Question:

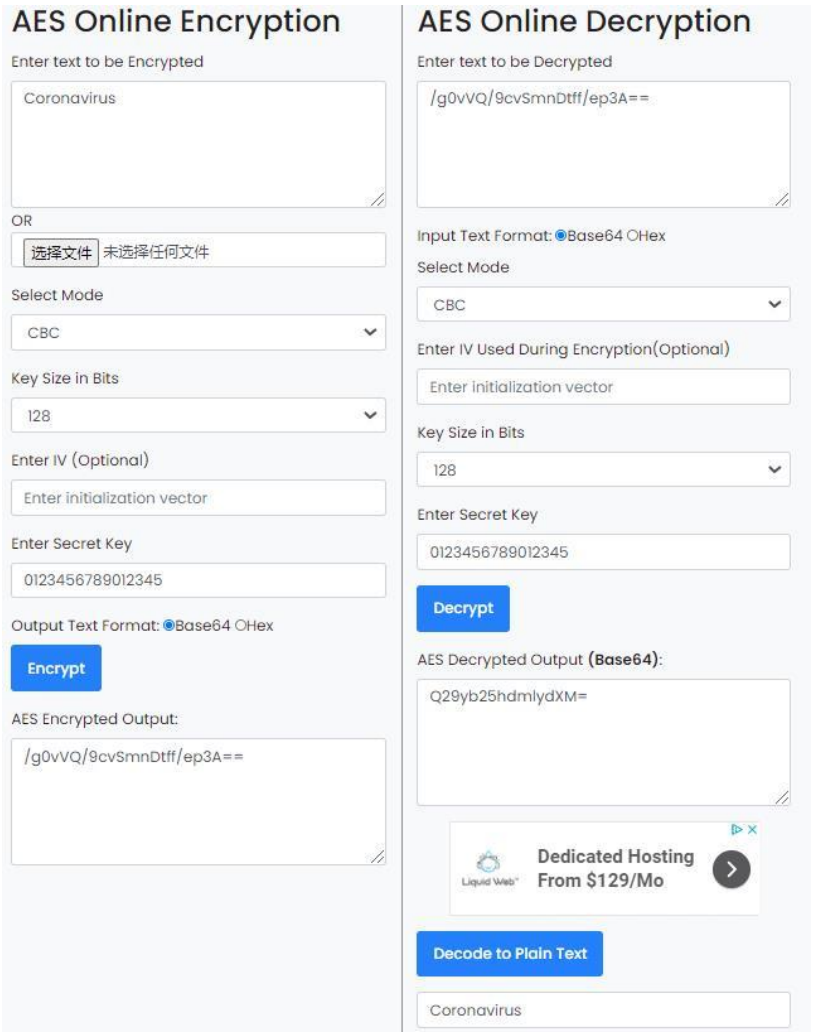
Pyhton (CTR mode) vs. Online Calculator (CBC Mode) . .

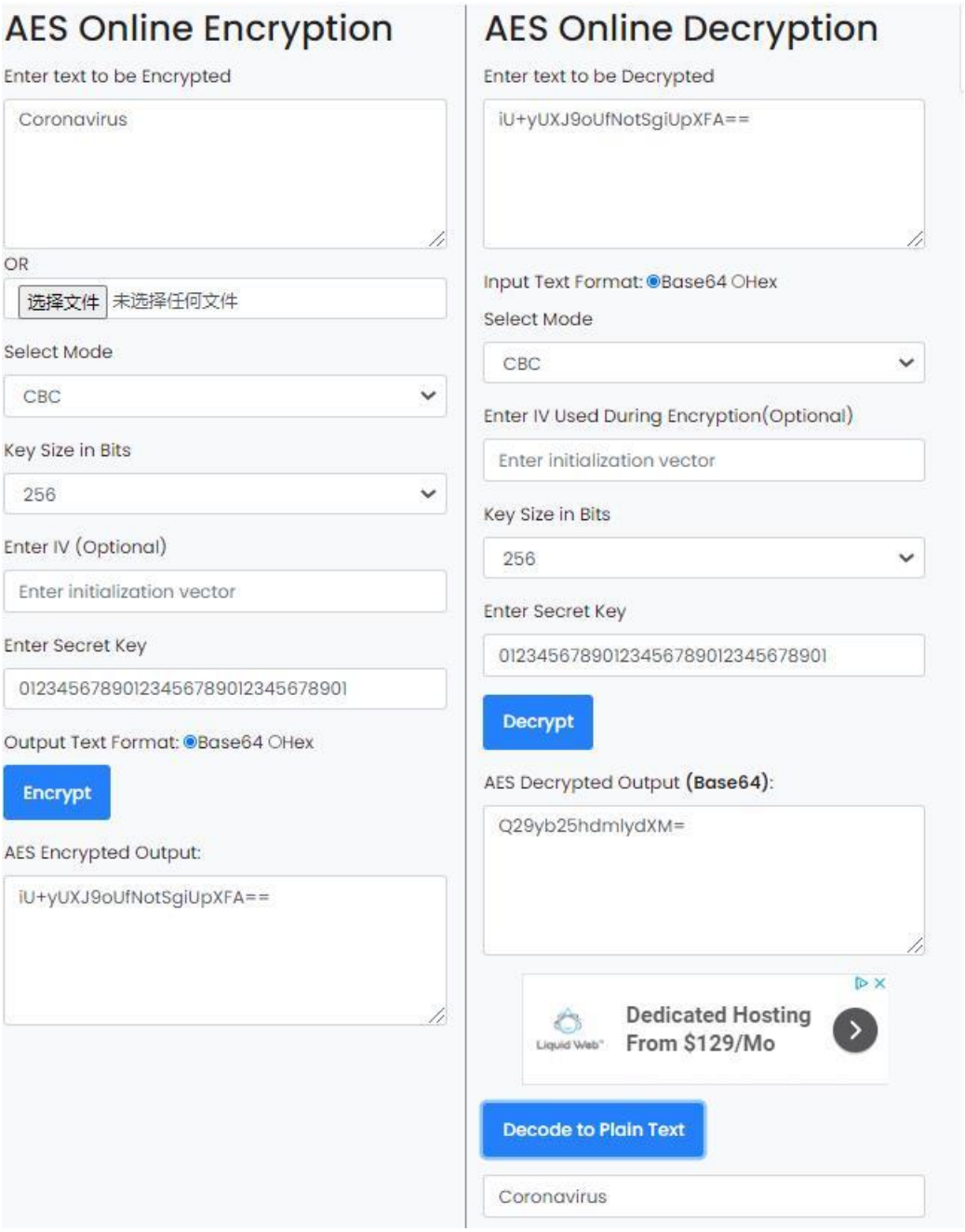
- Please compare the results of using the following two approaches of AES (CTR Mode & CBC Mode) to encrypt and decrypt the message "Coronavirus" by using the key '01234567890123456789012345678901'.
  - Python - CTR Mode
  - AES Online Calculator - CBC Mode

Ans:

Using online tool

The Key Size in Bits affect the Secret Key's length, if choice the '128', the Secret length is 16, if choice the '256', the Secret length is 32, based on our Secret key we should choice the '256'





Python code: (using ideone)

```
import binascii
from Crypto.Cipher import AES
from Crypto.Util import Counter
from Crypto import Random

# AES supports multiple key sizes: 16 (AES128), 24 (AES192),
# or 32 (AES256).
key_bytes = 32
# You need to define 32-byte key. Like
#         Key = '12345678901234567890123456789012'
```

```
# Please refer this page on how to create key.

# Otherwise you will get this error.

# Takes as input a 32-byte key and an arbitrary-length
# plaintext and returns a pair (iv, ciphtertext). "iv" stands for
# initialization vector.
def encrypt(key, plaintext):
        assert len(key) == key_bytes

        # Choose a random, 16-byte IV.
        iv = Random.new().read(AES.block_size)

        # Convert the IV to a Python integer.
        iv_int = int(binascii.hexlify(iv), 16)

        # Create a new Counter object with IV = iv_int.
        ctr = Counter.new(AES.block_size * 8, initial_value=iv_int)

        # Create AES-CTR cipher.
        aes = AES.new(key, AES.MODE_CTR, counter=ctr)

        # Encrypt and return IV and ciphertext.
        ciphertext = aes.encrypt(plaintext)
        return (iv, ciphertext)

# Takes as input a 32-byte key, a 16-byte IV, and a ciphertext,
# and outputs the corresponding plaintext.
def decrypt(key, iv, ciphertext):
        assert len(key) == key_bytes

        # Initialize counter for decryption. iv should be
        # the same as the output of encrypt().
        iv_int = int(iv.encode('hex'), 16)
        ctr = Counter.new(AES.block_size * 8, initial_value=iv_int)

        # Create AES-CTR cipher.
        aes = AES.new(key, AES.MODE_CTR, counter=ctr)

        # Decrypt and return the plaintext.
        plaintext = aes.decrypt(ciphertext)
        return plaintext

key = '01234567890123456789012345678901'
```

(iv, ciphertext) = encrypt(key, 'Coronavirus')
print ("cipheretxt is: ", encrypt(iv, ciphertext))
print ("plaintext is: ", decrypt(key, iv, ciphertext))

```
39. def decrypt(key, iv, ciphertext):
40.     assert len(key) == key_bytes
41.
42.     # Initialize counter for decryption. iv should be
43.     # the same as the output of encrypt().
44.     iv_int = int(iv.encode('hex'), 16)
45.     ctr = Counter.new(AES.block_size * 8, initial_value=iv_int)
46.
47.     # Create AES-CTR cipher.
48.     aes = AES.new(key, AES.MODE_CTR, counter=ctr)
49.
50.     # Decrypt and return the plaintext.
51.     plaintext = aes.decrypt(ciphertext)
52.     return plaintext
53.
54. key = '01234567890123456789012345678901'
55. (iv, ciphertext) = encrypt(key, 'Coronavirus')
56. print ("cipheretxt is: ", encrypt(iv, ciphertext))
57. print ("plaintext is: ", decrypt(key, iv, ciphertext))
```

Success #stdin #stdout 0.02s 11544KB comments (0)

stdin copy

```
Standard input is empty
```

stdout copy

```
('cipheretxt is: ', ('\x15\x83\xb2\x19\xeeL\x1e\xcb\x9c\x9co\xe7\x13w(M', 'cn\x98K\xc
c$\xc81\x11\xef\xf3'))
('plaintext is: ', 'Coronavirus')
```

Compare those two's result, their models are different, thus the ciphertext is different. CTR can ignore the iv, and it is more secure (need to decoding after decryption).