**STID3113 CONFIDENTIAL**

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**UUM**
Universiti Utara Malaysia

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**FINAL EXAM**
**SECOND SEMESTER SESSION 2011/2012**

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<th>COURSE CODE / NAME</th>
<th>STID3113/ RESEARCH METHOD IN IT</th>
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<tr>
<td>DATE</td>
<td>5 JUNE 2012 (TUESDAY)</td>
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<tr>
<td>TIME</td>
<td>2.30 – 5.00 P.M. (2 ½ HOURS)</td>
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<td>VENUE</td>
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**INSTRUCTION:**

1. This exam booklet contains **NINE (9) structured questions** on **TWELVE (12) printed pages** excluding the cover page.
2. Answer **ALL QUESTIONS** in the space provided **WITHIN THIS EXAM BOOKLET**.
3. Submit the exam booklet containing your complete answers to the exam invigilator.

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**DO NOT OPEN THIS EXAMINATION PAPER UNTIL INSTRUCTED**

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1. Define the following types of research:

a) Basic Research (2 marks)

b) Applied Research (2 marks)

c) Academic Research (2 marks)

d) Industrial Research (2 marks)
2. Read the literature review below.

Although thus far we have concentrated on using Cloud Computing for interactive Software as a Service (SaaS), Cloud Computing presents a unique opportunity for batch-processing and analytics jobs that analyze terabytes of data and can take hours to finish. If there is enough data parallelism in the application, users can take advantage of the cloud’s new “cost associativity”: using hundreds of computers for a short time costs the same as using a few computers for a long time. For example, Peter Harkins, a Senior Engineer at The Washington Post, used 200 EC2 instances (1,407 server hours) to convert 17,481 pages of Hillary Clinton’s travel documents into a form more friendly to use on the WWW within nine hours after they were released [3]. Programming abstractions such as Google’s MapReduce [16] and its open-source counterpart Hadoop [11] allow programmers to express such tasks while hiding the operational complexity of choreographing parallel execution across hundreds of Cloud Computing servers. Indeed, Cloudera [1] is pursuing commercial opportunities in this space. Again, using Gray’s insight, the cost/benefit analysis must weigh the cost of moving large datasets into the cloud against the benefit of potential speedup in the data analysis. When we return to economic models later, we speculate that part of Amazon’s motivation to host large public datasets for free [8] may be to mitigate the cost side of this analysis and thereby attract users to purchase Cloud Computing cycles near this data.

By: Michael Armbrust et. Al, UC Berkeley Reliable Adaptive Distributed Systems Laboratory, February 10, 2009

References:
2. TC3 Health Case Study: Amazon Web Services.
4. Amazon.com CEO Jeff Bezos on Animoto.
   http://blog.animoto.com/2008/04/21/amazon-ceo-jeff-bezos-on-animoto/.


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Based on the literature review, answer the following questions:

a) Suggest a suitable title for the literature review. (2 marks)

b) Give FIVE (5) reasons why it is a good literature review. (10 marks)

c) Suggest TWO (2) ways to improve the literature review. (4 marks)
3. Read the following passage below.

With the increase in applications of wireless sensor networks, data extraction and visualisation have become a key issue to develop and operate these networks. Wireless sensor networks typically gather data at a discrete number of locations. By bestowing the ability to predict inter-node values upon the network, it is proposed that it will become possible to build applications that are unaware of the concrete reality of sparse data. The aim of this thesis is to develop a service for maximising information return from large scale wireless sensor networks. This aim will be achieved through the development of a distributed information extraction and visualisation service called the mapping service. In the distributed mapping service, groups of network nodes cooperate to produce local maps which are cached and merged at a sink node, producing a map of the global network. Such a service would greatly simplify the production of higher-level information-rich representations suitable for informing other network services and the delivery of delivery of field information visualisations.

The proposed distributed mapping service utilises a blend of both inductive and deductive models to successfully map sense data and the universal physical principles. It utilises the special characteristics of the application domain to render visualisations in a map format that are a precise reaction of the concrete reality. This service is suitable for visualising an arbitrary number of sense modalities. It is capable of visualising from multiple independent types of the sense data to overcome the limitations of generating visualisations from a single type of sense modality. Furthermore, the proposed mapping service responds to changes in the environmental conditions that may impact the visualisation performance by continuously updating the application domain model in a distributed manner. Finally, a new distributed self-adaptation algorithm, Virtual Congress Algorithm, which is based on the concept of virtual congress is proposed, with the goal of saving more power and generating more accurate data visualisation.

By Mohammad Hamoudeh, University of Wolverhampton, 2008
Based on the above passage, answer the following questions:

a) Identify a possible problem statement from the passage. (2 marks)

b) What is the hypothesis for the research? (2 marks)

c) Describe THREE (3) objectives of the research. (6 marks)

d) Infer the type of research method employed and the reason for the selection. (4 marks)
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e) Suggest a suitable topic for the research.  

(2 marks)

4. Read the following abstract and answer the questions that follow.

In this paper we evaluate the accuracy of the combined sensor network simulation tool COOJA/MSPSim that consists of COOJA, a sensor network simulator, and MSPSim, a sensor node emulator. The evaluation is made using Contiki's power profiler as base-line [7]. The power profiler measures time spent in different modes for each chip on a node and calculates power consumption by multiplying time with pre-measured current draw and battery voltage. We compare experimental results measured on real sensor nodes with simulation results for three different MAC protocols. The MAC protocols are of varying types, one is TDMA based (CoReDac) and one is low power probing (LPP), and the final one is based on low power listening (X-MAC). The results of the evaluation indicate that COOJA/MSPSim enables accurate network-scale simulation of the power consumption of sensor networks.


a) Identify the independent and dependent variables in the research.  

(4 marks)

b) How are the results validated?  

(2 marks)
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5. The following terms may be found in a research proposal. Explain the meaning of each term in the context of a research proposal.

   a) Assumptions (2 marks)

   b) Proof-of-Concept (2 marks)

   c) Control Group (2 marks)

6. Describe **FOUR (4)** qualifying criteria for an interviewer. (8 marks)
7. Describe **FIVE (5)** methods for data collection. (10 marks)
8. Two types of bar graphs, Bar Graph A and Bar Graph B are used to illustrate the types of laptops sold by Swift Technologies. Answer the questions based on the two bar graphs.
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a) How many HP laptops were sold by Swift Technologies in 2009? (2 marks)

b) What is the total number of Dell laptops sold by Swift Technologies from 2009 to 2011? (2 marks)

c) What brand of laptops has the lowest total number of sales from 2009 to 2011? (2 marks)

d) What is the difference between the number of Toshiba laptops sold in 2010 and 2011? (2 marks)

e) What is the difference between the total number of Dell laptops and total number of Toshiba laptops sold by Swift Technologies from 2009 to 2011? (2 marks)

f) What is the difference between the total laptops sold in 2011 and the total laptops sold in 2010? (3 marks)

g) What is the percentage increase in the total laptops sold from 2010 to 2011? (3 marks)
h) What information is better represented in Bar Chart A than in Bar Chart B?  

(2 marks)

i) What information is better represented in Bar Chart B than in Bar Chart A?  

(2 marks)

9. Refer to the two bar graphs in Question 8. Suppose you are the Sales Manager in Swift Technologies. Write a report to the Managing Director of Swift Technologies on the sales of laptops in 2011. Present the total sales of the various brands of laptops in 2011 in the form of a pie chart.  

(10 marks)