



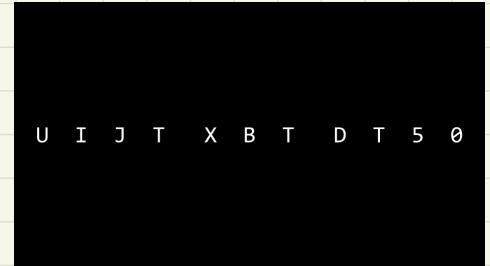
CS 50-II

Compiling

Encryption is the act of hiding plain text from seeing eyes.

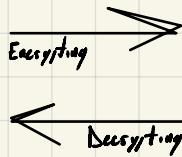
Decryption, then, is the act of taking an encrypted piece of text and return it to a human-readable form.

A Compiler is a specialized computer program that converts source code into machine code that can be understood by a computer.



An encrypted piece of text may look like above.

```
#include <stdio.h>
int main(void)
{
    printf("hello, world\n");
}
```



```
01111111 01000101 01001100 01000110 00000010 00000001 00000001 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000010 00000000 00000000 00000001 00000000 00000000 00000000 00000000
10110000 00000101 01000000 00000000 00000000 00000000 00000000 00000000
01000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
11010000 00010011 00000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 01000000 00000000 00111000 00000000
00001001 00000000 01000000 00000000 00100100 00000000 00100001 00000000
00000110 00000000 00000000 00000001 00000000 00000000 00000000 00000000
01000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
01000000 00000000 01000000 00000000 00000000 00000000 00000000 00000000
01111000 00000001 00000000 00000000 00000000 00000000 00000000 00000000
11111000 00000001 00000000 00000000 00000000 00000000 00000000 00000000
00001000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000111 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00111000 00000010 00000000 00000000 00000000 00000000 00000000 00000000
```

VSCode utilizes a compiler called Clang or C Language.

If you were to type `make filename`, it runs a command that executes clang to create an output file that you can run as a user.

```
clang -o hello hello.c
```

```
clang hello.c -lcs50
```

By default, the file is named `a.out`. But we can specify a name using the `-O` (output) argument.

When using an external library, we must use the `-l` argument. This will enable the compiler to access the library.

RDD; Rubber Duck Debugging

When having challenges with a code, consider how speaking out loud do, quite literally, a rubber duck about the code problem. Speak about the code.



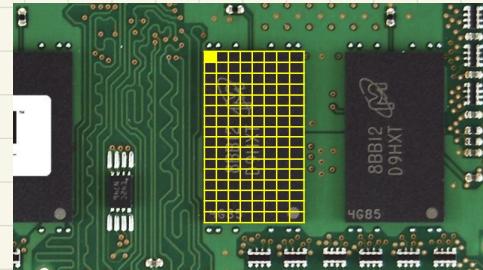
Arrays

Each data type requires a certain amount of system resources.

bool : int : float :
long : double :
char : string : ?

Inside of a computer, there is a finite amount of memory available

We can imagine how specific data bytes are stored.



Arrays are a way to store data back-to-back in memory such that this data is easily accessible.

int scores[3] is a way of telling the compiler to provide three back-to-back places in memory of size int to store three scores.

int scores[3];
^ Data type
^ name
size

String

A string is simply an array of variables of type char: an array of characters.

Strings end with a special character called a NUL character!

H	I	!	\0		
s[0]	s[1]	s[2]	s[3]		

Command-Line Arguments

Command-Line arguments are arguments that are passed to your programs at the command line. Like -o or -L with clang.

```
int main(void)
```



```
int main(int argc, string argv[])
```

Number of arguments ↙

↘ arguments.

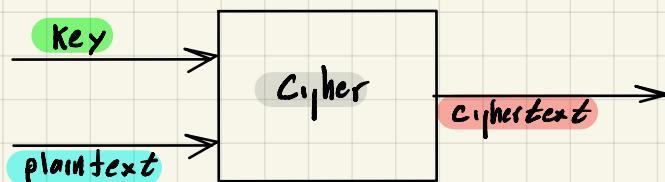
Exit status

When a program ends, a special exit code is provided to the computer.

When a program exits without error, a status code of 0 is provided to the computer. Often, when an error occurs that results in the program ending, a status of 1 is provided by the computer.

Cryptography

Cryptography is the art of ciphering and deciphering a message. Plaintext and a key are provided to a cipher, resulting in ciphered text.



The key is a special argument passed to the cipher along with the plaintext. The cipher uses the key to make decisions about how to implement its cipher algorithms.