KERBEROS: OVERVIEW

COMPUTER SYSTEMS SECURITY

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TODAY ….

Today we will overview Kerberos, a server/client security protocol.

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COMPUTER SYSTEMS SECURITY

KERBEROS: OVERVIEW

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OVERVIEW

- Kerberos is a client/server authentication protocol based on a ticketing system.
- In most computer systems, a user typically proves their identity by providing a password.
- Their password is then sent via an untrusted network to the authentication servers for verification.
- It is therefore necessary to prevent anyone from eavesdropping on the users password, as knowing their password allows anyone to assume that users identify within the IT environment.

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OVERVIEW

- In addition, it is also necessary to provide a means of authenticating users to use any service available on the network at anytime.
  - Such as, file shares, printers, management servers …. Etc
  - Kerberos provides authentication. It ***doesn't*** provide authorisation or accounting services.
- This can be achieved with Kerberos, which was designed for two main purposes:
  - Security
  - Authentication

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COMPUTER SYSTEMS SECURITY

KERBEROS: OPERATION

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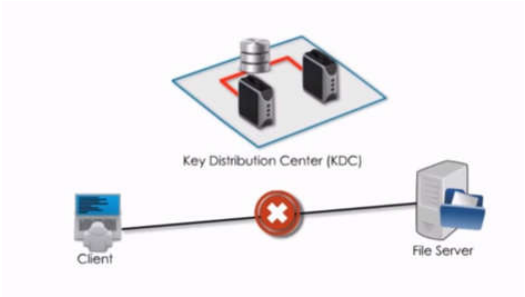
KERBEROS PROCESS:



- Suppose a client wants to access a file server, with Kerberos, the client must be verified through a trusted third-party.
- This trusted third party is called a, **Key Distribution Centre** (KDC)

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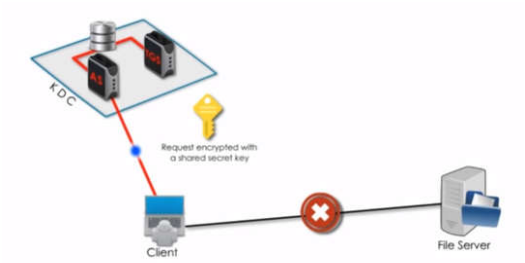
KERBEROS PROCESS:



- The Key Distribution Centre (KDC) consists of two servers:
  - The Authentication Server (AS), and
  - The Ticketing Granting Server (TGS)

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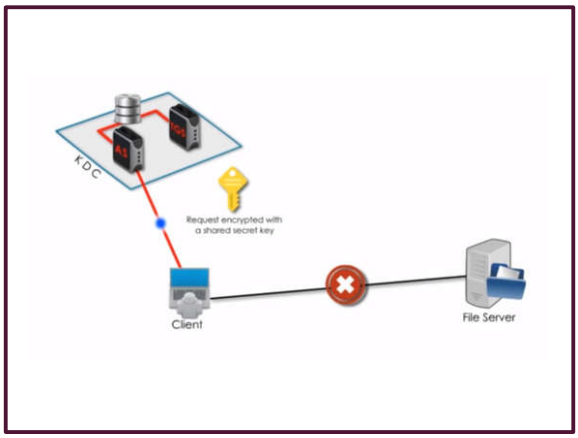
KERBEROS PROCESS: STEP ONE



- The Client sends a request to the Authentication Server (AS).
- The request consists of:
  - The user's username, and
  - A request for a ticket to access a server.
- The request is partially encrypted with a secret key
- The secret key used, is the user's password

Note: The user's password is never sent over the unsecure network. It is only used as an encryption key.

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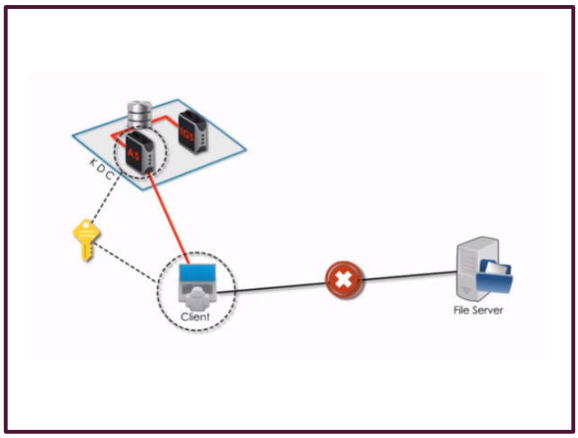
KERBEROS PROCESS: STEP ONE



- When the Authentication Server (AS) gets the clients request, it will retrieve their password from the AS database, based on userID.
  - The password is a shared secret key between Authentication Server and Client.
- Their password will then be used to decrypt the user's request.
- If the user's request gets successfully decrypted, the user has been successfully verified.

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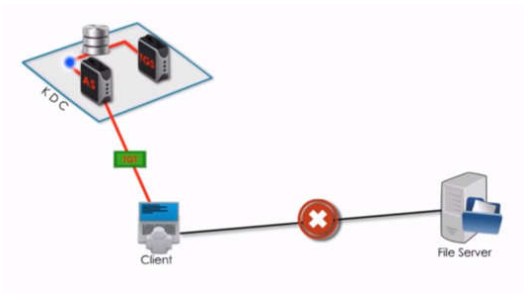
KERBEROS PROCESS: STEP ONE



- After verifying the client, the Authentication Server sends back a ticket called a ***Ticket Granting Ticket*** (TGT).
- The TGT is encrypted with another secret key.

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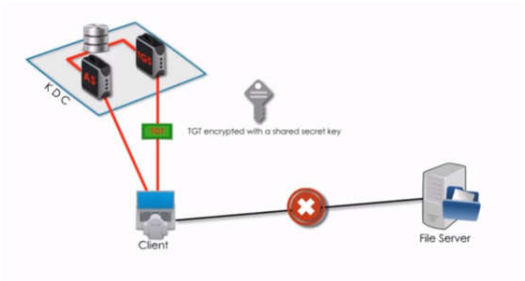
KERBEROS PROCESS: STEP TWO



- After the client gets the encrypted TGT, the client sends the ticket to the Ticket Granting Server along with the request for access to the file server.
  - Remember the client can not decrypt the TGT as it does not have the appropriate key.

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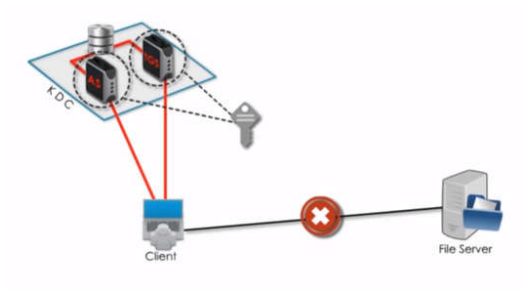
KERBEROS PROCESS: STEP TWO



- When the Ticket Granting Server (TGS) receives the Ticket Granting Ticket (TGT), it decrypts the ticket with the secret key shared with the Authentication Server (AS).

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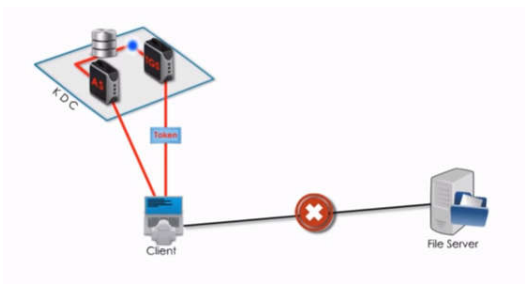
KERBEROS PROCESS: STEP TWO



- Then the TGS issues a token that is encrypted with another key.
- This third secret key is shared between the Ticket Granting Server and the File Server (or indeed any other resource that the user is trying to access on the network).

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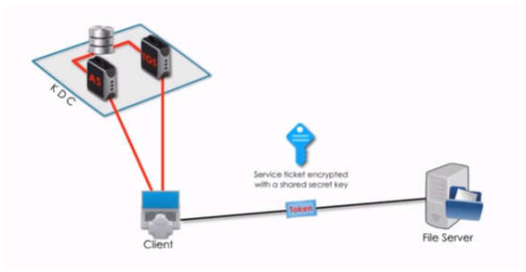
KERBEROS PROCESS: STEP TWO



- The Client then sends the token to the file server.

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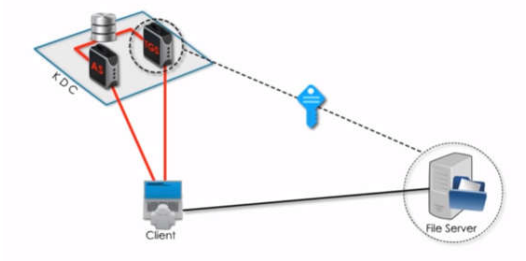
KERBEROS PROCESS: STEP THREE



- When the file server gets the token, it decrypts the token with the secret key shared with the Ticket Granting Server.

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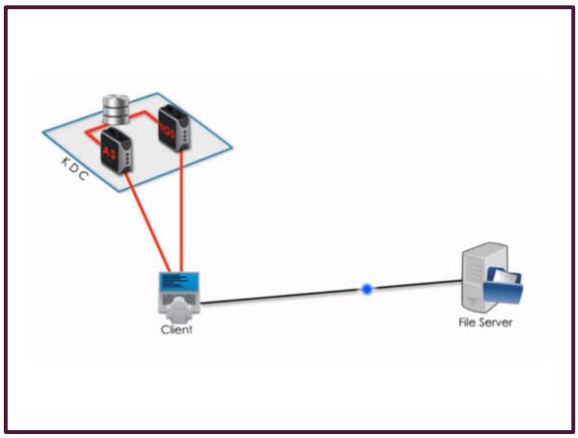
KERBEROS PROCESS: STEP THREE



- The file server then allows the Client to use its' resources for a certain period of time according to the token.

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KERBEROS PROCESS: STEP THREE

- The Token is often compared to a movie ticket, it allows you to:
  - Go to the cinema
  - See a certain movie
  - At a certain time
  - On a certain day

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KERBEROS PROCESS: STEP THREE

- All communications between the separate parties require a different key.
- Kerberos is an example of using private key encryption or symmetric key encryption

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KERBEROS: NETWORK TIME SERVER (NTS)

- Kerberos has strict time requirements, which means the clocks of the involved hosts must be synchronized within configured limits.
- The tickets have a time availability period and if the host clock is not synchronized with the Kerberos server clock, the authentication will fail.
- The default configuration per requires that clock times be no more than five minutes apart.
- In practice Network Time Protocol (NTP) daemons are usually used to keep the host clocks synchronized.

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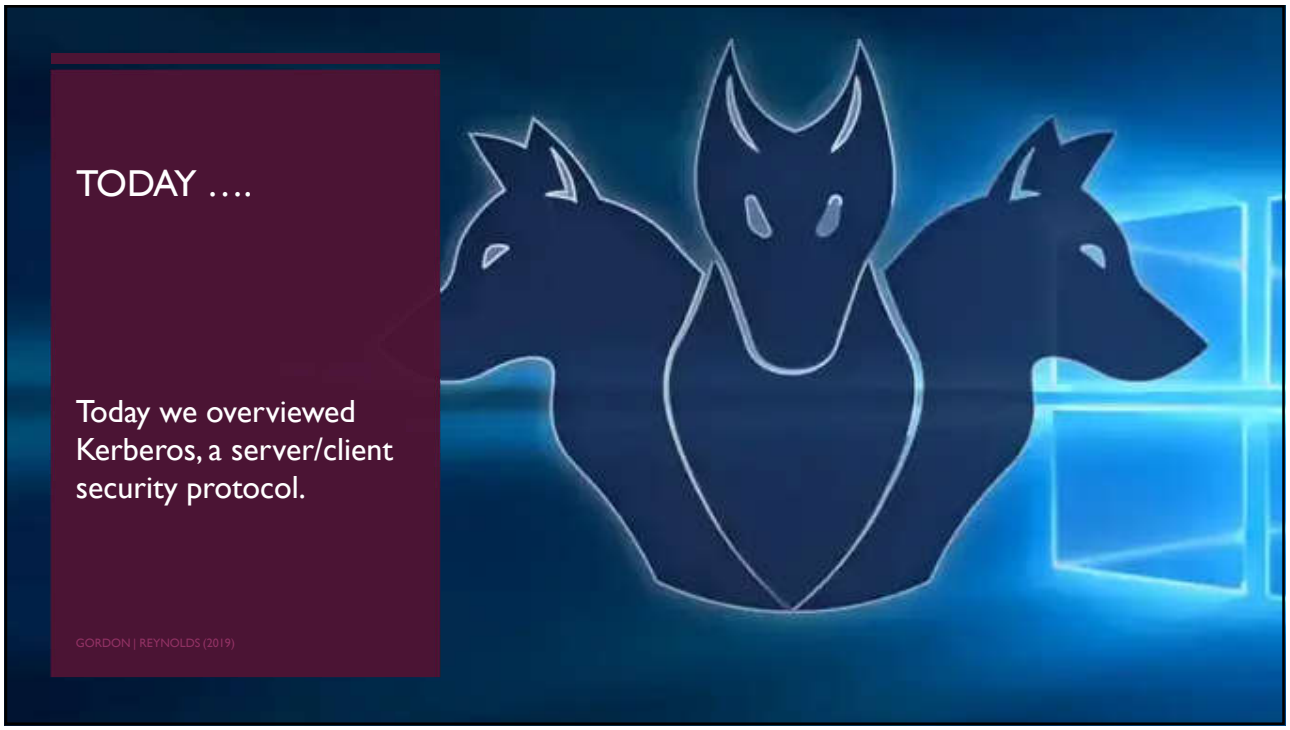
TODAY ….
Today we overviewed Kerberos, a server/client security protocol.
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