Architetture dei Sistemi di Elaborazione	Delivery date: 7th December 2023
Laboratory 7	Expected delivery of lab_07.zip must include: - zipped project folder of the exercises 1 and 2 - this document compiled possibly in pdf format.

Exercise 1)

A tennis player is following a strict food diet, in which she must count the number of calories taken in from the food eaten and the sport performed. Write a program in **ARM assembly** language that counts the **number of total daily calories**, subtracting from those taken in through food, those consumed through sports.

```
Days                    DCB 0x01, 0x02, 0x03, 0x04, 0x05, 0x06, 0x07

Calories_food           DCD 0x06, 1300, 0x03, 1700, 0x02, 1200, 0x04, 1900,
                        DCD 0x05, 1110, 0x01, 1670, 0x07, 1000

Calories_sport          DCD 0x02, 500, 0x05, 800, 0x06, 400

Num_days                DCB 7
Num_days_sport          DCB 3
```

`Days` is a table where each entry consists of a day of the week (e.g., 0x01 is Monday, 0x02 Tuesday, ..)
`Calories_food` is a table where each entry consists of two integer values: the ID of the day (4 bytes) and the quantity of calories assumed with food (4 bytes).
`Calories_sport` is a table where each entry consists of two integer values: the ID of the day (4 bytes) and the quantity of calories consumed with sport activities (4 bytes). Notice that not all days she plays sport.
`Num_days` is a 1-byte constant and indicates the number of days in a week.
`Num_days_sport` is a 1-byte constant and indicates the number of days she plays tennis.

Compute the **total number of days** she takes in <u>less than 500 calories per day</u> and store it in register R11.

<u>Note:</u> <u>The constant data section must be defined in the code section, with 4096 boundary zero bytes.</u>
<u>Example:</u>

```
…
// BOUNDARY (SPACE ….)
MY DATA
..
```

Exercise 2)

Save in two separate vectors `Calories_food_ordered` and `Calories_sport_ordered`, the ID of the days in descending order by calories assumed or consumed, respectively.
The output will be, for example:

```
Calories_food_ordered          DCD   0x04,0x03,0x01,0x06,0x02,0x05, 0x07
Calories_sport_ordered         DCD   0x05,0x02,0x06
```

Then, save in R11 the ID of the least "caloric" day.

Compute the needed bytes for the above vectors.

Vector	Size [bytes]
`Calories_food_ordered`	28
`Calories_sport_ordered`	12

Report the following program characteristics (Hint: See the build output window in Keil).

	Size [bytes]
Program Size	656
Read Only data	764
Read Write data	120
Zero Initialized data	512

And provide a brief explanation about which directives can influence the previous program characteristics.

Program size: è influenzato dalle direttive nella sezione .text, direttive come AREA che contribuiscono al size del programma finale. Per quanto riguarda la direttiva "align" potrebbe aumentare la dimensione finale del progetto, siccome potrebbero venire aggiunti extra byte per allineare la successiva sezione o dati.
Read Only data: è influenzato dalle costanti, dai dati statici nella sezione readonly, da direttive come DCD/DWC/LTORG e da qualsiasi vettore o costante utilizzata nel programma (come stringhe e array statici).
Read Write data: Influenzato dall'inizializzazione di variabili globali e locali che non sono costanti, tipicamete nella sezione .data. Le direttive sono quelle di SPACE, siccome riserva un blocco di memoria di dimensione specifica senza inizializzarlo
Zero Initialized data: influenzato da variabili locali e globali non inizializzate