Internet of things: A hands on approach by Bagha and madisetti

Chapter 1

1. What is the definition of IoT?

   a) A network of connected physical things only.

   b) An infrastructure with self-configuring devices.

   c) A network of virtual personalities.

   d) An isolated communication protocol.

   Answer: b) An infrastructure with self-configuring devices.

2. Which of the following is a characteristic of IoT devices?

   a) Static and unchanging behavior.

   b) Incompatibility with other devices.

   c) Self-configuring capability.

   d) Limited adaptation to changing contexts.

   Answer: c) Self-configuring capability.

3. What is a key feature of IoT communication protocols?

   a) Proprietary and closed communication standards.

   b) Inability to communicate with other devices.

   c) Support for interoperable communication protocols.

   d) Limited communication with the infrastructure.

   Answer: c) Support for interoperable communication protocols.

4. What is the role of a unique identity in IoT devices?

   a) It allows for anonymity in the network.

b) It serves as a password for device access.

c) It provides a distinct identifier for each device.

d) It hinders communication with users and the environment.

Answer: c) It provides a distinct identifier for each device.

5. How are IoT devices typically integrated into the network?

a) They operate in isolation without network connectivity.

b) They have their own separate communication networks.

c) They are usually integrated into the information network.

d) They rely on human intervention for data exchange.

Answer: c) They are usually integrated into the information network.

6. What are the primary functions of IoT devices?

A) Remote sensing and actuating

B) Data analytics and cloud storage

C) Audio and video streaming

D) Internet browsing and gaming

Correct Answer: A) Remote sensing and actuating

7. Which of the following is not considered an interface connection for IoT devices?

A) IoT interfaces for sensors

B) Memory and storage interfaces

C) Social media interfaces

D) Interfaces for internet connectivity

Correct Answer: C) Social media interfaces

8. What types of data can IoT devices collect from onboard or attached sensors?

A) Temperature and humidity

B) Social media posts

C) Stock market data

D) Video game scores

Correct Answer: A) Temperature and humidity

9. Which of the following is an example of an IoT device?

A) Toaster

B) Smartphone

C) Light bulb

D) Microwave

Correct Answer: C) Light bulb

10. What is the primary goal of processing data collected by IoT devices?

A) Entertainment

B) Generating useful information for further actions

C) Hiding data from external sources

D) Increasing device power consumption

Correct Answer: B) Generating useful information for further actions

11. Which layer of the IoT protocol stack is responsible for determining how data is physically sent over the network's physical layer?

A) Network Layer

B) Link Layer

C) Transport Layer

D) Application Layer

Correct Answer: B) Link Layer

12. What is the primary role of the 802.3 Ethernet standards in IoT?

A) Defining wireless communication standards

B) Specifying low-power device protocols

C) Providing wired Ethernet standards for the link layer

D) Establishing global IoT connectivity standards

Correct Answer: C) Providing wired Ethernet standards for the link layer

13. Which IoT protocol is associated with wireless local area network (WLAN) communication standards?

A) 802.3 Ethernet

B) 802.16 WiMAX

C) 802.15.4 LR-WPAN

D) 802.11 Wi-Fi

Correct Answer: D) 802.11 Wi-Fi

14. What is the primary purpose of IPv6 in IoT?

A) Identifying devices on a network using a 32-bit address scheme

B) Ensuring reliable data transmission using a connectionless protocol

C) Supporting low-power devices with limited processing capability

D) Providing a larger address space for an increasing number of devices

Correct Answer: D) Providing a larger address space for an increasing number of devices

15. Which transport layer protocol is connection-oriented and ensures reliable packet transmission?

A) UDP

B) HTTP

C) CoAP

D) TCP

Correct Answer: D) TCP

16. CoAP is an application layer protocol designed for:

A) Real-time communication and streaming XML data

B) Websocket communication between clients and servers

C) Machine-to-machine applications in constrained environments

D) Publishing and subscribing to topics on a server

Correct Answer: C) Machine-to-machine applications in constrained environments

17. Which IoT protocol allows full-duplex communication over a single socket connection?

A) HTTP

B) MQTT

C) Websocket

D) AMQP

Correct Answer: C) Websocket

18. MQTT is a lightweight message protocol that is well-suited for which type of environments?

A) High-power and high-speed environments

B) Low-power and constrained environments

C) Real-time communication environments

D) Peer-to-peer communication environments

Correct Answer: B) Low-power and constrained environments

19. What does DDS (Data Distribution Service) use to facilitate device-to-device machine-to-machine communication?

A) Publish-subscribe model

B) Point-to-point communication

C) Real-time voice calls

D) XML data streams

Correct Answer: A) Publish-subscribe model

20. AMQP (Advanced Message Queuing Protocol) supports which models of messaging?

A) Publish-subscribe only

B) Point-to-point only

C) Both publish-subscribe and point-to-point

D) Streaming data exchange only

Correct Answer: C) Both publish-subscribe and point-to-point

21. What is the primary purpose of the logical design of an IoT system?

A) Detailed implementation specifications

B) Abstract representation of entities and processes

C) Low-level hardware configuration

D) Hardware and software integration

Correct Answer: B) Abstract representation of entities and processes

22. Which of the following is NOT a functional block in an IoT system?

A) Devices

B) Communication

C) Hardware

D) Management

Correct Answer: C) Hardware

23. In the IoT communication model, which communication model involves Publishers, Brokers, and Consumers?

A) Request-response

B) Publish-Subscribe

C) Push-Pull

D) Exclusive Pair

Correct Answer: B) Publish-Subscribe

24. Which communication model in IoT involves data producers pushing data to queues, and consumers pulling data from the queues?

A) Request-response

B) Publish-Subscribe

C) Push-Pull

D) Exclusive Pair

Correct Answer: C) Push-Pull

25. What is the primary characteristic of the Request-Response communication model?

A) Full-duplex communication

B) Stateful communication

C) Stateless communication

D) Data is pushed to queues

Correct Answer: C) Stateless communication

26. What API design is based on architectural principles focusing on system resources and their representations?

A) REST-based communication API

B) WebSocket-based communication API

C) MQTT-based communication API

D) HTTP-based communication API

Correct Answer: A) REST-based communication API

27. In the REST architectural constraints, what does the "Stateless" constraint require?

A) The server should not be concerned with the user interface.

B) Each request must contain all necessary information.

C) Resources are identified separately from their representations.

D) Resources should be labeled as cacheable or non-cacheable.

Correct Answer: B) Each request must contain all necessary information.

28. Which API allows full-duplex, bi-directional communication between the client and the server without the need for a new connection setup for each message?

A) REST-based communication API

B) WebSocket-based communication API

C) MQTT-based communication API

D) CoAP-based communication API

Correct Answer: B) WebSocket-based communication API

29. How does the WebSocket API reduce network traffic and latency?

A) It uses a request-response model.

B) It relies on exclusive pairs for communication.

C) It eliminates the need for connection setup for each message.

D) It uses a stateless communication model.

Correct Answer: C) It eliminates the need for connection setup for each message.

30. What is the primary role of the "Code on Demand" constraint in the REST architectural principles?

A) It allows for executable code scripts to be provided by services.

B) It enforces strict separation of concerns between client and server.

C) It requires that resources are labeled as cacheable or non-cacheable.

D) It facilitates full-duplex communication between clients and servers.

Correct Answer: A) It allows for executable code scripts to be provided by services.

31. Which of the following is NOT considered an enabling technology for IoT?

A) Wireless Sensor Networks

B) Blockchain

C) Cloud Computing

D) Big Data Analytics

Correct Answer: B) Blockchain

32. What is the primary purpose of wireless sensor networks in IoT?

A) Data analytics and processing

B) Real-time communication between devices

C) Monitoring environmental and physical conditions

D) Managing cloud resources

Correct Answer: C) Monitoring environmental and physical conditions

33. In cloud computing, what does "IaaS" stand for?

A) Internet as a Service

B) Infrastructure as a Service

C) Information as a Service

D) Integration as a Service

Correct Answer: B) Infrastructure as a Service

34. Which cloud computing service model allows users to develop and deploy applications in the cloud?

A) IaaS (Infrastructure as a Service)

B) PaaS (Platform as a Service)

C) SaaS (Software as a Service)

D) XaaS (Anything as a Service)

Correct Answer: B) PaaS (Platform as a Service)

35. What is the primary challenge associated with big data in IoT systems?

A) Low data volume

B) Slow data velocity

C) Limited data variety

D) Managing and analyzing large volumes of data

Correct Answer: D) Managing and analyzing large volumes of data

36. What characteristic of big data refers to the speed at which data is generated and how frequently it varies?

A) Volume

B) Velocity

C) Variety

D) Value

Correct Answer: B) Velocity

37. In the context of big data analytics, what does "data munging" refer to?

A) Data cleaning and preparation

B) Real-time data analysis

C) Data visualization

D) Data storage and retrieval

Correct Answer: A) Data cleaning and preparation

38. Which IoT application example involves monitoring the health of structures by reading vibration data from sensor nodes?

A) Indoor air quality monitoring

B) Smart grid monitoring

C) Structural health monitoring

D) Weather monitoring

Correct Answer: C) Structural health monitoring

39. In IoT, what does the "variety" of big data refer to?

A) The volume of data generated

B) The speed at which data is generated

C) The forms of data, including structured and unstructured

D) The cost of data storage and processing

Correct Answer: C) The forms of data, including structured and unstructured

40. Which cloud computing service model provides complete software applications to users through a thin client interface?

A) IaaS (Infrastructure as a Service)

B) PaaS (Platform as a Service)

C) SaaS (Software as a Service)

D) XaaS (Anything as a Service)

Correct Answer: C) SaaS (Software as a Service)

41. What is the primary function of communication protocols in an IoT system?

A) Device hardware management

B) Defining device-specific tasks

C) Enabling network connectivity and data exchange

D) Managing embedded software

Correct Answer: C) Enabling network connectivity and data exchange

42. Which of the following is NOT a characteristic of embedded systems in IoT?

A) General-purpose computing capabilities

B) Designed for specific tasks

C) Inclusion of microprocessors and memory

D) Can have specialist processors like DSP

Correct Answer: A) General-purpose computing capabilities

43. Which component in an IoT system is responsible for accessing and storing information, controlling actuators, and enabling network access for the device?

A) Resources

B) Database

C) Controller Service

D) Web Service

Correct Answer: A) Resources

44. In IoT, what does the "controller service" do on the device?

A) Stores data in the cloud

B) Interacts with web services

C) Controls device hardware

D) Provides database access

Correct Answer: B) Interacts with web services

45. Which component in an IoT system is responsible for storing the data generated by the IoT device?

A) Device

B) Resources

C) Controller Service

D) Database

Correct Answer: D) Database

46. What is the primary role of a web service in an IoT system?

A) Controlling actuators on the device

B) Storing data in the local database

C) Serving as a link between devices, applications, and databases

D) Analyzing IoT data locally

Correct Answer: C) Serving as a link between devices, applications, and databases

47. In terms of statefulness, how do REST services and WebSocket differ?

A) Both are stateful

B) Both are stateless

C) REST is stateful, WebSocket is stateless

D) REST is stateless, WebSocket is stateful

Correct Answer: D) REST is stateless, WebSocket is stateful

48. Which communication model allows full-duplex communication between the client and server?

A) Request-response

B) Publish-Subscribe

C) Push-Pull

D) Exclusive Pair

Correct Answer: B) Publish-Subscribe

49. How does the use of REST services affect scalability in IoT systems?

A) It makes horizontal scaling easier

B) It makes vertical scaling easier

C) It doesn't impact scalability

D) It limits scalability

Correct Answer: A) It makes horizontal scaling easier

50. What is the primary role of the analysis component in an IoT system?

A) Enabling network connectivity

B) Storing IoT data

C) Generating results from IoT data

D) Controlling actuators

Correct Answer: C) Generating results from IoT data

51. What is the primary characteristic of a Level 1 IoT system?

A) Local analysis of data

B) Cloud-based application

C) Suitable for low-cost solutions

D) High computational intensity

Correct Answer: C) Suitable for low-cost solutions

52. Which IoT system level performs local analysis and stores data in the cloud?

A) Level 1

B) Level 2

C) Level 3

D) Level 4

Correct Answer: B) Level 2

53. In a Level 3 IoT system for package handling, what type of sensor is used to monitor vibration levels?

A) Light sensor

B) Temperature sensor

C) Accelerometer and gyroscope sensor

D) Humidity sensor

Correct Answer: C) Accelerometer and gyroscope sensor

54. What is the primary difference between Level 3 and Level 4 IoT systems?

A) Level 3 has local analysis, while Level 4 has cloud-based analysis.

B) Level 3 has cloud-based applications, while Level 4 has local applications.

C) Level 3 has multiple nodes, while Level 4 has a single node.

D) Level 3 performs control functions, while Level 4 only observes.

Correct Answer: D) Level 3 has multiple nodes, while Level 4 only observes.

55. In a Level 5 IoT system for forest fire detection, what does the coordinator node primarily provide?

A) Cloud-based applications

B) Internet connectivity to the IoT system

C) Local analysis of sensor data

D) Sensor data collection from the cloud

Correct Answer: B) Internet connectivity to the IoT system

56. What is the main feature of a Level 6 IoT system for weather monitoring?

A) Centralized controller for end nodes

B) Real-time cloud-based analysis

C) Independent end nodes without data sharing

D) Local data storage and analysis

Correct Answer: A) Centralized controller for end nodes

57. In which IoT system level does the analysis component analyze the data and store the results in the cloud?

A) Level 2

B) Level 3

C) Level 4

D) Level 6

Correct Answer: D) Level 6

58. Which IoT system level is most suitable for solutions where data volume is big and analysis requirements are computationally intensive?

A) Level 1

B) Level 2

C) Level 3

D) Level 5

Correct Answer: C) Level 3

59. In a Level 4 IoT system for noise monitoring, what do observer nodes primarily do?

A) Control functions

B) Local analysis

C) Real-time data collection

D) Independent data analysis

Correct Answer: B) Local analysis

60. Which IoT system level is the most suitable for modeling low-cost and low-complexity solutions?

A) Level 1

B) Level 2

C) Level 3

D) Level 4

Correct Answer: A) Level 1