

COMP1511 PROGRAMMING FUNDAMENTALS

LECTURE 6

I ❤️ ARRAYS

LAST LECTURE...

ON MONDAY...

- Talked about good style/bad style
- Functions - what/how/why?

THIS LECTURE...

TODAY...

- Starting to look at arrays
 - MAYBE strings if we are doing good time :)
- Look back at some functions (with arrays!)

“

WHERE IS THE CODE?

Live lecture code can be found here:

[HTTPS://CGI.CSE.UNSW.EDU.AU/~CS1511/24T1/LIVE/WEEK03/](https://cgi.cse.unsw.edu.au/~cs1511/24T1/LIVE/WEEK03/)



FUNCTIONS RECAP

WHAT?

- A function is a block of statements that performs a specific task

FUNCTIONS RECAP

WHY?

- Improve readability of the code
- Improve reusability of the code
- Debugging is easier (you can narrow down which function is causing issues)
- Reduces size of code (you can reuse the functions as needed, wherever needed)

FUNCTIONS RECAP

HOW?

- Predefined standard library functions (built-in)
 - printf(), scanf() inside stdio.h
- User defined function with syntax:

```
return_type function_name (arguments (type name)) {  
    BLOCK OF CODE (Set of instructions for the  
    function)  
}
```

- return_type - can be any data type such as int, double, char, etc (CAN'T BE ARRAY)
- function_name - whatever your heart desires, should be descriptive
- arguments - what are the inputs into the function
- Block of Code - set of instructions executed when call is made to the function

RECAP FUNCTIONS

A function,
which adds two
numbers
together and
returns the
result

return type:
What type
does this
function return?

**name of
function:**
What will I name
my function?

**input/
arguments:**
What am I giving
my function?

```
int add (int number_one, int number_two) {  
    int sum;  
    sum = number_one + number_two;  
    return sum;  
}
```

To finish I return an int (sum),
which is what I said I would
return when I wrote my
function

RECAP FUNCTIONS

PROTOTYPE

- You must have a prototype above your main to let everyone know the function is defined and is coming!

HOW DO WE EFFICIENTLY SOLVE PROBLEMS?

DIFFERENT PROBLEMS HAVE DIFFERENT OPTIMUM SOLUTIONS

- In this course we will learn about two pretty cool data structures:
 - Arrays (NOW!)
 - Linked Lists (after flexibility week)
- There are of course other data structures that you will learn about in further computing courses
- Choosing the right structure to house our data depends on what the problem is and what you are trying to achieve. Some structures lend themselves better to certain types of problems.

SO WITHOUT FURTHER ADO

THE ARRAY

- A PRETTY IMPORTANT DATA TYPE!
- A collection of variables all of the same type
 - Think about how this is very different to a struct
- We want to be able to deal with this collection as a whole entity, where we can:
 - Access any variable in this collection easily
 - Change any variable in this collection easily

SO WHAT KINDS OF PROBLEMS DO ARRAYS SOLVE?

**NOTICE THAT EACH OF
THESE COLLECTIONS
HAS THE SAME TYPE OF
VARIABLE I AM
RECORDING**

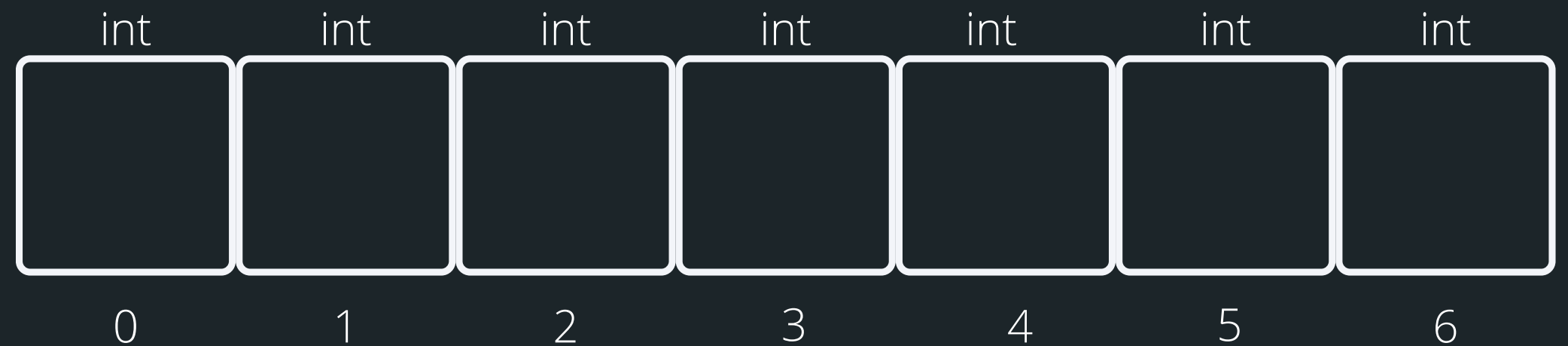
- Let's say I want to record the daily tea consumption for a week
- What about the daily temperatures for a year?
- The amount of time daily that I spend walking my dogs?

Can you think of other examples?

ARRAY (VISUALLY)

**NOTE: ALL ELEMENTS
OF AN ARRAY MUST BE
OF THE SAME DATA
TYPE (HOMOGENOUS)**

- If we group our data type as a collection, for example a collection of integers:
- We can access them as a group(collection)
- We can loop through and access each individual element of that collection



this array holds 7 integers

You can access elements of an array by referring to their index

WHY DO WE NEED AN ARRAY?

LET'S LOOK AT AN EXAMPLE PROBLEM

- Let's say I am tracking my tea consumption over a week (without arrays)

```
int mon = 2;
int tues = 3;
int wedn = 3;
int thur = 5;
int fri = 7;
int sat = 1;
int sun = 3;

// Any day with 3 or more teas is too
much!

if (mon >= 3){
    printf("Too much tea\n");
}

if (tue >= 3) {.....
```

WHY DO WE NEED AN ARRAY?

LET'S LOOK AT AN
EXAMPLE PROBLEM

- What if I am tracking this over the month or over a year?
 - Will I need 30 variables/365 variables?

THIS IS A GREAT PLACE TO USE AN ARRAY...

HOW DO WE DECLARE AN ARRAY

Type of data stored in array

Name of the array

Number of items in the array

// 1. Declaring an array
`int tea_drinking[7];`

// 2. Declaring and Initialise the array
// Note that once you declare an array,
// you can't initialise it in this way
`int tea_drinking[7] = {3, 2, 1, ...};`

To initialise, open curly bracket and separate values by comma. If you have empty {}, it means to initialise the whole array to 0

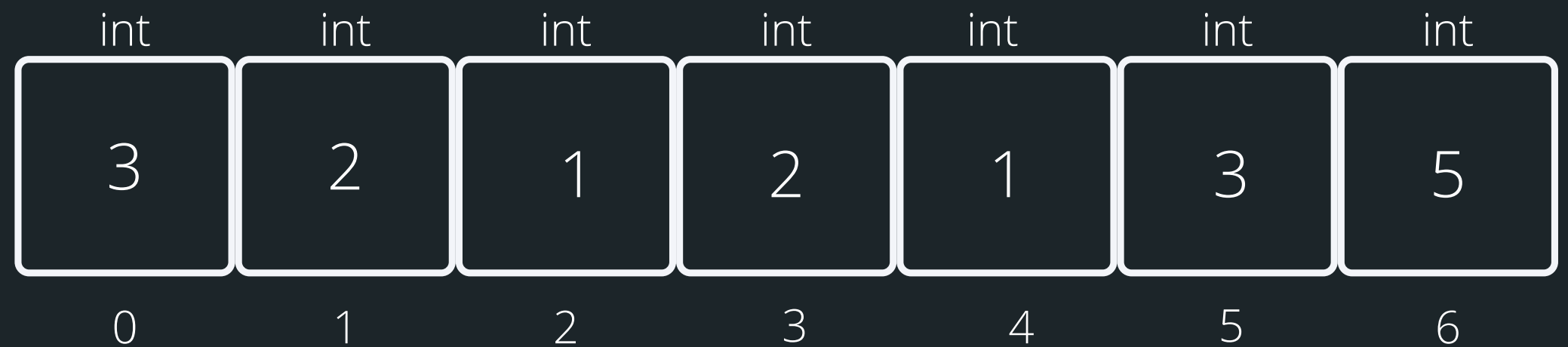
ARRAY (VISUALLY)

DECLARING AND INITIALISING AN ARRAY

- So let's say we have this declared and initialised:

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

- This is what it looks like visually:



this array holds 7 integers

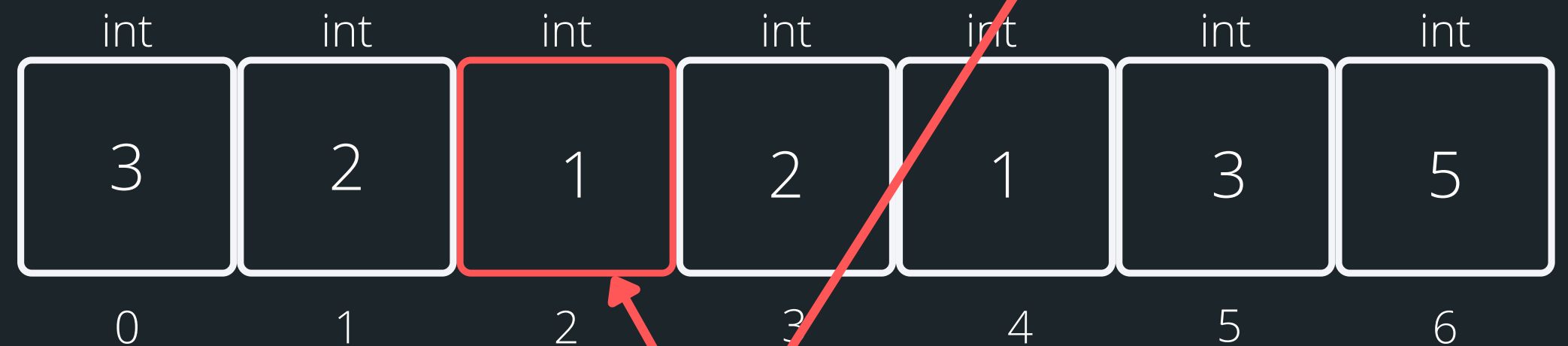
Note that indexing starts at 0

ARRAY (VISUALLY)

ACCESSING ARRAY ELEMENTS

- You can access any element of the array by referencing its index
- Note, that indexes start from 0
- Trying to access an index that does not exist, will result in an error

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



If I wanted the third element of the array

The index would be 2, so to access it:

```
tea_drinking[2]
```

USING ARRAYS

CLOSER LOOK

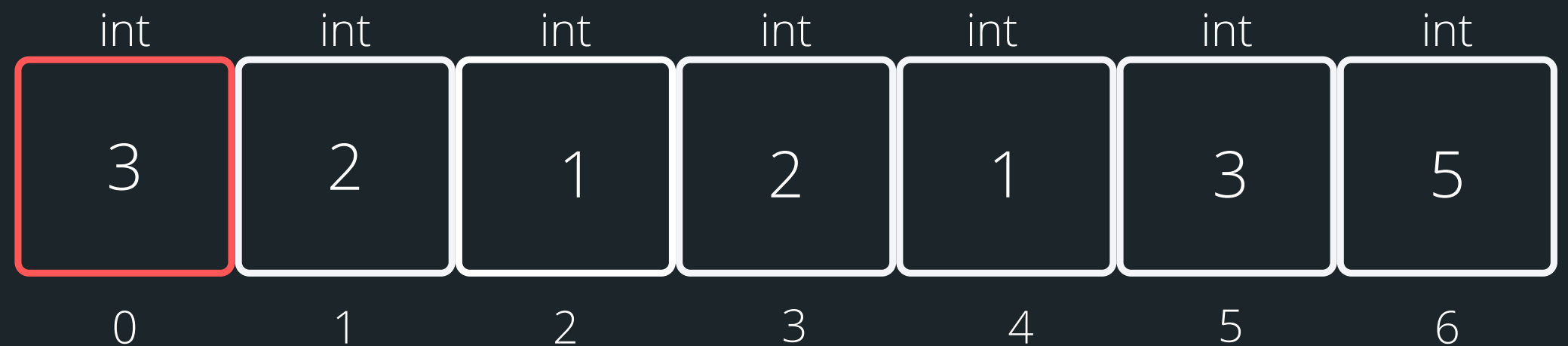
- You can't `printf()` a whole array, but you can print individual elements (consider how you could go through the array to print out every element...)
- You can't `scanf()` a whole array, i.e. a line of user input test into an array, but you can `scanf()` individual elements (think how to do every element in an array...)

USING ARRAYS

CLOSER LOOK

```
int tea_drinking[7] = {3, 2, 1, 2, 1, 3, 5};  
  
int i = 0;  
while (i < 7){  
    printf("%d ", tea_drinking[i]);  
    i++;  
}
```

Start at index 0 (first entry into while loop)
tea_drinking[0]
print what is inside index 0



USING ARRAYS

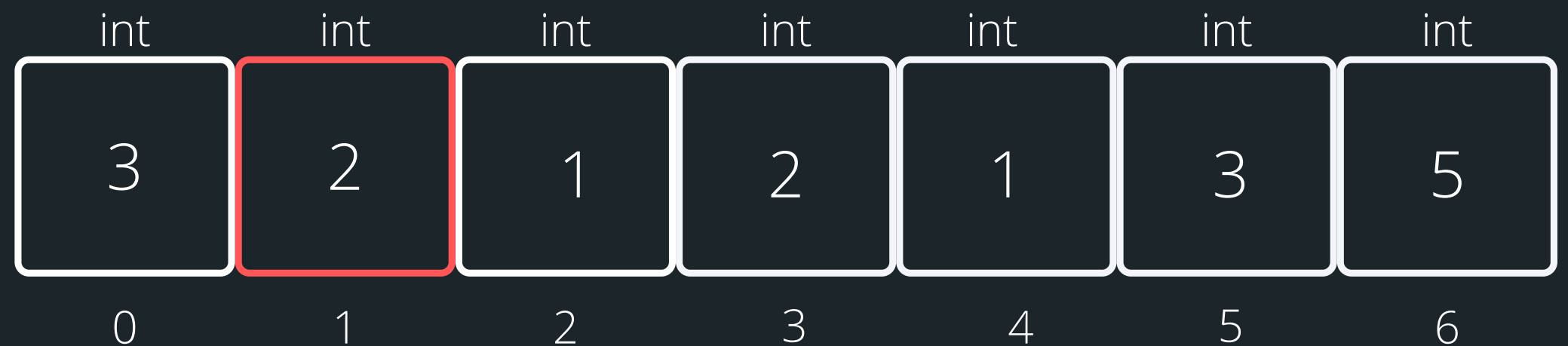
CLOSER LOOK

```
int tea_drinking[7] = {3, 2, 1, 2, 1, 3, 5};  
  
int i = 0;  
while (i < 7){  
    printf("%d ", tea_drinking[i]);  
    i++;  
}
```

increase index by 1

tea_drinking[1]

print what is inside index 1



USING ARRAYS

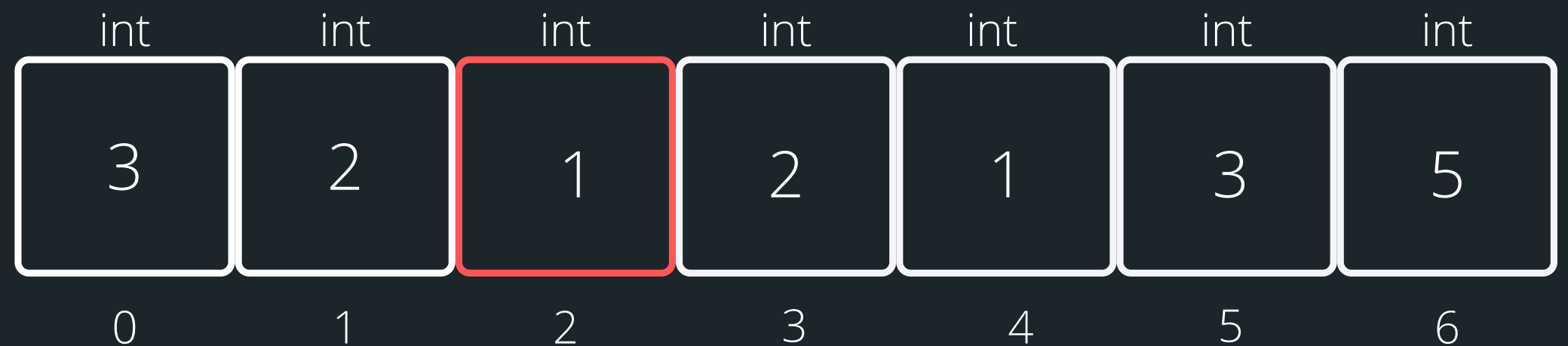
CLOSER LOOK

```
int tea_drinking[7] = {3, 2, 1, 2, 1, 3, 5};  
  
int i = 0;  
while (i < 7){  
    printf("%d ", tea_drinking[i]);  
    i++;  
}
```

increase index by 1

tea_drinking[2]

print what is inside index 2



USING ARRAYS

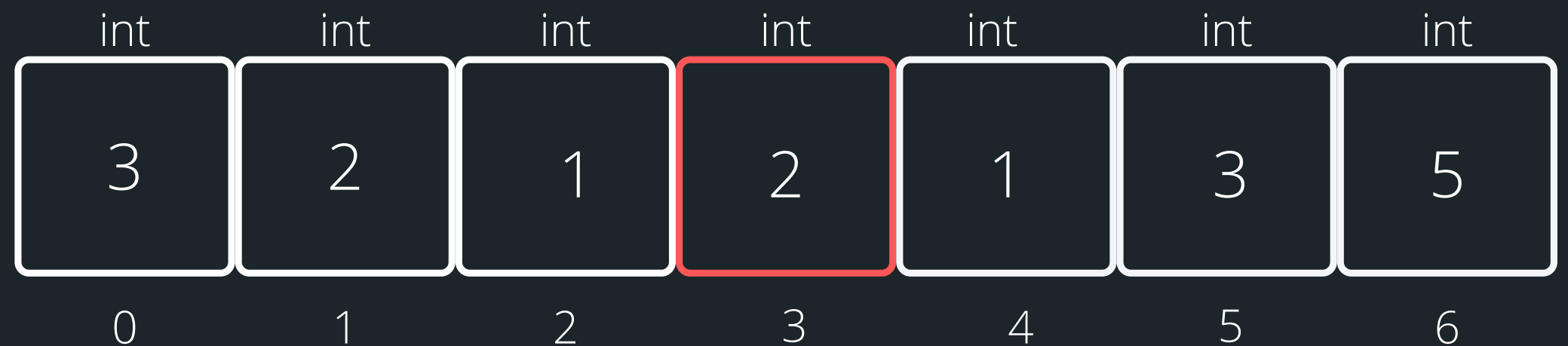
CLOSER LOOK

```
int tea_drinking[7] = {3, 2, 1, 2, 1, 3, 5};  
  
int i = 0;  
while (i < 7){  
    printf("%d ", tea_drinking[i]);  
    i++;  
}
```

increase index by 1

tea_drinking[3]

print what is inside index 3



USING ARRAYS

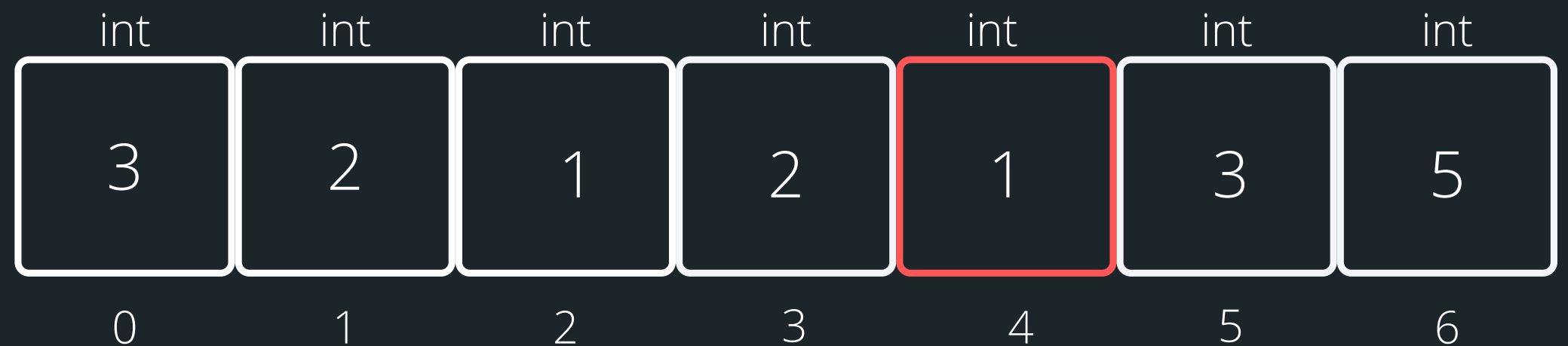
CLOSER LOOK

```
int tea_drinking[7] = {3, 2, 1, 2, 1, 3, 5};  
  
int i = 0;  
while (i < 7){  
    printf("%d ", tea_drinking[i]);  
    i++;  
}
```

increase index by 1

tea_drinking[4]

print what is inside index 4



USING ARRAYS

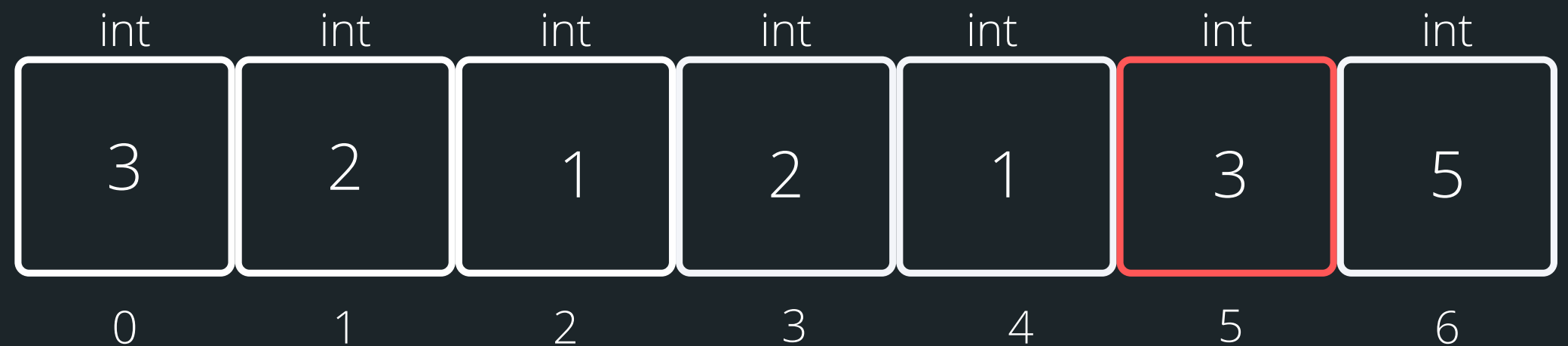
CLOSER LOOK

```
int tea_drinking[7] = {3, 2, 1, 2, 1, 3, 5};  
  
int i = 0;  
while (i < 7){  
    printf("%d ", tea_drinking[i]);  
    i++;  
}
```

increase index by 1

tea_drinking[5]

print what is inside index 5

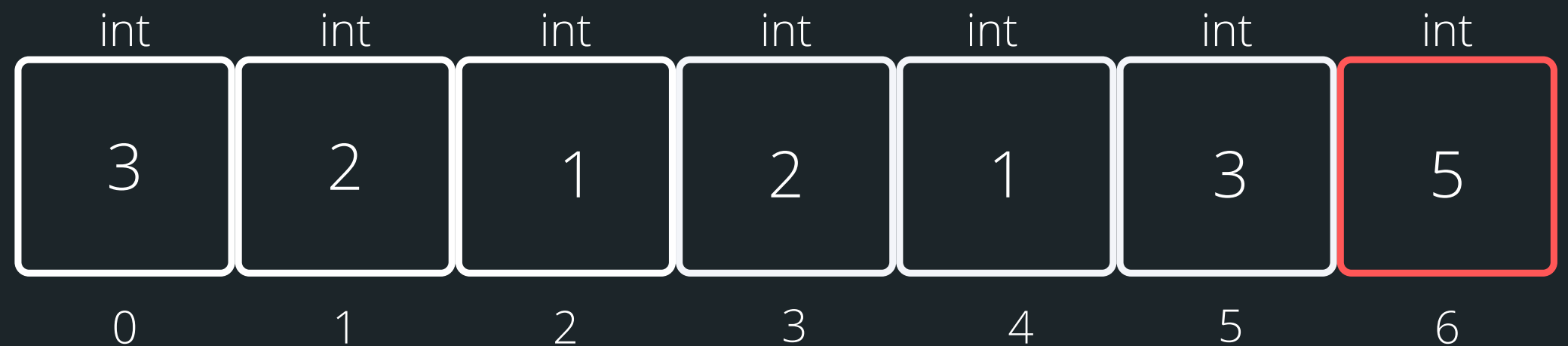


USING ARRAYS

CLOSER LOOK

```
int tea_drinking[7] = {3, 2, 1, 2, 1, 3, 5};  
  
int i = 0;  
while (i < 7){  
    printf("%d ", tea_drinking[i]);  
    i++;  
}
```

increase index by 1
tea_drinking[6]
print what is inside index 6



BREAK TIME

TIME TO STRETCH

You have two eggs in a 100-story building. You want to find out what floor the egg will break on, using the least number of drops.

PROBLEM SOLVING TIME

HOORAY!

- Some basic arrays to give you a feel for them!

`numbers.c`

`extra.c` (if there is time an array of
`structs`)



Feedback please!

I value your feedback and use to pace the lectures and improve your overall learning experience. If you have any feedback from today's lecture, please follow the link below. Please remember to keep your feedback constructive, so I can action it and improve the learning experience.

<https://forms.office.com/r/Gw0QJggwuY>

WHAT DID WE LEARN TODAY?

FUNCTIONS
RECAP

EXPLORING
ARRAYS

simple_array.c

numbers.c

extra.c

REACH OUT



CONTENT RELATED QUESTIONS

Check out the forum



ADMIN QUESTIONS

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