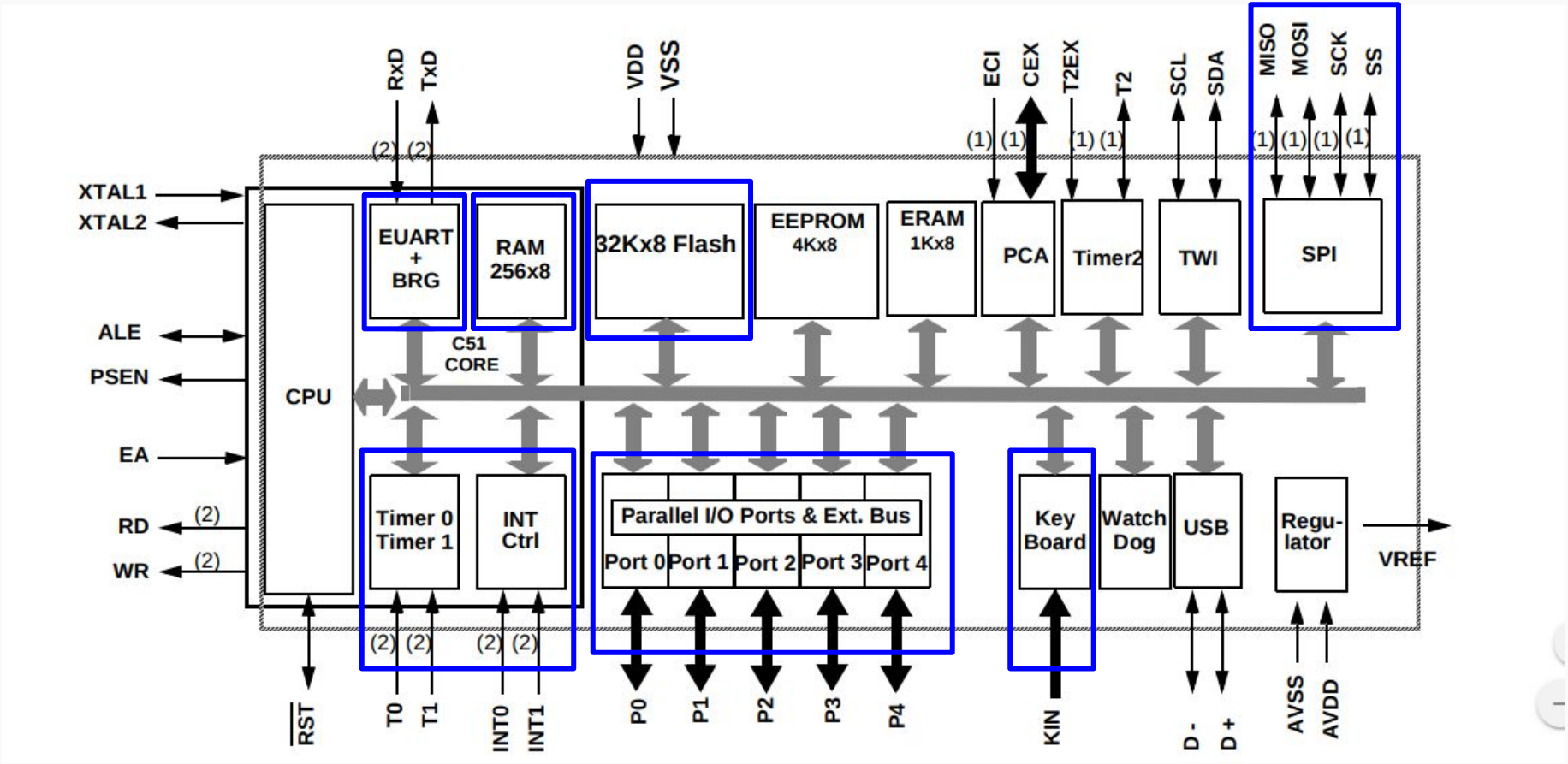
An Introduction to Programming & Debugging Using Keil

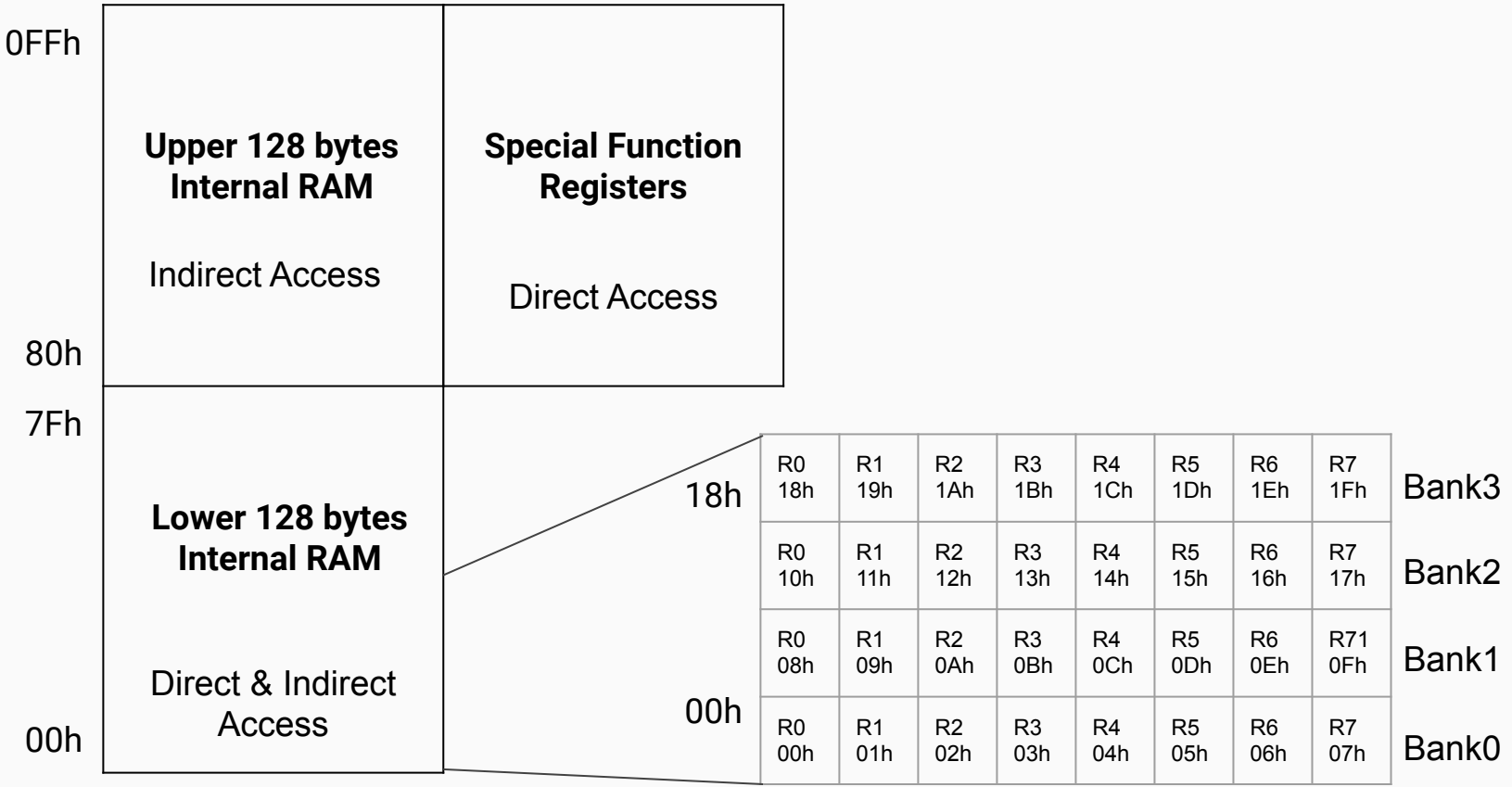
Harsh Bhargav and **Rahul C P**

August 6th , 2019

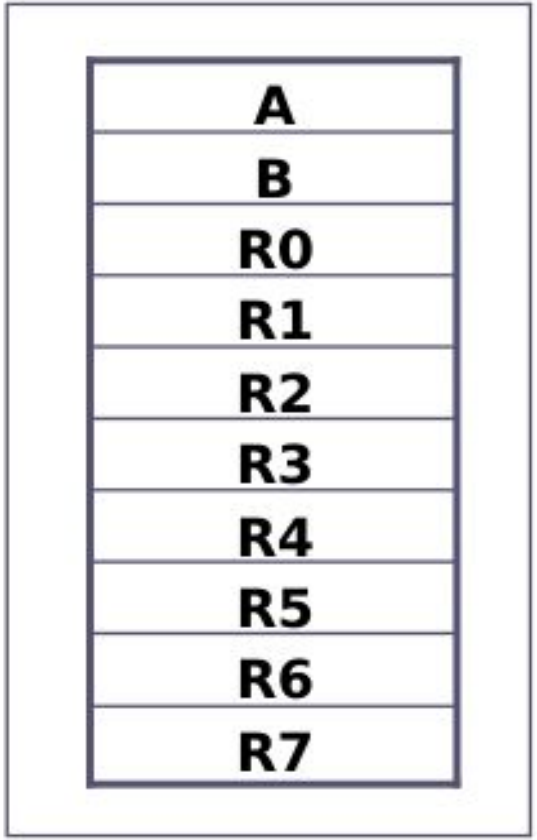
Block Diagram of AT89C5131

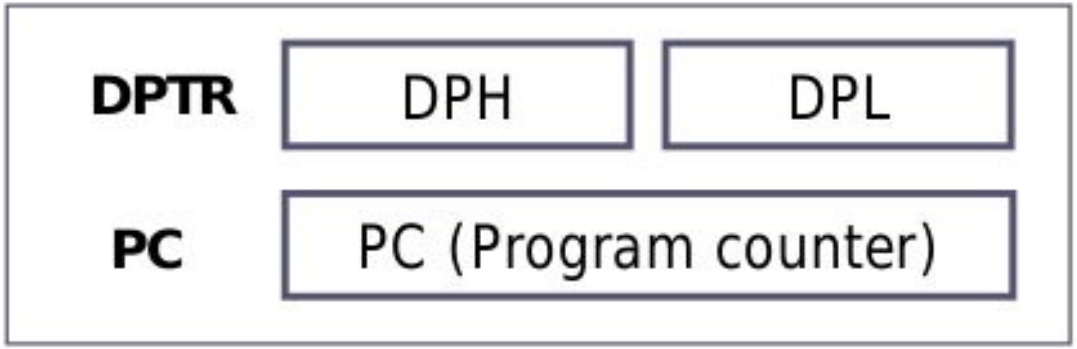


RAM Memory and accessibility



8051 Registers





- Register A,B,R0,R1…….R7 are of 8 bits.
- DPTR and PC are of 16 bits.
  - DPTR : Dual Data Pointer Register
  - PC : Program Counter

Program Status Word (PSW)

Flag Bits

CY	AC	F0	RS1	RS0	OV	----	P

CY : Carry Flag
AC : Auxiliary carry
F0 : User definable(Not Utilized here)
RS1 : Register Bank Selector bit 1
RS0 : Register Bank selector Bit 0
OV : Overflow Flag The result of signed number operation is too large, causing the high-order bit to overflow into the sign bit
P : Parity Flag Reflect the number of 1s in Accumulator (Odd parity)

Addressing Modes

- **MOV DESTINATION, SOURCE**

Immediate:

- MOV A , #55H ; Loading 55h in accumulator
- MOV R1, #37 ; Loading 37 in register R1

Direct Addressing:

- MOV A , 55H ; Loading content of memory location 55h in A
- MOV R1, 37 ; Loading content of memory location 37d in R1
- MOV 35H, R2 ; Copying content of R2 in location 35h

Addressing Modes

Register Addressing:

- MOV R3, R7 ; Copying content of register R7 into R3
- ADD A, R1 ; Adding the contents of A and R1

Indirect Addressing:

- Only register R0, R1 can be used
- Identified by @ symbol
- MOV A,@R0 ;move contents of RAM whose address is held by R0 into A

Problem Statement

Write an assembly language program

- To find the sum of N numbers starting from 1 and stores the partial sum values in N consecutive memory locations.
- N<20 and is given in memory location 50H.
- The resultant sum is to be stored in memory locations starting at 51H.
- As an example, if 3H is in 50H. Your program should result in having 1, 3, and 6 in memory locations 51H, 52H, and 53H.

Logic

By adding No. and Previous Partial Sum

No.	1	2	3	4	5	6
Partial Sum	1	3	6	10	15	21
Previous Partial Sum	-	1	3	6	10	15
Partial Sum Store Location	51H	52H	53H	54H	55H	56H

Things To Do

Decide No of Register required. (R0 ,R1, R2, …….,R7)

- One for storing no. and One for the value of N.
- One as Memory Pointer
- Accumulator needed as arithmetic operation will be performed

Identify Memory location to be Used:

- From where to read input and store the result.

Time Taken By Instructions

- One Machine Cycle takes 0.5us.

Instruction	No. of Machine Cycle	Time
INC A	1	0.5us
DJNZ R, Rel	2	1us
MUL AB	4	2us