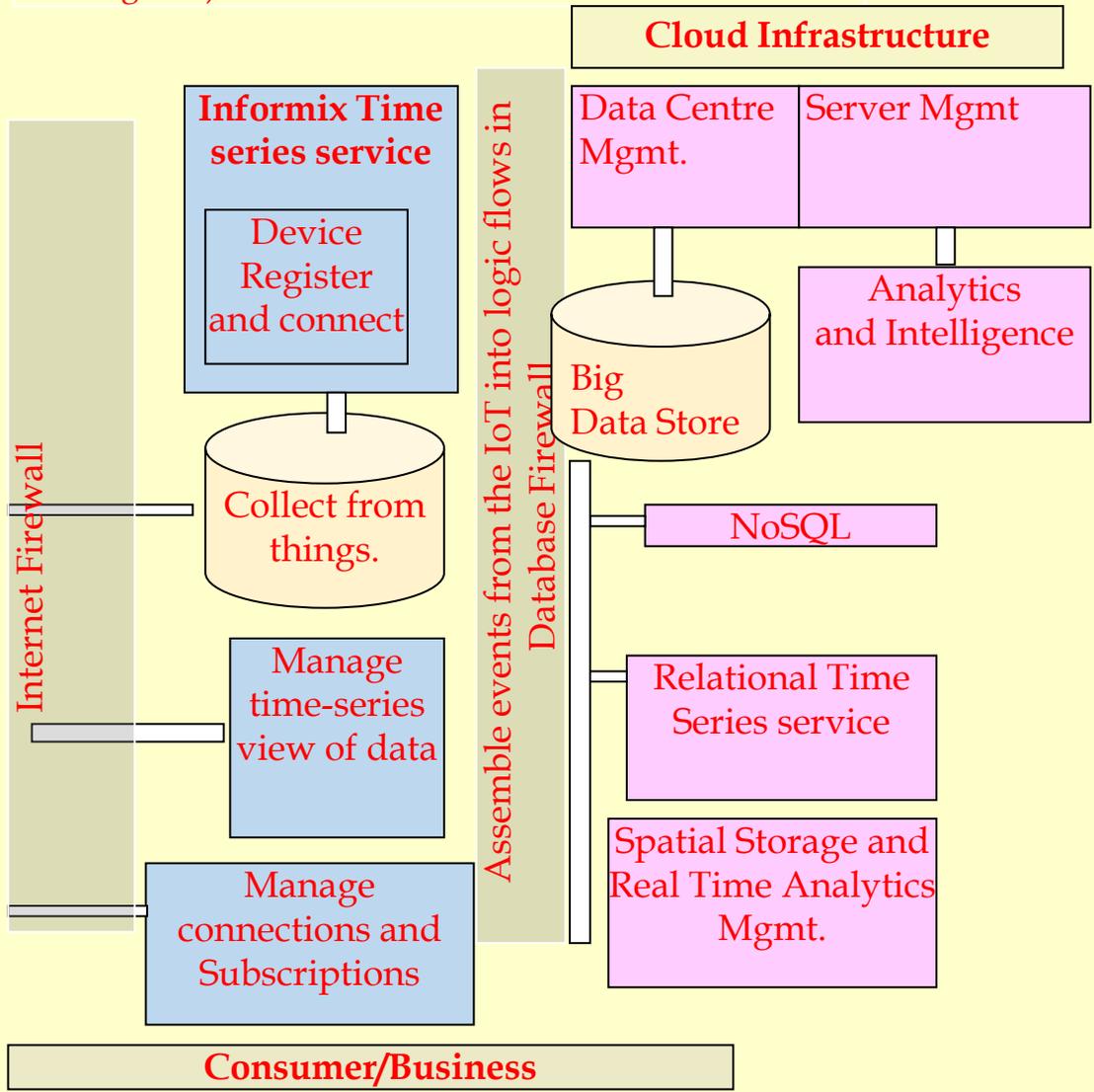


## Lesson 2

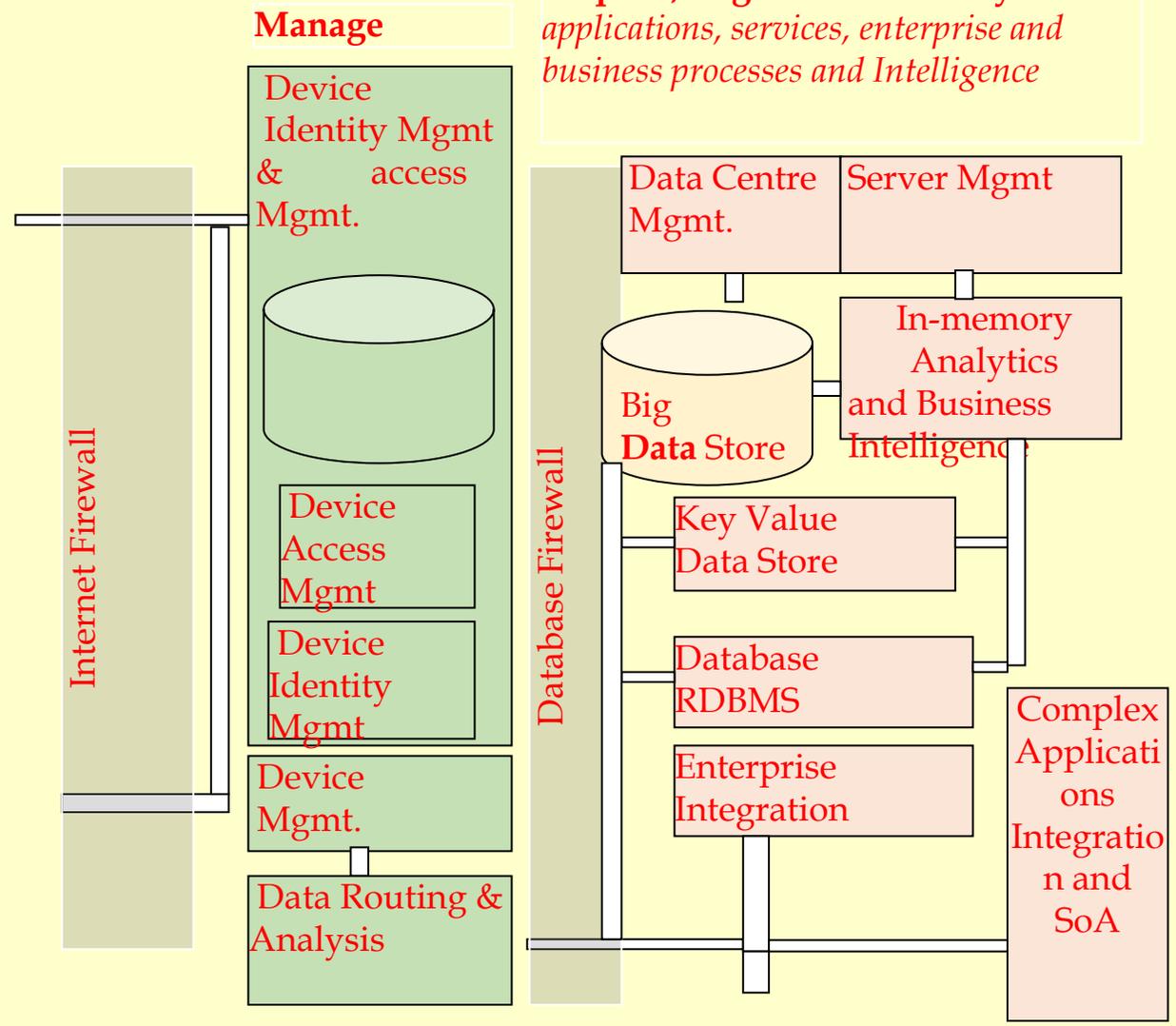
# Data Acquiring and Storing Functions for IoT/M2M Devices Data and Messages

**(Collect + Assemble + Manage) for analytics and Intelligence)**



(a)

**Acquire, Organize and Analyse applications, services, enterprise and business processes and Intelligence**



SoA: Service Oriented Architecture

(b)

Fig. 5.1 (a) Connect + Collect + Assemble +Manage IBM conceptual framework (b) Manage, Acquire, Organise and Analyse Oracle's framework in the IoT Architecture

# Data Generation

- IoT/M2M devices data
- Events data
- Real time data generation
- Analytics, Intelligence and Processes

# Passive Devices Data

- Data generates at the device or system
- Data following the result of interactions
- A passive device does not have own power source
- An external source makes that device to send data
- RFID or an ATM debit card

# Passive Device

- A contactless card have or may not have an associated microcontroller, Memory and transceiver
- Level or barcode not have an associated microcontroller

# Active Devices Data

- Data generates at the device or system
- Data following the result of interactions
- Active device own power source
- Examples: Active RFIDs, streetlight sensor, wireless sensor node.
- Active device associated microcontroller, memory and transceiver.

# Event Data from Device

- Generating data on an event once only
- Detection of the traffic or on dark ambient conditions, that signals an event. Then event communicates a need for the lighting up a group of streetlights.

# Event Data from Device

- A system consisting of security cameras generating data on an event of security breach or on intrusion detection
- A waste container with associate circuit generating data in the event of getting it 90% or above filled up.

# Event Data from Device

- The components and devices in an automobile generate data of their performance and functioning, and communicate to Internet as and when the automobile reaches near a Wi-Fi access point

# Example of **Event Driven device Data**

- A device receives command from Controller and Monitor, and
- Then performs actions using an actuator.
- When the action completes, then device sends an acknowledgement.

# Example of Event driven Data

- An Application seeks status of a device, then the device communicating the status

# Device Real Time Data:

- An ATM generating data and communicates to Server instantaneously through Internet
- Then initiating and enabling Online Transactions Processing (OLTP) in real time.

# Data Acquisition

- Data acquisition means acquiring the data from IOT/M2M devices
- The data communicate after the interactions with a Data acquisition system (Application)

# Data Acquisition

- The Application interacts and communicates with number of devices for acquiring the needed data
- The devices send data on demand or at the programmed intervals
- Data of devices communicate using the network, transport and security layers.

# Device management software

- Provisioning for the device ID or address, activation,
- Configuring (managing device parameters and settings),
- Registering, deregistering,
- Attaching, detaching.

# Data Validation

- Data needs validation checks
- Data validation software do the validation checks
- Validation software applies logic, rules and semantic annotations.

# Data Validation

- Must as the Applications/services/Processes depend on valid data
- Then only the analytics, predictions/ prescriptions/ diagnosis/decisions acceptable

# Data Store

- Database
- Relational database
- Flat file
- Spreadsheet
- Mail server
- Web server

# Data Store

- The acquired data stores in the databases at a server

# Data Storage Three Categories

1. On-line or real time or streaming data needing the processing, and only the results of processing and analysis need storage

# Data Storage Three Categories

2. Data called once, only the results of processing at a later time and of analysis store,

# Data Storage Three Categories

3. Data needing repeated calls store for reference or audit in future.,

# Data Store

- VMware at one node or distributed multiple nodes
- A **Data Store** is a data repository of a set of objects which integrate into the Store.

# Data Store Features

- Objects in a Data Store model using Classes which the **database schemas** define.
- Data Store may be distributed over multiple nodes, (Apache Cassandra is example of distributed Data Store.)

# Data Store

- A Data Store may consist of multiple schemas or may consist of data in only one scheme. (Example of only one scheme Data Store is relational database.)

# Data Store at Server

- For short reaction times, Optimised performance and high security

# Data Centre Data Store

- Data security and protection using the advanced tools, full data backups along with data recovery, redundant data communication connections and full system power

# Data Store Management

- Data Store requires Data Centre management or Server management.

# Spatial storage

- Spatial database optimised to store, enables querying the data objects defined in a geometric space, and which is a database for 2D and 3D objects

# Spatial storage

- Topological coverage, linear networks, triangular irregular networks or other complex structures.

# Summary

We learnt

- Data of Passive and Active Devices
- Events generated data
- Real time Data
- Data Acquisition
- Data Validation
- Data Store

End of Lesson 2 on  
Data Acquiring and Storing Functions for IoT/M2M  
Devices Data and Messages