

**Computer Programming**  
**Bachelor in Biomedical Engineering**  
**Bachelor in Applied Mathematics and Computing**  
**Course 2020 / 2021**

**Exercise sheet 11**

**– SOLUTIONS –**

**File Input/Output (II)**

**Content Table**

|                 |   |
|-----------------|---|
| Exercise 1..... | 3 |
| Exercise 2..... | 3 |
| Exercise 3..... | 4 |
| Exercise 4..... | 8 |

**Note:** To solve some of these exercises you will need a text file containing data for your program to read and process. You are asked to create the text files yourselves, taking as a start the example provided for each exercise. Remember: you can create a text file using the MATLAB editor.

- Click on “New script“
- Copy the example to the file
- Save the file as “xxx.txt”. Remember to select in “Save as type” the option “All files (\*.\*)”. Otherwise MATLAB will save the file with the default “.m” extension.

## Exercise 1

Copy an image file (e.g. from the internet) and put it in the MATLAB folder where you store your exercises. Write a program that reads this file (containing an image), and shows the image on screen.

### SOLUTION

```
clear;
a = imread('cat.jpg');
imshow(a);
```

## Exercise 2

Write a program that reads information from a file about race results that looks like this:

| Dorsal | Name   | Surname       | Hours | Min | Sec |
|--------|--------|---------------|-------|-----|-----|
| 1111   | Duncan | Kibet         | 03    | 30  | 28  |
| 0234   | Heile  | Gebreselassie | 03    | 35  | 12  |
| 6781   | James  | Kwambai       | 03    | 50  | 01  |
| 6331   | Juan   | Pérez         | 03    | 55  | 55  |

The program should print the following lists on screen:

List of runners' dorsals:

```
1111
0234
6781
6331
```

List of runners' names:

```
Duncan Kibet
Heile Gebreselassie
James Kwambai
Juan Pérez
```

List of runners' times:

```
03:30:28
03:35:12
03:50:01
03:55:55
```

## SOLUTION

```
clear;
vfile = fopen('runners.txt','rt');
vline = fgetl(vfile);
vcount = 0;
while feof(vfile) ==0
    info = textscan (vfile, '%s %s %s %s %s %s\n', 1);
    vcount= vcount+1;
    runner(vcount).dorsal    = info{1}{1};
    runner(vcount).name      = info{2}{1};
    runner(vcount).surname   = info{3}{1};
    runner(vcount).time      = [info{4}{1} ':' info{5}{1} ':' info{6}{1}];
end

disp('List of runners' ' dorsals');
for i= 1:vcount
    fprintf('%s\n',runner(i).dorsal);
end
fprintf('\n');

disp('List of runners' ' names');
for i=1:vcount
    fprintf('%s %s\n',runner(i).name, runner(i).surname);
end
fprintf('\n');

disp('List of runners' ' times');
for i=1:vcount
    fprintf('%s\n',runner(i).time);
end

fclose(vfile);
```

## Exercise 3

Write a program that reads a file called 'exam.txt' that contains the results of the last exam of several students. The format of the different lines in the file is:

*studentNIU studentName result*

Then, the program displays a menu on screen that looks like this:

Select one of the following options:

- 1.- Display students' information
- 2.- Modify students' results
- 3.- List students' data
- 4.- Save
- 5.- Exit

Option 1: the program requires a student's NIU and displays the information of the corresponding student

Option 2: the program requires a student's NIU and a value, and updates the information about the student's exam with that value

Option 3: list the information of all students on screen

Option 4: save the file with the current information

Option 5: exit

Example of the content of the file:

10004566 Esther 5

10007834 Marta 8

10006667 Laura 7

10007666 Elena 10

Select one of the following options:

1.- Display students' information

2.- Modify students' results

3.- List students' data

4.- Save

5.- Exit

Your selection is: 1

\*\*\*\* DISPLAYING STUDENT INFORMATION \*\*\*

Introduce a NIU: 10006667

NIU: 10006667

Name: Laura

Result: 7

Select one of the following options:

1.- Display students' information

2.- Modify students' results

3.- List students' data

4.- Save

5.- Exit

Your selection is: 2

\*\* MODIFYING STUDENT RESULTS \*\*

Introduce a NIU: 10007834

Introduce the result: 10

Information updated

Select one of the following options:

1.- Display students' information

2.- Modify students' results

3.- List students' data

4.- Save

5.- Exit

Your selection is: 3

\*\*\* STUDENT LIST \*\*\*

| Name | NIU | Result |
|------|-----|--------|
|------|-----|--------|

|        |          |   |
|--------|----------|---|
| Esther | 10004566 | 5 |
|--------|----------|---|

|       |          |    |
|-------|----------|----|
| Marta | 10007834 | 10 |
|-------|----------|----|

|       |          |   |
|-------|----------|---|
| Laura | 10006667 | 7 |
|-------|----------|---|

|       |          |    |
|-------|----------|----|
| Elena | 10007666 | 10 |
|-------|----------|----|

Select one of the following options:

- 1.- Display students' information
- 2.- Modify students' results
- 3.- List students' data
- 4.- Save
- 5.- Exit

Your selection is: 4

Information saved in the file

Select one of the following options:

- 1.- Display students' information
- 2.- Modify students' results
- 3.- List students' data
- 4.- Save
- 5.- Exit

Your selection is: 5

Bye!

## SOLUTION

```
clear;
cont = 0;
fid = fopen('exam.txt','rt');
if (fid == -1)
    disp('Error when opening the file.');
```

```
else
    while ~feof(fid)
        vNIU      = fscanf(fid, '%d', 1);
        vName     = fscanf(fid, '%s', 1);
        vResult   = fscanf(fid, '%d', 1);
        cont = cont + 1;
        students(cont).NIU      = vNIU;
        students(cont).name     = vName;
        students(cont).result   = vResult;
    end
    fclose(fid);
    option = -1;
    while (option ~= 5)
        fprintf('\n');
        disp('Select one of the following options:');
        disp('1.- Display students' information');
        disp('2.- Modify students' results');
        disp('3.- List students' data');
        disp('4.- Save');
        disp('5.- Exit');
        option = input('Your selection is: ');
        if (option < 1) || (option > 5)
            disp('Incorrect option');
```

```
        else
            fprintf('\n');
            switch option
                case 1
                    disp('**** DISPLAYING STUDENT INFORMATION ***');
                    usNIU = input('Introduce a NIU: ');
```

```

        index = searchStudent(students, usNIU);
    if (index ~= -1)
        fprintf('NIU: %d\n', students(index).NIU);
        fprintf('Name: %s\n', students(index).name);
        fprintf('Result: %d\n', students(index).result);
    else
        disp('Student does not exist');
    end
case 2
    disp('**** MODIFYING STUDENT RESULTS ****');
    usNIU = input('Introduce a NIU: ');
    index = searchStudent(students, usNIU);
    if (index ~= -1)
        nResult = input('Introduce the result: ');
        students(index).result = nResult;
        disp('Information updated');
    else
        disp('Student does not exist');
    end
case 3
    disp('**** STUDENT LIST ****');
    fprintf('Name\tNIU\tResult\n');
    for i=1:length(students)
        fprintf('%s\t%d\t%d\n', students(i).name,
students(i).NIU, students(i).result);
    end
case 4
    fid = fopen('exam.txt','wt');
    for i=1:length(students)-1
        fprintf(fid, '%d %s %d\n', students(i).NIU,
students(i).name, students(i).result);
    end
    fprintf(fid, '%d %s %d', students(cont).NIU,
students(cont).name, students(cont).result);
    disp('Information saved in the file');
end
end
disp('Bye!');
end

function [indexout] = searchStudent(studentVect, niu)
bFound = 0;
cont = 1;
while ((cont <= length(studentVect)) && (bFound ==0))
    if (studentVect(cont).NIU == niu)
        bFound = 1;
    else
        cont = cont + 1;
    end
end

if bFound == 1
    indexout = cont;
else
    indexout = -1;
end
end

```

## Exercise 4

You've been asked to write a program for a website of second hand sales. Your task is to create a program that reads information about sellers from a file called 'sellers.txt' and prints on screen:

- The name of the seller who had the best reports
- The name of the seller who sells the most products
- The complete list of sellers

In case two sellers have the same number of sales you should print the name of the seller that has the best reports between the two of them. Similarly, if there are two sellers who have the same amount of positive reports, you have to print the name of the seller who has the highest number of sales.

Example:

Content of the file sellers.txt:

```
Names Sales %PositiveReports
Esther : 20 90
Marta : 10 100
Laura : 25 50
Javier : 20 100
Izaskun : 25 20
```

Execution example:

The seller with the best reports is Javier.

The seller who sells the most is Laura

```
*****
Name
*****
Esther
Marta
Laura
Javier
Izaskun
```

## SOLUTION

```
clear;
cont = 0;
bestNumReports = -1;
topNumSales = -1;
vfileIn = fopen('sellers.txt','rt');
if (vfileIn == -1)
    disp('Error when opening the file');
else
    notUsed = fgets(vfileIn);
```

```
while (feof(vfileIn) == 0)
    info = textscan(vfileIn, '%s : %d %d\n', 1);
    cont = cont + 1;
    seller(cont).name = info{1}{1};
    seller(cont).sales = info{2}(1);
    seller(cont).reports = info{3}(1);
    if seller(cont).reports > bestNumReports
        bestSeller = seller(cont);
        bestNumReports = seller(cont).reports; % or bestSeller.reports
    elseif seller(cont).reports == bestNumReports
        if seller(cont).sales > bestSeller.sales
            bestSeller = seller(cont);
            bestNumReports = seller(cont).reports;
        end
    end
    if seller(cont).sales > topNumSales
        topSeller = seller(cont);
        topNumSales = seller(cont).sales;
    elseif seller(cont).sales == topNumSales
        if seller(cont).reports > topSeller.reports
            topSeller = seller(cont);
            topNumSales = seller(cont).sales;
        end
    end
end
fclose(vfileIn);
end
fprintf('The seller with the best reports is %s\n', bestSeller.name);
fprintf('The seller who sells the most is %s\n', topSeller.name);
fprintf('*****\n');
fprintf('Name\n');
fprintf('*****\n');
for i=1:cont
    fprintf('%s\n', seller(i).name);
end
```