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CMRIT

## Internal Assessment Test 3 – April 2023

| Sub: | Internet of Things | | | | | Sub Code: | 18CS81 | Branch: | ISE | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Date: | 13/04/2023 | Duration: | 90 mins | Max Marks: | 50 | Version/ Sem / Sec: | B/VIII/A,B,C | | | OBE | |

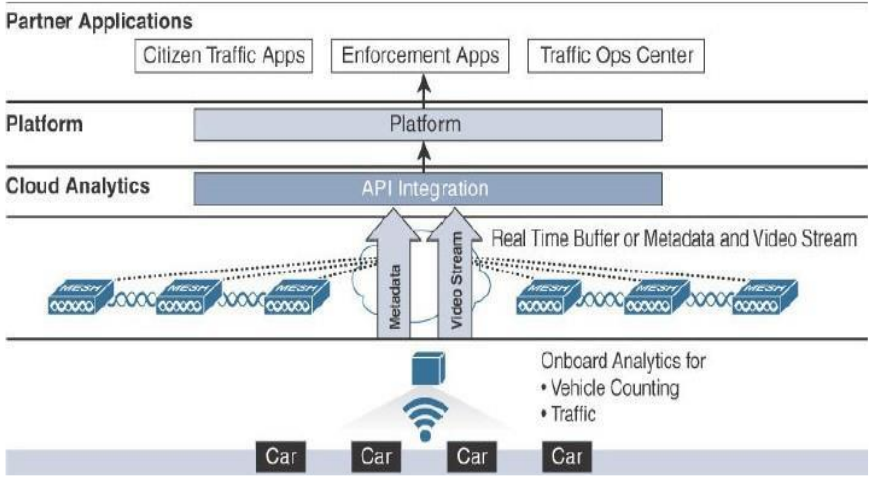| | Answer any FIVE FULL Questions | MARKS | CO | RBT |
|---|---|---|---|---|
| 1 | Explain Smart City Traffic control architecture | [10] | CO5 | L2 |
| 2 | Discuss Hadoop Eco-System-Lambda architecture. | [10] | CO4 | L2 |
| 3 | Develop a python program which monitors a temperature of an engine using DS18B20 Sensor and Raspberry Pi | [10] | CO5 | L3 |
| 4 | With a case study relate the concept of securing IOT. | [10] | CO4 | L3 |
| 5 (a) | Discuss the following: a). Supervised Learning b) Unsupervised Learning | [03] | CO4 | L2 |
| (b) | With a neat Diagram, explain wireless temperature monitoring system using Raspberry Pi | [07] | CO | L2 |
| 6 (a) | Explain different components of flexible Net Flow Architecture (FNF) | [8] | CO4 | L2 |
| (b) | Define function with respect to Arduino Programming | [02] | CO4 | L1 |

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| | | MARKS | CO | RBT |
|--|--|-------|----|-----|
| 1. | **Smart City Traffic control architecture**<br><br>•      In the architecture shown in Figure, a video analytics sensor computes traffic events based on a video feed and only pushes events (the car count, or metadata, not the individual images) through the network.<br><br>•      These events go through the architectural layers and reach the applications that can drive traffic services.<br><br>•      These services include traffic light coordination and also license plate identification for toll roads.<br><br>•      Some sensors can also recognize abnormal patterns, such as vehicles moving in the wrong direction or a reserved lane. In that case, the video feed itself may be uploaded to traffic enforcement agencies<br><br><br><br>•      Other types of sensors that are part of traffic control solutions include Bluetooth vehicle counters, real-time speed and vehicle counters, and lighting control systems.<br><br>•      These sensors provide a real-time perspective while also offering data collection services for historical data trending and correlation purposes | [10] | CO5 | L2 |
| 2. | Hadoop Eco-System-Lambda architecture.<br>Ultimately the key elements of a data infrastructure to support many IoT use cases involves the collection, processing, and storage of data using multiple technologies. Querying both data in motion (streaming) and data at rest (batch processing) requires a combination of the Hadoop ecosystem projects discussed<br>The Lambda Architecture is not limited to the packages in the Hadoop ecosystem, but due to its breadth and flexibility, many of the packages in the ecosystem fill the requirements of each layer nicely: | [10] | CO4 | L2 |

• **Stream layer:** This layer is responsible for near-real-time processing of events. Technologies such as Spark Streaming, Storm, or Flink are used to quickly ingest, process, and analyze data on this layer. Alerting and automated actions can be triggered on events that require rapid response or could result in catastrophic outcomes if not handled immediately.

• **Batch layer:** The Batch layer consists of a batch-processing engine and data store. If an organization is using other parts of the Hadoop ecosystem for the other layers, MapReduce and HDFS can easily fit the bill. Other database technologies, such as MPPs, NoSQL, or data warehouses, can also provide what is needed by this layer.

• **Serving layer:** The Serving layer is a data store and mediator that decides which of the ingest layers to query based on the expected result or view into the data. If an aggregate or historical view is requested, it may invoke the Batch layer. If real-time analytics is needed, it may invoke the Stream layer. The Serving layer is often used by the data consumers to access both layers simultaneously.
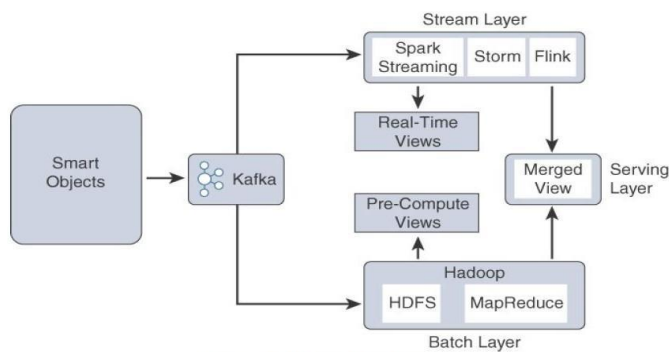
**Figure 7-11** *Lambda Architecture*

| 3. | Python program which monitors a temperature of an engine using DS18B20 Sensor and Raspberry Pi | [10] | CO5 | L3 |
|----|---|---|---|---|

Getting Started

Configuring the Raspberry Pi

Install the Python Library

Enable the Interface

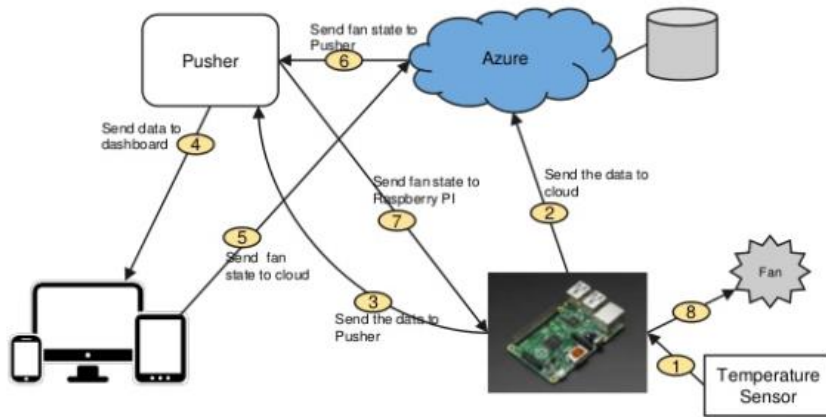Writing the Python Code

Importing the libraries

**Code:**
```
import time
Sensor
sensor = W1ThermSensor()
while True:
print("The temperature is %s celsius" % temperature)
time.sleep(1)
```

| 4 | Case study relate the concept of securing IOT.<br><br>Common Challenges in OT Security<br>**Erosion of Network Architecture**<br>Pervasive Legacy Systems<br><br>Insecure Operational Protocols<br><br>Device Insecurity<br><br><br>OT Network Characteristics Impacting Security<br><br>Security Priorities: Integrity, Availability, and Confidentiality<br><br>Security Focus<br><br><br>Formal Risk Analysis Structures: OCTAVE and FAIR<br><br><br>The Phased Application of Security in an Operational Environment<br><br>Secured Network Infrastructure and Assets<br><br>Deploying Dedicated Security Appliances<br><br>Higher-Order Policy Convergence and Network Monitoring | [10] | CO4 | L3 |
|---|---|---|---|---|
| 5 (a) | Discuss the following:<br>a) Supervised Learning   b) Unsupervised Learning<br><br>   a)   Supervised Learning:<br>In supervised learning, the machine is trained with input for which there is a known correct answer. For example, suppose that you are training a system to recognize when there is a human in a mine tunnel.<br><br>   b) Unsupervised Learning<br><br>There will occasionally be an engine in the group that displays unusual characteristics. This is the engine that you send for manual evaluation. The computing process associated with this determination is called unsupervised learning. This type of learning is unsupervised because there is not a "good" or "bad" answer known in advance. | [03] | CO4 | L2 |
| (b) | Wireless temperature monitoring system using Raspberry Pi | [07] | CO5 | L2 |

## What is a DS18B20?
- Waterproof temperature probe precise to ±0.5°C



- VCC (3V – 5V): Red
- GND: Black/Grey/Blue
- Data: Yellow/White
- Requires 4.7k or 10k ohm resistor between VCC and Data

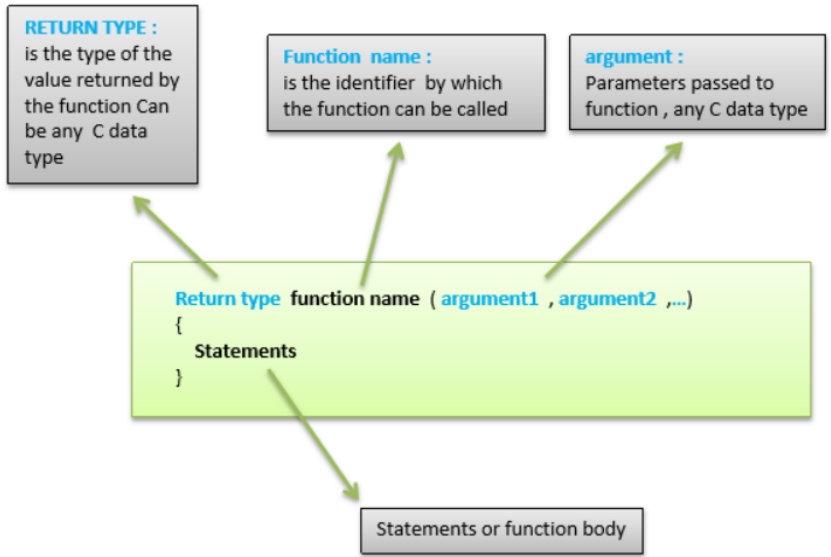| | | [8] | CO4 | L2 |
|---|---|---|---|---|
| 6 a | FNF is a flow technology developed by Cisco Systems that is widely deployed all over the world. Key advantages of FNF are as follows:<br>■ Flexibility, scalability, and aggregation of flow data<br>■ Ability to monitor a wide range of packet information and produce new information about network behavior<br>■ Enhanced network anomaly and security detection<br>■ User-configurable flow information for performing customized traffic identification and ability to focus and monitor specific network behavior<br>■ Convergence of multiple accounting technologies into one accounting mechanism | | | |

First packet of a flow will create the Flow entry using the Key Fields
Remaining packets of this flow will only update statistics (bytes, counters, timestamps)
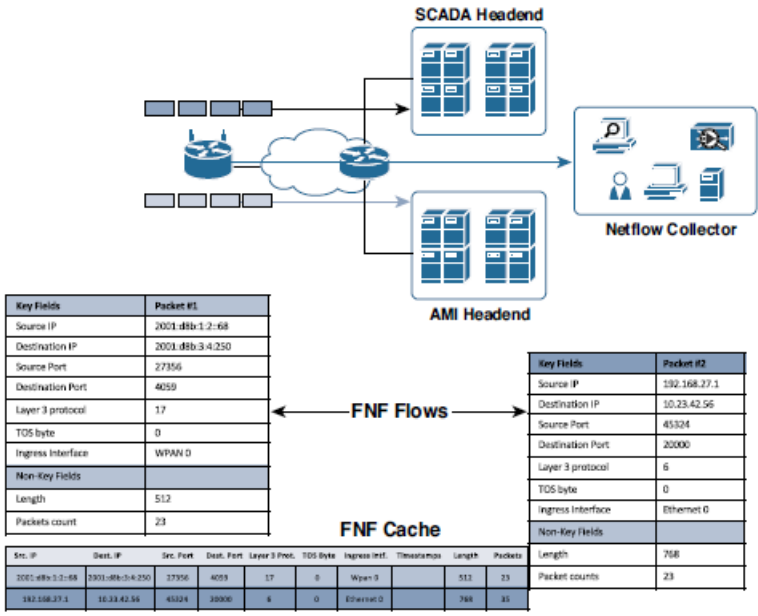


| 6 b | Function with respect to Arduino Programming | [2] | CO4 | L2 |

- Functions help the programmer stay organized. Often this helps to conceptualize the program.
- Functions codify one action in one place so that the function only has to be thought about and debugged once.
- This also reduces chances for errors in modification, if the code needs to be changed.
- Functions make the whole sketch smaller and more compact because sections of code are reused many times.
- They make it easier to reuse code in other programs by making it modular, and using functions often makes the code more readable.