

UNIVERSITY OF LIMERICK

COLLEGE OF INFORMATICS AND ELECTRONICS

Department of Computer Science
and Information Systems

Assessment Paper

Semester 2

Module Code: CS4012

Duration of Exam: 2 $\frac{1}{2}$ Hours

Lecturer: C. Ryan

Academic Year: 2007/08

Module Title: Representation and Modelling

% of Total Marks: 50%

Instructions to Candidates:

- Answer any **five** questions
- All questions carry equal marks

- (a) What is the difference between *modelling* and *representation*? (2 marks)
 - (b) What are the advantages and disadvantages of using models? (6 marks)
 - (c) Describe each of the following types of model using an example to illustrate your answer: *Iconic*, *Scale*, *Analogue*, *Symbolic*. (6 marks)
 - (d) What are the three rules for controlling agents in *Boids*-like simulations? (6 marks)
- (a) What is the difference between a *continuous* and a *discrete* space? Why would a continuous space need to be discretized? Give an example, indicating what factors affect it. (4 marks)
 - (b) Describe how to convert numbers from an arbitrary base to base 10. (2 marks)
 - (c) Perform the following conversions
 - i. 11011_2 to decimal and to hex
 - ii. $AB3E_{16}$ to decimal and octal

- iii. 841_{10} to binary and hex (6 marks)
 - (d) Describe briefly how the *RGB* colour scheme operates. (5 marks)
 - (e) What does ASCII stand for? What is it used for? Does 10000001_2 (65_{10}) represent the letter *A* (its entry in the ASCII table) or the number 65? (3 marks)

- 3.
 - (a) Explain what a *file format* is. (5 marks)
 - (b) Explain with examples what the differences between *plain text* and *binary* files are. (5 marks)
 - (c) What is RTF? Why is it useful? (5 marks)
 - (d) Explain in detail how the BitTorrent protocol works. What is it about BitTorrent that is illegal? (5 marks)

- 4.
 - (a) What is a mark up language? (4 marks)
 - (b) In terms of HTML, what is a layout engine? Explain why layout engines necessitate the need for standards. (4 marks)
 - (c) Give the (approximate) code to produce the following sentence in each of \LaTeX , HTML and RTF
 ...Text **from** a *file* that... (4 marks)
 - (d) In terms of HTML, what are CSS? Why are they useful? Give the standard rules of precedence for style definitions. (4 marks)
 - (e) Write the HTML code for the page in Appendix 1. There is no need to write out the long paragraphs. It is enough to give the start and the end of each so it is clear what paragraphs you are dealing with. (4 marks)

5. (a) What are *lossy* and *lossless* compression? What are the advantages and disadvantages of each? (4 marks)
 - (b) Describe briefly how LZW works. (4 marks)
 - (c) Perform simple LZW compression on the following string
RRGBGBGGBRGBBGBRRGBGBGBGBBBRRRBGBG (6 marks)
 - (d) Compare and contrast JPG, GIF and TIFF. (6 marks)
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6. (a) Describe audio sampling in terms of *sampling rate*, *bit depth* and *bit rate*. What effect does each have on the overall sound quality? Use a diagram to illustrate your answer. (8 marks)
 - (b) What is *Psychoacoustic Marking*? How does the MP3 compression method make use of it? (4 marks)
 - (c) What is MIDI? Why is it not an appropriate way to encode songs typically encoded as MP3? When is it a good way to download something? (4 marks)
 - (d) What is streaming? What are the advantages and disadvantages of using streaming? Give an example of a **non-web based streaming technology**. (4 marks)
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7. (a) What are the differences between relative and absolute addressing in Spreadsheets? Give an example of where you would use each. (4 marks)
 - (b) Given the spreadsheet below, write the following formulae, using relative and absolute values where appropriate, and make sure that when your functions are copied they will still work. **Note:** The second spreadsheet is there for illustrative purposes only, to show where formulas will be copied to. Work from the **first** one. (16 marks)
 - i. E2: Calculate total marks based on the breakdown in cells B11, B12 and B13. Do this in such a way that if the breakdown is changed, the way the marks is calculate will also automatically change. This formula will be copied into the locations below it. Write it in such a way that it will still function properly.

- ii. F2: If a student scores greater than the value in B9 write “Yes”, otherwise write “No”. Again, this formula will be copied, so write it in such a way that it will still function properly.
- iii. B7: Give a formula to calculate the averages for Assignment 1. Do so in such a way that it can be copied for Assignment 2 and the Exam.
- iv. B8: As for B7, but the formula should calculate the Standard Deviation.

	A	B	C	D	E	F
1	Student	Assign1	Assign2	Exam	Final	Pass?
2	Ryan	43	60	80		
3	O'Riordan	88	70	81		
4	Murphy	33	3	79		
5	Larkin	59	29	5		
6	Jones	21	54	7		
7	Average					
8	Standard Dev.					
9	Fail	40				
10						
11	Assign1	25				
12	Assign2	25				
13	Exam	50				
14						

The completed spreadsheet will look like:

	A	B	C	D	E	F
1	Student	Assign1	Assign2	Exam	Final	Pass?
2	Ryan	43	60	80	65.75	Yes
3	O'Riordan	88	70	81	80	Yes
4	Murphy	33	3	79	48.5	Yes
5	Larkin	59	29	5	24.5	No
6	Jones	21	54	7	22.25	No
7	Average	48.8	43.2	50.4	48.2	
8	Standard Dev.	25.9653615	27.0868972	40.5438035	25.2706599	
9	Fail	40				
10						
11	Assign1	25				
12	Assign2	25				
13	Exam	50				
14						

Appendix 1



**Locke's Box
Company**

Please find enclosed an invoice for your order dated 30/April/2008

Invoice

Item	Qty	Cost
Grey Flat	4000	300
Black Flat	5000	350
Total		650

>> Payment terms *30 days*

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- Locke's Box Company
 - 815 Oceanic Drive
 - Limerick

Locke's Box Company



