



## 4.9.4.10 Client-Server & Thin vs Thick Clients

1) The list below contains four statements about the principles of CRUD and REST.

- A. CRUD is an acronym for Create, Retrieve, Update, Delete.
- B. REST allows JavaScript to communicate with the server using the HTTP protocol.
- C. The database is connected to the web browser using REST.
- D. The REST API will be created and run on the client computer.

State which of the statements **A-D** is false.

[1 mark]

2) **Figure 1** shows two different representations of data received by a client from a database server.

**Figure 1**

| Representation 1                                                                                                                                                                                                                                                                        | Representation 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <pre>{ "Customers": [<br/>  { "Name": "Eric Turner",<br/>    "Age": 32,<br/>    "Address": "15 Acorn Drive",<br/>    "Postcode": "PF3 2KJ" },<br/>  { "Name": "Jessica Ashford",<br/>    "Age": 41,<br/>    "Address": "17 Green Avenue",<br/>    "Postcode": "RO3 2SW" },<br/>]}</pre> | <pre>&lt;Customers&gt;<br/>  &lt;Customer&gt;<br/>    &lt;Name&gt;Eric Turner&lt;/Name&gt;<br/>    &lt;Age&gt;32&lt;/Age&gt;<br/>    &lt;Address&gt;15 Acorn Drive&lt;/Address&gt;<br/>    &lt;Postcode&gt;PF3 2KJ&lt;/Postcode&gt;<br/>  &lt;/Customer&gt;<br/>  &lt;Customer&gt;<br/>    &lt;Name&gt;Jessica Ashford&lt;/Name&gt;<br/>    &lt;Age&gt;41&lt;/Age&gt;<br/>    &lt;Address&gt;17 Green Avenue&lt;/Address&gt;<br/>    &lt;Postcode&gt;RO3 2SW&lt;/Postcode&gt;<br/>  &lt;/Customer&gt;<br/>&lt;/Customers&gt;</pre> |

a) What encoding has been used in **Representation 2**.

[1 mark]

b) State **two** reasons why it could be argued that JSON is better than XML.

[2 marks]





- 3) Describe what thin-client computing is **and** explain **two** reasons why a thin-client system might be chosen in preference to a thick-client system.

[3 marks]

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- 4) Compare the hardware requirements of thin-client and thick-client computing systems.

[3 marks]

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- 5) A booking system can be accessed through a website which use CRUD and REST.

- a) Describe what Uniform Resource Locator (URLs) are used for in a RESTful application.

[1 mark]

- b) State which letters **A** to **E** indicates how REST enables CRUD to be mapped to database functions using SQL.

|          |              |               |                 |              |
|----------|--------------|---------------|-----------------|--------------|
| <b>A</b> | GET → FETCH  | POST → CREATE | DELETE → DELETE | PUT → UPDATE |
| <b>B</b> | GET → SELECT | POST → INSERT | DELETE → DELETE | PUT → UPDATE |
| <b>C</b> | GET → SELECT | POST → INSERT | DELETE → DELETE | PUT → CREATE |
| <b>D</b> | GET → SELECT | POST → UPDATE | DELETE → DELETE | PUT → INSERT |
| <b>E</b> | GET → UPDATE | POST → SELECT | DELETE → DELETE | PUT → CREATE |

[1 mark]

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- 6) The web server and the web browser on a client computer use the WebSocket protocol when they communicate with each other.

State which letter **A** to **E** indicates which of these statements about the WebSocket protocol is true.

- A** All messages sent using the protocol encode data using XML.
- B** All messages sent using the protocol have a digital signature.
- C** Messages sent using the protocol can only originate from the web server.
- D** The protocol establishes a full-duplex communication channel.
- E** The protocol operates at the network layer of the TCP/IP stack

[1 mark]

