

CSC209 Week 4 Notes

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Introduction to arrays in C 1 of 3

- Array

- **Syntax:** <TYPE >VAR_NAME[ARRAY_SIZE]

```
1  #include <stdio.h>
2
3  int main() {
4      float daytime_high[4];
5  }
6
```

Introduction to arrays in C 2 of 3

- Accessing Array Elements

- C doesn't check if an array access is within the bounds of array
- Overwrites memory location if exists

```
1  #include <stdio.h>
2
3  int main() {
4      float daytime_high[4] = {1,2,3};
5      daytime_high[5] = 999;
6  }
7
```

- Segmentation fault occurs if suitable memory location doesn't exist.

```
1  #include <stdio.h>
2
3  int main() {
4      int daytime_high[4] = {1,2,3};
5      daytime_high[3000] = 999;
6  }
7
```

Introduction to arrays in C 3 of 3

- Iterating Over Arrays

- For loop

* ‘<’ is used over ‘<=’ for the end condition, i.e. $i < 4$ in for ($i = 0; i < 4; i++$).

```

1  #include <stdio.h>
2
3  int main() {
4      float daytime_high[4] = {16.0, 12.8, 14.6, 19.1};
5
6      float average_temp = 0;
7
8      int i;
9      for (i = 0; i < 4; i++) {
10         printf("Adding element %d with value %f.\n", index
11         , daytime_high[i]);
12         average_temp += daytime_high[i];
13     }
14
15     average_temp = average_temp / 4;
16     printf("average %f\n", average_temp);
17
18     return 0;
19 }

```

- Constants

* Combines multiple repeating values into one

* Used to increase maintainability and readability

```

1  #include <stdio.h>
2  #define DAYS 4 // <-- HERE!!
3
4  int main() {
5      float daytime_high[DAYS] = {16.0, 12.8, 14.6, 19.1};
6
7      float average_temp = 0;
8
9      int i;
10     for (i = 0; i < DAYS; i++) {
11         printf("Adding element %d with value %f.\n", index
12         , daytime_high[i]);
13         average_temp += daytime_high[i];
14     }
15
16     average_temp = average_temp / DAY;
17     printf("average %f\n", average_temp);
18
19     return 0;
20 }

```

Pointers in C 1 of 7

- Address in C

- `&<VARIABLE_NAME>`
- Returns memory location of variable

```
1  #include <stdio.h>
2  #define DAYS 4
3
4  int main() {
5      int i;
6      i = 5;
7      printf("Value of i: %d\n", i);
8      printf("Address of i: %p\n", &i);
9  }
10
```

- Pointer

- `<TYPE>* <VARIABLE_NAME>`
- Is used to store memory addresses

```
1  #include <stdio.h>
2  #define DAYS 4
3
4  int main() {
5      int *pt;
6      pt = &i;
7
8      printf("value of pt: %p\n", pt);
9      printf("Address of pt: %p\n", &pt);
10
11     printf("Value pointed to by pt: %d\n", *pt);
12 }
13
```

Pointers in C 2 of 7

- Assigning to Deferred Pointers

- `TYPE*` is a type (but is a pointer)
- `TYPE *<POINTER_NAME> = VARIABLE_NAME`
 - * Stores memory location of variable to pointer
 - * is the same as

```
1  <TYPE> *<POINTER_NAME>;  
2  <POINTER_NAME> = VARIABLE_NAME  
3
```

- ***<POINTER_NAME> = VALUE**
 - * changes the value pointed by pointer

Example:

```
1  #include <stdio.h>  
2  #define DAYS 4  
3  
4  int main() {  
5      int i = 7;  
6      int *pt;  
7      pt = &i; // <- stores memory location of i, i.e. 0  
6      x7ffeeab32a28  
8      *pt = 9; // <- changes the value of i to 9  
9  
10     printf("Value of i: %d\n", i);  
11     printf("Address of i: %p\n", &i);  
12  
13     printf("pt points to %d\n", *pt);  
14  
15     return 0;  
16 }  
17
```