OpenSSL Keys, certs, TLS

Private key genpkey / req -newkey → `req -new` → **CSR** request with public key → `signed by a CA` → **Certificate** x509 -text to inspect → `pkcs12 -export` → **Bundle** .p12 / fullchain.pem

CONCEPTS

Usage is openssl <subcommand> <options>. Most subcommands read stdin and write stdout, so they pipe into each other. Files are PEM (base64 text) unless you ask for DER.

Passwords on the command line show up in ps and shell history. Use -passin/-passout with env:VAR, file:path or stdin instead of pass:.

KEYS

```
openssl genpkey -algorithm ED25519 -out <key.pem>
```
Generate a private key

```
openssl genpkey -algorithm RSA -pkeyopt rsa_keygen_bits:4096 -out <key.pem>
```
RSA key with chosen size

```
openssl genpkey -algorithm EC -pkeyopt ec_paramgen_curve:P-256 -out <key.pem>
```
Elliptic curve key

KEYS (cont.)

```
openssl genpkey -aes-256-cbc -algorithm ED25519 -out <key.pem>
```
Key protected by a passphrase

```
openssl pkey -in <key.pem> -pubout -out <pub.pem>
```
Extract the public key

```
openssl pkey -in <key.pem> -text -noout
```
Show key components

```
openssl pkey -in <key.pem> -aes-256-cbc -out <enc.pem>
```
Add a passphrase to a key

```
openssl pkey -in <enc.pem> -out <plain.pem>
```
Remove a passphrase

```
openssl rand -hex <num>
```
Random bytes as hex

REQUESTS AND CERTIFICATES

```
openssl req -new -key <key.pem> -out <req.csr>
```
CSR from an existing key

```
openssl req -new -newkey rsa:2048 -noenc -keyout <key.pem> -out <req.csr>
```
New key and CSR together

REQUESTS AND CERTIFICATES (cont.)

```
openssl req -new -key <key.pem> -subj "/CN=<name>" -addext "subjectAltName=DNS:<name>" -out <req.csr>
```
CSR with name and SAN, no prompts

```
openssl req -in <req.csr> -noout -text
```
Read a CSR

```
openssl req -x509 -newkey rsa:4096 -noenc -days <num> -keyout <key.pem> -out <cert.pem>
```
Self-signed certificate

```
openssl req -x509 -key <key.pem> -days <num> -subj "/CN=<name>" -addext "subjectAltName=DNS:<name>" -out <cert.pem>
```
Self-signed cert from a key

INSPECT CERTIFICATES

```
openssl x509 -in <cert.pem> -noout -text
```
Full certificate details

INSPECT CERTIFICATES (cont.)

```
openssl x509 -in <cert.pem> -noout -subject -issuer
```
Subject and issuer

```
openssl x509 -in <cert.pem> -noout -dates
```
Validity period

```
openssl x509 -in <cert.pem> -noout -checkend <secs>
```
Exit 1 if expiring within N seconds

```
openssl x509 -in <cert.pem> -noout -ext subjectAltName
```
Show the SAN list

```
openssl verify -CAfile <ca.pem> <cert.pem>
```
Verify against a CA

TEST A TLS SERVER

```
openssl s_client -connect <host>:443 -servername <host>
```
Open a TLS connection

```
openssl s_client -connect <host>:443 -brief </dev/null
```
Short connection summary

TEST A TLS SERVER (cont.)

```
openssl s_client -connect <host>:443 -showcerts </dev/null
```
Show the full chain sent

```
openssl s_client -connect <host>:443 </dev/null | openssl x509 -noout -dates
```
Check remote cert expiry

```
openssl s_client -connect <host>:443 </dev/null | openssl x509 -out <cert.pem>
```
Save the server cert

DIGESTS AND ENCRYPTION

```
openssl dgst -sha256 <file>
```
SHA-256 of a file

CONVERT FORMATS

```
openssl pkcs12 -export -inkey <key.pem> -in <cert.pem> -certfile <chain.pem> -out <bundle.p12>
```
Bundle key and cert as PKCS#12