structure

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struct (structure in C)

- A struct in C is a complex data type declaration that defines a physically grouped list of variables to be placed under one name in a block of memory
- It allows the different variables to be accessed via a single pointer, or the struct declared name which returns the same address.
- struct(in C), class (in C++/Python)
- cf., An array is also a kind of data structure that can store a collection of data elements of the same type.

Name of a structure (or *Tag*)

```
char author[20];
char title[30];
int page, year;

Member variables

**Member functions (method)
} Book;
```

instance

(It is optional as we can create it somewhere else in the code)

```
#include <stdio.h>
#include <string.h>

struct book // define a structure
    { char author[20];
    char title[30];
    int page, year; };
```

Exercise

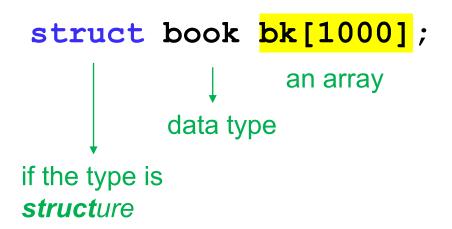
- Assign values to bk2
- And show the info of bk2

```
struct book bk1, bk2; 1// declare structure instances
bk1.year = 2019; bk1.page = 230; // assign values to those structures' members
strcpy(bk1_author, "Mike Taylor"); strcpy(bk1_title, "C Programming");
  // In C we cannot assign a string value to a char array (string), but have to copy
  // into them with strcpy(), memcpy() or similar.
  // bk1.author = "Mike Taylor"; // error C2106
  // let copy the string into the char array, instead
  // access and print those values to standard output
 printf("\n\n[bk1]\nAuthor: %s\n", bk1.author);
printf("Title: %s\nYear: %i, Page: %i \n\n", bk1.title, bk1.year, bk1.page);
// while (!kbhit()); // optional
```

Structure Array

Questions

- If we have to store information for 1000 books, do we need to create 1000 instances, e.g. bk1, bk2, bk3,.....bk1000?
- Let's be smart. If items have the same data type/ structure, we can use an array, i.e. structure array, such as:



<u>Homework</u>

- 1) Assign values for 3 books to bk[], i.e. bk[0], bk[1], bk[2]
 - ✓ Use a <u>Structure Array</u>, e.g. struct book bk[100];

2) Use a (for or while) loop to show all the info of bk[0]~bk[2]

Summary - struct (in C)

- A struct (in C) is very similar to a class (in C++/ Python)
- In order to use a structure, we must first declare a structure template:

```
struct str_name {
    int mbr0; float mbr1;
} name1, name2;
```

- The variables in a structure are called members.
- In C, you must explicitly use the struct keyword to declare a structure and create an instance, i.e. my_str:

```
int main() { ......

struct str_name my_str; ..... }
```

 Optionally declaring instances by placing one or more comma-separated instance names at the end of a struct. instance can be declared somewhere in the code.