

23/11/2021

MICROPROCESSOR

8085 Stack operation

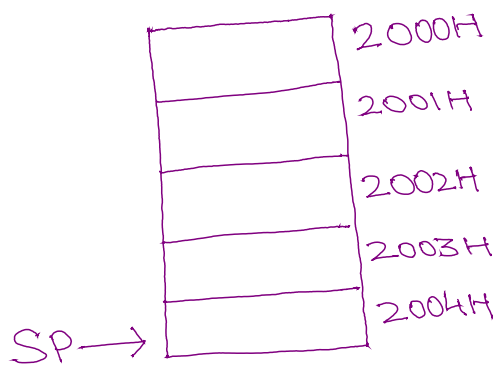
- The stack is a portion of read/write memory set aside by the user for the purpose of storing information temporarily.
- When the information is written on stack the operation is called PUSH.
- When the information is read from stack the operation is called POP.
- The stack operates in First IN Last out (FILO) fashion. This means that the first information pushed on to the stack is the last information popped off from the stack.
- In 8085, stack is implemented using STACK POINTER register. SP is a 16-bit register which gives the address of memory where the information is to be stored or to be read.
- The memory location currently pointed by stack pointer is called top of stack.
- In 8085, there are 2 instructions that work with stack.

① PUSH ap ② POP ap

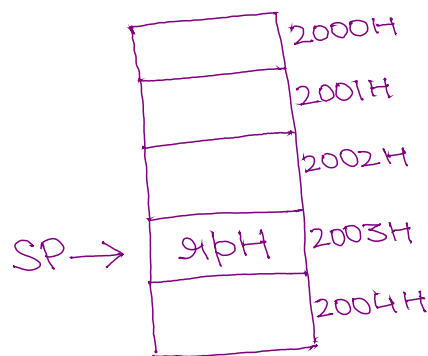
ap → means 16-bit register pair (BC, DE, HL)

PUSH rp : This instruction decrements stack pointer by one and copies the higher byte of the register pair mentioned in the instruction into the memory location pointed by stack pointer. It then decrements the stack pointer again by one and copies the lower byte of the register pair into memory location pointed by stack pointer.

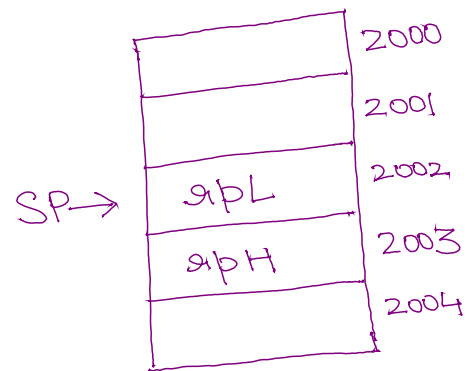
Operation : $\text{SP} \leftarrow \text{SP} - 1$; $(\text{SP}) \leftarrow \text{rpH}$; $\text{SP} \leftarrow \text{SP} - 1$;
 $(\text{SP}) \leftarrow \text{rpL}$



(a) Initial position



(b) Decrement SP by 1 and store lower byte of rp



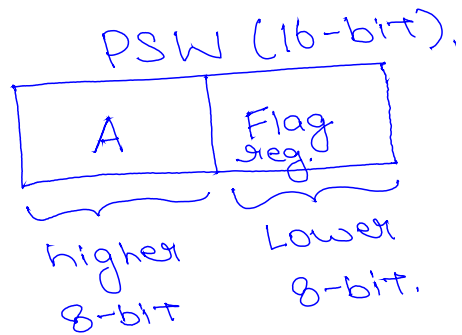
(c) Decrement SP by 1 and store higher byte of rp .

Example :

- $\text{PUSH B} \leftarrow$ Store BC rp onto stack
- $\text{PUSH D} \leftarrow$ Store DE rp onto stack
- $\text{PUSH H} \leftarrow$ Store HL rp onto stack
- $\text{PUSH PSW} \leftarrow$ Store PSW onto stack.

\hookrightarrow Program Status Word.

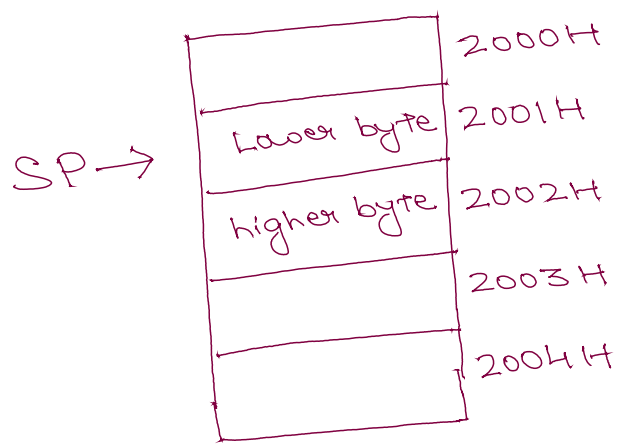
PSW : Program Status Word is the combination of accumulator and Flag register.



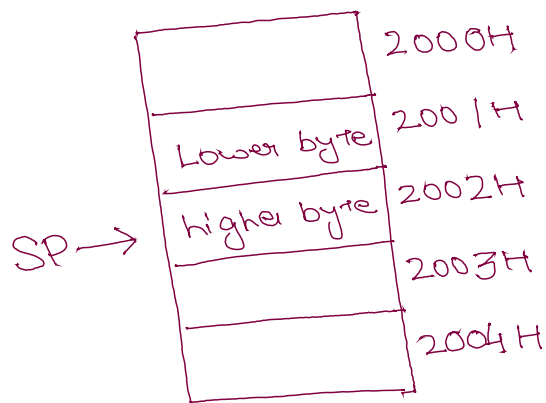
POP sp : This instruction copies the contents of memory location pointed by the stack pointer into the lower byte of the specified register pair and increments the stack pointer by one. Then it copies the contents of memory location pointed by stack pointer into the higher byte of the specified register pair and increments the stack pointer again by one.

operation : $spL \leftarrow (SP)$
 $SP \leftarrow SP + 1$
 $spH \leftarrow (SP)$
 $SP \leftarrow SP + 1$

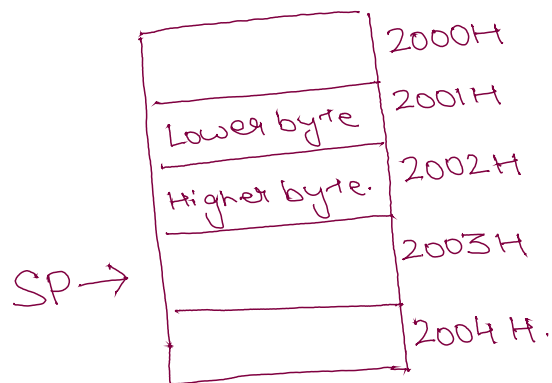
Examples : $POP\ B \leftarrow \text{read into BC } sp$
 $POP\ D \leftarrow \text{read into DE } sp$
 $POP\ H \leftarrow \text{read into HL } sp$
 $POP\ PSW \leftarrow \text{read into PSW}$



(a) Initial position



(b) Read lower byte into r1bL then increment SP by 1



(c) Read higher byte into r1bH then increment SP by 1.

→ Program to swap the contents of BC and ~~DE~~ DE register pair using stack.

LXI SP, 2004H ← SP is initialized.

LXI B, 4444H } random values are
LXI D, 5555H. } stored in BC, DE register pair.

PUSH B ← contents of BC is stored on stack

PUSH D ← contents of DE is stored on stack

POP B ← contents of stack load to BC

POP D ← contents of stack load to DE

HLT.