C Programming

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C Programming

- C is a powerful general-purpose programming language.
- It is fast, portable and available in all platforms.
- C language used for wide range of applications from Operating systems like Windows, Unix and iOS to software that is used for creating 3D movies.
- C programming is highly efficient. That’s the main reason why it’s very popular despite being more than 40 years old.
- If you are new to programming, C is a good choice to start your programming journey.

History of C programming

The PDP-11 version of Unix system was written in assembly language. Assembly languages (**A**) are low-level programming languages that are specific to a particular computer architecture. They are hard to write and understand.

The developers (Dennis Ritchie and Stephen C. Johnson) of Unix Operating system decided to rewrite the system in **B** language. However, B couldn’t suffice some of the features of PDP-11, which led to the development of **C**.

History of C programming

In 1972, the development of **C** started on the PDP-11 Unix system. A large part of Unix was then rewritten in **C**.

By 1973, **C** was powerful enough to be used in Unix Kernel.

Dennis Ritchie and Stephen C. Johnson made further changes to the language for several years to make it portable in Unix Operating system.

Books on C Programming

In 1978, the first book of C programming, **The C Programming Language**, was published. The first edition of the book provided programmers informal specification of the language. Written by Brian Kernighan and Dennis Ritchie, this book is popular among C programmers as "K&R".

However, personally I believe, **C Programming: A Modern Approach** (2nd Edition) is the best book for beginners.

Acknowledgment

Materials available at
“Learn C Programming - The Definitive Guide”
https://www.programiz.com/c-programming is used in this course.

What will you gain if you learn C?

- You will understand how a computer works.
- You will write better programs.
- You will find it much easier to learn other programming languages.
- Opportunity to work on open source projects that impact millions of people.

If you are busy and don’t want to invest time on something that doesn’t have direct effect on your day-to-day work, C programming is not for you.

The fun begins:
Your first C program

```
#include <stdio.h>
int main()
{
    printf("Ayubowan C!\n");
    return 0;
}
```

```
root@d3103c6a9341:/home# gcc -o ayubowan. ayubowan.c
root@d3103c6a9341:/home# ./ayubowan.
Ayubowan C!
root@d3103c6a9341:/home#
```

Your first C program

In this program, we have used printf() **function** which displays the text inside the quotation mark. Since **printf()** is defined in **stdio.h**, you need to include stdio.h.

In C programming, the code execution begins from the start of main() function (doesn’t matter if main() isn’t located at the beginning).

The code inside the curly braces { } is the body of main() function. The main() function is **mandatory** in every C program.

Your first C program

The printf() is a library function that sends formatted output to the screen (displays the string inside the quotation mark).

Notice the semicolon at the end of the statement.

The return statement **return 0**; inside the main() function ends the program. This statement isn't mandatory. However, it's considered good programming practice to use it.

Key notes to take away

- All C program starts from the **main()** function and it's **mandatory**.
- You can use the required header file that's necessary in the program.
- C is **case-sensitive**; the use of uppercase letter and lowercase letter have different meanings.
- The C program ends when the program encounters the return statement inside the main() function.
- The statement in a C program ends with a **semicolon**.

Docker

```
# Docker file
FROM gcc
MAINTAINER Kasun De Zoysa
RUN apt-get update && apt-get install
-y \
vim \
gdb \
git
```

```
# Build a Docker image
docker build -t gcc .
```

```
# Run Docker image call gcc and name it as gcc
docker run -v ~/prg:/home --name gcc -it gcc
```

Docker

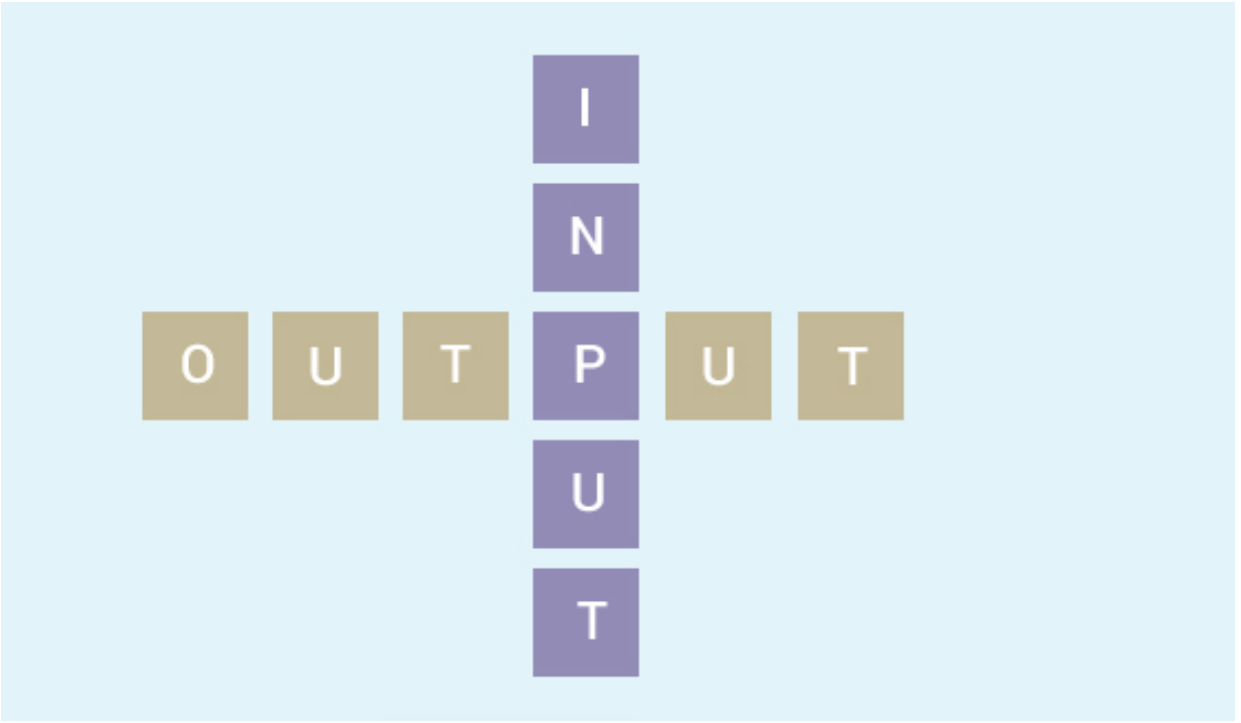
```
docker
Kasuns-MacBook-Air:prg kasundezoysa$ clear
Kasuns-MacBook-Air:prg kasundezoysa$ docker run -v ~/prg:/home --name gcc -it gcc
root@d3103c6a9341:/# cd /home/
root@d3103c6a9341:/home# ls
Dockerfile
root@d3103c6a9341:/home# vim ayubowan.c
```

```
docker
#include <stdio.h>

int main()
{
        printf("Ayubowan C!\n");
        return 0;
}

~
~
~
~
~
:wq
```

```
root@d3103c6a9341:/home# vim ayubowan.c
root@d3103c6a9341:/home# ls
Dockerfile  ayubowan.c
root@d3103c6a9341:/home# gcc -o ayubowan. ayubowan.c
root@d3103c6a9341:/home# ./ayubowan.
Ayubowan C!
root@d3103c6a9341:/home#
```



C programming has several in-built library functions to perform input and output tasks.

Two commonly used functions for I/O (Input/Output) are printf() and scanf().

The scanf() function reads formatted input from standard input (keyboard) whereas the printf() function sends formatted output to the standard output (screen).

C Output

```c
#include <stdio.h>        //This is needed to run printf() function.
int main()
{
    printf("C Programming");  //displays the content inside quotation
    return 0;
}
```

```c
#include <stdio.h>
int main()
{
    int testInteger = 5;
    printf("Number = %d", testInteger);
    return 0;
}
```

Inside the quotation of printf() function, there is a format string "%d" (for integer). If the format string matches the argument (testInteger in this case), it is displayed on the screen.

How this program works?

All valid C program must contain the main() function. The code execution begins from the start of main() function.

The printf() is a library function to send formatted output to the screen.

The printf() function is declared in "stdio.h" header file.
Here, stdio.h is a header file (standard input output header file) and #include is a preprocessor directive to paste the code from the header file when necessary.

When the compiler encounters printf() function and doesn't find stdio.h header file, compiler shows error.

The return 0; statement is the "Exit status" of the program. In simple terms, program ends.

Comments

As programs get bigger and more complicated, they get more difficult to read. Formal languages are dense, and it is often difficult to look at a piece of code and figure out what it is doing, or why.

For this reason, it is a good idea to add notes to your programs to explain in natural language what the program is doing.

These notes are called comments , and they start with The // symbol or /* */ for C.

C Integer Input/Output

```c
#include <stdio.h>
int main()
{
      int testInteger;
      printf("Enter an integer: ");
      scanf("%d",&testInteger);
      printf("Number = %d",testInteger);
      return 0;
}
```

The scanf() function reads formatted input from the keyboard. When user enters an integer, it is stored in variable testInteger.

Note the '&' sign before testInteger; &testInteger gets the address of testInteger and the value is stored in that address.

C Floats Input/Output

```c
#include <stdio.h>
int main()
{
      float f;
      printf("Enter a number: ");
// %f format string is used in case of floats
      scanf("%f",&f);
      printf("Value = %f", f);
      return 0;
}
```

The format string "%f" is used to read and display formatted in case of floats.

C Character I/O

```c
#include <stdio.h>
int main()
{
      char chr;
      printf("Enter a character: ");
      scanf("%c",&chr);
      printf("You entered %c.",chr);
      return 0;
}
```

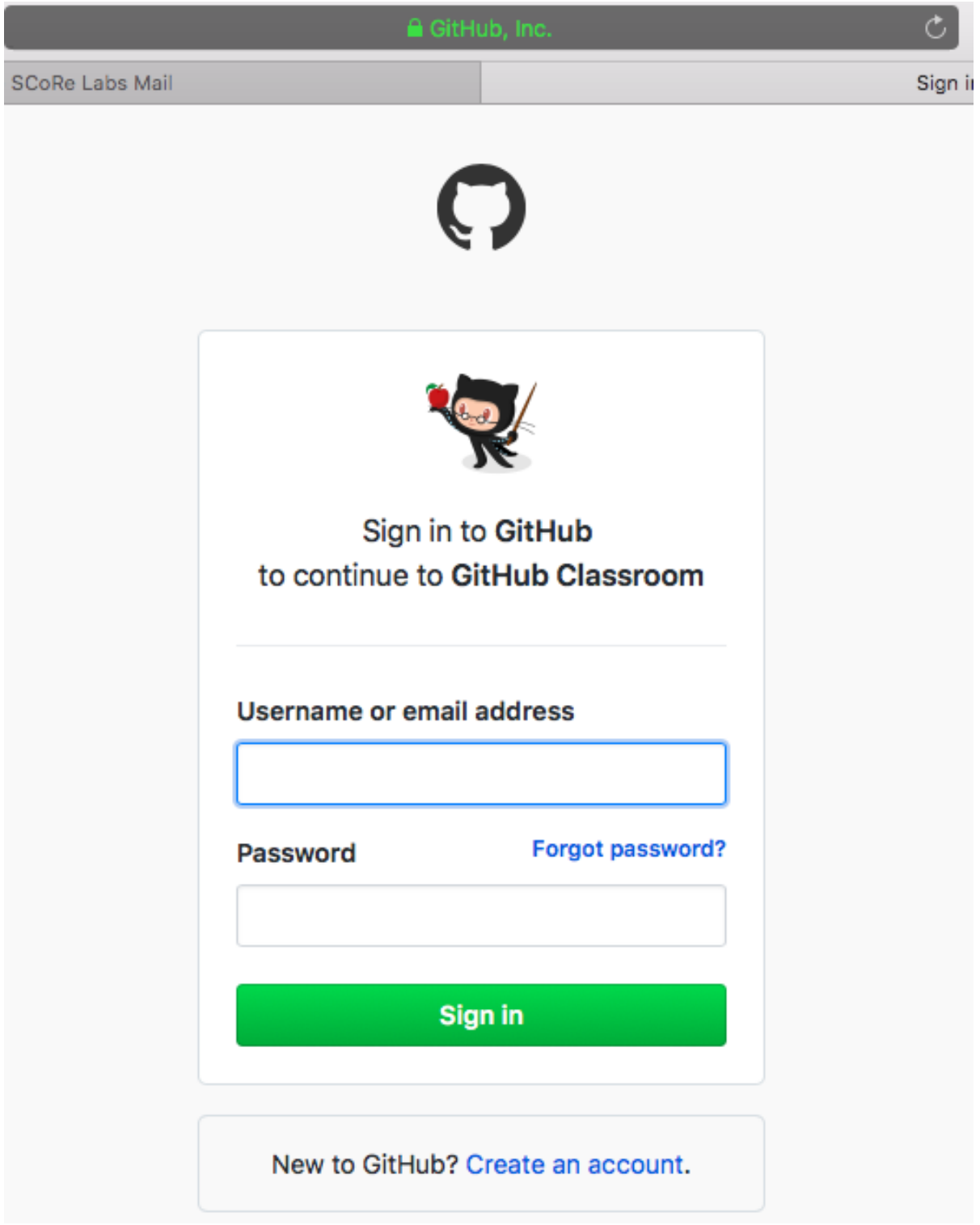
Format string %c is used in case of character types.

C ASCII Code

```c
#include <stdio.h>
int main()
{
      char chr;
      printf("Enter a character: ");
      scanf("%c",&chr);

      // When %c text format is used, character is displayed
      printf("You entered %c.\n",chr);

      // When %d text format is used, integer is displayed i
      printf("ASCII value of %c is %d.", chr, chr);
      return 0;
}
```


GitHub, Inc.
SCoRe Labs Mail
Sign i
Sign in to GitHub
to continue to GitHub Classroom
Username or email address
Password
Forgot password?
Sign in
New to GitHub? Create an account.

Authorize GitHub Classroom

GitHub Classroom by github
wants to access your **sathindu** account

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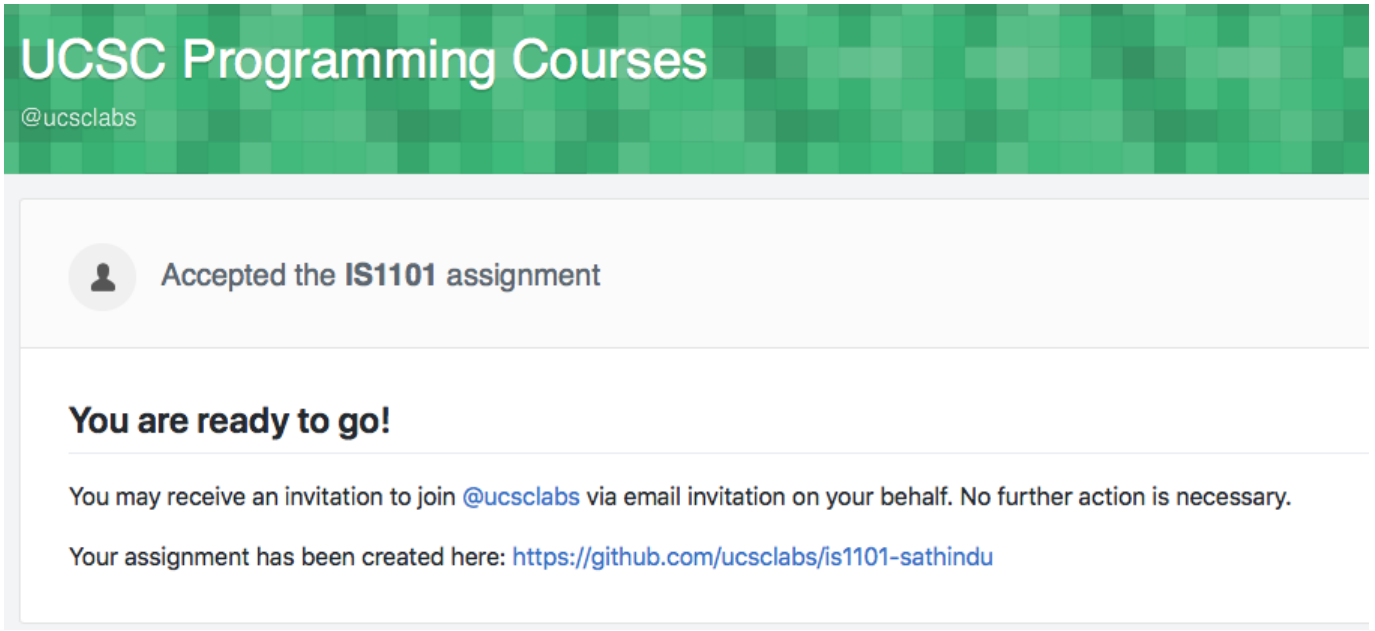
Authorizing will redirect to
https://classroom.github.com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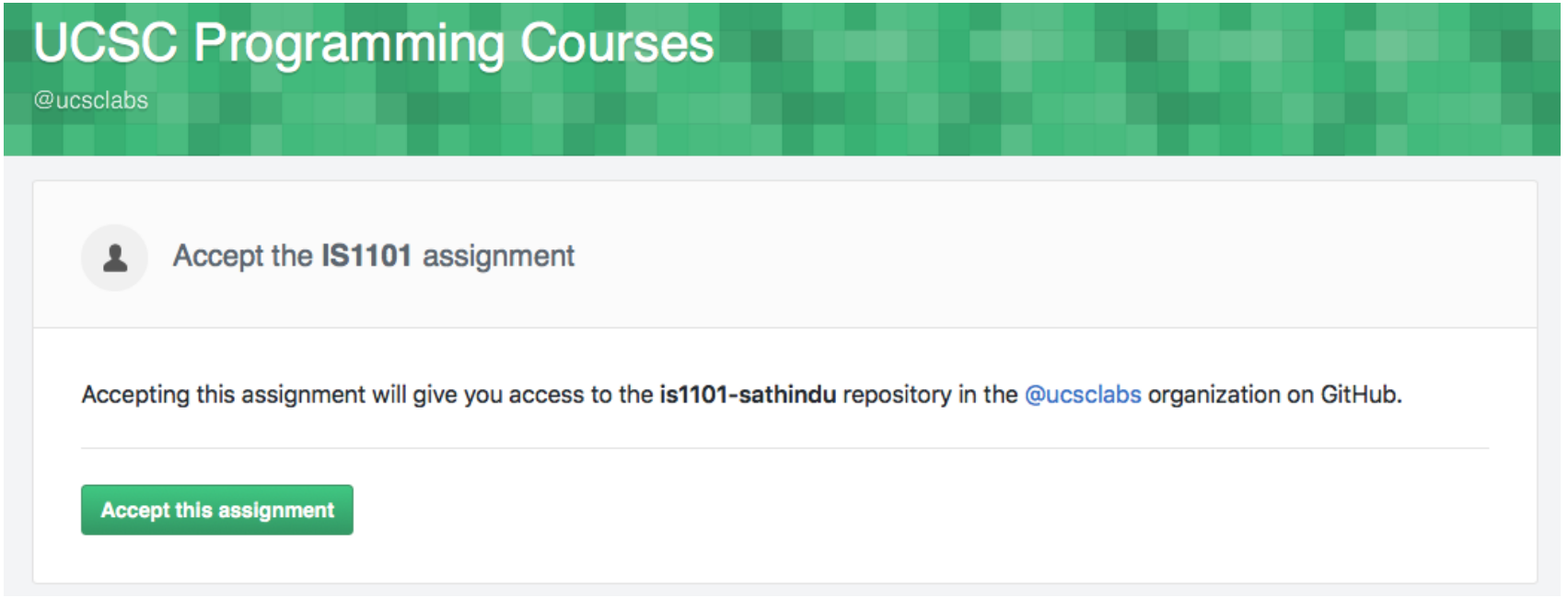
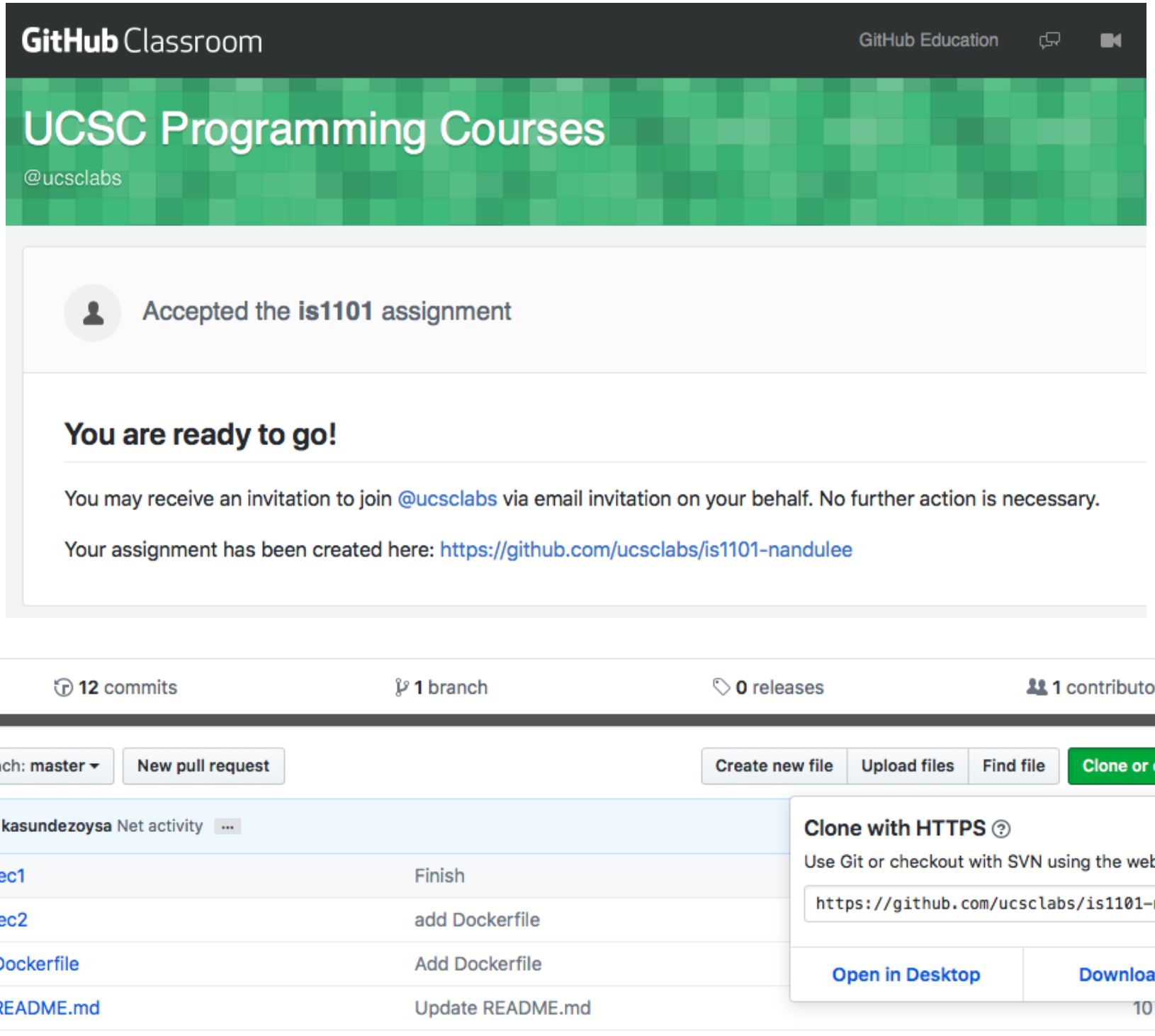
Accepted the IS1101 assignment
You are ready to go!
You may receive an invitation to join @ucsclabs via email invitation on your behalf. No further action is necessary.
Your assignment has been created here: https://github.com/ucsclabs/is1101-sathindu


UCSC Programming Courses
@ucsclabs
Accept the IS1101 assignment
Accepting this assignment will give you access to the is1101-sathindu repository in the @ucsclabs organization on GitHub.
Accept this assignment


GitHub Classroom
GitHub Education
UCSC Programming Courses
@ucsclabs
Accepted the is1101 assignment
You are ready to go!
You may receive an invitation to join @ucsclabs via email invitation on your behalf. No further action is necessary.
Your assignment has been created here: https://github.com/ucsclabs/is1101-nandulee
12 commits
1 branch
0 releases
1 contributor
Branch: master
New pull request
Create new file
Upload files
Find file
Clone or download
kasundezoysa Net activity
lec1 Finish
lec2 add Dockerfile
Dockerfile Add Dockerfile
README.md Update README.md
10 hours ago
Clone with HTTPS
Use SSH
Use Git or checkout with SVN using the web URL.
https://github.com/ucsclabs/is1101-nan
Copied!
Open in Desktop
Download ZIP

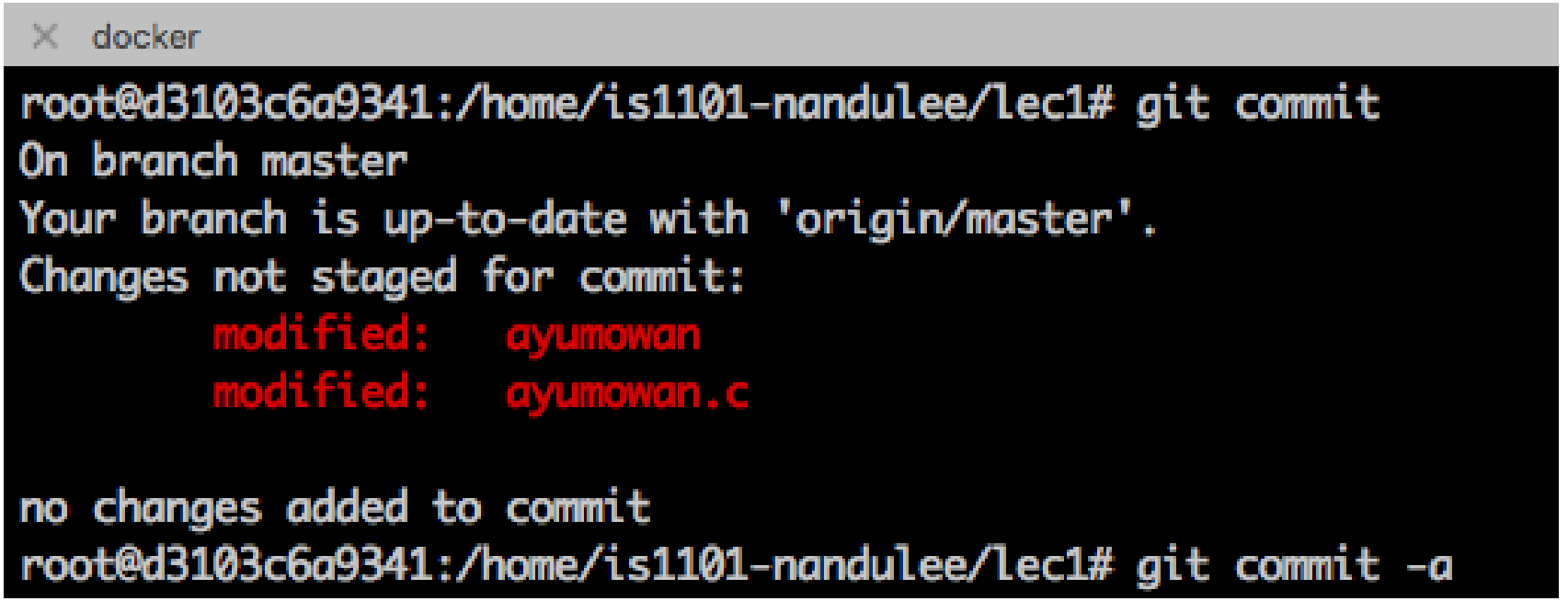
```
docker
root@d3103c6a9341:/home# git clone https://nandulee@github.com/ucsclabs/is1101-nandulee
.git
Cloning into 'is1101-nandulee'...
Password for 'https://nandulee@github.com':
remote: Counting objects: 42, done.
remote: Compressing objects: 100% (24/24), done.
remote: Total 42 (delta 9), reused 42 (delta 9), pack-reused 0
Unpacking objects: 100% (42/42), done.
root@d3103c6a9341:/home# ls
Dockerfile  ayubowan.  ayubowan.c  is1101-nandulee
root@d3103c6a9341:/home# cd is1101-nandulee/
root@d3103c6a9341:/home/is1101-nandulee# ls
Dockerfile  README.md  array.c  docker.txt  lec1  lec2
root@d3103c6a9341:/home/is1101-nandulee#
```

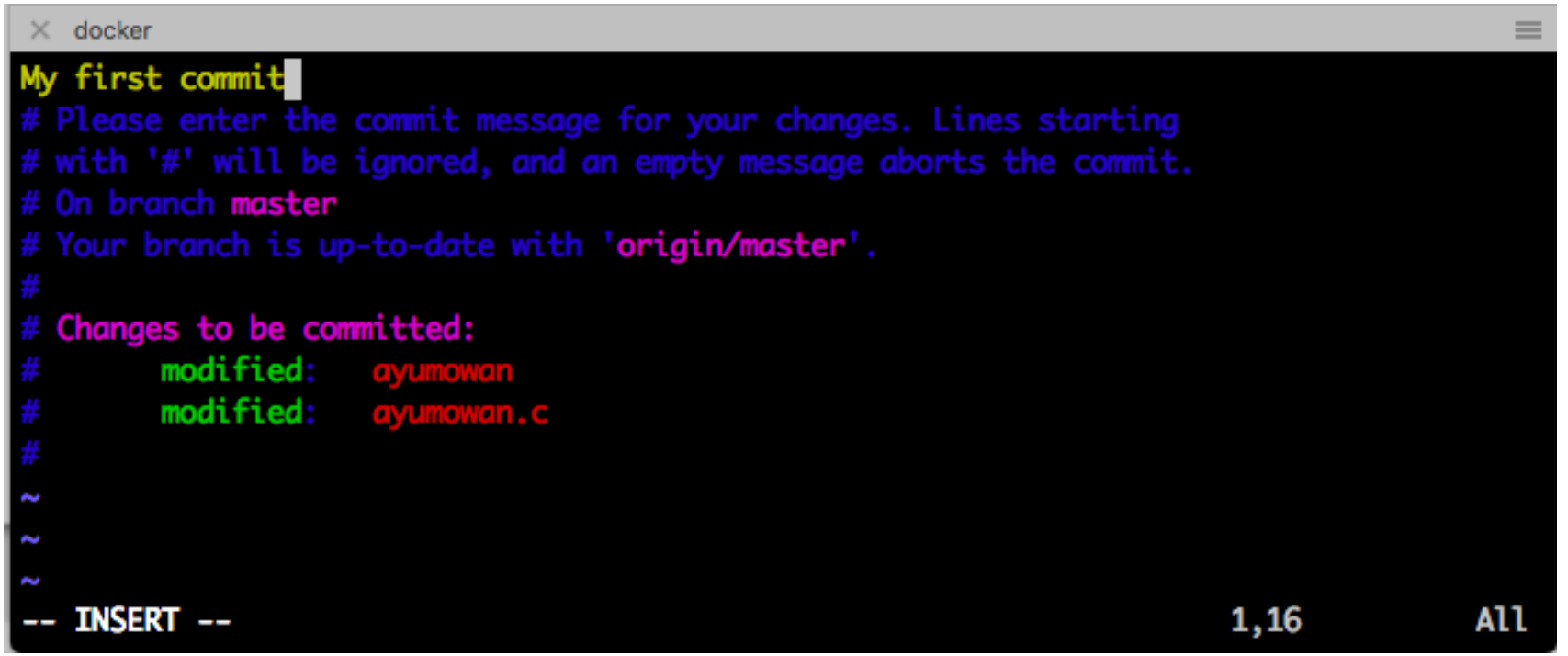
```
docker
root@d3103c6a9341:/home/is1101-nandulee# cd lec1/
root@d3103c6a9341:/home/is1101-nandulee/lec1# ls
ayumowan  ayumowan.c
root@d3103c6a9341:/home/is1101-nandulee/lec1# vim ayumowan.c
```

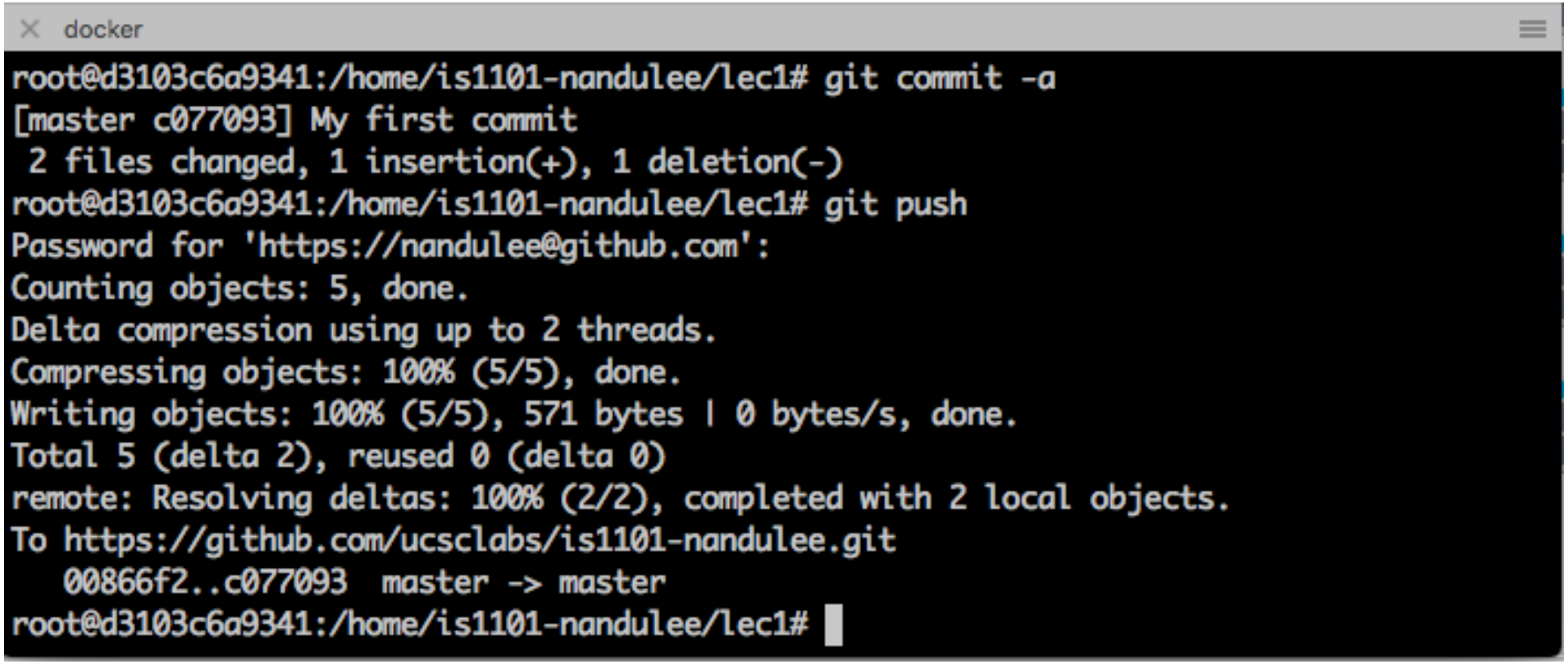
```
docker
root@d3103c6a9341:/home/is1101-nandulee/lec1# gcc -o ayumowan ayumowan.c
root@d3103c6a9341:/home/is1101-nandulee/lec1# ./ayumowan
Ayubowan KASUN
root@d3103c6a9341:/home/is1101-nandulee/lec1#
```

```
docker
#include <stdio.h>

int main(){
 printf("Ayubowan KASUN\n");
 return 0;
}
~
~
~
~
~
~
~
:wq
```


docker
root@d3103c6a9341:/home/is1101-nandulee/lec1# git commit
On branch master
Your branch is up-to-date with 'origin/master'.
Changes not staged for commit:
modified: ayumowan
modified: ayumowan.c
no changes added to commit
root@d3103c6a9341:/home/is1101-nandulee/lec1# git commit -a


docker
My first commit
Please enter the commit message for your changes. Lines starting
with '#' will be ignored, and an empty message aborts the commit.
On branch master
Your branch is up-to-date with 'origin/master'.
#
Changes to be committed:
modified: ayumowan
modified: ayumowan.c
#
~
~
~
-- INSERT -- 1,16 All



2 contributors

7 lines (5 sloc) | 74 Bytes

```c
#include <stdio.h>

int main(){
 printf("Ayubowan KASUN\n");
 return 0;
}
```

Problems

1. Write a C program to read and print your name

2. Write a C program to add two Integers