



UNIVERSITY OF NAIROBI

SECOND SEMESTER EXAMINATIONS 2012/2013

FIRST YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE

CSC 121: PROGRAMMING AND PROBLEM SOLVING

DATE: MAY 6, 2013

TIME: 9.00 A.M. – 11.00 A.M.

Answer Question 1 and two others

All programs must be written in C

For each question answered (Q2 to Q5) Use stepwise refinement to develop the algorithm
[7 Marks] Translate the algorithm to a C language program [8 Marks]

Question 1 (20 Marks)

- (a) Briefly describe your understanding of the algorithm development technique commonly referred to as the stepwise refinement. State any two attributes of a good algorithm.

[5 Marks]

- (b) Demonstrate your understanding of the algorithm development technique as you have outlined in your answer to question 1(a), by developing an algorithm for the problem described below.

[7 Marks]

You are required to develop a program which drills a user in English-French vocabulary. Two arrays *English* and *French* are used to hold 10 words each such that *French[j]* contains the French equivalent of the word in *English[j]*. The program displays an English word and the user is requested to type the French for it. The user scores 5 marks for every correct answer and 1 mark for every incorrect answer. The user is drilled on 5 words (1 to 5 or 6 to 10) and a score is displayed for each word entered. At the end of the drill a total score is displayed. The English and French words are hard coded in the program.

- (c) Provide an implementation of the algorithm you have developed in 1(b). Show how you would document (inline documentation) your program.

[8 Marks]

Question 2 (15 Marks)

A survey of 10 pop records numbered 1 to 10 is made. Each of the 30 persons surveyed, votes for their top three records in order, by specifying three record numbers representing their choice of first, second and third. First choice scores 4 points, second choice scores 2 points and third choice scores 1 point. The survey data recorded in file "surveydata.txt" consists of 30 lines of voter's choices. You are required to develop a program that reads the survey data, processes the votes and prints the most popular record and the points obtained. The survey data should be preliminarily processed and stored in a two dimensional array surveyResults of 30 rows and 10 columns containing the points awarded to each record following each voter's choice. Appropriate validation should be done while reading to ensure that a person does not vote for the same record more than once.

Question 3 (15 Marks)

Given the problem in question 1(b), you are required to develop parts of a program which for easier manipulation, stores the English and French words required for the drill in an array of struct. Each element of the array contains an English word and its French equivalent. The words used for the drill can from time to time be changed to provide for different levels of challenge. Changes (if any) are entered into a file "changes.txt" in the form shown below. Each line of text shows the record to be changed and the changes to be made. You are required to develop two functions which use array declared as global variables. One function can be called to either read from or write to the binary file "EnglishFrenchWords". The function reads from binary file into the array of struct or writes from the array of struct to the binary file a specified number of records. The second function reads the changes.txt file and updates the binary file (not array) containing records of English and equivalent French Words accordingly.

5 EnglishWord FrenchWord

9 EnglishWord FrenchWord

Question 4 (15 Marks)

You are required to develop a program to extract data from a computer file containing results of the Mock KCPE exams for standard eight pupils in Turkana County. The Mock KCPE was carried out for 300 students. The county education office computer on which the results were stored crashed and results stored on the hard disk were lost. The secretary was requested to type the data from hard copy documents into a computer file (MockKCPE2012.txt) from which the computerised results can be reconstructed. The data for every student who sat for the mock exam is entered into the file in the following format:

Jason 48% 64% 39 % 60%

Mary 50% 60% 43% 50%

Develop a function *ExtractNameAndMarks* which when passed a string of characters e.g. Jason 48% 64% 39 % 60% read from the file and position of the student in the file will extract both the name and marks and store the marks in a global array of 300 struct each containing the name (array of char) and marks(int) for each of the four subjects. Assume no student obtains 100% and that items in a line are separated by spaces. Show your declaration of all global variables.

Question 5 (15 Marks)

You are required to develop a function to process the KCPE results of the 300 students in Turkana county (see Question 4). The function is passed an array of 300 struct containing each student's name and marks and is expected to compute and display the following results; (i) The name and average mark of the best student and (ii) The average mark for each of the four subjects