* + 1. W/hat is Service-Oriented Architecture? [02 Marks]

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**Model Answer**

**An architectural style of building software applications that promotes loose coupling between components so that you can reuse them and work within a distributed systems architecture**

* + 1. What are the common principals of Service orientation? [04 Marks]

**Model Answer [1 \*3 Marks]**

* **Loose coupling**
* **Services share a formal contract**
* **Reusability**
* **Discoverability**
* **Interoperability**
* **Services are stateless**
* **Services are autonomous**
* **Services are compassable**
* **Services abstract underlying logic**
  + 1. What is the difference between SOA and a Web service?  [04 Marks]

**Model Answer 1 [\*3 Marks]**

|  |  |
| --- | --- |
| **SOA** | **Web Service** |
| **SOA is** **a software design principle and an architectural pattern for implementing loosely coupled, reusable and coarse grained services.** | **Web service is an implementation technology and one of the ways to implement SOA.** |
| **You can implement SOA using any protocols such as HTTP, HTTPS, JMS, SMTP, RMI, IIOP (i.e. EJB uses IIOP), RPC etc.** | **Web services offer is the standards based  and platform-independent service via HTTP, XML, SOAP, WSDL and UDDI** |
| **Messages can be in XML or Data Transfer Objects (DTOs).** |  |

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* + 1. What are the primary aspects of security addressed by distributed computing? [05 Marks]

**ANSWER**

**Identification, authentication, authorization, integrity, and confidentiality, and non-repudiation**

* + 1. What are the challenges of developing distributed multitiered applications? [05 Marks]
* **Portability**
* **Reliability**
* **Diverse**
* **Environments**
* **Time-to-market**
* **Core Competence**
* **Assembly**
* **Integration** 
  + 1. What is concurrency? [03 Marks]

**ANSWER**

**Concurrency is the ability to run several programs or several parts of a program in parallel.**

* + 1. Briefly describe the following terms. [09 Marks]

|  |
| --- |
| * + - * 1. **XML** |
| * + - * 1. **SOAP Transport Protocol** |
| * + - * 1. **WSDL Standard Format** |

* + 1. What are the main features of JDBC? [04 Marks]

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|  |
| --- |
| **Model answer (1 \* 4)**   * **Provides a set of classes for java with a standard SQL DB access interface.** * **Uniform access to wide range of relational DBs.** * **Provides an API for DB drivers to make actual connections & transaction to DB products.** * **Includes JDBC ODBC bring to standard ODBC drivers.** * **JDBC is a low level interface calling SQL commands directly but is when to based for high-level languages** |

* + 1. What is web component in J2EE? Give 2 examples [04 Marks]

|  |
| --- |
| **Model Answer**  **Web components provide the dynamic extension capabilities for a web server.**  **Eg:**   * **Java servlets** * **web pages implemented with JavaServer Faces technology** * **JSP pages.** |

**PART B – Answer four questions only**

**3. [Total 15 marks]**

i. What is JDBC? [02 Marks]

**Model Answer**

**JDBC is a set of Java API for executing SQL statements. This API consists of a set of classes and interfaces to enable programs to write pure Java Database applications.**

1. The following java program performs a simple query on the **Students** database that retrieves the entire studentsDetails table and displays the data. Fill the blanks with suitable java codes. [10 Marks]

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import java.sql.\*;

public class StudentTester {

static final String url = "jdbc:mysql://localhost/Students";

public static void main(String[] args) {

try {

// Load JDBC driver

// Make connection

// Create statement



// Query Database

while (rs.next()) {

...

}

// ensure connection, statement and result set are closed



} catch (Exception e) {

System.out.println("exception" + e);

}

}

**Model Answer**

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// Import necessary Java classes

import java.sql.\*;

public class StudentTester {

static final String url = "jdbc:mysql://localhost/Students";

public static void main(String[] args) {

try {

// Load JDBC driver

**2 Marks**

**2 Marks per each**

* + - 1. **Class.forName("com.mysql.jdbc.Students");**

// Make connection

* + - 1. **Connection conn= DriverManager.getConnection(url);**

// Create statement

* + - 1. **Statement stmt = conn.createStatement();**

// Query Database

* + - 1. **ResultSet rs= stmt.executeQuery("SELECT\* FROM studentsDetails ");**

while (rs.next()) {

...

}

// ensure connection, statement and result set are closed

* + - 1. **rs.close();**
      2. **stmt.close();**
      3. **conn.close();**

} catch (Exception e) {

System.out.println("exception" + e);

}

}

1. What is ResultSet? What does ResultSet actually contain? [03marks]

**Answer**

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**A ResultSet is an interface. Its implementation depends on the driver and hence, what it “contains” depends partially on the driver and what the query returns.**

1. Java contains two Meta data interfaces .What are they? Write 3 available methods to get Meta data. [05 marks]

**Answer**

* **DataBaseMetaData and ResultSetMetaData interface.**
* **Methods :**
* **int getColumnCount ()**
* **String getColumnName (int x)**
* **String getColumTypeName (int x)**

**4**. **[Total 20 marks]**

1. Define each of the following terms [09 Marks]
   1. Thread
   2. runnable state
   3. Deadlock
2. Threads can be created by two ways. What are they? [04 marks]

**Model Answer**

* **By extending the Thread class**
* **By implementing the Runnable interface**

1. What is the major problem of single-threaded application? How you could overcome that problem when writing java applications? [05 Marks]

**Model Answer**

**A problem with single-threaded applications that can lead to poor responsiveness is that lengthy activities must complete before others can begin. [03 Marks]**

**Solution is multithreaded application. [02Marks]**

1. What is the Java keyword which indicates that only one thread at a time should execute on an object. [02 Marks]

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**Model Answer**

* **Synchronized**

**5**. **[Total 20 marks]**

1. What is web service? [03 Marks]

**Model Answer**

**Web services are software systems** **designed to support interoperable machine-to-machine interaction over a network**

**Interoperability is gained through a set of** **XML-based open standards, such as WSDL, SOAP, and UDDI**

1. List the 2 type of web services and mention the Java APIs for each type of web services? [04 Marks]

**Model Answer [02 Marks]**

* **SOAP (Big) web services**
* **RESTful Web Services**

**[02 Marks]**

* **Java API for SOAP web services is** 🡪 **JAX-WS**
* **Java API for RESTful Web Services is** 🡪 **JAX-RS**

1. List the protocol for each web service type? [04 Marks]

**Model Answer**

* **SOAP web service –SOAP protocol**
* **RESTful web service – HTTP protocol**

1. Briefly describe the importance of XML based protocol and WSDL for web services? [05 Marks]

**Model Answer**

* **SOAP is a protocol for exchanging structured information between distributed systems and used to communications in web services as SOAP messages.(Explain that the SOAP is the communication protocol for web service)**
* **WSDL is used for describing the operations provided by a web service component and about how to use web service. It will describe about the location of a service (host and port), the protocol to be used, the messages used, the types of argument and the return types.(Describe that the WSDL describes the web service)**

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1. Explain the use of underlined code lines in the following code. [04 marks]

package helloservice.endpoint;

**import javax.jws.WebService;**

import javax.jws.WebMethod;

**@WebService**

public class Hello {

private String message = new String("Hello, ");

public void Hello() {

}

**@WebMethod**

public String sayHello(String name) {

return message + name + ".";

}

}

**Answer**

1. **The @WebService annotation---- defines the class as a web service endpoint.**
2. **The @WebMethod annotation ---exposes the annotated method to web service clients.**

**6. [Total 20 marks]**

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1. Why Is XML Important in developing web applications? [05 Marks]

**Model Answer (briefly explanation to any 5 points)**

* **Plain Text - you can create and edit files using anything from a standard text editor to a visual development environment. That makes it easy to debug your programs**
* **Data Identification - XML tells you what kind of data you have, not how to display it**
* **Stylability - When display is important, the stylesheet standard, XSL can use**
* **Inline Reusability**
* **Linkability**
* **Easily Processed**
* **Hierarchical**

1. Write XML code that describes the given scenario. The root element is STUDENTS. The STUDENT element must contain one each of items NAME, REGNO, COURSE, and ADDRESS in order. The STUDENT element may contain an attribute called "type" which may have a value of "fulltime" or "parttime". The elements NAME, REGNO, COURSE, and ADDRESS all contain PCDATA which is parsed character data. [05 Marks]

**Model Answer – any correct xml code eg:**

**< STUDENTS >**

**< STUDENT type = “fulltime”>**

**< NAME >Nethu Basnayake</ NAME >**

**< REGNO >1200</ REGNO >**

**< COURSE >HNDIT</ COURSE >**

**< ADDRESS > Kurunegala</ ADDRESS >**

**</ STUDENT >**

**< STUDENT >**

**< NAME >Chaminda Bandara</ NAME >**

**< REGNO >1500</ REGNO >**

**< COURSE >HNDE</ COURSE >**

**< ADDRESS > Kandy</ ADDRESS >**

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**</ STUDENT >**

**</ STUDENTS>**

1. Write the DTD file for the above XML document. [05 Marks]

**ANSWER**

**<!DOCTYPE STUDENTS [**

**<!ELEMENT STUDENTS (STUDENT\*)>**

**<!ELEMENT STUDENT (** NAME, REGNO, COURSE, ADDRESS**)+>**

**<!ATTLIST STUDENT type (fulltime|parttime) #IMPLIED>**

**<!ELEMENT** NAME **(#PCDATA)>**

**<!ELEMENT** REGNO **(#PCDATA)>**

**<!ELEMENT** COURSE **(#PCDATA)>**

**<!ELEMENT** ADDRESS **(#PCDATA)>**

**]>**

1. What is XML Namespace? Why is it important? [05 Marks]

**Model Answer [description 3 marks, importance 2 marks]**

**XML namespaces are used for providing uniquely named elements and attributes in an XML document. They are defined in, a W3C recommendation. An XML instance may contain element or attribute names from more than one XML vocabulary.**

**Namespace is important to avoid naming conflicts of different xml documents.**

7. **[Total 20 Marks]**

* + 1. Briefly describe the general security issues for enterprise applications? [05 Marks]

**Model Answer**

1. **Authentication for identity verification – Making sure a user is who he claims he is**
2. **Authorization (Access control) – Making sure resources are accessible only to users who have access privilege. The user has to be authenticated first**
3. **Confidentiality (Privacy) - Protecting the sensitive data from prying eyes while it is on the wire**

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* + 1. You can protect web resources by specifying a security constraint. Briefly describe the role of a Security constraint in web applications. [05 Marks]

**Model Answer**

**A *security constraint* determines who is authorized to access a *web resource collection*, which is a list of URL patterns and HTTP methods that describe a set of resources to be protected. Security constraints are defined using an application deployment tool, such as deploytool**

* + 1. What is [WS-SecurityPolicy](http://www.oasis-open.org/specs/index.php#ws-secpol)? [04 Marks]

**Model Answer**

[**WS-SecurityPolicy**](http://www.oasis-open.org/specs/index.php#ws-secpol) **is a** [**web services**](http://en.wikipedia.org/wiki/Web_Services) **specification, created by** [**IBM**](http://en.wikipedia.org/wiki/IBM) **and 12 co-authors, that has become an** [**OASIS**](http://en.wikipedia.org/wiki/OASIS_%28organization%29) **standard as of version 1.2. It extends the fundamental security protocols specified by the** [**WS-Security**](http://en.wikipedia.org/wiki/WS-Security)**,** [**WS-Trust**](http://en.wikipedia.org/wiki/WS-Trust) **and** [**WS-SecureConversation**](http://en.wikipedia.org/wiki/WS-SecureConversation) **by offering mechanisms to represent the capabilities and requirements of web services as policies. Security policy assertions are based on the** [**WS-Policy framework**](http://en.wikipedia.org/wiki/WS-Policy)**.**

* + 1. Name three authentication mechanisms that you can specify when you try to access a protected web resource. [06Marks]

**Model Answer [2\*3 Marks]**

* **HTTP basic authentication**
* **Form-based login authentication**
* **Client certificate authentication**
* **Mutual authentication**
* **Digest authentication**