Choose the Right Hardware

Proposal by Archisha Chandel

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.

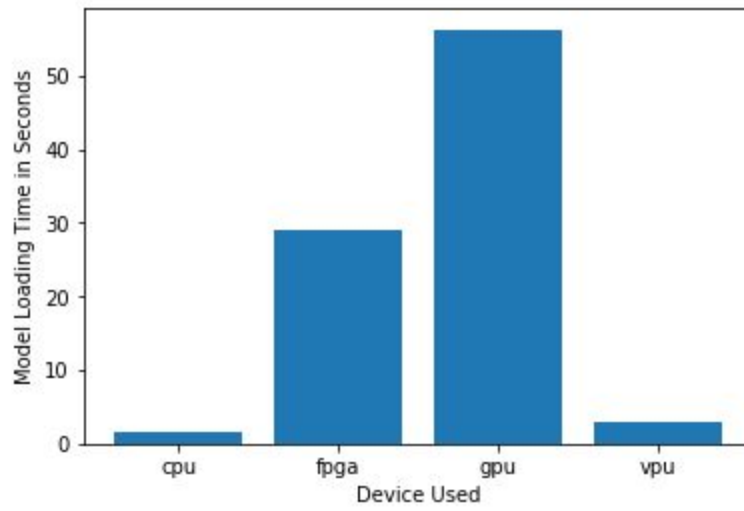| Which hardware might be most appropriate for this scenario? (CPU / IGPU / VPU / FPGA) |
|---|
| *FGPA* |

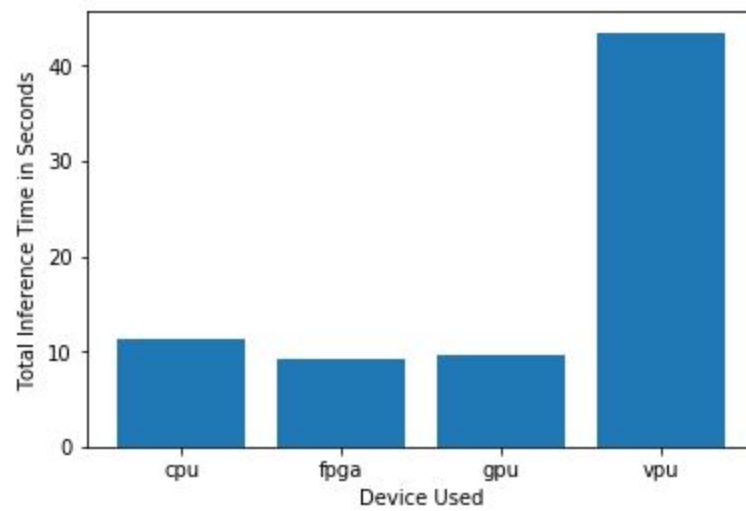| Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
Good Durability (5-10 years)	*FGPAs last that long, we can trust quality and durability there*
30-35 FPS with minimum 5 images per second processing	*FGPAs outperform other devices and will be able to meet these requirements*
No cost restrictions	*FGPAs even if expensive, won't be a problem in this scenario*
There are multiple chip designs—and new designs are created regularly. Flexibility of the system is needed	*FPGA fulfills the requirement of flexibility as it can be designed as required*

Queue Monitoring Requirements

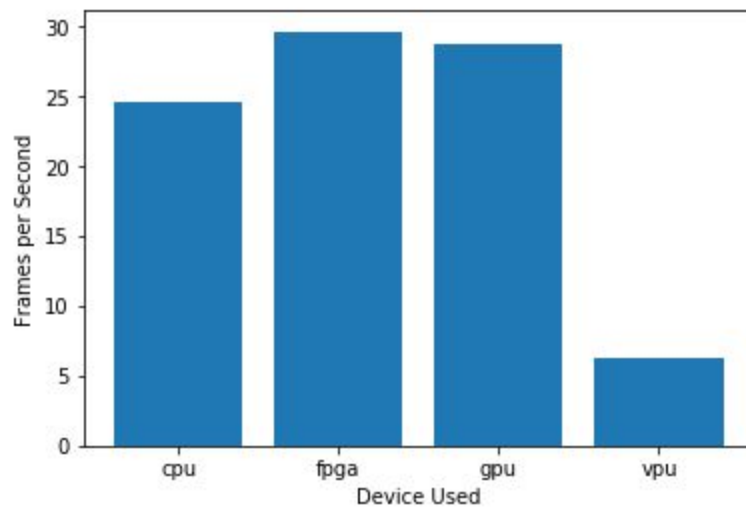|	
Maximum number of people in the queue	*5*
Model precision chosen (FP32, FP16, or Int8)	*FP16*

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 seen in the graphs above, FPGA shows the best performance. It meets the client's 30-35 FPS requirement . Even if it is a little slow in loading the model, but least inference time and highest FPS cover for the loading time. Client has a 24 hour prediction running requirement which is easily satisfied by 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.

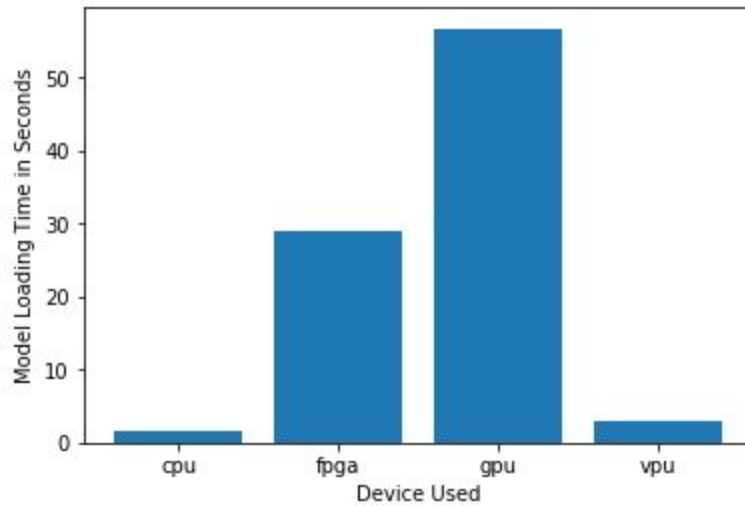| Which hardware might be most appropriate for this scenario?
(CPU / IGPU / VPU / FPGA) |
| --- |
| *CPU* |

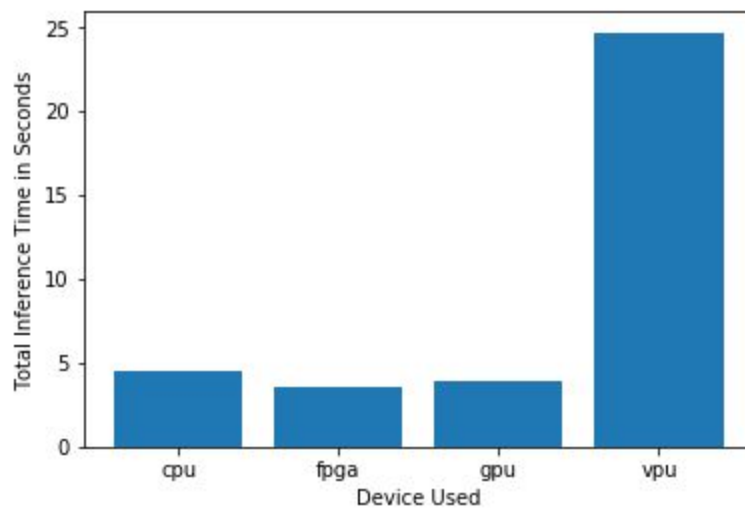| Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
Less money, can't invest in Hardware	*Already i7 core processors available*
Need during rush hours, good FPS and processing needed	*Since computers are already used, running the application on that itself at checkout would be cost and compute efficient.*

Queue Monitoring Requirements

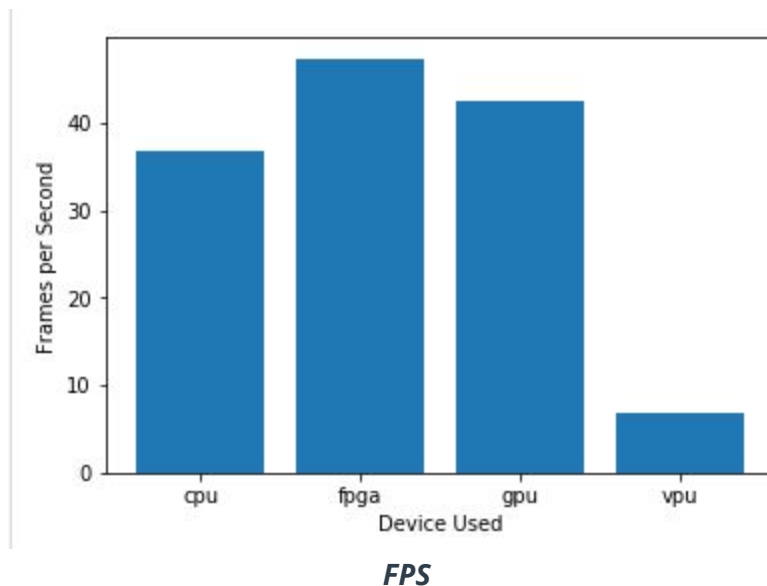| Maximum number of people in the queue	*5*
Model precision chosen (FP32, FP16, or Int8)	*FP16*

Test Results

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Write-up: Final Hardware Recommendation
As you can see, the CPU does give a good performance and even model load time is least, even the inference time is not bad. No extra hardware needed so this makes a good case. I would also like to mention that IGPUs are a good option too. Though there will be some initial hardware expenses and model load time is highest but that is only a one time thing , after that IGPUs perform really well and even their FPS is quite high, also they have configurable power consumption so electric bills could be saved. So it's a tough choice between CPUs and IGPUs if a little initial investment is affordable, I'd recommend IGPUs as they can save money on electric bills which is a monthly affair in most places and compared to an initial investment, in the long run IGPUs will be profitable. If the client is not ready to spend even a little on hardware then CPUs would work too.

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.

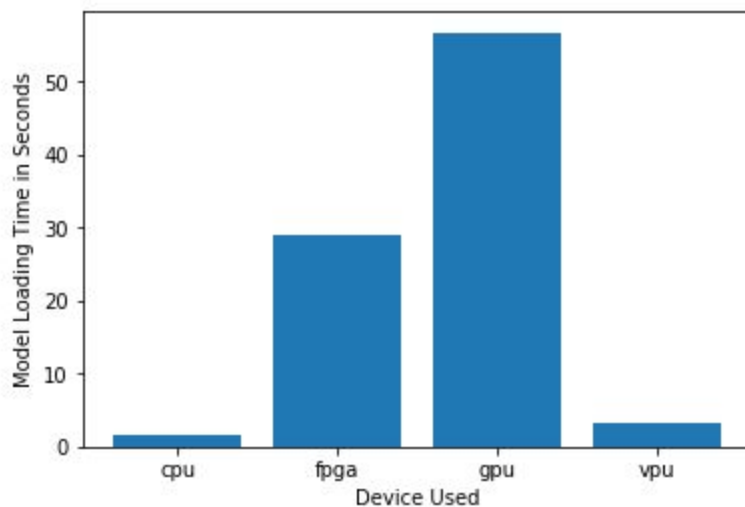| Which hardware might be most appropriate for this scenario?
(CPU / IGPU / VPU / FPGA) |
|---|
| *VPU* |

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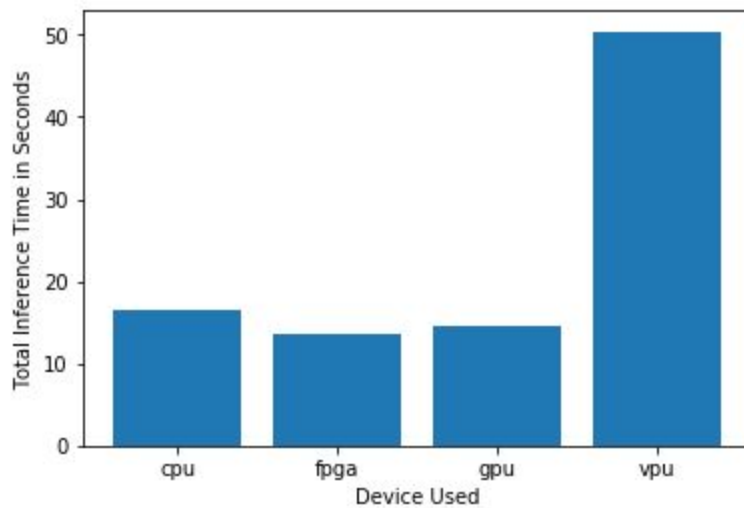| Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
Maximum of $300 per machine (low budget)	*VPUs would fit in the price range.*
Save both on hardware and future power requirements.	*Power Consumption of a VPU is not high as typically it is a small USB attachment.*

Queue Monitoring Requirements

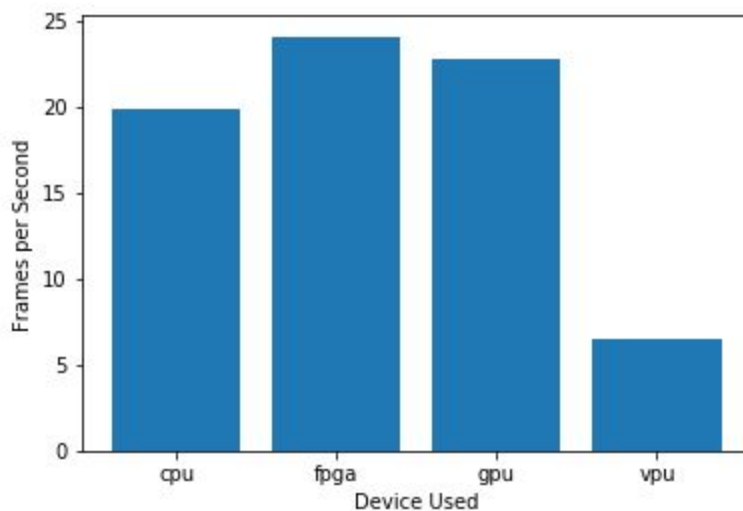| Maximum number of people in the queue	*7*
Model precision chosen (FP32, FP16, or Int8)	*FP16*

Test Results

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Write-up: Final Hardware Recommendation
The inference time of VPU is high and fps are comparatively lesser than other devices but It will still meet the requirement of the client to handle 7 to 15 people in a queue without spending money on the new hardware for each computer. A simple plugin VPU is the best choice for this scenario. Additional VPUs, that is more than 1 VPU can be purchased in the given budget. For example: Intel NCS2 costs around $70 to $100 and at least 3 can be bought in the given budget range.

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