Cryptography

A (nearly) complete overview

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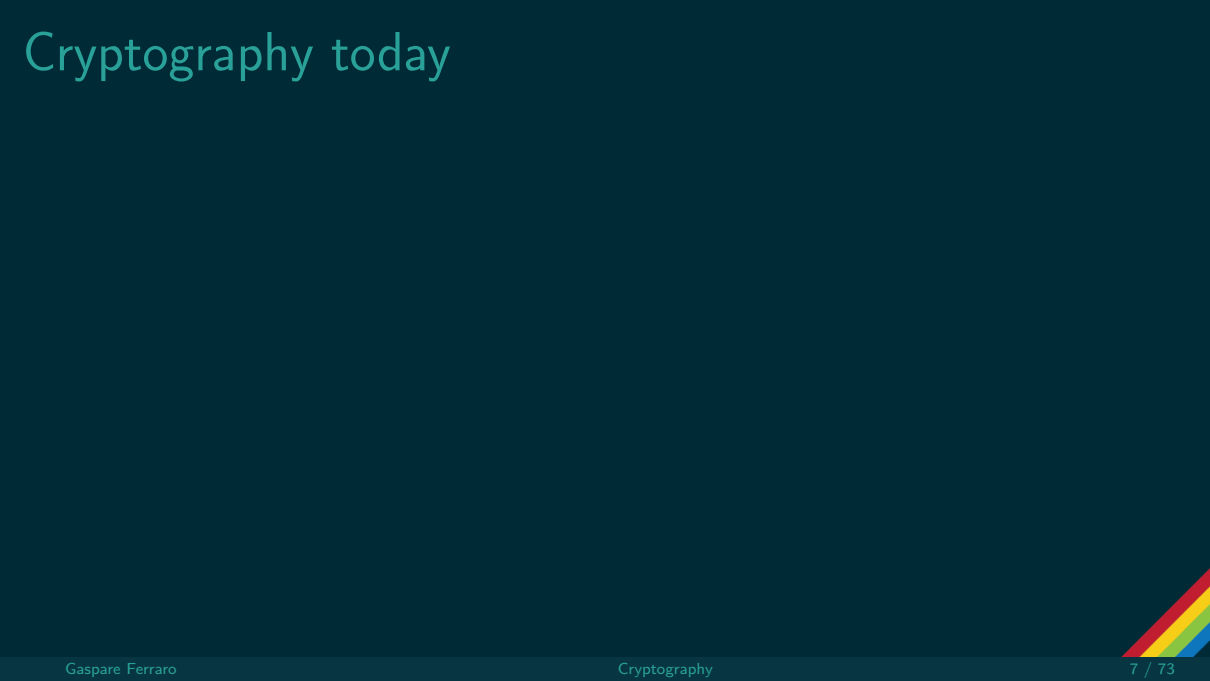
Warning!

Why cryptography?

Cryptography yesterday

Cryptography today



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What is a message?

ASCII encoding

Unicode encoding

Base64

Base65536

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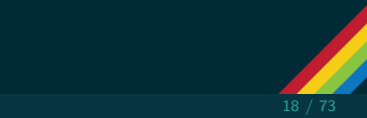
Caesar cipher

ROT13

Substitution cipher

Cryptanalysis



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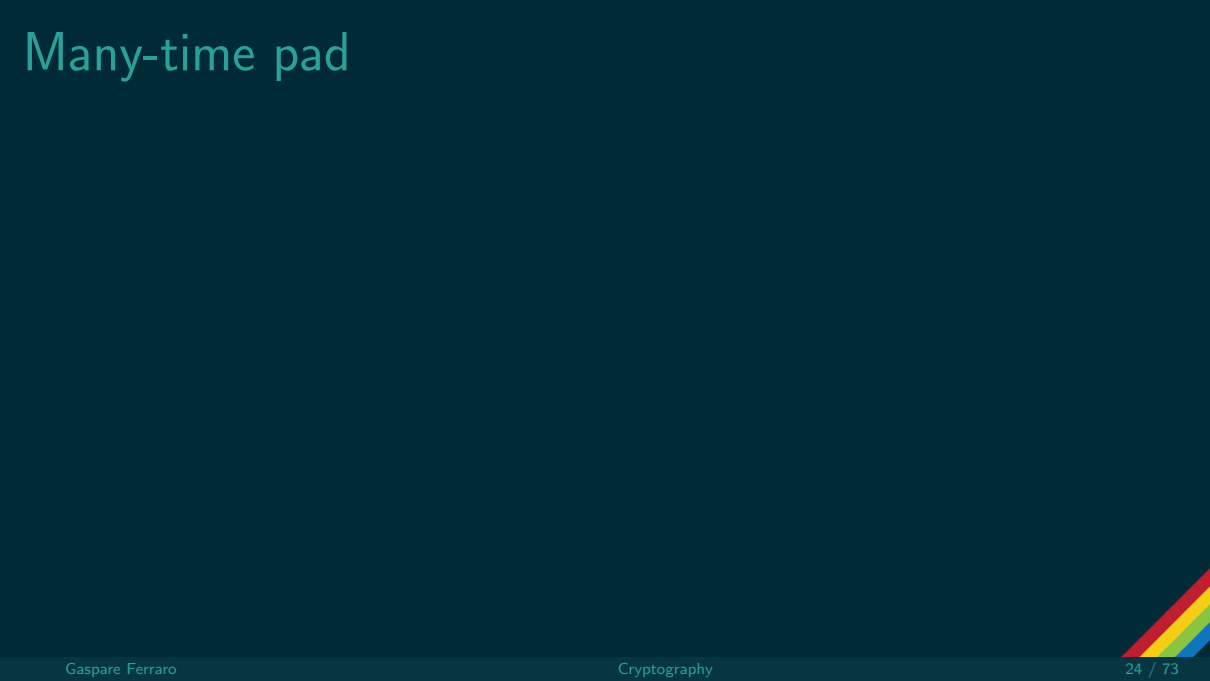
Symmetric-key cryptography

Shannon principle

XOR cipher

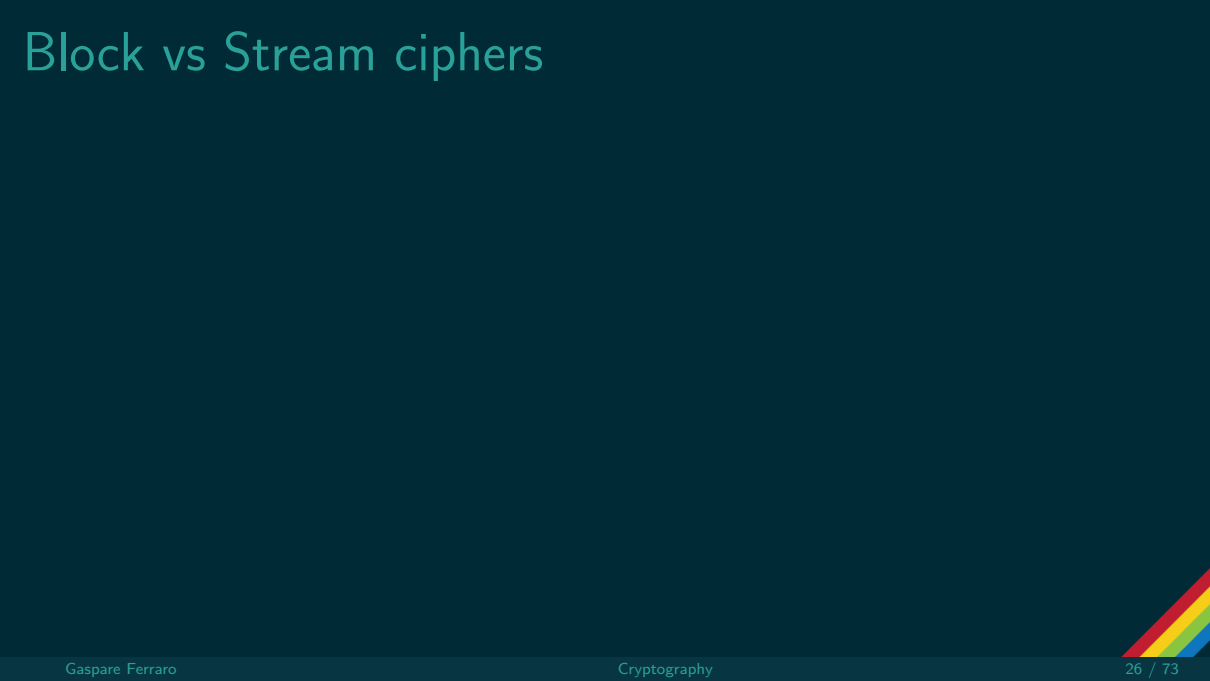
One-time pad

Many-time pad



XorTool

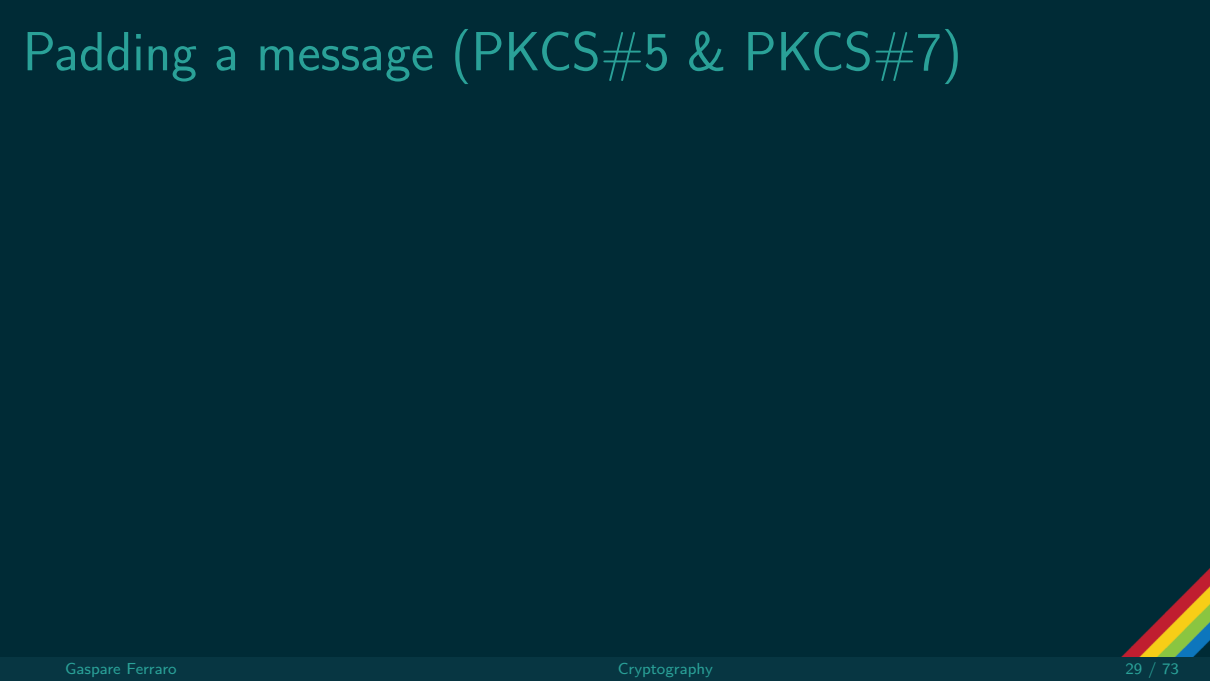
Block vs Stream ciphers



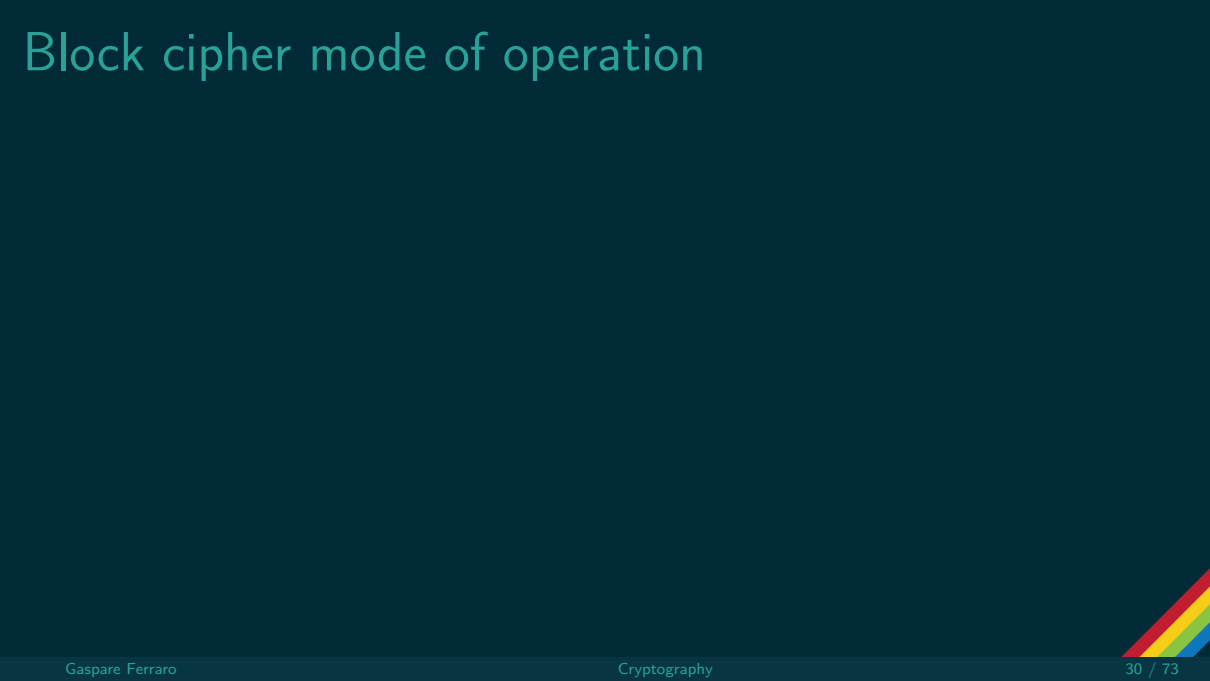
DES

AES

Padding a message (PKCS#5 & PKCS#7)



Block cipher mode of operation



ECB (Electronic Codebook)

How to break ECB (padding-oracle attack)

CBC (Cipher Block Chaining)

How to break CBC (bit-flipping attack)

Stream ciphers (Salsa & Cha-Cha)

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Public-key cryptography

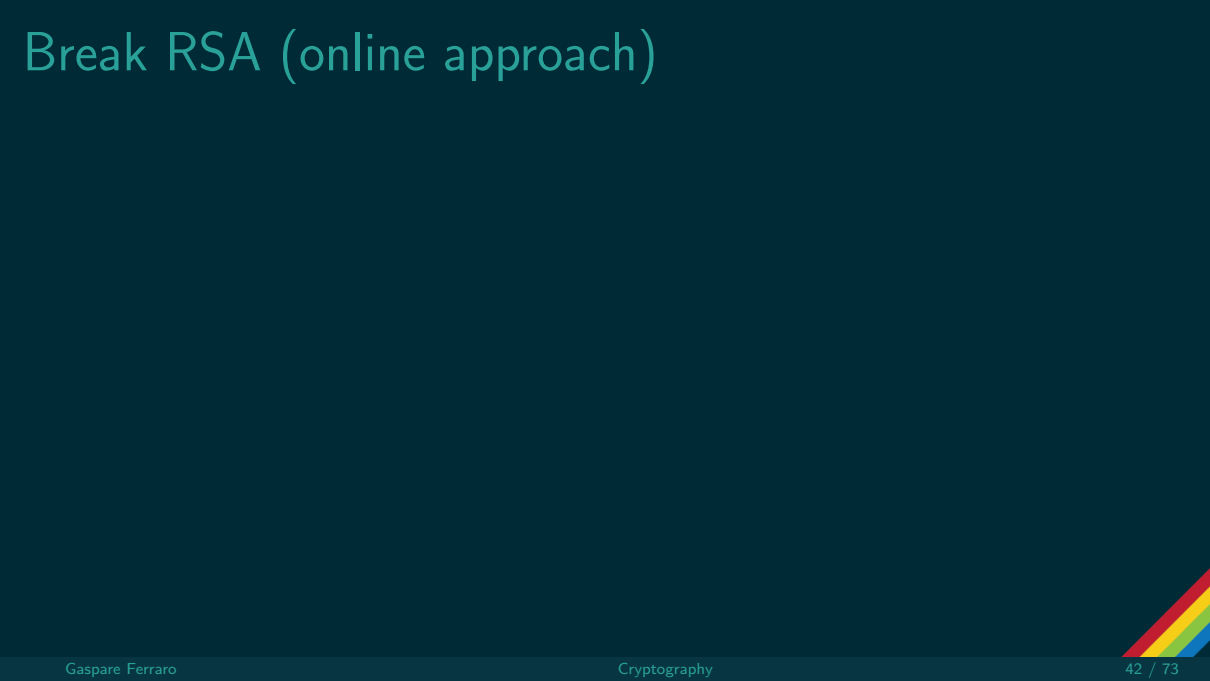
Modular arithmetic

RSA

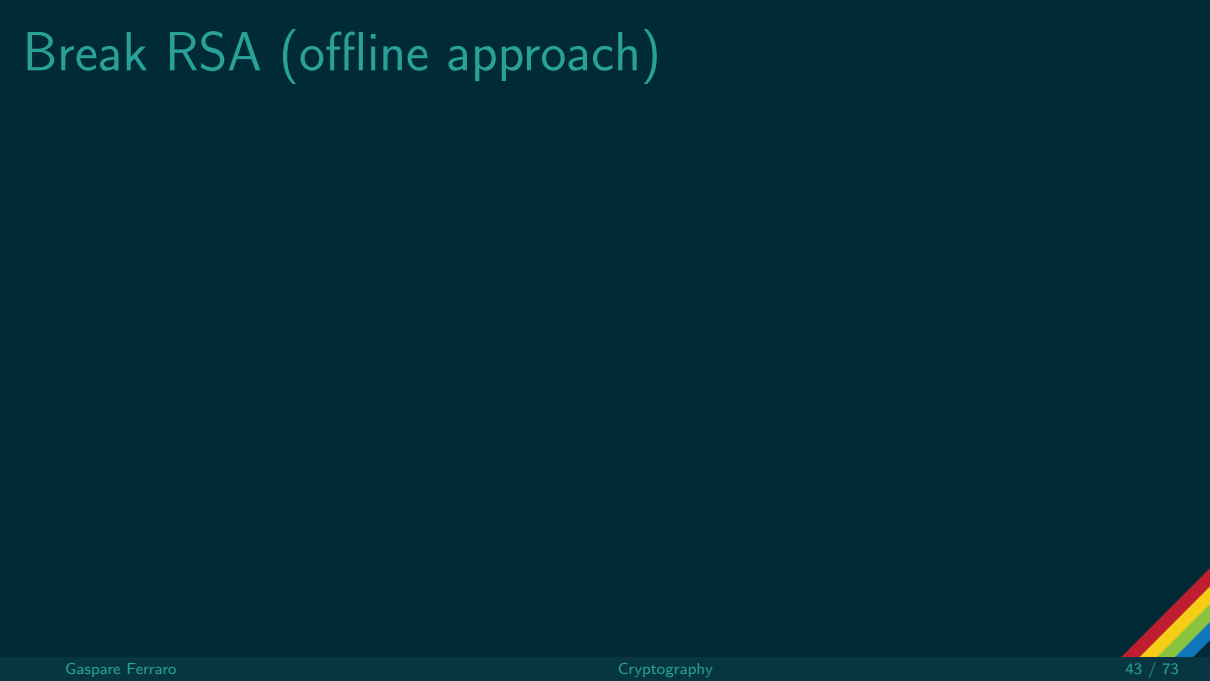
An example...

How to choose parameters

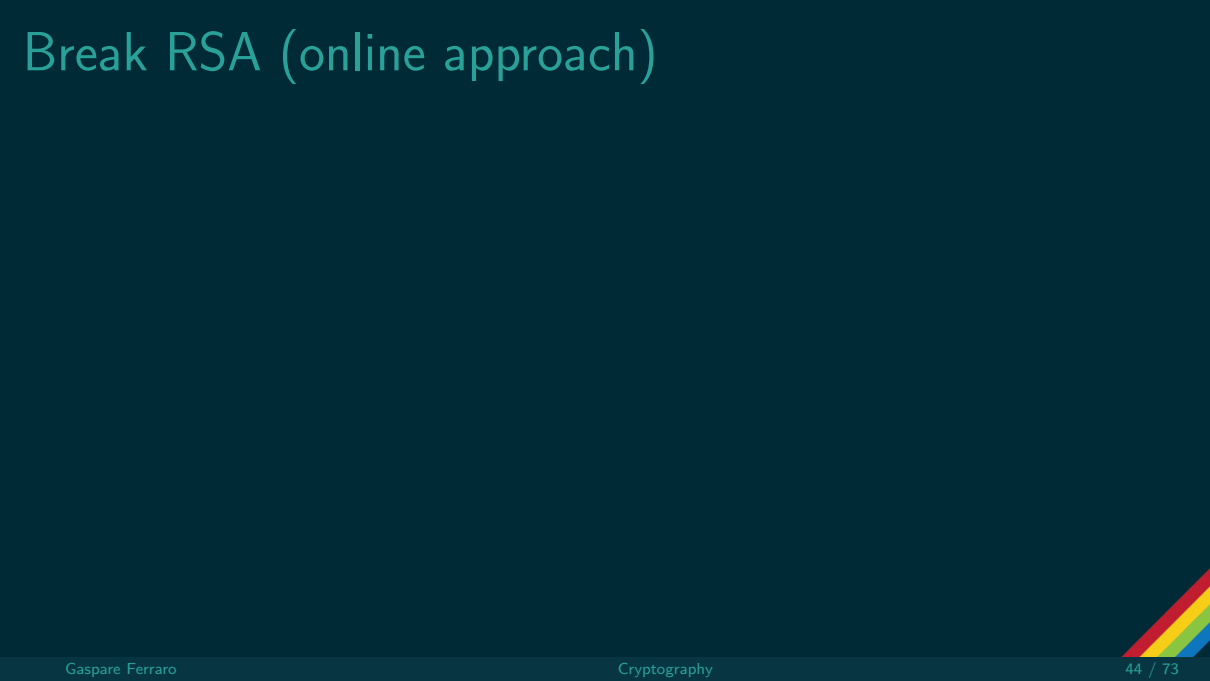
Break RSA (online approach)



Break RSA (offline approach)



Break RSA (online approach)



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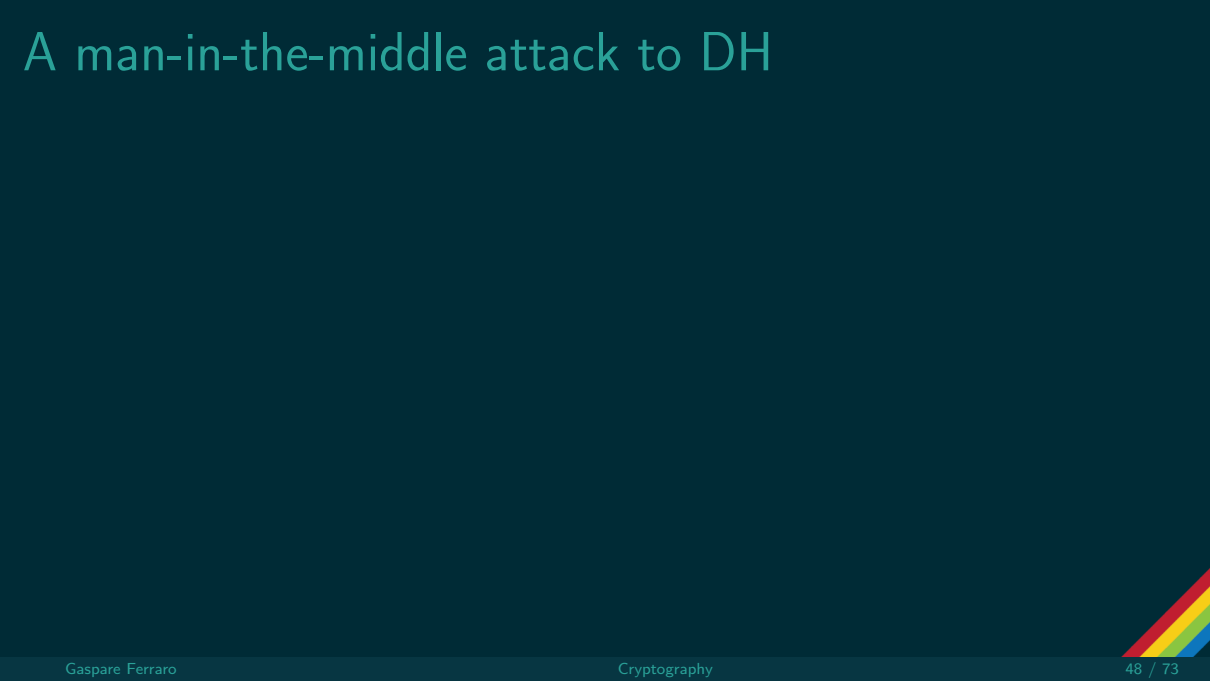
Key exchange

Diffie-Hellman key exchange

A man-in-the-middle attack to DH



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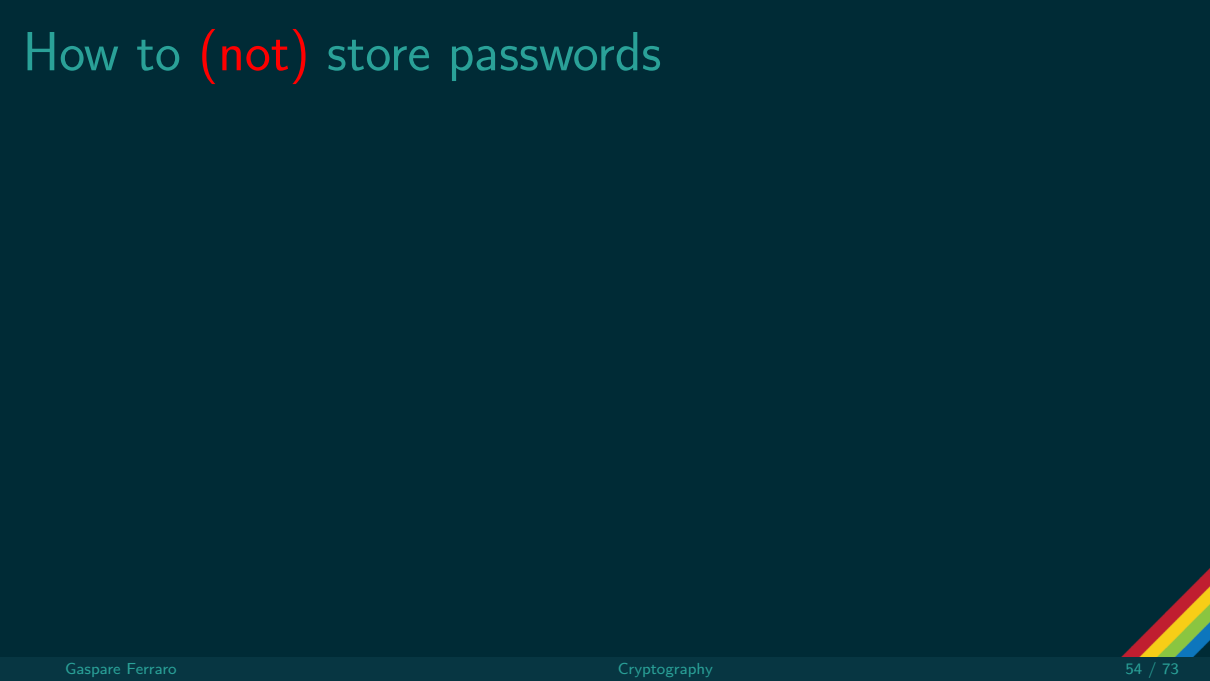
Hash function

Why hash

How to store passwords

How to store passwords[2]

How to (not) store passwords



Proof of Work

MD5

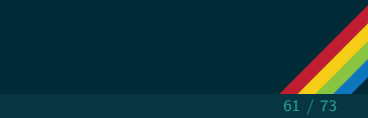
SHA{0, 1, 2}

Finding collision

Reverse an hash function (online approach)

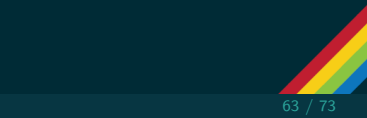
Reverse an hash function (offline approach)

fcrackzip



JohnTheRipper

Hashcat



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Steganography

File stego (file, binwalk, exiftool, strings)

Image stego

Layer stego

Audio stego

Morse code

Spectography analysis (Audacity)

AudioStego

DeepSound