

Name _____

Lastname _____

Student number

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Advanced Web Technologies academic year 2007-08

Rules

- This is a closed books exam.
- The operation of any electronic device is prohibited (e.g, no calculator, phone or PDA).
- Write clearly and put your name and student number on each page you hand in.

Questions

1. Consider the directed graph in Figure 1 and give:
 - (a) The average indegree, outdegree, and degree
 - (b) The diameter
 - (c) The path from a to e
 - (d) The \mathbf{H} matrix representation of the graph
 - (e) The PageRank at iteration two π_2^T without adjustments, i.e., $\pi_2^T = \pi_0^T \mathbf{H} \mathbf{H}$
 - (f) The stochastically adjusted matrix \mathbf{S} , and the Google matrix \mathbf{G} (supposing $\alpha = 0.75$)
 - (g) Remove one (and only one) link to the graph with the goal of obtaining the maximum decrease of the PageRank of node e. Provide explanations for the choice.

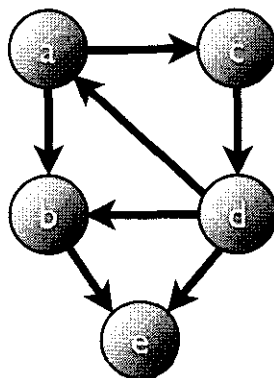


Figure 1: A directed graph.

2. The term 'Semantic Web' refers to a vision on an improved version of the present Web.
 - (a) Sketch this vision, and explain where it differs from the present Web.
 - (b) Also indicate what has to be done to realize the Semantic Web.
3. Considering the Web
 - (a) What is a model of its growth?
 - (b) With which method is the growth computed?
 - (c) Describe the bow-tie model of the Web proposed in 1999.
4. What is the Grid Security Infrastructure (GSI)? Describe how it is used for authentication when submitting jobs on a User Interface machine through a Resource Broker to a Computing Element. What are the steps involved in the authentication process on the different machines?

5. Given the BPEL code below:

- (a) Describe what the process does (make and report any assumption you have made in order to answer the question).
- (b) What is the control flow of the process? Provide a graphical representation of it.
- (c) What happens if we substitute the <flow> tag with a <sequence> tag?

```
<?xml version="1.0" encoding="UTF-8"?>
<process
  xmlns="http://schemas.xmlsoap.org/ws/2003/03/business-process/"
  xmlns:print="http://www.eclipse.org/tptp/choreography/2004/engine/Print"

  <import importType="http://schemas.xmlsoap.org/wsdl/"
    location="../../../test_bucket/service_libraries/tptp_EnginePrinterPort.wsdl"
    namespace="http://www.eclipse.org/tptp/choreography/2004/engine/Print" />

  <partnerLinks>
    <partnerLink      name="printService"
      partnerLinkType="print:printLink"
      partnerRole="printService"/>
  </partnerLinks>

  <variables>
    <variable      name="tentamen"
      messageType="print:PrintMessage" />
    <variable      name="mark"
      messageType="print:PrintMessage" />
  </variables>

  <flow>
    <assign>
      <copy>
        <from><literal>Tentamen</literal></from>
        <to>$tentamen.value</to>
      </copy>
    </assign>
    <assign>
      <copy>
        <from><literal>Mark</literal></from>
        <to>$mark.value</to>
      </copy>
    </assign>
  </flow>

  <invoke partnerLink="printService" operation="print" inputVariable="tentamen" />
  <invoke partnerLink="printService" operation="print" inputVariable="mark" />
</process>
```