95-843 Service Oriented Architecture Due: Thursday, June 20, 2013

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Exam 1

This is a take home exam. You may use the web, books or notes. On the final exam such tools will not be available.

For multiple-choice style questions, choose the one best answer.

For short answer essay style questions, write clearly. Points are deducted if the writing is in any way unclear. Use no more than two or three sentences.

For fill in the blank style questions, write clearly in block letters.

For true or false style questions, write the words TRUE or FALSE.

For questions asking for a sketch, draw clearly.

Part 1) Petri nets (10 Points)

a) Draw a Petri net that represents the following business process. You need not be concerned with exception handling. Your Petri net must begin with a single token. It should end with a single token left in a single place. (4 Points).

A request for a loan arrives. Two activities then go on in parallel. The first activity checks the requestor’s credit rating. The second activity involves a phone interview with the requestor. When these two activities are both complete, a decision is made. The requestor is notified of the decision and a record of the entire process is archived. These last two activities (requestor notification and archival) will be done in parallel.

b) Represent the Petri Net that you drew in Part 1 (a) as three sets

(P for places, T for transitions, and E for edges.) (2Points).

c) Draw the Petri Net that corresponds to the following definitions.

(2 Points).

P = {P1,P2,P3,P4,P5}

T = {t1,t2,t3,t4}

E = {(P1,t1),(t1,P2),(t1,P3),(P3,t3),(P2,t2),(t2,P4),(t3,P5),

(P4,t4),(P5,t4),(t4,P1)}

d) With respect to your picture in 1c), suppose we start with a single token in

P1. Suppose then that t1 fires. What place(s) will then have tokens?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(2 Points)

Part 2) Business Process Modeling Notation (10 Points)

Multiple choice (Circle the one best answer) (3 Points)

a) According to IBM's BPMN slides, the term "Orchestration"

1. is defined by interaction between lanes.

2. is contained within one pool.

3. is shown by the message flow between pools.

4. is modeled as RPC.

5. is defined by interaction between pools.

Multiple choice (Circle the one best answer) (3 Points)

b) According to IBM's BPMN slides, the term "Choreography" :

1. is defined by interaction between lanes.

2. is contained within one pool.

3. defines processes that are internal to a specific organization.

4. means internal business workflow.

5. is defined by interaction between pools.

c) True of Falses. Mark each as True or False (4 points)

1. BPMN is closer to the execution layer than is BPEL. \_\_\_\_\_\_

2. BPEL is closer to the technology implementation than is BPMN. \_\_\_\_\_\_

3. In BPMN, there are different types of events. These are described with

circles. \_\_\_\_\_\_

4. All types of gateways are circles. \_\_\_\_\_\_\_\_

5. An exclusive gateway provides several paths that are to be executed in

parallel. \_\_\_\_\_\_\_\_

6. Inclusive gateways represent decisions where there is more than one

possible outcome. \_\_\_\_\_\_\_\_\_\_

Part 3) Oracle's slides on Oracle's Enterprise Service Bus (5 Points)

a) Name three capabilities of an enterprise service bus. (2 Point)

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b) With respect to services, what is meant by "Location Transparency"? (2 Point)

c) Mark each as True or False (1 point)

1. The proxy service would typically include a pipeline. \_\_\_\_\_\_

2. The business service would typically include a pipeline. \_\_\_\_\_\_

3. When setting up an Oracle Enterprise Service Bus, you connect a Proxy

Service to a Business service. \_\_\_\_\_\_

4. A business service may be used to provide load balancing and failover. \_\_\_\_\_\_

5. In general, Oracle is the only large technology firm providing an enterprise

ESB. \_\_\_\_\_\_\_

Part 4) SOA Technical Foundations (15 Points)

1. Which oneof the following statements is true about

XML Schema (XSD) ? ( 2 Points)

1. XSD is used to locate parts of an XML message.

2. XSD is used to describe the operation names of a service.

3. XSD is used to define a UDDI registry.

4. XSD is used to define the format of a single message or document.

5. Each web service message is written with XSD headers and an XSD body.

1. Which one of the following statements is true about XPATH ? (2 Points)

1. XPATH is used to define a single message or document.

2. Each web service message is written with XPATH headers and an

XPATH body.

3. XPATH is used to describe the operation names of a service.

4. XPATH is used to define a UDDI registry.

5. XPATH is used to locate parts of an XML message.

c) Which of the following statements is true about WSDL ? (2 Points)

1. Web service messages may be written with WSDL headers and

a WSDL body.

2. WSDL is used to locate parts of an XML message.

3. WSDL is used to describe the operation names of a service.

4. WSDL is used to describe REST style web services.

5. WSDL is used to define a single message or document.

d) Which of the following statements is true about SOAP ? (2 Points)

1. Web service messages may be written with SOAP headers and a

SOAP body.

2. SOAP is used to locate parts of an XML message.

3. SOAP is used to clean the data.

4. SOAP is used primarily for REST style web services.

5. SOAP is used only with RPC style web services.

e) Which of the following is true of IBM's Solution Stack View? (2 Points)

1. Business processes are represented near the top making use

of lower level services.

2. Composite services are at the topmost level. Below them

are business processes.

3. IBM's Solution Stack View includes consumers operating

over one type of channel. This channel shows messages

arriving off of an ESB.

4. Operational Systems are at the topmost level.

5. The concept of "governance" is not addressed in the

Solution Stack View.

f) Where would you most likely find the following code? (1 Point)

<restriction base=”string">

<pattern value="d{3}-[A-Z]{2}"/>

<restriction>

1. In XPATH.
2. In SOAP.
3. IN XSDL (XSD).
4. In XSLT.
5. In OSB.

g) In class, we discussed a web service for a fictional hotel - Hotel GreatH. We discussed the two operations – CheckAvailability and MakeReservation. We talked about building a simple synchronous call and response.

Describe, from a business perspective, how the use of asynchronous messaging might improve this system. Refer to this example and be specific and brief.

(2 Points)

Describe, from a business perspective, why the adoption of standards would promote agility. Refer to this example and be specific and brief. (2 Points)

Part 5) Service Enablement (5 Points)

a) Within Oracle's SOA Suite, components called

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ provide a mapping between non-web

service interfaces and the rest of the SOA Suite. (2 Points)

b) The components described in 5 a) are Java components built according to the

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ specification. (2 Points)

c) The specification described in part 5 (b) is mainly for application programmers

and is not for the development of the components themselves.

\_\_\_\_\_\_\_\_\_\_\_ (True or False) (1 Point)

Part 6) Governance (5 Points)

a) Describe the difference between the functional characteristics of a service and

the non-functional characteristics of a service. (1 Point)

b) The two types of policies that SOA governance must define are: (2 Point)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ policies and

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ policies.

c) Describe an interesting feature or capability that a machine readable SLA would provide. Be sure to say what “SLA” stands for be sure to describe what it is. (2 Points)

Part 7) Chapter 1 Introduction to Oracle SOA Suite (5 Points)

Circle True or False

a) (True/False) SOA makes it possible for business and IT to speak

the same language, that is, the language of services.

b) (True/False) Composing new services out of existing services allows

easy reasoning about the availability and performance

characteristics of the composite services.

c) (True/False) An architecture implies a consistent and coherent

design approach.

d) (True/False) SOA allows us to build more interoperable systems as

it is based on standards agreed to by all the major

technology vendors.

e) (True/False) The WSI's Basic Profile is a collection of standards

that focus on interoperability.

f) (True/False) The Oracle SOA Suite supports the WSI Basic Profile.

g) (True/False) The Service Component Architecture (SCA) is a standard

that is used to define how services in a composite

application are connected.

h) (True/False) An SCA assembly is described in a file named composite.xml.

i) (True/False) Adapters add a service interface to existing functionality.

j) (True/False) An ESB and a mediator component provide similar functionality.

Part 8) Chapter 2 Writing Your First Composite (5 Points)

Which of the following best describes the system built in chapter 2 of the course

text?

a) A client called a BPEL process which sent a message to an ESB.

b) A client called a mediator which sent a message to a BPEL process.

c) The client called a proxy on the ESB and the proxy called the

business service on the ESB.

d) The client called a proxy on the ESB and the proxy called a

business service on the ESB. The business services interacted with

a mediator and the mediator passed information on to the BPEL process.

e) A client called a BPEL process which sent a message to an ESB. The

ESB passed the information onto a proxy service.

Part 9) Chapter 3 Service Enabling Existing Systems (5 Points)

a) (True/False) An adapter may be configured to watch for the arrival

of a trigger file.

b) (True/False) A trigger file signals the availability of data.

c) (True/False) A file adapter wizard will usually need to know the

format of a file.

d) (True/False) The file adapter may be configured to read a comma

delimited file and generate XML that conforms to a

particular XSD schema.

e) (True/False) In order to configure a file adapter, a developer should

be skilled in implementing JCA compliant code.

f) (True/False) The file adapter may be configured with a logical file

name or a physical file name.

g) (True/False) It is a best practice to configure a file adapter with a

physical name.

h) (True/False) A database adapter may be configured to poll for new or

changed records in a database.

i) (True/False) A database adapter may be configured to execute stored

procedures in the database.

j) (True/False) Chapter 3 described Oracle's NoSQL adapter in detail.

Part 10) Clearly and fully sketch the following patterns from EIP (5 Points).

a) File Transfer pattern. (1 Points)

b) Shared Database pattern. (1 Points)

c) Remote Procedure Call pattern. (1 Points)

d) Messaging pattern. (1 Points)

e) Canonical Data Model. (1 Point)

Part 11) From IBM’s CMU Reference Arcitecture (15 Points)

True/False

1. In the Introduction, the document suggests that to move forward, CMU will need to rewrite significant pieces of existing functionality. \_\_\_\_\_\_\_\_\_\_\_\_\_
2. In the Introduction, it is pointed out that CMU is fortunate in that the field of education is likely to change little over the years. \_\_\_\_\_\_\_\_\_
3. We studied four major patterns that are used in application integration. The current CMU SIS relies most heavily on the messaging pattern. \_\_\_\_\_\_\_\_
4. The document points out that performance is more important than interoperability and that performance is of primary concern in building an SOA. \_\_\_\_\_\_\_\_
5. The document argues that security and auditability are of very high importance when building an SOA.

Part 12) Industry perspectives from the articles from BIAN. (10 Points)

True/False

a) According to research released a few months ago by Infosys and Ovum, around

three quarters of European banks are using outdated core systems. \_\_\_\_\_\_\_\_

1. According to Hans Tesselaar, if we want to reduce costs the industry should be provided with an open reference model that includes generic service definitions. \_\_\_\_\_\_\_\_\_\_
2. Microsoft is a founding member of BIAN. \_\_\_\_\_\_\_\_\_\_\_

Part 13) Software Engineering Technical Note. (5 Points)

Briefly describe why a bank might utilize SMART from CMU. Be sure to describe what SMART is and why it would be used.