

# Struct Address

## Objective

- Learn basics of data structures
  - Learn how memory may be padded within data structures
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## Review Basics

Here is the basic use of data structures in C:

```
// Declare data structure in C using typedef
typedef struct {
    int i;
    char c;
    float f;
} my_struct_t;
// Pass data structure as a copy
void struct_as_param(my_struct_t s) {
    s.i = 0;
    s.c = 'c';
}
// Pass data structure as a pointer
void struct_as_pointer(my_struct_t *p) {
    p->i = 0;
    p->c = 'c';
}
// Zero out the struct
void struct_as_pointer(my_struct_t *p) {
    memset(p, 0, sizeof(*p));}
```

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## Padding

1. Use the struct below, and try this sample code
  - Note that there may be a compiler error in the snippet below that you are expected to resolve on your own
  - Struct should ideally be placed before the main() and the `printf()` should be placed inside of the `main()`
  - You should use your SJ embedded board because the behavior may be different on a different compiler or the board
2. Now un-comment the `packed` attribute such that the compiler packs the fields together, and print them again.

```
typedef struct {
    float f1; // 4 bytes
    char c1; // 1 byte
    float f2;
    char c2;
} /*__attribute__((packed))*/ my_s;
// TODO: Instantiate a struct of type my_s with the name of "s"
printf("Size : %d bytes\n"
       "floats 0x%p 0x%p\n"
       "chars 0x%p 0x%p\n",
       sizeof(s), &s.f1, &s.f2, &s.c1, &s.c2);
```

**Note:**

- Important: In your submission (could be comments in your submitted code), provide your summary of the two print-outs. Explain why they are different, and try to draw conclusions based on the behavior.

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