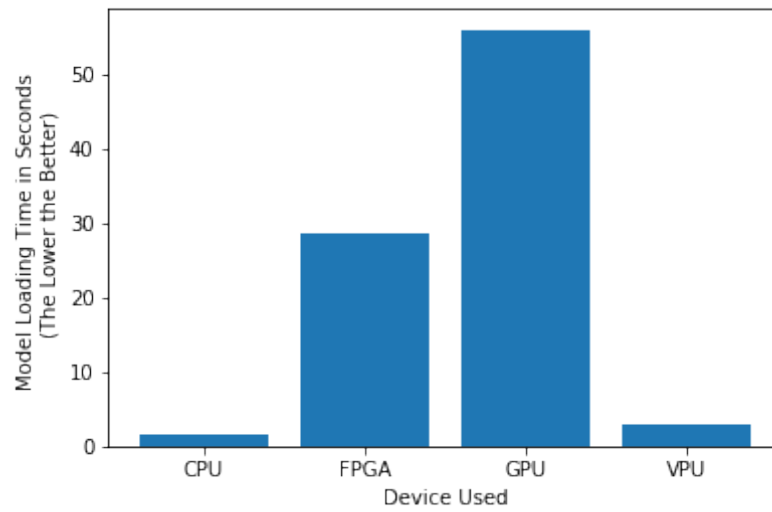
Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
Economic Constraint Mr. Lin does not have much money to invest in additional hardware.	The store's checkout counters already have a modern computer with Intel i7 core processor. The IGPU of the computer can be utilized to run inference.
Power Requirement Mr. Lin would like to save as much as possible on his electric bill.	Utilizing existing IGPU of the computer without introducing additional hardware devices.

Queue Monitoring Requirements

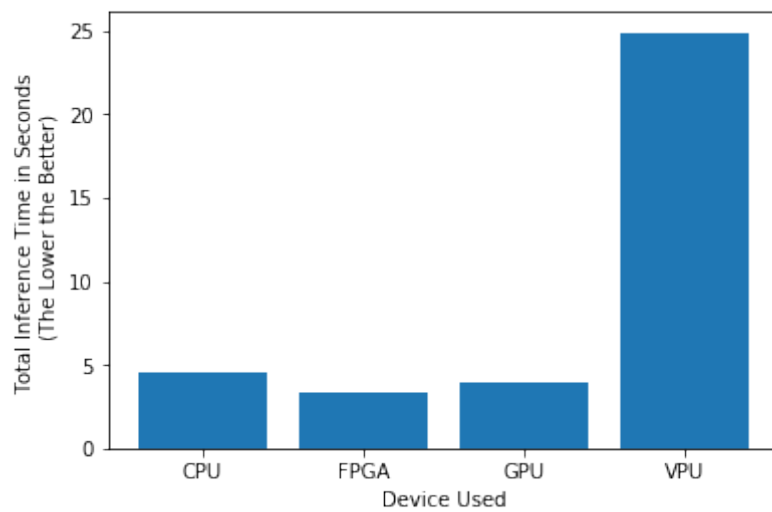
Maximum number of people in the queue	3
Model precision chosen (FP32, FP16, or Int8)	FP16

Test Results

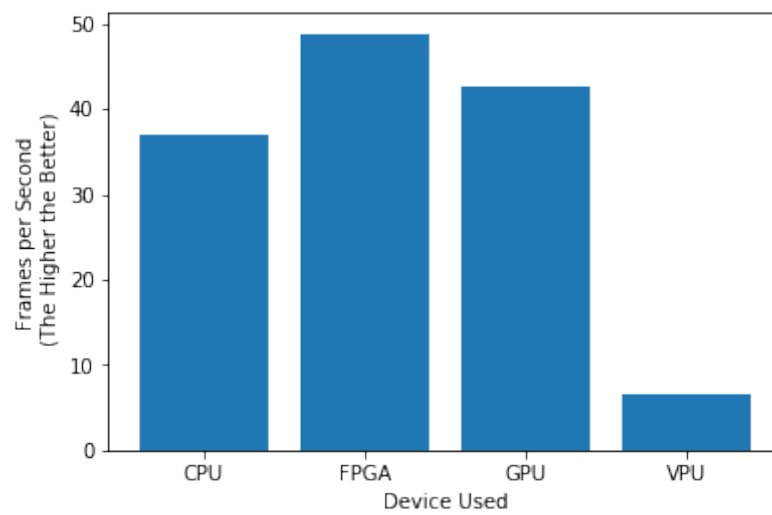
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Model Load Time



Inference Time



FPS

Final Hardware Recommendation

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Write-up: Final Hardware Recommendation

While IGPU is not the best performance hardware in terms of inference time and FPS, but its performance satisfies the requirement of a queuing system of a small retail store. Pre-installed CPU with IGPU is the recommended solution since it will not need additional hardware cost. The increase of power consumption to run inference is also minimum.

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)
CPU + VPU

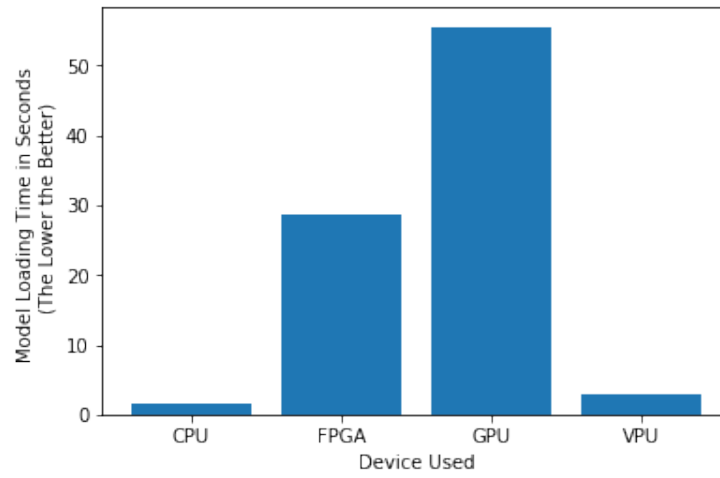
Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
Economic Constraint The maximum budget allocated is \$300 per machine.	The retail price of a NSC2 stick is less than \$100. Ms. Leah can purchase multiple sticks for each machine to boost the inference performance.
Performance The CPUs in the machines are currently being used to process and view CCTV footage and no significant additional processing power is available to run inference.	The CPU of the machines could not be utilized to run inference. Additional hardware accelerators such as NSC2 sticks are needed.
Power Requirements Ms. Leah would like to save as much as possible on future power requirements.	NCS2 is a low-power device that can be easily deployed at the edge.

Queue Monitoring Requirements

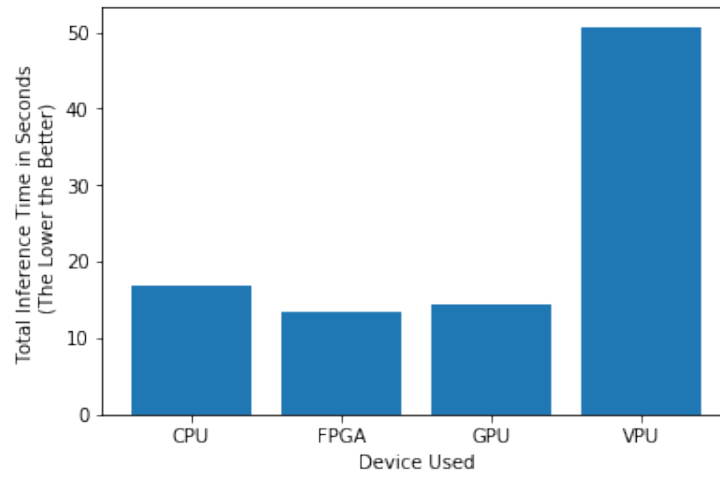
Maximum number of people in the queue	7
Model precision chosen (FP32, FP16, or Int8)	FP16

Test Results

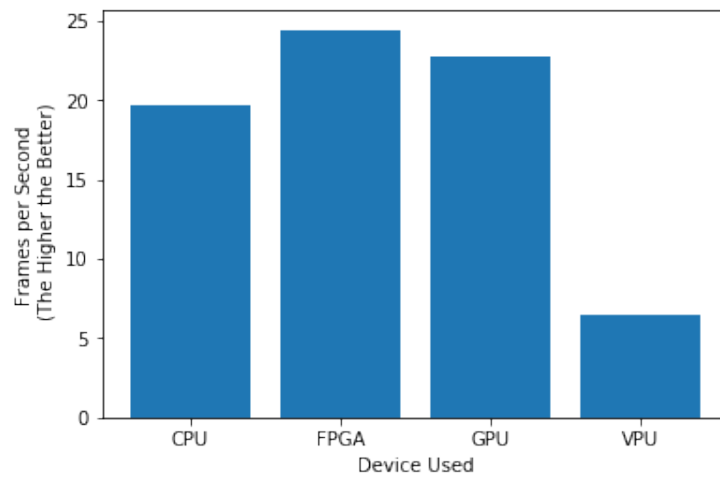
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Model Load Time



Inference Time



FPS

Final Hardware Recommendation

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Write-up: Final Hardware Recommendation

Given the budget constraint and the power requirement, a low-cost and low-power hardware, such as NSC2 is a reasonable solution here. Multiple NSC2 sticks can be plugged into existing machines to process the video stream of 7 CCTV cameras on the platform.