Note Title 27-07-2012

July 27

Last Class : ARM Instructions.

(ADD/SUB/CMP/B)

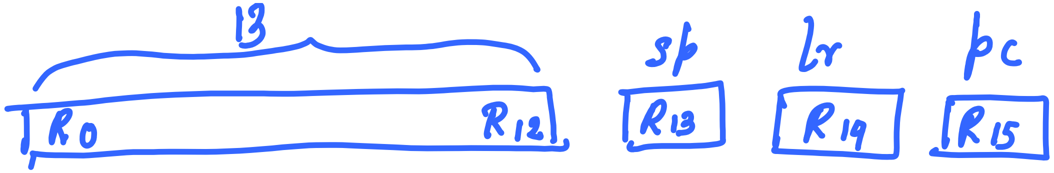
```
sum= 0;
for (i = 1; i<100; i++)
    sum += i;
```

```
        MOV   R1, #0
        MOV   R0, #1
.Loop   CMP   R0, # 100
        BGE   .exit
        ADD   R1, R1, R0
        ADD   R0, R0, # 1
        B     .Loop
.exit
```

```
i = 10;
switch (i){
    Case 1:
           j=2;
           break;

    case 2:
           j =3;
           break;
    default:
           j=4;
}
```

```
              MOV   R0, #10

              CMP   R0, #1.
              BNE   .next1
              MOV   R1, #2
              B     .exit

.next1    CMP   R0, #2
          BNE. next 2
          MOV   R1, #3
          B.    exit

. next2    MOV   R1, #4

. exit
```

functions



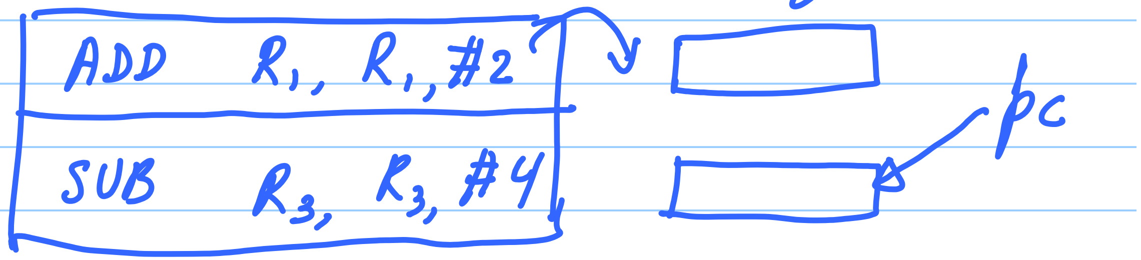
pc ← program counter.

program ⟷ array of instructions in memory

each instruction is of the same size
4 bytes

PC → index into this array.

e.g.



ADD R_1, R_1, #2

SUB R_3, R_3, #4

link register :

```
int j=0;
foo() {
    j = 7
}
main() {
    k=5;
    foo();
    k += j;
}
```

```
(k ⟷ R0)
(j ⟷ R1)
      MOV   R1, #0
      MOV   R0, #5

      BL    .foo   ——..  (lr=pc+4)

      ADD   R0, R0, R1
      B     .exit


.foo  MOV   R1, #7
      MOV   pc, lr   (return)
```

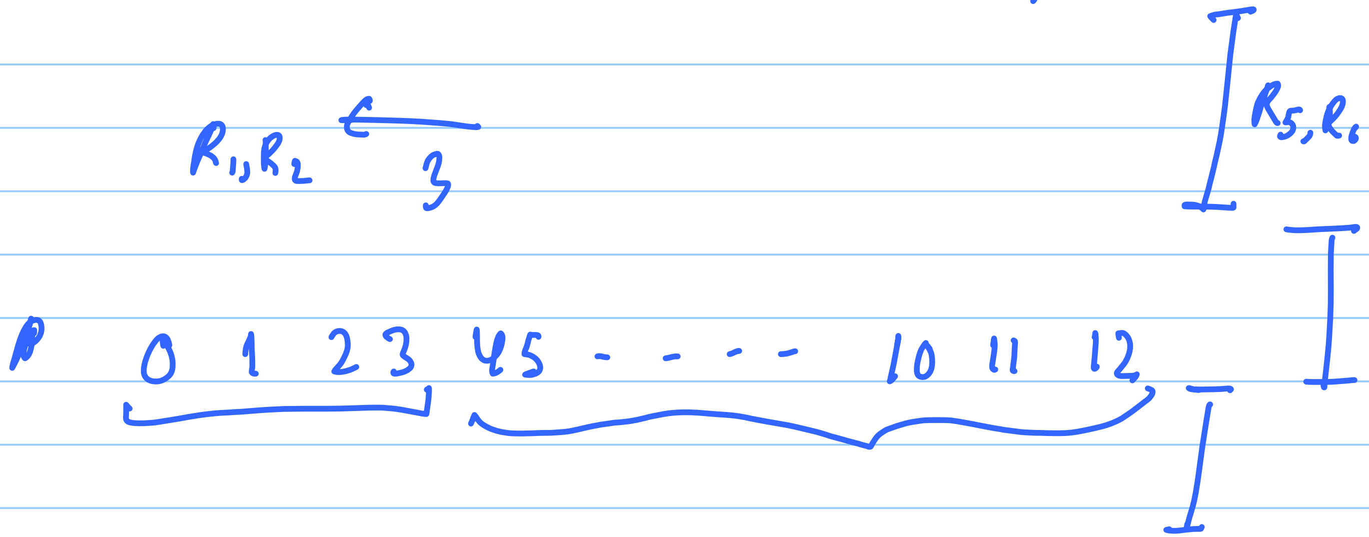
```
int foo (int x){
    return (x+2);

}

main(){
        i = 0; j=3;
        j += foo(i);
       [print(j);]
}
```

(i → R0) (j → R1)

```
     MOV   R0, #0   (i=0)
     BL    .foo
     MOV   R1, #3
     ADD   R1, R1, R0
     B .exit
.foo   ADD   R0, R0, #2
       MOV   PC, LR
```

Take home point: pass and obtain values in functions through registers.

func ($\underline{R_0}$, $\underline{R_1}$, $\underline{R_2}$) {



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Basic Concepts

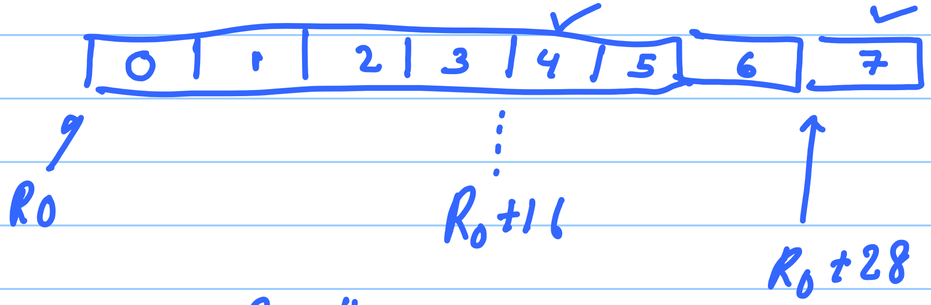
🚩 1) B, BL
(LR ← PC+4)

3) mov PC, LR
(return)

2) Args, Ret vals passed through regs.

```
int A[];
A[4] = 0;
A[7] = 19;
```

(A (ptr in main mem) $\longrightarrow$ R_0)



mov R_1, #0

$$\text{STR} \quad R_1, \underbrace{[R_0, \#16]}_{\text{loc. in memory}}$$

(mem[R_0 + 16] = 0)

mov R_2, #19

STR R_2, [R_0, # 28]

$x = A[4]$

$(x \rightarrow R_1)$

LDR R_1, [R_0, #16]