

# Lesson 6

## **Case Study: Customer monitoring in IoT Applications/Services Project**

# Tracking Of Customers Carrying Internet Connected Digital Devices' (TCCICDD) Project

- Tracking using customer's Internet connected mobile apps and wearable digital devices, customer databases, customer-end embedded devices and sensors.
- Information from customer feedbacks
- Sale services
- Maintenance centres

# TCCICDD

- Enable creation of innovative products
- Intelligent infrastructure
- Enhancing the operational efficiencies
- Craft provisioning of new customer experiences
- Offer unique services to their customers
- Creation of information for controlling supply chain and boosting sales

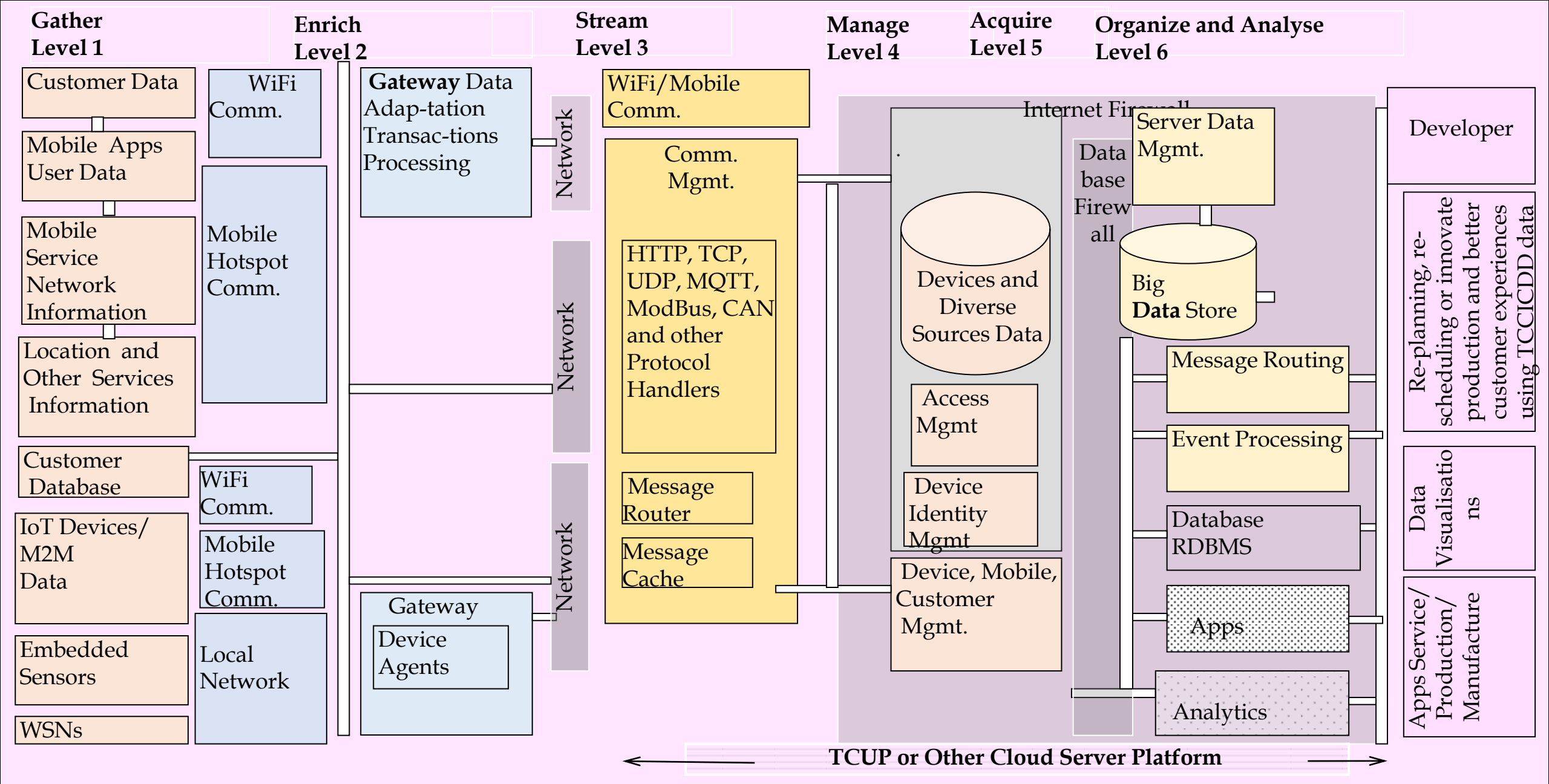


Fig. 12.4 Data flow diagram and architecture for information, customers' data, IoT/M2M devices and sensors driven using the TCUP or other Cloud Server for PaaS for the Developers and IoT applications/Services

# TCCICDD

- Messages include customer ID, location and time stamps
- Contents as devices database
- Database deploys the time series information
- Customer feedbacks
- Sale services and maintenance centres.

# TCCICDD

- Communication gateway
- Communication between the customer data, customer database and device messages and a connected universe or other PaaS

# Abstraction of TCCICDD Design and Implementation

- The sensors put at the places of customer's visits, such as malls and company sales centres.
- Sensors and devices data
- Customer data
- Abstracted as devices messages, events, alerts and triggers

# Design Steps

1. Abstraction
2. Reference Model
3. Identifying Requirements of Device and Gateway Domain
4. Identifying Requirements of Network Sub-domain



# Design Steps

5. Design Implementation of Device and Gateway

Domain Hardware and Software

6. Design Implementation of Application and Network

Domain Software

7. Testing and Validation

# Oracle IoT Architecture Reference Model for TCCICDD Design and Implementation

- Layer 1 (Gather): Wearable and other devices, connected devices, *customer data, customer change of locations*, product health, preferences and usages of the product and feedbacks
- Layer 2 (Gateway): The software at embedded devices, sensors at malls and other public places also
- gather and send the data to gateway.

# Oracle IoT Architecture Reference Model for TCCICDD Design and Implementation

- Layer 3 (Manage): Communication management functions accesses and performs the ID management, data and messages routing and caching functions.
- Layer 4 (Acquire and Organise at server or cloud): Devices and diverse sources data store acquiring the data, data route. Data organise as Big Data store and database RDBMS

# Oracle IoT Architecture Reference Model for TCCICDD Design and Implementation

- Layer 5 (Analyse + Intelligence): Applications perform analytics and data visualisation
- and extract intelligence
- Layer 6 (Enterprise Integration, Complex Applications Integration and SoA)

# Identifying Requirements for TCCICDD

- Layer 1 (Gather): The applications and services installs at the mobile and wearable devices embed hardware and software for gathering the customer data
- An embedded device gathers the customer for acquiring at server database
- The embedded sensors and device hardware and software gather the data and communicate that to the gateway

# Identifying Requirements for TCCICDD

- Layer 2 (Enrich and Stream): Gateway software
- Process and access the data of layer 1
- Enrich the data by generating time series and location stamped data
- Adapt the data for sending that to the network
- Network card or shield streams to the server using network protocols.

# Identifying Requirements for TCCICDD

- Layer 3 (Manage): Communication management functions
- Accesses and IDs management
- Customer data and messages routing and caching

# Identifying Requirements for TCCICDD

- Layer 4 (Acquire and Organise): Server data storing and acquiring the devices and Diverse Sources and customer events and data



# Identifying Requirements for TCCICDD

- Layer 5 (Analyse and Intelligence) Data organise as big data store and database RDBMS.
- Data analyse using the event processing, message routing, and analytics
- Applications perform analytics and data visualisation, and extract intelligence

# Identifying Requirements for TCCICDD

- Layer 6 (Enterprise Integration, Complex Applications Integration and SoA)
- Service, production and manufacturing, re-planning, re-scheduling or innovating the production and providing better customer experiences using TCCICDD data.

# Layer 1 Gather

- Sensors/devices needs Arduino and Raspberry Pi like computing power depending on the sensor
- Internet connected smart phones for weather and location services using the APIs for web applications
- A mobile app tracks the location data of the customer

# TCUP or other Paa

- PaaS for communication management.
- Data store, database
- Events and streams processing
- OLTP and OLAP software
- Database functions
- Event analytics,
- Analytics and data visualisation
- ,Extract intelligence for service, production and
- manufacturing, re-planning, re-scheduling or innovating the production.

# TCUP or other PaaS

- Analytics and data visualisation
- Extract intelligence for service
- Production
- Manufacturing
- Re-planning
- Re-scheduling
- Innovating the production

# Summary

## We learnt

- An architecture based on Oracle reference model is used for TCCICDD.
- A customer monitoring system TCCICDD uses mobile apps, embedded sensors/devices, gateway, network, server and applications.

# Summary

## We learnt

- Applications for data visualisation and service, production or manufacture re-planning, re-scheduling or innovate the production and provide better customer experiences using TCCICDD data
- The project uses TCUP or other server platform for communication management, data store and database.

# Summary

## We learnt

- Event processing and OLTP software, database functions and event analytics for the development of applications for the company using TCCICDD data



End of Lesson 6 on  
**Case Study: Customer monitoring in IoT  
Applications/Services Project**