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Assignment 9

- Title: Factorial of a number.
- Problem Statements
  Write x86 ALP to find the factorial of a given integer number on a command line by recursion. Explicit stack manipulation is expected in the code.
- Objective:
  To understand how to use stack segment for recursion.
- Outcome:
  I will study recursion using stack in ALP.
- Requirements
  1. Processor : Core 2 duo / i3 / i5 / i7
  2. OS : Linux 32 bit / 64 bit os
  3. Editor & Assembler
- Theory:

1) Recursion

When a procedure calls itself within it's definition, it is known as recursion. While making a recursive call, the variable of procedure should be appropriately pushed

on the stack, otherwise they are overwritten The instruction pointer is implicitly pushed & popped by call & ret instructions.

2> Factorial:

Factorial is the multiplication of all digits from 1 to n

$n! = 1 * 2 * 3 * 4 \ldots * (n-1) * (n)$

- Algorithm:

1. START
2. Pop stack thrice [rsi]
3. MOV [number], [rsi]
4. Convert number Hex
5. Compare number with 0
   if equal
   result = 1
   goto step ⑦
6. Call factorial
7. Convert [result] from Hex to ASCII
8. display
9. STOP

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factorial:

1. Compare [num] with 1
   if (equal)
      goto step ⑦
2. push [num] on stack
3. dec [num]
4. call factorial
5. Pop stack into rbx
6. [result] = [result] * rbx
7. return.

- Test Cases:

	Input	Expected o/p	Actual o/p
1.	00	1	Pass
2.	01	1	Pass
3.	04	18	Pass
4.	0F	1307775800	Pass
5	10	13077752000	Pass

- Conclusion:
  Factorial of a number given on command line is computed using recursion.