Machine Language Simulator

Summary

This is a program to simulate the execution of machine code.

Getting Started

Compile the code with gcc

```
gcc main.c simulator.c cmd_writer.c global.c -ansi -pedantic -Wall -Wextra -o program.exe
```

and run 'program.exe' (or your equivalent) and type in your pseudo machine code. When done type '!' on a new line.

Alternativley you can pass a file like this:

```
program.exe < yourcode.mc
```

Example Code

```
P1      INIT            S2
P2      INCREMENT       S2
P3      JUMP0           P7,S1
P4      ADD             S2,S2
P5      DECREMENT       S1
P6      JUMP            P3
P7      RETURN          S2
S1      2
S2
!
```

Machine Code Overview

Valid commands are:

Command	Parameters	Explanation
INIT	A	Store value 0 at address A.
ADD	A,B	Add to memory address A the value of memory address B.
SUB	A,B	Substract from memory address A the value of memory address B.
DECREMENT	A	Decrease the value of memory address A by 1.
DECREMENT0	A,B	Decrease the value of memory address A by 1 in case value of memory address B equals 0.

Command	Parameters	Explanation
INCREMENT	A	Increase the value of memory address A by 1.
INCREMENT0	A,B	Increase the value of memory address A by 1 in case value of memory address B equals 0.
JUMP	A	Jump to program pointer A.
JUMP0	A,B	Jump to program pointer A in case value of memory address B equals 0.
RETURN	A	Return value of memory address A.
RETURN0	A,B	Return value of memory address A in case value of memory address B equals 0.

PROGRAM step has the format Px while 'x' is the line number.
DATA address has the format Dx while 'x' is the memory address.
STACK address has the format Sx while 'x' is the memory address.
HEAP address has the format Hx while 'x' is the memory address.

Addresses of successive memory cells are numbered consecutively. Do not leave any gaps.

Valid values for S,D and H are from INT_MIN+1 to INT_MAX.

Separation either by 'Space', 'Tab' or ','.

Configuration

User preferences can be adjusted in the file config.h before compilation.
There are setting for max number of lines, max address size, max address content, line length and debug verbosity.

Compile

with gcc

```
gcc main.c simulator.c cmd_writer.c global.c -ansi -pedantic -Wall -Wextra -o program.exe
```

via the makefile

```
make
```

Run

```
program.exe
```

Known issues

- Mixed register value that starts with digit and contains letters is only read until first letter, no error returned. ie. S1 3234r54 => S1 3234
- User query does not work for piped input, i.e. program.exe < example-code.mc. Therefore missing or wrong parameters will result in error code.

Error codes

- Combined summary block of all RETURNS or ERRORS at the end. Possible Errors:
  - 010 - Error Parsing: Unkown Parser Error
  - 011 - Error Parsing: Invalid Register
  - 012 - Error Parsing: Register address out of bounds
  - 013 - Error Parsing: Invalid Command
  - 014 - User Input: Buffer Error
  - 015 - User Input: Invalid input.
  - 021 - Error Execution: Program does not terminate
  - 022 - Error Execution: Register not initialized
  - 023 - Error Execution: Value out of bounds
  - 020 - Error Execution: Unkown Execution Error
  - 030 - System Error: Memory Allocation