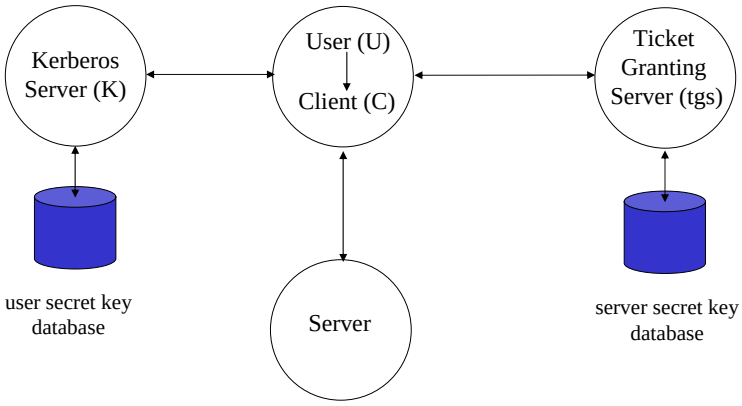
Kerberos: Structure



Requirements:

- each user has a private password known only to the user
- a user's secret key can be computed by a one-way function from the user's password
- the Kerberos server knows the secret key of each user and the tgs
- each server has a secret key know by itself and tgs

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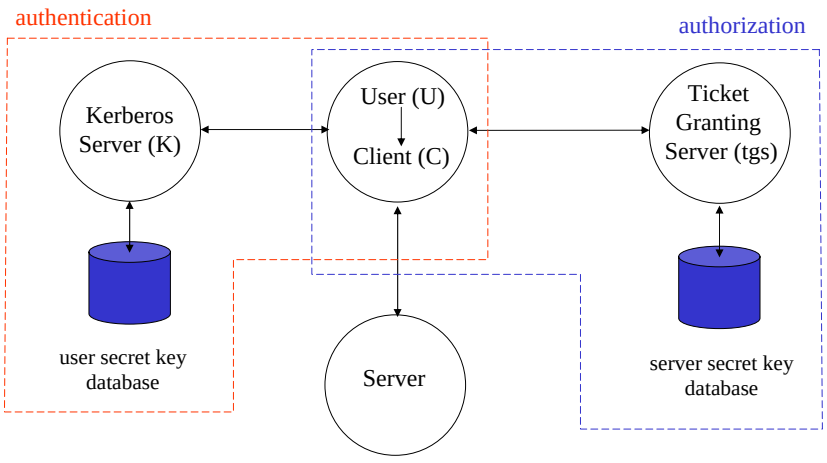
Kerberos: Steps



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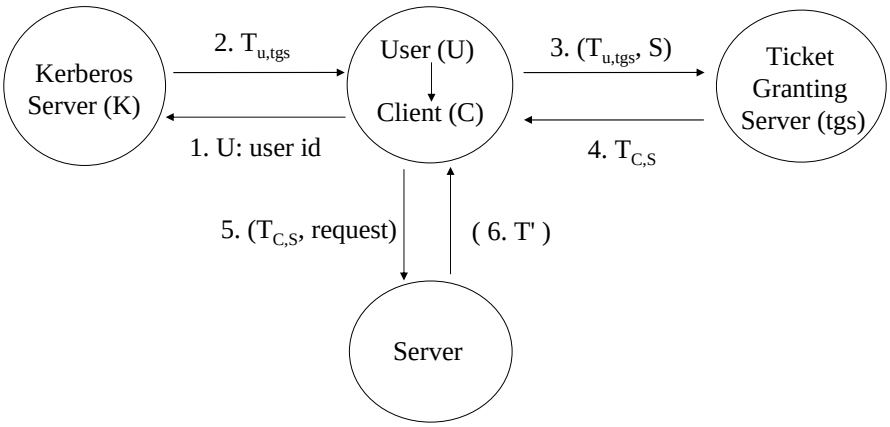
Protocol Overview



Ticket Structure:

$E_{K(S)}$ {C, S, $K_{C,S}$, timestamp, lifetime}

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Phase 1

1. The user logs on to the client and the client asks for credentials for the user from Kerberos

   U --> C : U (user id)
   C --> K: (U, tgs)

2. Kerberos constructs a ticket for U and tgs and a credential for the user and returns them to the client

   $T_{u,tgs} = E_{K(tgs)}$ { U, tgs, $K_{U,tgs}$, ts, lt}
   K --> C: $E_{K(U)}$ {$T_{U,tgs}$, $K_{U,tgs}$, ts, lt}

The client obtains the user's password, P, and computes:

K'(U) = f(P)

The user is authenticated to the client if and only if K'(U) decrypts the credential.

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Phase 2

3. The client constructs an "authenticator" for user U and requests from TGS a ticket for server, S:

   $A_U = E_{K(U,tgs)} \{C, ts\}$
   $C \text{ --> } TGS : \quad (S, T_{U,tgs}, A_U)$

4. The server authenticates the request as coming from C and constructs a ticket with which C may use S:

   $T_{C,S} = E_{K(S)} \{ C, S, K_{C,S}, ts, lt\}$
   $TGS \text{ --> } C: \quad E_{K(U,tgs)} \{T_{C,S}, K_{C,S}, ts, lt \}$

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Phase 3

5. The client builds an authenticator and send it together with the ticket for the server to S:

   $A_C = E_{K(C,S)} \{ C, ts \}$
   $C \text{ --> } S : \quad (T_{C,S}, A_C)$

6. The server (optionally) authenticates itself to the client by replying:

   $S \text{ --> } C: \quad E_{K(C,S)} \{ts + 1 \}$

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