



Sri Lanka Institute of Information Technology

B.Sc. Special Honours Degree/ Diploma
in
Information Technology

Final Examination
Year 3, Semester II (2015)

IT301 – System Programming and Design Concepts

Duration: 3 Hours

October 2015

Instructions to Candidates:

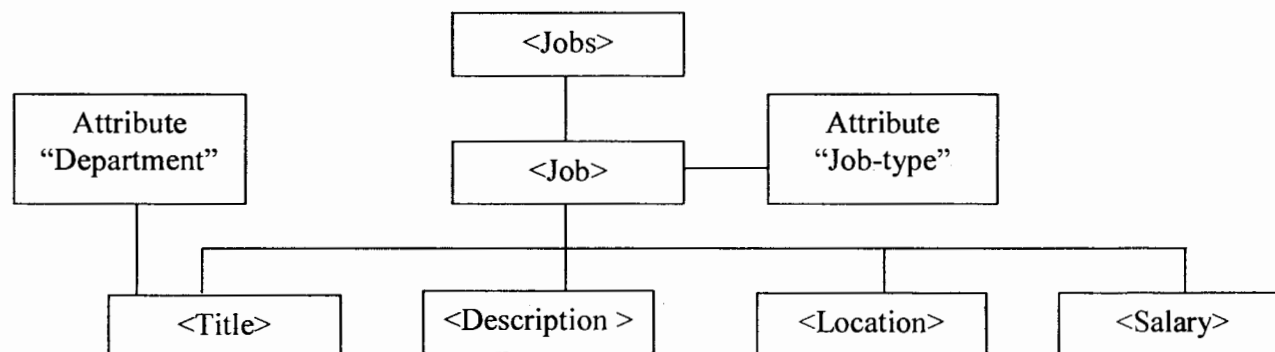
- ◆ This paper contains 5 essay type questions.
- ◆ **Answer all** questions in the answer booklet provided.
- ◆ Total marks for the paper is 100 and the paper carries 60% weight for the final mark.
- ◆ This paper contains 6 pages including the cover page.

Question 01**(20 Marks)**

- a) Define a **Component** in distributed computing? (2 Marks)
- b) How does a component differ from an object? (4 Marks)
- c) Name four advantages of distributing an application? (2 Marks)
- d) What is Remote Procedure Call (RPC)? Explain with a diagram how the RPC works. (4 Marks)
- e) List the RPC methods available in Java EE and Microsoft .NET (2 Marks)
- f) What is the purpose of a Naming Service in a distributed system? How does it help when remote services are moved from one server machine to another? (3 Marks)
- g) Explain how architecture of CORBA supports interoperability. (3 Marks)

Question 02**(20 Marks)**

- a) What is XML? (2 Marks)
- b) "XML does not do anything". Do you agree with this statement? Justify your answer. (2 Marks)
- c) Name four Internet Languages used in web applications which are based on XML. (2 Marks)
- d) Consider the following hierarchy of elements.



Define following records in a XML file using the above hierarchy of elements.

(4 Marks)

Job Title	Description	Location	Salary(Rs)	Job Type	Department
Distribution Manager	Managing the distribution operations and functions	Colombo 07	100,000	Full Time	Distribution
Advertising Manager	Marketing and publicizing goods or services	Moratuwa	100,000	Part Time	Marketing
HR Manger	Establishing and implementing human resources strategy	Malabe	90,000	Full Time	HR
Transportation Manager	Managing transportation department	Malabe	75,000	Contract	Transport
IT manager	Overseeing and managing IT projects.	Colombo 04	140,000	Full Time	IT

Additional Information: Elements 'Job' can appear one or more times.

Attribute 'job-type' and 'Department' are of string type.

- e) Write a schema file (XSD) for the XML file created in part (d). The schema should also reflect the additional information mentioned. (4 Marks)
- f) What is the purpose of namespaces in XML? Explain with aid of a suitable example. (3 Marks)
- g) "DOM parser is a better choice than SAX parser for quickly accessing data". Do you agree with this statement? Justify your answer. (3 Marks)

Question 03**(20 Marks)**

- a) Name and explain four key elements in Remoting. (4 Marks)
- b) Explain the difference between Marshal by value and Marshal by reference. (2 Marks)
- c) What is a proxy used in .NET Remoting? (2 Marks)
- d) What is an Activation Method in Remoting? Who decides what activation method is to be used? (3 marks)
- e) What are the differences between **server activated singleton** and **client activate objects**? (3 marks)
- f) Consider the following program of a .NET Remoting Server. The Server is supposed to listen on port 8005 for clients. The code has twelve mistakes which will not make it proper remotely accessible server. Correct the code and rewrite it without the mistakes. (6 marks)

*Note: According to the proposed solution, need to pass **Driver** object to the client side. Clients can create **LicenseApp** objects remotely as remote objects.*

```

class Driver{
    private Driver()
    {
        //Implementation not important
    }
}

class LicenseApp{
    private LicenseApp()
    {
        //Implementation not important
    }

    private int createDriver(){
        Driver dl = new Driver();
        return dl;
    }
}

```

```

class program{
    static void Main(string[] args){
        TcpChannel tcp = new TcpChannel(0);
        ChannelServices.RegisterChannel(tcp, false);
        RemotingConfiguration.RegisterActivatedClientType(
            typeof(Driver), sURL);

        console.WriteLine();
    }
}

```

Question 04**(20 Marks)**

- a) What is an asynchronous call? How does it differ from a synchronous call? (4 marks)
- b) What are the three methods that .NET provide to facilitate asynchronous communication? (2 marks)
- c) When is it appropriate to use Asynchronous Calls? (2 marks)
- d) Write down a delegate to following method. (4 marks)


```

public int calcTotal(string name, int id, string dept){
    //Implementation not important
}

```
- e) Explain **Remote callback** and **completion callbacks**. (4 marks)
- f) What are the advantages and disadvantages of using Blocking and Completion callback to implement asynchronous communication? (4 marks)

Question 05**(20 Marks)**

- a) Describe three issues in traditional RPC (Remote Procedure Call) frameworks that motivated the development of SOA (Service Oriented Architecture) (3 marks)
- b) What is service-oriented architecture (SOA)? (2 marks)
- c) Explain why we need Service Oriented Architecture. (2 marks)
- d) "Service Oriented Architecture (SOA) is always applicable to every proposed systems". Do you agree with this statement? Justify your answer. (2 marks)
- e) What are the elements of a Web Service? (2 marks)
- f) Name four features of Windows Communication Foundation (WCF). (2 marks)
- g) What is Ajax? Explain using Ajax sequence diagram. (3 marks)
- h) Write a web service class called **BankLoanApp** which contains following methods. (4 Marks)
- **calcInterestAmountPerMonth()**, which will calculate and return interest per month given *loan amount*, *loan term* and *interest rate* received as input parameters.
$$\text{Monthly interest} = (\text{loan amount} / \text{loan term}) * (\text{interest rate} / 100)$$
 - **calcMonthlyPayment()** which will calculate and return the monthly payment given *capital payment* and *interest* as input parameters.
$$\text{Monthly payment} = \text{capital payment} + \text{interest}$$

*****End of the Question Paper*****