

# Internetul Lucrurilor

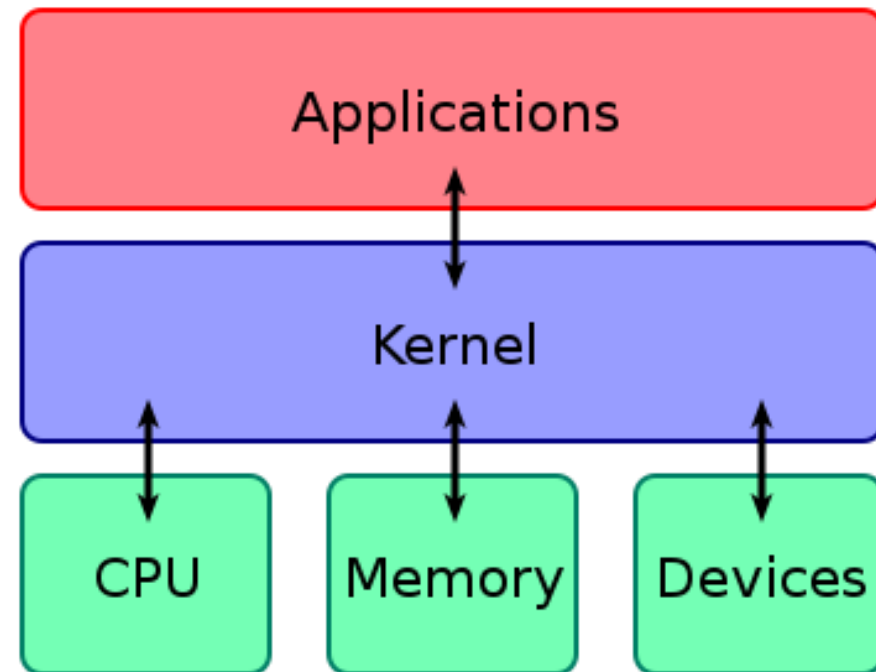
Sisteme de Operare  
Secventiale

# Sistem de operare

sistem de gestionare a resurselor unui sistem de calcul

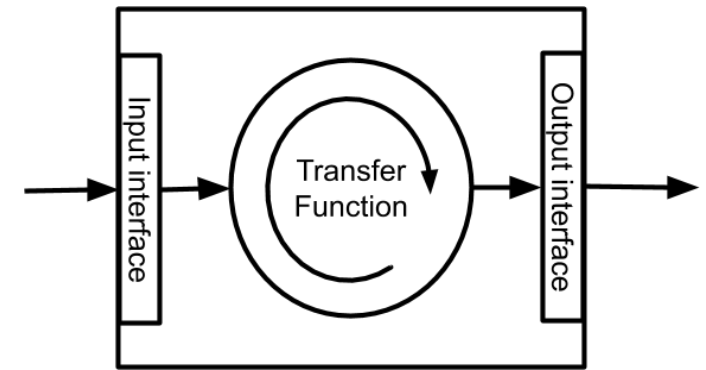
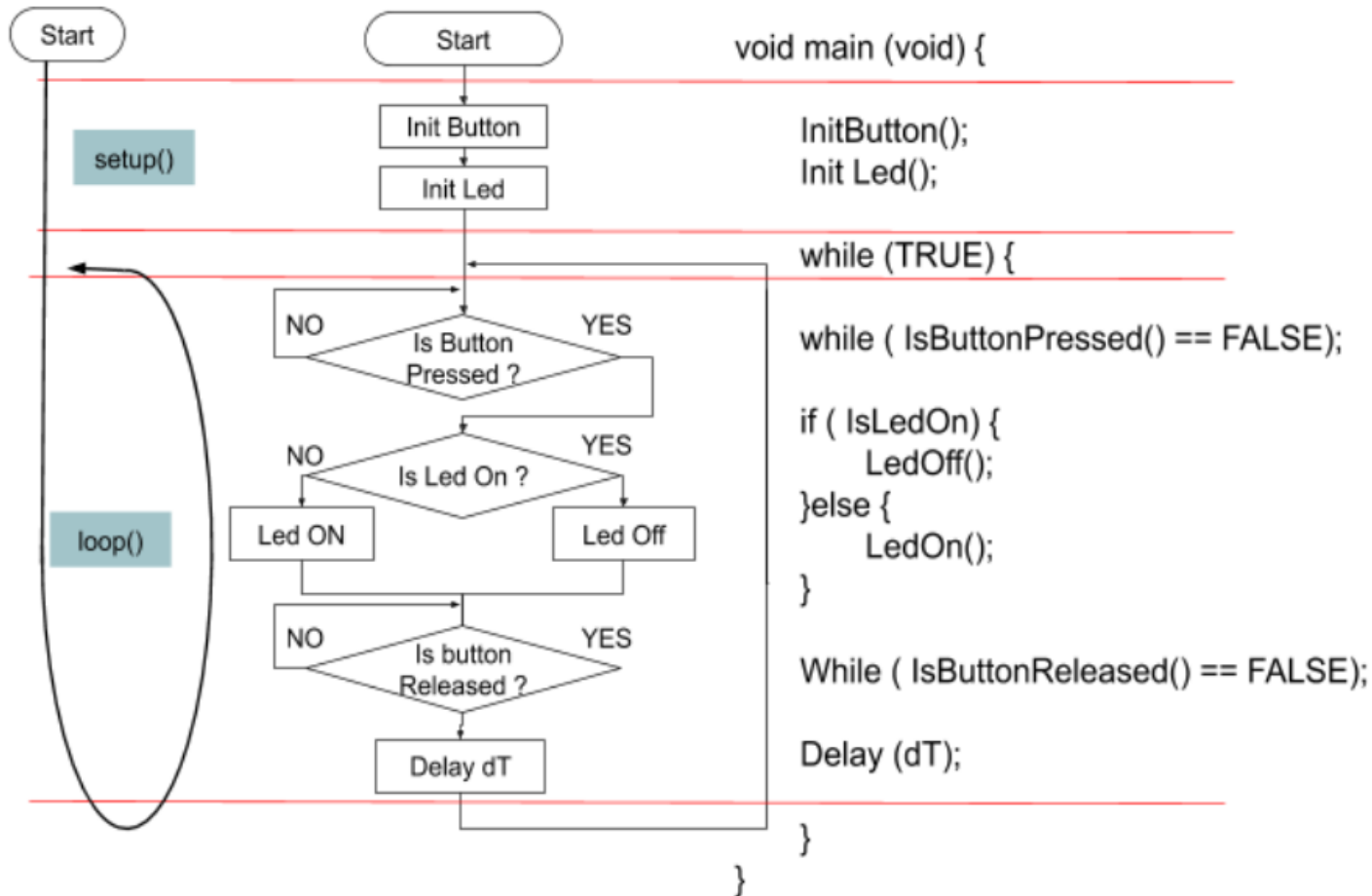
Resurse gestionate:

- Memorie
- Periferii
- Timp de procesare



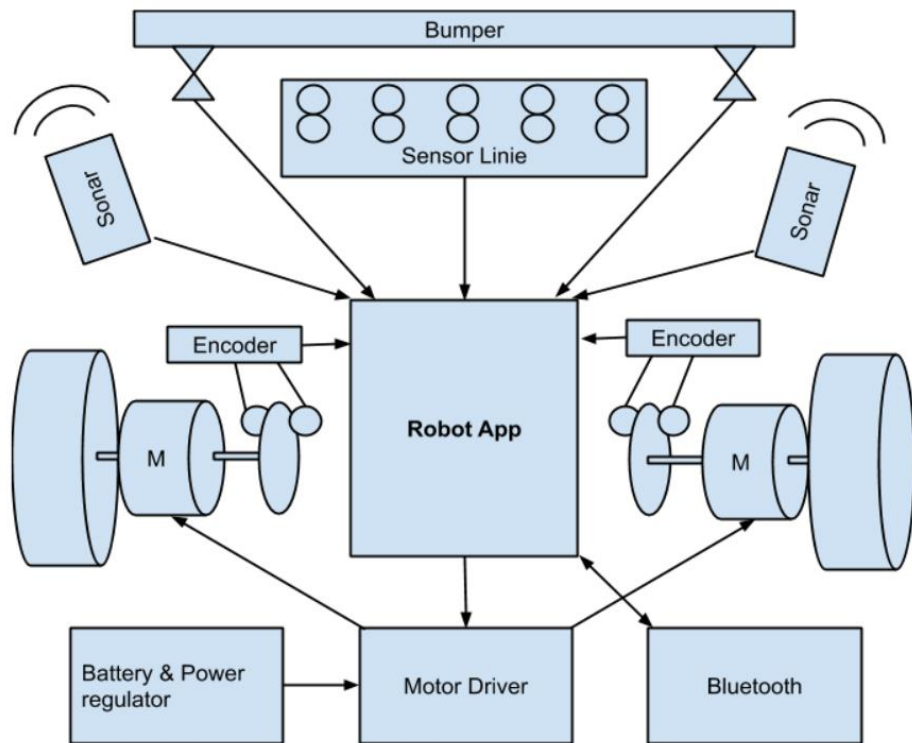
# Single-process – Infinite loop

## Aplicatie clasica – Buton / Led

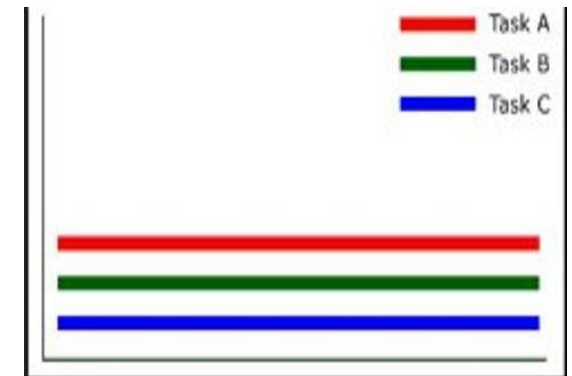
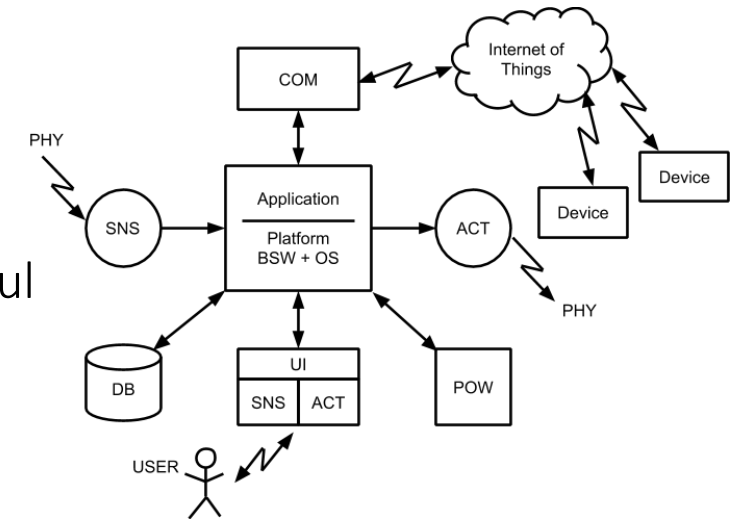


# Multi tasking - Problem

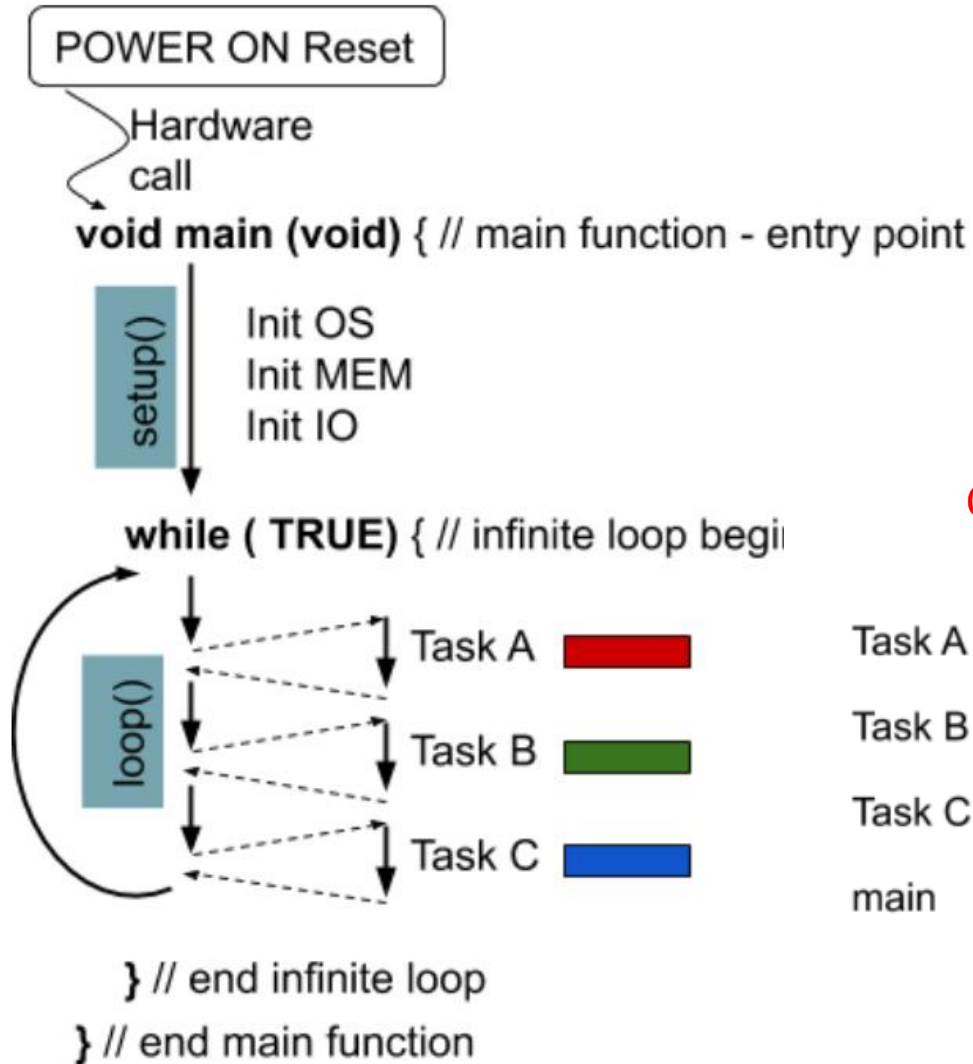
coexistarea mai multor functionalitati concomitent



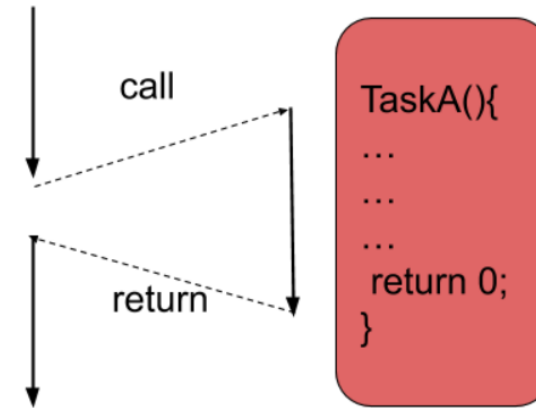
- Interactiune cu utilizatorul
- Sensor
- Actuator
- Control
- Comunicare



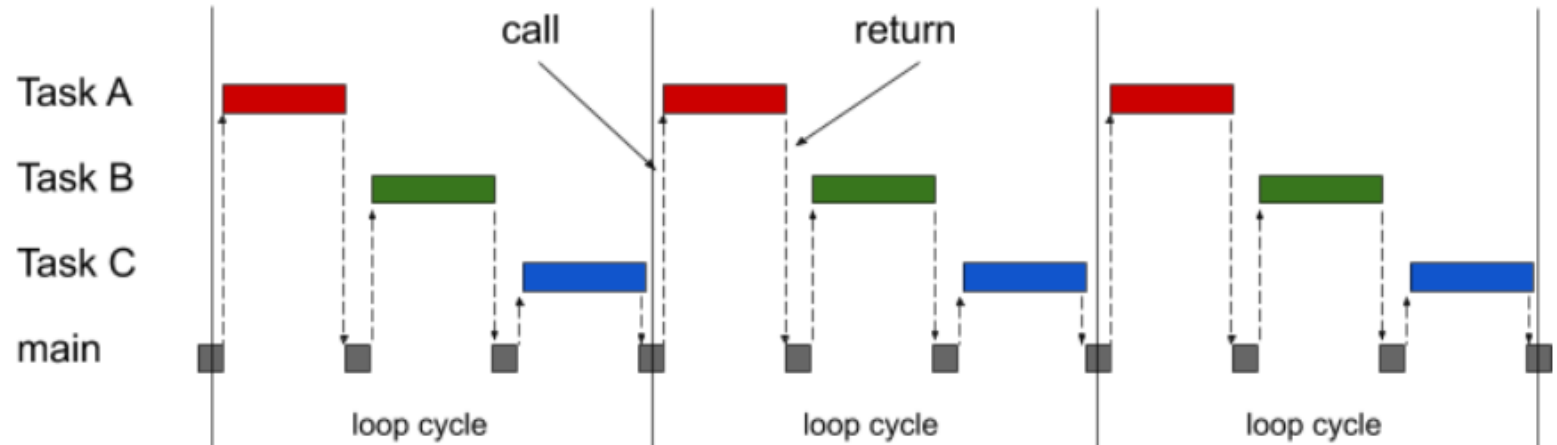
# Multi tasking - Single process



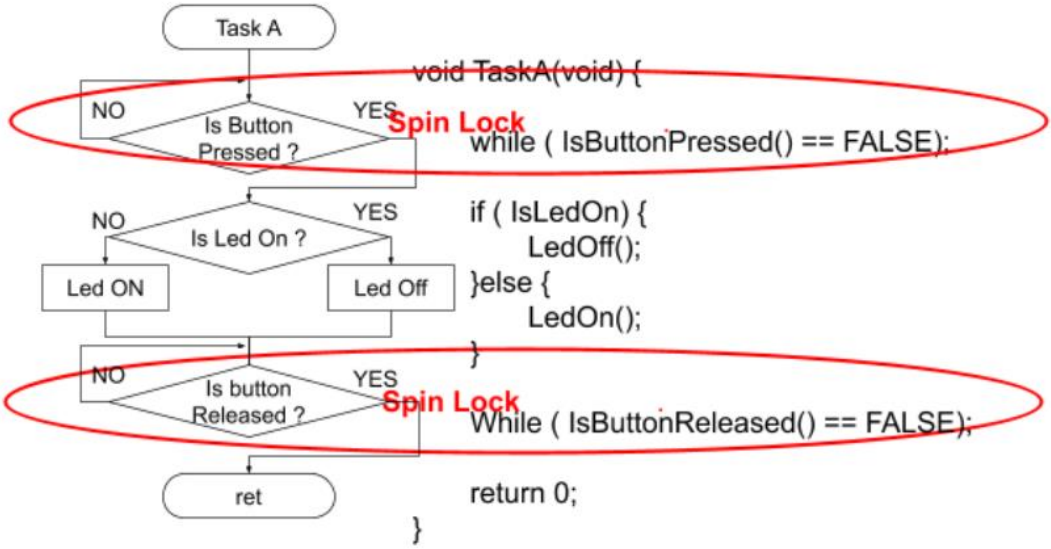
Task switch context



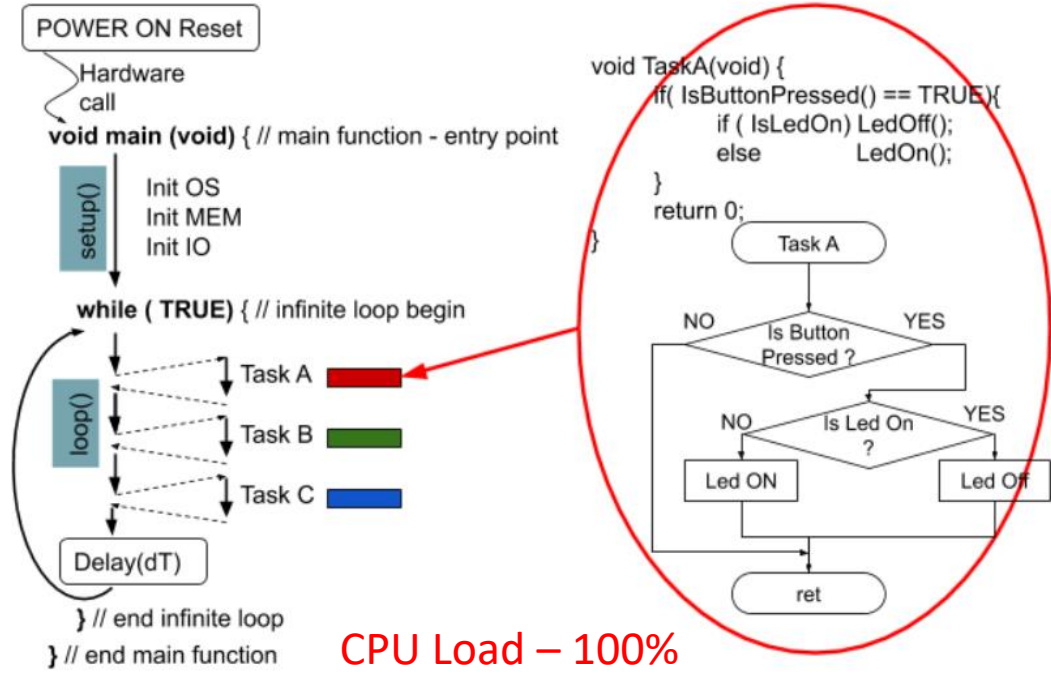
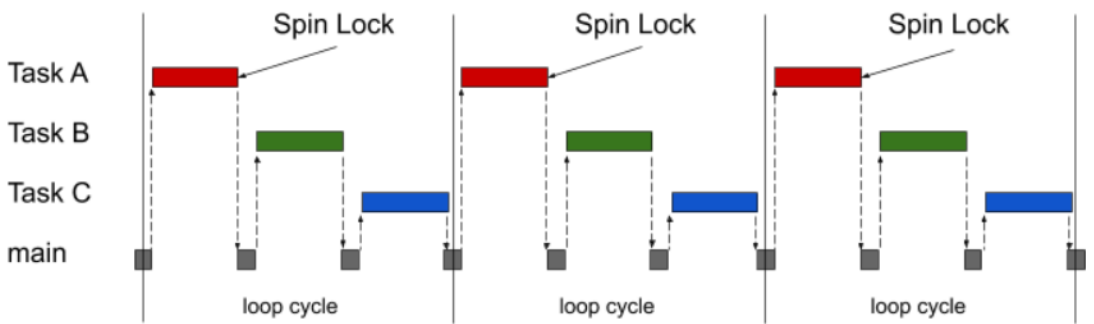
CPU Load – 100%



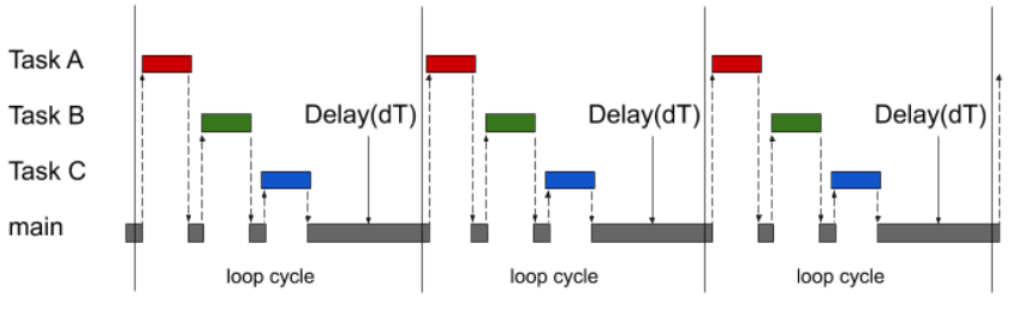
# Multi tasking – Spin Lock to Sequential



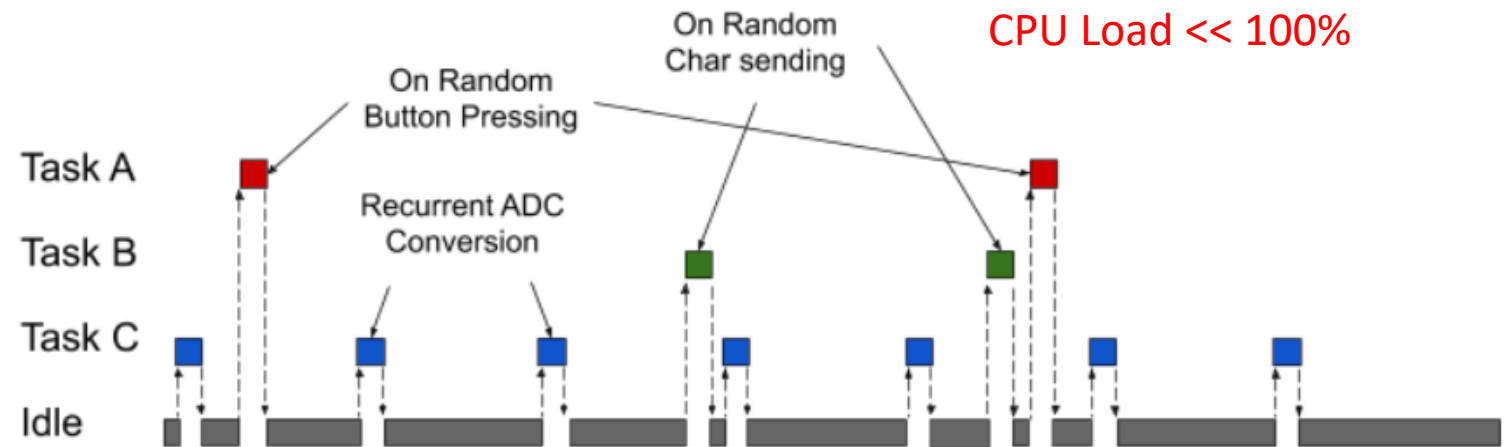
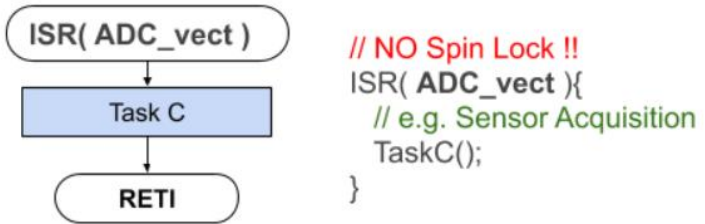
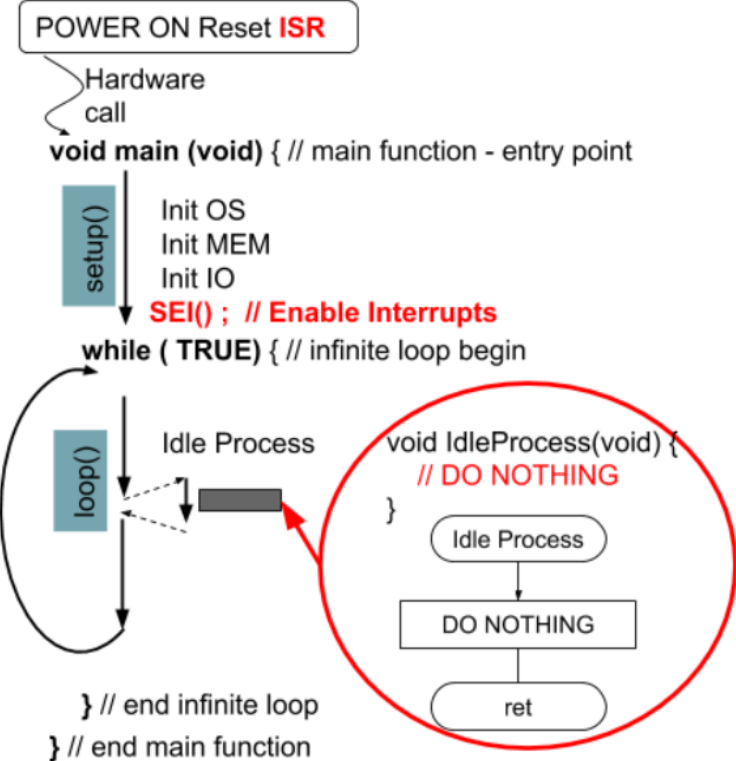
CPU Load – 100%



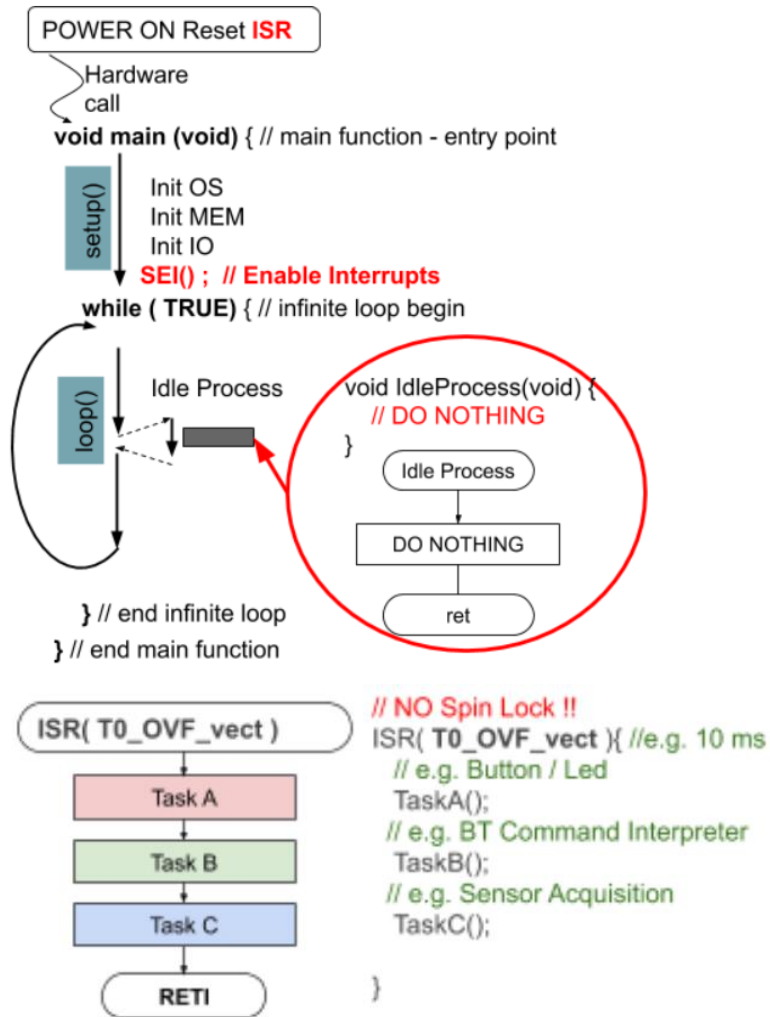
CPU Load – 100%



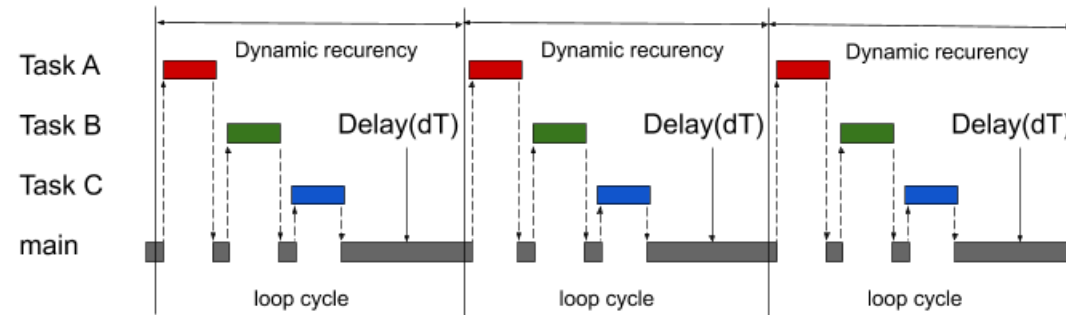
# Multi tasking – Event driven & Interrupts



# Multi tasking – Timer Interrupt based

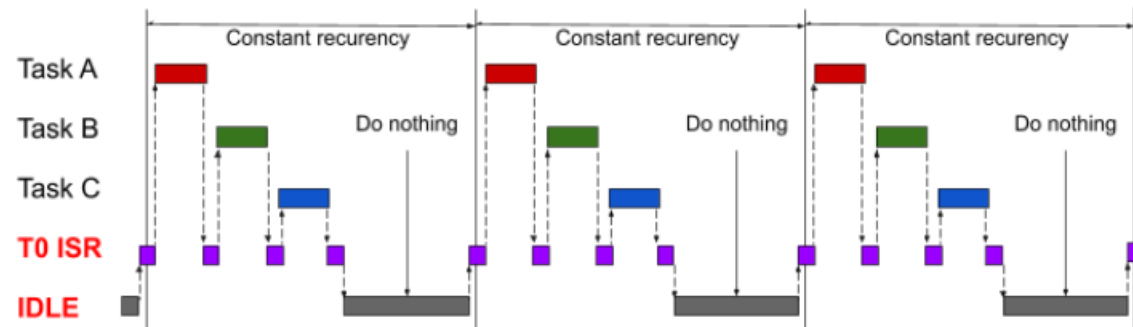


CPU Load – 100%



Multi tasking - Single process

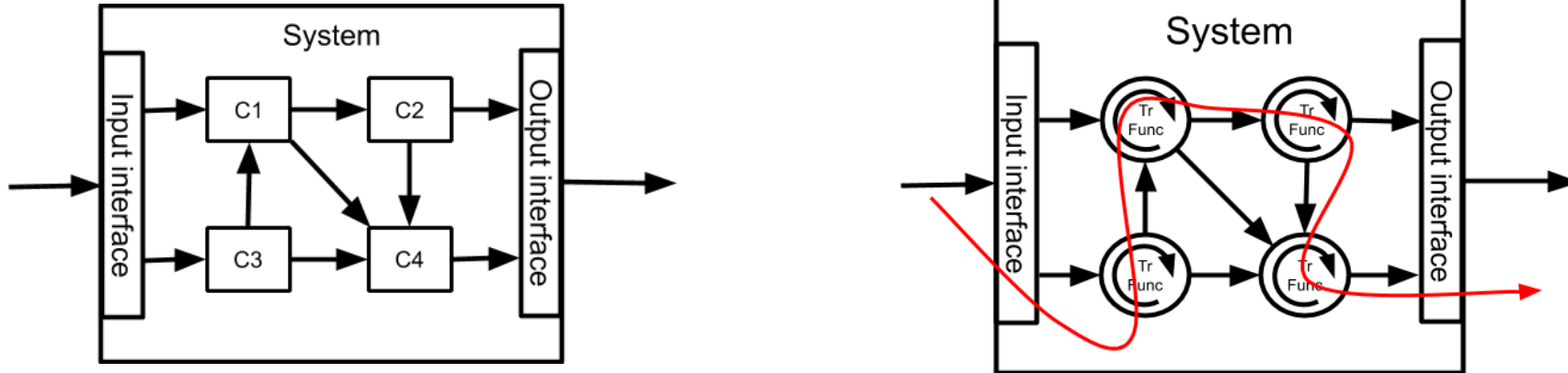
CPU Load < 100%



Multi tasking – Timer ISR based

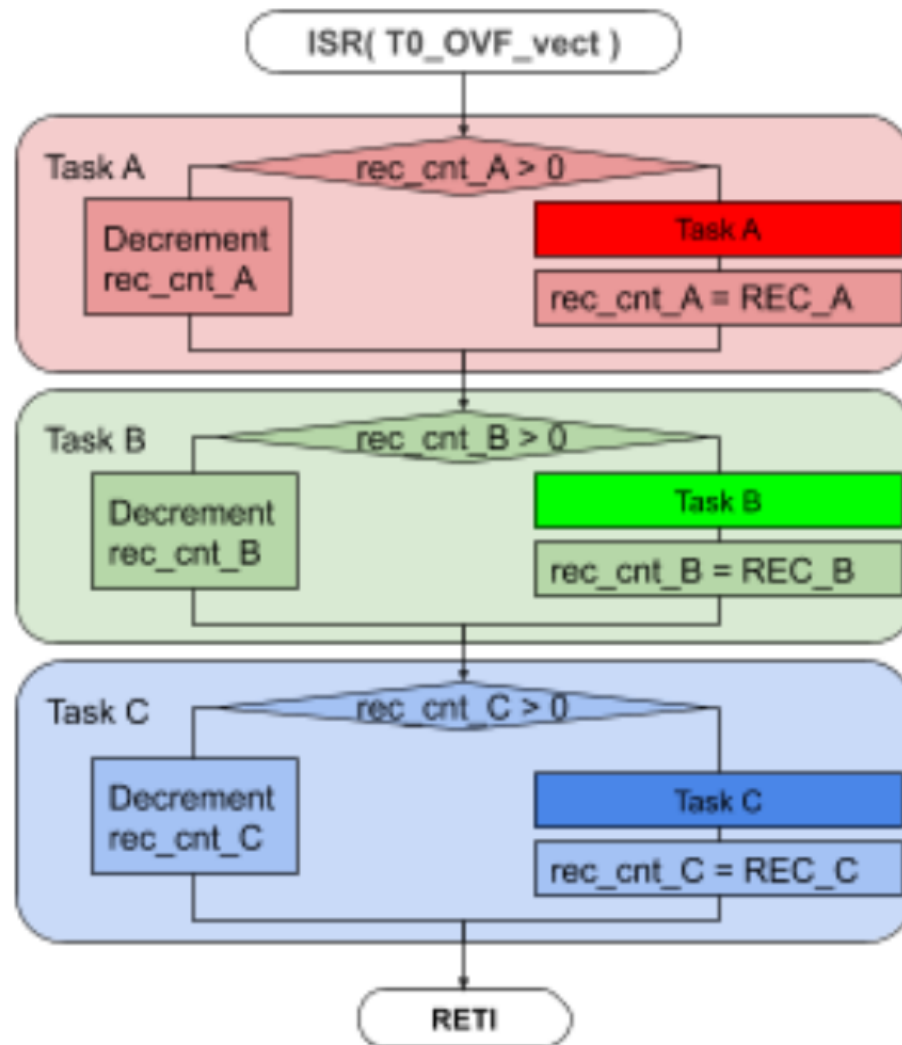


# Multi tasking – Task Recurrence & Order



1. C3 – Task 3: Recurrence = e.g. 1 ms , Offset 0 ms
2. C1 – Task 1: Recurrence = e.g. 2 ms , Offset 1 ms
3. C2 – Task 2: Recurrence = e.g. 3 ms , Offset 3 ms
4. C4 – Task 4: Recurrence = e.g. 5 ms , Offset 6 ms

# Multi tasking – Task Recurrence & Order



## Task Config

Task A: REC\_A = 3 ms , OFST\_A 3 ms

Task B: REC\_B = 2 ms , OFST\_B 1 ms

Task C: REC\_C = 4 ms , OFST\_C 0 ms

## Recurrency Counters Init:

rec\_cnt\_A = OFST\_A

rec\_cnt\_B = OFST\_B

rec\_cnt\_C = OFST\_C

```
ISR( T0_OVF_vect ) { // 1 ms
    // e.g. Button / Led
    if(--rec_cnt_A <= 0) {
        TaskA();
        rec_cnt_A = REC_A;
    }
    // e.g. BT Command Interpreter
    if(--rec_cnt_B <= 0) {
        TaskB();
        rec_cnt_B = REC_B;
    }
    // e.g. Sensor Acquisition
    if(--rec_cnt_C <= 0) {
        TaskC();
        rec_cnt_C = REC_C;
    }
}
```

# Multi tasking – Task Distribution

