

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)

Department of Computer Science and Engineering (CSE)

SEMESTER FINAL EXAMINATION

SUMMER SEMESTER, 2016-2017

DURATION: 3 Hours

FULL MARKS: 150

CSE 4603: Unix Programming

Programmable calculators are not allowed. Do not write anything on the question paper.

There are 8 (eight) questions. Answer any 6 (six) of them.

Figures in the right margin indicate marks.

1. Suppose you have created a new programming language called MICRO-C. As the name suggests, the language is a very tiny version of plain old C language. In MICRO-C, you put the following features: 25

- The programs, written in MICRO-C, consist of only a *header* section and a *main* function.
- The *header* section allows the programmer to include the required *library* files which are needed for the program.
- MICRO-C has three different library files: *standard_io.micro*, *standard_lib.micro* and *micro_c_string.micro*
- To refer to any of these library files in a program, the file is needed to be included. For example, the syntax to include *standard_io.micro* is like: `!include<standard_io.micro>`. Note the preceding `!include` and the triangular braces in the syntax.
If it is necessary to include more than one library files, a programmer will need to write statements like this for each of such files.
- These library files are stored in `/usr/bin/micro_c` directory. If any of the files included in a program is missing, it is considered as a syntax error.
- The *main* function of the program should be followed by an opening and closing parentheses. Moreover, the body of the function are written inside a pair of curly parentheses, which are placed in two separate lines. So, the first two of the following four examples are correct, whereas, the third and fourth ones are incorrect syntax. Example:

Table1: Valid and invalid syntax of main function

maiN(){ }	Main() { }	mAin () { }	main(){ }
Correct Syntax		Incorrect Syntax	

As you can notice, the function name is case-insensitive.

Now consider a scenario where you are given a program written in MICRO-C and your task is to find the syntax errors of this program. The programs you are given only have a *header* section and a *main* function. Use *bash scripting* and *awk*.

2. Use perl script to create an Address book. The fields of the Address book are: Name, Address, Phone, Mobile, and Email. The fields are placed inside triangular parentheses `<...>`. Each line of the address book's file is an entry. The script should take a list of inputs. The options indicate the task at hand. `-c` means to create a new entry. This should be followed by the fields. `-r` means to read all the entries and output them in a terminal. `-d` takes a line number as input and deletes the corresponding entry. `-f` takes a string as input and outputs the names that contain the given string. 25

3. a) What are the main differences between Unix and Linux? Write short note on SSMTP. 5+2
 b) What is a *cron job*? Write the commands to find a list of files in the background and mail the location of the files to a specific address. 10
 c) With proper example, write the commands to do the following: 4×2
- Create a new user
 - Give the user 'sudo' privilege
 - Change a file's ownership
 - Change the current user
4. a) Write a command pipeline to find files in a directory hierarchy that have the '.ts' extension and delete them. 5
 b) Use crontab to schedule a script that removes the files in a directory hierarchy that have '.ts' extension and delete them at the start of each day. 5
 c) Write a command pipeline to find the valid ipv4 addresses in a list of files, sort the addresses and store the unique addresses in a separate file. A valid ipv4 address display the following properties: 15
1. If it starts with 25, next number should be 0 to 5 (250 to 255)
 2. If it starts with 2, next number could be 0-4 followed by 0-9 (200 to 249)
 3. The numbers range from 0 to 255
5. a) Write a cron task that will be executed on every Friday at 2:30 pm 5
 b) The ".csv" files in table 2 have results of students in four different semesters. The columns of each result sheet are separated by a semi-colon (;). 20

Table2: Results of student of four different semesters

second_semester.csv	fourth_semester.csv	sixth_semester.csv	eight_semester.csv
id; name; cgpa; grade 21; sa; 3.64; B 22; sb; 3.85; A 23; sc; 3.59; B 24; sd; 2.00; D 25; se; 1.50; F	id; name; cgpa; grade 41; fa; 3.94; A+ 42; fb; 2.85; C 43; fc; 3.55; B 44; fd; 3.00; B 45; fe; 2.50; D	id; name; cgpa; grade 61; ssa; 3.24; B 62; ssb; 3.45; B 63; ssc; 3.69; B 64; ssd; 4.00; A+ 65; sse; 1.50; F	id; name; cgpa; grade 81; ea; 2.64; C 82; eb; 3.85; A 83; ec; 3.50; B 84; ed; 2.00; C 85; ee; 4.00; A+

Now use perl script to answer the following questions:

- Write a perl script that takes any number of result sheets in this format as input and calculates the average cgpa for each semester.
- What percentage of the students gets an A+ in all the semesters? What percentage of them fails?
- Output the number of students who got their results in each semester?

6. a) Details of some files are given below:

Table3: list of files in 'buetcse' home

```
buetcse@localhost:~$ ls -l /home/buetcse
-r-x----- 1 buetcse buet 38 August 11 13:36 file1
----r-x--- 1 cuetese cuet 460 August 11 15:53 file2
-rw-rw-r-- 1 buetcse buet 37 August 11 14:24 file3
-rw-rw-r-- 1 buetece buet 93 August 11 16:13 file4
dr-x---r-x 2 cuet cuet 4096 August 16 12:42 dir1
dr-x---r-x 2 buet buet 4096 August 16 12:44 dir2
```

Now, write commands to complete the following tasks:

- Create three new users 'iut', 'iutce' and 'iuteee'
- Create a new group 'iut'

- Add 'iut', 'iutcese' and 'iuteee' to the groups 'iut'
 - Give 'iut', 'iutcese' and 'iuteee' users the 'sudo' privilege
 - Change active user to iut and create directory 'dir3'
 - Change the files' owners owned by 'cuetcese' to 'iutcese' and change the group to 'iut'
 - Change the files' owners owned by 'bueteee' to 'iuteee' and change the group to 'iut'
 - Login as 'buetcese' and change the file1's permission so that only 'buet' group members can read or execute the file. Do the same for file3. Revoke all other permissions for those two files.
 - Login as the owner of dir3 and change the permission of dir3 so that only the owner of the dir3 can list the contents of the directory and also enter into the directory. The group members should list the contents of dir3 but cannot enter. The rest of the users should not be able to do either.
 - What would be the final situation if now we give the command 'ls -l'?
- b) Consider the following html code segment:

Table 4: Code segment for question 6(b)

```
<html>
  <h1>
    Hello World
  </h1>
</html>
```

Now write 'egrep' command to print the lines with html tags.

7. a) Write a C-Program module that will find palindrome strings. Now use this module in two separate programs. Describe the process to compile and run those programs in Unix. 10
- b) Describe how you can write a background process. 5
- c) Write a command pipeline that will find all the files in a directory hierarchy which have at least one vowel in the last three letters of the filename, sort them and send them to example@mail.com. All these processes need to be done on the background. 10
8. A bank issues has a loan table that records the loans given out to the customers. The loan table has four columns: Customer's name, loan issued payment per instalment and interest rate. The loan issued column represents the total amount received by the customer as loan. Payment per instalment column represents the amount of money to be returned to the bank by the customers in each installment. The bank wants to know how many instalments will it require for each customer to pay their loan back with the interest. For example, one of the rows in the table *loan* has the following entry: 25

John Doe;30000;100;2

This means, John Doe has taken 30,000\$ as loan with 2% interest rate and he is to return the loan on top of the interest in instalments of 100\$. Now John Doe needs to pay 30,600\$ at the end of his instalments. Now it will take him 306 instalments to complete his payment.

Now write a *shell* script called *loan.sh* to do the following:

- a) *loan -f john*: The command will look for the names that matches john and calculate his number of interests and show it on the terminal
- b) *loan -a*: The command with print all the customer's name and the number of instalments required to finish their loan payment.
- c) Describe a pipeline of commands to sort the customers according to their required instalments to pay off the loan.