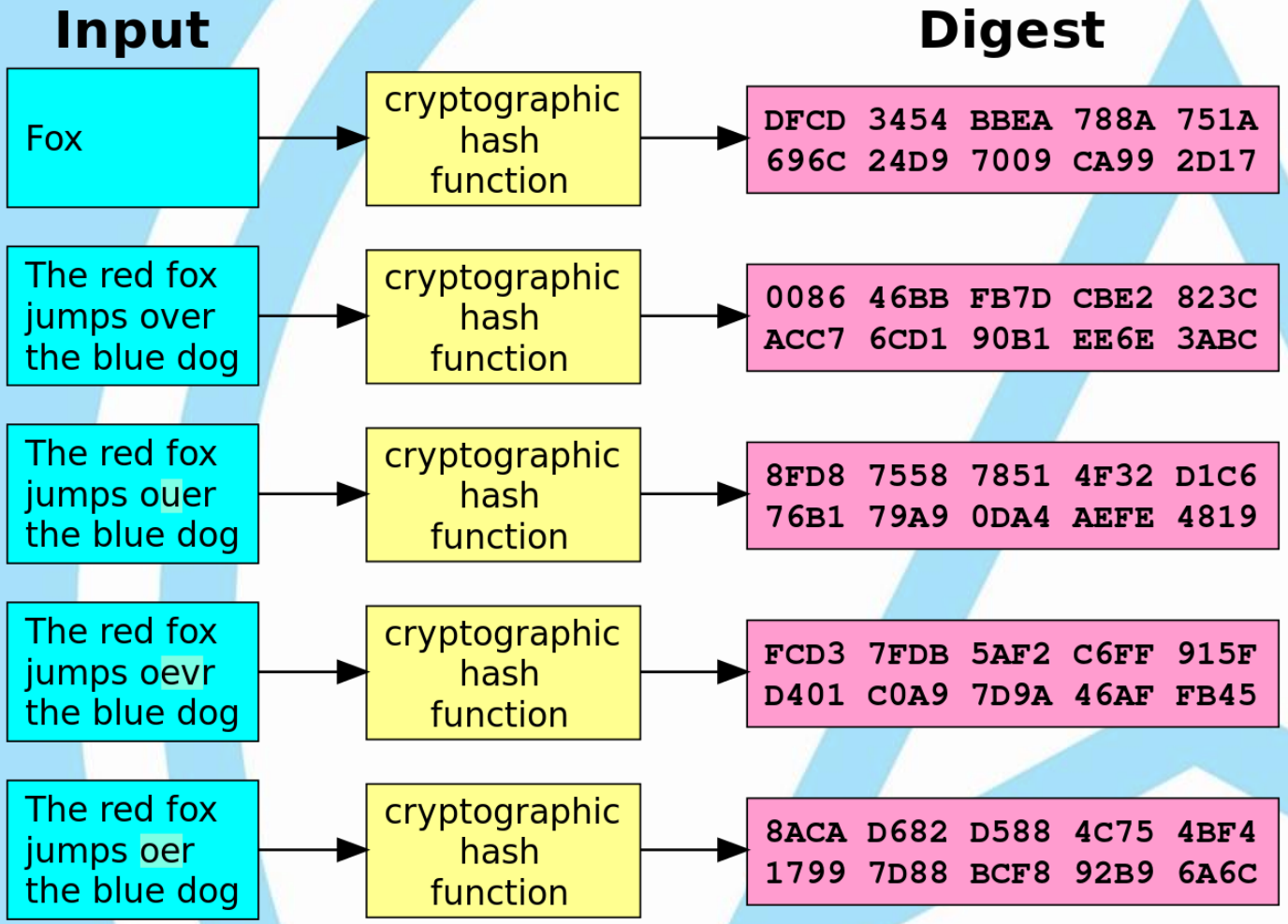
Module 2 Day 8

Hashing and Encryption

Hashing Data

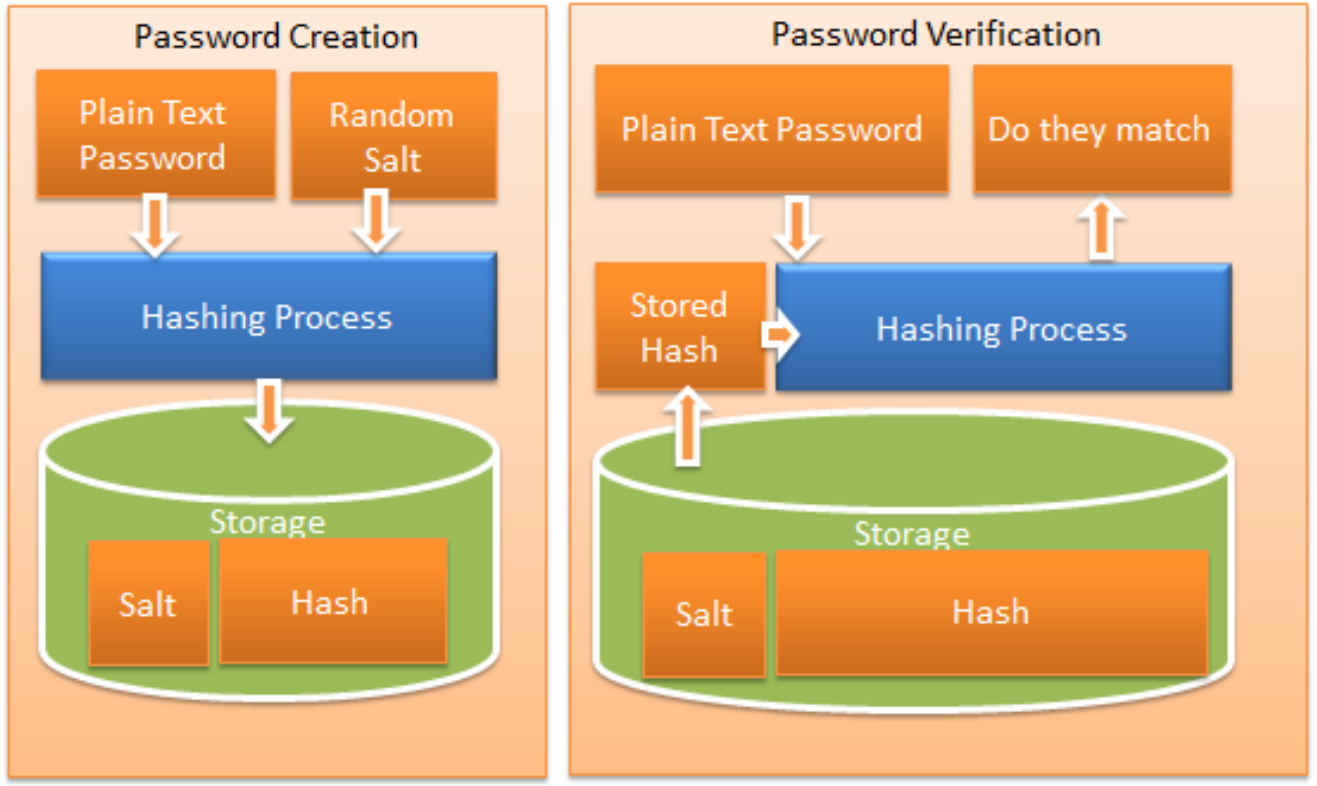
- One-way, repeatable algorithm to change data into a “hash value”
- One-way means there is no way to get to the original data, given only the hash
- Repeatable means if I run the same original data through the algorithm again, I’ll get the same result
- Used to verify data transmissions (aka, checksum)
- Used for storing passwords securely

Hashing Data



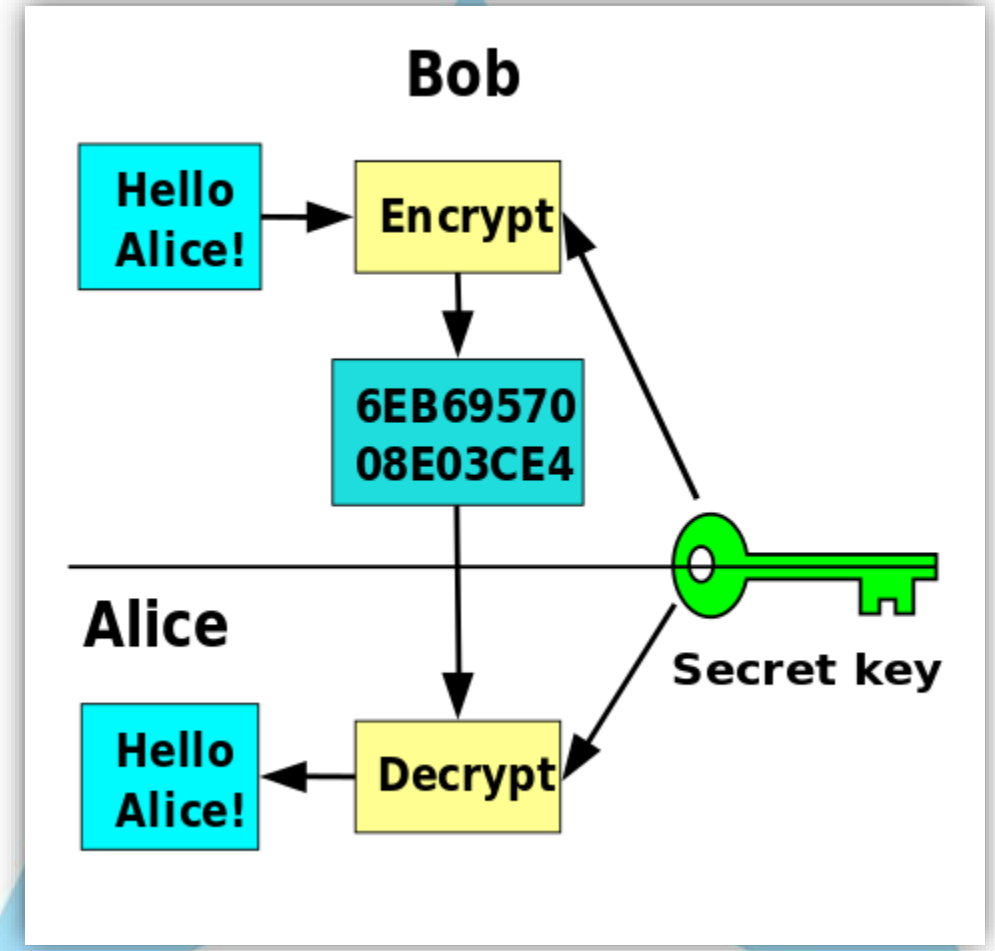
Hashing Passwords

- Password is hashed when created
  - Hash is stored in DB
- To login, password is hashed using the same algorithm
  - Hashes are compared.
- Adding a salt prevents dictionary attacks
  - Salt also stored in the DB
- Increasing work factor greatly increases security
  - Hash the hash



Encryption – Symmetric Key

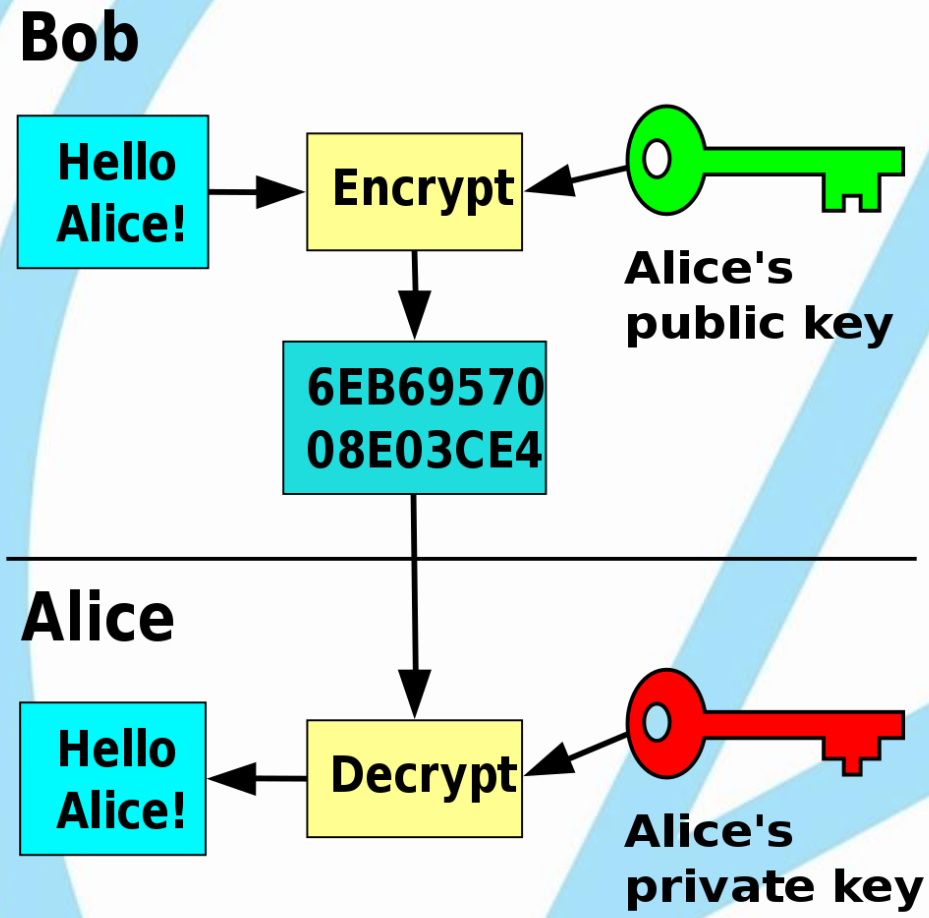
- Uses a single key to encrypt (lock) and decrypt (unlock) the data
- “Shared secret”
- Examples:
  - Password-protected files
  - Windows BitLocker
  - “Data at Rest”



Encryption – Asymmetric Key

- Public key cryptography / Public Key Infrastructure (PKI)
- Two keys used: a “public” key and a “private” key
  - Messages encrypted using Public must be decrypted using Private
  - Message encrypted using Private must be decrypted using Public
- Can be used to
  - Securely send data to another user, or (encrypt public, decrypt private)
  - Guarantee the identity of the sender (encrypt private, decrypt public)

Bob securely sends message to Alice



Alice proves this message is from her