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|  | Tallinna Tehnikaülikool  **Arvutisüsteemide instituut** |
|  | **Exam "PROGRAMMEERIMINE II"** |

***Although the exam gives only 50p, its result shows what you have learned when you pass the subject - at least for yourself. Now how the points are divided and this is also a guide for solving the given task.***

***Of course, there must be no syntax errors using the gcc and no global variables have been used.***

***1 (total 15p). The task is divided into parts, functions, at least 3 10p***

***1.1 Prototypes for all functions. -3p***

***1.2 There is no functions without parameterless-2p***

***2. (total 20p) Data are described as records, new(typedef) data types are created -5p***

***2.1 record size control in input file and memory allocation for dynamic array -10p***

***2.2 from the entered file with record size control and allocated memory as a stack - 15p***

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***2. (15 p in total) File processing..***

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***2.3Program correctly divided between 3 files -5p***

. TASK 1.

Characters (Latin letters and Arabic numbers with the sequence number of the entry) are entered from the file f9.txt, up to the first vowel. Output the entered consonants with order numbers), in alphabetical order, to the display screen and to the TU.txt file. The numbers output only to the display screen in order of input.

Task2

1. from the file F1, the N,size of the polynomial P (2<=N<=10) is entered and in natural order (i.e. from the factor of the highest degree)

the real terms of the polynomial P are placed on the stack

{Ai},i=N..0(if. N=3, then

P=A[3]\*X\*\*3+ A[2]\*X\*\*2 + A[1]\*X\*\*1+ A[0]\*X\*\*0);

1. the polynomial value is output to file F2 S=PN(X2 ) (X is entered from the keyboard) and then all members with sequence numbers

NB!Using recursion gives a 3p bonus.

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**TASK 2.**

**Natural numbers M and K are entered from the file aa.txt (K<=M max M=15);**

**Then calculated and placed on the stack value of P**

**K-1**

**P = 1/K! \* ∏(M – i)**

**i=0**

**with all intermediate factors of the product P with the sequence number of the operations. (eg. M=3 K=3, then the factors are 1-1/6, 2-3, 3-2, 4-1).**

**Data from the stack is output to the screen and to the Fb.txt file using the LIFO rule.**

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TASK 3

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**TASK 4**

**1. from the file F1, the real number elements of the array A are entered and placed on the stack with their indices (sequence number).**

**2. an array with H elements is formed and placed on the stack**

**H0 = 1,**

**H1 = X,**

**Hi = X\*Hi-1 – (i – 1)\*Hi-2, i = 2,…,N, where N is determined by the number of elements of A (maxN=15) and X is entered from the keyboard;**

**3. and the elements of array H with sequence number and size are output to file F2**

**N**

**S = ∑Ai\*Hi .**

**i=0**

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**Task 5**

**from the file R.txt, records are entered with the structure Group:**

**– strings Code and Name;**

**2. the results of the exam are entered from the second file E.txt**

**– record with Subject structure:**

**– strings Code (subject code) and Name (subjecte name)**

**and the record Result with the structure:**

**– natural number Grade (0..5)**

**– string Code (student code);**

**3. the exam sheet completed in the V.txt file is issued (i.e. students related to the subject and the result)**

**4. The program must work with arbitrary initial data. The raw data provided is for testing purposes only.**

Data:

1.Fail:R.txt Group 2. Fail:E.txt

010111LAS Subject 3103IAX Projekt

Karu Ott Result

010001LAP 0 010002MAM

Lepa Triinu 5 010111LAS

029999LAC 5 027755AAA

Kärbes Cece 4 980001LAE

019999LAB 3 01999LAB

Vaht Manni 4 010001LAP

010200LAE 2 010200LAE

Vader Rein 1 059999FAR

4 060000KAA

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**Task 6**

**1. The program reads records from file F1 with the structure:**

**• Product, text (product name);**

**purchased in a reduced quantity. Cash balance and unpurchased products with quantities are printed on the screen.**

**NB! Using recursion gives a 3p bonus**

**• Quantity, positive integer (pieces);**

**• Price, positive real number (price per piece).**

**Entries are in order, with higher priority items first. The number of records is not specified.**

**2. The real number S (the amount of money available) is entered from the keyboard.**

**3. The program outputs to file F2 the names and quantities of products that can be bought for S. If there is enough money, the entire list reaches file F2 and the balance of money is printed on the screen. If there is a shortage of money, priority will be given to products with a higher priority. If there is not enough money for the desired quantity of a particular product, it is**

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**Ülesanne 7**

**1. natural numbers in the 10th system are entered from the file XX.txt, together with the sequence number of the entry;**

**2. the base of the number system P (1<P<17) is entered from the keyboard;**

**3. every entered number is output line by line in the file TT.txt, together with its sequence number and its shape in the system with the base P.**

**4. The displayed lines must be in ascending order, starting from base 10 in the system**

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**Ülesanne 8**

**1. From the keyboard, enter the names of the original data and result files na1, na2, nt1, nt2;**

**2. Insert structures (max15) from file na1:**

**county - char[ ]**

**city - char[ ]**

**3. Insert structures from file na2 (max 10)**

**name - char[ ],**

**address - with structure:**

**city - char[ ]**

**tanav - char[ ]**

**house - int,**

**4. Sort the entries entered from file na2 by county (they must be in alphabetical order) and save them to file nt1 and display them on the monitor screen.**

**Output to file na2 all those raw data records that could not be placed in file na1.**

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**Ülesanne 9**

**. records with the Student structure are entered from file F1:**

**• Name – string,**

**• Code (student code) ten letters;**

**2. From the file F2, the entries Exam results are inserted with the structure:**

**• record with Substance structure:**

**\*name- string**

**\*code- string**

**• and entries records with the structure Result:**

**\*Tud (student code) – string,**

**\*Grade - natural number (0..5);**

**3. Subject code are entered from the keyboard and the completed exam sheet is displayed on the screen (a table with a header where students' data + results).**