Windows Security

By Anna and Seamus

Agenda

- Windows Internals
  - Registry
  - LSA
  - SAM
- Active Directory basics
  - stuff
  - Group Policy
  - Security concerns

The Windows Registry

- A hierarchical key-value store, with 5 root keys
  - HKLM - Computer Specific
  - HKCC - Runtime Information
  - HKCU - Information specific to currently logged in user
  - HKCR - Information for applications
  - HKU - all users
  - HKEY_PERF_DATA
    - Not stored as a standard hive
    - How the performance subsystem is implemented

Local Security Authority (LSA)

- Windows subsystem responsible for managing authentication and local security policy

- Local security policy determines:
  - Which users can access the system and in what way
  - Which users have which permissions on the system
  - What forms of auditing are being performed

Security Accounts Manager (SAM)

- Database that stores users' password hashes
- Two password hashing algorithms have been used
  - Lan Manager (LM) hash
  - NT (NTLM) hash
- On most modern Windows OS versions, the SAM file is encrypted to prevent password cracking

Directory Services

- A Directory Service maps a network resource (applications, services, printers, computers, users) to a network address
- DNS can be considered a directory service
- Many different directory servers out there - IBM, Oracle, Microsoft implemented proprietary ones, as well as open source alternatives

LDAP!

- Open, vendor neutral protocol for accessing directory services
- Originally an alternative to X.500 for the TCP/IP protocol suite
- In Plain English: “Search in the company email directory for all people located in Nashville, whose name contains “Bob”, return their full name, title, email, and description”

Active Directory

- “Active Directory…keeps track of your user accounts and passwords, storing them in one protected location, improving your users security”
- “An LDAP enabled database with LDAP dependent applications and services on top of it such as DNS, kerberos, etc”
- “...a centralized and standardized system that automates network management of user data, security, and distributed resources…”

...but what is it really?

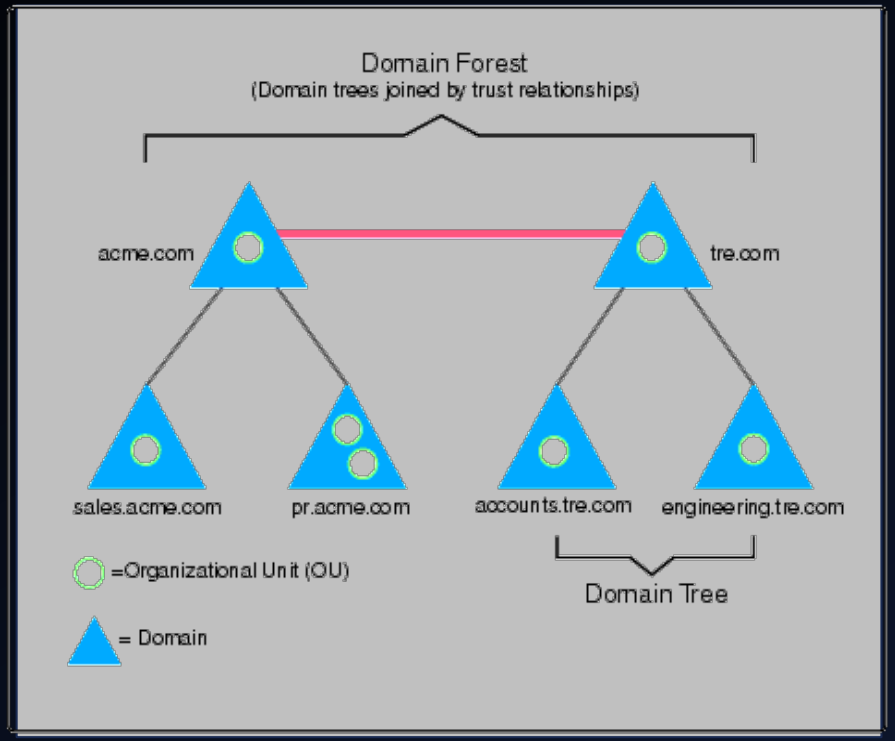
- A distributed, Jet database
- Directory System Agent (DSA)
  - LDAP
  - ADSI
  - SAM
- Jet makes it fast, DSA gives it LDAP

AD on Disk

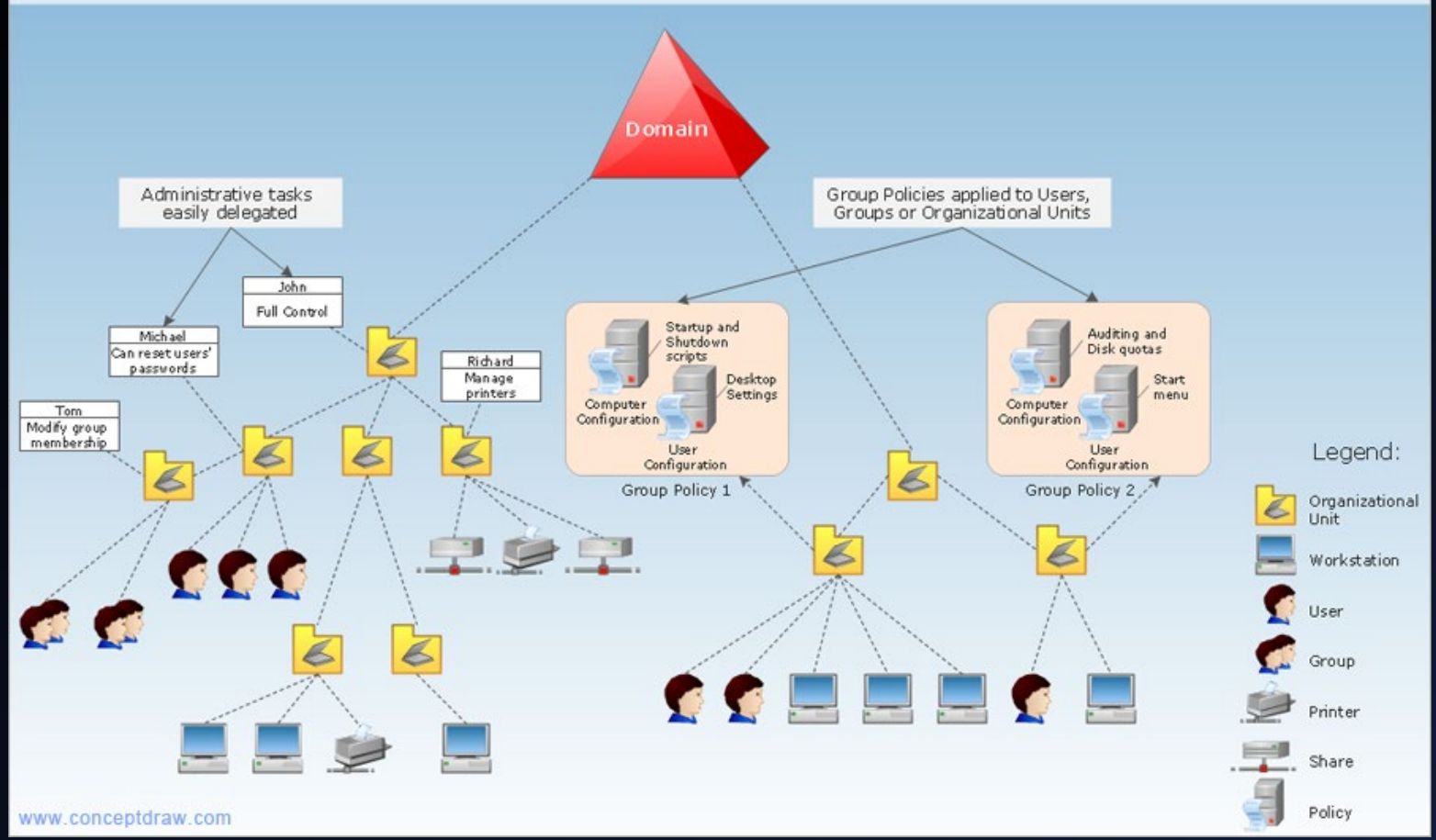
- NTDS.dit
- SYSVOL
  - Group Policies
  - Logon scripts
  - Folders to sync data between DC’s
- NETLOGON
  - Symlink to logon scripts in \SYSVOL

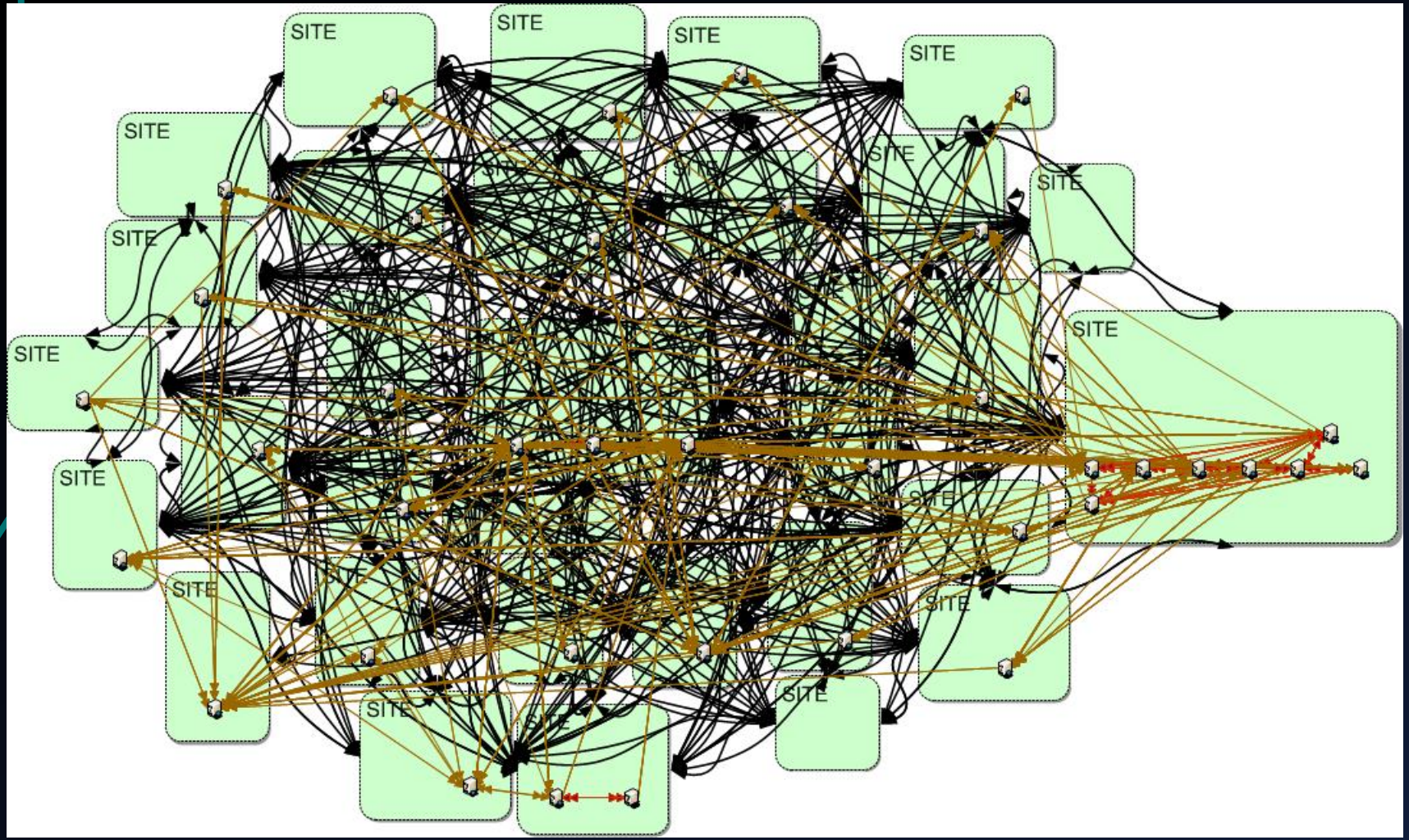
Domain Admin

- Full control of the domain and everything in it
- Admin on the Domain Controllers
- Admin on all workstations
- Admin on all servers
- Everything


Domain Forest
(Domain trees joined by trust relationships)
acme.com
tre.com
sales.acme.com
pr.acme.com
accounts.tre.com
engineering.tre.com
=Organizational Unit (OU)
= Domain
Domain Tree

Active Directory Domain Services Diagram Sample

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Group Policy

- GP provides centralized management and configuration of the OS and applications' settings
- A set of configurations is grouped into a Group Policy Object (GPO)
- AD can distribute GPOs to computers in the domain
  - Every computer pulls the policy every 90 minutes and checks for updates
- Really powerful for enforcing desired state across multiple computers

Kerberos

- Authentication protocol, uses “tickets” to allow users to authenticate to each other, establish trust about who you are talking to
- MIT developed it, open source
- Used everywhere
  - BSD
  - OS X
  - Solaris
  - HP-UX
  - Windows
  - Linux

Microsoft Kerberos

- KDC - Key Distribution Center - the service which supplies the keys.
- krbtgt - the user account which runs the KDC
- TGT - Ticket Granting Ticket
  - Represents the user after being authenticated
  - Can derive other tickets from this, for services and stuff
  - Stays valid for ~10 hours
  - Encrypted and signed by krbtgt key!!!

Attacking the Domain

- There are two major ways to move around a domain
- Attack NTLM
  - Pass hashes
- Attack Kerberos
  - Golden/silver tickets