# Secure Authentication Gateway using Kerberos

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# OBJECTIVE

- Authenticating users to network services can prove dangerous when the method used by the protocol is inherently insecure, as evidenced by the transfer of unencrypted passwords over an unsecured network using the traditional FTP and Telnet protocols.
- To solve password storing and account managing problem a centralized user/password database is required, and then all the servers should consult that database to authenticate usernames and passwords.
- A multiuser/multiserver environment should allow to have any number of employees use the same credentials to log into resources throughout their domain

# WHAT IS KERBEROS

- Kerberos is a network authentication protocol that uses tickets to allow entities to prove their identity over potentially insecure channels or distributed networks to provide mutual authentication.
- It also uses symmetric encryption to protect protocol messages from eavesdropping and replay attacks.

So our project would be basically a simulation of the authentication functionality of kerberos and we would use it over a small distributed system containing some clients who wants to access certain functionality provided by 2-3 servers.

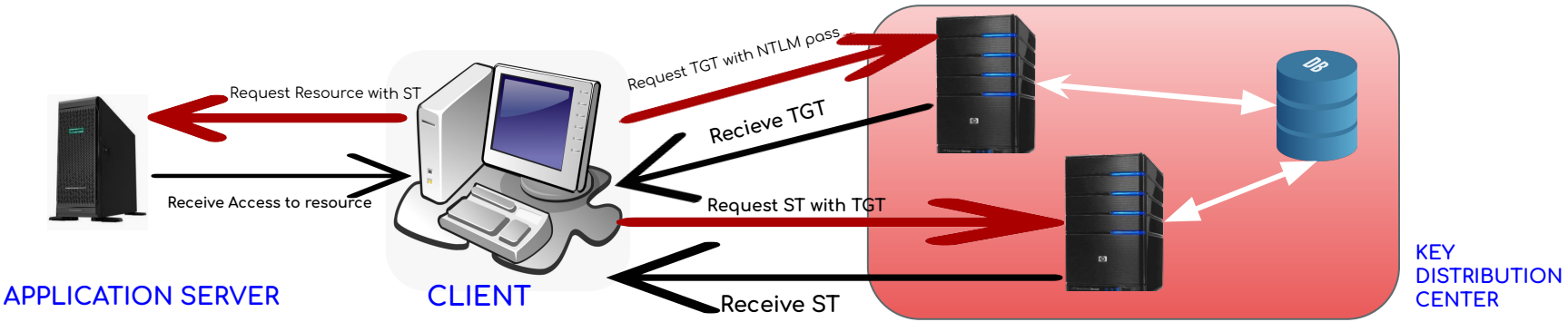

# PROCEDURE

The basic operation of Kerberos is as follows :

1. Initial client authentication request.
2. KDC verifies the client credentials, The client sends the encrypted TGT to the TGS and requests a service ticket for access to the application server. This ticket has two copies of the session key: One copy is encrypted with the client secret key, and the other copy is encrypted with the Ticket granting server (TGS) secret key.
3. The client decrypts the message

# contd...

4. Client uses TGT to request access.
5. The KDC creates a ticket for the file server.
6. The client uses the file ticket to authenticate.
7. The target server receives, decryption and authentication.



# Innovation

In the course of this project we have tried to address the security threat possessed by kerberos because of dictionary attacks, to make the message passing secure from Authentication server to client we are introducing a way using diffie-hellman algorithm without adding more latency to the system.

Steps that we changed in Kerberos Authentication system:

1. Clients should have a secret private key (which would be generated from client's password using SHA256 algorithm ) , say CPvtKey and one random key RKey would be generated at run time.
2. Using DH, a public key say CPubKey is created which is a combination of the client's secret key and random key.
3. Now when client sends request to authentication server, one more json object would be added containing both CPubKey and Rkey.
4. Authentication server on receiving the request first create a private Symmetric Key, say SymmKey that would be used for encryption.

```
export interface KeyEx{
  publicKey: string,
  random: string
}
```

# REFERENCES


- Authors Notes by MIT https://web.mit.edu/kerberos/
- Kerberos as used by Microsoft https://docs.microsoft.com/en-us/windows-server/security/kerberos/kerberos-authentication-overview
- https://medium.com/@robert.broeckelmann/kerberos-and-windows-security-kerberos-on-windows-3bc021bc9630
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- Comparitive Study https://medium.com/@robert.broeckelmann/kerberos-and-windows-security-kerberos-on-windows-3bc021bc9630
- Secure Key Distribution Prototype Based on Kerberos https://sci-hub.ee/10.1007/978-3-030-48149-0

# THANK YOU