

IoT simulation

January 2023

Questions

1. The IoT system functional view is made of:
 - a) data collection, processing, acting upon the world based on the outcomes and cloud component;
 - b) data collection, processing and acting upon the world based on the outcomes;
 - c) data collection and processing;
 - d) data collection, processing, acting upon the world based on the outcomes, cloud component and fog component.
2. Analytics and storage can be part of:
 - a) cloud component only;
 - b) fog component only;
 - c) cloud and fog components only;
 - d) cloud, fog and gateway components.
3. According to the Nyquist sampling theorem, the input signal must be sampled with at least:
 - a) the highest frequency that needs to be measured;
 - b) half of the highest frequency that needs to be measured;
 - c) three times the highest frequency that needs to be measured;
 - d) twice the highest frequency that needs to be measured.
4. In order to produce analog output signals, corresponding output data (numbers) are fed into:
 - a) AC/DC;
 - b) ADC;
 - c) Microprocessor;
 - d) DAC.
5. Common data plane core functions of a complete functional edge node do NOT include:
 - a) data acquisition;
 - b) transmission;
 - c) actuation;
 - d) data storage.
6. Messaging and queueing systems implementation that can be used in IoT systems include:
 - a) AMQP, IP, XMPP and MQTT;
 - b) AMQP, DDS, XMPP and MQTT;
 - c) AMQP, TCP, XMPP and MQTT;

- d) TCP/IP, DDS, XMPP and MQTT.
7. Node-RED:
- a) is officially positioned as the flow based programming for the IoT;
 - b) does not provide a graphical user interface to construct data flows with the functional processing modules and actuation output stages;
 - c) generates TCP/IP code that implements the corresponding action and completes event and stream processing pipelines;
 - d) cannot combine multiple inputs and produce multiple outputs to and from its functional blocks.
8. A protocol is:
- a) a set of actions that a layer provides to a higher layer on the same machine;
 - b) an access points for services;
 - c) a set of rules that a layer uses to exchange information with its counterpart on the remote peer node that is interacting with;
 - d) a set of actions that a layer provides to a higher layer on another machine.
9. TCP:
- a) does not benefit from retransmissions;
 - b) is an unreliable connectionless protocol;
 - c) is a connection oriented, reliable byte-stream service;
 - d) is the only transport layer protocol in the Internet model.
10. The IEEE 802.15.4 is called Low-Rate Wireless Personal Area Network:
- a) it primarily connects personal devices in the proximity of a user;
 - b) it has a maximum link rate of 10 kbit/s;
 - c) In IoT, it is mostly used to connect constrained things and sensors;
 - d) it has a maximum link rate of 1 kbit/s.
11. In 6 LowPAN a router:
- a) routes messages between nodes within the 6 LowPAN network in mesh configurations, cannot sleep;
 - b) connects 6 LowPAN network to the internet as a fully functional IP networking layer node and router;
 - c) route messages between nodes within the 6 LowPAN network in mesh configurations, can sleep;
 - d) performs generation and maintainance of the 6 LowPAN radio network.
12. Bluetooth operates using:
- a) 2.4 GHz unlicensed band;
 - b) 2.4 GHz licensed band;
 - c) 2.4 and 5 GHz unlicensed band;
 - d) 868 MHz unlicensed band.
13. Suppose that a CoAP client sends to a server the follwing message:
- ```
CON [0x7a10]
GET /temperature
(Token 0x73)
```
- The answer of the server will be:
- a) ACK [0x7a10];

- b) ACK [0x73];
  - c) ACK /temperature;
  - d) ACK "22.5 C".
14. In MQTT QoS 1 is defined as:
- a) at least once delivery - message receipt is acknowledged, duplicates are possible;
  - b) at most once delivery - best effort message delivery with no confirmation of receipt;
  - c) exactly once delivery - message receipt confirmed, no duplicates;
  - d) exactly once delivery - message receipt confirmed, duplicates are possible.
15. Databases suitable for IoT data storage generally belong to the category called:
- a) SQL databases;
  - b) NoSQL databases;
  - c) RDBMs;
  - d) Commercial databases.
16. In asymmetric cryptographic systems:
- a) the same keys are used for encryption and decryption;
  - b) different keys are used for encryption and decryption;
  - c) TLS is used;
  - d) DTLS is used.

## Correct answers

- 1. Correct answer is b)
- 2. Correct answer is d)
- 3. Correct answer is d)
- 4. Correct answer is d)
- 5. Correct answer is d)
- 6. Correct answer is b)
- 7. Correct answer is a)
- 8. Correct answer is c)
- 9. Correct answer is c)
- 10. Correct answer is d)
- 11. Correct answer is a)
- 12. Correct answer is a)
- 13. Correct answer is a)
- 14. Correct answer is a)
- 15. Correct answer is b)
- 16. Correct answer is b)