Choose the Right Hardware

Proposal Template

Scenario 1: Manufacturing

First Project – Monitoring Number of People in the Factory Line:

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)
*The appropriate hardware for this solution could be **CPU**.*

Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
To count people the idea is to use cameras recording at 30 fps to 35 fps.	*CPU can process this fps.*
Data about processing information is five times per second.	*The inference average times of CPU is enough to cover this point.*
Currently they have 30% less of revenue because the extended times of process (10 to 12 weeks in comparison to 6 to 8 weeks).	*CPU have good price and they have enough space to install a PC.*

Second Project - Detecting Chip Flaws + Monitoring Number of People:

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)
*The appropriate hardware adding both solutions could be **FPGA**.*

Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?

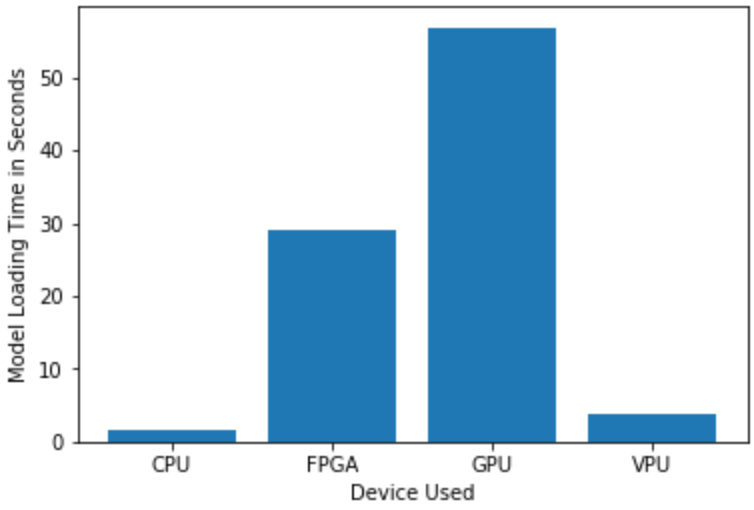
Actually they need record at 30 fps to 35 fps, but adding the failed chips detection they will need more fps. *Great capacity of processing frames adding both systems. Remember that to counter people they only needs five times per second.*	FPGA can process more fps because is a dedicated hardware programmed in RTL (VHDL, VERILOG or others).
Installing the first project they can improve the revenues, having more money to implement a better system. We can orientate the client to install a very good system at the beginning doing a ROI (Return Of Investment) analysis.	FPGA has higher costs than CPU, but it can do both implementations using one hardware.
They can do the investment and they needs a period of 5 to 10 years of duration of the system.	FPGA are hardware with great durability, Intel guarantees 10 years of availability.

Queue Monitoring Requirements

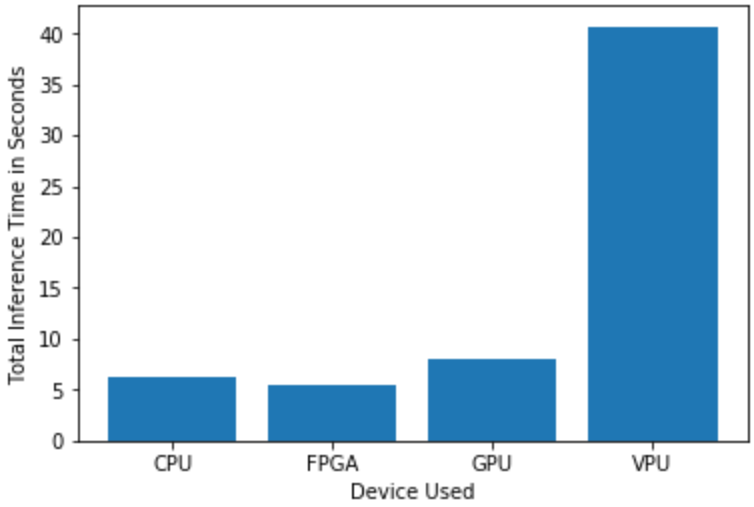
Maximum number of people in the queue	***5***
Model precision chosen (FP32, FP16, or Int8)	***FP32***

Test Results

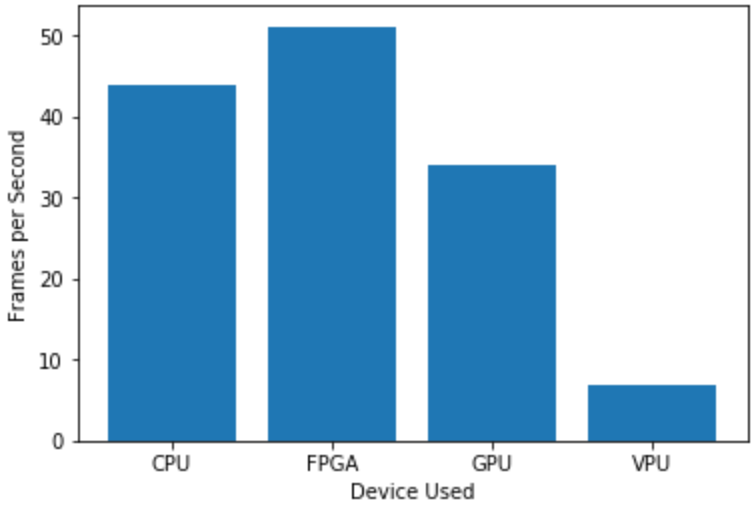
After you've tested your application on all four hardware types (CPU, IGPU, VPU, and FPGA), copy the matplotlib output showing the comparison into the spaces below. You should have three graphs (for model load time, inference time, and FPS).



Model Load Time [seconds: low is better]



Inference Time [seconds: low is better]



FPS [Frames Per Second: high is better]

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
If the customer wanted to spend little money and implement the first project, they could do so using CPU-based hardware. This would lead us to change everything to FPGA-based hardware when you decide to implement the second project that includes the first one, in this situation project one plus project two requires more processing capacity. ***To implement both projects the best hardware solution is to use an FPGA based system, this is because of necessity in the near future.***

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)
*The appropriate hardware for this solution could be **CPU** or **IGPU** or **CPU+IGPU**.*

Requirement Observed (Include at least two.)	**How does the chosen hardware meet this requirement?**
Average wait time of 230 seconds at the checkout counters, enough time to count persons with a reduced system.	With 230 seconds of average time of a people in queue and keeping in mind that the inference times are stipulated in seconds (5 or 6), we can implement the system in a CPU, IGPU or CPU+IGPU.
They have a reduced budget of money to invest in the system.	Deployment can be done on existing PCs to save money on hardware. This is why at this point we would think of hardware type CPU, IGPU or CPU+IGPU.
Every store checkout counter has a PC with Intel CPU Core i7.	Although the recommended hardware would be using the existing one, we should prove that it is better: only CPU, only IGPU or CPU+IGPU.

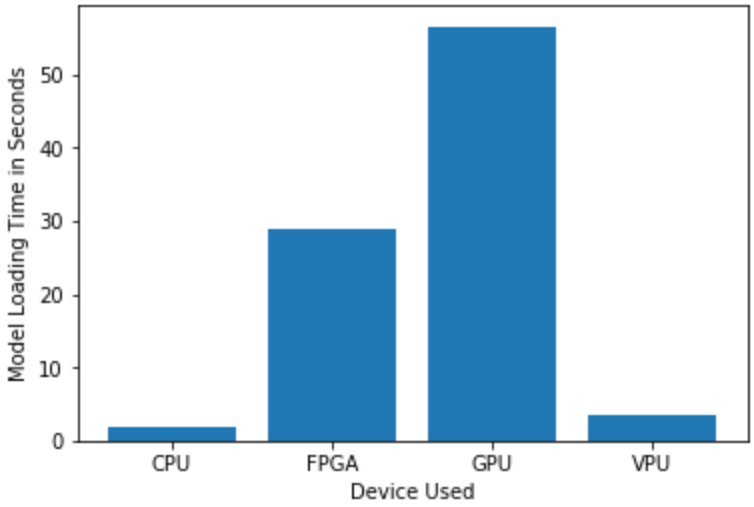
Queue Monitoring Requirements

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

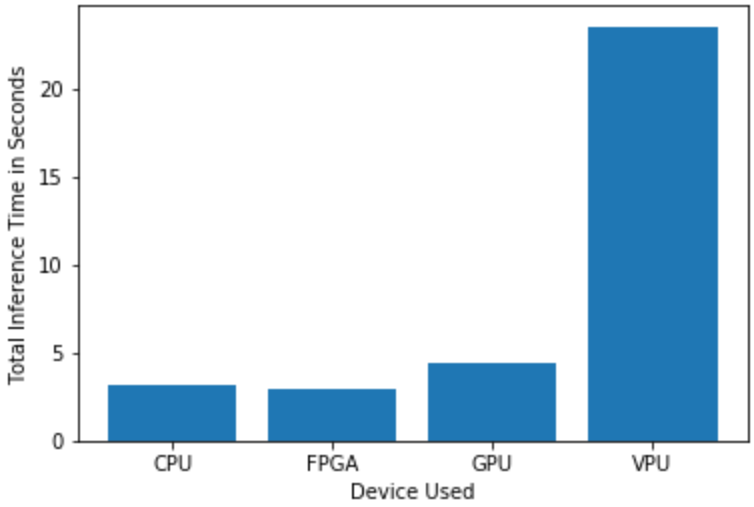
Test Results

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).

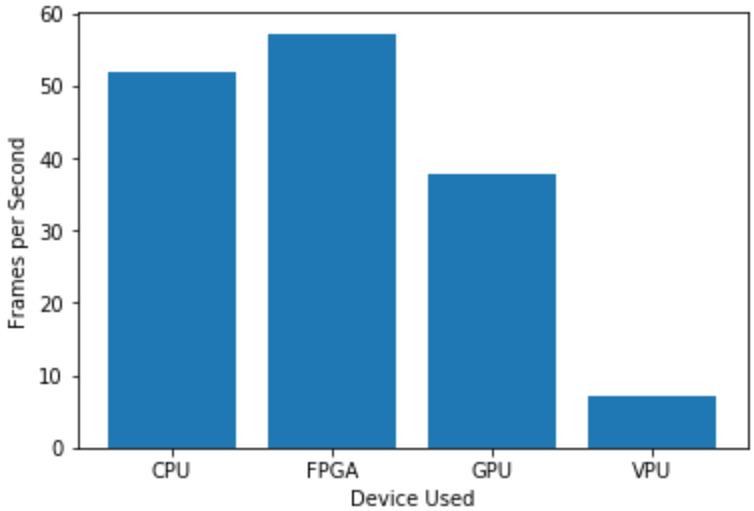
1) ***CPU and IGPU alone:***



Model Load Time [seconds: low is better]

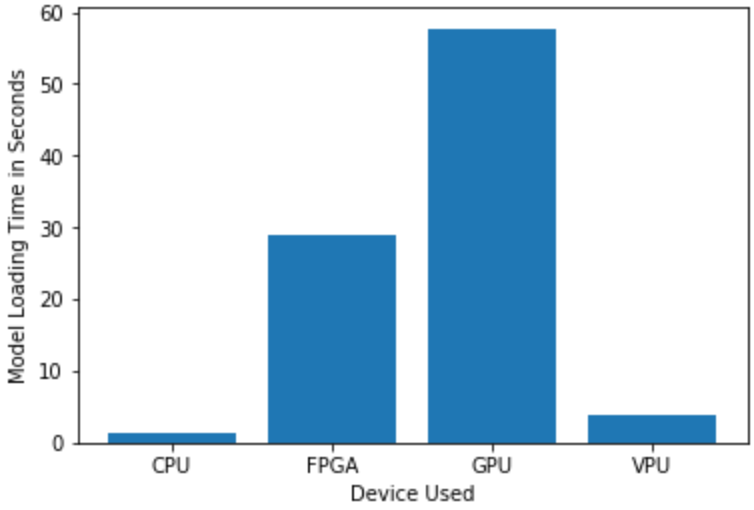


Inference Time [seconds: low is better]

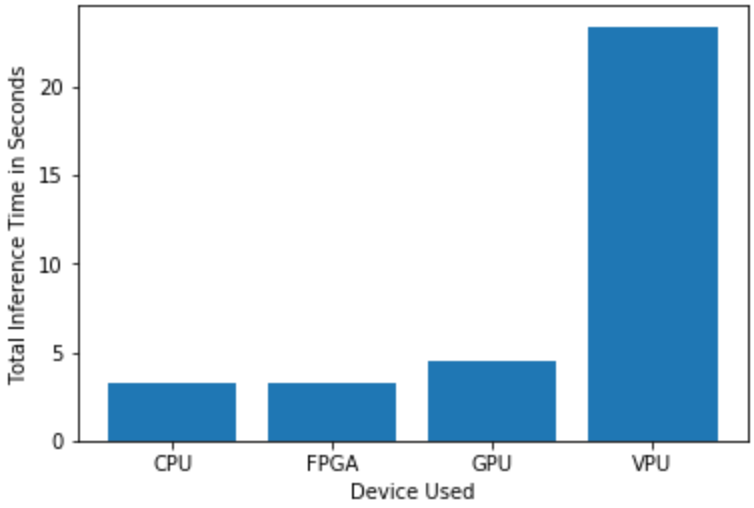


FPS [Frames Per Second: high is better]

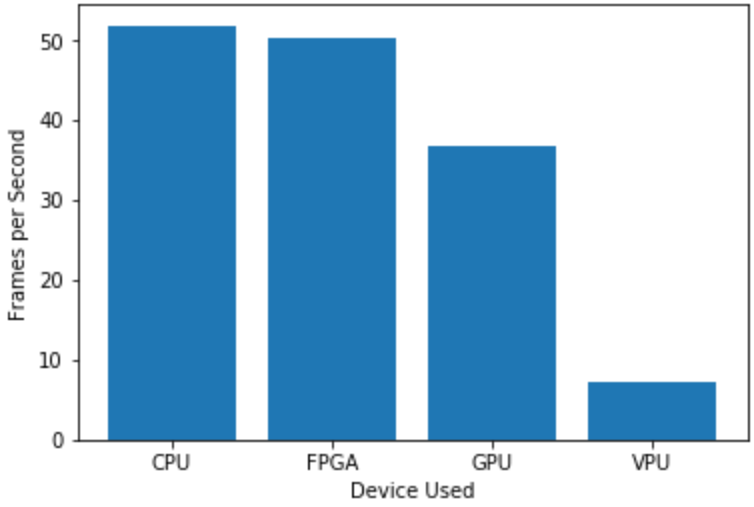
2) CPU+IGPU (using "MULTI:GPU,CPU" sentence in "Step 1.2: Node with a CPU and IGPU"):



Model Load Time [seconds: low is better]



Inference Time [seconds: low is better]



FPS [Frames Per Second: high is better]

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
It is observed that the best option would be the use of a CPU to carry out the work. Also, because in general the graphical interfaces in shops have a low percentage of use because the management programs are very simple; CPU+IGPU could be used. The recommendation is to implement a system that uses CPU + IGPU. ***A slight improvement in fps can be observed when using CPU+IGPU instead of just IGPU, the model loading time would not be a problem, because the system would turn on once a day at the beginning of the working day and the inference time meets the requirements of the client.***

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)
*The appropriate hardware for this solution could be **VPU** (maybe is a good idea to analyze the load of the All-In-One PCs processors in order to use additionally the **CPUs**).*

Requirement Observed (Include at least two.)	**How does the chosen hardware meet this requirement?**
Ms. Leah's budget allows for a maximum of $300 per machine.	VPU costs approximately USD 70, under USD 300.
She would like to save as much as possible both on hardware and future power requirements.	VPU consumes very low power.
From 7 to 15 people in a single queue and 2 minutes to process the information.	VPU can do this task.

Queue Monitoring Requirements

Maximum number of people in the queue	***15***
Model precision chosen (FP32, FP16, or Int8)	***To compare to the other devices we use FP32 but we can improve the VPU using FP16.***

Test Results

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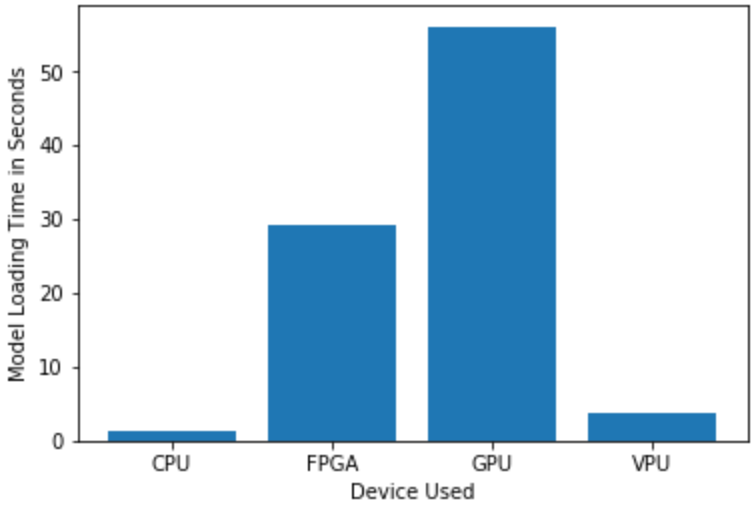
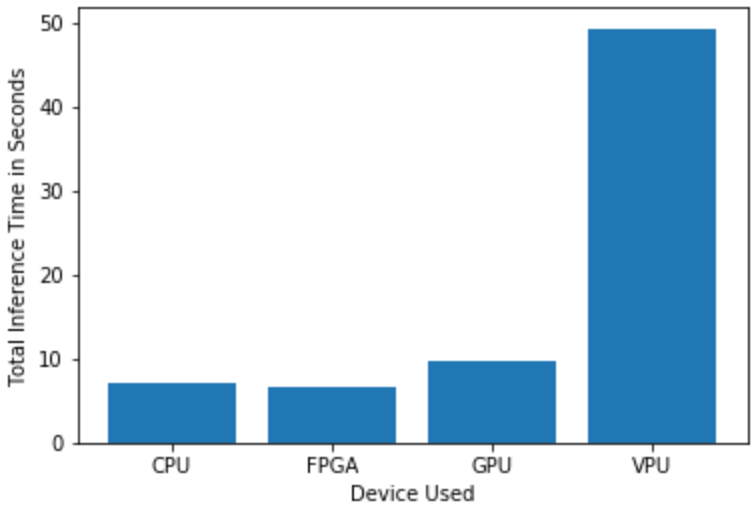
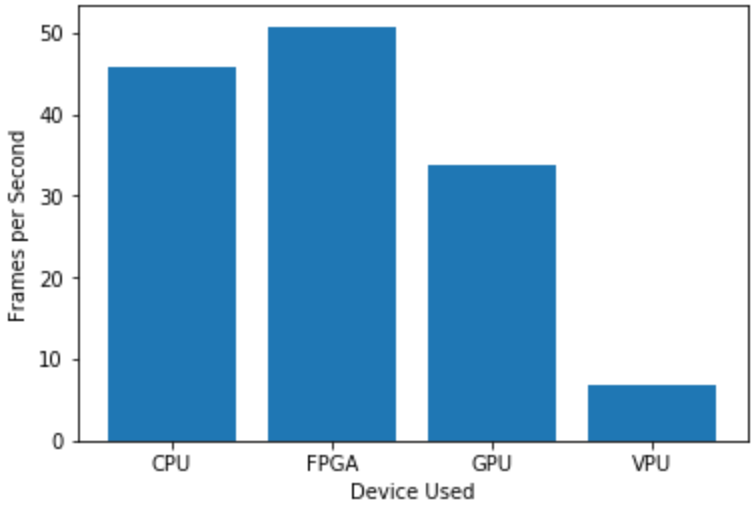


Model Load Time [seconds: low is better]



Inference Time [seconds: low is better]



FPS [Frames Per Second: high is better]

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 we see in the graphics, it would be advisable to be able to use the CPUs to carry out the implementation. ***Because we are not sure how much load the All-In-One PCs have, we will recommend the use of VPU as hardware for the implementation of the system this time.***