Lecture 10

2D Array Practice with Tammy :}

COMP1511 Programming Fundamentals
Intro
Announcements

- Assignment 1 Livestream Recording (under Week 4)
- Lots of help Sessions* this week and next week! (+ some stages-specific help sessions!)
- Simple Snake lab this week to help with Assignment 1 (+ this lecture :D)

*Help Session timetable here: https://cgi.cse.unsw.edu.au/~cs1511/23T1/help-sessions/
This Lecture...

Concepts (maybe) transferrable to assignment 1 - Practice with a problem about 2D array of structs (a.k.a. array of arrays of struct)
Live Code (hopefully)

https://cgi.cse.unsw.edu.au/~cs1511/23T1/live/Week05/
Quick Revision
Quick Revision

**Structs**

1. Define (above main)

```c
struct coordinate {
    int x_coordinate;
    int y_coordinate;
};
```

2. Declare

```c
struct coordinate cood_point;
```

3. Initialise

```c
cood_point.x_coordinate = 3;
cood_point.y_coordinate = 5;
```

**Enums**

1. Define (above main)

```c
enum icecream {Dulce, Vanilla, Choc, Pistachio, Strawberry, Mint}
```

2. Declare

```c
enum icecream menu_choice;
```

3. Initialise

```c
menu_choice = Dulce;
```
Quick Revision

**1D Arrays**

1. Declare & Initialise
   ```
   int ice_cream_consum[7] = {3, 2, 1, 2, 1, 3, 5};
   ```

2. Access an element
   ```
   ice_cream_consum[2]
   ```

Visually:

```
  0 1 2 3 4 5 6
  🟥 3 2 1 2 1 3 5
```

**2D Arrays (Array of Arrays)**

1. Declare (can also initialise with a loop)
   ```
   int array[3][5];
   ```

2. Access an element
   ```
   array[2][3];
   ```

Visually:

```
row 0: 3 2 1 2 1
row 1: 3 2 1 2 1
row 2: 3 2 1 2 1
```
Quick Revision

1D Array of Structs

Assume a defined Struct like:

```
struct coordinate {
    int x;
    int y;
};
```

1. Declare

```
struct coordinate map[5];
```

2. Initialise

```
map[0].x = 3;
map[0].y = 1;
```

Visually:

```

```

2D Array of Structs (containing enums)

What we are going through today :)
Practice Problem: Context
I have moved to a new home and am craving for bubble tea (as usual).
But I don't know this area very well - so we will go on an adventure, (navigating using WASD keys around a map) to look for a bubble tea (boba) store.
Bubble Tea Adventure

This problem has been broken down into 5 smaller tasks:

1. Get user input for initial details about the map - home location (coordinates), boba shop location (coordinates).
2. Update the map with these details.
3. Keep getting user input of 'w' (up), 'a' (left), 's' (down), 'd' (right), update and print the updated map until I find the boba store.
4. [If time allows] Add code to get more user input (as a part of the initial details) to build a big gym (2x2) (so I can stay healthy whilst drinking more boba) - gym location (starting coordinate).
5. [If time allows] Allow user to give up before finding a boba store by pressing ctrl+ d.
We have some starter code to work with, containing code to setup, including functions to:

- initialise_map
- print_map (and print_location - known as print_tile in assignment 1)
Set Up

```cpp
enum entity {
    PERSON,
    BOBA,
    FOOTPRINT_UP,
    FOOTPRINT_DOWN,
    FOOTPRINT_LEFT,
    FOOTPRINT_RIGHT,
    EMPTY
};
```

```cpp
enum place_type {
    SHOP,
    GYM,
    HOME,
    UNDEVELOPED
};
```
Set Up

Examples of a struct location:

```cpp
enum entity { 
    PERSON,
    BOBA,
    FOOTPRINT_UP,
    FOOTPRINT_DOWN,
    FOOTPRINT_LEFT,
    FOOTPRINT_RIGHT,
    EMPTY
};

struct location {
    enum entity entity;
    enum place_type_type place;
};
```
Examples of a struct location:

```c
struct location {  
    enum entity entity;  
    enum place_type place;  
};
```

Every single cell on the map is a struct location!
Set Up
The 2D Array of Structs

Graphically:

How we may visualise it in relation to code:

```c
struct location {
    enum entity entity;
    enum place_type place;
};

struct location map[MAP_ROWS][MAP_COLUMNS];
```
Set Up

The 2D Array of Structs

How we may visualise it in relation to code:

```
struct location {
    enum entity {entity;}
    enum place_type place;
};
```

```
struct location map[MAP_ROWS][MAP_COLUMNS];
```

How we show it on the terminal - the print_map function does this for us:

The circled part is an example of map[0][0]!
Practice Problem: Coding Time!
Practice Problem!

Task #1

Get user input for initial details about the map - home location (coordinates), boba shop location (coordinates).
Practice Problem!

Task #2

If the inputs are valid, update the map with the boba shop and home location then print out the initial map.
Practice Problem!

**Task #3**

Keep getting user input of 'w' (up), 'a' (left), 's' (down), 'd' (right), update and print the updated map until I find the boba store.

Once that is working, add code to leave footprints where you have explored!
Break Time!
Code Style
*Some* of the Things in the Assignment 1 Style Rubric

Let's look at these in the context of the code we wrote!

- **Functions**
  - 2 ways you can go about this depending on whether you feel confident about functions
- **#defines for magic numbers**
- **Comments**
- **Line length**

NOTE: Style is marked manually in your assignment 1 but the 1511 style checker can help you pick up on some smaller issues. (Make sure you are also following the 1511 style guide!)
Practice Problem: Back to Coding!
Practice Problem!

Task #4

Add code to get more user input (as a part of the initial details) to build a big gym (2x2) (so I can stay healthy whilst drinking more boba) - gym location (starting coordinate).
Task #5

Allow user to give up before finding a boba store by pressing ctrl+ d.
This is my first ever 1511 lecture, I would really appreciate any feedback to help me improve my teaching <3

https://www.menti.com/aligwybon37r
Recording under week 4 on course website!

Building on from what we learnt about enums, structs, arrays, 2D arrays.

Bubble Tea Adventure!
If you have any questions

Course Related:
Course Forum + Help Sessions!

Admin Related:
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Thank you everyone :)