Embedded Networks – ITESO. Embbedded C programming quiz.

1) Define what is a **“Static”** variable

Una variable estatica mantiene su valor, y solo se puede utilizar en el file que se creo.

2) How much memory needs to be allocated upon definition of the following variables/pointers on a 32-bit controller.

a.
```
UINT8       u8Var1;
```
4 Bytes

b.
```
UINT16      (*fctn_ptr)(UINT8 param1, UINT16 param2);
```
8 Bytes

c.
```
UINT32      u32Array2[] = {0xaabbccdd, 0xddcc3322, 0x44556677};
```
12 Bytes

d.
```
UINT16      *u16_var_ptr;
```
4 Bytes

e.
```
struct mystruct_t
{
  UINT16    *u16_var_ptr;
  UINT8     u8Var1;
  UINT16    (*fctn_ptr)(UINT8 param1, UINT16 param2);
 }my_struct;
```
16 Bytes

f.
```
 union my_union_t
{
UINT8       u8Var1;
UINT16      u16_var;
}my_union;
```
8 Bytes

3) Define the following terms

a) C-Preprocessor

Son las librerias que agragas al file.

b) Linker

Combierte el codigo de alto nivel a un ejecutable.

5) In runtime, where are the local variables created? What is their lifespan?

Se guardan en la RAM, duran hasta que la ejecucion termine.

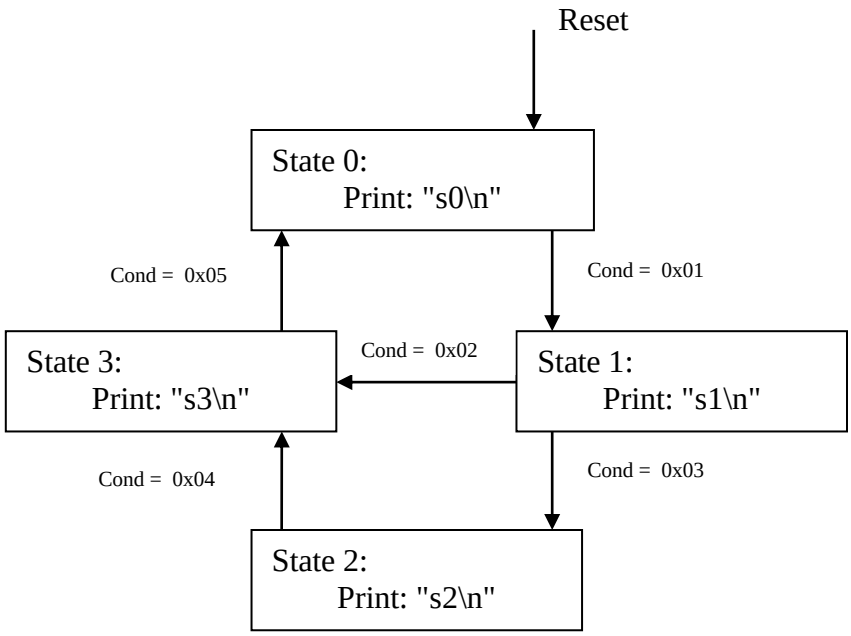
7) What is a callback function?

Es cuando utilizas una funcion como parametro de otra funcion.

8) What is the difference between constant variable and Macro? (i.e. CONST UINT8 U8var=8u; vs. #define u8var 8u)

La diferencia es que al definirla siempre tendra ese valor y no lo puedes modificar, y en una vatiable constante lo inicializas en 8u pero puede cambiar su valor en la ejecucion del programa.

9)Implement the following state machine:
- Reset is an asynchronous signal.
- Consider the variable “Cond” to be modified externally. FSM only checks for their values.




```
enum states{
      STATE_0,
      STATE_1,
      STATE_2,
      STATE_3,
      MAX_STATES
}State;

void state_0(void);
void state_1(void);
void state_2(void);
void state_3(void);

void(*const state_table[MAX_STATES])(void) = {
```

```
            state_0,
            state_1,
            state_2,
            state_3
};

int main(void)
{
    State = STATE_0;
    while (1)
    {
      state_table [State]();

    }
}

void state_0(void){

      if(Cond = 0x01){
            State = STATE_1;

      }
}

void state_1(void){

      if(Cond = 0x02){
            State = STATE_3;

      }else if(Cond = 0x03){
            State = STATE_2;

      }

}

void state_2(void){
      if(Cond = 0x04){
            State = STATE_3;

      }
}

void state_3(void){
      if(Cond = 0x05){
            State = STATE_0;

      }

}
```