Computer Architecture
Homework Assignment 2

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Universidade do Algarve 2024-2025

UAlg FCT
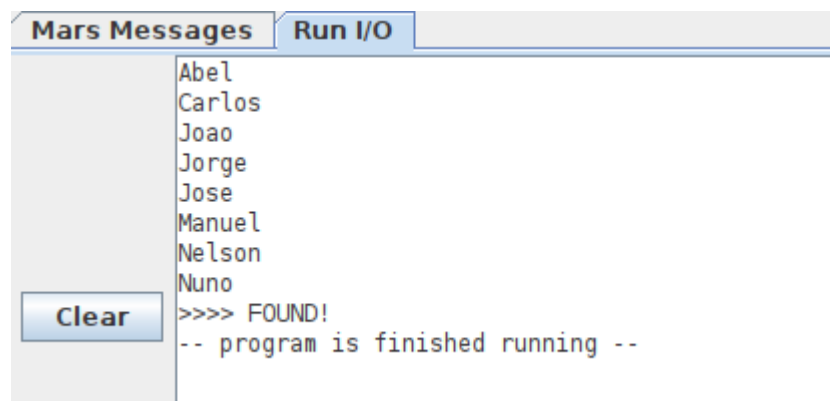UNIVERSIDADE DO ALGARVE
FACULDADE DE CIÊNCIAS E TECNOLOGIA

Great scandal. A peasant woman in Almodôvar claims her son is the son of one of the players of the local football team. Unfortunately, due to the severe state of intoxication at the time of the 'accident', she cannot remember anymore who it was. An investigation has been started. Blood samples have been taken from all the players, as well as from the son. Helped by the latest techniques in DNA sequencing, the DNA structure of all 11 players and of the son has been determined and saved in a file. You, as the expert programmer, are being called in to determine who is the father.

The DNA sequence the son is part of the Assembly data segment (see next page) while only the relevant information (about 100 characters) of the 11 possible fathers is saved in the file `dna.txt`, with the format

```
name
DNA sequence
name
DNA sequence
... etc.
```

The DNA information is a sequence of letters C, G, T, A. The code of one of the players is located in the code of the son. Which one?

Write a MIPS Assembly program that determines who is the father.

Mars Messages	Run I/O

```
Abel
Carlos
Joao
Jorge
Jose
Manuel
Nelson
Nuno
>>>> FOUND!
-- program is finished running --
```

Clear

NB: The ASCII code for newline is linefeed (LF, 10). (In Windows newline is carriage-return+linefeed (CRLF, 13+10). End-of-string is null (0).

Remember how we learned to read files in C:

```c
#include <stdio.h>

int main(int argc, char **argv)
{
   char hellow[] = "Hello world!";
   char ch;

   FILE *f;

   f = fopen("output.txt", "w");
   fprintf(f, "%s\n", hellow);
   fclose(f);

   f = fopen("output.txt", "r");
   while((ch = getc(f)) != EOF){
      printf("%c", ch);
   }
   fclose(f);
   printf("\n");
   return(0);
}
```

The above program outputs "Hello world!" to the screen.

Use this in the beginning of the MIPS Assembly file:

```
.data

filename: .asciiz "dna.txt"
searchstring: .asciiz "TGGGTGCGTTTGCCACACGCCTTTTATTTGTCTAGCCGTAACCAGAA"
foundstring: .asciiz ">>>> FOUND!"
notfoundstring: .asciiz "NOT FOUND!!!!"
```

- Groups of one (1) or two (2) people.
- Hand in one (1) file (aXXXXXaYYYYY.asm) at the Tutoria Electronica. (Not needed for both members of the group to hand in a file. One suffices).
- Deadline: **April 19, 2025, 23h59** (Lisbon time).
- Write your names (2) as a comment in the first line of the file. **Exactactly** like this:
  `# nome: João Silva, número: a87510`
  `# nome: Pedro Guerreiro, número: a89111`
- Do not use function calls (jal) in your program.
- Do not use AI for the answer.