This practical assignment must be uploaded to eve.uj.ac.za before 2024-08-23 17h05. Late[1] or incorrect submissions will not be accepted and will therefore not be marked. You are not allowed to collaborate with any other student. Plagiarism is not tolerated. All submissions are tested for plagiarism.

Good coding practices include a proper coding convention and a good use of commenting. Marks will be deducted if these are not present.

The reminder page includes details for submission. Please ensure that ALL submissions follow the guidelines. The reminder page can be found on the last page of this assignment.

BeatWatch is satisfied with its current R&D progress and wants to tackle the following functional requirements. In the future, they would like to implement recursive functionality to handle hierarchical structure navigation (**e.g., tree traversal**), etc. *While the functionality has pros and cons, they want to proceed*.

They would like to implement a Recursive function to identify the average number of steps (Step Count) a person has taken within a 7-day week.

Write an **80x86** assembly program with the following:

Main program structure (requirements):

1. Use *general-purpose **32-bit** registers* only (such as, **eax, ebx, ecx, edx, esi, <u>etc</u>**.)
2. Create *global variables* only. Besides the below, any supporting variables you can create at your discretion.
3. Create the **stepCountArray** array holding seven step counts for the simulated **7** days (*see the table for examples provided*). There is *no need for user-input functionality, i.e., a static array will suffice as the focus is on recursion*.
4. <u>Call the **RecursiveStepCount** function to</u>:
   a. Iterate through the array
   b. Use the stack to *store* and *retrieve* the daily step count values
   c. Accumulate the values in a **stepCountSum** variable
   d. Consider the base of the recursion by catering for a **baseCase** label
5. Compute the average of the step count in the **stepCountAverage** variable.

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[1] Alternate arrangements for exceptional circumstances will be posted on eve.

Testing set – Use these values to test your program

Step Count Array	Step Count Sum	Step Count Average
[10, 20, 30, 40, 50, 60, 70]	280	40
[1000, 2000, 3000, 0, 500, 60, 7000]	13 560	1937
[2000, 1456, 183, 3412, 1298, 0, 0]	8349	1192

Mark sheet

1. Design **[10]**
2. **RecursiveStepCount** function: **[35]**
    a. Entry/exit (05)
    b. Stack implementation (10)
    c. Register implementation/management (10)
    d. Base case implementation (05)
    e. **stepCountSum** implementation (05)
3. **stepCountAverage** implementation **[10]**
4. Main procedure **[05]**
5. Structure and layout (no temporary/local variables, relevant data types) **[05]**
6. Commenting **[05]**
7. Correct execution **[50]**

TOTAL   [120]

NB

Submissions that **do not assemble** will be capped at 40%!

Practical marks are awarded subject to the student's ability to explain the concepts and decisions made in preparing the practical assignment solution.

(Inability to explain code → inability to be given marks.)

Execution marks are awarded for a correctly functioning application and not for related code.

Reminder

Your submission must follow the naming convention below:

SURNAME_INITIALS_STUDENTNUMBER_SUBJECTCODE_YEAR_PRACTICALNUMBER

Example: Berners-Lee_TJ_209912345_CSC03B3_2024_P05

Surname	Berners-Lee	Module Code	CSC03B3
Initials	TJ	Current Year	2024
Student number	209912345	Practical number	P05

Your submission must be **a single zip (compressed) file**!

Your submission must include the following:

File	Naming	Folder	Purpose
Design	STUDENTNUMBER_P05.pdf	docs	Contains your program design. All files must be in **PDF** format. Your details must be included at the top of any **PDF** files submitted[0].
Source	STUDENTNUMBER_P05.asm	src	Contains all relevant source code. Your details must be included at the top of the source code[0].

Multiple uploads

Note that only **one** submission is marked. If you already have submitted once and want to upload

a newer version then submit a newer file with the same name as the uploaded file in order to overwrite it.

[0]Failure to correctly indicate your details will result in a penalty.