

Lecture 23

Kerberos

- scenario: users at workstations wish to access services on servers distributed throughout the network – many to many authentication

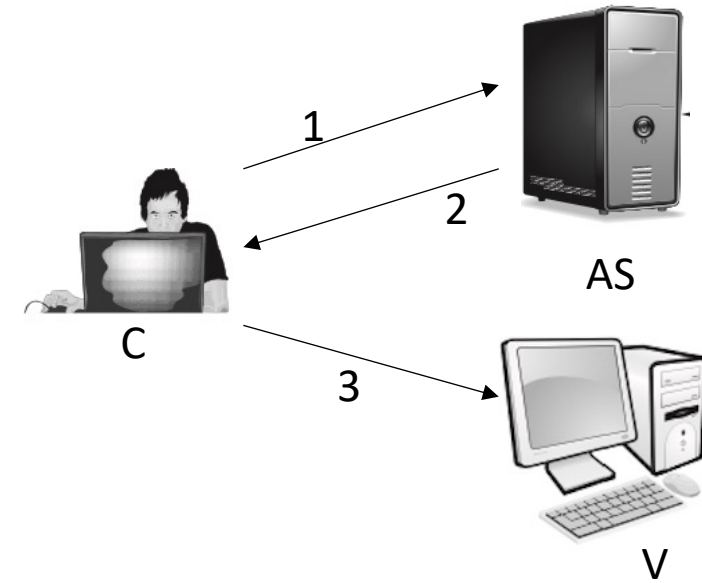
Kerberos

- a centralized authentication server provides mutual authentication between users and servers
 - a key distribution and user authentication service developed at MIT
 - works in an open distributed environment
- client-service model
- Kerberos protocol messages are protected against eavesdropping and replay attacks
- Kerberos v4 and v5 [RFC 4120]

A Simple Authentication Dialogue

- 1. $C \rightarrow AS: ID_C || P_C || ID_V$
- 2. $AS \rightarrow C: Ticket = E(K_V, [ID_C || AD_C || ID_V])$
- 3. $C \rightarrow V: ID_C || Ticket$

- AS – authentication server
- ID_* – identifier
- P_C – password of user
- AD_C – network address of C
- K_V – secret encryption key shared by AS and V



Advantage

- Client and malicious attacker cannot alter ID_C (impersonate), AD_C (change of address), ID_V
- server V can verify the user is authenticated through ID_C , and grants service to C
- guarantee the ticket is valid only if it is transmitted from the same client that initially requested the ticket

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2. $AS \rightarrow C : \text{Ticket} = E(K_V, [ID_C || AD_C || ID_V])$
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Secure?

- **Insecure**: password is transmitted openly and frequently
- Solution: no password transmitted by involving ticket-granting server (TGS)

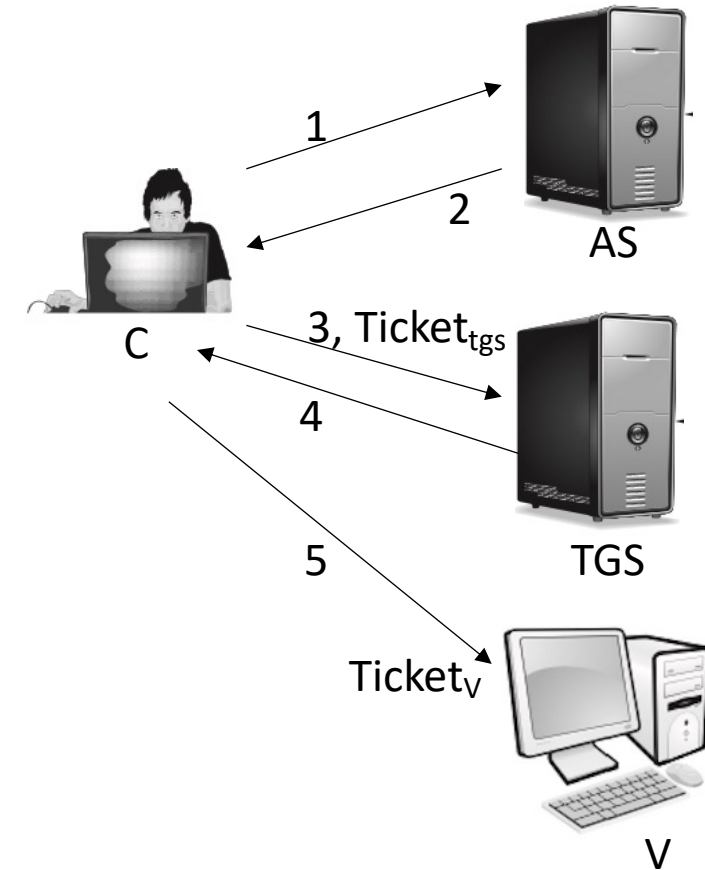
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A More Secure Authentication Dialogue

- Once per user logon session
 - (1) $C \rightarrow AS: ID_C || ID_{tgs}$
 - (2) $AS \rightarrow C: E(K_C, Ticket_{tgs})$
- Once per type of service:
 - (3) $C \rightarrow TGS: ID_C || ID_v || Ticket_{tgs}$
 - (4) $TGS \rightarrow C: Ticket_v$
- Once per service session:
 - (5) $C \rightarrow V: ID_C || Ticket_v$

$$Ticket_{tgs} = E(K_{tgs}, [ID_C || AD_C || ID_{tgs} || TS_1 || Lifetime_1])$$

$$Ticket_v = E(K_v, [ID_C || AD_C || ID_v || TS_2 || Lifetime_2])$$



1. $C \rightarrow AS: ID_C || P_C || ID_v$
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