GNU Privacy Guard

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Problem 1

- Alice wants to send a message to Bob
- Eve is eavesdropping
- How to securely communicate?

Solution 1: Symmetric-key cryptography

- Alice and Bob meet up and exchange a secret password
- Use password to encrypt everything
- Problem: need to physically meet

Solution 2: Public-Key Cryptography

- “Trapdoor functions” allow public-key cryptography
- Bob generates an public key and an associated private key
- Bob publishes public key, keeps private key secret
- Public key = lock, private key = key
- How Alice sends message to Bob:
  - Alice encrypts message with Bob’s public key
  - Alice sends encrypted message to Bob
- Bob decrypts with his private key

Problem 2

- Carol sends a message to Victor
- Victor wants to know if it’s legitimate

Solution

- Carol signs the message with private key
  - Kind of like inverse of encryption
- Victor uses public key to verify the signature

What is GPG

- Software program for securing communications
  - Ensuring confidentiality of messages by encryption
  - Ensuring authenticity of messages by signing

Demo of Sending a Message with GPG

Key Exchange

- How to obtain other’s public keys
- One method: physical exchange

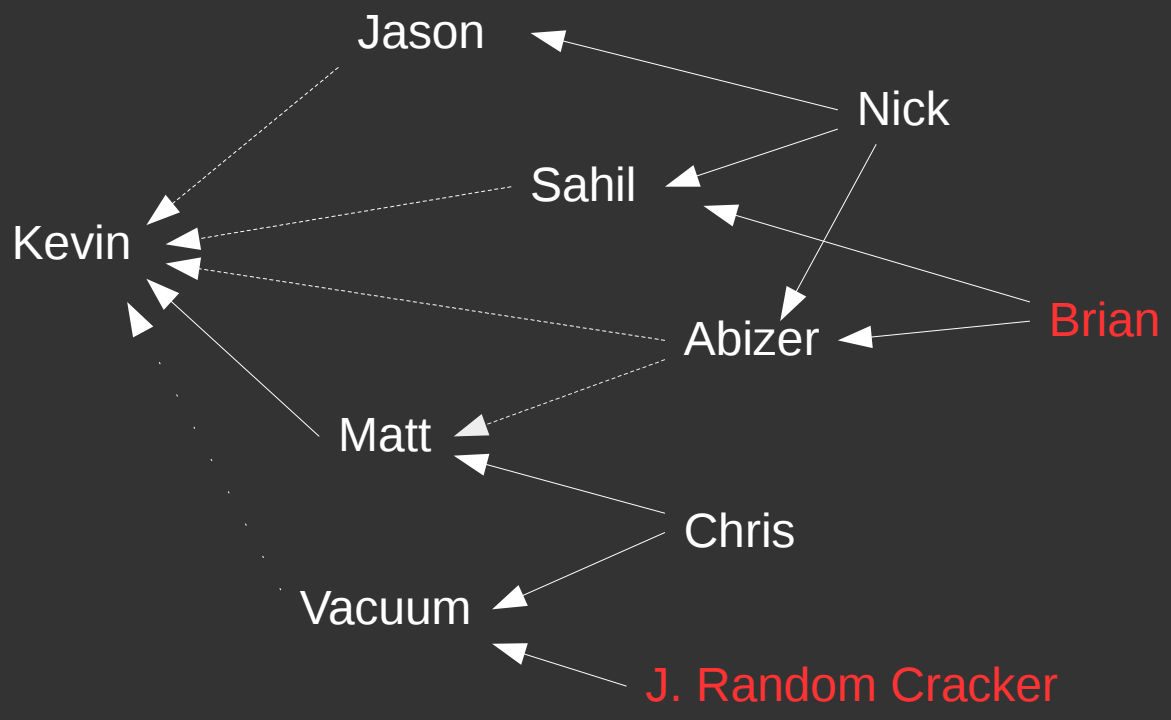
Key Exchange

- Another method: keyservers
- Need to verify identity from keyservers!
  - Anyone can generate a fake keypair

Web of Trust

- I can trust keys that other responsible GPG users have verified
- To indicate trust in a key in GPG, sign it
- Example: Matt signs Chris’s key. I sign Matt’s key. If I download Chris’s key and it has Matt’s signature on it, I can trust Chris’s key

Web of Trust


Jason
Nick
Sahil
Kevin
Brian
Abizer
Matt
Chris
Vacuum
J. Random Cracker

Levels of Trust

- 4 types by default:
  - Unknown: I don’t know how responsible this user is
  - None: This user doesn’t verify keys properly at all
  - Marginal: This user kinda understands how to responsibly validate keys
  - Full: This user fully understands how to validate keys
- Keys trusted if:
  - One of the following conditions satisfied:
    - You signed it personally
    - Someone you fully trust signed it
    - Three marginally trusted people signed it
  - The chain of signatures is of length <= 5

Group Demo