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

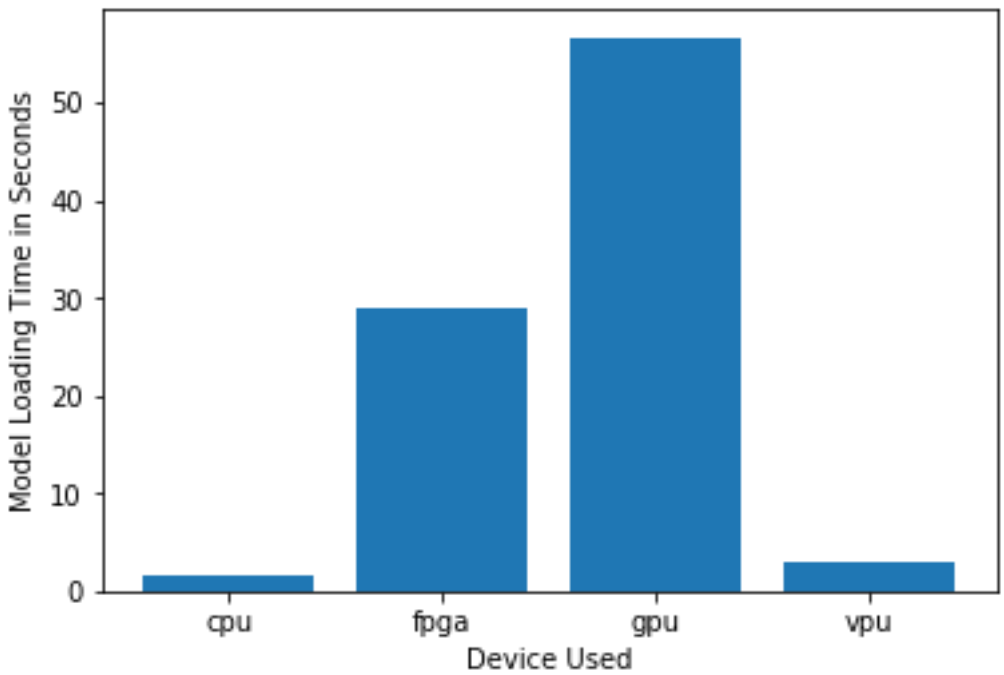
Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
Harsh environment of factory	FPGA is robust and can be deployed in harsh environment and still perform optically
As step # 07 (shipping to customers) is taking too much time. There is one particular shop floor which has two industrial conveyer belts, also a vision camera has installed at both belts and record 30-35 fps. And the client would like the processing task to be completed five times per second.	In this case time delay is major concern/ issue. So FPGA will be helpful to lower latency as FPGA has ability to run many sections of the chip in parallel and FPGA do not go off chip for the memory.
A significant percentage of the semi-conductors chips being packed for shipping have flaws. These are not detected until the chips are being used by the users. If these flaws could be detected prior to packaging, this would save money and improve the company's reputation.	FPGA will be a good choice for doing this job as an edge application will be required and FPGA will give high performance and improved inference.
To be able to detect chip flaws without slowing down the packaging process, the system would need to be run inference on the video stream very quickly.	FPGA can be used for speed up inference and FPGA has known for parallel processing.
Client has plenty of revenue to install a system in order to increase factory's revenue	FPGA is expensive but it fulfil the client's need and client also has lot of revenue for the system
There are multiple chip design and new design are created regularly, the system need to be flexible.	FPGA are re-programmable and highly flexible so it fulfils the client's requirement.
The client want the system that last for at least 5-10 years.	FPGA has a very long life and it can last 5-10 years.

Queue Monitoring Requirements

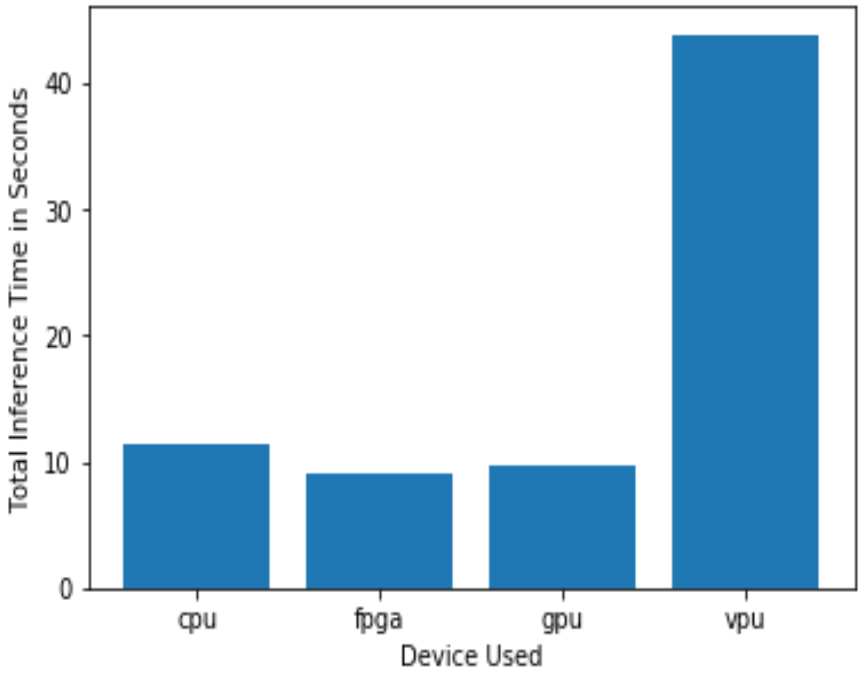
Maximum number of people in the queue	*2*
Model precision chosen (FP32, FP16, or Int8)	*FP16*

Test Results

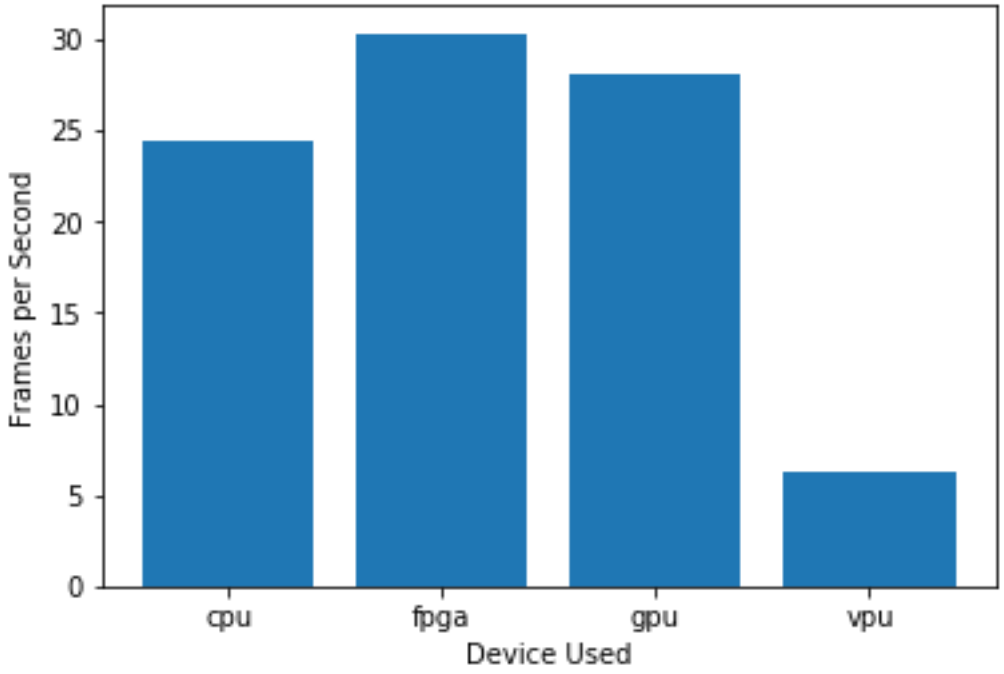
After you've tested your application on all four hardware types (CPU, IGPU, VPU, and FPGA), copy the matplotlib output showing the comparison into the spaces below. You should have three graphs (for model load time, inference time, and FPS).



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
As per graphs pasted above, FPGA took the minimum/least time to perform inference and also has high FPS. FPGA has performed better than other device. Since it has meet all the client's requirement, so final recommendation is to use FPGA.

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

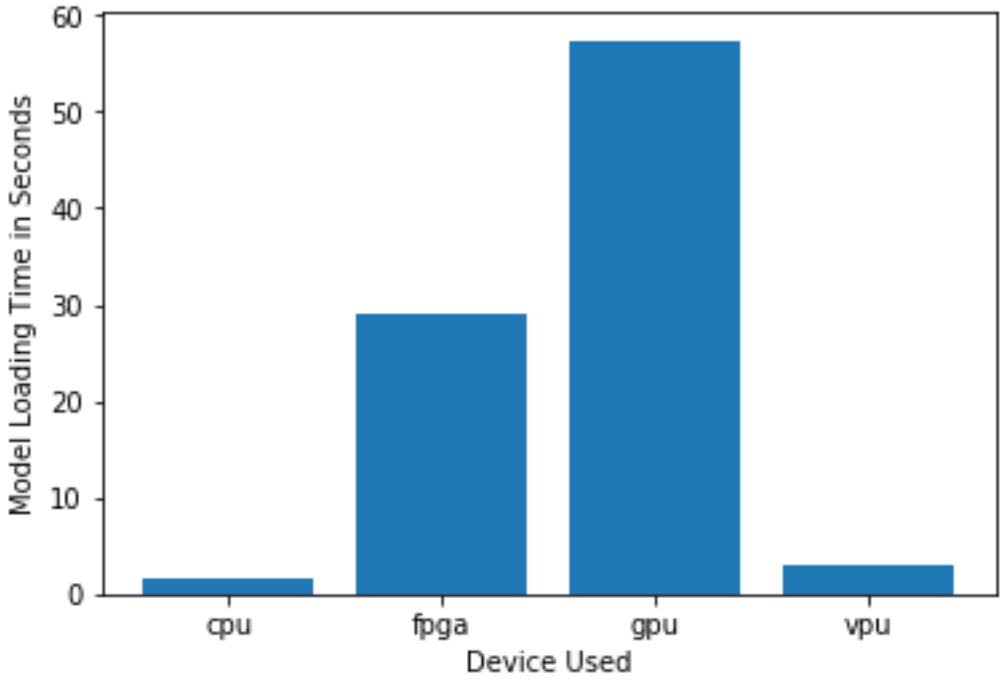
Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
Most of the store's checkout counter already have a modern computer i.e. Intel Core i7 processor. Currently these processors are only used to carry out few minimal tasks that are not computationally expensive.	Client already has modern computers and they are not doing computationally expensive tasks. So CPU can be the solution.
Client do not want to invest money in additional hardware.	Client's issue can be solved by the existing CPUs so he will not spend extra money.
Client also want to save as much as possible on electricity bills.	CPU will save electricity bills as well.
Client do not need to run the system for 24/7 as he/she is running the retail store.	CPU will be the best choice.s

Queue Monitoring Requirements

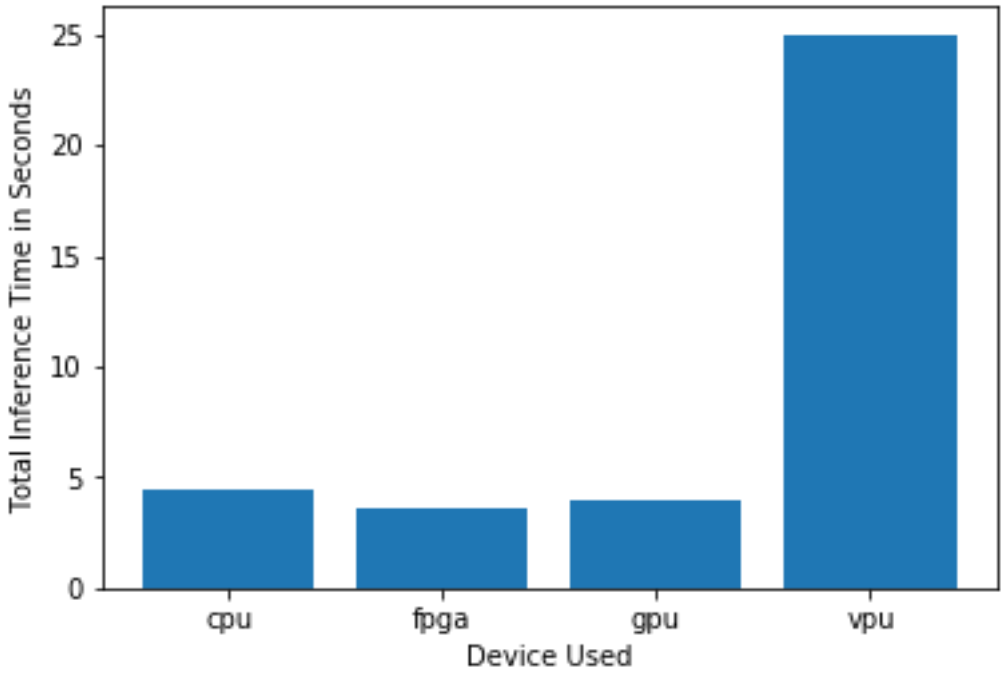
Maximum number of people in the queue	*2*
Model precision chosen (FP32, FP16, or Int8)	*FP32*

Test Results

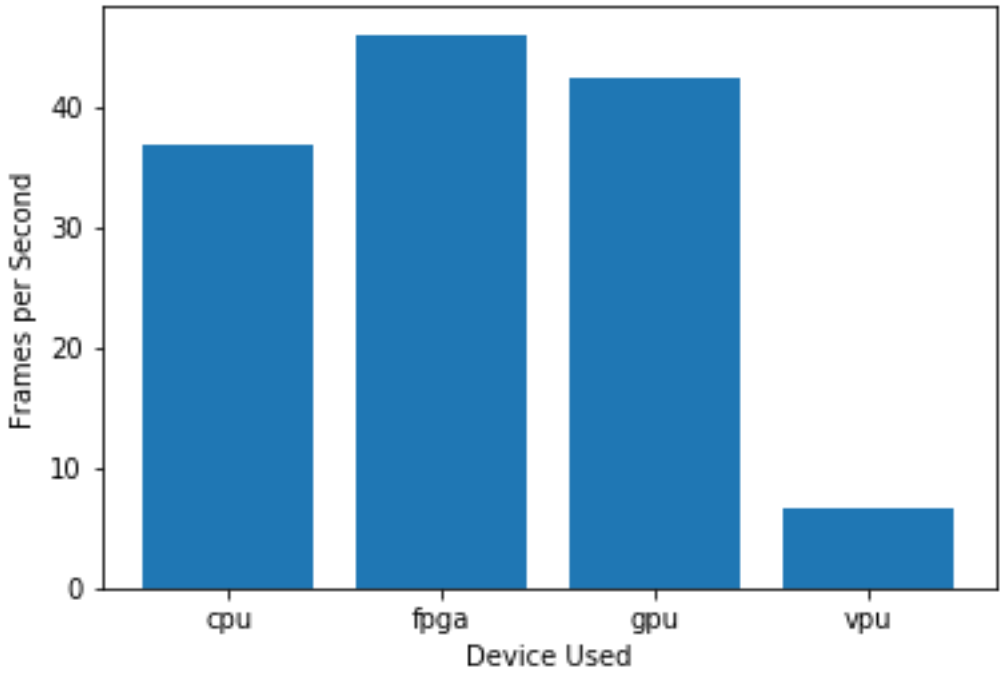
After you've tested your application on all four hardware types (CPU, IGPU, VPU, and FPGA), copy the matplotlib output showing the comparison into the spaces below. You should have three graphs (for model load time, inference time, and FPS).



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 client do not want to spend any additional amount on hardware, so we can not talk or discuss about FPGA's performance. CPU has low inference time comparable to VPU and GPU and inference time is very crucial for this case. CPU will help the client to save costs and electricity bills. So CPU will be a good choice for this case.

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?
CPU are currently used to process and view CCTV footage for security purpose and no additional processing power is available to run inference.	VPU is favorable as no additional power is available run the inference as VPU (Intel Neural Compute Stick 2) is a plug and play kind of device.
Client budget is maximum of 300 $ per machine	VPU (Neural Compute Stick 2) cost almost 70$ - 100$
Client want to save as much as possible on future power requirements.	VPU is extremely low power device.

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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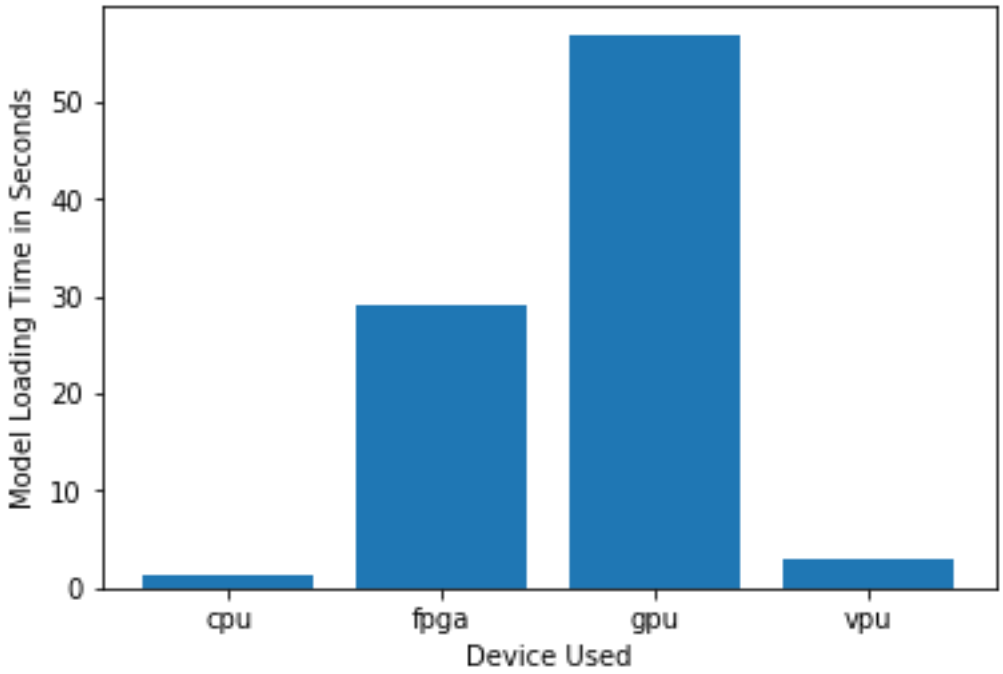
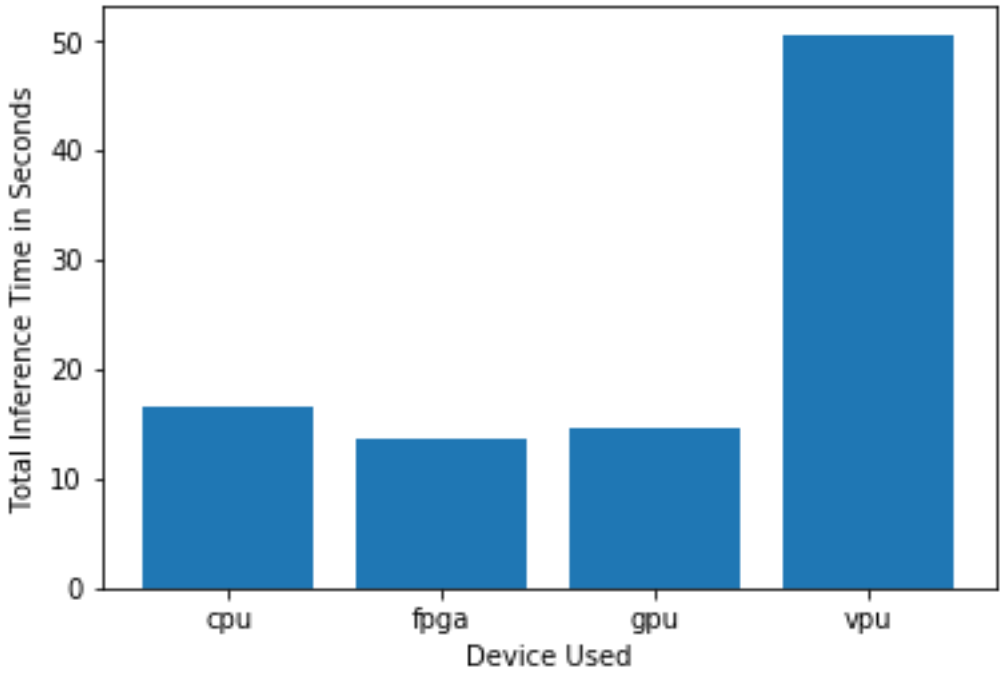
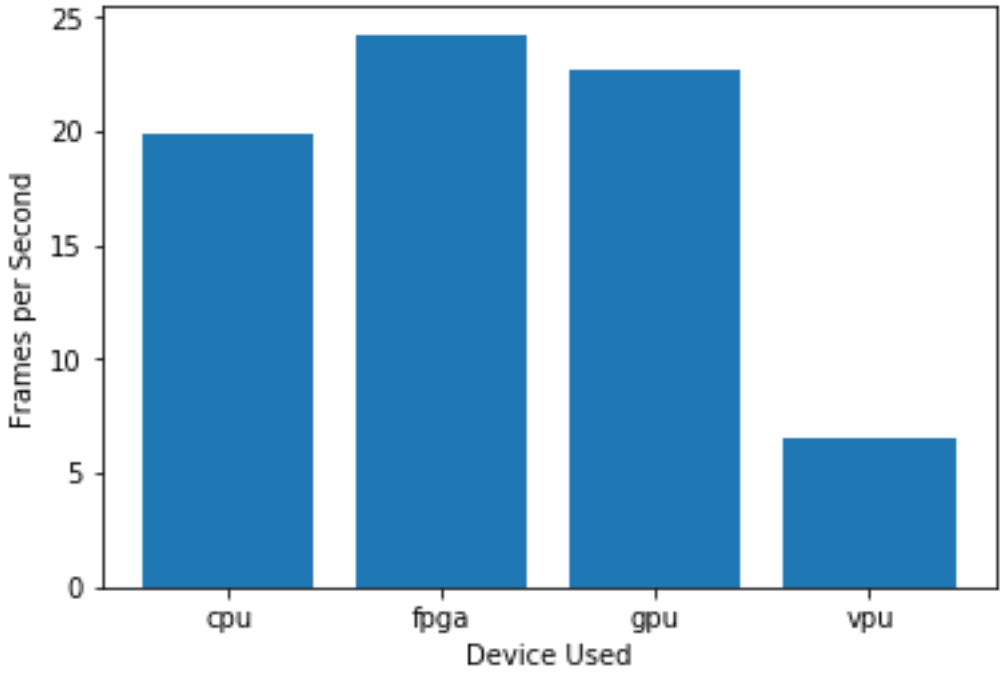


Model Load Time



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
VPU gave very high inference time and low FPS. A good CPU or GPU will be a good choice but client concerns are low budget and power savings. So VPU will be ideal choice for this case.