Analisis dan Implementasi Algoritma Rijndael (AES) dan Kriptografi RSA pada Pengamanan File

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ABSTRAK

Salah satu cara untuk meningkatkan keamanan terhadap data atau file yaitu dengan menggunakan metode kriptografi. Pada kriptografi modern, algoritma yang digunakan tidak dirahasiakan sebab setiap kali algoritma diketahui lawan, maka kriptografer (cryptographer) harus membuat algoritma baru, dengan demikian cukup kuncinya yang harus dirahasiakan dan benar-benar dijaga keamanannya. Algoritma Rijndael didesain untuk mengganti algoritma DES yang sudah cukup lama. Algoritma ini menggunakan kunci 128-bit, 192-bit atau 256 bit. Sistem yang dibangun mampu mengenkripsi dan dekripsi file yang dipilih saja. Panjang kunci algoritma Rijndael pada sistem ini hanya 128-bit. Hasil penelitian ini diperoleh sistem enkripsi dan dekripsi terhadap plainteks dan kunci simetris (sessionkey) dengan kombinasi algoritma Rijndael dan RSA. Hasil enkripsi plainteks pada sistem yang dibangun berupa kode karakter, sedangkan untuk enkripsi sessionkey berupa kode number.

PENDAHULUAN

Perkembangan teknologi komunikasi yang semakin pesat saat ini membuat segala urusan sehari-hari manusia tidak terlepas dari penggunaan perangkat teknologi dalam menunjang berbagai aktivitas agar lebih mudah dan cepat. Penggunaan perangkat teknologi saat ini boleh dikatakan wajib mengingat kecepatan waktu merupakan tujuan utama baik dalam hal berkomunikasi atau berbagi informasi mulai dari yang sifatnya rahasia (private) maupun yang sifatnya umum (public)[1], [2]. Namun seiring dengan kemajuan tersebut tingkat kejahatan di era teknologi juga semakin meningkat dan berkembang, sehingga sangat perlu diperhatikan segi keamanannya pada saat melakukan komunikasi atau hal-hal lain terutama yang bersifat rahasia.

Salah satu cara untuk meningkatkan keamanan terhadap data atau file yaitu dengan menggunakan metode kriptografi. Pada kriptografi modern, algoritma yang digunakan tidak dirahasiakan sebab setiap kali algoritma diketahui lawan, maka kriptografer (cryptographer) harus membuat algoritma baru, dengan demikian cukup kuncinya yang harus dirahasiakan dan benar-benar dijaga keamanannya. Berdasarkan jenis kunci yang digunakan, kriptografi terbagi atas dua metode, yaitu kriptografi kunci simetris dan kriptografi kunci asimetris. Perbedaan dari kedua kriptografi ini terletak pada penggunaan kunci [3]. Untuk kriptografi simetris menggunakan kunci yang sama pada saat melakukan enkripsi dan dekripsi. Oleh sebab itu harus benar-benar dijaga kerahasian kunci tersebut, namun berbeda halnya dengan kriptografi asimetris, kunci pada saat enkripsi berbeda dengan kunci yang digunakan pada saat melakukan dekripsi, hal ini menjadi salah satu faktor kriptografi asimetris lebih aman dibandingkan dengan kriptografi simetris [4].

Berdasarkan uraian di atas, sistem kriptografi secara mutlak ditentukan oleh keamanan kunci yang digunakan. Selain panjangnya kunci, proses pada saat pertukaran kunci harus juga diperhatikan agar kunci tersebut tetap aman. Algoritma kriptografi kunci publik atau sering disebut dengan algoritma kunci asimetris terkadang tidak pernah berdiri sendiri, algoritma kunci publik juga membutuhkan algoritma kunci simetris. Dalam hal ini biasanya algoritma kunci simetris tersebut digunakan untuk enkripsi dan dekripsi plainteks karena dari segi kecepatan waktu algoritma simetris cukup menguntungkan, sedangkan algoritma kunci publik berperan untuk mengenkripsikan kunci dari kunci simetris tersebut agar lebih aman pada saat pendistribusian kunci dan pesan.

Berdasarkan permasalahan itu penulis berencana untuk mengkombinasikan kedua sistem kriptografi tersebut. Untuk kriptografi simetris penulis memilih algoritma kriptografi Rijndael yang merupakan pemenang dalam kompetisi yang dilakukan oleh NIST (National Institute of standard and Tekhnology) pada 2 Oktober 2000 untuk menggantikan algoritma DES (Data Encryption Standard) yang dirasa sudah tidak aman lagi dalam penggunaannya. Algoritma Rijndael didesain untuk mengganti algoritma DES yang sudah cukup lama. Algoritma ini menggunakan kunci 128-bit, 192-bit atau 256 bit [1]. Algoritma ini dibuat oleh dua orang periset yaitu Joan Daemen dan Vincent Rijmen. Rijndael telah dipilih oleh NIST (National Institute of Standards and Technology) sebagai proposal yang paling cocok dengan kriteria keamanan, efisiensi dalam implementasi, sifat yang berubah-ubah dan kesederhanaan.

Terkadang istilah AES dan Rijndael digunakan tertukar-tukar, tetapi keduanya berbeda. AES secara luas diperkirakan untuk menjadi standard utama dalam mengenkripsi semua bentuk data elektronik termasuk data yang digunakan dalam aplikasi komersial seperti perbankan dan transaksi finansial, telekomunikasi, dan informasi privat. Algoritma memiliki beberapa kelebihan antara lain relatif

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