

# LAB 3

## Message authentication and integrity

- u prvom dijelu vježbe smo napravili funkciju za verifikaciju poruke i zatim pokušali narušiti integritet poruke mijenjajući njen sadržaj te zamijetili da u tom slučaju funkcija `verify_MAC` vraća `false`
- probali smo promijeniti i signature (hex) no funkcija je isto vratila `false`

```
from cryptography.hazmat.primitives import hashes, hmac
from cryptography.exceptions import InvalidSignature

def verify_MAC(key, signature, message):
    if not isinstance(message, bytes):
        message = message.encode()

    h = hmac.HMAC(key, hashes.SHA256())
    h.update(message)
    try:
        h.verify(signature)
    except InvalidSignature:
        return False
    else:
        return True

def generate_MAC(key, message):
    if not isinstance(message, bytes):
        message = message.encode()

    h = hmac.HMAC(key, hashes.SHA256())
    h.update(message)
    signature = h.finalize()
    return signature

if __name__ == "__main__":
    key = b"my super secret"

    # Reading from a file
    with open("message.txt", "rb") as file:
        content = file.read()

    with open("message.sig", "rb") as file:
        mac = file.read()

    # mac = generate_MAC(key, content)

    # with open("message.sig", "wb") as file:
    #     file.write(mac)

    is_authentic = verify_MAC(key, mac, content)
    print(is_authentic)
```

- u drugom dijelu vježbe smo trebali utvrditi vremenski ispravnu sekvencu transakcija sa odgovarajućim dionicama
- moj kod za rješavanje izazova 2:

```

from cryptography.hazmat.primitives import hashes, hmac
from cryptography.exceptions import InvalidSignature
import os

def verify_MAC(key, signature, message):
    if not isinstance(message, bytes):
        message = message.encode()

    h = hmac.HMAC(key, hashes.SHA256())
    h.update(message)
    try:
        h.verify(signature)
    except InvalidSignature:
        return False
    else:
        return True

def generate_MAC(key, message):
    if not isinstance(message, bytes):
        message = message.encode()

    h = hmac.HMAC(key, hashes.SHA256())
    h.update(message)
    signature = h.finalize()
    return signature

if __name__ == "__main__":
    key = "celan_dea".encode()
    path = "mac_challenge"
    for ctr in range(1, 11):
        msg_filename = f"order_{ctr}.txt"
        with open(os.path.join(path, msg_filename), "rb") as file:
            message = file.read()

        mac = generate_MAC(key, message)

        sig_filename = f"order_{ctr}.sig"
        with open(os.path.join(path, sig_filename), "rb") as file:
            signature = file.read()
        is_authentic = verify_MAC(key, signature, mac)

        print(f'Message {message.decode():>45} {"OK" if is_authentic else "NOK":<6}')
```