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/

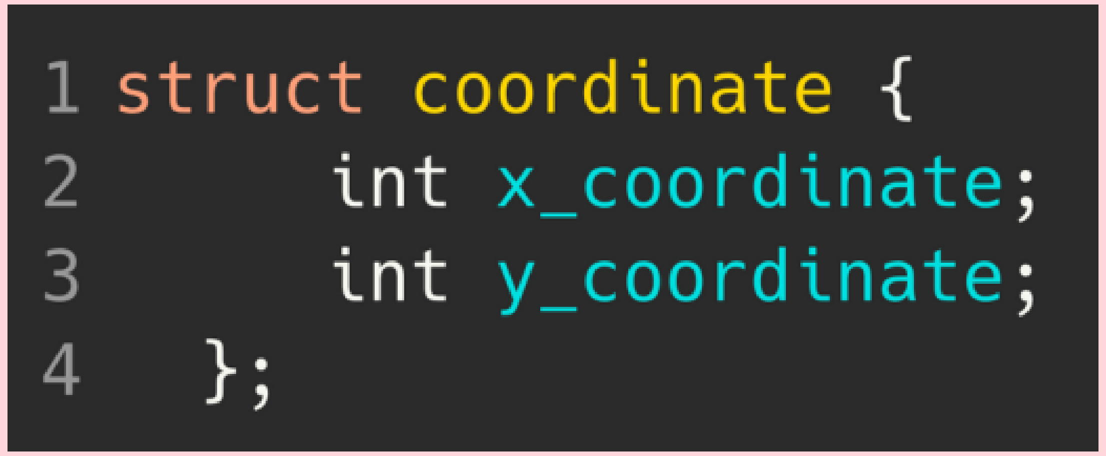
Quick Revision

Stolen from Sasha's Slides :)

Quick Revision

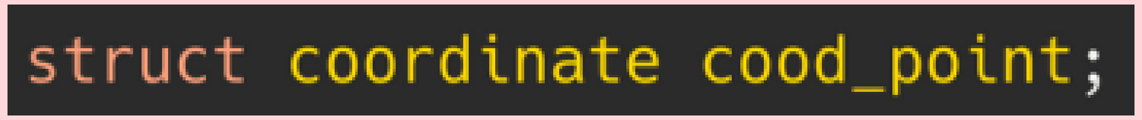
Structs

1. *Define (above main)*



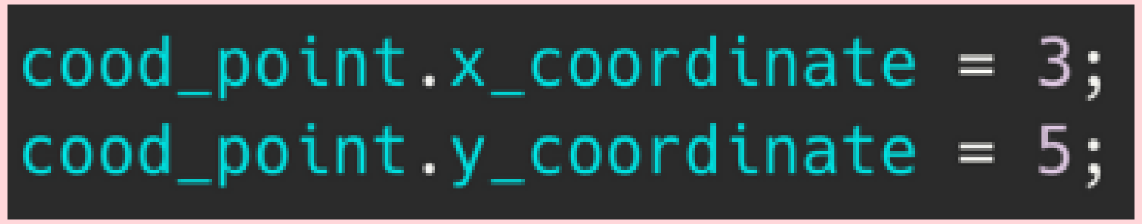
```
struct coordinate {
      int x_coordinate;
      int y_coordinate;
  };
```

2. *Declare*



```
struct coordinate cood_point;
```

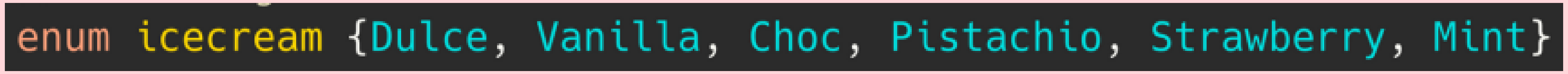
3. *Initialise*



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

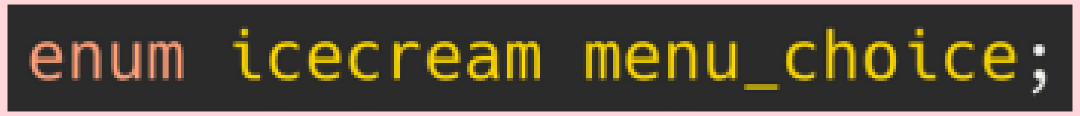
Enums

1. *Define (above main)*



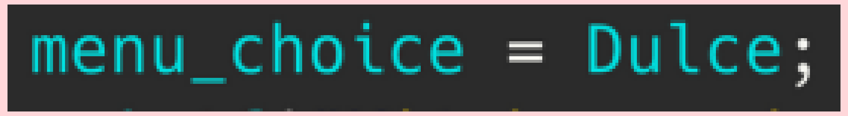
```
enum icecream {Dulce, Vanilla, Choc, Pistachio, Strawberry, Mint}
```

2. *Declare*



```
enum icecream menu_choice;
```

3. *Initialise*



```
menu_choice = Dulce;
```

Stolen from Sasha's Slides :)

Quick Revision

1D Arrays

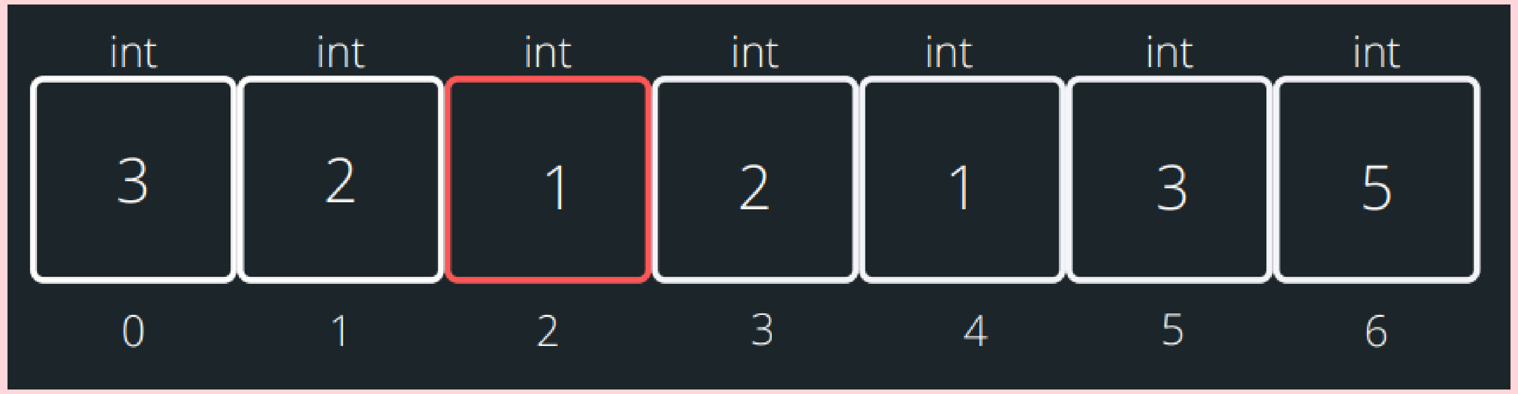
1. Declare & Initialise

```
int ice_cream_consum[7] = {3, 2, 1, 2, 1, 3, 5};
```

2. Access an element

```
ice_cream_consum[2]
```

Visually:



int	int	int	int	int	int	int
3	2	1	2	1	3	5
0	1	2	3	4	5	6

2D Arrays (Array of Arrays)

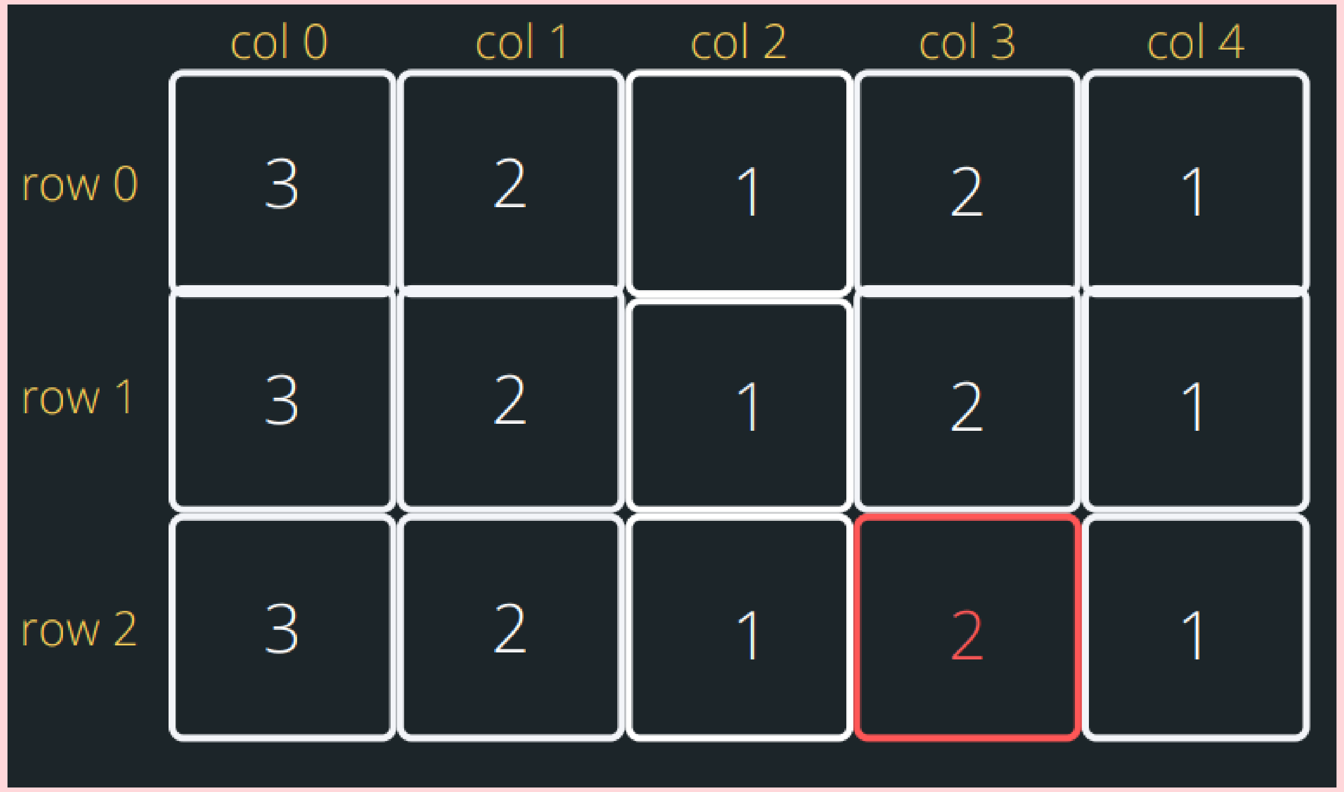
1. Declare (can also initialise with a loop)

```
int array[3][5];
```

2. Access an element

```
array[2][3];
```

Visually:



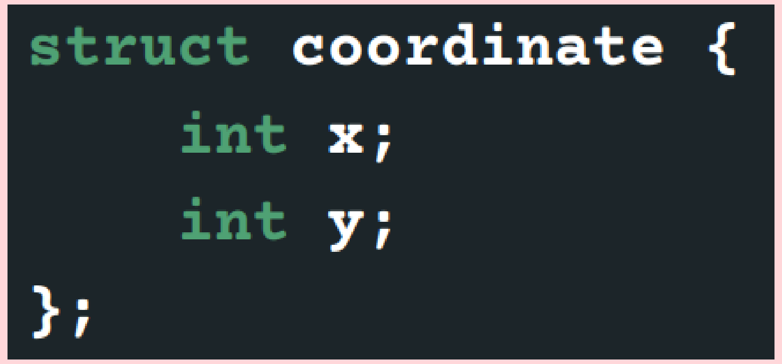
	col 0	col 1	col 2	col 3	col 4
row 0	3	2	1	2	1
row 1	3	2	1	2	1
row 2	3	2	1	2	1

Stolen from Sasha's Slides :)

Quick Revision

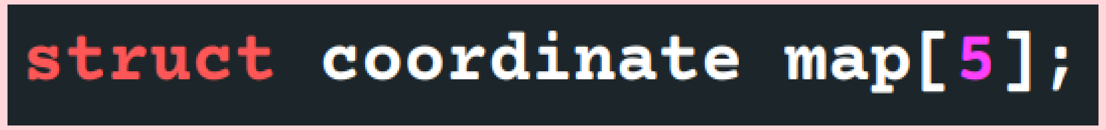
1D Array of Structs

Assume a defined Struct like:



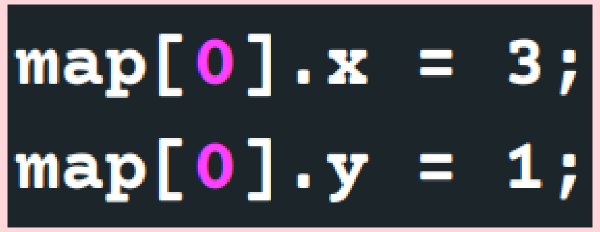
```
struct coordinate {
    int x;
    int y;
};
```

1. *Declare*



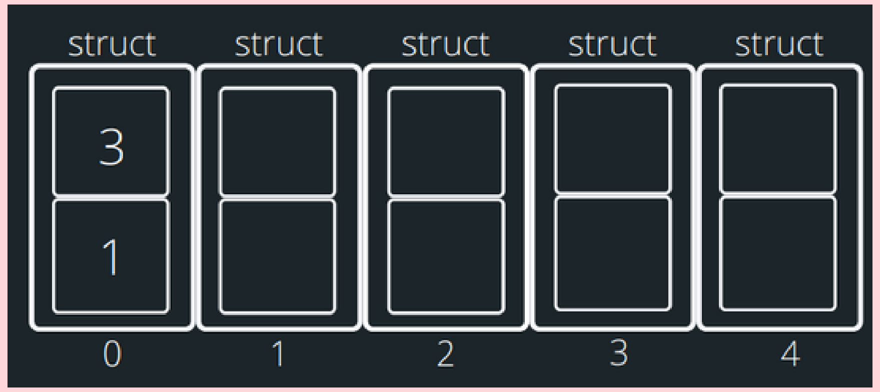
```
struct coordinate map[5];
```

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

Practice Problem!

Bubble Tea Adventure

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.

Practice Problem!

Bubble Tea Adventure

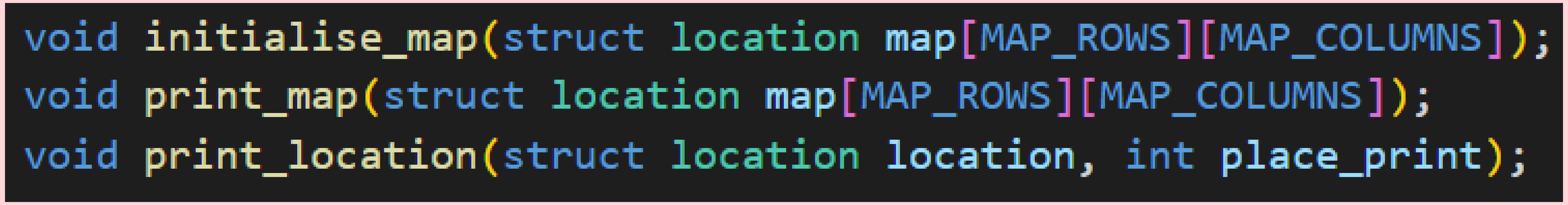
This problem has been broken down into 5 smaller tasks:

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.

Some similarity to Assignment 1...

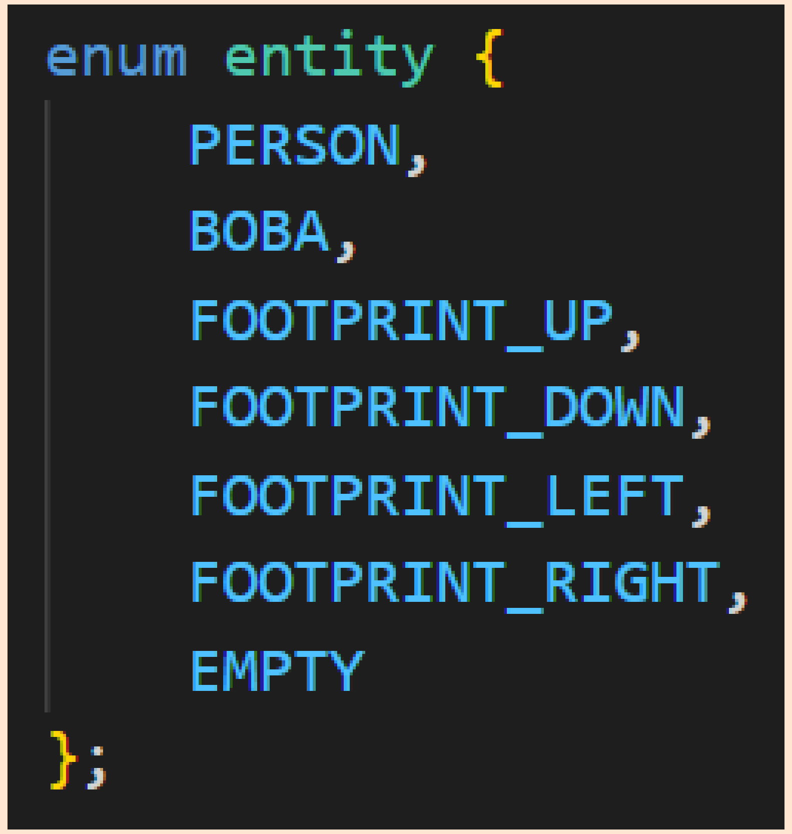
We have some starter code to work with, containing code to setup, including functions to:

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

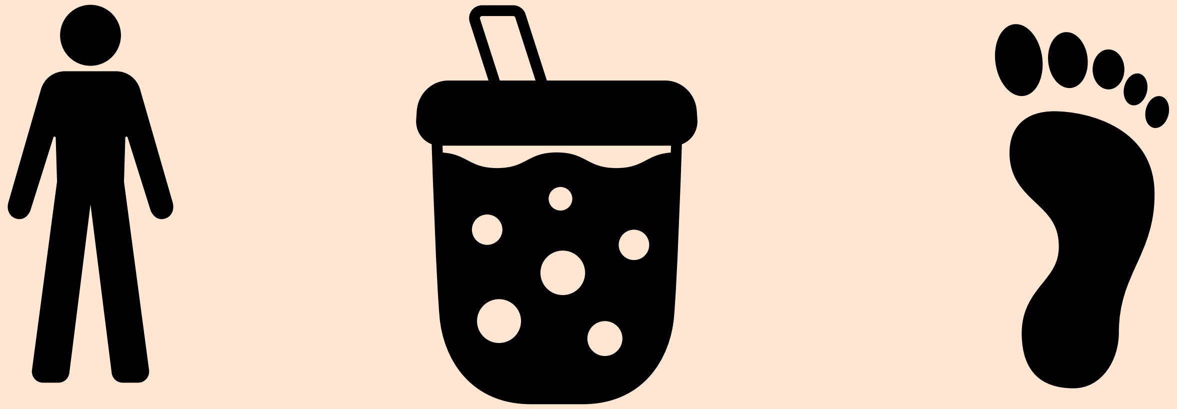


```c
void initialise_map(struct location map[MAP_ROWS][MAP_COLUMNS]);
void print_map(struct location map[MAP_ROWS][MAP_COLUMNS]);
void print_location(struct location location, int place_print);
```

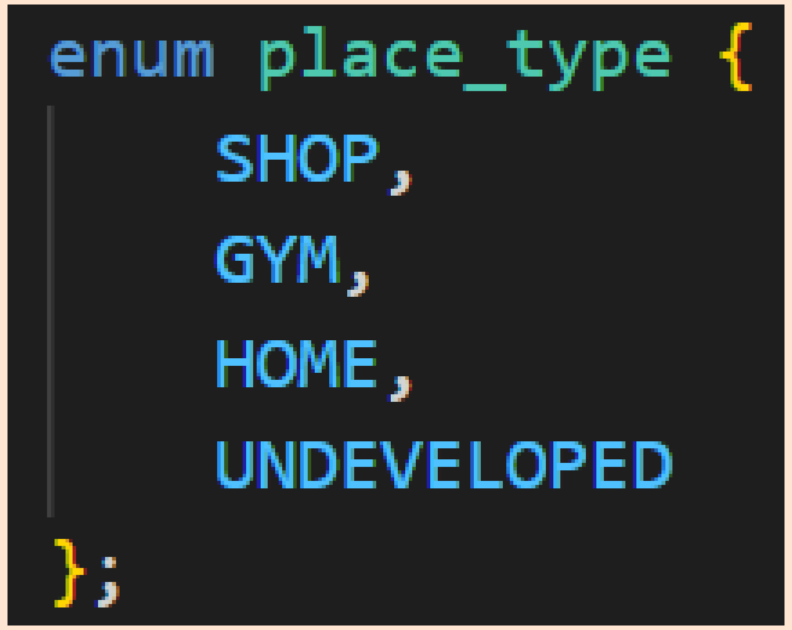
Set Up



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



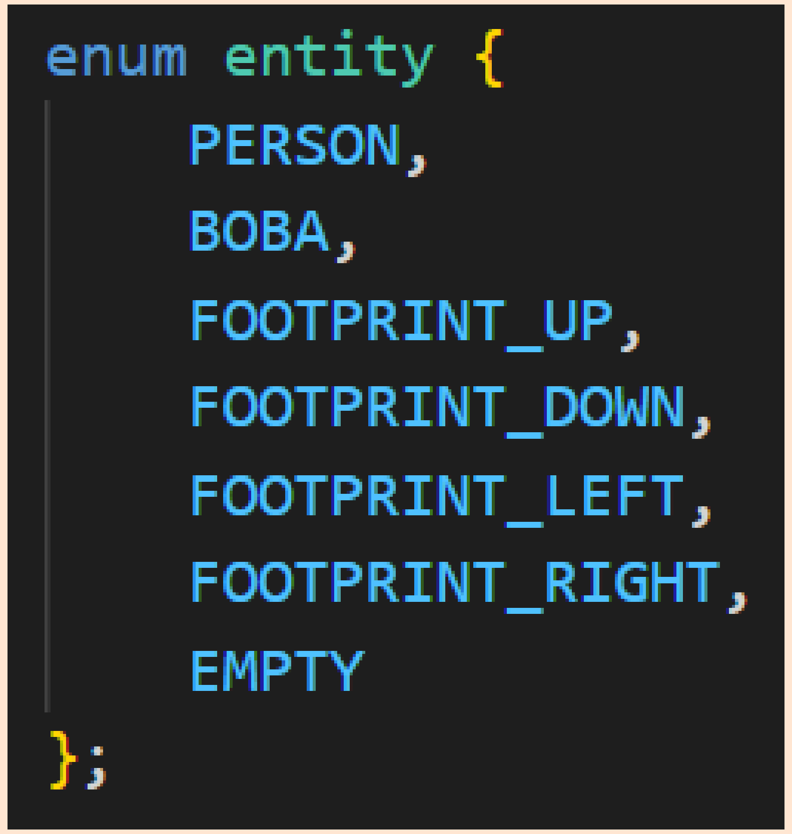
EMPTY



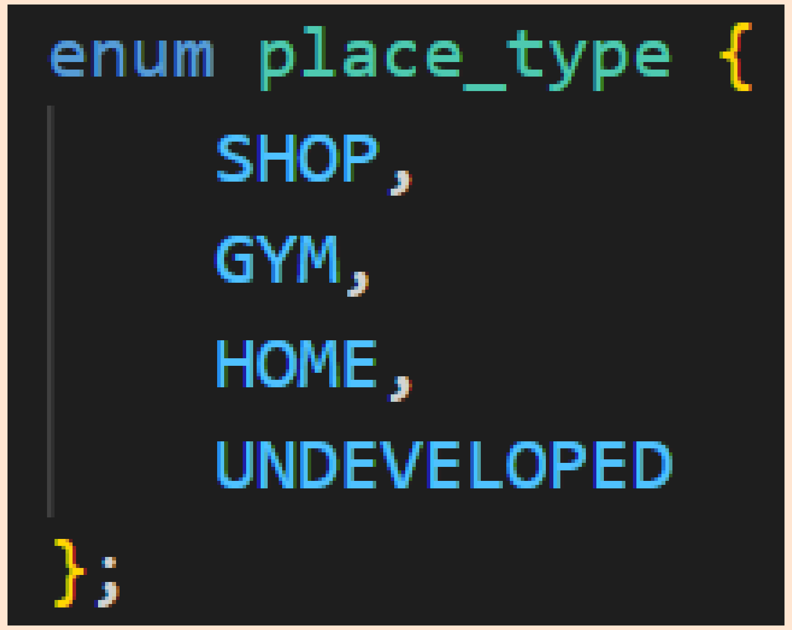
```
enum place_type {
    SHOP,
    GYM,
    HOME,
    UNDEVELOPED
};
```

SHOP
OPEN
GYM

Set Up

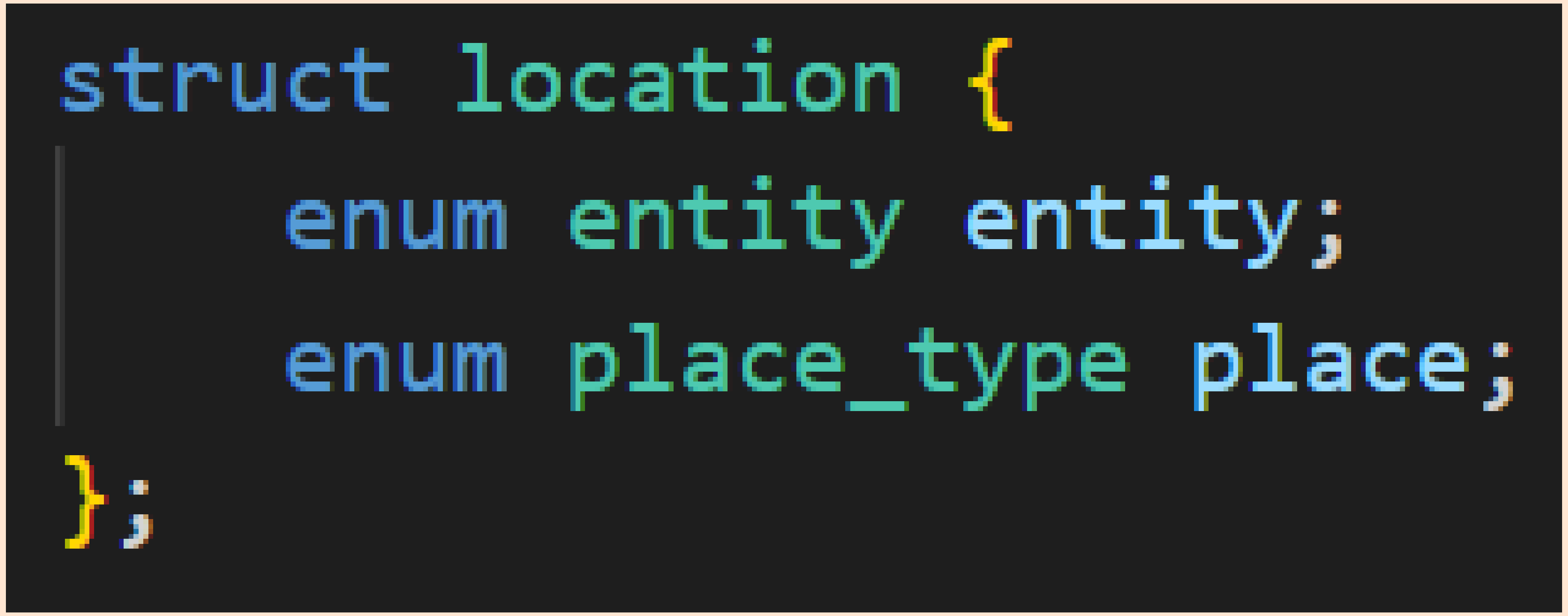


```
enum entity {
    PERSON,
    BOBA,
    FOOTPRINT_UP,
    FOOTPRINT_DOWN,
    FOOTPRINT_LEFT,
    FOOTPRINT_RIGHT,
    EMPTY
};
```



```
enum place_type {
    SHOP,
    GYM,
    HOME,
    UNDEVELOPED
};
```

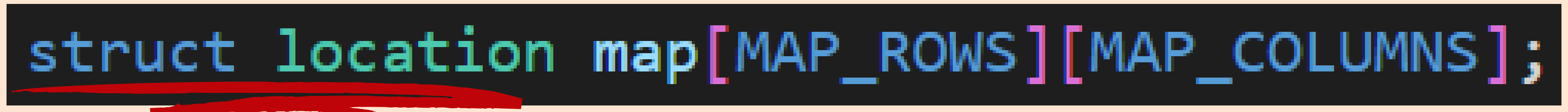
Examples of a struct location:



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

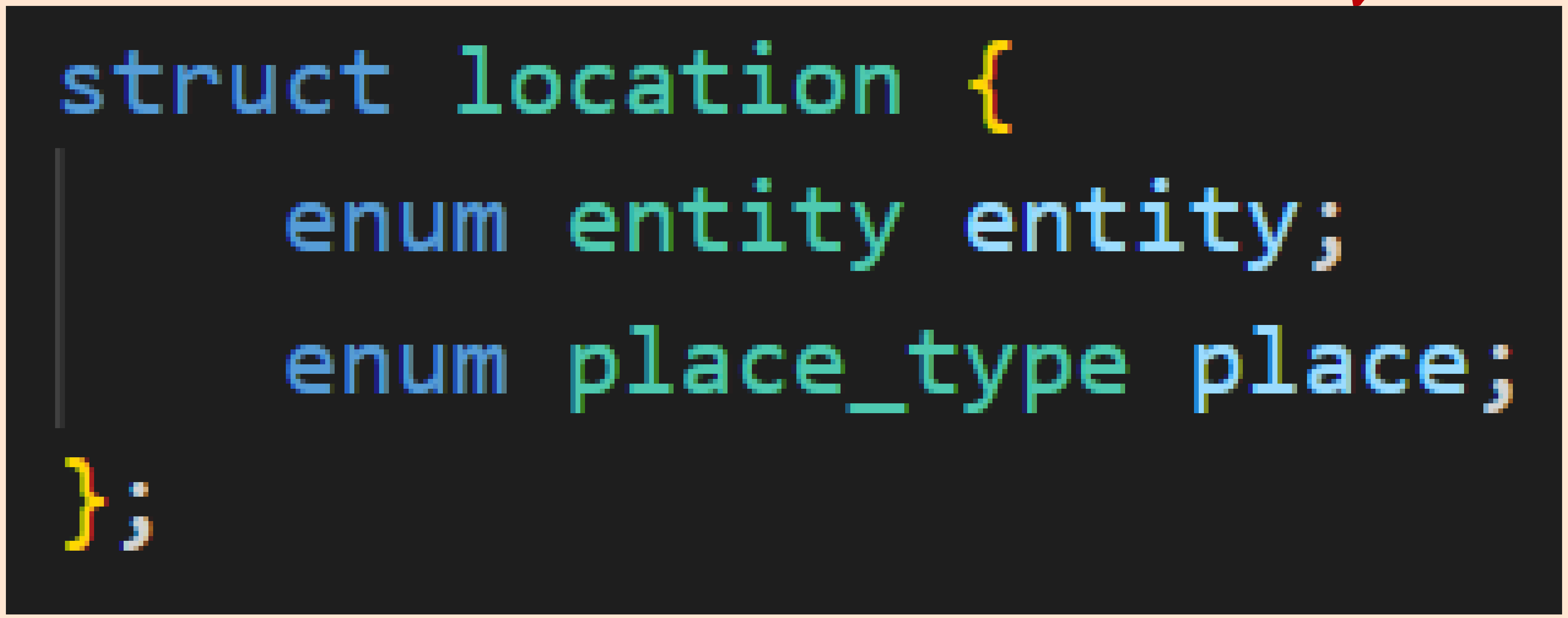
Set Up

6 8

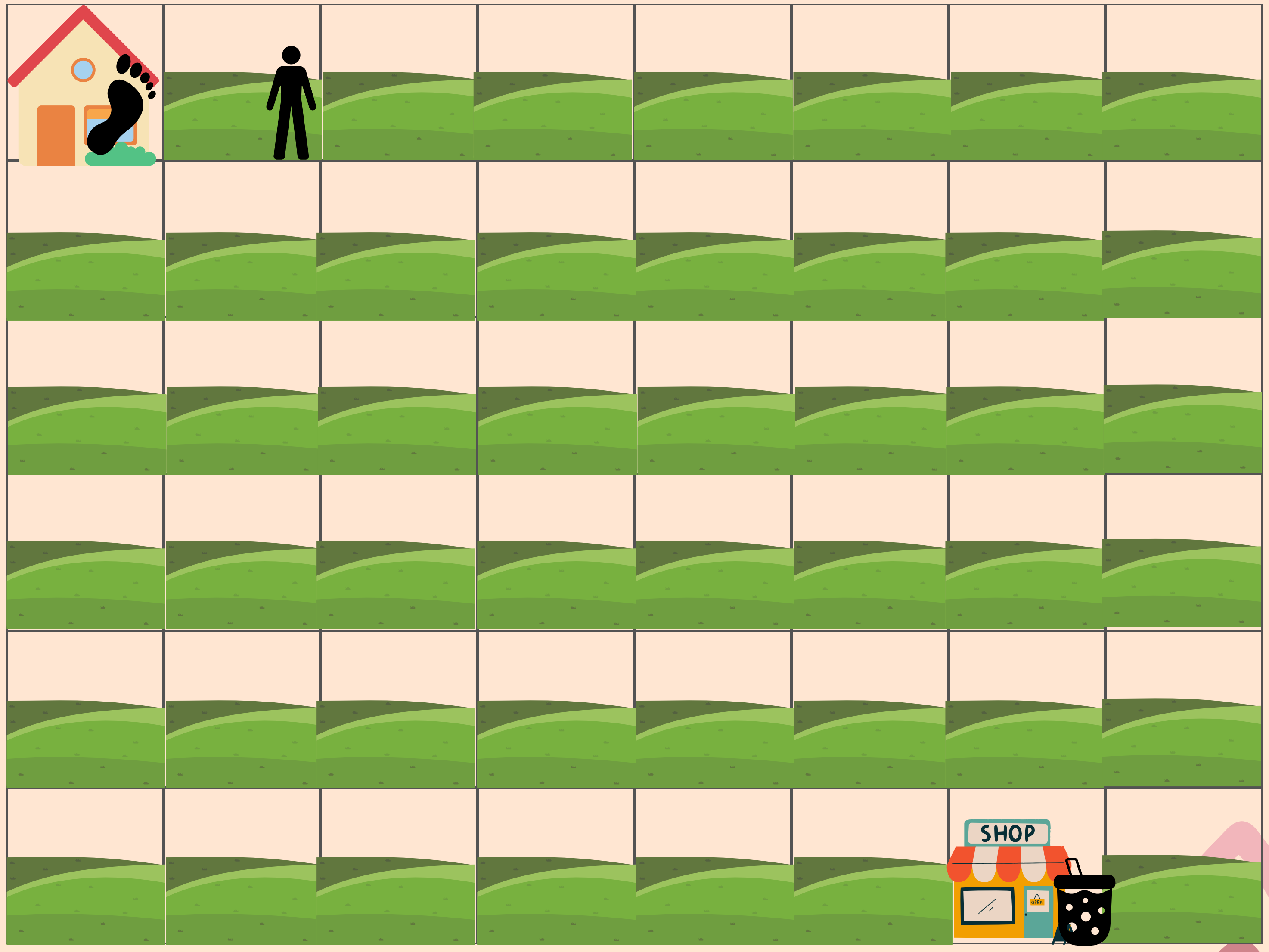


```
struct location map[MAP_ROWS][MAP_COLUMNS];
```

Examples of a struct location:



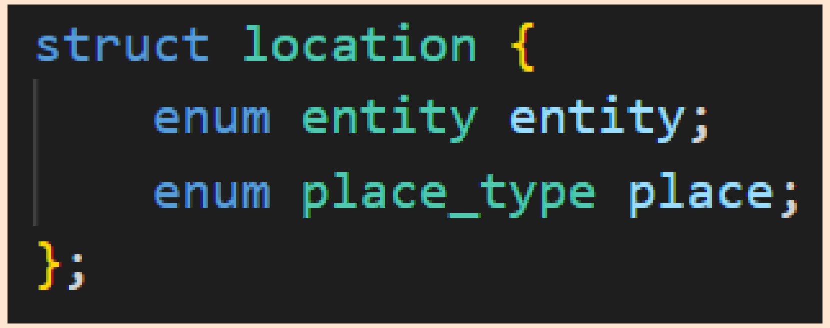
```
struct location {
    enum entity entity;
    enum place_type place;
};
```



Every single cell on the map is a struct location!

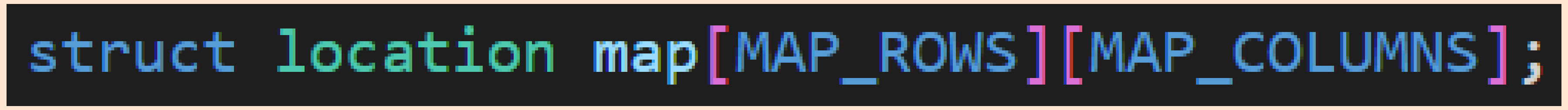
Set Up

The 2D Array of Structs



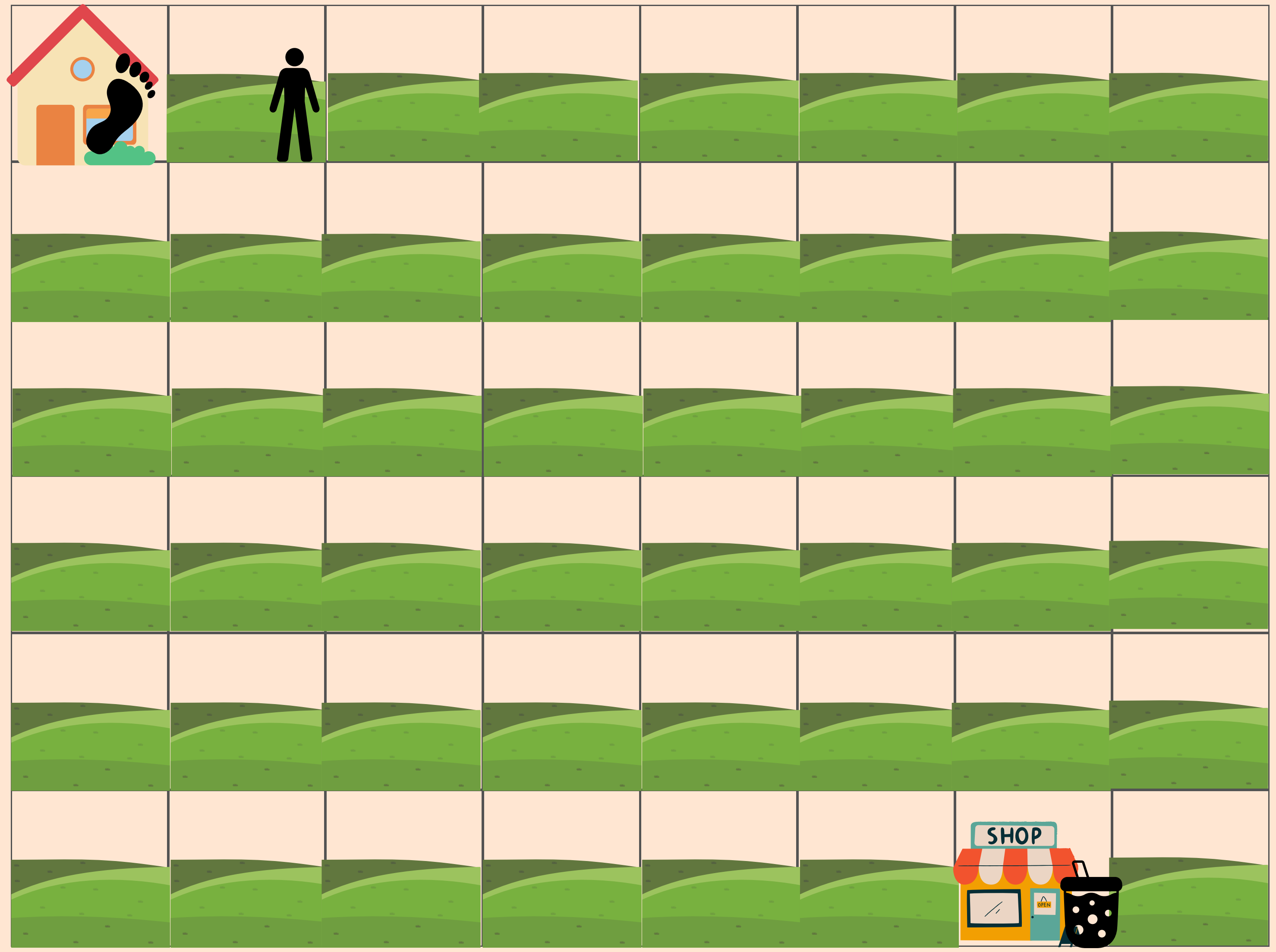
```c
struct location {
    enum entity entity;
    enum place_type place;
};
```

6 8



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

Graphically:



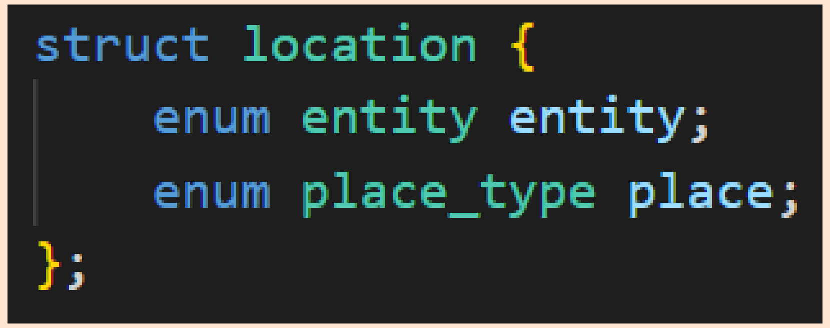
How we may visualise it in relation to code:

	0	1	2	3	4	5	6	7
0	entity == FOOTPRINT place == HOME	entity == PERSON place == UNDEVELOPED	entity == EMPTY place == UNDEVELOPED					
1								
2								
3								
4								
5							entity == BOBA place == SHOP	

AND SO ON...

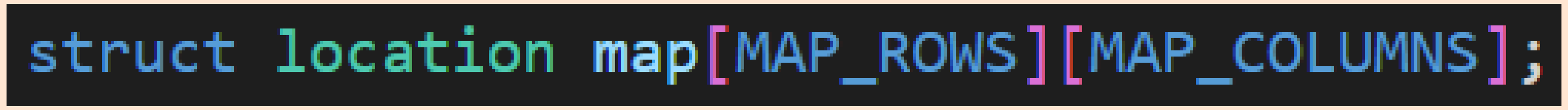
Set Up

The 2D Array of Structs



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

6 8



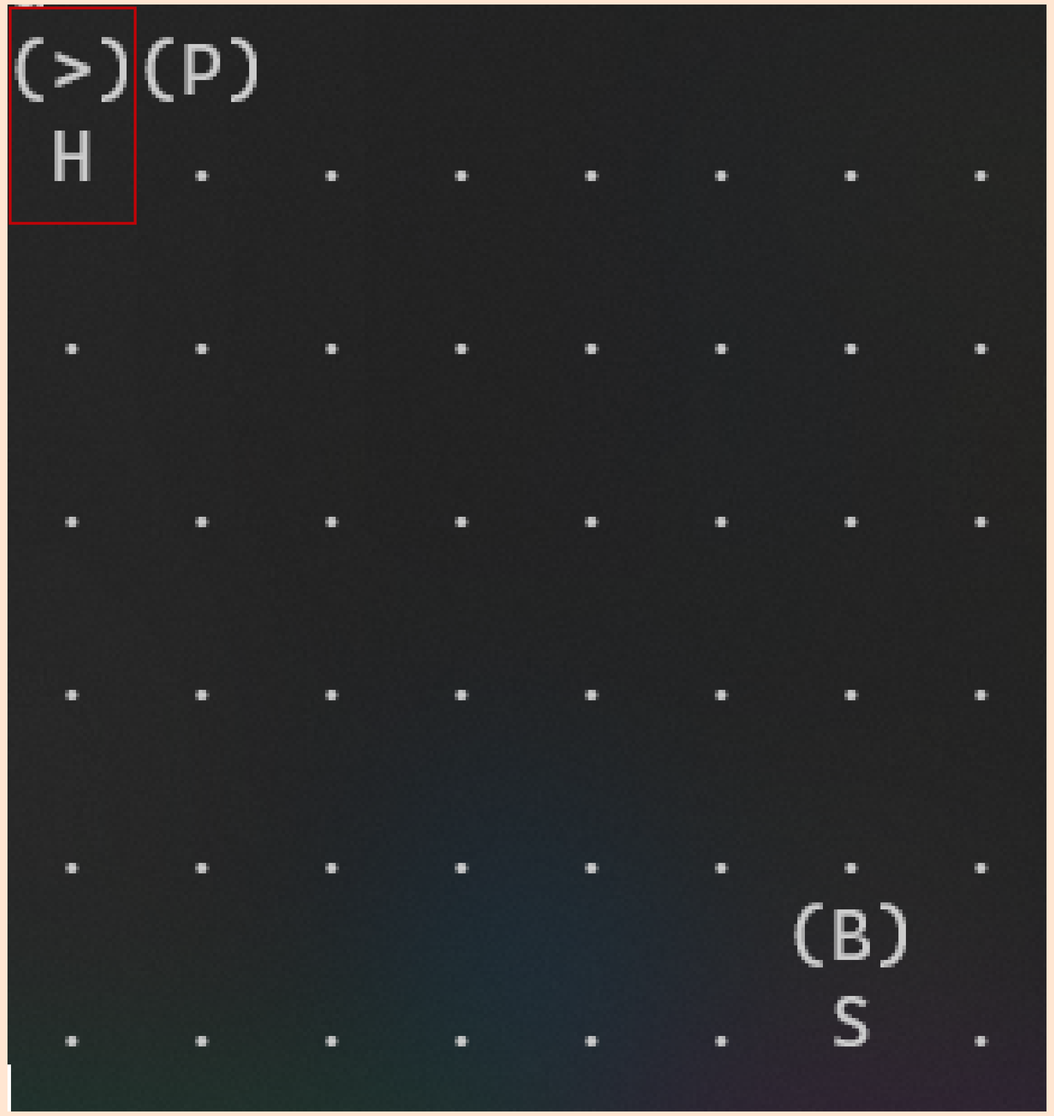
```c
struct location map[MAP_ROWS][MAP_COLUMNS];
```

How we may visualise it in relation to code:

	0	1	2	3	4	5	6	7
0	entity == FOOTPRINT place == HOME	entity == PERSON place == UNDEVELOPED	entity == EMPTY place == UNDEVELOPED					
1								
2								
3								
4								
5							entity == BOBA place == SHOP	

AND SO ON...

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



```
(>)(P)
 H  .  .  .  .  .  .  .

 .  .  .  .  .  .  .  .

 .  .  .  .  .  .  .  .

 .  .  .  .  .  .  .  .

 .  .  .  .  .  .  .  .
                  (B)
 .  .  .  .  .  .  S  .
```

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

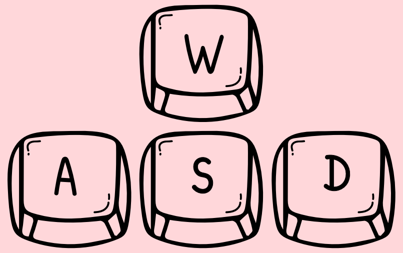
If the inputs are valid, update the map with the boba shop and home location then print out the initial map.

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).

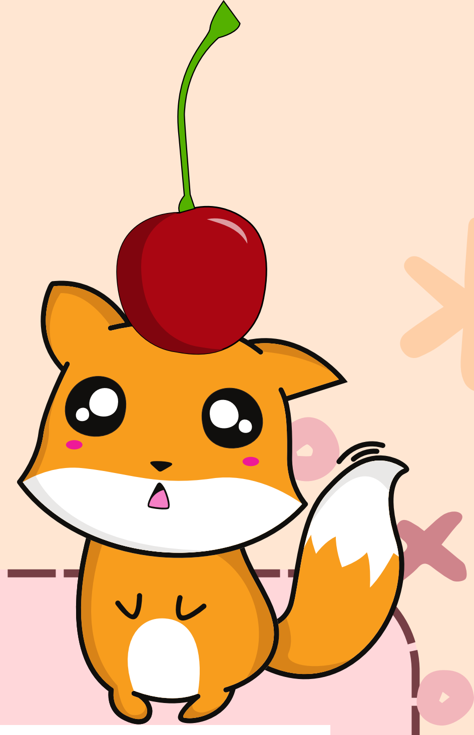
Practice Problem!

Task #5

Allow user to give up before finding a boba store by pressing ctrl+ d.

Feedback

(pretty please with a cherry on top)



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

Summary

Assignment 1 Livestream

Recording under week 4 on course website!

2D Array of Structs

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

Practice Problem

Bubble Tea Adventure!

If you have any questions

Course Related:

Course Forum + Help Sessions!

Admin Related:

cs1511@unsw.edu.au

Thank you everyone :)