

# Choose the Right Hardware

## Proposal Template

Project #3 Smart Queuing System

By: Marwan Saeed Alsharabbi

## 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

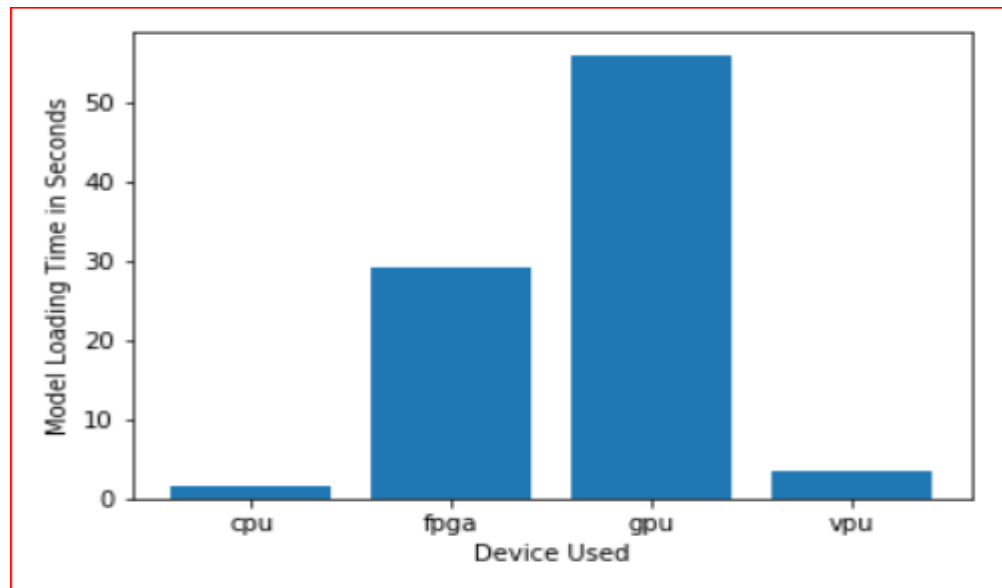
Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
Flexibility	As Mr. Vishwas wants to fix the second problem as well where he wants to know the defected chip in Advance. So there we will need FPGA, as the model to decide which chip is defective may change over time. So with the feature of reprogrammability, FPGA are best suited with this requirement.
Economic constraint	Given the condition, Mr. Vishwas already has a great revenue so he doesn't have any economic constraints. So he can easily afford the FPGA.
Long Term solution	As Mr. Vishwas wants this solution for 5-10 years. And given the fact the FPGA devices are designed to have 100% on-time performance, meaning they can be continuously running 24 hours a day, 7 days a week and for a whole year.
Space Requirement	Since it's a factor line, I don't think space would be a very big constraint and we can easily accommodate the FPGA device which is in fact not a big device
Client can optimize this type in future	Because FPGA's are reprogrammable

## Queue Monitoring Requirements

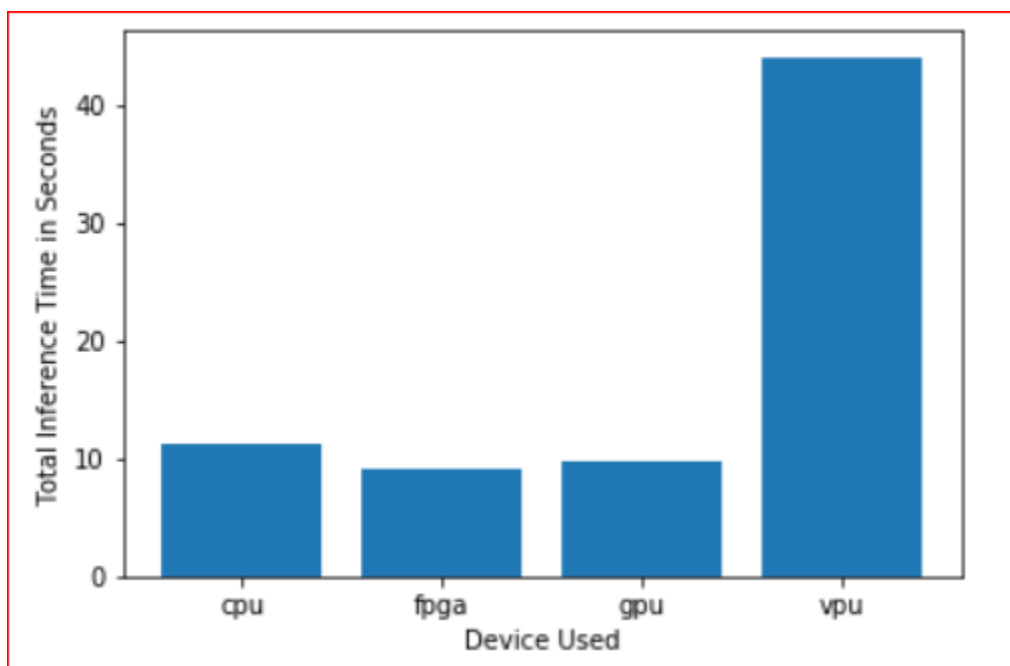
Maximum number of people in the queue	5
Model precision chosen (FP32, FP16, or Int8)	FP16

## Test Results

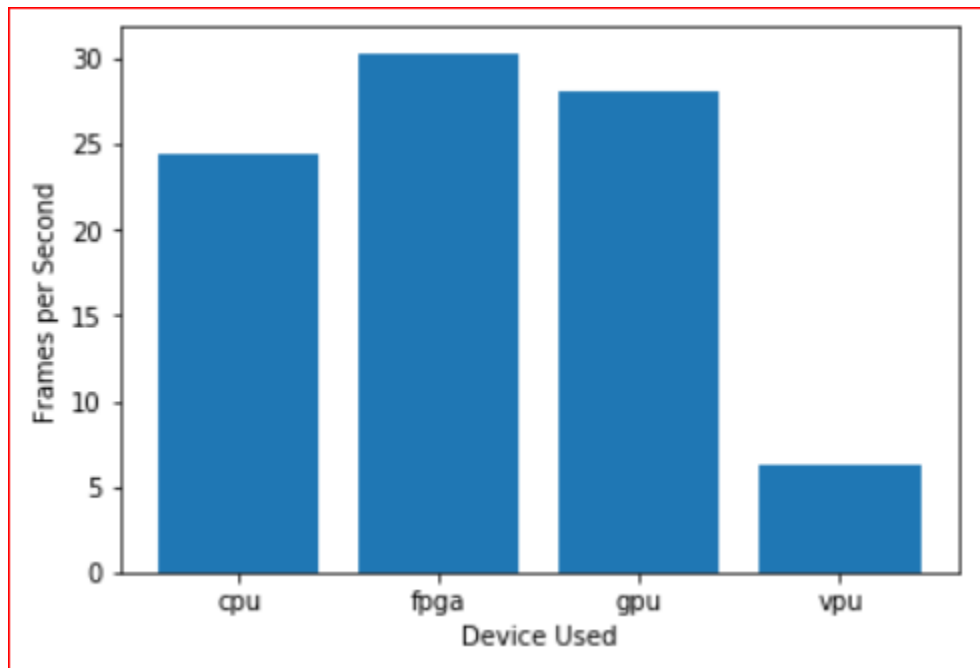
After you've tested your application on all four hardware types (CPU, IGPU, VPU, and FPGA), copy the matplotlib output showing the comparison into the spaces below. You should have three graphs (for model load time, inference time, and FPS).



*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

*Considering the most crucial requirement like flexibility and long term solution, and given the fact the FPGA are the devices which can be reprogrammed according to the requirement and have long durability. in future they can reprogramme this device for there requirements without upgrading in hardware*

## 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*

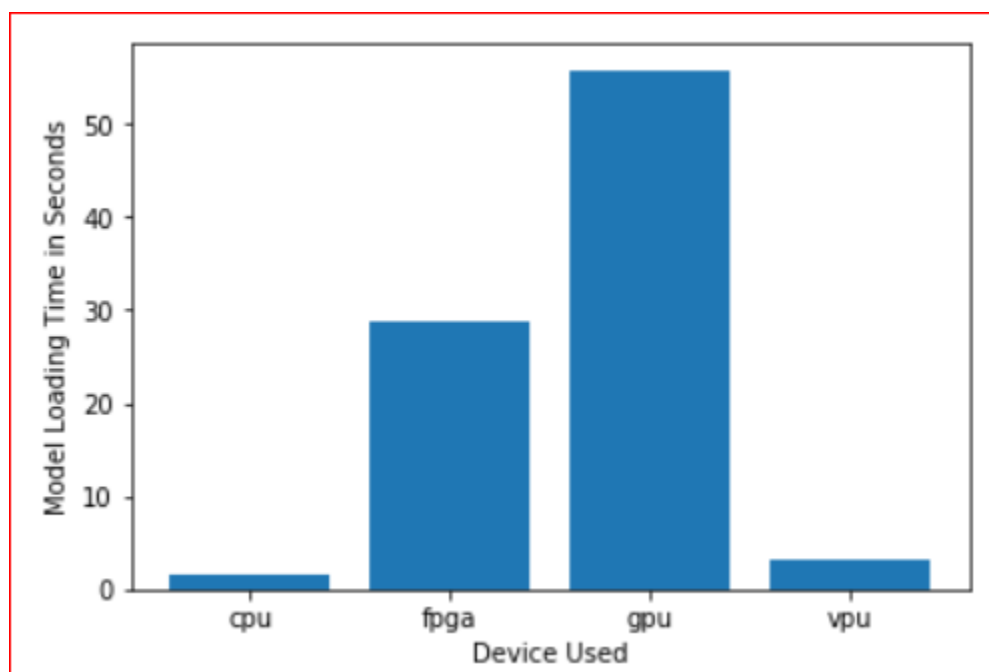
Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
<i>Cost constraint</i>	<i>As clear from the requirements, Mr. Lin can't afford a costly solution here. And also with the fact that, CPU with i7 (which has IGPU ) are already installed at the counter so we can use them only.</i>
<i>Energy/Power Constraint</i> <i>would like to save as much as possible on his electric bill</i>	<i>In accordance with the low energy/power constraint, pre-installed CPUs are the best possible solution here. By this client can save as much as possible Because this type of processors consume low power so that he could save money in electricity bill as well</i>

## Queue Monitoring Requirements

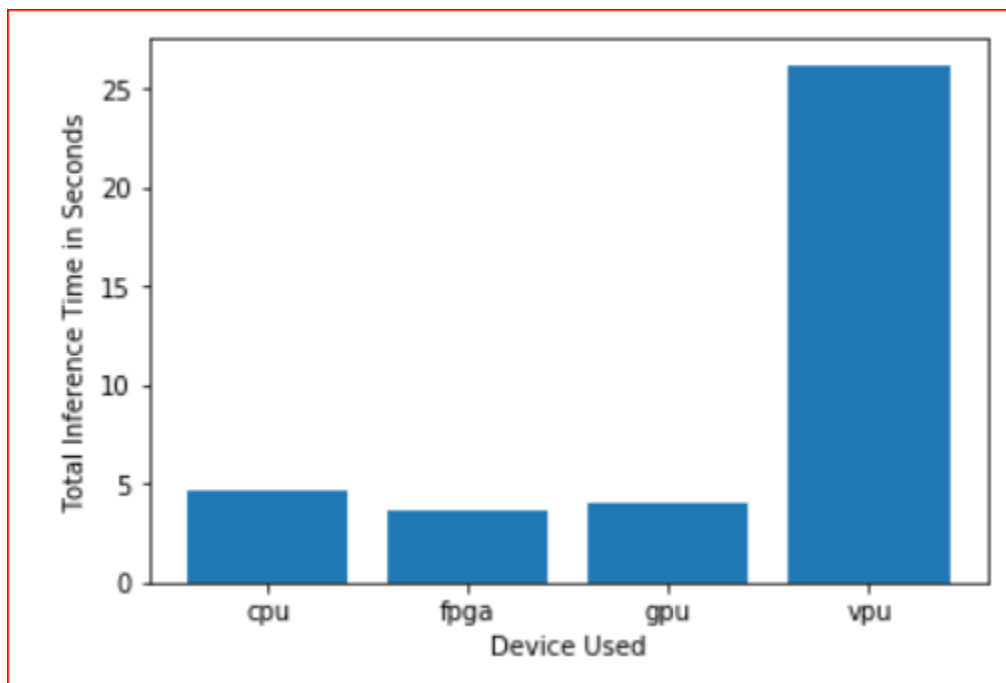
Maximum number of people in the queue	5
Model precision chosen (FP32, FP16, or Int8)	FP16

## Test Results

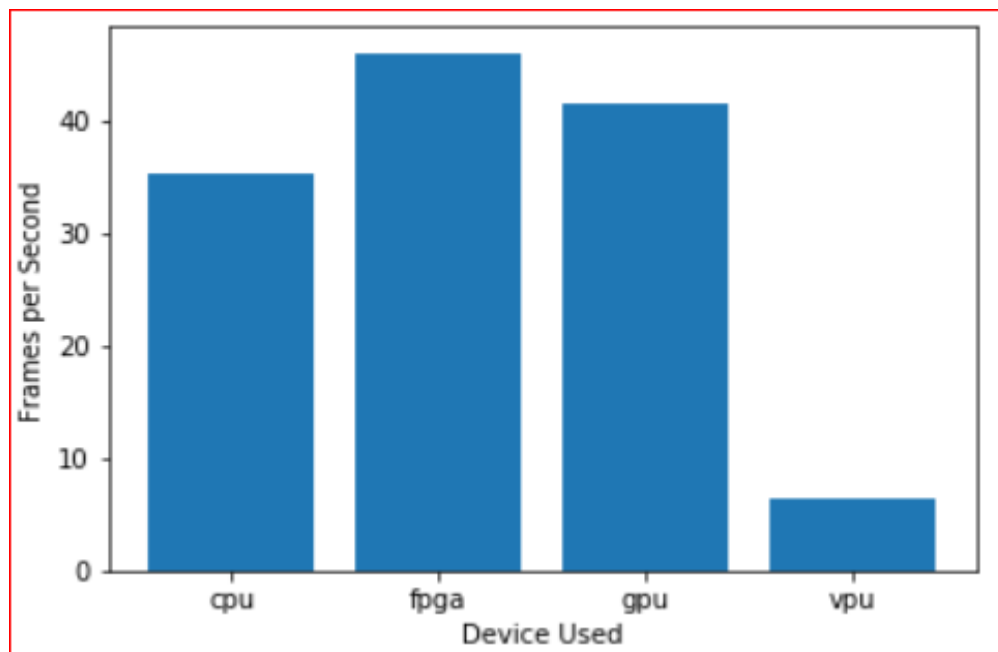
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*FPS*

## Final Hardware Recommendation

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## Write-up: Final Hardware Recommendation

*Mr. Lin does not have much money to invest in additional hardware, and also would like to save as much as possible on his electric bill. so using IGPU can save as much as possible by different perspectives Taking into account the constraints of power and cost, pre-installed CPUs with IGPU are the best possible solution in this scenario. As it won't need any additional hardware and also the increase in the power consumption wouldn't be too much.*

## 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*

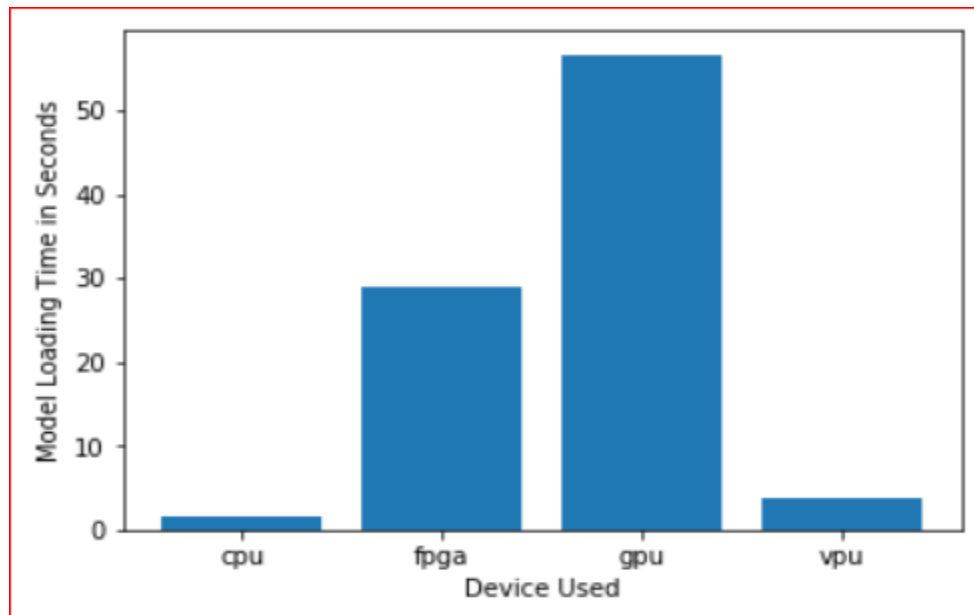
Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
<i>Cost constraint</i>	<i>Client can't invest more than 300\$ on one machine which makes the VPU the ideal solution for this scenario. And as we can have NCS2 with Myriad X processor at a price under 100\$.</i>
<i>Power constraint no significant additional processing power is available to run inference</i>	<i>As clear from the client's requirement that all in one PC already processing CCTV footage and significant additional power can't be supplied.</i>
<i>Space requirement</i>	<i>Given the fact that there is only one PC located so we don't have much space to use. So in this case, as the size of NCS2 are of size thumb drive, makes the ideal solution</i>
<i>Performance</i>	<i>As video streams are coming from 7 CCTV cameras, we need a device which can process all of them. As Myriad X VPU is quite high performant, so we can use them easily.</i>
<i>Buying 2 to 3 NCS2 its a budget because a single NCS2 cost 70-100\$</i>	<i>Using these sticks in parallel gets better performance as a results with low electric power consumption</i>

## Queue Monitoring Requirements

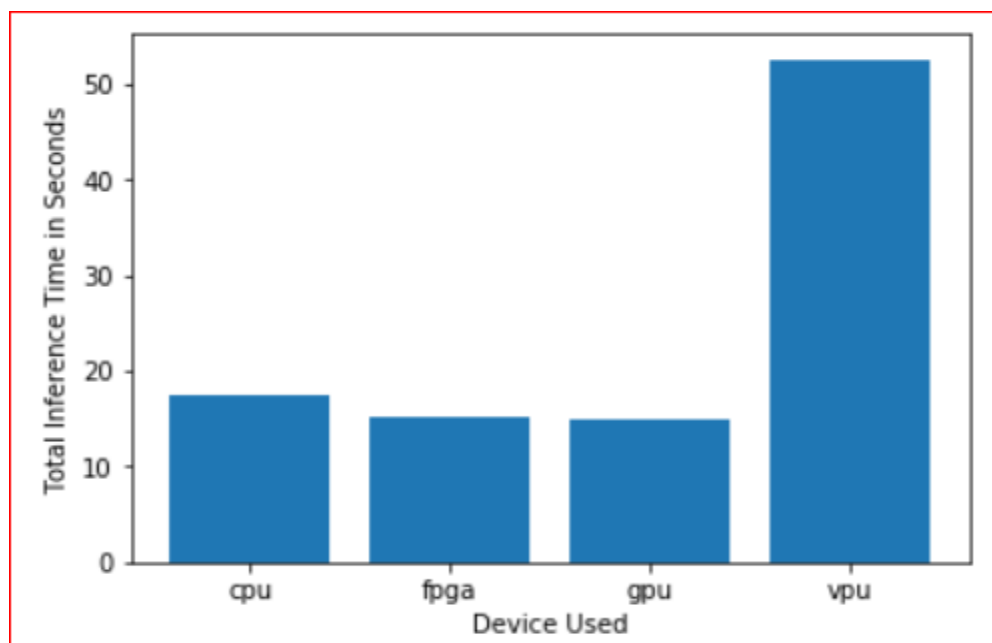
Maximum number of people in the queue	7
Model precision chosen (FP32, FP16, or Int8)	FP16

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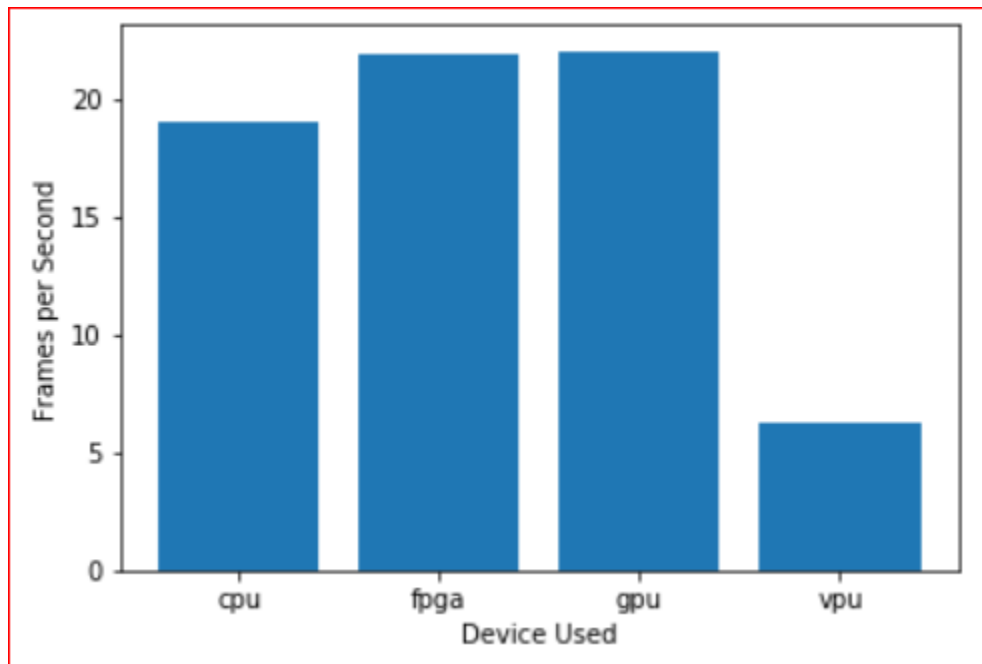
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#### Write-up: Final Hardware Recommendation

*Ms. Leah is budget allows for a maximum of \$300 per machine, and she would like to save as much as possible both on hardware and future power requirements. so using NCS2 in parallel can give him best performance with low electric power consumption In this case, after looking at the performance FPGA seems a more reasonable choice. But because of cost and space constraint we won't be able to use that.*