

# Intro to Computing—CSCI-1310

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Mon, Apr 20, 2015 · Lab

## Lab 14—A game of pointers

### Objectives

Practice using pointers.

Practice dynamic memory allocation.

### Background

Game of Thrones is a popular novel series and HBO television show. As fans know, every character in the story has several aliases, rather than a single name. This makes it more interesting to try to follow the story!

Jaime Lannister is called the Kingslayer, Daenerys Targaryen is the Mother of Dragons, and so on. Sounds like a perfect use of pointers as aliases!

Each player is attempting to acquire power over the monarchy of Westeros and sit on the Iron Throne. This game ends badly for almost everyone.

### Part 1

Let's start by practicing creating pointers to addresses in memory.

Write a `main` function that creates `string` variables for the following character names:

`cersei` - Cersei Lannister

`daenerys` - Daenerys Targaryen

`jaime` - Jaime Lannister

Declare a string pointer variable for each character:

`queen` points to `cersei`

`mother_of_dragons` points to `daenerys`

`kingslayer` points to `jaime`

Now each character has a variable containing their real name as well as one pointer variable that gives them an alias.

## Part 2

Now we'll give the players a way to acquire the Iron Throne.

Write a `Throne` class with a single public `crown` method. The method accepts a single string pointer parameter named `player`.

When a player is crowned, append " is the ruler of the seven kingdoms" to their name.

## Part 3

Now we'll use the `Throne` class and the pointers we previously declared to tie this all together.

In `main`:

Allocate a new `Throne` pointer from the heap and assign it to a variable named `iron_throne`.

Crown each of the three players by passing their pointer to the `iron_throne` object's `crown` method.

Print each player's name to `cout`.

Free the memory associated with the `iron_throne` pointer.

## Output

```
 Cersei Lannister is the ruler of the seven kingdoms
 Daenerys Targaryen is the ruler of the seven kingdoms
 Jaime Lannister is the ruler of the seven kingdoms
```

## Questions

Here are some follow-up questions to think about. The answers aren't required to be turned in with the lab code. Understanding these questions will give you a good start studying for the exam.

What happens if we forget to free the `iron_throne` pointer? Does the process crash? Does it continue to run in an unknown state?

What happens if we free a pointer to a stack-allocated variable like `mother_of_dragons`?

How do we pass a non-pointer like `cersei`, `jaime`, or `daenerys` to `crown()`?

Why did the change to their name strings persist even after the `crown()` method completed? Try passing `kingslayer` to `crown()` several times and then printing the value with `cout`.

## Zip and submit

To get credit for this lab exercise:

Submit the file to Moodle as a zip file named Firstname\_Lastname\_Lab14.zip  
Show the TA your code and run your program.

### Exceptions Inheritance