Cryptography & Network Security

PRN - 2019BTECS00026

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Batch - B1

Assignment - 9

Title: Prime Factorization

Aim: To Demonstrate Prime Factorization

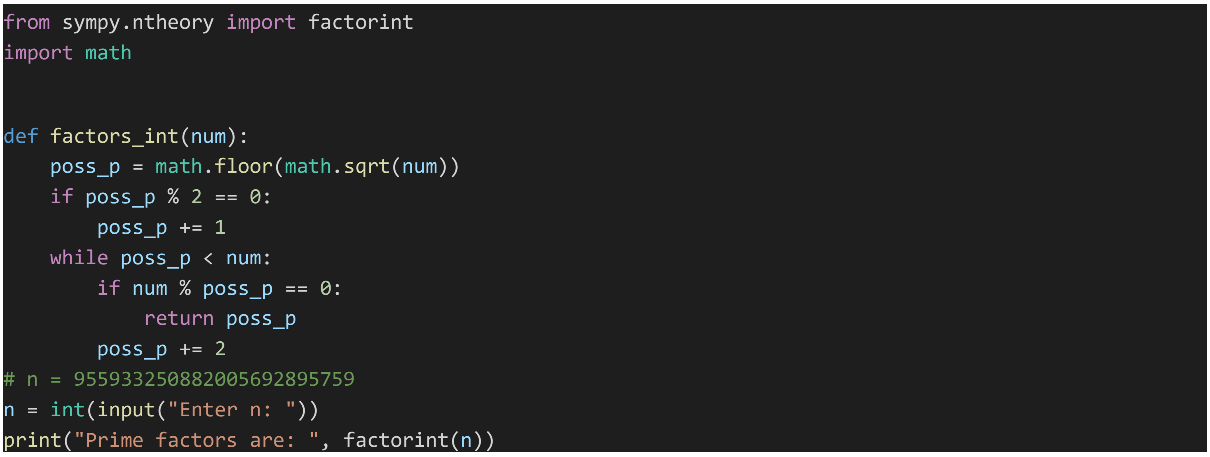
Theory:

RSA Laboratories states that: for each RSA number n, there exists prime numbers p and q such that

n = p × q.

The problem is to find these two primes, given only n.

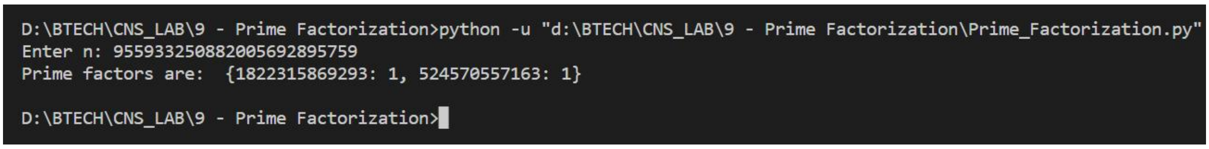
Code:



```python
from sympy.ntheory import factorint
import math


def factors_int(num):
    poss_p = math.floor(math.sqrt(num))
    if poss_p % 2 == 0:
        poss_p += 1
    while poss_p < num:
        if num % poss_p == 0:
            return poss_p
        poss_p += 2
# n = 955933250882005692895759
n = int(input("Enter n: "))
print("Prime factors are: ", factorint(n))
```

Output:



```
D:\BTECH\CNS_LAB\9 - Prime Factorization>python -u "d:\BTECH\CNS_LAB\9 - Prime Factorization\Prime_Factorization.py"
Enter n: 955933250882005692895759
Prime factors are:  {1822315869293: 1, 524570557163: 1}

D:\BTECH\CNS_LAB\9 - Prime Factorization>
```

Conclusion:

The RSA Factoring Challenge was a challenge put forward by RSA Laboratories to encourage research into computational number theory and the practical difficulty of factoring large integers and cracking RSA keys used in cryptography. They published a list of semiprimes (numbers with exactly two prime factors) known as the RSA numbers, with a cash prize for the successful factorization of some of them.