CONCORDIA UNIVERSITY
Department of Computer Science
SOEN 487/ 4NN Web Services and Applications

FINAL EXAM: April 13, 2011 (ANSWER) 19:00 - 22:00 – (3 hours)

IDENTIFICATION:

First Name _____ Last Name_____ ID _____

Signature _____

Information:
1. This is a close book exam.
2. Please answer all questions – 100 points as shown.
3. Please put your answer to the multiple choice questions in the table below.

Questions		Mark	Questions		Mark
Section I	Answer		Section II		
1		/2	1		/5
2		/2	2		/5
3		/2	3		/15
4		/2	Section III		
5		/2	1		/20
6		/2	2		/10
7		/2	3		/15
8		/2	4		/10
9		/2			
10		/2			
11		/2			
12		/2			
13		/2			
14		/2			
15		/2			

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Section I: Multiple Choices (30 points)

1. A Web Services can be created regardless of the
   A. systems
   B. programming language
   C. services
   D. internet

Answer: B

2. This method ensures that each XML element type and attribute name has a unique identity.
   A. namespace
   B. fully-qualified domain name
   C. QName
   D. named pipe

Answer: A

3. Canonical XML specification is designed to
   A. Determine if two XML documents are logically equivalent
   B. Digitally encrypt an XML document
   C. Digitally sign an XML documents
   D. Use multibyte encoding in XML document

Answer: A

4. Which statement about namespace is NOT true?
   A. Namespace is defined as attribute
   B. The namespace URI is used by the parser to look up information
   C. The prefix is a short name for the namespace
   D. Namespace can avoid name crash.

Answer: B

5. SOAP is used to transfer the:
   A. control
   B. output
   C. data
   D. None of the above

Answer: C

6. UDDI is used for listing what _____ are available.

A. data
B. control
C. programs
D. services

Answer: D

7. What are the properties of services in the economics study? [Select multiple correct answers]
A. Co-creation of value
B. Services can be stored for later consumption
C. Services can be directed to intangible assets
D. Perceived quality-of-service varies from one client to the next

Answer: A,B,D

8. The Web services cannot offer the application components like:
A. the currency conversion
B. weather reports
C. the language translation
D. web browsers

Answer: D

9. The XML provides the _____ in which you can write the specialized languages to express the complex interactions between the clients and the services or between the components of a composite service.
A. language
B. meta language
C. meta
D. services

Answer: B

10. Which of these are not the elements WSDL ?
A. Types
B. Port Type
C. Service
D. destination

Answer: D

11. Which of these test do use an HTTP POST and will send the XML response.
A. <?xml version="1.0" encoding="utf-8" ?>
<short xmlns="http://tempuri.org/">38</short>
B. <?xml ?>
<short xmlns="http://tempuri.org/">38</short>
C. <?xml version="1.0" encoding="utf-8" ?>
<short xmlns="http://tempuri.org/">38
D. <short xmlns="http://tempuri.org/">38</short>

Answer: A

12. XML Digital Signature is used to
    A. Digitally sign an XML document
    B. Using the sender's private key to create signature
    C. Include a digest created by an ecryption algorithm
    D. All of the above

Answer: D

13. Which of the following tag is not part of WS-BPEL2.0 specification? [Select multiple correct answers]
    A. <envelope>
    B. <invoke>
    C. <activity>
    D. <assign>

Answer: A, C

14. The "green page" in UDDI contains
    A. The general information of a business
    B. Technical capacity of a service
    C. List how many services included in a business
    D. Classification information of a business

Answer: B

15. Check the code below and select All correct answers [Select multiple correct answers]

```
<portType name="SubmitPurchaseOrderPortType">
    <operation name="SubmitPurchaseOrder">
        <input name="order" message="SubmitPurchaseOrderMessage"/>
    </operation>
</portType>
```

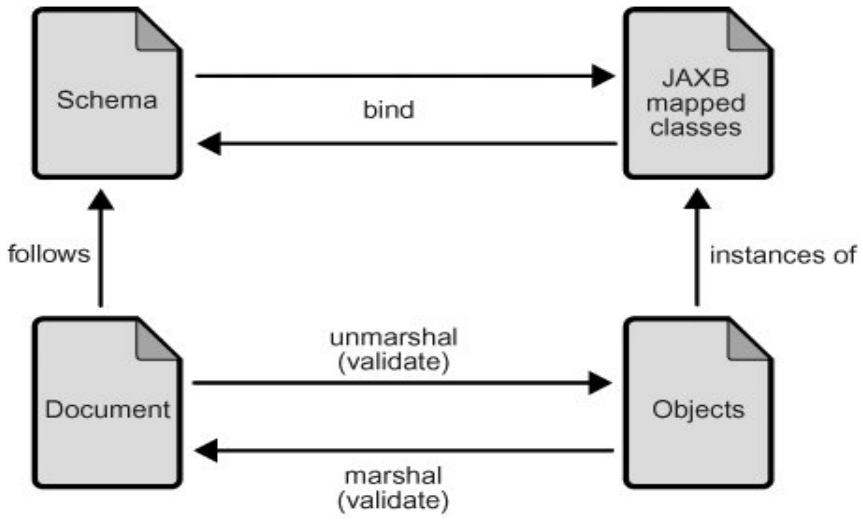
    A. This is a notification operation.
    B. This is a one-way operation.
    C. This is a two-way operation.
    D. JAX-WS implementation that may throw a predefined exceptions.
    E. JAX-WS implementation that does not throw predefined exception.

Answer: B, D

Section II: Short Answer Questions (25 points)

1. In a JAXB binding process, you need to deal with "schema", "document", "classes", and "objects". Draw a diagram to show their relations and briefly describe the principle of JAXB binding (5 points).

Answer:



2. Please write down the mapping between XML scheme and Java in the following table (5 points):

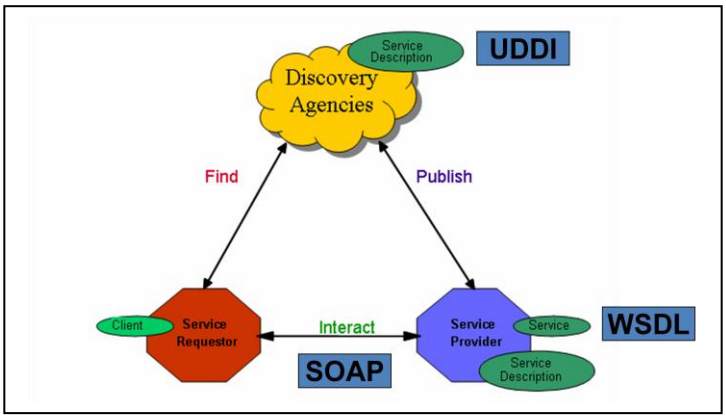
XML data type	Java data type
boolean	
dateTime	
decimal	
double	
float	
QName	
string	

Answer:

XML data type	Java data type
boolean	boolean
dateTime	java.util.Calendar
decimal	java.math.BigDecimal
double	double
float	float
QName	javax.xml.namespace.QName
string	java.lang.String

3. Draw the SOA triangle and explain 1) the roles and their functions in this triangle (5points); 2) the open specifications used by the roles (5 points) ; 3) the advantages to use SOA techniques (5 points).

Answer:



Service encapsulation

Service interoperability

Service abstraction - Beyond what is described in the service contract, services hide logic from the outside world

Service loose coupling - Services maintain a relationship that minimizes dependencies and only requires that they maintain an awareness of each other

Service contract - Services adhere to a communications agreement, as defined collectively by one or more service description documents

Service reusability - Logic is divided into services with the intention of promoting reuse

Service composability - Collections of services can be coordinated and assembled to form composite services

Service autonomy – Services have control over the logic they encapsulate

Service statelessness – Services minimize retaining information specific to an activity

Service discoverability – Services are designed to be outwardly descriptive so that they can be found and assessed via available discovery mechanism

Section III: Answer the Following Questions with Code (40 points)

Question 1 JAX-WS programming (20 marks)

Please read the following WSDL file for a book catelog service. The book catelog service has three operations: **getContent** returns all the books in the catelog; **addBook** inserts a book into the catelog; **removeBook** removes a book from the catelog, if the title exists, otherwise, a fault message is returned. Please read the WSDL file and implement the service in JAX-WS.

Hints/requirements:

1) Defint the classes **Book** and **BookException** or anyother classes necessary (5 points)

2) Program the service functions and use JAX-WS annotations. Pay attention to the input and output data type. For example, **getContent** should return a **list** of **Books**. (5 points)

3) Use EJB or XML for persistency of the catelog (5 points).

4) If you cannot do 3), explain what function you are missing by not doing so (1 point). If you can do 3), do not do this one.

5) Handle exception properly (5 points)

The book catelog service WSDL:

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- Published by JAX-WS RI at http://jax-ws.dev.java.net. RI's version is JAX-WS RI
2.2.1-hudson-28-. -->
<!-- Generated by JAX-WS RI at http://jax-ws.dev.java.net. RI's version is JAX-WS RI
2.2.1-hudson-28-. -->
<definitions xmlns:wsu="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-
wssecurity-utility-1.0.xsd" xmlns:wsp="http://www.w3.org/ns/ws-policy"
xmlns:wsp1_2="http://schemas.xmlsoap.org/ws/2004/09/policy"
xmlns:wsam="http://www.w3.org/2007/05/addressing/metadata"
xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
xmlns:tns="http://flydragontech.com/" xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns="http://schemas.xmlsoap.org/wsdl/" targetNamespace="http://flydragontech.com/"
name="BookCatalogServiceService">
<types>
<xsd:schema>
<xsd:import namespace="http://flydragontech.com/"
schemaLocation="http://localhost:8080/BookCatalog/BookCatalogServiceService?xsd=1"/>
</xsd:schema>
</types>
<message name="getContent">
<part name="parameters" element="tns:getContent"/>
</message>
<message name="getContentResponse">
<part name="parameters" element="tns:getContentResponse"/>
</message>
<message name="addBook">
<part name="parameters" element="tns:addBook"/>
</message>
<message name="addBookResponse">
<part name="parameters" element="tns:addBookResponse"/>
</message>
<message name="removeBook">
<part name="parameters" element="tns:removeBook"/>
</message>
<message name="removeBookResponse">
<part name="parameters" element="tns:removeBookResponse"/>
</message>
<message name="BookException">
<part name="fault" element="tns:BookException"/>
</message>
```

```
<portType name="BookCatalogService">
<operation name="getContent">
<input wsam:Action="http://flydragontech.com/BookCatalogService/getContentRequest"
message="tns:getContent"/>
<output wsam:Action="http://flydragontech.com/BookCatalogService/getContentResponse"
message="tns:getContentResponse"/>
</operation>
<operation name="addBook">
<input wsam:Action="http://flydragontech.com/BookCatalogService/addBookRequest"
message="tns:addBook"/>
<output wsam:Action="http://flydragontech.com/BookCatalogService/addBookResponse"
message="tns:addBookResponse"/>
</operation>
<operation name="removeBook">
<input wsam:Action="http://flydragontech.com/BookCatalogService/removeBookRequest"
message="tns:removeBook"/>
<output wsam:Action="http://flydragontech.com/BookCatalogService/removeBookResponse"
message="tns:removeBookResponse"/>
<fault message="tns:BookException" name="BookException"
wsam:Action="http://flydragontech.com/BookCatalogService/removeBook/Fault/BookExceptio
n"/>
</operation>
</portType>
<binding name="BookCatalogServicePortBinding" type="tns:BookCatalogService">
<soap:binding transport="http://schemas.xmlsoap.org/soap/http" style="document"/>
<operation name="getContent">
<soap:operation soapAction=""/>
<input>
<soap:body use="literal"/>
</input>
<output>
<soap:body use="literal"/>
</output>
</operation>
<operation name="addBook">
<soap:operation soapAction=""/>
<input>
<soap:body use="literal"/>
</input>
<output>
<soap:body use="literal"/>
</output>
</operation>
<operation name="removeBook">
<soap:operation soapAction=""/>
<input>
<soap:body use="literal"/>
</input>
<output>
<soap:body use="literal"/>
</output>
<fault name="BookException">
<soap:fault name="BookException" use="literal"/>
</fault>
</operation>
</binding>
<service name="BookCatalogServiceService">
<port name="BookCatalogServicePort" binding="tns:BookCatalogServicePortBinding">
<soap:address location="http://localhost:8080/BookCatalog/BookCatalogServiceService"/>
</port>
</service>
</definitions>
```

The schema used:

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- Published by JAX-WS RI at http://jax-ws.dev.java.net. RI's version is JAX-WS RI
2.2.1-hudson-28-. -->
<xs:schema xmlns:tns=http://flydragontech.com/
xmlns:xs="http://www.w3.org/2001/XMLSchema" version="1.0"
targetNamespace="http://flydragontech.com/">
<xs:element name="BookException" type="tns:BookException"/>
<xs:element name="addBook" type="tns:addBook"/>
<xs:element name="addBookResponse" type="tns:addBookResponse"/>
<xs:element name="getContent" type="tns:getContent"/>
<xs:element name="getContentResponse" type="tns:getContentResponse"/>
<xs:element name="removeBook" type="tns:removeBook"/>
<xs:element name="removeBookResponse" type="tns:removeBookResponse"/>
<xs:complexType name="addBook">
<xs:sequence>
<xs:element name="title" type="xs:string" minOccurs="0"/>
<xs:element name="authors" type="xs:string" minOccurs="0"/>
<xs:element name="price" type="xs:double"/>
</xs:sequence>
</xs:complexType>
<xs:complexType name="addBookResponse">
<xs:sequence>
<xs:element name="return" type="xs:boolean" minOccurs="0"/>
</xs:sequence>
</xs:complexType>
<xs:complexType name="getContent">
<xs:sequence/>
</xs:complexType>
<xs:complexType name="getContentResponse">
<xs:sequence>
<xs:element name="return" type="tns:book" minOccurs="0" maxOccurs="unbounded"/>
</xs:sequence>
</xs:complexType>
<xs:complexType name="book">
<xs:sequence>
<xs:element name="authors" type="xs:string" minOccurs="0"/>
<xs:element name="price" type="xs:double"/>
<xs:element name="title" type="xs:string" minOccurs="0"/>
</xs:sequence>
</xs:complexType>

<xs:complexType name="removeBook">
<xs:sequence>
<xs:element name="title" type="xs:string" minOccurs="0"/>
</xs:sequence>
</xs:complexType>

<xs:complexType name="removeBookResponse">
<xs:sequence/>
</xs:complexType>

<xs:complexType name="BookException">
<xs:sequence>
<xs:element name="message" type="xs:string" minOccurs="0"/>
</xs:sequence>
</xs:complexType>
</xs:schema>
```

Question 2 RESTful service (10 marks)

Assume you have a RESTful service to lookup today's IBM stock price. The singleton bean is shown in the text box at right. Please 1) program the server side code to response to the client query (5 points); 2) program the client side Ajax code for retrieving the prices and for changing the price (5 points).

```
package com.flydragontech;
public class StockPriceBean {
   private String price = "40.0";
   private StockPriceBean() {
   }
   public static StockPriceBean getInstance() {
      return StockPriceBeanHolder.INSTANCE;
   }
   private static class StockPriceBeanHolder {
      private static final StockPriceBean INSTANCE = new
StockPriceBean();
   }
   public String getStockPrice(){
      return StockPrice;
   }
   public void setStockPrice(String p){
      this.StockPrice = p;
   }
 }
```

Question 3 Business Process Modeling for a travel agency (15 marks)

A travel agency can book flights, hotels, and car rentals for a client upon request. The process starts by receiving a request message from a client. The flights should be booked first. Then the hotel and the rental car can be booked in parallel after the flight schedule is decided. The travel agency sends the booking information to the client for confirmation. If all the bookings are agreed upon, the travel agent asks credit card from the client. Once credit card is received, the credit card is charged. If the credit card is successfully charged, the flight tickets will be issued and the hotel booking and the rental car booking will be confirmed. If the bookings are not agreed by the client or the credit card is failed to be charged, the bookings will be cancelled without any charge. In all the cases, a confirmation will be sent to the client to finish the booking process.

The client can cancel a trip after the payment is done. The client can be refunded after being charged a certain amount of penalty. If the client sends in a cancellation request, the travel agency sends cancellations to the related companies. The airline always requires cancellation penalty. The hotel and the rental car company require cancellation penalty if the cancellation is made within 24 hours of the start hour of the service. The travel agency charges $100 for the service fee. The client receives whatever left and a confirmation of cancellation.

Please model the booking business process and the cancellation business process in Petri nets (10 points) and discuss if your model is correct (5 points). Please give your definition of correctness before you start the discussion.

Question 4 Theoretical Research (10 points)

With the business case in Question 3, we further discuss the communication between the travel agency and the client. Please use the concept of Open Net in the Wil der Aalst paper to model the booking process again. This time, you need to model the message exchange between the travel agency and a client. During this analysis, you do not need to model the messages to the other partners for simplicity. Please 1) draw the open net of the travel agency (3 points); 2) draw a client behavior which is a strategy of the travel agency's model (3 points).

Assume after the client receives the booking information from the travel agency, the client has an activity called "Make a decision" to decide whether the bookings are acceptable or not. Assume after this activity, the client can send an answer to the travel agency, or abandon this travel agency and turns to another travel agency. Please drw the client's behavior and analyze if the agency can work with this client. (4 points).