Key Distribution

Symmetric Key Distribution and User Authentication

4.2

Ways to achieve symmetric key distribution

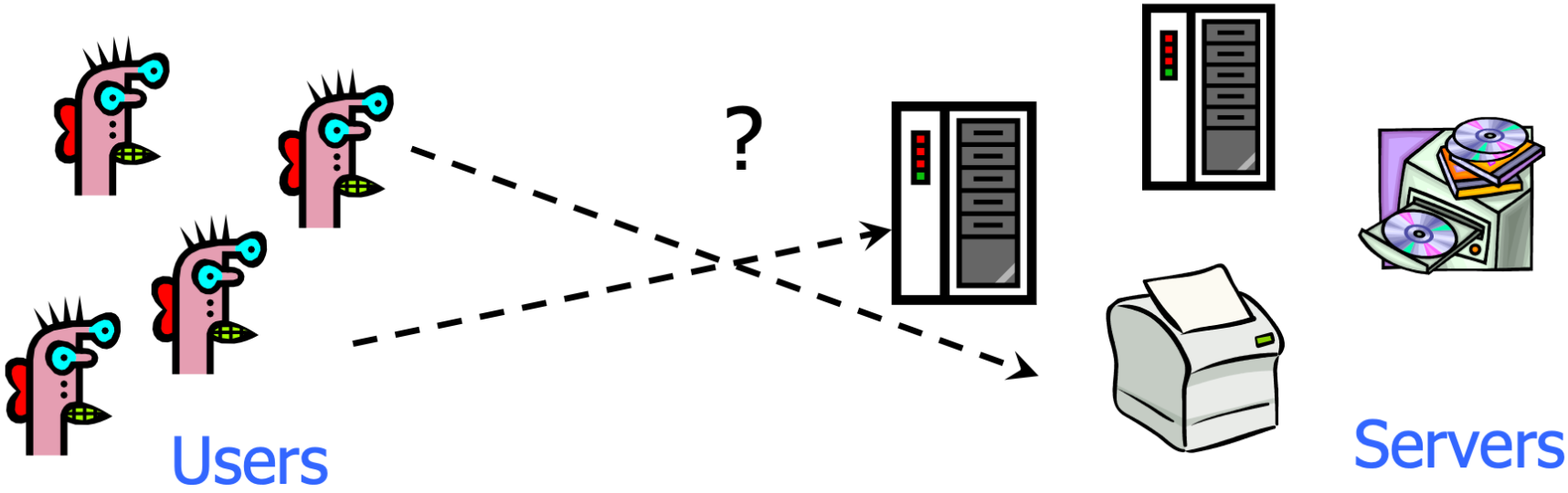
- A key could be selected by A and physically delivered to B
- A third party could select the key and physically deliver it to A and B
- If A and B have previously and recently used a key, one party could transmit the new key to the other, using the old key to encrypt the new key
- If A and B each have an encrypted connection to a third-party C, C could deliver a key on the encrypted links to A and B

Terminologies

- Session key
- Permanent key
- key distribution center (KDC)
  - third party authority, centralized infrastructure
  - give permissions for two parties to communicate

Kerberos
4.3

Many-to Many Authentication



How do users prove their identities when requesting services from machines on the network?

Threats

- User impersonation
  - Malicious user with access to a workstation pretends to be another user from the same workstation
- Network address impersonation
  - Malicious user changes network address of his workstation to impersonate another workstation
- Eavesdropping, tampering, replay
  - Malicious user eavesdrops, tampers, or replays other users' conversations to gain unauthorized access

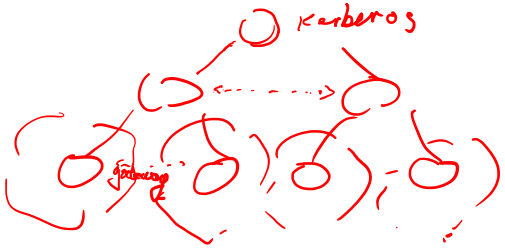
Requirements

- Security
  - against attacks by eavesdroppers and malicious users
- Transparency
  - users shouldn't notice authentication taking place
  - entering password is ok, if done rarely
- Scalability → List methods.
  - Large number of users and servers

Kerberos

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

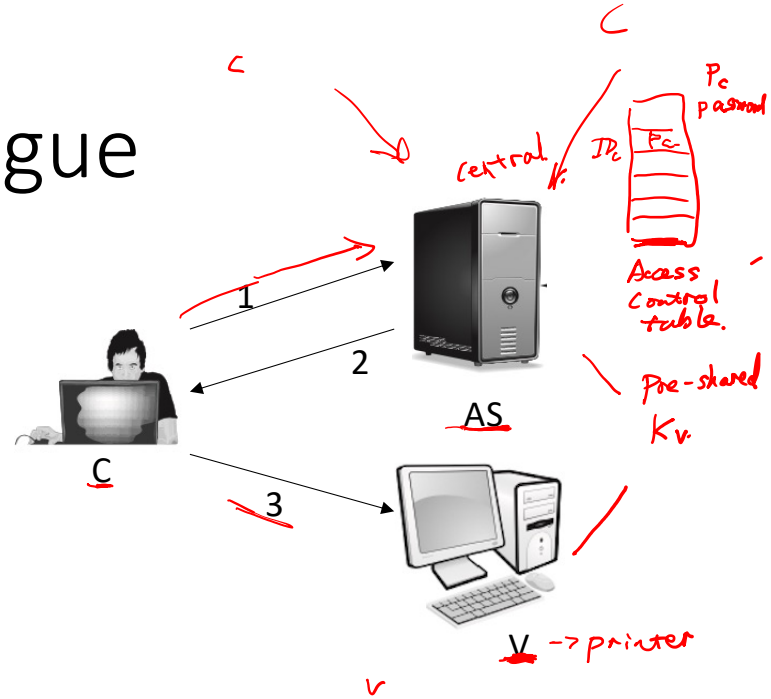
Kerberos



- 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 → centralized
- Kerberos protocol messages are protected against eavesdropping and replay attacks

A Simple Authentication Dialogue

- 1. C —>AS: ID_C | | P_C | | ID_V
- 2. AS —> C : Ticket = E(K_V, [ID_C | | AD_C | | ID_V])
- 3. C —> 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

Mid-term Exam

- Nov. 7, 2025 (Friday), 2:00 pm – 2:50 pm, in class
- Closed book, but you're allowed to bring one cheat sheet (1 A4-sized paper)
- Chapter 1 – 3 , Kerberos & Diffie Hellman Key Exchange