Jephte pierre

Public Key Infrastructure

PKI provides Trust services

Confidentiality

- Assurance of the data packet
- Packet cannot be spoofed/sniffed
- Data encryption

Integrity

- Data tampering assurance
- Prevent data compromisation
- Evidence of tampering

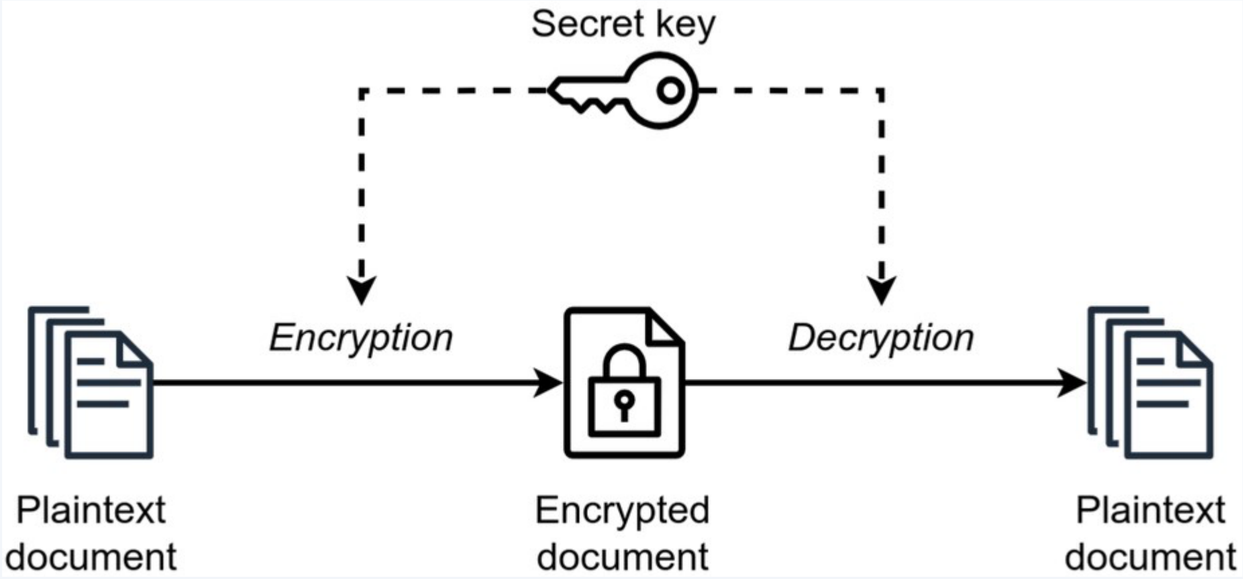
Authenticity

- Assurance of connection or evidence of proper connection
- Server side authentication by client

01.

Public Key Cryptogra

Symmetric Encryption



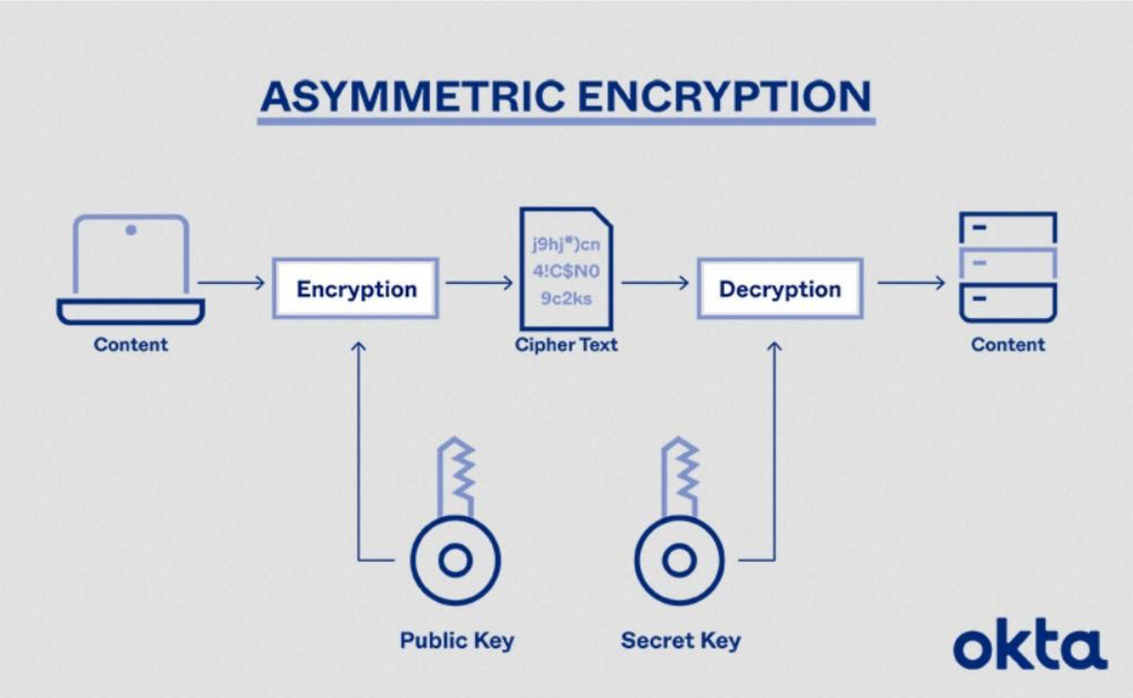
The secret key is used for both encryption and decryption

Implementations

AES, DES, IDEA, Blowfish

Also known as secret-key, single-key, shared-key, one-key etc

Asymmetric Encryption



2 keys are published

- 1 public key
- 1 secret key

The public key does not decrypt the message

RSA is the most common public key asymmetric algorithm

- Based on prime number factoring

Implementations:

- RSA, DSS/DSA, Diffie-Hellman key exchange

Pros and cons

Symmetric

Faster encryption process

Requires less resources

Risk of stealing single key

Key has to be shared securely

Asymmetric

Slower encryption process

Requires more resources

Published key does not need to be protected

Private key must be protected

02.

Infrastructure

Infrastructure overview

Certificate Authority (CA)

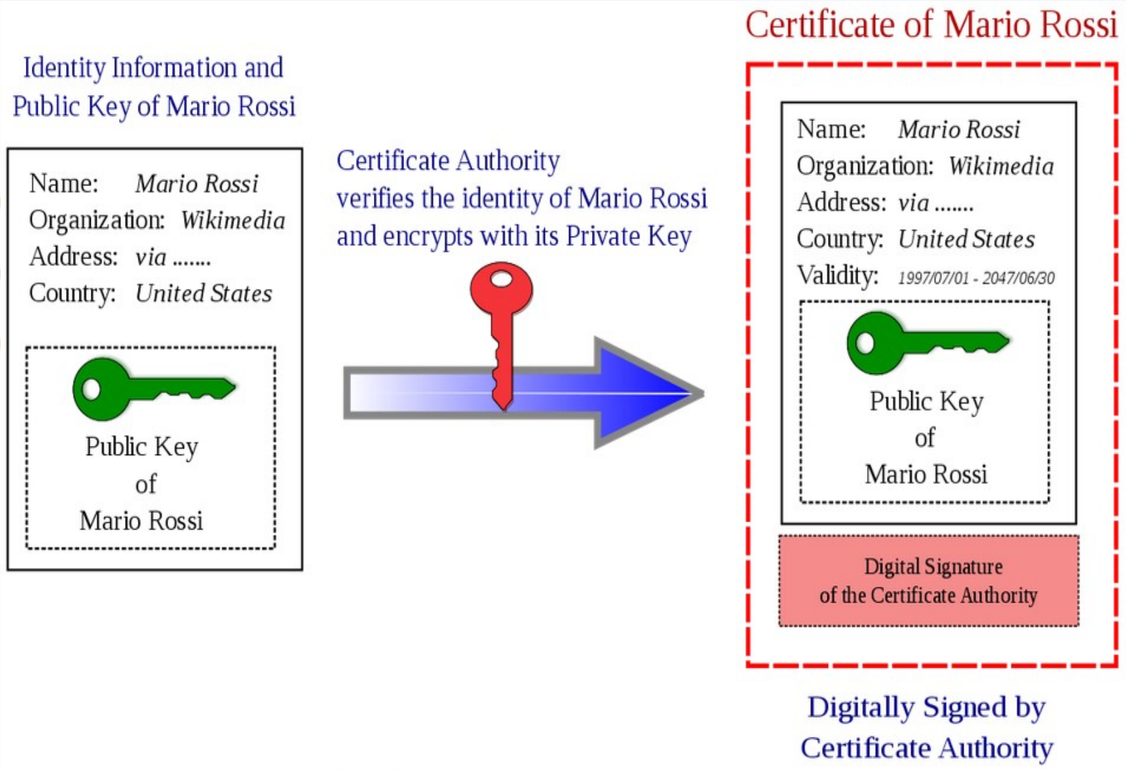
Registration Authority (RA)

Central Directory

Certificate Management System

Certificate Policy

Certificate Authority



Stores, signs, issues digital certificates

Circumvent man-in the middle attack

Trusted certificates to create secure connections to a server

CA certificate to authenticate

Certificates

Commercial CA (GoDaddy, DigiCert, etc..)

Non-profit (Let's Encrypt)

Self-Signed -> not always trusted

Validation

Certificates for HTTPS

- Domain Validation

Extended Validation

- X.509 proving legal entity

Registration Authority

Standards organizations

ISO/IEC, IEEE, W3C, IETF, ISOC

Verification

verifies identity (certs, keys) hosted by the CA

Facilitate implementations

Provides standards for the CA

Similar to

Government standards for roads, Shipping containers, etc

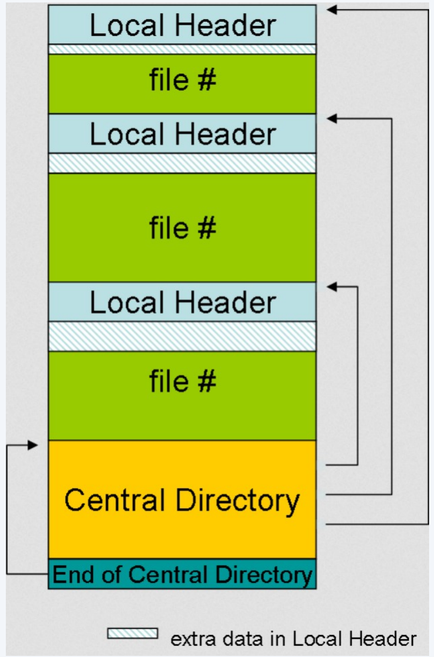
Central Directory

Database

Stores information regarding certificates, keys, services offered

Certificate Policy

Outline rules for the use of keys, certificates



Examples

LDAP, AAD

Real world example

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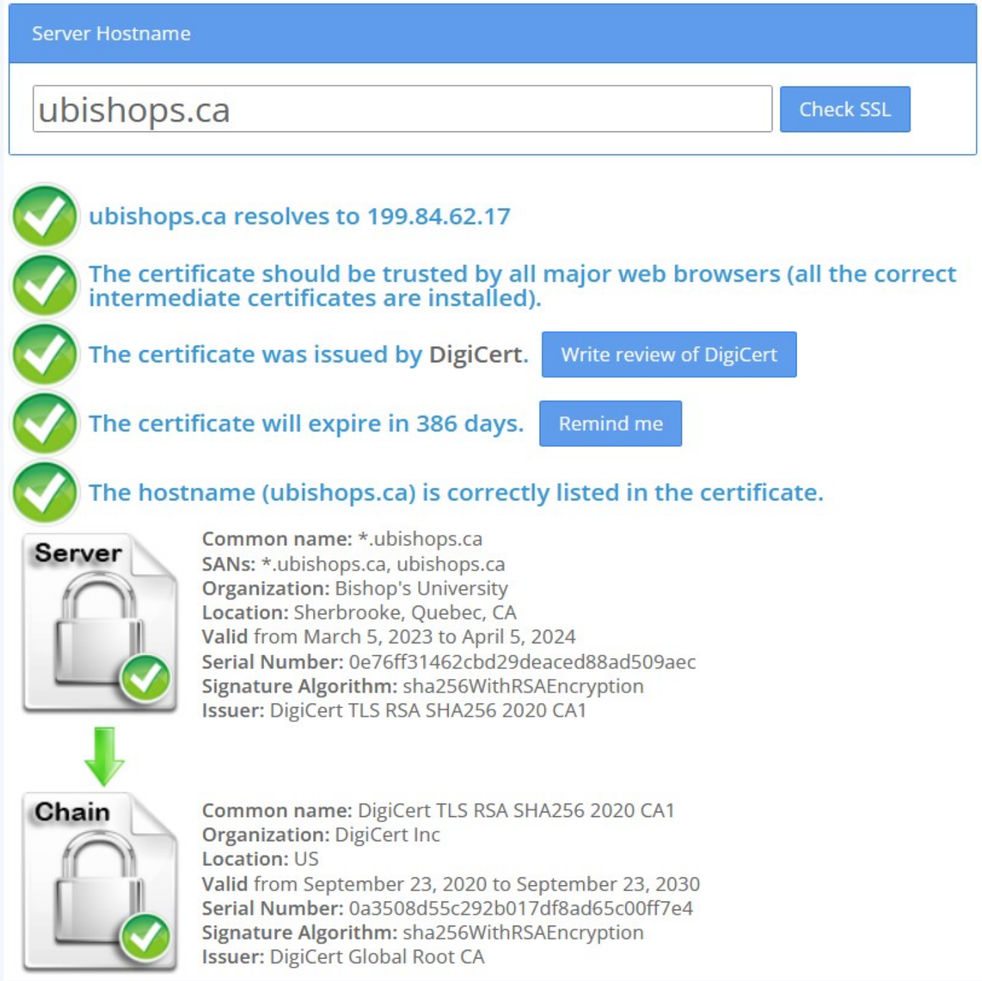
Certificate Management System

6 Stages

Discovery, Creation, Storage, Monitoring, Renewal, Revocation

Allows automation

Clients, Enterprises, Vendors



Certificate Policy

Document

States the different entities of PKI roles and duties

RFC 3647

Current certificate policy for the framework

Main points

Architecture
Certificate uses
Naming, identification, authentication
Key generation
Procedures
Operations controls
Technical controls
Revocation lists
Audit and assessments

03.

USES

Typical Usage

Signing

Document signing

Email signing

Encryption

Data security

Local data

Network AD

Authentication/ Validation

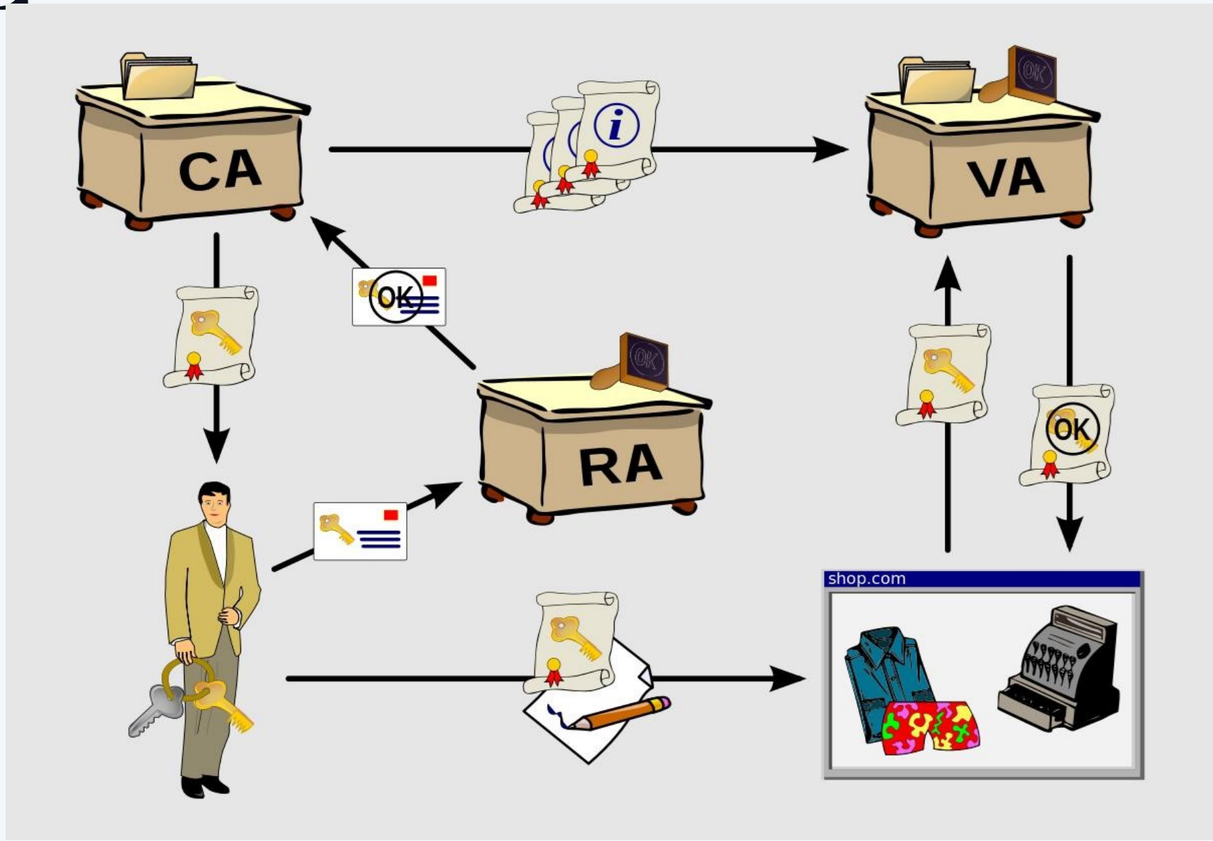
Identity cards

Server validation

Visitor validation

Machine authentication

Workstation login



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