Coláiste na Tríonóide, Baile Átha Cliath
Trinity College Dublin
Ollscoil Átha Cliath | The University of Dublin

Faculty of Engineering, Mathematics and Science

School of Computer Science & Statistics

Integrated Computer Science   Trinity Term 2018
BA (Mod) Computer Science and Business
Year 2 Annual Examinations

Information Management 1

Thursday 10th May 2018   RDS Main Hall   09.30-11.00

Prof. Declan O'Sullivan

Instructions to Candidates:

Attempt **two** questions. All questions carry equal marks. Each question is scored out of a total of 25 marks.

You may not start this examination until you are instructed to do so by the invigilator.

Exam paper is not to be removed from the venue

Materials Permitted for this examination:

Non-programmable calculators are permitted for this examination – please indicate the make and model of your calculator on each answer book used.

SOME QUESTIONS REFER TO THE FOLLOWING

FIGURE A:

```
<?xml version="1.0" encoding="UTF-8" ?>

<breakfast_menu>

  <food calories='650'>

    <name>Belgian Waffles</name>

    <price>$5.95</price>

    <description>Two of our famous Belgian Waffles with plenty of real maple
syrup</description>

</food>

  <food>

    <name>Strawberry Belgian Waffles</name>

    <price>$7.95</price>

    <description>Light Belgian waffles covered with strawberries </description>

    <description> Covered in whipped cream</description>

</food>

  <food calories='900'>

    <name>Berry-Berry Belgian Waffles</name>

    <price>$8.95</price>

</food>

<food calories='600'>

    <name>French Toast</name>

    <price>$4.50</price>

    <description>Thick slices made from our homemade sourdough bread</description>

</food>

</breakfast_menu>
```

SEE NEXT PAGE FOR QUESTIONS

1. Using UML diagrams and associated textual descriptions, design an information system to support aspects of the operation of an **Airport** (for example Dublin or Shannon Airport).

(a) Model at least 6 UML classes (each with at least 2 attributes) representing your information and include labels showing cardinalities, named associations and association roles between the classes.
Do not have more than 2 subclasses modelled in your model. Only include maximum of one aggregation association. [8 marks]

(b) Model 2 UML use cases (include diagrams and standard textual descriptions (e.g. preconditions etc.)) that will be supported by these classes. [6 marks]

(c) Provide a UML Activity diagram for each use case that indicates the flow of activities that will implement the UML use case provided in part (b) above. [6 marks]

(d) Provide a detailed commentary on the design decisions you took during the modelling tasks (a) to (c) above, and any ethical concerns that may need to be addressed during the design or implementation of the system. [5 marks]

[Total 25 Marks]

2. (a) Describe how DOM and SAX parsers work, and in what circumstances you might use one rather than the other. [4 Marks]

(b) Use DTD notation to fully describe the XML document shown in Figure A. Provide explanations for your design decisions. [8 Marks]

(c) Define and explain XQuery statements for each of the following queries posed over the document in Figure A (which shows food items on a breakfast menu). Show expected results and explain your design decisions.

I. Return within a single new element called 'Healthy_options', all the names of those food items which have calories less than 800 , with each name separated by a semicolon ';'.

II. Return a new element called "Waffles_menu" which contains all the food items with 'Waffles' in the name.

III. Return all the price elements but include a new element which is the average price of items on the menu.

IV. Return only the second of the set of food items on the menu.

[13 Marks]
[Total 25 Marks]

3. The move to Linked Data (and eventually the Semantic Web) will bring benefits, compared with how data is currently available on the web, for application developers, such as: ability to deal with ad-hoc contexts, easy extensibility of data schemas, ease of querying.

Discuss and use diagrams to illustrate your points.

Include at least the following points in your answer:

- Explain the concept of Linked Data.

- Explain the concept of Semantic Web.

- Explain how the W3C RDF standard turns graphs of data into triples.

- Explain the extensibility of the RDF graph model.

- Explain the Linked Data principles.

- Explain the difference between Linked Data and Linked Open Data.

- Explain how RDF is queried.

- Explain in what way does OWL build upon RDF, and what benefits this brings.

[Total 25 Marks]