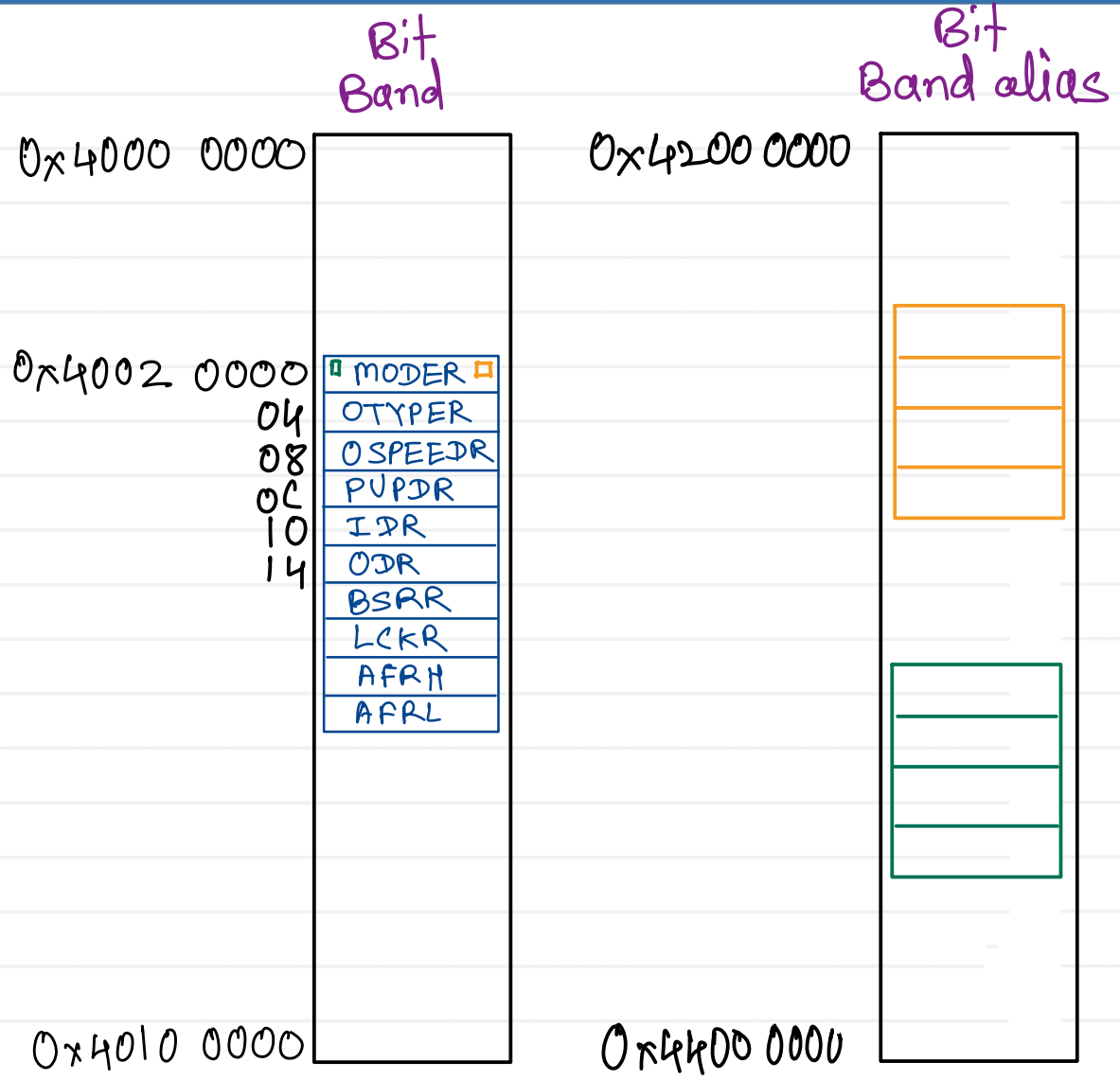
Sunbeam Institute of Information Technology
Pune and Karad

Module - Micro controller Programming and Interfacing

Trainer - Devendra Dhande

Email – devendra.dhande@sunbeaminfo.com

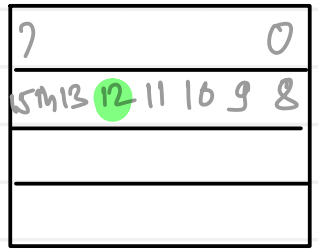
Bit banding



bit_word_addr = bit_band_base
+ (byte_offset * 32)
+ (bit_number * 4)

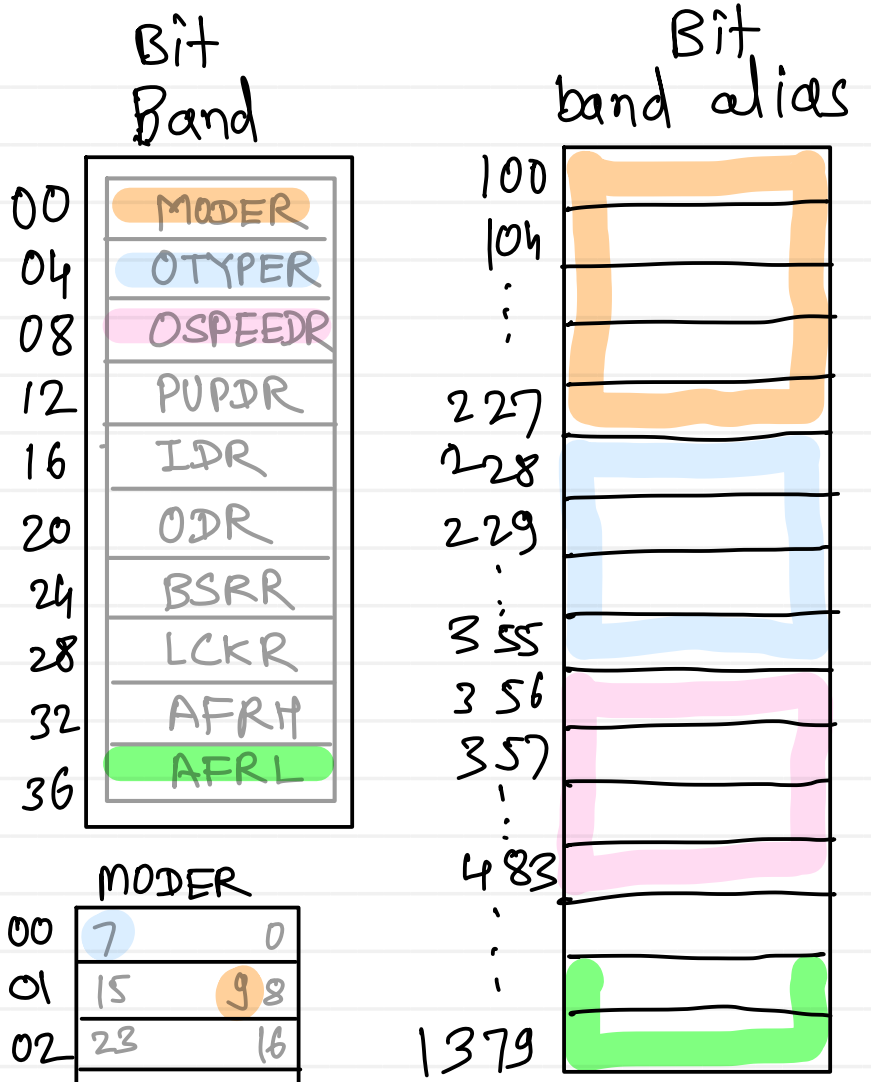
ODR - bit = 12

0x4002 0014
0x4002 0015
0x4002 0016
0x4002 0017



bit_band_base = 0x4200 0000
byte_offset * 32 = 0x0040 02A0
bit_number * 4 = 0x0000 0010
bit_word_addr = 0x4240 02B0

Bit banding



MODER – bit=7

bit_band_alias_bas = 100
byte_offset * 32 = 0x32 = 000
bit_number * 4 = 7x4 = 28
128

MODER – bit=9

bit_band_alias_bas = 100
byte_offset * 32 = 1x32 = 32
bit_number * 4 = 1x4 = 4
136

bit_band_alias_bas = = 100
byte_offset * 32 = 5x32 = 160
bit_number * 4 = 1x4 = 4
264

100
4x32 = 128
9x4 = 36
264

-O0

```
while(flag==0)
{
}
```

```
      LDA  r7, =flag
start:LDA  r6, [r7]
      CMP  r6, 0
      beq  start;
```

-O3

```
int flag;
while(flag==0)
{
}
```

```
      LDA  r7, =flag
      LDA  r6, [r7]
start:CMP  r6, 0
      beq  start;
```

-O3

```
volatile int flag;
while(flag==0)
{
}
```

```
      LDA  r7, =flag
start:LDA  r6, [r7]
      CMP  r6, 0
      beq  start;
```

volatile keyword

Optimization :-O0 (None)

```
int flag = 0;
void EXTI0_IRQHandler(void) {
    flag = 1;
        MOV r7, =flag
        LDA #1, [r7]
}
int main(void) {
    while(1) {
            MOV r7, =flag
    start : LDA r6, [r7]
            CMP r6, #0
            beq start
            ---
    }
}
```

Optimization :-O3 (Most)

```
int flag = 0;
void EXTI0_IRQHandler(void) {
    flag = 1;
        MOV r7, =flag
        LDA #1, [r7]
}
int main(void) {
    while(1) {
            MOV r7, =flag
            LDA r6, [r7]
    start : CMP r6, #0
            beq start
            ---
    }
}
```

Optimization :-O3 (Most)

```
volatile int flag = 0;
void EXTI0_IRQHandler(void) {
    flag = 1;
        MOV r7, =flag
        LDA #1, [r7]
}
int main(void) {
    while(1) {
            MOV r7, =flag
    start : LDA r6, [r7]
            CMP r6, #0
            beq start
            ---
    }
}
```

extern : variable scope is through out the program

static : variable scope is limited (function / file)

const : make variable location non modifiable

volatile : disables compiler optimization for variable

```
extern const volatile int var = 1;
static const volatile int var = 1;
extern static const volatile int var = 1;
```

Thank you!!!

Devendra Dhande

devendra.dhande@sunbeaminfo.com