An efficient and secure RSA–like cryptosystem exploiting Rédei rational functions over conics – Help page

Made by Asaf Yusufov & Roni Belkin

If this is your first time here, WELCOME !

Important note –

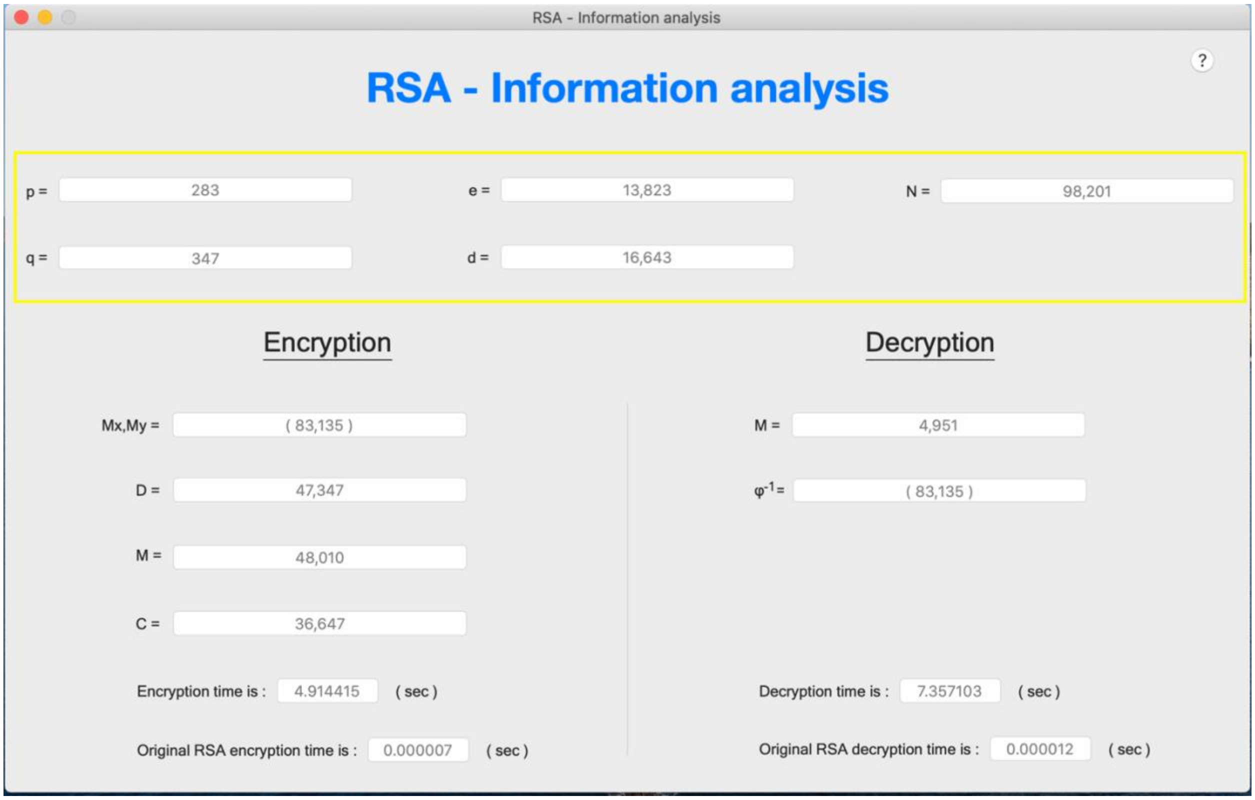
In our window we present a lot of parameters. To understand each of them and how they calculated thoroughly, please check our book - An efficient and secure RSA–like cryptosystem exploiting Rédei rational functions over conics.

Explanation about The window-

RSA-information analysis –

This window shows all the information about the values and results that had been used and measured in the running.

Top of the window –



RSA - Information analysis

RSA - Information analysis

p = 283

q = 347

e = 13,823

d = 16,643

N = 98,201

Encryption

Mx,My = (83,135)

D = 47,347

M = 48,010

C = 36,647

Encryption time is : 4.914415 (sec)

Original RSA encryption time is : 0.000007 (sec)

Decryption

M = 4,951

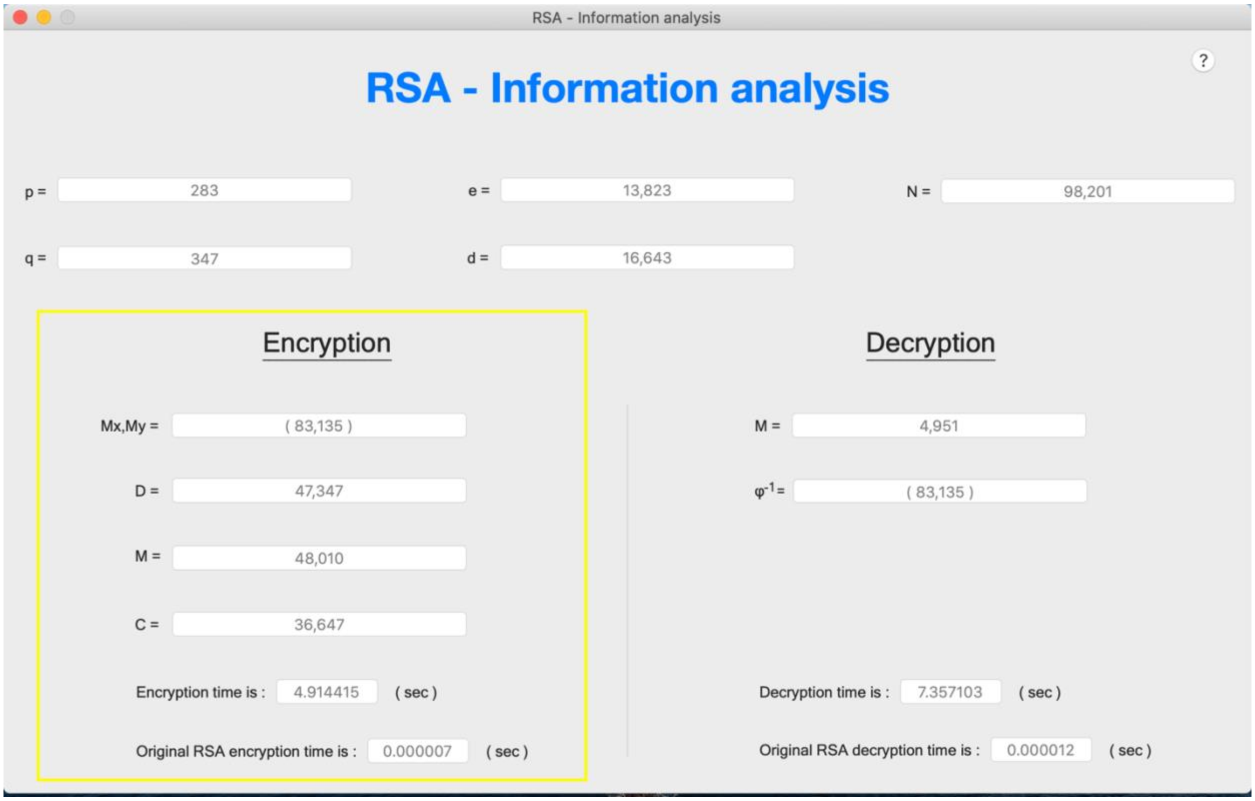
φ^{-1} = (83,135)

Decryption time is : 7.357103 (sec)

Original RSA decryption time is : 0.000012 (sec)

- p is a prime number that had been chosen randomly.
- q is a prime number that had been chosen randomly.
- N is a result of multiplication of $p \cdot q$.
- e had been chosen randomly and must confirm the following $gcd(e, lcm(p+1, q+1) = 1)$.
    - The e defines the number of iterations in the encryption.
- d is a modular multiplicative inverse of an integer e - $e^{-1}\ modulo\ (lcm(p+1, q+1))$.
    - The d defines the number of iterations in the decryption.

Left side of the Window (encryption)–



RSA - Information analysis

RSA - Information analysis

p = 283

e = 13,823

N = 98,201

q = 347

d = 16,643

Encryption

Mx,My = (83,135)

D = 47,347

M = 48,010

C = 36,647

Encryption time is : 4.914415 (sec)

Original RSA encryption time is : 0.000007 (sec)

Decryption

M = 4,951

φ^{-1}= (83,135)

Decryption time is : 7.357103 (sec)

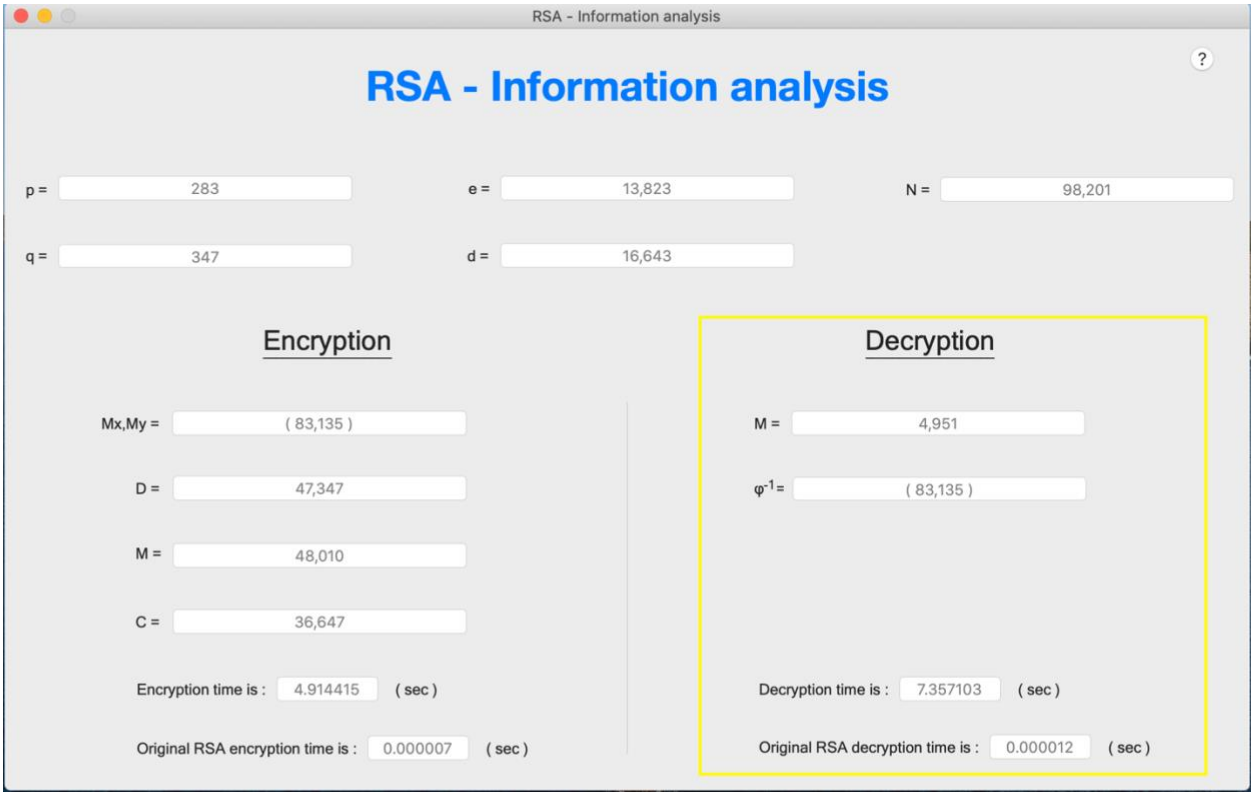
Original RSA decryption time is : 0.000012 (sec)

- M_x, M_y is an ordered pair that represent the message before the encryption. Those values will be encrypted, and they are point values over conic.
- D is a non quadratic residue square. D is calculated by $\frac{M_x^2 - 1}{M_y^2}(mod\ N)$.
- M is the result of parametrization on the point - $M = \Phi(M_x, M_y) = \frac{M_x + 1}{M_y}(mod\ N)$.
- C is the result of using Rédei rational function - $C = M^{\odot Pe}(mod\ N) = Q_e(D, M)(mod\ N)$.
    - After this step the message M becomes an encrypted message C.

Note –

In the next two labels you will see the encryption running time result for RSA-like cryptosystem first, and then the encryption running time result for original RSA. This time measured in seconds.

Right side of the Window (decryption) –



RSA - Information analysis

p = 283

e = 13,823

N = 98,201

q = 347

d = 16,643

Encryption

Mx,My = (83,135)

D = 47,347

M = 48,010

C = 36,647

Encryption time is : 4.914415 (sec)

Original RSA encryption time is : 0.000007 (sec)

Decryption

M = 4,951

φ^{-1} = (83,135)

Decryption time is : 7.357103 (sec)

Original RSA decryption time is : 0.000012 (sec)

- M is the decryption result after getting the value of C. M is calculated as $C^{\odot Pd}(mod\ N) = M$, and then you get the decrypted message M.
- φ^{-1} is the inverse parametrization of the message M to get the point values M_x, M_y. It calculated $\Phi^{-1}(M) = \left(\frac{M^2+D}{M^2-D}, \frac{2M}{M^2-D}\right)(mod\ N) = \left(M_x, M_y\right)$.

Note –

In the next two labels you will see the encryption running time result for RSA-like cryptosystem first, and then the encryption running time result for original RSA. This time measured in seconds.