

NAME

IO::Socket::SSL::Utils — loading, storing, creating certificates and keys

SYNOPSIS

```

use IO::Socket::SSL::Utils;

$cert = PEM_file2cert('cert.pem');      # load certificate from file
my $hash = CERT_asHash($cert);          # get details from certificate
PEM_cert2file('cert.pem', $cert);        # write certificate to file
CERT_free($cert);                       # free memory within OpenSSL

@certs = PEM_file2certs('chain.pem');    # load multiple certificates from file
PEM_certs2file('chain.pem', @certs);     # write multiple certificates to file
CERT_free(@certs);                     # free memory for all within OpenSSL

my $cert = PEM_string2cert($pem);        # load certificate from PEM string
$pem = PEM_cert2string($cert);          # convert certificate to PEM string

$key = KEY_create_rsa(2048);             # create new 2048-bit RSA key
PEM_string2file($key, "key.pem");        # and write it to file
KEY_free($key);                         # free memory within OpenSSL

```

DESCRIPTION

This module provides various utility functions to work with certificates and private keys, shielding some of the complexity of the underlying Net::SSLeay and OpenSSL.

FUNCTIONS

- Functions converting between string or file and certificates and keys. They croak if the operation cannot be completed.

```

PEM_file2cert(file) -> cert
PEM_cert2file(cert, file)
PEM_file2certs(file) -> @certs
PEM_certs2file(file, @certs)
PEM_string2cert(string) -> cert
PEM_cert2string(cert) -> string
PEM_file2key(file) -> key
PEM_key2file(key, file)
PEM_string2key(string) -> key
PEM_key2string(key) -> string

```

- Functions for cleaning up. Each loaded or created cert and key must be freed to not leak memory.

```

CERT_free(@certs)
KEY_free(@keys)

```

- KEY_create_rsa(bits) -> key

Creates an RSA key pair, bits defaults to 2048.

- KEY_create_ec(curve) -> key

Creates an EC key, curve defaults to prime256v1.

- CERT_asHash(cert, [digest_algo]) -> hash

Extracts the information from the certificate into a hash and uses the given digest_algo (default: SHA-256) to determine digest of pubkey and cert. The resulting hash contains:

subject Hash with the parts of the subject, e.g. commonName, countryName, organizationName, stateOrProvinceName, localityName. If there are multiple values for any of these parts the hash value will be an array ref with the values in order instead of just a scalar.

subjectAltNames

Array with list of alternative names. Each entry in the list is of [*type,value*], where *type* can be OTHERNAME, EMAIL, DNS, X400, DIRNAME, EDIPARTY, URI, IP or RID.

issuer

Hash with the parts of the issuer, e.g. *commonName*, *countryName*, *organizationName*, *stateOrProvinceName*, *localityName*. If there are multiple values for any of these parts the hash value will be an array ref with the values in order instead of just a scalar.

not_before, not_after

The time frame, where the certificate is valid, as *time_t*, e.g. can be converted with *localtime* or similar functions.

serial

The serial number

crl_uri

List of URIs for CRL distribution.

ocsp_uri

List of URIs for revocation checking using OCSP.

keyusage

List of *keyUsage* information in the certificate.

extkeyusage

List of extended key usage information from the certificate. Each entry in this list consists of a hash with *oid*, *nid*, *ln* and *sn*.

pubkey_digest_xxx

Binary digest of the pubkey using the given digest algorithm, e.g. *pubkey_digest_sha256* if (the default) SHA-256 was used.

x509_digest_xxx

Binary digest of the X.509 certificate using the given digest algorithm, e.g. *x509_digest_sha256* if (the default) SHA-256 was used.

fingerprint_xxx

Fingerprint of the certificate using the given digest algorithm, e.g. *fingerprint_sha256* if (the default) SHA-256 was used. Contrary to *digest_** this is an ASCII string with a list of hexadecimal numbers, e.g. "73:59:75:5C:6D:...".

signature_alg

Algorithm used to sign certificate, e.g. *sha256WithRSAEncryption*.

ext

List of extensions. Each entry in the list is a hash with *oid*, *nid*, *sn*, *critical* flag (boolean) and *data* (string representation given by *X509V3_EXT_print*).

version

Certificate version, usually 2 (x509v3)

- **CERT_create(hash) -> (cert,key)**

Creates a certificate based on the given hash. If the issuer is not specified the certificate will be self-signed. The following keys can be given:

subject

Hash with the parts of the subject, e.g. *commonName*, *countryName*, ... as described in *CERT_asHash*. Default points to *IO::Socket::SSL*.

not_before

A *time_t* value when the certificate starts to be valid. Defaults to current time.

not_after

A *time_t* value when the certificate ends to be valid. Defaults to current time plus one 365 days.

serial

The serial number. If not given a random number will be used.

version

The version of the certificate, default 2 (x509v3).

CA true/false

If true declare certificate as CA, defaults to false.

purpose string|array|hash

Set the purpose of the certificate. The different purposes can be given as a string separated by non-word character, as array or hash. With string or array each purpose can be prefixed with '+' (enable) or '-' (disable) and same can be done with the value when given as a hash. By default enabling the purpose is assumed.

If the CA option is given and true the defaults "ca,sslca,emailca,objca" are assumed, but can be overridden with explicit purpose. If the CA option is given and false the defaults "server,client" are assumed. If no CA option and no purpose is given it defaults to "server,client".

Purpose affects basicConstraints, keyUsage, extKeyUsage and netscapeCertType. The following purposes are defined (case is not important):

```

client
server
email
objsign

CA
sslCA
emailCA
objCA

emailProtection
codeSigning
timeStamping

digitalSignature
nonRepudiation
keyEncipherment
dataEncipherment
keyAgreement
keyCertSign
cRLSign
encipherOnly
decipherOnly
```

Examples:

```

# root-CA for SSL certificates
purpose => 'sslCA'    # or CA => 1

# server certificate and CA (typically self-signed)
purpose => 'sslCA,server'

# client certificate
purpose => 'client',
```

ext [{ sn => ..., data => ... }, ...]

List of extensions. The type of the extension can be specified as name with sn or as NID with nid and the data with data. These data must be in the same syntax as expected within openssl.cnf, e.g. something like OCSP;URI=http://.... Additionally the critical flag can be set with critical = 1>.

key key use given key as key for certificate, otherwise a new one will be generated and returned

issuer_cert cert

set issuer for new certificate

issuer_key key

sign new certificate with given key

issuer [cert, key]

Instead of giving issuer_key and issuer_cert as separate arguments they can be given both together.

digest algorithm

specify the algorithm used to sign the certificate, default SHA-256.

AUTHOR

Steffen Ullrich