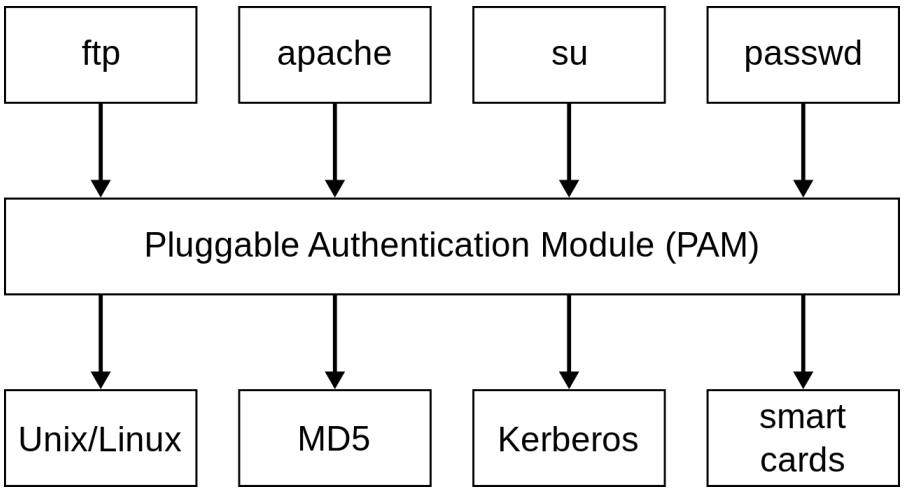
Pluggable Authentication Modules (PAM)

Linux System Administration
Fall 2022

What is PAM?

- Common authentication module used by many services to authenticate users
  - Allows fine grained control for user access
  - Single service to simplify authentication



Important Password Attributes

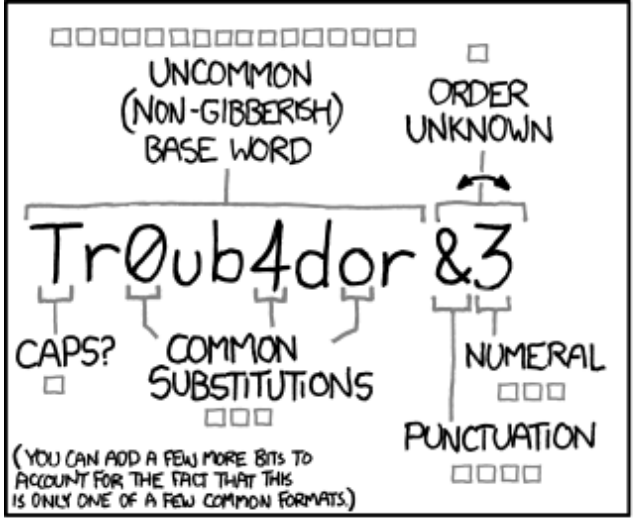
- Username
- Password hash (Method + Salt + Hash)
- Last date changed
- Maximum age
  - Warning time
  - Inactive time
  - Expire

Password Threats

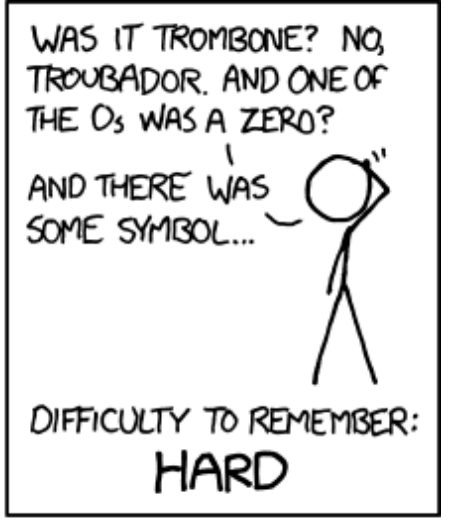
- Hashes from /etc/shadow or elsewhere
- Plain-text passwords in scripts
- Sniffing of insecure protocols
- Shoulder surfing
- Keyboard loggers (hardware or software)
- Brute force guessing or dictionary attacks

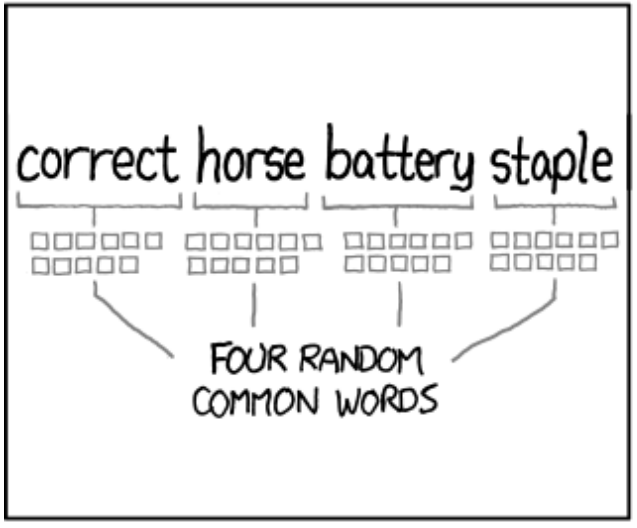
Mitigrating password threats

- Allow no users on the machine
- Enforce passwords that are randomly generated, 12 characters or longer and from a set of 94 characters, symbols and numbers
- Using a key fob or application to generate key
- Two factor authentication

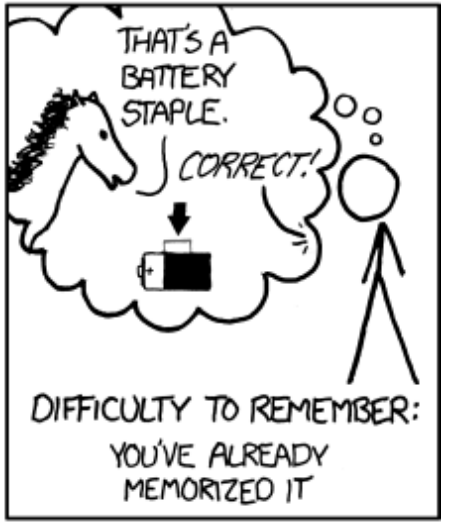












THROUGH 20 YEARS OF EFFORT, WE'VE SUCCESSFULLY TRAINED EVERYONE TO USE PASSWORDS THAT ARE HARD FOR HUMANS TO REMEMBER, BUT EASY FOR COMPUTERS TO GUESS.

Common sense password policy

- Enforce passwords that are strong enough, and educate them on selecting a good memorable password and force them to change it periodically.
- Use two factor authentication for critical systems

Password Expiration Example

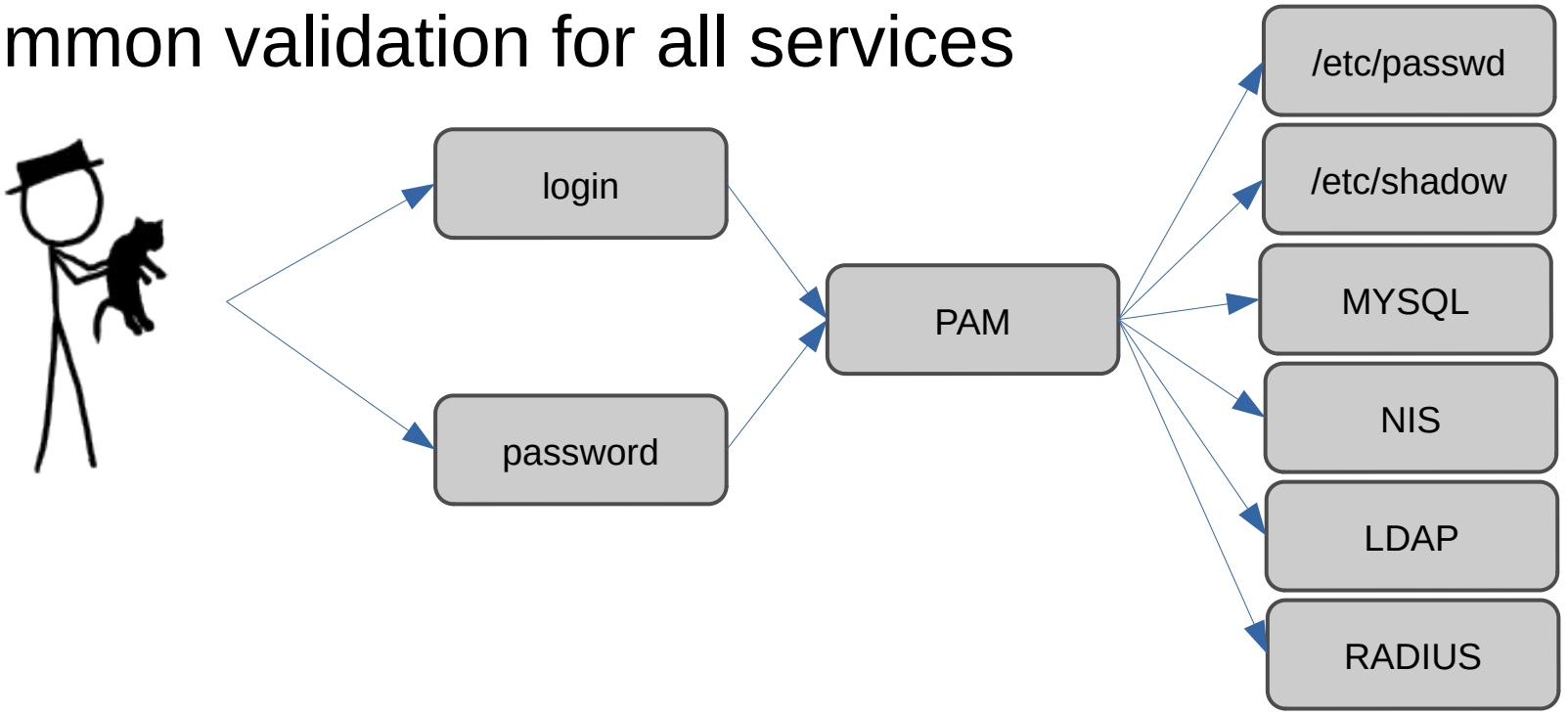
- `mscott:$6$88afba…:19245:0:90:10:7::`
  - `19245` = Sep 10, 2022
  - `90` = Maximum age (Dec 9, 2022)
  - `10` = Warning period (Nov 29, 2022)
  - `7` = Inactivity period (Dec 15, 2022)
  - account expiration period (never)

Setting password aging

- `chage` *`user`*
  - `-l` show current settings
  - `-d 0` force change at next login
  - `-E` set expiration date
  - `-l` lock account
  - `-u` unlock account

PAM login

- Pluggable Authentication Modules
- Common validation for all services



PAM Modules

- Authorization
  - Identifies users, groups and membership
- Account
  - Enforces login restrictions
- Session
  - Takes cares of tasks like creating or mounting home directory
- Password
  - Deals with password changes

PAM Files

- `/etc/pam.d`
  - PAM configuration files
- `/etc/security`
  - Policy files
  - `access.conf` - who can login from where
  - `pwquality.conf` - password requirements

Enable PAM Access

- RedHat
  - Files
    - `/etc/pam.d/system-auth`
    - `/etc/pam.d/sshd`
  - Add after last account entry
    - `account required pam_access.so`
- Debian
  - Files
    - `/etc/pam.d/login`
    - `/etc/pam.d/sshd`
  - Uncomment

    `account required pam_access.so`

This enables `/etc/security/access.conf`

/etc/security/access.conf

- Format
  - Allow/Deny : user or group : from
- Evaluated in order

`+:root:ALL`	allow root from anywhere
`+:mscott:10.21.32.2`	allow mscott from machinee
`+:(sales):ALL`	allow group sales from anywhere
`-:ALL:ALL`	deny all others

PAM Password Quality Checks

- Is it a dictionary word?
- Is it a palindrome?
- Did only the case change?
- Is it too similar to the old one?
- Is it just a rotated version of the old one?
- Is it too simple?
- Are there more than 5 different characters?
- Does it contain the username or gecos?

/etc/security/pwquality.conf

- `minlen` minimum length
- `difok` difference from old
- `gecoscheck` no gecos
- `dictcheck` no words
- `usercheck` no username
- `maxrepeat` repeat limit
- `minclass` min # classes

- **Classes**
  - Positive is a max credit
  - Negative is a minimum
- `dcredit` digits
- `ucredit` upper case
- `lcredit` lower case
- `ocredit` other

Password quality examples 1

- Required
  - `dcredit = 2`
  - `lcredit = 0`
  - `minlen = 10`
- Proposed
  - `r2wrexac` too short (8+1)
  - `r2wrexa1` OK (8+2)
  - `r2wre32` too short (7+2)

- Required
  - `dcredit = -2`
  - `lcredit = 0`
  - `minlen = 10`
- Proposed
  - `r2wrexacpw` only one digit
  - `r2wrexa1` too short
  - `r2wrexa32r` OK

Password quality examples 2

- Required
  - `dcredit = 2`
  - `ucredit = 1`
  - `lcredit = 0`
  - `minlen = 10`
- Proposed
  - `r2wrexaC` OK (8+1+1)
  - `r2wrexa1` OK (8+2)
  - `r2wRe32` OK (7+2+1)

- Required
  - `dcredit = -2`
  - `lcredit = 0`
  - `minlen = 10`
  - `minclass = 3`
- Proposed
  - `r2wrexacpw` only one digit
  - `r2wrexa32r` only 2 classes
  - `R2wrexa32r` OK