

# Choose the Right Hardware

## Proposal Template

### 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

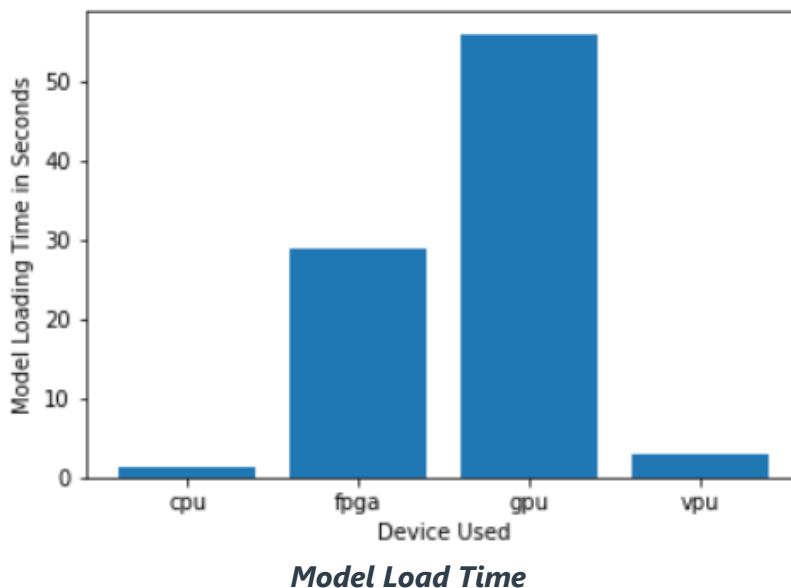
Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
Client has noticed a dropdown in Production, but workers are working 24 hours in shifts. So, the Client wants a system to monitor the number of people in the factory line.	FPGA's are designed for 100% uptime performance. They can function for 365*24*7 hours. (Can be affected due to external factors)
Client has also encountered that a significant percentage of the semiconductor chips being packaged for shipping have flaws. These are not detected until the chips are used by clients. Client wants to detect these flaws prior to packaging.	FPGA's can be reprogrammed on the field, which can improve inferences. FPGA's can perform very accurately in high loads and can be used, as this requirement requires high performance as well as accuracy.
Client has multiple chip designs—and new designs are created regularly—the system would also need to be flexible so that it can be reprogrammed and optimized to quickly detect flaws in different chip designs.	FPGA's can be used as accelerators for speeding the inference and detecting the flaws quickly regardless of multiple chip designs. FPGA's are flexible and can be programmed on field as needed.
Client wants the system to last at least for 5-10 years.	FPGA's can last for very long period (10-12 years) if not damaged by external factors.

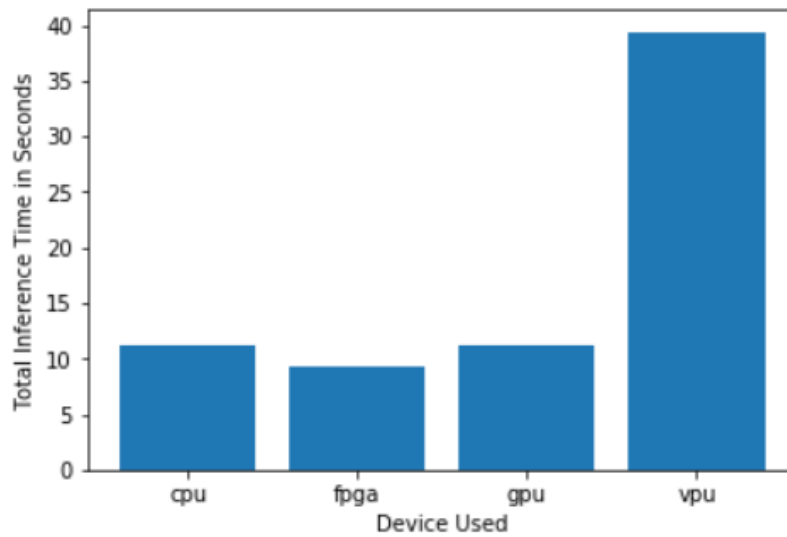
## Queue Monitoring Requirements

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

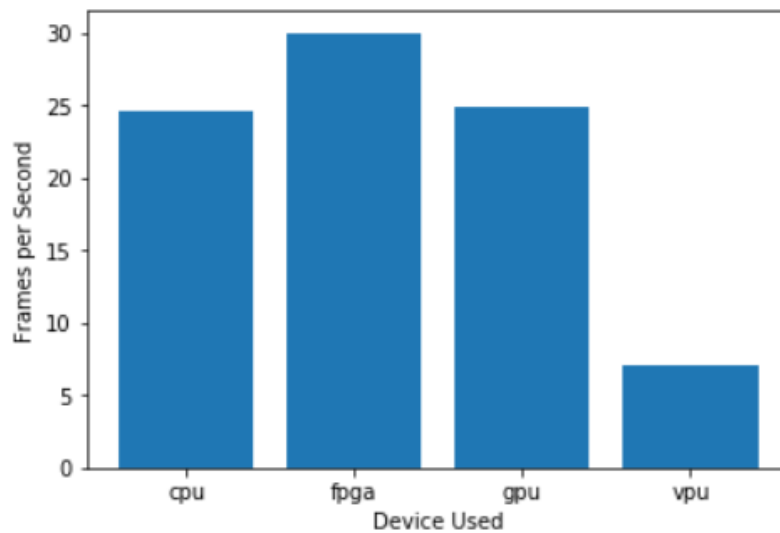
## Test Results

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).





***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

By seeing the Graphs, we can derive the following results:

- Client requires 30-35 FPS which is easily achieved using FPGA
- FPGA can be reprogrammed on the field according to client's requirements
- FPGA last longer 10-12 years if not affected by external factors
- FPGA can be used to detect People as well as for identifying Flaws in Chips

Hence as FPGA satisfies all the Client conditions, they are a good choice for this use-case/scenario.

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## 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

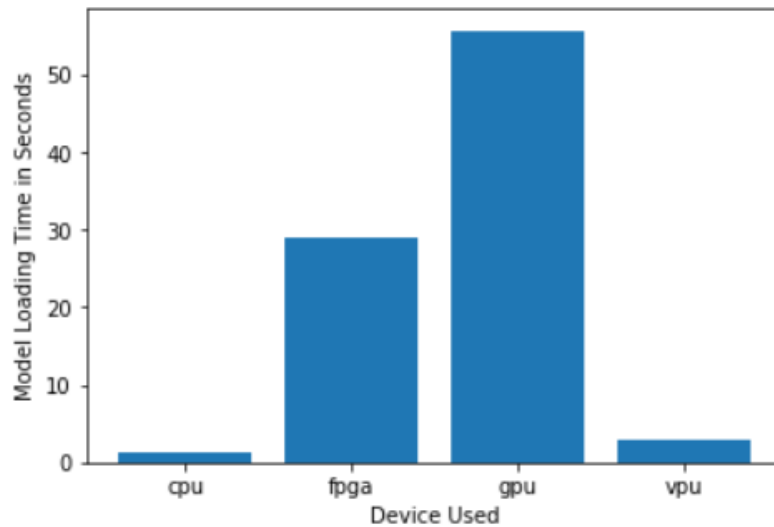
Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
Client wants Edge AI System to monitor and direct people to less-congested queues for faster checkouts.	CPU can be used in this case as it can handle the processing well without extra investment.
Client already has Intel i7 core processors and wants to use these as they are used to carry out minimal tasks that are not computationally expensive.	Client already has Intel i7 core processor on Checkout Counters.
Client does not want to invest extra money in Hardware and wants to save as much as possible on Electricity bills.	As not extra investment is needed and also CPU takes less power compared to GPU, so this will be helpful in saving electricity costs.

### Queue Monitoring Requirements

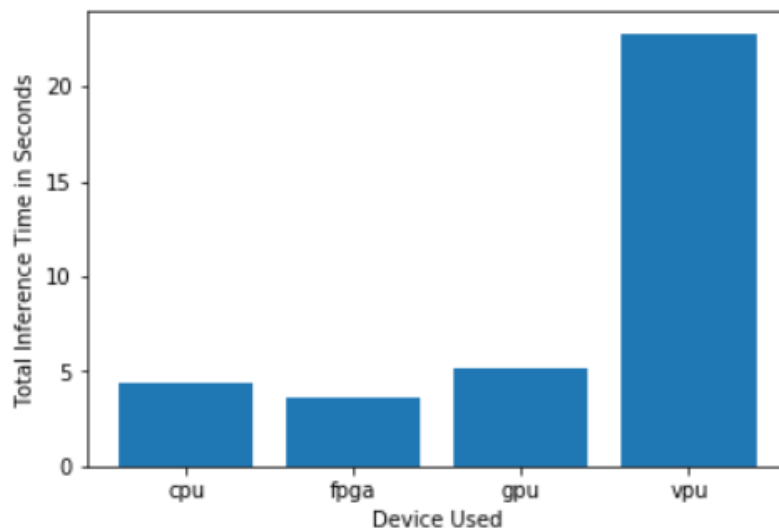
Maximum number of people in the queue	2 (normal) – 5 (rush/peak hours)
Model precision chosen (FP32, FP16, or Int8)	FP32

### Test Results

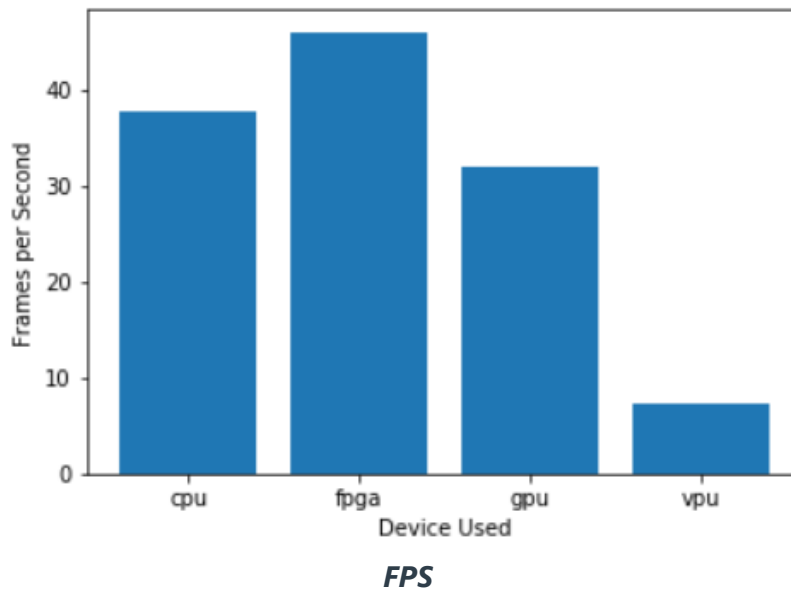
After you've tested your application on all four hardware types (CPU, IGPU, VPU, and FPGA), copy the matplotlib output showing the comparison into the spaces below. You should have three graphs (for model load time, inference time, and FPS).



***Model Load Time***



***Inference Time***



## 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

The Client did not want to invest on Hardware and had Intel i7 core processors which can be used in this scenario. From the results we can see that CPU has lowest Model Loading time and a very good FPS Performance compared to GPU. This will also help the Client to save Electricity costs. Hence CPU is a good option for this scenario.

## 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?
Client wants to automate monitoring the queues in real-time and quickly direct the crowd in the right manner using an Edge AI system.	A VPU or NCS 2 stick can be used which comes as simple as Plug and Play and satisfies required performance in this scenario.
Client's budget is maximum of \$300 per machine	VPU or NCS 2 stick costs around 100\$ which is very less compared to other hardware.
Client wants to save as much as possible both on hardware and future power requirements.	VPU or NCS 2 sticks are not costly and are designed to run on low power. NCS 2 sticks can run on only 1W of power.

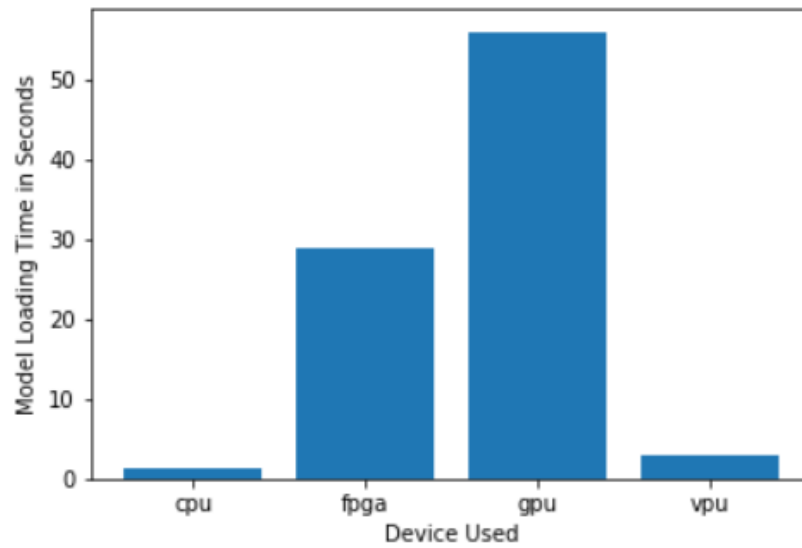
### Queue Monitoring Requirements

Maximum number of people in the queue	7 (normal) – 15 (peak/rush hours)
Model precision chosen (FP32, FP16, or Int8)	FP32

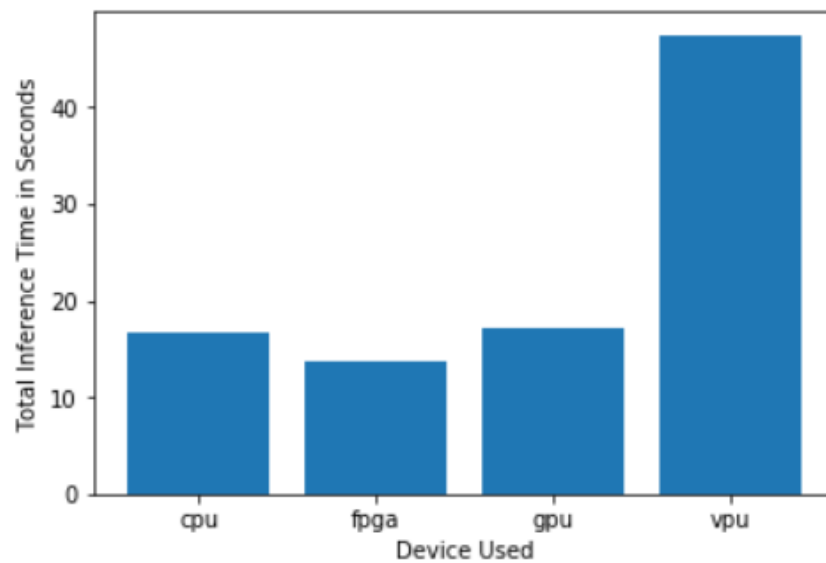
### Test Results



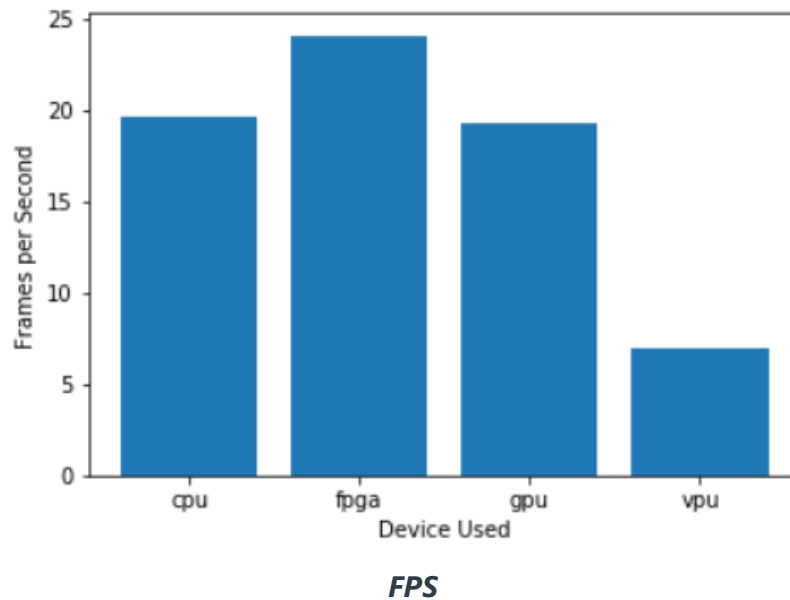
After you've tested your application on all four hardware types (CPU, IGPU, VPU, and FPGA), copy the matplotlib output showing the comparison into the spaces below. You should have three graphs (for model load time, inference time, and FPS).



***Model Load Time***



***Inference Time***



## 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

For this scenario VPU or NCS 2 stick will be recommended as Client do not want to invest more than 300\$ per machine and wants to save power costs.  
CPU can also be recommended as VPU has low FPS and performance but using CPU might get Client's budget little higher than expected.  
Hence VPU or NCS 2 stick is good for this scenario/user-case.