National University of Computer and Emerging Sciences, Lahore Campus

Introduction to Internet of Things (Code: IO4041)

Quiz 2 [BSCS-8B] Spring 2022

Date: April 12, 2022 Weighatge: 2.5% Marks: 15 Duration: 30 Minutes

Name: ---------- **Roll # ----------**

Question 1: Encircle the correct option. Cutting/overwriting is not allowed: [5 Marks]

i. A TCP sender ---------- its ---------- if there is ---------- perceived congestion on the path between itself and the destination.
A. reduces, send rate, little B. reduces, send rate, more
C. increases, send rate, more D. increases, receive rate, more

ii. Each CoAP message contains a Message ID used to ---------- and for optional reliability.
A. detect duplicates B. provide security
C. provide essential reliability D. none of these

iii. In TCP, reliability is achieved by ----------.
A. buffering B. positive ACKs C. Retransmissions D. All of these

iv. In CoAP messaging model, when a recipient is not at all able to process a CON message, it replies with ---------- message(s).
A. an ACK B. Reset (RST) C. Both A and B D. none of these

v. ------- is the correct combination of true and false for following statements (i) UDP is well suited to traffic with low reliability demands., (ii) due to strict requirement in terms of high-throughput performance in many smart object networks, mechanisms in TCP such as sliding window algorithm and delayed ACK are not needed.
A. true, true B. true, false C. false, false D. false, true

Question 2: Provide the precise answers to the following questions: [4+3+3 = **10 Marks**]

I. What is TCP delayed ACK mechanism? Does it decrease the throughput for a constrained TCP sender who only sends one TCP segment at a time? If your answer is yes, then what is the solution to avoid this problem? If your answer is no, then how? [2+1+1 = 4 Marks]

Answer:

TCP delayed ACK is intended to reduce the amount of ACK packets sent over a TCP connection.

Incoming TCP data are not ACKed immediately. The host waits for a short time, usually 200 ms, before sending the ACK.

Yes, it may significantly reduce the throughput. Solution: turn off the delayed ACK mechanism at the receiver to avoid this problem

II. Differentiate between non-caching and caching mode with respect to Reliable Multi-Segment Transport (RMST). Give one benefit of each [3 Marks]

Answer:

In non-caching mode, only the source and destination play a role in providing reliability. The packet losses are detected at the sink and requested from the source node in an end-to-end fashion through a NACK packet.

Benefit: it requires no involvement from the intermediate nodes in the multi-hop network and, hence, no additional processing, storage, and energy consumption occurs.

In caching mode, the intermediate nodes on the reinforced path cache the transmitted packets to decrease the overhead.

Benefit: **It minimizes the cost associated with end-to-end retransmissions.**

III. CoAP and HTTP both follow request response model. What are the three major differences between them? [3 Marks]

Answer:

1. HTTP is synchronous while CoAP is asynchronous

2. HTTP is connection oriented via TCP while CoAP is connectionless via UDP

3. HTTP is ASCII based (more complex client) while CoAP is binary (simple client)

4. HTTP has to pay more bytes on data transfer while CoAP pays less bytes on data transfer