Lab 8

Helpful Tips

point_array.h -> 2 structures

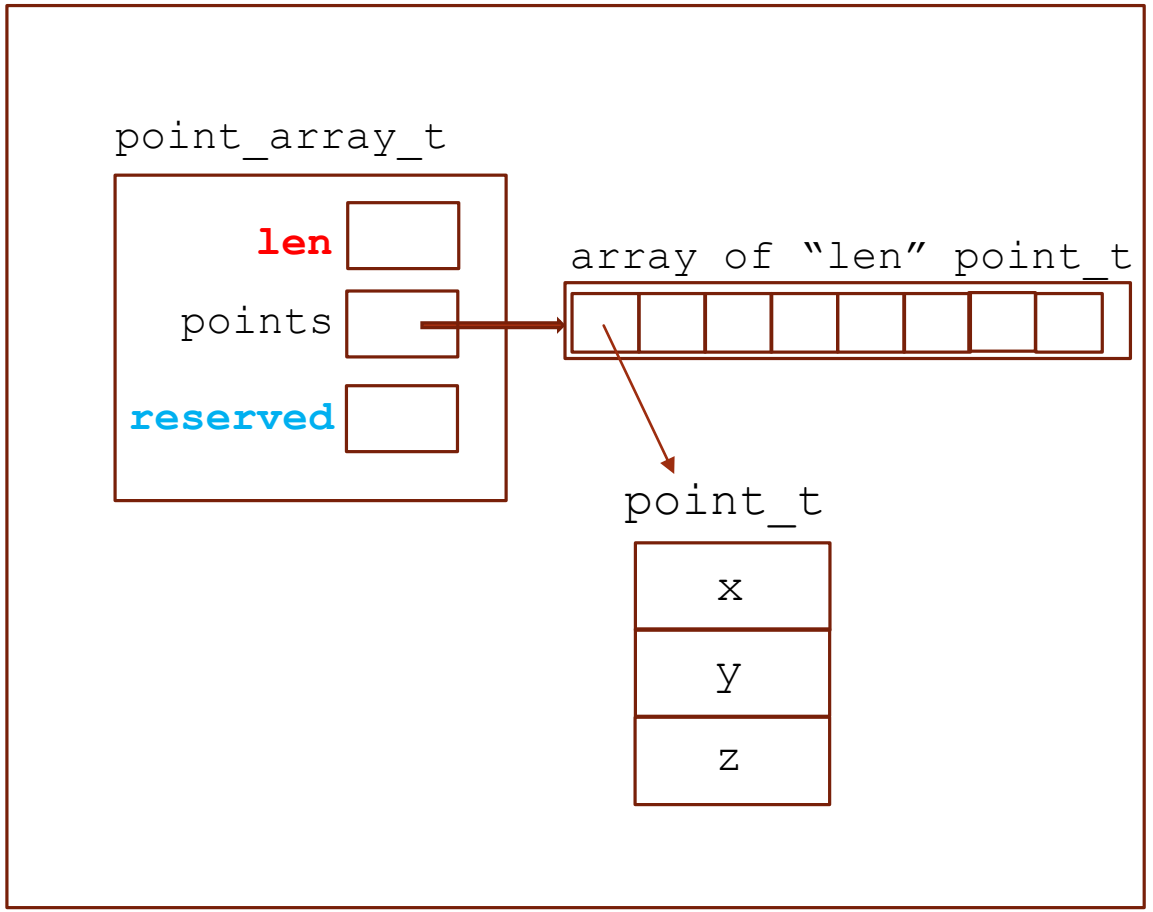
```c
typedef struct point
{
  double x, y, z;
} point_t;

typedef struct
{
  // number of points in the array
  size_t len;

  // pointer to an array of point_t structs
  // There is space for 'reserved' point_t structs,
  // but 'len' point_t structs have been used so far.
  point_t* points;

  // to be discussed in class - see Demo
  size_t reserved;

} point_array_t;
```



point_array.h – 4 functions

```
/* ALL THESE FUNCTIONS REQUIRE A VALID POINT_ARRAY_T POINTER AS THEIR
   FIRST PARAMETER. THEY SHOULD FAIL ON ASSERTION IF THIS POINTER IS NULL */

/* TASK 1 */

// Safely initalize an empty array structure.
void point_array_init( point_array_t* pa );

/* TASK 2 */

// Resets the array to be empty, freeing any memory allocated if necessary.
void point_array_reset( point_array_t* pa );

/* TASK 3 */

// Append a point to the end of an array. If successful, return 0, else return 1.
int point_array_append( point_array_t* pa, point_t* p );

/* TASK 4 */

// Remove the point at index i from the array, reducing the number of elements
// stored in the array by one. The order of points in the array may change.
// If successful, return 0, else return 1.
int point_array_remove( point_array_t* pa, unsigned int i );
```

`len` versus `reserved`?

- The idea of Lab 8 is for you to implement these 4 functions using 2 different Memory Allocation Strategies
  - These Memory Allocation Strategies are described in details in Lab 8 Demo
- In Task 1, you are to use …
  - `len` -> to represent the **number of points in the array** as well as the **size of allocated** (or reallocated) **memory for the array of points** -> array size
- In Task 2, you are to use …
  - `len` -> to represent the **number of points in the array**
  - `reserved` -> to represent the **size of allocated** (or reallocated) **memory for the array of points** -> array size

Compiling and testing our `t1.c` and `t2.c`

- Use `demo.c` as a testing program (test driver)
  - You may have to tweak it first
- Compile and test your code before submitting it to your Git repo

`makefile` for Lab 8

```
all: t1 t2

t1: demo.c t1.c
    gcc -Wall -std=c99 -o $@ demo.c t1.c

t2: demo.c t2.c
    gcc -Wall -std=c99 -o $@ demo.c t2.c

clean:
    rm -f t1 t2 *.o
```

`assert( )` and `free( )`

- You may want to investigate the function `assert( )`
  - How it works
  - What it returns
  - Use it to check the validity of functions' parameters
- When we call `free( aPtr )`, let's make sure we set `aPtr` to `NULL`:

```
free( aPtr );
aPtr = NULL;
```