

An introduction to computer cryptography

A book by Behrad.B([TadavomnisT](#))

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Introduction:

Cryptography is now a widely discussed and an essential topic in computer science. Simply put, cryptography is nothing but mathematical approaches with the aim of transforming plain data into complex mathematical equations that only individuals with prior knowledge can decipher. This serves the purpose of ensuring privacy and security in the process. In this book, I aim to provide an introduction to this field, starting from the very basics. Though I am not an expert in this line of work nor academically inclined, but I have some practical experience with cryptography and hope to share my knowledge through this book.

Behrad.B

Chapter 1: What is cryptography?

1.1 What is the concept of cryptography?

The main purpose in cryptography is to hide a data[1] in a way that no one can see it, except the person who knows a key. It is important to say that cryptography is totally different from an authentication system. Let's see an example of cryptography.

Suppose we have a data called "Plain Data":

Note[1]: A data can be anything, a concept, a word, a speech, anything that can be expressed with a special rule based on mathematics. In the field of computers, we may mean anything by data , files, information, etc.

Plain text:

Data is a precious thing and will last longer than the systems themselves. - Tim Berners Lee

Now, we intend to do something to it that hides this plain data, so we replace every letter with 3 letters after that in alphabet. So the Mapping of the letters will be like this:

Plain letter Replacement

A	D
B	E
C	F
D	G
E	H
F	I
G	J
H	K
I	L
J	M
K	N
L	O
M	P
N	Q
O	R
P	S
Q	T
R	U
S	V
T	W
U	X
V	Y
W	Z
X	A
Y	B
Z	C

So we come up with this text after replacing those letters that we call it “Cipher Data”:

Cipher text:

Gdwd lv d suhflrxv wklqj dqg zloo odvw orqjhu wkdq wkh vbvwhpv wkhpvhoyhv. - Wlp
Ehuqhuv Ohh

This process is called **Encrypting** or **Ciphering** a plain-data. Take a look at cipher-data, could you understand what is that without knowing the process? A piece of information that indicates the what process done to plain-text to become cipher-text (or simply encrypt it), is called the **Encryption-Key**. After all these things, a Person who knows the Key, can **Decrypt** or **Decipher** the cipher-data:

Key:

Replace every letter with 3 letters before that in alphabet.

Cipher text:

Gdwd lv d suhflrxv wklqj dqg zloo odvw orqjhu wkdq wkh vbvwhpv wkhpvhoyhv. - Wlp
Ehuqhuv Ohh

Cipher letter	Replacement
---------------	-------------

D	A
E	B
F	C
G	D
H	E
I	F
J	G
K	H
L	I
M	J
N	K
O	L
P	M
Q	N
R	O
S	P
T	Q
U	R
V	S
W	T
X	U
Y	V
Z	W
A	X
B	Y
C	Z

Deciphered text (Plain text):

Data is a precious thing and will last longer than the systems themselves. - Tim
Berners Lee

And that was a simple definition of Cryptography!

1.1.1 Encryption / Cipher

1.1.2 Decryption / Decipher

1.2 Why is cryptography such an important matter?

1.3 A few quotes on cryptography

“Cryptography shifts the balance of power from those with a monopoly on violence to those who comprehend mathematics and security design.”

— Jacob Appelbaum

“Cryptography is the ultimate form of non-violent direct action.”

— Julian Assange

“One must acknowledge with cryptography no amount of violence will ever solve a math problem.”

— Jacob Appelbaum

“There are two kinds of cryptography in this world: cryptography that will stop your kid sister from reading your files, and cryptography that will stop major governments from reading your files.”

— Bruce Schneier

“Cryptography is the essential building block of independence for organisations on the internet, just like armies are the essential building blocks of states, because otherwise one state just takes over another.”

— Julian Assange

“When cryptography is outlawed, bayl bhgynjf jvyy unir cevinpl.”

— John Perry Barlow

“Bitcoin was created to serve a highly political intent, a free and uncensored network where all can participate with equal access.”

— Amir Taaki

“Privacy is an inherent human right, and a requirement for maintaining the human condition with dignity and respect.”

— Bruce Schneier

Chapter 2: What is NOT cryptography?!

2.1 Coding / Encoding

2.2 Hash

2.3 Obfuscation

2.4 Steganography

2.5 Compression

Chapter 3: What is Symmetric Cryptography?

- 3.1 What is the meaning of symmetric cryptography?
 - 3.2 Simple asymmetric encryption examples
 - 3.3 AES?
 - 3.4 DES?
 - 3.5 One Time Pad
-

Chapter 4: What is Asymmetric Cryptography?

- 4.1 What is asymmetric cryptography and why it's needed?
 - 4.2 Diffie-Hellman
 - 4.3 RSA?
-

Chapter 5: Cryptographic hash

- 5.1 What is a Cryptographic hash?
 - 5.2 MD5
 - 5.3 SHA
-

Chapter 6: Elliptic Curves

Chapter 7: Quantum Cryptography

Chapter 8: Cryptography in practice

- 8.1 SSL
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Chapter 9: Cryptocurrency

Chapter 10: Common attacks in cryptography

Codes:

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