
Initial Score (out of 100)

Name

Student ID

In accordance with both the letter and spirit of the Honor Code, I have neither given nor received assistance on this examination.

Signature _____

Make sure to write succinct answers to each question.

Question 1: (15 points)

1. Briefly explain the difference between HTTPS and HTTP, and why we need to use HTTPS.

2. What is the name of the encryption protocol used in HTTPS?

Question 2: (15 points)

Fill in the blanks with "JSP", "Javascript", and "Java Servlet",

X:_____ Y:_____ Z:_____

- **X** is often used to provide a dynamic user interface (e.g., popup dialog). It works without compilation before its execution because it is an interpreted language.
- **Y** and **Z** work on a Tomcat server. Both allow developers to write code to generate dynamic pages. **Z** can integrate Java code into an HTML page.

Question 3: (10 points) (Multiple correct answers are possible.)

Which SQL statement(s) is (are) correct to search for all the titles ending with "**game**" in the title attribute (**varchar**)?

- A. SELECT title FROM movies WHERE title LIKE 'game';
- B. SELECT title FROM movies WHERE title LIKE '+game';
- C. SELECT title FROM movies WHERE title LIKE '%game';
- D. SELECT title FROM movies WHERE title LIKE '?game';
- E. SELECT title FROM movies WHERE title LIKE '*game';

Question 4: (10 points)

Complete the following SQL statement to search for all the IDs containing "**777**" as a substring in the id attribute, which is an **integer** type. For example, an id with a **integer value** 1237779 is a valid result.

SELECT id FROM movies WHERE _____;

Question 5: (10 points) (Multiple correct answers are possible.)

Which one(s) of the following statements about XML is/are true? _____

- A. Uses a tree-structured representation for storing data.
- B. A valid XML does not need to be well formed.
- C. May introduce high redundancy.
- D. Is a self-describing data format.
- E. Is a semi-structured data model because it has some structure, but less flexible than the relational model.

Question 6: (10 points)

Sentences below are about SAX and DOM parsers. Match the properties with the corresponding parser.

- A. Gives more control to the implementer.
- B. Needs to load the entire XML file into memory before further processing.
- C. Represents an XML document as a hierarchical structure.
- D. Uses an event-based API.

SAX _____

DOM _____

Question 7: (12 points)

Give two advantages of the Tomcat Servlet architecture compared to the CGI architecture.

Question 8: (8 points)

Give one main advantage of using stored procedures in a relational DBMS.

Question 9: (10 points)

For each of the following statements, mark **True ("T")** or **False ("F")**:

1. _____ The reCAPTCHA service provided by Google provides subscribing websites with images that are hard for a computer program to analyze.
2. _____ In MySQL, if we set call `Connection.setAutoCommit(false)` for a JDBC connection, then every update to the database will be made permanent immediately.
3. _____ In project 3, one way to optimize the process of parsing the XML files is to store the parsed records as in-memory hash tables.
4. _____ HTTP Get and HTTP Post are both good choices for a secure Web application.

Question 1: (15 points)

1. HTTPS encrypts its communication between the client and server, but HTTP doesn't. We use HTTPS for secure communication because we need to protect user's sensitive information such as credit card information.
2. SSL (TLS)

Question 2: (15 points)

X: Javascript, Y: Java Servlet, Z: JSP

Question 3: (10 points)

C, E

Question 4: (10 points)

CAST(id as varchar) LIKE '%7777%'

Question 5: (10 points)

A C D

Question 6: (10 points)

SAX: AD
DOM: BC

Question 7: (12 points, 6 points for each)

1. In Tomcat, each request is handled by a new thread of a servlet, while in CGI each request is handled by a new process. From the perspective of the OS, a process is much more expensive than a thread.
2. In Tomcat, those servlet threads are running inside the Tomcat server, making it easier for them to share resources with each other and the server. In CGI, those processes are running outside the Web server, making information sharing much harder.

Question 8: (8 points)

1. Stored procedures and SQL statements can be used to build other procedures to make applications easier to develop (without writing low-level SQL statements).

OR

2. From a client's perspective, they can easily call a stored procedure that is pre-declared on the database server, which can make the server more powerful.

Question 9: (10 points, 3 each)

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