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# **Cert Human Documentation**

***Release 1.0.7***

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# CHAPTER 1

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## Description

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Somebody said something about over-engineering. So I obviously had to chime in.

No, but seriously, I was in the midst of rewriting [another project of mine](#), and I wanted to incorporate a method to get an SSL certificate from a server, show the user the same kind of information as you'd see in a browser, prompt them for validity, then write it to disk for use in further requests using [requests](#) to a server.

I was unable to find any great / easy ways that incorporated all of these concepts into one neat thing. So I made a thing.

Originally this was based off of the lovely over-engineered solution in [get-ca-py](#) by [Josh Peak](#).

I wound up wanting a more officially supported way of patching urllib3 to have access to the certificate attributes in the raw attribute of a `requests.Response` object. So I wrote *Replacement Connect and Response subclasses* for `urllib3.HTTPSConnectionPool`, and a *patcher, unpatcher, and context manager* to enable/disable the new classes.

I also wanted some generalized utility functions to get the certificates, so I wrote some *get certificate functions*.

I then wanted an easier, more *human* way of accessing all of the information in the certificates. And that wound up turning into a whole thing. So *CertStore and CertChainStore classes* were born.



## CHAPTER 2

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### Python Versions Supported

---

I only focused on writing and testing for the latest versions of 2.7 and 3.7. It might work on other versions, have fun.





## CHAPTER 3

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### Installation

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Install into your system wide site-packages:

```
$ pip install cert_human
```

Or install into your pipenv:

```
$ pipenv install cert_human
```



## CHAPTER 4

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### Get the Source Code

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Cert Human is actively developed on GitHub, where the code is [always available](#).

You can clone the public repository:

```
$ git clone git://github.com/lifehackjim/cert_human.git
```

Once you have a copy of the source, you can embed it in your own Python package, or install it into your site-packages easily:

```
$ cd requests  
$ pip install .
```



## 5.1 CLI

### 5.1.1 CLI Examples

#### 5.1.1.1 Getting certs/cert chains

##### Use requests to get cert

```
bash-3.2$ ./cert_human_cli.py cyborg
Issuer: Common Name: cyborg
Subject: Common Name: cyborg
Subject Alternate Names: cyborg
Fingerprint SHA1: 67 FD F1 7A 02 26 C7 AB 77 AD CD CB 63 76 19 AD 83 0C BF B7
Fingerprint SHA256: FA BF 9D EC CF 6C 3F 8A 08 89 29 04 5E 9E B5 A8 28 A9 F7 A8 E8 38 ↵
↵14 7F 32 CE 78 DC 26 B0 84 EA
Expired: False, Not Valid Before: 2008-11-15 06:32:10+00:00, Not Valid After: 2028-11-
↵15 02:56:10+00:00
Self Signed: maybe, Self Issued: True
```

##### Use socket to get cert

```
bash-3.2$ ./cert_human_cli.py cyborg --method socket
Issuer: Common Name: cyborg
Subject: Common Name: cyborg
Subject Alternate Names: cyborg
Fingerprint SHA1: 67 FD F1 7A 02 26 C7 AB 77 AD CD CB 63 76 19 AD 83 0C BF B7
Fingerprint SHA256: FA BF 9D EC CF 6C 3F 8A 08 89 29 04 5E 9E B5 A8 28 A9 F7 A8 E8 38 ↵
↵14 7F 32 CE 78 DC 26 B0 84 EA
```

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```
Expired: False, Not Valid Before: 2008-11-15 06:32:10+00:00, Not Valid After: 2028-11-
↪15 02:56:10+00:00
Self Signed: maybe, Self Issued: True
```

### Use requests to get cert chain

```
bash-3.2$ ./cert_human_cli.py cyborg --chain

- CertStore #1
  Issuer: Common Name: cyborg
  Subject: Common Name: cyborg
  Subject Alternate Names: cyborg
  Fingerprint SHA1: 67 FD F1 7A 02 26 C7 AB 77 AD CD CB 63 76 19 AD 83 0C BF B7
  Fingerprint SHA256: FA BF 9D EC CF 6C 3F 8A 08 89 29 04 5E 9E B5 A8 28 A9 F7 A8_
↪E8 38 14 7F 32 CE 78 DC 26 B0 84 EA
  Expired: False, Not Valid Before: 2008-11-15 06:32:10+00:00, Not Valid After:_
↪2028-11-15 02:56:10+00:00
  Self Signed: maybe, Self Issued: True
```

### Use socket to get cert chain

```
bash-3.2$ ./cert_human_cli.py cyborg --chain --method socket

- CertStore #1
  Issuer: Common Name: cyborg
  Subject: Common Name: cyborg
  Subject Alternate Names: cyborg
  Fingerprint SHA1: 67 FD F1 7A 02 26 C7 AB 77 AD CD CB 63 76 19 AD 83 0C BF B7
  Fingerprint SHA256: FA BF 9D EC CF 6C 3F 8A 08 89 29 04 5E 9E B5 A8 28 A9 F7 A8_
↪E8 38 14 7F 32 CE 78 DC 26 B0 84 EA
  Expired: False, Not Valid Before: 2008-11-15 06:32:10+00:00, Not Valid After:_
↪2028-11-15 02:56:10+00:00
  Self Signed: maybe, Self Issued: True
```

### Get a cert and write it to a file

```
bash-3.2$ ./cert_human_cli.py cyborg --write /tmp/cyborg.pem
** Wrote cert in pem format to: '/tmp/cyborg.pem'
```

### Get a cert chain and write it to a file

```
bash-3.2$ ./cert_human_cli.py cyborg --chain --write /tmp/cyborg_chain.pem
** Wrote cert chain in pem format to: '/tmp/cyborg_chain.pem'
```

#### 5.1.1.2 Validating certs

## Use correct cert to validate host

```
bash-3.2$ ./cert_human_cli.py cyborg --verify /tmp/cyborg.pem
Issuer: Common Name: cyborg
Subject: Common Name: cyborg
Subject Alternate Names: cyborg
Fingerprint SHA1: 67 FD F1 7A 02 26 C7 AB 77 AD CD CB 63 76 19 AD 83 0C BF B7
Fingerprint SHA256: FA BF 9D EC CF 6C 3F 8A 08 89 29 04 5E 9E B5 A8 28 A9 F7 A8 E8 38
↪14 7F 32 CE 78 DC 26 B0 84 EA
Expired: False, Not Valid Before: 2008-11-15 06:32:10+00:00, Not Valid After: 2028-11-
↪15 02:56:10+00:00
Self Signed: maybe, Self Issued: True
```

## Use wrong cert to validate host

```
bash-3.2$ ./cert_human_cli.py cyborg --verify /tmp/google.pem
SSL Validation Failed:
  HTTPSPool(host='cyborg', port=443)
  Max retries exceeded with url
  / (Caused by SSLError(SSLError("bad handshake
  Error([('SSL routines', 'tls_process_server_certificate', 'certificate verify failed
  ↪')]),),),))
```

### 5.1.1.3 Print cert info

#### Print public key for cert

```
bash-3.2$ ./cert_human_cli.py cyborg --print_mode key
Public Key Algorithm: rsa, Size: 2048, Exponent: 65537, Value:
  EC 79 B9 78 66 C2 C9 F1 F6 55 E9 F4 BD C5 91 9B 55 F3 A7 55
  FA F8 30 FE B2 BF 4E A8 01 BA A1 64 6D 63 B6 5A 99 7E 60 A3
  C5 E1 E8 E5 A9 F5 13 99 58 C5 E2 83 D0 99 47 08 F2 8A A4 CB
  9A 8A 29 55 BD A3 A6 76 E3 2D 54 17 D2 DA CD C2 6A 2D FF 5E
  C6 BF AC 0A A5 46 E3 6F E5 36 DC A1 1F 81 42 E8 3B 95 5F 90
  4C 85 F3 3B 01 26 2E 6F C5 1B 47 0A B5 7C 88 14 E9 86 BB 3C
  11 55 D1 14 38 6C C2 3E 47 09 F8 F0 AC 8D 63 43 13 18 AA 2C
  3D D8 64 F1 9F 67 9F 89 FB 5A 60 46 7A 6E 9E DA A3 6E 70 D1
  A8 DC 80 99 24 21 91 D9 2D 1E 53 7F 8C EC D4 05 C0 81 4F 14
  3D EB 63 31 40 04 3D C9 9D E7 FD 9F 69 C9 2C AD B8 92 AD FD
  F8 AB 03 88 4C 2B 2E 03 31 37 25 52 3D 2C 4C 2D FE A2 6A 62
  F6 7E 6B 5C 6C 37 AF 2B 10 DC 6A E4 BC 47 CF 2E 40 47 12 1E
  53 8F 30 A9 34 58 77 07 E1 F6 50 C1 0E 37 99 A5

Signature Algorithm: sha256_rsa, Value:
  C1 0A 57 A7 FA 15 4C BD 1D EA B6 5E 74 DD 7E 01 83 BF A0 23
  EA D3 96 66 49 06 5D 4D 02 C7 D2 92 08 A6 01 18 36 D8 66 95
  8C D9 19 77 F3 FA 55 14 DF 1B 23 83 77 F4 0F 69 8B D6 0E DA
  2A 08 9C 34 00 5A 43 56 7D 19 18 8A E1 8B B4 80 3A AA BC 35
  B7 99 77 60 85 83 A6 88 6A A1 AD 9B 12 13 F2 4D BF CA 4F 18
  3D 02 9B DE 40 A5 A6 CB F3 E5 6B F7 28 EF 85 B3 B4 D5 03 F3
  E6 08 D6 59 91 92 6D D0 7D D1 C1 B0 48 51 D2 5D A5 1D F1 26
  6B 36 CD 14 5B 6B 13 C8 0D F6 24 83 C2 AE B4 2E 12 C9 E8 60
```

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```
B6 0D BD 1F 34 D5 54 E4 6B EA 4D C1 AF 19 B7 77 5C C1 AD 9C
A2 2E 04 DD 3E 5C 2E 66 DD 17 41 57 E8 28 EB 4E 89 DE D7 AA
00 80 7D B6 4C 00 76 6B 7A 00 E3 8C 9F 9B C8 BE 06 B9 14 C3
D4 A7 78 A0 17 C1 B4 17 6E E2 6E 8D AA 79 69 FE 18 39 8A 19
FF 9C 36 1A 3C A3 66 EF D0 5F 4D 7C 54 FD 4D A1
```

Serial Number:

```
B7 83 C6 92 09 1E 1A 32 79 D0 7B 5E EE D6 F5 FC 6D E8 CA 01
50 62 37 91 5E 2A 00 C9 66 82 44 A6
```

## Print extensions for cert

```
bash-3.2$ ./cert_human_cli.py cyborg --print_mode extensions
Extensions:
  Extension 1, name=subjectKeyIdentifier, ↵
↵value=E7:28:DA:62:24:2E:D0:CE:58:4D:60:34:77:85:1F:0F:7F:C6:F2:93
  Extension 2, name=subjectAltName, value=DNS:cyborg
```

## Print all info for cert

```
bash-3.2$ ./cert_human_cli.py cyborg --print_mode all
Extensions:
  Extension 1, name=subjectKeyIdentifier, ↵
↵value=E7:28:DA:62:24:2E:D0:CE:58:4D:60:34:77:85:1F:0F:7F:C6:F2:93
  Extension 2, name=subjectAltName, value=DNS:cyborg

Public Key Algorithm: rsa, Size: 2048, Exponent: 65537, Value:
EC 79 B9 78 66 C2 C9 F1 F6 55 E9 F4 BD C5 91 9B 55 F3 A7 55
FA F8 30 FE B2 BF 4E A8 01 BA A1 64 6D 63 B6 5A 99 7E 60 A3
C5 E1 E8 E5 A9 F5 13 99 58 C5 E2 83 D0 99 47 08 F2 8A A4 CB
9A 8A 29 55 BD A3 A6 76 E3 2D 54 17 D2 DA CD C2 6A 2D FF 5E
C6 BF AC 0A A5 46 E3 6F E5 36 DC A1 1F 81 42 E8 3B 95 5F 90
4C 85 F3 3B 01 26 2E 6F C5 1B 47 0A B5 7C 88 14 E9 86 BB 3C
11 55 D1 14 38 6C C2 3E 47 09 F8 F0 AC 8D 63 43 13 18 AA 2C
3D D8 64 F1 9F 67 9F 89 FB 5A 60 46 7A 6E 9E DA A3 6E 70 D1
A8 DC 80 99 24 21 91 D9 2D 1E 53 7F 8C EC D4 05 C0 81 4F 14
3D EB 63 31 40 04 3D C9 9D E7 FD 9F 69 C9 2C AD B8 92 AD FD
F8 AB 03 88 4C 2B 2E 03 31 37 25 52 3D 2C 4C 2D FE A2 6A 62
F6 7E 6B 5C 6C 37 AF 2B 10 DC 6A E4 BC 47 CF 2E 40 47 12 1E
53 8F 30 A9 34 58 77 07 E1 F6 50 C1 0E 37 99 A5

Signature Algorithm: sha256_rsa, Value:
C1 0A 57 A7 FA 15 4C BD 1D EA B6 5E 74 DD 7E 01 83 BF A0 23
EA D3 96 66 49 06 5D 4D 02 C7 D2 92 08 A6 01 18 36 D8 66 95
8C D9 19 77 F3 FA 55 14 DF 1B 23 83 77 F4 0F 69 8B D6 0E DA
2A 08 9C 34 00 5A 43 56 7D 19 18 8A E1 8B B4 80 3A AA BC 35
B7 99 77 60 85 83 A6 88 6A A1 AD 9B 12 13 F2 4D BF CA 4F 18
3D 02 9B DE 40 A5 A6 CB F3 E5 6B F7 28 EF 85 B3 B4 D5 03 F3
E6 08 D6 59 91 92 6D D0 7D D1 C1 B0 48 51 D2 5D A5 1D F1 26
6B 36 CD 14 5B 6B 13 C8 0D F6 24 83 C2 AE B4 2E 12 C9 E8 60
B6 0D BD 1F 34 D5 54 E4 6B EA 4D C1 AF 19 B7 77 5C C1 AD 9C
A2 2E 04 DD 3E 5C 2E 66 DD 17 41 57 E8 28 EB 4E 89 DE D7 AA
```

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```

00 80 7D B6 4C 00 76 6B 7A 00 E3 8C 9F 9B C8 BE 06 B9 14 C3
D4 A7 78 A0 17 C1 B4 17 6E E2 6E 8D AA 79 69 FE 18 39 8A 19
FF 9C 36 1A 3C A3 66 EF D0 5F 4D 7C 54 FD 4D A1

```

Serial Number:

```

B7 83 C6 92 09 1E 1A 32 79 D0 7B 5E EE D6 F5 FC 6D E8 CA 01
50 62 37 91 5E 2A 00 C9 66 82 44 A6

```

Issuer: Common Name: cyborg

Subject: Common Name: cyborg

Subject Alternate Names: cyborg

Fingerprint SHA1: 67 FD F1 7A 02 26 C7 AB 77 AD CD CB 63 76 19 AD 83 0C BF B7

Fingerprint SHA256: FA BF 9D EC CF 6C 3F 8A 08 89 29 04 5E 9E B5 A8 28 A9 F7 A8 E8 38

↪14 7F 32 CE 78 DC 26 B0 84 EA

Expired: False, Not Valid Before: 2008-11-15 06:32:10+00:00, Not Valid After: 2028-11-

↪15 02:56:10+00:00

Self Signed: maybe, Self Issued: True

## 5.1.2 CLI Reference

Command line interface to request a URL and get the server cert or cert chain.

`cert_human_cli.cli` (*argv*)

Parse arguments.

**Parameters** `argv` (*list*) – sys.argv or manual list of args to parse.

**Returns** (*argparse.Namespace*)

`cert_human_cli.main` (*cli\_args*)

Process arguments and run the workflows.

**Parameters** `cli_args` (*argparse.Namespace*) – Parsed args from sys.argv or list.

### 5.1.2.1 Help

```

bash-3.2$ ./cert_human_cli.py --help
usage: cert_human_cli.py [-h] [--port PORT] [--method {requests,socket}]
                        [--chain] [--print_mode {info,key,extensions,all}]
                        [--write WRITE] [--overwrite] [--verify VERIFY]
                        HOST

```

Command line interface to request a URL and get the server cert or cert chain.

positional arguments:

HOST Host to get cert or cert chain from

optional arguments:

```

-h, --help            show this help message and exit
--port PORT          Port on host to connect to (default: 443)
--method {requests,socket}
                        Use requests.get a SSL socket to get cert or cert
                        chain. (default: requests)
--chain              Print/write the cert chain instead of the cert.
                        (default: False)

```

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```
--print_mode {info,key,extensions,all}
    When no --write specified, print this type of
    information for the cert. (default: info)
--write WRITE
    File to write cert/cert chain to (default: )
--overwrite
    When writing to --write and file exists, overwrite.
    (default: False)
--verify VERIFY
    PEM file to verify host, empty will disable verify,
    for --method requests. (default: )
```

## 5.2 API

### 5.2.1 High level API Examples

Different examples of working with certs and cert chains using *cert\_human.CertStore* and *cert\_human.CertChainStore*.

#### 5.2.1.1 Getting certs

##### Using sockets

```
>>> store = cert_human.CertStore.from_socket(host="cyborg")
>>> chain_store = cert_human.CertChainStore.from_socket(host="cyborg")
```

##### Using requests

```
>>> store = cert_human.CertStore.from_request(host="cyborg")
>>> chain_store = cert_human.CertChainStore.from_request(host="cyborg")
```

##### Using a requests response object

```
>>> cert_human.enable_urllib3_patch()
>>> response = requests.get("https://cyborg")
>>> store = cert_human.CertStore.from_response(response=response)
>>> chain_store = cert_human.CertChainStore.from_response(response=response)
```

#### 5.2.1.2 Writing PEM certs to disk

```
>>> store_path = store.to_disk("/tmp/certs/cyborg.pem", overwrite=True)
>>> store_path.is_file()
True

>>> chain_path = chain_store.to_disk("/tmp/certs/cyborg_chain.pem", overwrite=True)
>>> chain_path.is_file()
True
```

### 5.2.1.3 Creating CertStore from various types

```
>>> # auto CertStore from a requests.Response object
>>> r = cert_human.get_response("cyborg")
>>> auto_response = cert_human.CertStore.from_auto(r)

>>> # auto CertStore from a asn1crypt.X509.Certificate object
>>> auto_asn1 = cert_human.CertStore.from_auto(auto_response.asn1)

>>> # auto CertStore from a PEM string
>>> auto_pem = cert_human.CertStore.from_auto(auto_response.pem)

>>> # auto CertStore from a OpenSSL.crypto.X509 object
>>> auto_x509 = cert_human.CertStore.from_auto(auto_response.x509)

>>> # CertStore from a pem file on disk
>>> from_path = cert_human.CertStore.from_path("tests/certs/cert.pem")
```

### 5.2.1.4 CertStore: Attributes

#### PEM format

```
>>> print(store.pem)
-----BEGIN CERTIFICATE-----
MIIC8TCCAdmgAwIBAgIhALeDxpIJHhoyedB7Xu7W9fxt6MoBUGI3kV4qAMlmgkSm
MA0GCSqGSIb3DQEBCwUAMBExDzANBgNVBAMMBmN5Ym9yZzAeFw0wODExMTUwNjMy
MTBaFw0yODExMTUwNjU2MTBaMBExDzANBgNVBAMMBmN5Ym9yZzCCASIwDQYJKoZI
hvcNAQEBBQADggEPADCCAQoCggEBAAOx5uXhmwsnx9lXp9L3FkZtV86dV+vgw/rK/
TqgBuqFkbW02Wpl+YKPF4ejlqfUTmVjF4oPQmUcI8oqky5qKKVW9o6Z24y1UF9La
zcJqLf9exr+sCqVG42/1NtyhH4FC6DuVX5BMhfM7ASyub8UbRwqlfIgU6Ya7PBFV
0RQ4bMI+Rwn48KyNY0MTGKosPdhk8Z9nn4n7WmBGem6e2qNucNGo3ICZJCGR2S0e
U3+M7NQFwIFPFD3rYzFABD3Jnef9n2nJLK24kq39+KsDiEwrLgMxNyVSPSxMLf6i
amL2fmtcbDevKxDcauS8R88uQECSH1OPMKk0WHcH4fZQwQ43maUCAwEAAaM0MDIw
HQYDVR0OBByEFOco2mIkLtDOWElgNHeFHw9/xvKTMBeGA1UdEQQKMAiCBmN5Ym9y
ZzANBgkqhkiG9w0BAQsFAAOCAQEAWpXp/oVTL0d6rZedN1+AYO/oCPq05ZmSQZd
TQLH0pIIpgEYNthmlYzZGXfz+1UU3xsjg3f0D2mL1g7aKgicNABAQ1Z9GRiK4Yu0
gDqqvDW3mXdghYOmIGqhrZsSE/JNv8pPGD0Cm95ApabL8+Vr9y jvhb001QPz5gjW
WZGSbdB90cGwSFHSXaUd8SZrNs0UW2sTyA32JIPCrrQuEsnoYLYNvR801VTka+pN
wa8Zt3dcwa2coi4E3T5cLmbdF0FX6CjrTone16oAgH22TAB2a3oA44yfm8i+BrkU
w9SneKAXwbQXbuJujap5af4YOYoZ/5w2GjyjZu/QX018VP1NoQ==
-----END CERTIFICATE-----
```

#### Issuer

```
>>> store.issuer
{'common_name': 'cyborg'}
>>> store.issuer_str
'Common Name: cyborg'
```

## Subject

```
>>> store.subject
{'common_name': 'cyborg'}
>>> store.subject_str
'Common Name: cyborg'
>>> store.subject_alt_names
['cyborg']
```

## Fingerprints

```
>>> store.fingerprint_sha1
'67 FD F1 7A 02 26 C7 AB 77 AD CD CB 63 76 19 AD 83 0C BF B7'
>>> store.fingerprint_sha256
'FA BF 9D EC CF 6C 3F 8A 08 89 29 04 5E 9E B5 A8 28 A9 F7 A8 E8 38 14 7F 32 CE 78 DC
↪26 B0 84 EA'
```

## Public Key

```
>>> store.public_key
↪'EC79B97866C2C9F1F655E9F4BDC5919B55F3A755FAF830FEB2BF4EA801BAA1646D63B65A997E60A3C5E1E8E5A9F513995
↪'
>>> print(store.public_key_str)
EC 79 B9 78 66 C2 C9 F1 F6 55 E9 F4 BD C5 91 9B 55 F3 A7 55
FA F8 30 FE B2 BF 4E A8 01 BA A1 64 6D 63 B6 5A 99 7E 60 A3
C5 E1 E8 E5 A9 F5 13 99 58 C5 E2 83 D0 99 47 08 F2 8A A4 CB
9A 8A 29 55 BD A3 A6 76 E3 2D 54 17 D2 DA CD C2 6A 2D FF 5E
C6 BF AC 0A A5 46 E3 6F E5 36 DC A1 1F 81 42 E8 3B 95 5F 90
4C 85 F3 3B 01 26 2E 6F C5 1B 47 0A B5 7C 88 14 E9 86 BB 3C
11 55 D1 14 38 6C C2 3E 47 09 F8 F0 AC 8D 63 43 13 18 AA 2C
3D D8 64 F1 9F 67 9F 89 FB 5A 60 46 7A 6E 9E DA A3 6E 70 D1
A8 DC 80 99 24 21 91 D9 2D 1E 53 7F 8C EC D4 05 C0 81 4F 14
3D EB 63 31 40 04 3D C9 9D E7 FD 9F 69 C9 2C AD B8 92 AD FD
F8 AB 03 88 4C 2B 2E 03 31 37 25 52 3D 2C 4C 2D FE A2 6A 62
F6 7E 6B 5C 6C 37 AF 2B 10 DC 6A E4 BC 47 CF 2E 40 47 12 1E
53 8F 30 A9 34 58 77 07 E1 F6 50 C1 0E 37 99 A5
>>> store.public_key_algorithm
'rsa'
>>> store.public_key_exponent
65537
>>> store.public_key_parameters
>>> store.public_key_size
2048
```

## Signature

```
>>> store.signature
↪'C10A57A7FA154CBD1DEAB65E74DD7E0183BFA023EAD3966649065D4D02C7D29208A6011836D866958CD91977F3FA5514D
↪'
```

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```
>>> print(store.signature_str)
C1 0A 57 A7 FA 15 4C BD 1D EA B6 5E 74 DD 7E 01 83 BF A0 23
EA D3 96 66 49 06 5D 4D 02 C7 D2 92 08 A6 01 18 36 D8 66 95
8C D9 19 77 F3 FA 55 14 DF 1B 23 83 77 F4 0F 69 8B D6 0E DA
2A 08 9C 34 00 5A 43 56 7D 19 18 8A E1 8B B4 80 3A AA BC 35
B7 99 77 60 85 83 A6 88 6A A1 AD 9B 12 13 F2 4D BF CA 4F 18
3D 02 9B DE 40 A5 A6 CB F3 E5 6B F7 28 EF 85 B3 B4 D5 03 F3
E6 08 D6 59 91 92 6D D0 7D D1 C1 B0 48 51 D2 5D A5 1D F1 26
6B 36 CD 14 5B 6B 13 C8 0D F6 24 83 C2 AE B4 2E 12 C9 E8 60
B6 0D BD 1F 34 D5 54 E4 6B EA 4D C1 AF 19 B7 77 5C C1 AD 9C
A2 2E 04 DD 3E 5C 2E 66 DD 17 41 57 E8 28 EB 4E 89 DE D7 AA
00 80 7D B6 4C 00 76 6B 7A 00 E3 8C 9F 9B C8 BE 06 B9 14 C3
D4 A7 78 A0 17 C1 B4 17 6E E2 6E 8D AA 79 69 FE 18 39 8A 19
FF 9C 36 1A 3C A3 66 EF D0 5F 4D 7C 54 FD 4D A1
>>> store.signature_algorithm
'sha256_rsa'
```

## Serial Number

```
>>> store.serial_number
'B783C692091E1A3279D07B5EEED6F5FC6DE8CA01506237915E2A00C9668244A6'
>>> store.serial_number_str
'B7 83 C6 92 09 1E 1A 32 79 D0 7B 5E EE D6 F5 FC 6D E8 CA 01\n50 62 37 91 5E 2A 00 C9
↪66 82 44 A6'
```

## Validity

```
>>> store.is_expired
False
>>> store.is_self_issued
True
>>> store.is_self_signed
'maybe'
>>> store.not_valid_before
datetime.datetime(2008, 11, 15, 6, 32, 10, tzinfo=datetime.timezone.utc)
>>> store.not_valid_after
datetime.datetime(2028, 11, 15, 2, 56, 10, tzinfo=datetime.timezone.utc)
>>> store.not_valid_before_str
'2008-11-15 06:32:10+00:00'
>>> store.not_valid_after_str
'2028-11-15 02:56:10+00:00'
```

## Extensions

```
>>> store.extensions
{'subjectKeyIdentifier': 'E7:28:DA:62:24:2E:D0:CE:58:4D:60:34:77:85:1F:0F:7F:C6:F2:93
↪', 'subjectAltName': 'DNS:cyborg'}
>>> print(store.extensions_str)
Extension 1, name=subjectKeyIdentifier,
↪value=E7:28:DA:62:24:2E:D0:CE:58:4D:60:34:77:85:1F:0F:7F:C6:F2:93
Extension 2, name=subjectAltName, value=DNS:cyborg
```

## Info in string format

Basic cert info:

```
>>> print(store)
CertStore:
  Issuer: Common Name: cyborg
  Subject: Common Name: cyborg
  Subject Alternate Names: cyborg
  Fingerprint SHA1: 67 FD F1 7A 02 26 C7 AB 77 AD CD CB 63 76 19 AD 83 0C BF B7
  Fingerprint SHA256: FA BF 9D EC CF 6C 3F 8A 08 89 29 04 5E 9E B5 A8 28 A9 F7 A8 E8 38 14 7F 32 CE 78 DC 26 B0 84 EA
  Expired: False, Not Valid Before: 2008-11-15 06:32:10+00:00, Not Valid After: 2028-11-15 02:56:10+00:00
  Self Signed: maybe, Self Issued: True

>>> print(store.dump_str_info) # same as print(store)
Issuer: Common Name: cyborg
Subject: Common Name: cyborg
Subject Alternate Names: cyborg
Fingerprint SHA1: 67 FD F1 7A 02 26 C7 AB 77 AD CD CB 63 76 19 AD 83 0C BF B7
Fingerprint SHA256: FA BF 9D EC CF 6C 3F 8A 08 89 29 04 5E 9E B5 A8 28 A9 F7 A8 E8 38 14 7F 32 CE 78 DC 26 B0 84 EA
Expired: False, Not Valid Before: 2008-11-15 06:32:10+00:00, Not Valid After: 2028-11-15 02:56:10+00:00
Self Signed: maybe, Self Issued: True
```

Public key info:

```
>>> print(store.dump_str_key)
Public Key Algorithm: rsa, Size: 2048, Exponent: 65537, Value:
EC 79 B9 78 66 C2 C9 F1 F6 55 E9 F4 BD C5 91 9B 55 F3 A7 55
FA F8 30 FE B2 BF 4E A8 01 BA A1 64 6D 63 B6 5A 99 7E 60 A3
C5 E1 E8 E5 A9 F5 13 99 58 C5 E2 83 D0 99 47 08 F2 8A A4 CB
9A 8A 29 55 BD A3 A6 76 E3 2D 54 17 D2 DA CD C2 6A 2D FF 5E
C6 BF AC 0A A5 46 E3 6F E5 36 DC A1 1F 81 42 E8 3B 95 5F 90
4C 85 F3 3B 01 26 2E 6F C5 1B 47 0A B5 7C 88 14 E9 86 BB 3C
11 55 D1 14 38 6C C2 3E 47 09 F8 F0 AC 8D 63 43 13 18 AA 2C
3D D8 64 F1 9F 67 9F 89 FB 5A 60 46 7A 6E 9E DA A3 6E 70 D1
A8 DC 80 99 24 21 91 D9 2D 1E 53 7F 8C EC D4 05 C0 81 4F 14
3D EB 63 31 40 04 3D C9 9D E7 FD 9F 69 C9 2C AD B8 92 AD FD
F8 AB 03 88 4C 2B 2E 03 31 37 25 52 3D 2C 4C 2D FE A2 6A 62
F6 7E 6B 5C 6C 37 AF 2B 10 DC 6A E4 BC 47 CF 2E 40 47 12 1E
53 8F 30 A9 34 58 77 07 E1 F6 50 C1 0E 37 99 A5

Signature Algorithm: sha256_rsa, Value:
C1 0A 57 A7 FA 15 4C BD 1D EA B6 5E 74 DD 7E 01 83 BF A0 23
EA D3 96 66 49 06 5D 4D 02 C7 D2 92 08 A6 01 18 36 D8 66 95
8C D9 19 77 F3 FA 55 14 DF 1B 23 83 77 F4 0F 69 8B D6 0E DA
2A 08 9C 34 00 5A 43 56 7D 19 18 8A E1 8B B4 80 3A AA BC 35
B7 99 77 60 85 83 A6 88 6A A1 AD 9B 12 13 F2 4D BF CA 4F 18
3D 02 9B DE 40 A5 A6 CB F3 E5 6B F7 28 EF 85 B3 B4 D5 03 F3
E6 08 D6 59 91 92 6D D0 7D D1 C1 B0 48 51 D2 5D A5 1D F1 26
6B 36 CD 14 5B 6B 13 C8 0D F6 24 83 C2 AE B4 2E 12 C9 E8 60
B6 0D BD 1F 34 D5 54 E4 6B EA 4D C1 AF 19 B7 77 5C C1 AD 9C
A2 2E 04 DD 3E 5C 2E 66 DD 17 41 57 E8 28 EB 4E 89 DE D7 AA
00 80 7D B6 4C 00 76 6B 7A 00 E3 8C 9F 9B C8 BE 06 B9 14 C3
```

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```
D4 A7 78 A0 17 C1 B4 17 6E E2 6E 8D AA 79 69 FE 18 39 8A 19
FF 9C 36 1A 3C A3 66 EF D0 5F 4D 7C 54 FD 4D A1
```

Serial Number:

```
B7 83 C6 92 09 1E 1A 32 79 D0 7B 5E EE D6 F5 FC 6D E8 CA 01
50 62 37 91 5E 2A 00 C9 66 82 44 A6
```

Extensions info:

```
>>> print(store.dump_str_exts)
Extensions:
    Extension 1, name=subjectKeyIdentifier,
↪value=E7:28:DA:62:24:2E:D0:CE:58:4D:60:34:77:85:1F:0F:7F:C6:F2:93
    Extension 2, name=subjectAltName, value=DNS:cyborg
```

All info blocks as one:

```
>>> print(store.dump_str)
Extensions:
    Extension 1, name=subjectKeyIdentifier,
↪value=E7:28:DA:62:24:2E:D0:CE:58:4D:60:34:77:85:1F:0F:7F:C6:F2:93
    Extension 2, name=subjectAltName, value=DNS:cyborg

Public Key Algorithm: rsa, Size: 2048, Exponent: 65537, Value:
    EC 79 B9 78 66 C2 C9 F1 F6 55 E9 F4 BD C5 91 9B 55 F3 A7 55
    FA F8 30 FE B2 BF 4E A8 01 BA A1 64 6D 63 B6 5A 99 7E 60 A3
    C5 E1 E8 E5 A9 F5 13 99 58 C5 E2 83 D0 99 47 08 F2 8A A4 CB
    9A 8A 29 55 BD A3 A6 76 E3 2D 54 17 D2 DA CD C2 6A 2D FF 5E
    C6 BF AC 0A A5 46 E3 6F E5 36 DC A1 1F 81 42 E8 3B 95 5F 90
    4C 85 F3 3B 01 26 2E 6F C5 1B 47 0A B5 7C 88 14 E9 86 BB 3C
    11 55 D1 14 38 6C C2 3E 47 09 F8 F0 AC 8D 63 43 13 18 AA 2C
    3D D8 64 F1 9F 67 9F 89 FB 5A 60 46 7A 6E 9E DA A3 6E 70 D1
    A8 DC 80 99 24 21 91 D9 2D 1E 53 7F 8C EC D4 05 C0 81 4F 14
    3D EB 63 31 40 04 3D C9 9D E7 FD 9F 69 C9 2C AD B8 92 AD FD
    F8 AB 03 88 4C 2B 2E 03 31 37 25 52 3D 2C 4C 2D FE A2 6A 62
    F6 7E 6B 5C 6C 37 AF 2B 10 DC 6A E4 BC 47 CF 2E 40 47 12 1E
    53 8F 30 A9 34 58 77 07 E1 F6 50 C1 0E 37 99 A5

Signature Algorithm: sha256_rsa, Value:
    C1 0A 57 A7 FA 15 4C BD 1D EA B6 5E 74 DD 7E 01 83 BF A0 23
    EA D3 96 66 49 06 5D 4D 02 C7 D2 92 08 A6 01 18 36 D8 66 95
    8C D9 19 77 F3 FA 55 14 DF 1B 23 83 77 F4 0F 69 8B D6 0E DA
    2A 08 9C 34 00 5A 43 56 7D 19 18 8A E1 8B B4 80 3A AA BC 35
    B7 99 77 60 85 83 A6 88 6A A1 AD 9B 12 13 F2 4D BF CA 4F 18
    3D 02 9B DE 40 A5 A6 CB F3 E5 6B F7 28 EF 85 B3 B4 D5 03 F3
    E6 08 D6 59 91 92 6D D0 7D D1 C1 B0 48 51 D2 5D A5 1D F1 26
    6B 36 CD 14 5B 6B 13 C8 0D F6 24 83 C2 AE B4 2E 12 C9 E8 60
    B6 0D BD 1F 34 D5 54 E4 6B EA 4D C1 AF 19 B7 77 5C C1 AD 9C
    A2 2E 04 DD 3E 5C 2E 66 DD 17 41 57 E8 28 EB 4E 89 DE D7 AA
    00 80 7D B6 4C 00 76 6B 7A 00 E3 8C 9F 9B C8 BE 06 B9 14 C3
    D4 A7 78 A0 17 C1 B4 17 6E E2 6E 8D AA 79 69 FE 18 39 8A 19
    FF 9C 36 1A 3C A3 66 EF D0 5F 4D 7C 54 FD 4D A1

Serial Number:
    B7 83 C6 92 09 1E 1A 32 79 D0 7B 5E EE D6 F5 FC 6D E8 CA 01
    50 62 37 91 5E 2A 00 C9 66 82 44 A6
```

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```
Issuer: Common Name: cyborg
Subject: Common Name: cyborg
Subject Alternate Names: cyborg
Fingerprint SHA1: 67 FD F1 7A 02 26 C7 AB 77 AD CD CB 63 76 19 AD 83 0C BF B7
Fingerprint SHA256: FA BF 9D EC CF 6C 3F 8A 08 89 29 04 5E 9E B5 A8 28 A9 F7 A8 E8 38
↳14 7F 32 CE 78 DC 26 B0 84 EA
Expired: False, Not Valid Before: 2008-11-15 06:32:10+00:00, Not Valid After: 2028-11-
↳15 02:56:10+00:00
Self Signed: maybe, Self Issued: True
```

### 5.2.1.5 Exporting all attributes in a CertStore

Get all the JSON friendly attributes as a JSON string:

```
>>> print (store.dump_json)
{
  "issuer": {
    "common_name": "cyborg"
  },
  "issuer_str": "Common Name: cyborg",
  "subject": {
    "common_name": "cyborg"
  },
  "subject_str": "Common Name: cyborg",
  "subject_alt_names": [
    "cyborg"
  ],
  "subject_alt_names_str": "cyborg",
  "fingerprint_sha1": "67 FD F1 7A 02 26 C7 AB 77 AD CD CB 63 76 19 AD 83 0C BF B7",
  "fingerprint_sha256": "FA BF 9D EC CF 6C 3F 8A 08 89 29 04 5E 9E B5 A8 28 A9 F7 A8
↳E8 38 14 7F 32 CE 78 DC 26 B0 84 EA",
  "public_key":
↳"EC79B97866C2C9F1F655E9F4BDC5919B55F3A755FAF830FEB2BF4EA801BAA1646D63B65A997E60A3C5E1E8E5A9F513995
↳",
  "public_key_str": "EC 79 B9 78 66 C2 C9 F1 F6 55 E9 F4 BD C5 91 9B 55 F3 A7 55\nFA
↳F8 30 FE B2 BF 4E A8 01 BA A1 64 6D 63 B6 5A 99 7E 60 A3\nC5 E1 E8 E5 A9 F5 13 99
↳58 C5 E2 83 D0 99 47 08 F2 8A A4 CB\n9A 8A 29 55 BD A3 A6 76 E3 2D 54 17 D2 DA CD
↳C2 6A 2D FF 5E\nC6 BF AC 0A A5 46 E3 6F E5 36 DC A1 1F 81 42 E8 3B 95 5F 90\n4C 85
↳F3 3B 01 26 2E 6F C5 1B 47 0A B5 7C 88 14 E9 86 BB 3C\n11 55 D1 14 38 6C C2 3E 47
↳09 F8 F0 AC 8D 63 43 13 18 AA 2C\n3D D8 64 F1 9F 67 9F 89 FB 5A 60 46 7A 6E 9E DA
↳A3 6E 70 D1\nA8 DC 80 99 24 21 91 D9 2D 1E 53 7F 8C EC D4 05 C0 81 4F 14\n3D EB 63
↳31 40 04 3D C9 9D E7 FD 9F 69 C9 2C AD B8 92 AD FD\nF8 AB 03 88 4C 2B 2E 03 31 37
↳25 52 3D 2C 4C 2D FE A2 6A 62\nF6 7E 6B 5C 6C 37 AF 2B 10 DC 6A E4 BC 47 CF 2E 40
↳47 12 1E\n53 8F 30 A9 34 58 77 07 E1 F6 50 C1 0E 37 99 A5",
  "public_key_parameters": null,
  "public_key_algorithm": "rsa",
  "public_key_size": 2048,
  "public_key_exponent": 65537,
  "signature":
↳"C10A57A7FA154CBD1DEAB65E74DD7E0183BFA023EAD3966649065D4D02C7D29208A6011836D866958CD91977F3FA5514D
↳",
  "signature_str": "C1 0A 57 A7 FA 15 4C BD 1D EA B6 5E 74 DD 7E 01 83 BF A0 23\nEA
↳D3 96 66 49 06 5D 4D 02 C7 D2 92 08 A6 01 18 36 D8 66 95\n8C D9 19 77 F3 FA 55 14
↳DF 1B 23 83 77 F4 0F 69 8B D6 0E DA\n2A 08 9C 34 00 5A 43 56 7D 19 18 8A E1 8B B4
↳80 3A AA BC 35\nB7 99 77 60 85 83 A6 88 6A A1 AD 9B 12 13 F2 4D BF CA 4F 18\n3D 02
↳9B DE 40 A5 A6 CB F3 E5 6B F7 28 EF 85 B3 B4 D5 03 F3\nE6 08 D6 59 91 92 6D D0 7D
↳D1 C1 B0 48 51 D2 5D A5 1D F1 26\n6B 36 CD 14 5B 6B 13 C8 0D F6 24 83 C2 AE B4 2E
↳12 C9 E8 60\nB6 0D BD 1F 34 D5 54 E4 6B EA 4D C1 AF 19 B7 77 5C C1 AD 9C\nA2 2E 04
↳DD 3E 5C 2E 66 DD 17 41 57 E8 28 EB 4E 89 DE D7 AA\n00 80 7D B6 4C 80 74 6B 7E 00
↳E3 8C 9F 9B C8 BE 06 B9 14 C3\nD4 A7 78 A0 17 C1 B4 17 6E E2 6E 8D AA 79 69 FE 18
↳39 8A 19\nFF 9C 36 1A 3C A3 66 EF D0 5F 4D 7C 54 FD 4D A1",
```

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```

"signature_algorithm": "sha256_rsa",
"x509_version": "v3",
"serial_number": "B783C692091E1A3279D07B5EEED6F5FC6DE8CA01506237915E2A00C9668244A6",
"serial_number_str": "B7 83 C6 92 09 1E 1A 32 79 D0 7B 5E EE D6 F5 FC 6D E8 CA_
↪01\n50 62 37 91 5E 2A 00 C9 66 82 44 A6",
"is_expired": false,
"is_self_signed": "maybe",
"is_self_issued": true,
"not_valid_before_str": "2008-11-15 06:32:10+00:00",
"not_valid_after_str": "2028-11-15 02:56:10+00:00",
"extensions": {
    "subjectKeyIdentifier":
↪"E7:28:DA:62:24:2E:D0:CE:58:4D:60:34:77:85:1F:0F:7F:C6:F2:93",
    "subjectAltName": "DNS:cyborg"
},
"extensions_str": "Extension 1, name=subjectKeyIdentifier,_
↪value=E7:28:DA:62:24:2E:D0:CE:58:4D:60:34:77:85:1F:0F:7F:C6:F2:93\nExtension 2,_
↪name=subjectAltName, value=DNS:cyborg"
}

```

Get all the attributes as a dict:

```

>>> pprint.pprint(store.dump)
{'extensions': {'subjectAltName': 'DNS:cyborg',
               'subjectKeyIdentifier':
↪'E7:28:DA:62:24:2E:D0:CE:58:4D:60:34:77:85:1F:0F:7F:C6:F2:93'},
 'extensions_str': 'Extension 1, name=subjectKeyIdentifier, '
↪'value=E7:28:DA:62:24:2E:D0:CE:58:4D:60:34:77:85:1F:0F:7F:C6:F2:93\n'
               'Extension 2, name=subjectAltName, value=DNS:cyborg',
 'fingerprint_sha1': '67 FD F1 7A 02 26 C7 AB 77 AD CD CB 63 76 19 AD 83 0C BF '
               'B7',
 'fingerprint_sha256': 'FA BF 9D EC CF 6C 3F 8A 08 89 29 04 5E 9E B5 A8 28 A9 '
               'F7 A8 E8 38 14 7F 32 CE 78 DC 26 B0 84 EA',
 'is_expired': False,
 'is_self_issued': True,
 'is_self_signed': 'maybe',
 'issuer': {'common_name': 'cyborg'},
 'issuer_str': 'Common Name: cyborg',
 'not_valid_after': datetime.datetime(2028, 11, 15, 2, 56, 10, tzinfo=datetime.
↪timezone.utc),
 'not_valid_after_str': '2028-11-15 02:56:10+00:00',
 'not_valid_before': datetime.datetime(2008, 11, 15, 6, 32, 10, tzinfo=datetime.
↪timezone.utc),
 'not_valid_before_str': '2008-11-15 06:32:10+00:00',
 'public_key':
↪'EC79B97866C2C9F1F655E9F4BDC5919B55F3A755FAF830FEB2BF4EA801BAA1646D63B65A997E60A3C5E1E8E5A9F513995
↪',
 'public_key_algorithm': 'rsa',
 'public_key_exponent': 65537,
 'public_key_parameters': None,
 'public_key_size': 2048,
 'public_key_str': 'EC 79 B9 78 66 C2 C9 F1 F6 55 E9 F4 BD C5 91 9B 55 F3 A7 '
               '55\n'
               'FA F8 30 FE B2 BF 4E A8 01 BA A1 64 6D 63 B6 5A 99 7E 60 '
               'A3\n'
               'C5 E1 E8 E5 A9 F5 13 99 58 C5 E2 83 D0 99 47 08 F2 8A A4 '

```

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```
'CB\n'
'9A 8A 29 55 BD A3 A6 76 E3 2D 54 17 D2 DA CD C2 6A 2D FF '
'5E\n'
'C6 BF AC 0A A5 46 E3 6F E5 36 DC A1 1F 81 42 E8 3B 95 5F '
'90\n'
'4C 85 F3 3B 01 26 2E 6F C5 1B 47 0A B5 7C 88 14 E9 86 BB '
'3C\n'
'11 55 D1 14 38 6C C2 3E 47 09 F8 F0 AC 8D 63 43 13 18 AA '
'2C\n'
'3D D8 64 F1 9F 67 9F 89 FB 5A 60 46 7A 6E 9E DA A3 6E 70 '
'D1\n'
'A8 DC 80 99 24 21 91 D9 2D 1E 53 7F 8C EC D4 05 C0 81 4F '
'14\n'
'3D EB 63 31 40 04 3D C9 9D E7 FD 9F 69 C9 2C AD B8 92 AD '
'FD\n'
'F8 AB 03 88 4C 2B 2E 03 31 37 25 52 3D 2C 4C 2D FE A2 6A '
'62\n'
'F6 7E 6B 5C 6C 37 AF 2B 10 DC 6A E4 BC 47 CF 2E 40 47 12 '
'1E\n'
'53 8F 30 A9 34 58 77 07 E1 F6 50 C1 0E 37 99 A5',
'serial_number': 'B783C692091E1A3279D07B5EEED6F5FC6DE8CA01506237915E2A00C9668244A6',
'serial_number_str': 'B7 83 C6 92 09 1E 1A 32 79 D0 7B 5E EE D6 F5 FC 6D E8 '
'CA 01\n'
'50 62 37 91 5E 2A 00 C9 66 82 44 A6',
'signature':
→ 'C10A57A7FA154CBD1DEAB65E74DD7E0183BFA023EAD3966649065D4D02C7D29208A6011836D866958CD91977F3FA5514D
→ ',
'signature_algorithm': 'sha256_rsa',
'signature_str': 'C1 0A 57 A7 FA 15 4C BD 1D EA B6 5E 74 DD 7E 01 83 BF A0 '
'23\n'
'EA D3 96 66 49 06 5D 4D 02 C7 D2 92 08 A6 01 18 36 D8 66 '
'95\n'
'8C D9 19 77 F3 FA 55 14 DF 1B 23 83 77 F4 0F 69 8B D6 0E '
'DA\n'
'2A 08 9C 34 00 5A 43 56 7D 19 18 8A E1 8B B4 80 3A AA BC '
'35\n'
'B7 99 77 60 85 83 A6 88 6A A1 AD 9B 12 13 F2 4D BF CA 4F '
'18\n'
'3D 02 9B DE 40 A5 A6 CB F3 E5 6B F7 28 EF 85 B3 B4 D5 03 '
'F3\n'
'E6 08 D6 59 91 92 6D D0 7D D1 C1 B0 48 51 D2 5D A5 1D F1 '
'26\n'
'6B 36 CD 14 5B 6B 13 C8 0D F6 24 83 C2 AE B4 2E 12 C9 E8 '
'60\n'
'B6 0D BD 1F 34 D5 54 E4 6B EA 4D C1 AF 19 B7 77 5C C1 AD '
'9C\n'
'A2 2E 04 DD 3E 5C 2E 66 DD 17 41 57 E8 28 EB 4E 89 DE D7 '
'AA\n'
'00 80 7D B6 4C 00 76 6B 7A 00 E3 8C 9F 9B C8 BE 06 B9 14 '
'C3\n'
'D4 A7 78 A0 17 C1 B4 17 6E E2 6E 8D AA 79 69 FE 18 39 8A '
'19\n'
'FF 9C 36 1A 3C A3 66 EF D0 5F 4D 7C 54 FD 4D A1',
'subject': {'common_name': 'cyborg'},
'subject_alt_names': ['cyborg'],
'subject_alt_names_str': 'cyborg',
'subject_str': 'Common Name: cyborg',
```

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```
'x509_version': 'v3'}
```

### 5.2.1.6 CertChainStore: Attributes

```
>>> print(chain_store.pem) # concatted string of pem from each cert in chain store
>>> chain_store.asn1 # list of each cert in cert chain in asn1 format
>>> chain_store.der # list of each cert in cert chain in der format
>>> chain_store.dump_str # concatted and indexed output of dump_str on each cert in_
↳chain store
>>> chain_store.dump_str_exts # concatted and indexed output of dump_str_exts on_
↳each cert in chain store
>>> chain_store.dump_str_info # concatted and indexed output of dump_str_info on_
↳each cert in chain store
>>> chain_store.dump_str_key # concatted and indexed output of dump_str_key on each_
↳cert in chain store
>>> chain_store.dump_json # json string with list of dicts from dump_json on each_
↳cert in chain store
>>> chain_store.dump # list of dict from dump on each cert in chain store
```

## 5.2.2 Low level API Examples

Different examples of getting certs and cert chains manually using cert\_human.

### 5.2.2.1 Using cert\_human.get\_response to get cert and cert chain

`cert_human.get_response` does a number of things:

- It will automatically construct a url based on `host` and `port` arguments as follows:
  - if no `://` in `host`, prepend `host` with the default scheme `https://`
  - if no `:int` in `host`, append `host` with the default port `:443`
- You can supply a value to the `host` argument a number of different ways:
  - `google.com`
  - `google.com:443`
  - `https://google.com:443`
  - `https://www.google.com`
- Uses a context manager to disable warnings from requests about SSL certificate validation.
- Uses a context manager to patch `urllib3` to add SSL certificate attributes to the `HTTPSResponse` object.
- Makes a request to a server using `requests.get()`.
- Returns the response object, with the SSL certificate objects available via:
  - `response.raw.peer_cert`: The servers actual certificate as an `OpenSSL.crypto.X509` object.
  - `response.raw.peer_cert_chain`: The servers certificate chain as a list of `OpenSSL.crypto.X509` objects
  - `response.raw.peer_cert_dict`: A dictionary that seems to only contain the subject info from the servers certificate, and therefore has limited usefulness, but is included for completeness sake.

## Valid certs

You can get a valid cert and cert chain (signed by known CA):

```
>>> # get the response object
>>> response = cert_human.get_response(host="www.google.com")

>>> # access the cert chain from the response.raw object
>>> print(response.raw.peer_cert_chain)
[<OpenSSL.crypto.X509 object at 0x104d1a5f8>, <OpenSSL.crypto.X509 object at 0x104d1a6a0>]

>>> # access the cert from the response.raw object
>>> print(response.raw.peer_cert.get_subject().get_components())
[(b'C', b'US'), (b'ST', b'California'), (b'L', b'Mountain View'), (b'O', b'Google LLC'), (b'CN', b'www.google.com')]

>>> # convert the cert from x509 object to PEM string
>>> pem = cert_human.x509_to_pem(response.raw.peer_cert)

>>> # write the PEM to a file
>>> path = cert_human.write_file(path="/tmp/certs/google.pem", text=pem,
    ↳ overwrite=True, mkparent=True, protect=True)
>>> path.is_file()
True
```

## Invalid certs

You can get an invalid cert (self-signed/self-issued/signed by unknown CA):

```
>>> # get the response object
>>> response = cert_human.get_response(host="cyborg")

>>> # access the cert from the response.raw object
>>> print(response.raw.peer_cert.get_subject().get_components())
[(b'CN', b'cyborg')]

>>> # access the cert chain from the response.raw object
>>> print(x.raw.peer_cert_chain)
[<OpenSSL.crypto.X509 object at 0x10e7a7908>]

>>> # convert the cert from x509 object to PEM string
>>> pem = cert_human.x509_to_pem(response.raw.peer_cert)

>>> # write the PEM to a file
>>> path = cert_human.write_file(path="/tmp/certs/cyborg.pem", text=pem,
    ↳ overwrite=True, mkparent=True, protect=True)
>>> path.is_file()
True
```

### 5.2.2.2 Using `cert_human.ssl_socket` to get cert and cert chain

`cert_human.ssl_socket` does a number of things:

- Allows fetching a cert or cert chain using a `socket.socket` wrapped with `OpenSSL.SSL.Context`.

- This means you don't need to patch `urllib3.connectionpool.HTTPSConnectionPool` so that requests can access the certificate attributes on the raw object.
- By default does not allow SSLv2 connections.

## Valid or invalid certs

Getting certs with this method performs NO verification, so you can just get your cert on.

```
>>> # get the cert and cert chain
>>> with cert_human.ssl_socket(host="cyborg") as sock:
...     cert = sock.get_peer_certificate()
...     cert_chain = sock.get_peer_cert_chain()
...

>>> print(cert_chain)
[<OpenSSL.crypto.X509 object at 0x10bccd6d8>]

>>> # access whatever cert info manually from the OpenSSL.crypto.x509 object
>>> print(cert.get_subject().get_components())
[(b'CN', b'cyborg')]

>>> # convert the cert from x509 object to PEM string
>>> pem = cert_human.x509_to_pem(cert)

>>> # write the PEM to a file
>>> path = cert_human.write_file(path="/tmp/certs/cyborg.pem", text=pem,
↳ overwrite=True, mkparent=True, protect=True)
>>> path.is_file()
True
```

```
>>> # get the cert and cert chain
>>> with cert_human.ssl_socket(host="google.com") as sock:
...     cert = sock.get_peer_certificate()
...     cert_chain = sock.get_peer_cert_chain()

>>> print(cert_chain)
[<OpenSSL.crypto.X509 object at 0x10bccd7b8>, <OpenSSL.crypto.X509 object at 0x10bccd860>]

>>> # access whatever cert info manually from the OpenSSL.crypto.x509 object
>>> print(cert.get_subject().get_components())
[(b'C', b'US'), (b'ST', b'California'), (b'L', b'Mountain View'), (b'O', b'Google LLC'), (b'CN', b'*.google.com')]

>>> # convert the cert from x509 object to PEM string
>>> pem = cert_human.x509_to_pem(cert)

>>> # write the PEM to a file
>>> path = cert_human.write_file(path="/tmp/certs/cyborg.pem", text=pem,
↳ overwrite=True, mkparent=True, protect=True)
>>> path.is_file()
True
```

### 5.2.2.3 Using requests methods to get cert and cert chain

These examples just patch urllib3 for requests so you can use any normal `requests` method to get a response.

#### Valid certs using urllib3 patch tools

Using the `cert_human.urllib3_patch` context manager:

```
>>> # get the response with the cert attributes set
>>> with cert_human.urllib3_patch():
...     response = requests.get("https://www.google.com")
...
>>> print(response.raw.peer_cert.get_subject().get_components())
[(b'C', b'US'), (b'ST', b'California'), (b'L', b'Mountain View'), (b'O', b'Google LLC
↳'), (b'CN', b'www.google.com')]
```

Using `cert_human.enable_urllib3_patch` to patch urllib3:

```
>>> # patch urllib3
>>> cert_human.enable_urllib3_patch()

>>> # get a response using whatever method in requests
>>> response = requests.get("https://www.google.com")

>>> # access whatever cert info manually from the OpenSSL.crypto.x509 object
>>> print(response.raw.peer_cert.get_subject().get_components())
[(b'C', b'US'), (b'ST', b'California'), (b'L', b'Mountain View'), (b'O', b'Google LLC
↳'), (b'CN', b'www.google.com')]

>>> # convert the cert from x509 object to PEM string
>>> pem = cert_human.x509_to_pem(response.raw.peer_cert)

>>> # write the PEM to a file
>>> path = cert_human.write_file(path="/tmp/certs/google.pem", text=pem,
↳overwrite=True, mkparent=True, protect=True)
>>> path.is_file()
True

>>> # optionally disable the urllib3 patch once you no longer need
>>> # to get responses with the cert attributes attached
>>> cert_human.disable_urllib3_patch()
```

#### Invalid certs using urllib3 patch tools

Same as valid certs using urllib3 patch tools, but you need to set `verify=False` in your requests method (and optionally disable requests warnings as well):

```
>>> cert_human.enable_urllib3_patch()
>>> response = requests.get("https://cyborg", verify=False)
/Library/Frameworks/Python.framework/Versions/3.7/lib/python3.7/site-packages/urllib3/
↳connectionpool.py:847: InsecureRequestWarning: Unverified HTTPS request is being_
↳made. Adding certificate verification is strongly advised. See: https://urllib3.
↳readthedocs.io/en/latest/advanced-usage.html#ssl-warnings
InsecureRequestWarning)
```

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```
>>> print(response.raw.peer_cert.get_subject().get_components())
[(b'CN', b'cyborg')]
```

## 5.2.3 API Reference

### 5.2.3.1 Classes

#### Store Classes

**class** cert\_human.CertStore(x509)

Bases: object

Make SSL certs and their attributes generally more accessible.

#### Examples

```
>>> # x509 cert from any number of methods
>>> cert = CertStore(OpenSSL.crypto.X509)
>>> # not echoing any of these due to length
>>> print(cert) # print the basic info for this cert
>>> x = cert.issuer # get a dict of the issuer info.
>>> print(cert.issuer_str) # print the issuer in str form.
>>> x = cert.subject # get a dict of the subject info.
>>> print(cert.subject_str) # print the subject in str form.
>>> print(cert.dump_str_exts) # print the extensions in str form.
>>> print(cert.pem) # print the PEM version.
>>> print(cert.public_key_str) # print the public key.
>>> print(cert.dump_str_key) # print a bunch of public key info.
>>> print(cert.dump_str_info) # print what str(cert) prints.
>>> x = cert.dump # get a dict of ALL attributes.
>>> x = cert.dump_json_friendly # dict of JSON friendly attrs.
>>> print(cert.dump_json) # JSON str of JSON friendly attrs.
>>> # and so on
```

#### Notes

The whole point of this was to be able to provide the same kind of information that is seen when looking at an SSL cert in a browser. This can be used to prompt for validity before doing “something”. For instance:

- If no cert provided, get the cert and prompt user for validity before continuing.
- If no cert provided, get cert, prompt for validity, then write to disk for using in further connections.
- ... to print it out and hang it on the wall???

**\_\_str\_\_()**

Show dump\_str\_info.

**\_\_repr\_\_()**

Use str() for repr().

**classmethod from\_socket** (host, port=443)

Make instance of this cls using socket module to get the cert.

---

### Examples

```
>>> cert = CertStore.from_socket("cyborg")
>>> print(cert)
```

---

#### Parameters

- **host** (*str*) – hostname to connect to.
- **port** (*str*, optional) – port to connect to on host. Defaults to: 443.

**Returns** (*CertStore*)

**classmethod from\_request** (*host*, *port=443*)

Make instance of this cls using requests module to get the cert.

---

### Examples

```
>>> cert = CertStore.from_request("cyborg")
>>> print(cert)
```

---

#### Parameters

- **host** (*str*) – hostname to connect to.
- **port** (*str*, optional) – port to connect to on host. Defaults to: 443.

**Returns** (*CertStore*)

**classmethod from\_response** (*response*)

Make instance of this cls using a requests.Response object.

---

### Examples

```
>>> enable_urllib3_patch()
>>> response = requests.get("https://cyborg", verify=False)
>>> cert = CertStore.from_response(response)
>>> print(cert)
```

---

### Notes

This relies on the fact that `enable_urllib3_patch()` has been used to add the SSL attributes to the `requests.Response.raw` object.

---

**Parameters** **response** (`requests.Response`) – response object to get `raw.peer_cert`.

**Returns** (*CertStore*)

**classmethod from\_auto** (*obj*)

Make instance of this cls from a number of types.



**:param obj** (`str` or `bytes` or `OpenSSL.crypto.X509` or: `X509.Certificate` or `requests.Response`):  
Object to create CertStore.

**Returns** (`CertStore`)

**classmethod from\_path** (`path`)

Make instance of this cls from a file containing a PEM.

**Parameters** `path` (`str` or `pathlib.Path`) – Path to file containing PEM.

**Returns** (`CertStore`)

**pem**

Return the PEM version of the original x509 cert object.

**Returns** (`str`)

**x509**

Return the original x509 cert object.

**Returns** (`OpenSSL.crypto.X509`)

**der**

Return the DER bytes version of the original x509 cert object.

**Returns** (`bytes`)

**asn1**

Return the ASN1 version of the original x509 cert object.

**Returns** (`x509.Certificate`)

**to\_path** (`path`, `overwrite=False`, `mkparent=True`, `protect=True`)

Write self.pem to disk.

---

### Examples

```
>>> # get a cert using sockets:
>>> cert = CertStore.from_socket("cyborg")
>>> # or, get a cert using requests:
>>> cert = CertStore.from_request("cyborg")
```

```
>>> # ideally, do some kind of validation with the user here
>>> # i.e. use ``print(cert.dump_str)`` to show the same
>>> # kind of information that a browser would show
```

```
>>> # then write to disk:
>>> cert_path = cert.to_path("~/cyborg.pem")
```

```
>>> # use requests with the newly written cert
>>> # no SSL warnings or SSL validation errors happen
>>> # even though it's self signed:
>>> response = requests.get("https://cyborg", verify=cert_path)
```

---

**Parameters** `path` (`str` or `pathlib.Path`) – Path to write self.pem.

**Returns** (`pathlib.Path`)

**test** (*host*, *port=443*, *\*\*kwargs*)

Test that a cert is valid on a site.

**Parameters**

- **host** (*str*) – hostname to connect to. can be any of: “scheme://host:port”, “scheme://host”, or “host”.
- **port** (*str*, optional) – port to connect to on host. If no :PORT in host, this will be added to host. Defaults to: 443
- **kwargs** – passed thru to requests.get()

**Returns** True / False if cert was valid. Exception that was thrown if cert not valid, or None if successful.

**Return type** (*tuple* of (*bool*, *Exception*))

**issuer**

Get issuer parts.

**Returns** (*dict*)

**issuer\_str**

Get issuer parts as string.

**Returns** (*str*)

**subject**

Get subject parts.

**Returns** (*dict*)

**subject\_str**

Get subject parts as string.

**Returns** (*str*)

**subject\_alt\_names**

Get subject alternate names.

**Returns** (*list* of *str*)

**subject\_alt\_names\_str**

Get subject alternate names as CSV string.

**Returns** (*str*)

**fingerprint\_sha1**

SHA1 Fingerprint.

**Returns** (*str*)

**fingerprint\_sha256**

SHA256 Fingerprint.

**Returns** (*str*)

**public\_key**

Public key in hex format.

---

**Notes**

EC certs don’t have a modulus, and thus public\_key in asn1 obj is not a dict, just the cert itself.

---

**Returns** (`str`)

**public\_key\_str**

Public key as in hex format spaced and wrapped.

**Returns** (`str`)

**public\_key\_parameters**

Public key parameters, only for 'ec' certs.

**Returns** (`str`)

**public\_key\_algorithm**

Algorithm of public key ('ec', 'rsa', 'dsa').

**Returns** (`str`)

**public\_key\_size**

Size of public key in bits.

**Returns** (`int`)

**public\_key\_exponent**

Public key exponent, only for 'rsa' certs.

**Returns** (`int`)

**signature**

Signature in hex format.

**Returns** (`str`)

**signature\_str**

Signature in hex format spaced and wrapped.

**Returns** (`str`)

**signature\_algorithm**

Algorithm used to sign the public key certificate.

**Returns** (`str`)

**x509\_version**

Version of x509 this certificate is using.

**Returns** (`str`)

**serial\_number**

Certificate serial number.

**Returns** int if algorithm is 'ec', or hex str.

**Return type** (`str` or `int`)

**serial\_number\_str**

Certificate serial number.

**Returns** int if algorithm is 'ec', or spaced and wrapped hex str.

**Return type** (`str` or `int`)

**is\_expired**

Determine if this certificate is expired.

**Returns** (`bool`)

**is\_self\_signed**

Determine if this certificate is self\_sign.

**Returns** ('yes', 'maybe', or 'no')

**Return type** (str)

**is\_self\_issued**

Determine if this certificate is self issued.

**Returns** (bool)

**not\_valid\_before**

Certificate valid start date as datetime object.

**Returns** (datetime.datetime)

**not\_valid\_before\_str**

Certificate valid start date as str.

**Returns** (str)

**not\_valid\_after**

Certificate valid end date as datetime object.

**Returns** (datetime.datetime)

**not\_valid\_after\_str**

Certificate valid end date as str.

**Returns** (str)

**extensions**

Certificate extensions as dict.

---

**Notes**

Parsing the extensions was not easy. I sort of gave up at one point. Resorted to using str(extension) as OpenSSL returns it.

---

**Returns** (dict)

**extensions\_str**

Certificate extensions as str with index, name, and value.

**Returns** (str)

**dump**

Dump dictionary with all attributes of self.

**Returns** (dict)

**dump\_json\_friendly**

Dump dict with all attributes of self that are JSON friendly.

**Returns** (dict)

**dump\_json**

Dump JSON string with all attributes of self that are JSON friendly.

**Returns** (str)

**dump\_str**

Dump a human friendly str of the all the important bits.

**Returns** (*str*)

**dump\_str\_info**

Dump a human friendly str of the important cert info bits.

**Returns** (*str*)

**dump\_str\_exts**

Dump a human friendly str of the extensions.

**Returns** (*str*)

**dump\_str\_key**

Dump a human friendly str of the public\_key important bits.

**Returns** (*str*)

**\_extension\_str** (*ext*)

Format the string of an extension using str(extension).

**Returns** (*str*)

**\_extensions**

List mapping of extension name to extension object.

**Returns** (*list of list*)

**\_public\_key\_native**

Access self.asn1.public\_key.

**Returns** (*dict*)

**\_cert\_native**

Access to self.asn1.

**Returns** (*dict*)

**\_is\_ec**

Determine if this certificates public key algorithm is Elliptic Curve ('ec').

**Returns** (*bool*)

**class** cert\_human.CertChainStore (*x509=None*)

Bases: *object*

Make SSL cert chains and their attributes generally more accessible.

This is really just a list container for a cert chain, which is just a list of x509 certs.

**\_\_str\_\_** ()

Show most useful information of all certs in cert chain.

**\_\_repr\_\_** ()

Use str() for repr().

**\_\_getitem\_\_** (*i*)

Passthru to self.\_certs[n].

**\_\_len\_\_** ()

Passthru to len(self.\_certs).

**append** (*value*)

Passthru to self.\_certs.append with automatic conversion for PEM or X509.

Parameters **value** (*str* or `OpenSSL.crypto.X509` or *CertStore*) –

**classmethod from\_socket** (*host*, *port=443*)

Make instance of this cls using socket module to get the cert chain.

---

### Examples

```
>>> cert_chain = CertChainStore.from_socket("cyborg")
>>> print(cert_chain)
```

---

### Parameters

- **host** (*str*) – hostname to connect to.
- **port** (*str*, optional) – port to connect to on host. Defaults to: 443.

**Returns** (*CertChainStore*)

**classmethod from\_request** (*host*, *port=443*)

Make instance of this cls using requests module to get the cert chain.

---

### Examples

```
>>> cert_chain = CertChainStore.from_request("cyborg")
>>> print(cert_chain)
```

---

### Parameters

- **host** (*str*) – hostname to connect to.
- **port** (*str*, optional) – port to connect to on host. Defaults to: 443.
- **timeout** (*str*, optional) – Timeout for connect/response. Defaults to: 5.

**Returns** (*CertChainStore*)

**classmethod from\_response** (*response*)

Make instance of this cls using a requests.Response.raw object.

---

### Examples

```
>>> enable_urllib3_patch()
>>> response = requests.get("https://cyborg", verify=False)
>>> cert_chain = CertChainStore.from_response(response)
>>> print(cert_chain)
```

---

---

### Notes

This relies on the fact that `enable_urllib3_patch()` has been used to add the SSL attributes to the `requests.Response.raw` object.

---

**Parameters** `response` (`requests.Response`) – response object to get `raw.peer_cert_chain` from.

**Returns** (`CertChainStore`)

**classmethod** `from_pem(pem)`

Make instance of this cls from a string containing multiple PEM certs.

**Parameters** `pem` (`str`) – PEM string with multiple pems to convert to x509.

**Returns** (`CertChainStore`)

**classmethod** `from_path(path)`

Make instance of this cls from a file containing PEMs.

**Parameters** `path` (`str` or `pathlib.Path`) – Path to file containing PEMs.

**Returns** (`CertChainStore`)

**certs**

Expose `self._certs` list container.

**pem**

Return all of the joined PEM strings for each cert in self.

**Returns** all PEM strings joined.

**Return type** (`str`)

**x509**

Return the X509 version of the each CertStore in self.

**Returns** (list of `x509.Certificate`)

**der**

Return the DER bytes version of the each CertStore in self.

**Returns** (list of `bytes`)

**asn1**

Return the asn1crypto X509 version of the each CertStore in self.

**Returns** (list of `x509.Certificate`)

**to\_path(path, overwrite=False, mkparent=True, protect=True)**

Write `self.pem` to disk.

**Parameters** `path` (`str` or `pathlib.Path`) – Path to write `self.pem` to.

**Returns** (`pathlib.Path`)

**dump\_json\_friendly**

Dump dict with all attributes of each cert in self that are JSON friendly.

**Returns** (list of `dict`)

**dump\_json**

Dump JSON string with all attributes of each cert in self that are JSON friendly.

**Returns** (`str`)

**dump**

Dump dictionary with all attributes of each cert in self.

**Returns** (list of `dict`)

#### **dump\_str**

Dump a human friendly str of the all the important bits for each cert in self.

**Returns** (str)

#### **dump\_str\_info**

Dump a human friendly str of the important cert info bits for each cert in self.

**Returns** (str)

#### **dump\_str\_key**

Dump a human friendly str of the public\_key important bits for each cert in self.

**Returns** (str)

#### **dump\_str\_exts**

Dump a human friendly str of the extensions for each cert in self.

**Returns** (str)

### WithCert Classes

```
class cert_human.HTTPSConnectionWithCertCls(host, port=None, key_file=None,
                                             cert_file=None, key_password=None,
                                             strict=None, timeout=<object object>,
                                             ssl_context=None, server_hostname=None,
                                             **kw)
```

Bases: `urllib3.connection.VerifiedHTTPSConnection`

#### **connect()**

Connect to the host and port specified in `__init__`.

#### **\_\_set\_cert\_attrs()**

Add cert info from the socket connection to a HTTPSConnection object.

Adds the following attributes:

- `peer_cert`: x509 certificate of the server
- `peer_cert_chain`: x509 certificate chain of the server
- `peer_cert_dict`: dictionary containing `commonName` and `subjectAltName`

```
class cert_human.ResponseWithCertCls(*args, **kwargs)
```

Bases: `urllib3.response.HTTPResponse`

#### **\_\_set\_cert\_attrs()**

Add cert info from a HTTPSConnection object to a HTTPSResponse object.

This allows accessing the attributes in a HTTPSConnectionWithCertCls from a `requests.Response.raw` object like so:

- `requests.Response.raw.peer_cert`
- `requests.Response.raw.peer_cert_chain`
- `requests.Response.raw.peer_cert_dict`

```
_abc_impl = <_abc_data object>
```



## Exception Classes

**exception** `cert_human.CertHumanError`

Bases: `Exception`

Exception wrapper.

### 5.2.3.2 Functions

#### Get Cert Functions

`cert_human.get_response(host, port=443, **kwargs)`

Get a `requests.Response` object with cert attributes.

#### Examples

Make a request to a site that has a valid cert:

```
>>> response = get_response(host="www.google.com")
>>> print(response.raw.peer_cert.get_subject().get_components())
>>> print(response.raw.peer_cert_chain)
>>> print(response.raw.peer_cert_dict)
```

Make a request to a site that has an invalid cert (self-signed):

```
>>> response = get_response(host="cyborg")
>>> print(response.raw.peer_cert.get_subject().get_components())
```

#### Notes

This is to fetch a `requests.Response` object that has cert attributes.

- Uses a context manager to disable warnings about SSL cert validation.
- Uses a context manager to patch `urllib3` to add SSL cert attributes to the `HTTPSResponse` object, which is then accessible via the `requests.Response.raw` object.
- Makes a request to a server using `requests.get()`

#### Parameters

- **host** (`str`) – hostname to connect to. can be any of: “scheme://host:port”, “scheme://host”, or “host”.
- **port** (`str`, optional) – port to connect to on host. If no `:PORT` in host, this will be added to host. Defaults to: 443
- **kwargs** – passed thru to `requests.get()`

**Returns** (`requests.Response`)

`cert_human.ssl_socket(host, port=443, *args, **kwargs)`

Context manager to create an SSL socket.

#### Examples

Use sockets and OpenSSL to make a request using this context manager:

```
>>> with ssl_socket(host="cyborg", port=443) as sock:
...     cert = sock.get_peer_certificate()
...     cert_chain = sock.get_peer_cert_chain()
...
>>> print(cert.get_subject().get_components())
>>> print(cert_chain)
```

---

### Parameters

- **host** (`str`) – hostname to connect to.
- **port** (`str`, optional) – port to connect to on host. Defaults to: 443.

**Yields** (`OpenSSL.SSL.Connection`)

`cert_human.test_cert(host, port=443, timeout=5, **kwargs)`

Test that a cert is valid on a site.

### Parameters

- **host** (`str`) – hostname to connect to. can be any of: “scheme://host:port”, “scheme://host”, or “host”.
- **port** (`str`, optional) – port to connect to on host. If no :PORT in host, this will be added to host. Defaults to: 443
- **timeout** (`str`, optional) – Timeout for connect/response. Defaults to: 5.
- **kwargs** – passed thru to requests.get()

**Returns** True / False if cert was valid. Exception that was thrown if cert not valid, or None if successfull.

**Return type** (`tuple of (bool, Exception)`)

## WithCert Functions

`cert_human.enable_urllib3_patch()`

Patch HTTPSPool to use the WithCert Connect/Response classes.

---

### Examples

Make a request using `requests` and patch urllib3 until you want to unpatch it:

```
>>> enable_urllib3_patch()
>>> response1 = requests.get("https://www.google.com")
>>> # self-signed, don't verify
>>> response2 = requests.get("https://cyborg", verify=False)
>>> print(response1.raw.peer_cert.get_subject().get_components())
>>> print(response2.raw.peer_cert.get_subject().get_components())
>>> # optionally disable the urllib3 patch once you no longer need
>>> # to make requests with the cert attributes attached
>>> disable_urllib3_patch()
```

---

### Notes

Modifies `urllib3.connectionpool.HTTPSConnectionPool` attributes `urllib3.connectionpool.HTTPSConnectionPool.ConnectionCls` and `urllib3.connectionpool.HTTPSConnectionPool.ResponseCls` to the `WithCert` classes.

---

`cert_human.disable_urllib3_patch()`

Unpatch `HTTPSConnectionPool` to use the default `Connect/Response` classes.

---

### Notes

Modifies `urllib3.connectionpool.HTTPSConnectionPool` attributes `urllib3.connectionpool.HTTPSConnectionPool.ConnectionCls` and `urllib3.connectionpool.HTTPSConnectionPool.ResponseCls` back to original classes.

---

`cert_human.urllib3_patch()`

Context manager to enable/disable cert patch.

---

### Examples

Make a request using `requests` using this context manager to patch `urllib3`:

```
>>> import requests
>>> with urllib3_patch():
...     response = requests.get("https://www.google.com")
...
>>> print(response.raw.peer_cert.get_subject().get_components())
```

---

`cert_human.using_urllib3_patch()`

Check if `urllib3` is patched with the `WithCert` classes.

**Returns** (`bool`)

`cert_human.check_urllib3_patch()`

Throw exception if `urllib3` is not patched with the `WithCert` classes.

**Raises** (`CertHumanError`) – if `using_urllib3_patch()` returns `False`.

---

## Conversion Functions

`cert_human.asn1_to_der(asn1)`

Convert from `asn1crypto` x509 to DER bytes.

**Parameters** `asn1` (`x509.Certificate`) – `asn1crypto` x509 to convert to DER bytes

**Returns** (`bytes`)

`cert_human.asn1_to_x509(asn1)`

Convert from `asn1crypto` x509 to `OpenSSL` x509.

**Parameters** `asn1` (`x509.Certificate`) – `asn1crypto` x509 to convert to `OpenSSL` x509

**Returns** (`OpenSSL.crypto.X509`)

---

`cert_human.der_to_asn1(der)`

Convert from DER bytes to asn1crypto x509.

**Parameters** `der` (`bytes`) – DER bytes string to convert to `x509.Certificate`.

**Returns** (`x509.Certificate`)

`cert_human.der_to_x509(der)`

Convert from DER bytes to OpenSSL x509.

**Parameters** `der` (`bytes`) – DER bytes string to convert to `x509.Certificate`.

**Returns** (`OpenSSL.crypto.X509`)

`cert_human.pem_to_x509(pem)`

Convert from PEM str to OpenSSL x509.

**Parameters** `pem` (`str`) – PEM string to convert to x509 certificate object.

**Returns** (`OpenSSL.crypto.X509`)

`cert_human.pems_to_x509(pem)`

Convert from PEM str with multiple certs to list of OpenSSL x509s.

**Parameters** `pem` (`str`) – PEM string with multiple certs to convert to x509 certificate object.

**Returns** (`list` of `OpenSSL.crypto.X509`)

`cert_human.x509_to_asn1(x509)`

Convert from OpenSSL x509 to asn1crypto x509.

**Parameters** `x509` (`OpenSSL.crypto.X509`) – x509 object to convert to `x509.Certificate`.

**Returns** (`x509.Certificate`)

`cert_human.x509_to_der(x509)`

Convert from OpenSSL x509 to DER bytes.

**Parameters** `x509` (`OpenSSL.crypto.X509`) – x509 certificate object to convert to DER.

**Returns** (`bytes`)

`cert_human.x509_to_pem(x509)`

Convert from OpenSSL x509 to PEM str.

**Parameters** `x509` (`OpenSSL.crypto.X509`) – x509 certificate object to convert to PEM.

**Returns** (`str`)

## Utility Functions

`cert_human.clsname(obj)`

Get objects class name.

**Parameters** `obj` (`object`) – The object or class to get the name of.

**Returns** (`str`)

`cert_human.hexify(obj, space=False, every=2, zerofill=True)`

Convert bytes, int, or str to hex and optionally space it out.

**Parameters**

- `obj` (`str` or `int` or `bytes`) – The object to convert into hex.

- **zerofill** (*bool*, optional) – Zero fill the string if len is not even. This gets around oddly sized hex strings. Defaults to: True.
- **space** (*bool*, optional) – Space the output string using join. Defaults to: False.
- **join** (*str*, optional) – Rejoining str. Defaults to: ” “.
- **every** (*str*, optional) – The number of characters to split on. Defaults to: 2.

**Returns** (*str*)

`cert_human.indent(txt, n=4, s=' ')`  
Text indenter.

**Parameters**

- **txt** (*str*) – The text to indent.
- **n** (*str*, optional) – Number of s to indent txt. Defaults to: 4.
- **s** (*str*, optional) – Char to use for indent. Defaults to: ” “.

**Returns** (*str*)

`cert_human.write_file(path, text, overwrite=False, mkparent=True, protect=True)`  
Write text to path.

**Parameters**

- **path** (*str* or *pathlib.Path*) – The path to write text to.
- **text** (*str*) – The text to write to path.
- **overwrite** (*bool*, optional) – Overwrite file if exists. Defaults to: False.
- **mkparent** (*bool*, optional) – Create parent directory if not exist. Defaults to: True.
- **protect** (*bool*, optional) – Set file 0600 and parent 0700. Defaults to: True.

**Raises** (*CertHumanError*) – path exists and not overwrite, parent not exist and not mkparent.

**Returns** (*pathlib.Path*)

`cert_human.read_file(path)`  
Read text from path.

**Parameters** **path** (*str* or *pathlib.Path*) – Path to file to read.

**Raises** (*CertHumanError*) – if path does not exist.

**Returns** (*str*)

`cert_human.find_certs(txt)`  
Split text with multiple certificates into a list of certificates.

**Parameters** **txt** (*str*) – the text to find certificates in.

**Returns** (*list* of *str*)



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