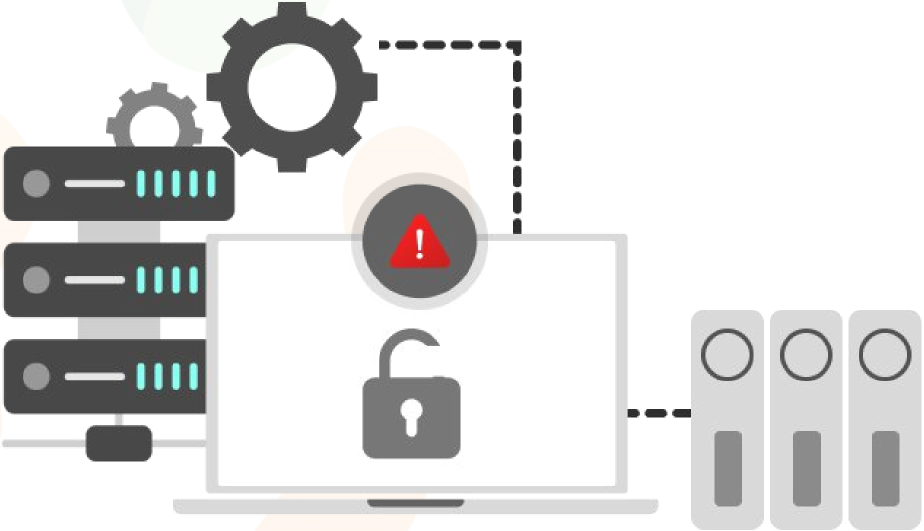
IdentityShield



Unmasking LDAP & KERBEROS Vulnerabilities

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- Experienced on working in LDAP and Kerberos Integration for 3+ Years.
- WordPress Plugin Developer in Cyber Security Domain
- Works on providing solutions for API Security use cases.

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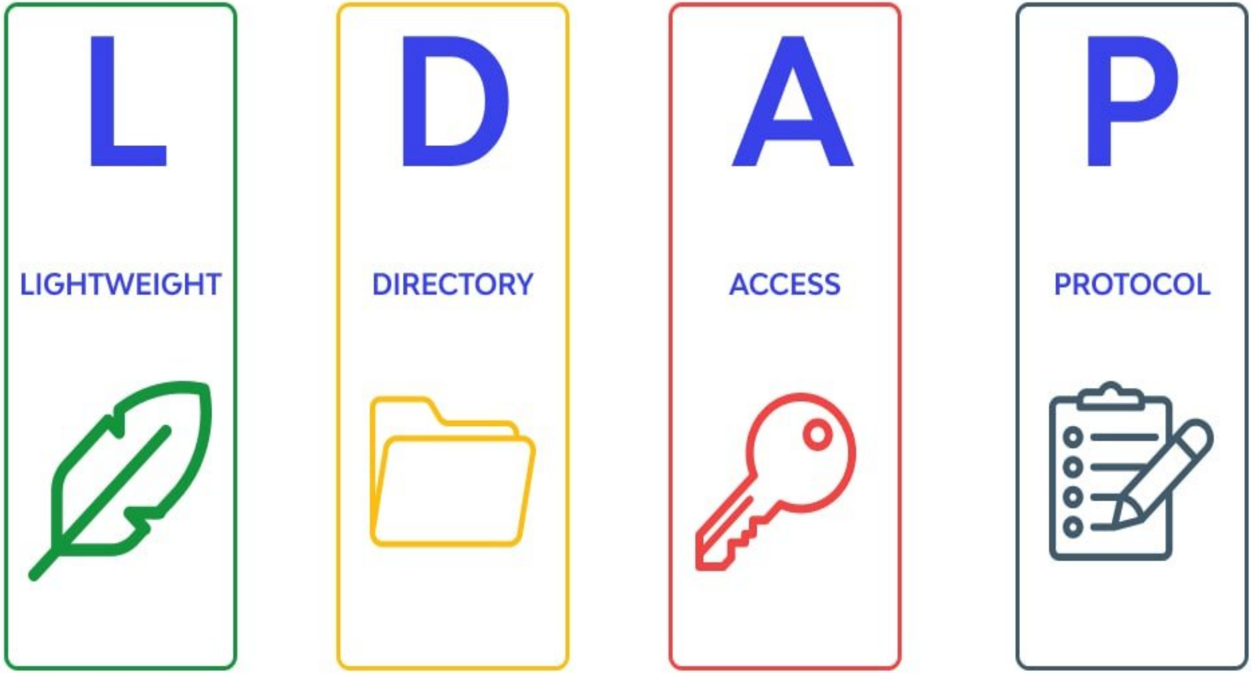
WHO AM I?

WHAT IS A DIRECTORY ?

- A directory is a hierarchical database which can easily mimic an organisation’s structure with information like user objects, computers etc.
- It can be accessed via LDAP that could be used for Authentication & perform CRUD operations.
- Ex: Microsoft Active Directory, FreeIPA, OpenLDAP, ApacheDS, OpenDJ.

IdentityShield

WHAT IS LDAP PROTOCOL ?



L

LIGHTWEIGHT

D

DIRECTORY

A

ACCESS

P

PROTOCOL

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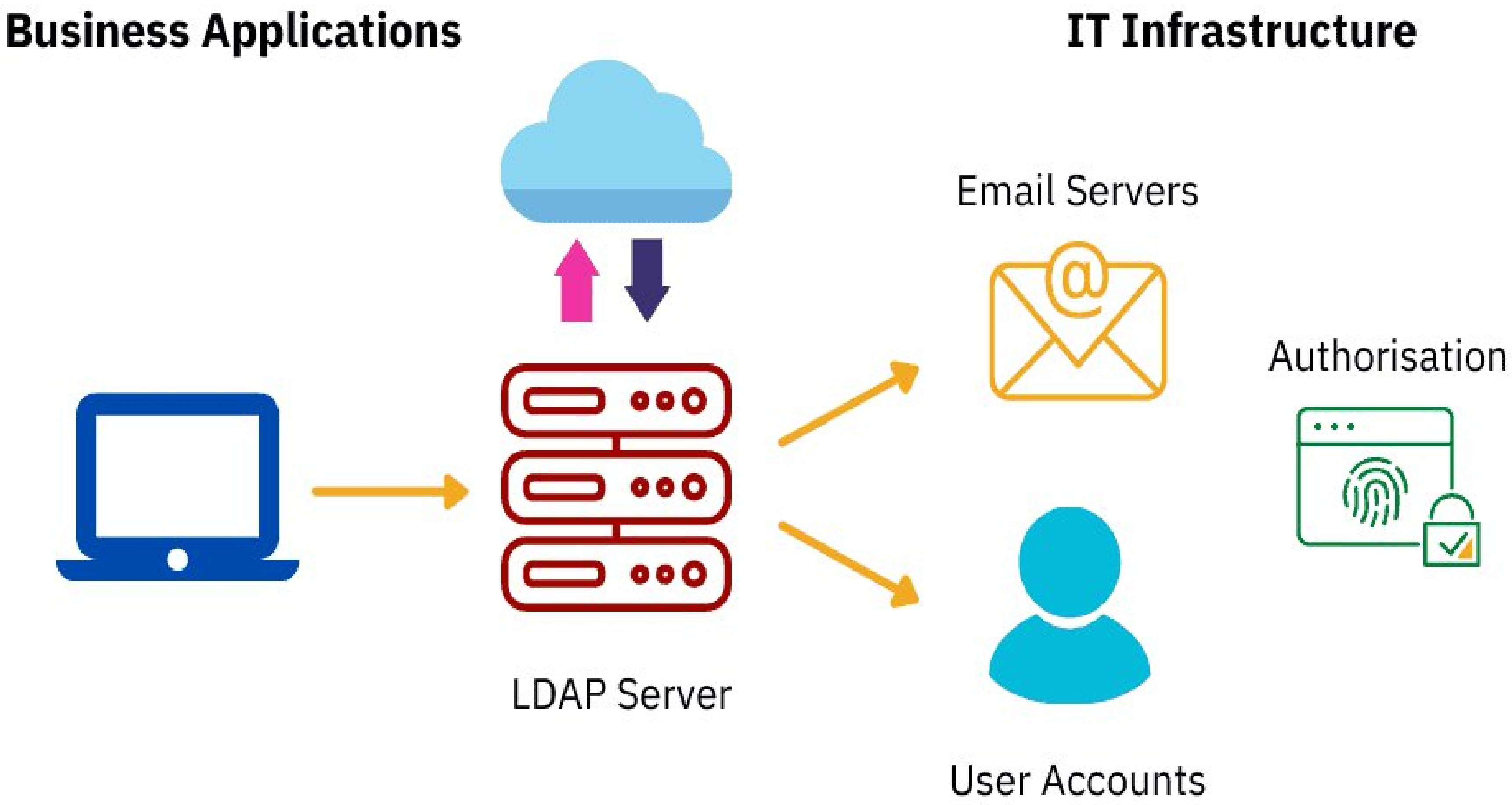
WHAT IS LDAP PROTOCOL ?

- LDAP is used to query into a Directory to Bind, Authenticate users & perform CRUD operations on the objects.
- It can be used to connect to the Directory from outside the network as well.
- Required/Used by 3rd Party Apps to connect their services to their company’s Directory.

Let’s Discuss

WHERE IS A DIRECTORY USED ?



Business Applications

IT Infrastructure

Email Servers

Authorisation

LDAP Server

User Accounts

Meet
~~Fluffy~~
KERBEROS

Unlike Fluffy

MUSIC DOESN’T TAKE KERBEROS DOWN ;)

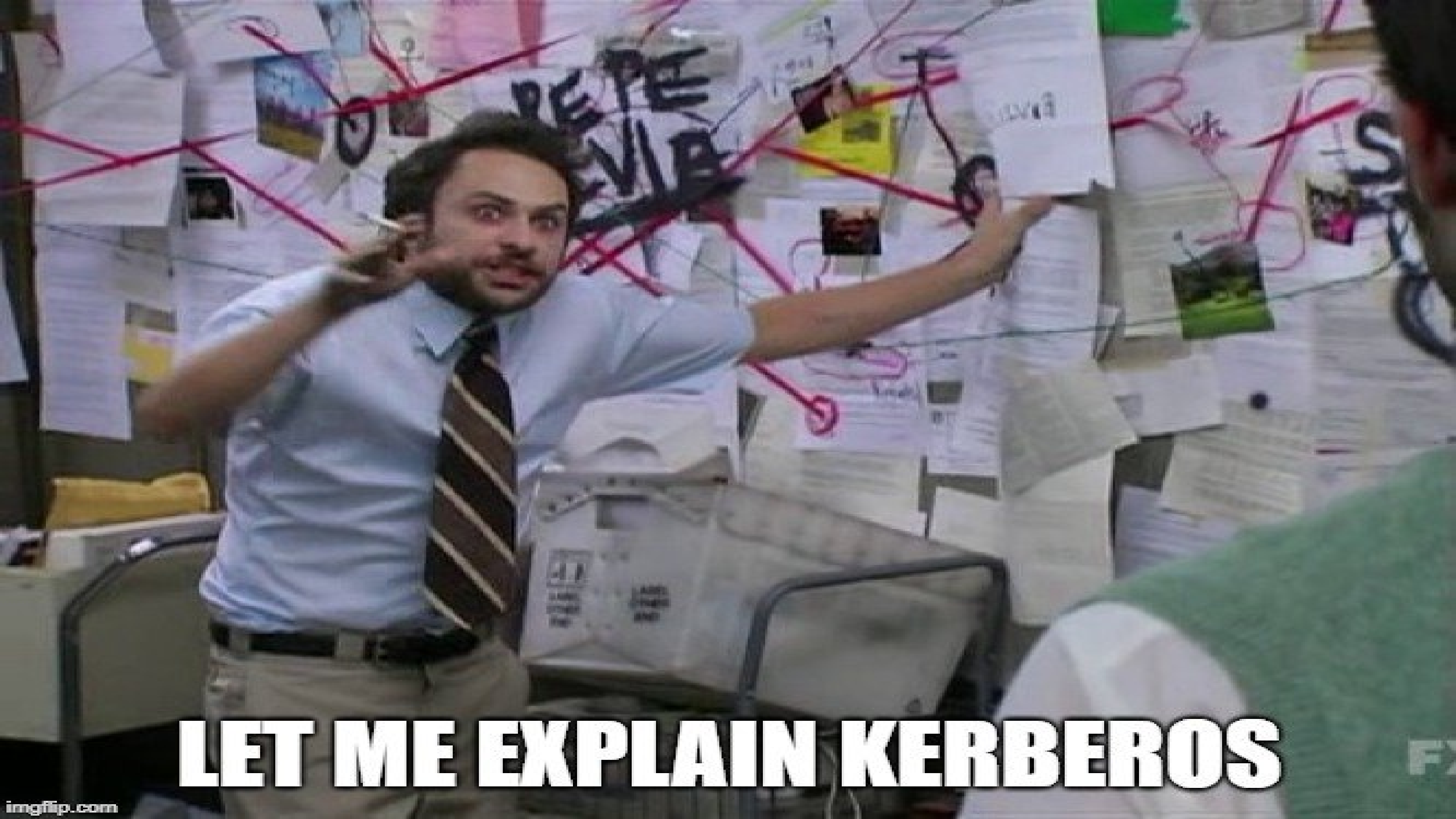
WHAT IS KERBEROS ?

- Kerberos is an authentication protocol typically used by clients in a domain joined network.
- Each domain user have complete access of a workstation, but a workstation cannot be completely trusted to identify its user for accessing any service.
- Kerberos act as a 3rd party authenticator to help users prove their identity for accessing services

WHY TO USE KERBEROS ?

- Authentication is required at multiple steps for multi-user environments, Auto-login plays a crucial role.

- Sending username & password over the network is not always secure, and can lead to the probability of interception.



LET ME EXPLAIN KERBEROS
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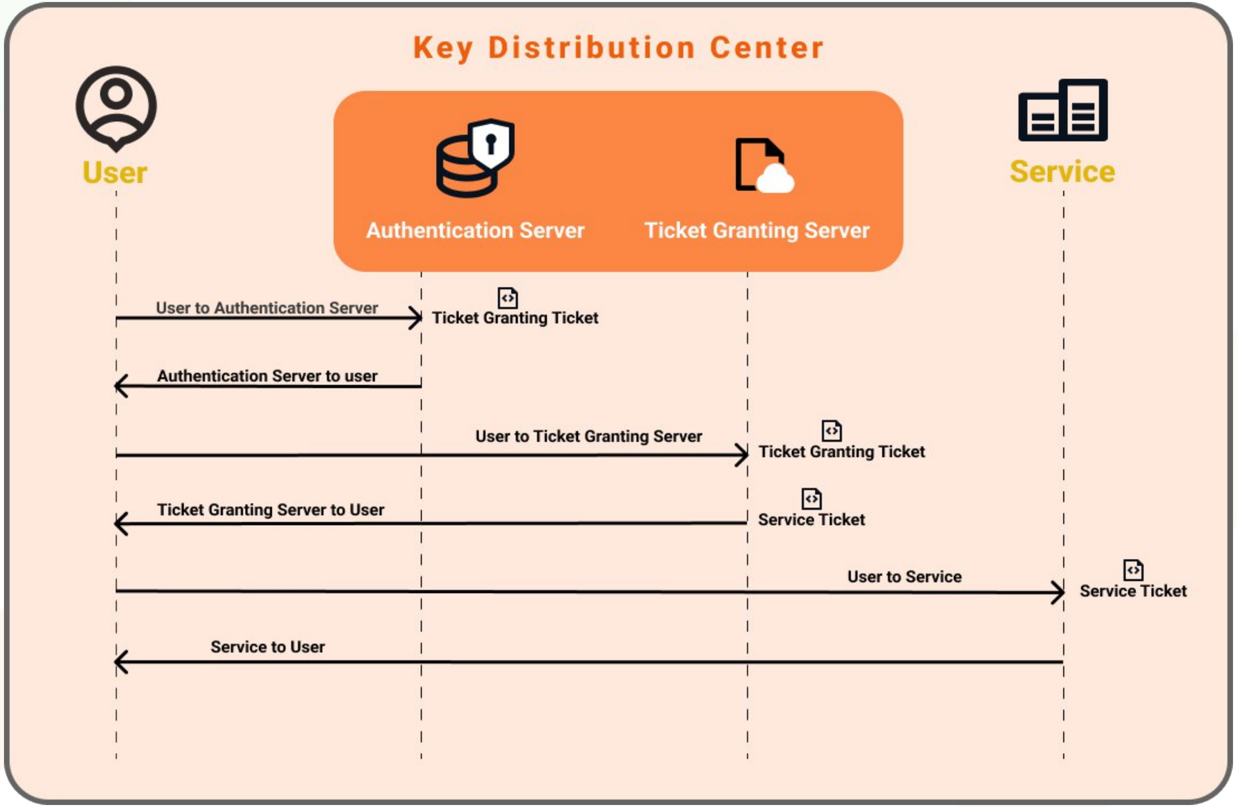
FEW TERMINOLOGIES TO KNOW

- **CLIENT**: A normal user who wants to access the service.
- **Key Distribution Center (KDC)**: The most important component which plays the main role in Authentication Process.
- **Application Server**: Any Application Service such as SQL.
- **TGT - Ticket Granting Ticket**: Ticket needed for requesting TGS from KDC, It is obtained from the KDC only.
- **TGS - Ticket Granting Service**: Ticket needed for Authenticating against a particular service.
- **SPN - Service Principal Name**: SPN is an identifier for each service instance, it is one of the key Components in the process of authentication.

WORKING OF KERBEROS PROTOCOL



LDAP & KERBEROS VULNERABILITIES

PASSWORD SPRAYING

KERBEROASTING

Pass-the-hash with MIMIKATZ

LDAP INJECTION

1: LDAP INJECTION

- Attackers exploit vulnerabilities in web applications integrated with Active Directory / LDAP Directories to manipulate LDAP queries
- This can lead to unauthorized access to or manipulation of directory services data
- These attacks can compromise the security of an entire network by allowing attackers to bypass authentication, access sensitive information, and even modify directory data

LDAP INJECTION

- **LDAP Search Filter Example:**
    - **Search Filter:** (&(objectclass=user)(samaccountname=<username>))
    - **Correct search filter:**
        - **username=** ”vikas”
        - (&(objectclass=user)(samaccountname=**vikas**))
    - **LDAP Injection Search Filter**
        - **Injected username**: “vikas)(telephonenumber=*”
        - (&(objectclass=user)(samaccountname=vikas)(telephonenumber=*))

DEMO

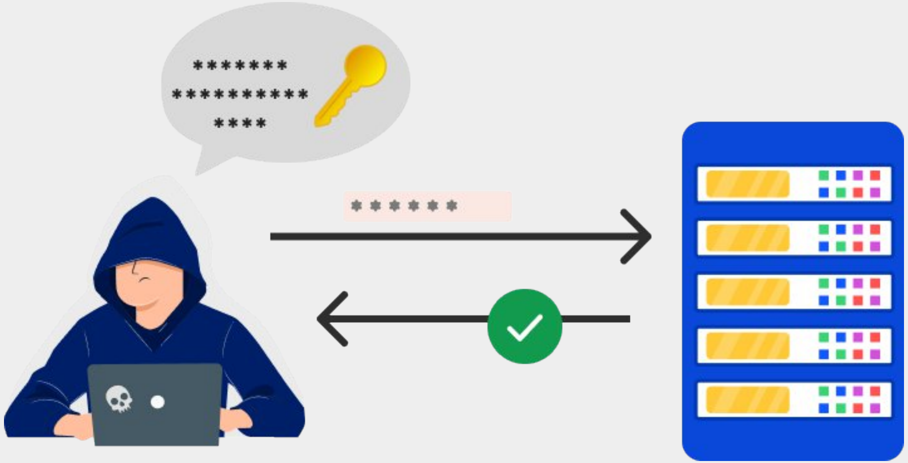
2: PASSWORD SPRAYING

- Password spraying is a type of brute force attack
- It attempts to access multiple user accounts using a few commonly used passwords unlike traditional brute force attacks that focus on one account at a time
- This makes sure the least likelihood of triggering security measures like account lockouts

DEMO

3: PASS-THE-HASH with Mimikatz

- Pass-the-hash is a technique used to steal credentials from Active Directory and also facilitates lateral movement throughout the environment.
- Attackers exploit the NTLM authentication protocol to impersonate a user and dump credential hashes from memory.
- Mimikatz has become the standard tool for exploiting the NTLM authentication protocol.
- Mimikatz extracts the NTLM hashes stored in the local system memory or the Ntds.dit file.



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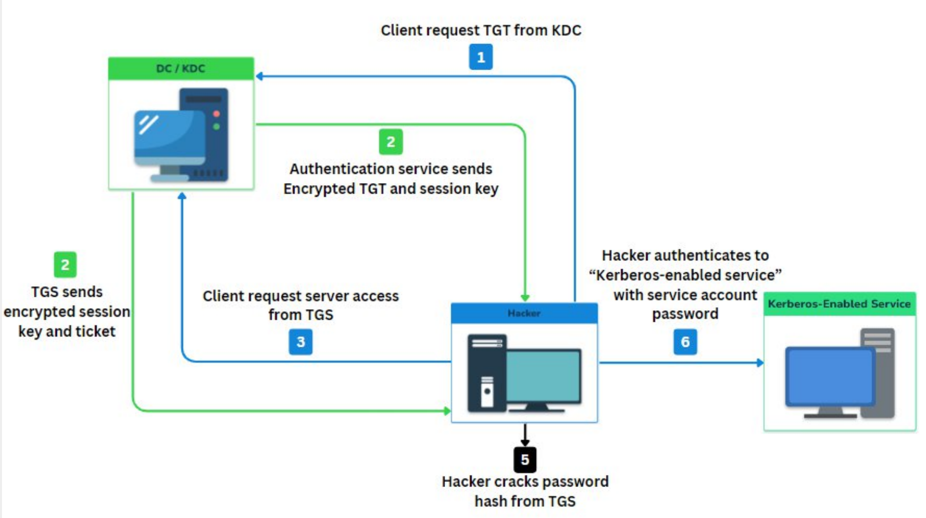
4: KERBEROASTING

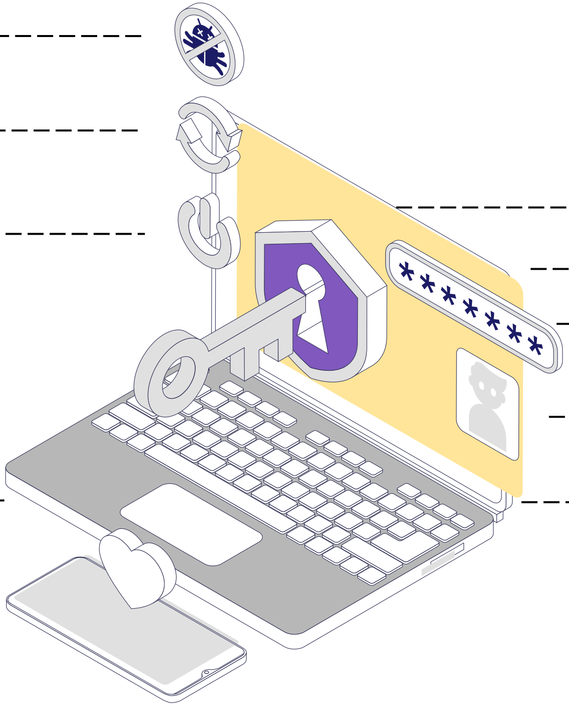
WHAT IS KERBEROASTING?

- Kerberoasting is a type of cyber attack targeting Windows Active Directory environments.
- It exploits the Kerberos protocol Ticket Granting Service (TGS) to crack the passwords of service accounts.
- Service accounts are special user accounts that are created for running applications or services on a network, and they often have elevated privileges.

HOW KERBEROASTING WORKS?



CONSEQUENCES OF ATTACKS



Data Breaches:

Network Compromise

Directory Enumeration & Data Modification

Bypassing Authentication Mechanisms

Unauthorized Access to Sensitive Information

Operational Disruption

Compliance Violations

Financial Impact

Elevated Access and Privilege Escalation

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BEST PRACTICES for Organizations

Strong Password Policies

Monitor and Analyze Login Attempts

Account Lockout Policies

Implement Logon restrictions

Educate and Train Users

Multi-factor Authentication (MFA)

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ANY QUESTIONS ?

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Please Submit Your VALUABLE FEEDBACK

THANK YOU