Crypto Tools

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Cryptographic Protocol

- Alice encrypts her message using a GUI
    - can choose between multiple encryption schemes
    - GUI generates key for Alice
    - GUI returns ciphertext
- Alice sends ciphertext to Bob through text or email
    - Alice mentions encryption scheme choice and number of bits used to generate key
- Bob uses same GUI to decrypt Alice's message

Encryption Scheme Options

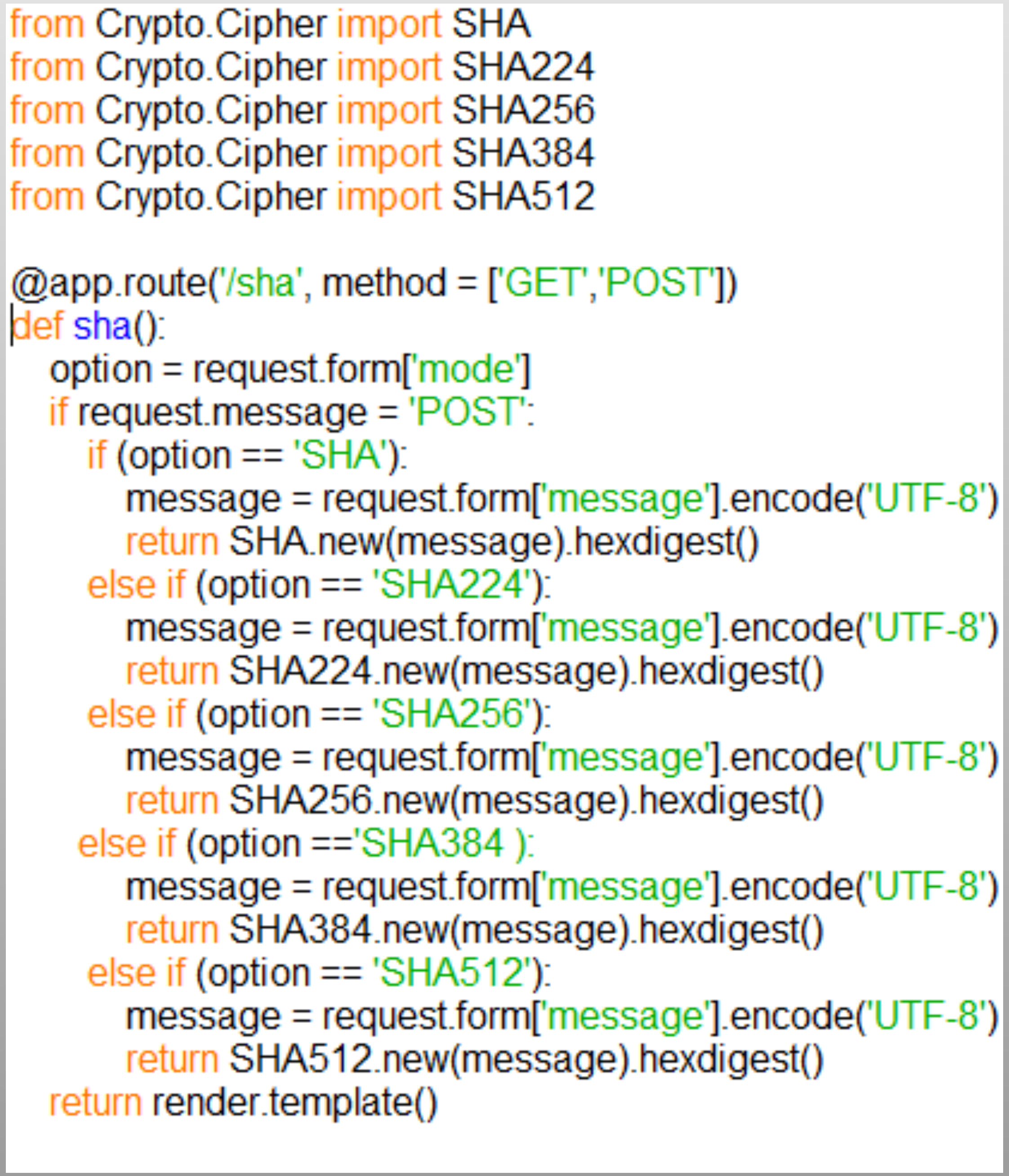
- Hash
  - MD5
  - SHA
    - SHA1, SHA224, SHA256, SHA384, SHA512
- Asymmetric
  - Diffie-Hellman
- Symmetric
  - AES
    - CTR, ECB, OFB, CBC
  - DES

GUI

- take the user’s input such as:
    - choice of mode
    - key (copied and pasted from key generator offered by GUI)
    - designated number of bits (for key generator)
    - plaintext message (for encrypt)
    - ciphertext message (for decrypt)

GUI

- process user’s input
    - make calls to PyCrypto to obtain high-level functions along with their primitives
    - rendered output to front end
- incorporate back-end code into GUI functionality

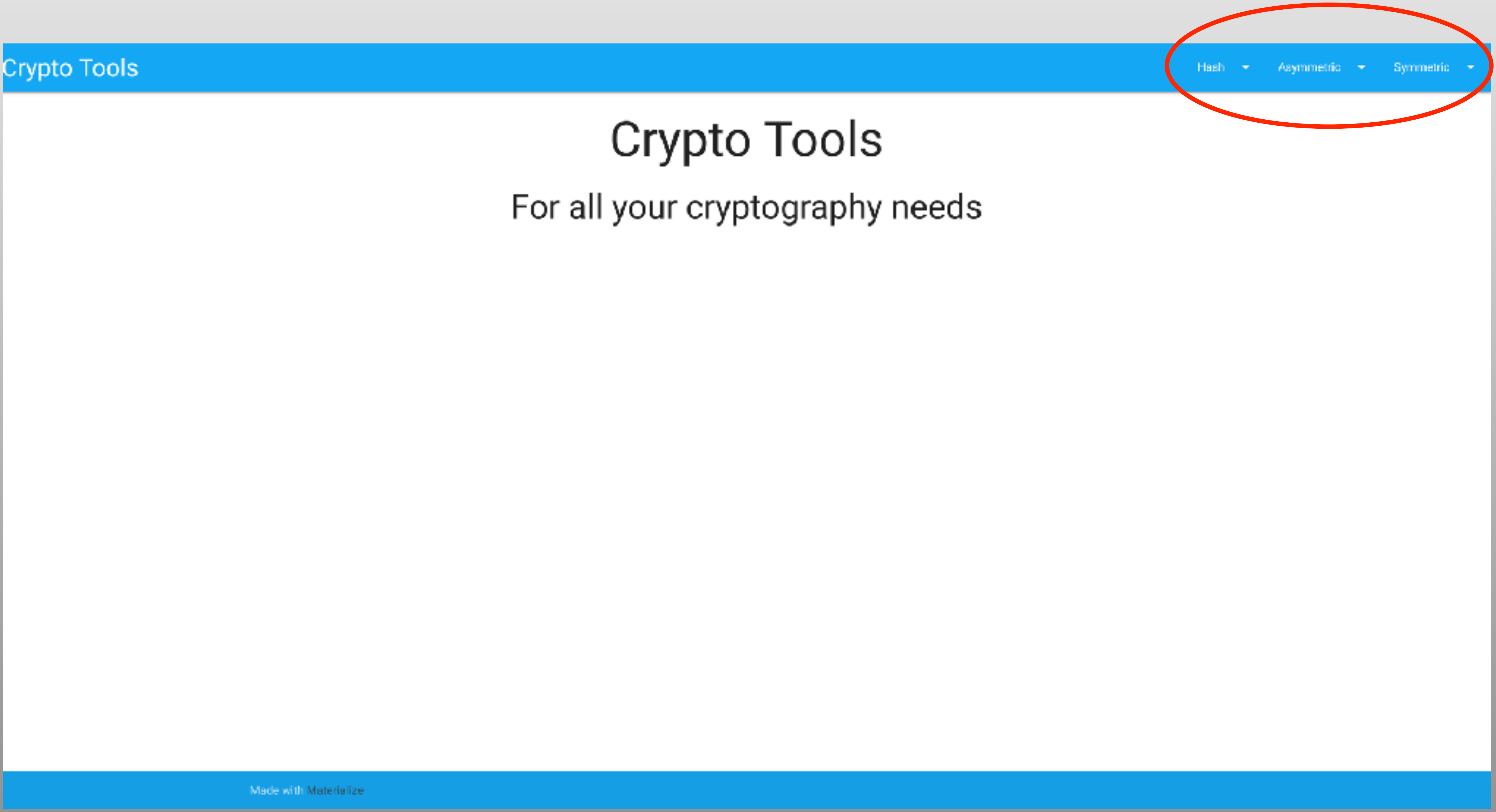


```
from Crypto.Cipher import SHA
from Crypto.Cipher import SHA224
from Crypto.Cipher import SHA256
from Crypto.Cipher import SHA384
from Crypto.Cipher import SHA512

@app.route('/sha', method = ['GET','POST'])
def sha():
    option = request.form['mode']
    if request.message = 'POST':
        if (option == 'SHA'):
            message = request.form['message'].encode('UTF-8')
            return SHA.new(message).hexdigest()
        else if (option == 'SHA224'):
            message = request.form['message'].encode('UTF-8')
            return SHA224.new(message).hexdigest()
        else if (option == 'SHA256'):
            message = request.form['message'].encode('UTF-8')
            return SHA256.new(message).hexdigest()
       else if (option =='SHA384 ):
            message = request.form['message'].encode('UTF-8')
            return SHA384.new(message).hexdigest()
        else if (option == 'SHA512'):
            message = request.form['message'].encode('UTF-8')
            return SHA512.new(message).hexdigest()
    return render.template()
```

GUI

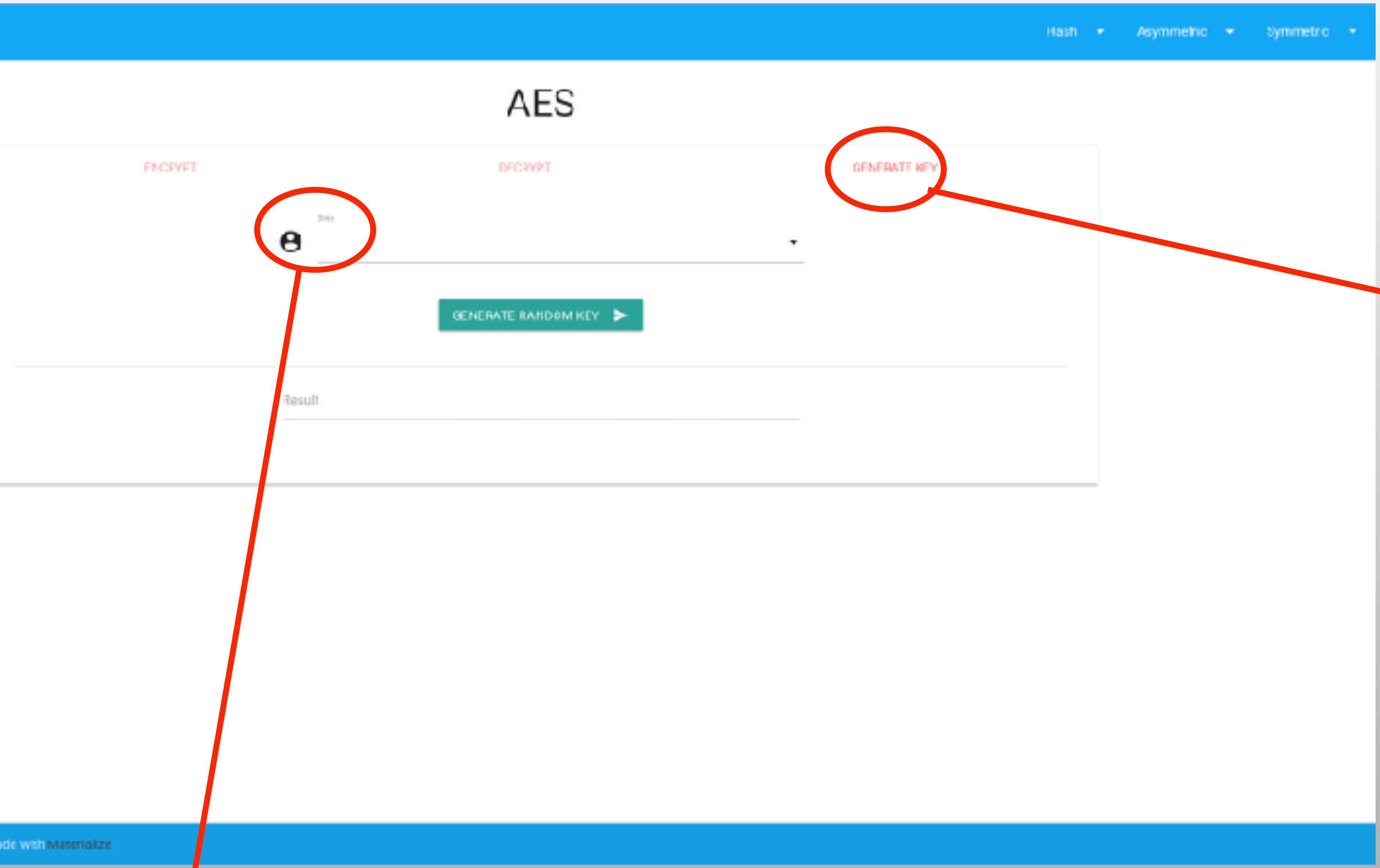
- Alice opens the GUI
  - options in the top right: Hash, Asymmetric, Symmetric



Crypto Tools

For all your cryptography needs

GUI



- Alice chooses AES under Symmetric

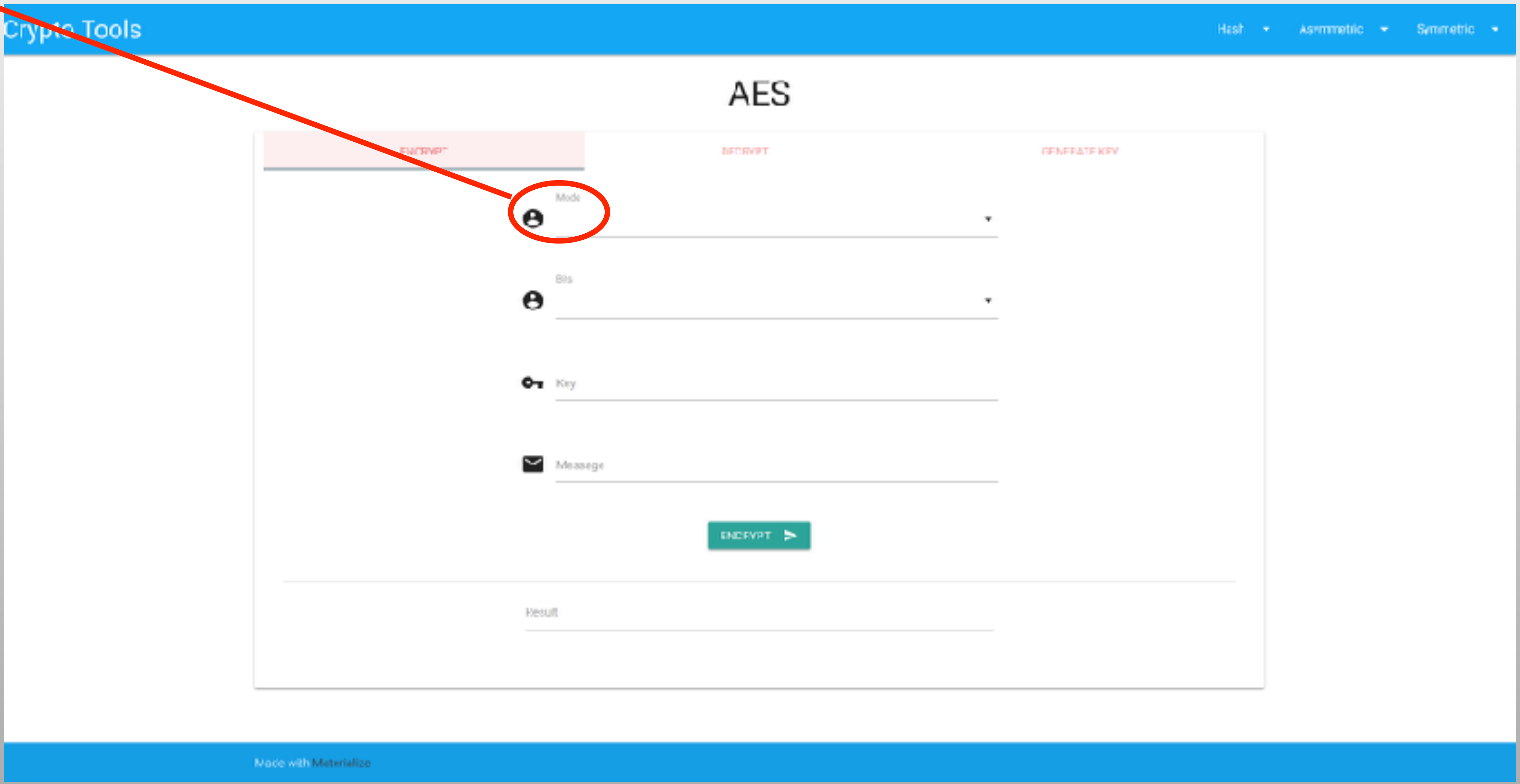
- clicks on "GENERATE KEY" tab

- chooses bits number then clicks "GENERATE RANDOM KEY" button

- copies the outputted key

GUI

- she then clicks on "ENCRYPT" tab
- chooses type of AES from "Mode" dropdown



- inputs same bits number she had chosen when generating key
- pastes generated key and writes out her message
- clicks "ENCRYPT" button

GUI

- Alice copies outputted ciphertext
- Alice texts Bob the ciphertext, which encryption scheme she used, and number of bits
- Bob copies ciphertext and opens GUI
- chooses correct scheme and clicks “DECRYPT” tab
- inputs necessary information
- is outputted the plaintext