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THE UNIVERSITY
of LIVERPOOL

MAY 2006 EXAMINATIONS

Bachelor of Science : Year 3
No qualification aimed for : Year 1

Advanced Web Technologies

TIME ALLOWED : Two Hours and a Half

INSTRUCTIONS TO CANDIDATES

Attempt all questions in Section A.
Attempt **TWO** questions from Section B only.

If you attempt to answer more questions than the required number of questions (in any section), the marks awarded for the excess questions will be discarded (starting with your lowest mark).

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SECTION A

Attempt ALL questions from this section. Section A is worth 50 marks

1. Describe SAX and DOM, and outline the reasons that may lead to the choice of one of them. **(10 marks)**

2. Define the syntax and semantics of queries on logic programs using monotonic rules. **(10 marks)**

3. Describe the main components of a SOAP message. **(10 marks)**

4. Describe the expressive power of OWL-DL and OWL-Lite. Illustrate the answer with examples of the type of axioms that can be expressed. **(10 marks)**

5. Define the meaning of *reification* and explain what it is used for. Illustrate its use with an example. **(10 marks)**

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SECTION B

Attempt TWO questions from this section. Each question is worth 25 marks. Credit will be given for the best 2 answers only.

1. Sketch an ontology for use by a music store which covers the items listed below. Draw the hierarchies as trees, or UML-style diagrams. There is no need to use OWL syntax. Indicate the hierarchies for both concepts (including classes and individuals) and attributes (properties). For concepts, distinguish clearly between classes and individuals, and for classes indicate whether they are disjoint. Indicate, for each property, whether it is symmetric, unique, or transitive. Note any ambiguities, and key design assumptions.

   Items to be represented:

   - Information about artists. Artists can be solo artists and/or groups. When dealing with groups, data about the members have to be recorded. If artists are also musicians (i.e. famous for playing a certain instrument like guitar, violin, and so on..) information about the instrument played must be modelled. Relations between solo artists and groups must be represented. For instance, Paul McCartney is a solo artist and a member of the Beatles. The ontology should also model information about:
     - the artistic name of the artist (for instance Bono, singer of the group U2, aka Paul Hewitson);
     - homepages collecting informations about the artists (if it/they exist(s));
     - the music genre of the artist;
   - The ontology needs to include information about records, such as:
     - the name of the record,
     - the year it was produced,
     - the number of tracks it contains
     - the artist who has recorded the album.
     - information about production Companies (or Labels). In particular: name of the Label, records produced by the Label, and artists signed by the Label.
     - information about the songs composing a record.

   (25 marks)

2. Mr John Doe looks on eBay for a holiday package. He has the following requirements:

   - Mr Doe is looking for a holiday that lasts for at *at least* two weeks;
   - The accommodation provided by the holiday package should host *at least* 3 people;
   - The accommodation provided by the holiday package should include a kitchenette;
   - Tennis facilities should be provided by the holiday package;
   - The accommodation provided by the holiday package should be less than 45 minutes by car from an airport; In addition, Mr Doe is willing to bid an extra 50 per additional person that can be hosted, and 500 more if child care facilities are provided;
   - Mr Doe cannot pay more than 3,000;
   - Given the choice, Mr Doe would prefer the cheapest option. If more than one holiday resort satisfies the price constraint, then Mr Doe's second priority is the availability of child care facilities.

   Using the predicates below, provide a formal representation of Mr Doe's requirements (including the additional ones) in non monotonic rules. Explain any assumptions made when formalising the requirements, such as that Mr Doe can bid on at most one holiday, or the bid is acceptable by the seller. **(25 marks)**

duration(x, y)	y is the duration of holiday x in weeks;
beds(x, y)	the accommodation provided by holiday package x can host y people;
price(x, y)	y is the price for holiday package x
kitchenette(x)	accommodation provided by holiday package x includes a kitchenette;
tennis-court(y)	the holiday resort provided by holiday package y offers tennis facilities;
distance(x, y)	the holiday resort provided by holiday package x is y minutes by car from an airport;
child-care(x)	the holiday resort provided by holiday package x offers child care facilities;
acceptable(x)	holiday package x satisfies Mr Doe's requirements;
bid(x,y)	Mr Doe is willing to bid y for holiday package x;
cheapest(x)	x is the holiday package with the cheapest price;
reservation(x,y)	x has a reservation price of y;

3. Consider the fragment of an XML document given below.
Provide the XPath expression corresponding to each of the following statements, and explain it in plain English **(25 marks)**:

   a Select the STAFFNO element of the first member of STAFF in the XML document.

   b Select the STAFFNO elements of the first two members of STAFF.

   c Select the LNAME element node of all members of STAFF working at BRANCH "B005".

   d Select all members of STAFF whose salary is greater than 15000.

   e Select all STAFF element nodes without a phone number.

```
<?xml version="1.0" encoding="UTF-8" standalone="yes" ?>
<?xmlstylesheet type="text/xsl" href="staff_list.xsl"?>
<!DOCTYPE STAFFLIST SYSTEM "staff_list.dtd">
<STAFFLIST>
   <STAFF branchNo="B005" salary=30000>
      <STAFFNO>SL21</STAFFNO>
         <NAME>
            <FNAME> John </FNAME> <LNAME> White </LNAME>
         <NAME>
      <POSITION>Manager</POSITION>
      <DOB>1-Oct-45</DOB>
   </STAFF>
   <STAFF branchNo="B003" phone="4023" salary=12000>
      <STAFFNO>SG37</STAFFNO>
         <NAME>
            <FNAME>Ann</FNAME> <LNAME>Beech</LNAME>
         <NAME>
      <POSITION>Assistant</POSITION>
   </STAFF>
</STAFFLIST>
```