

```
C:\>set PATH=%PATH%;C:\OpenSSL-Win64\bin
```

```
C:\>set PATH=%PATH%;C:\Program File\Java\jdk-14.0.2\bin
```

Administrator: C:\Windows\system32\cmd.exe

```
C:\Program Files\Java\jdk-14.0.2\bin>keytool -genkey -alias Deb -keystore DebKey
Store.jks -Keyalg RSA -sigalg SHA1withRSA
Enter keystore password:
Re-enter new password:
What is your first and last name?
  [Unknown]: Weijian Xiong
What is the name of your organizational unit?
  [Unknown]: NPU
What is the name of your organization?
  [Unknown]: NPU
What is the name of your City or Locality?
  [Unknown]: Fremont
What is the name of your State or Province?
  [Unknown]: California
What is the two-letter country code for this unit?
  [Unknown]: CA
Is CN=Weijian Xiong, OU=NPU, O=NPU, L=Fremont, ST=California, C=CA correct?
  [no]: yes

Generating 2,048 bit RSA key pair and self-signed certificate (SHA1withRSA) with
a validity of 90 days
    for: CN=Weijian Xiong, OU=NPU, O=NPU, L=Fremont, ST=California, C=CA
```

```
C:\Program Files\Java\jdk-14.0.2\bin>keytool -list -v -keystore DebKeyStore.jks
Enter keystore password:
Keystore type: PKCS12
Keystore provider: SUN

Your keystore contains 1 entry

Alias name: deb
Creation date: Jul 17, 2020
Entry type: PrivateKeyEntry
Certificate chain length: 1
Certificate[1]:
Owner: CN=Weijian Xiong, OU=NPU, O=NPU, L=Fremont, ST=California, C=CA
Issuer: CN=Weijian Xiong, OU=NPU, O=NPU, L=Fremont, ST=California, C=CA
Serial number: e06c383627364bb9
Valid from: Fri Jul 17 07:16:39 PDT 2020 until: Thu Oct 15 07:16:39 PDT 2020
Certificate fingerprints:
    SHA1: 49:89:F6:BD:90:DB:EC:3E:9E:50:8C:EF:E5:A7:58:AE:BE:34:16:4F
    SHA256: 10:C4:EB:F1:DC:1F:7D:27:12:C2:D8:80:C6:86:10:E1:81:6A:6F:6F:93:
E6:2B:CA:66:F8:B6:9F:BB:9A:B7:11
Signature algorithm name: SHA1withRSA
Subject Public Key Algorithm: 2048-bit RSA key
Version: 3

Extensions:

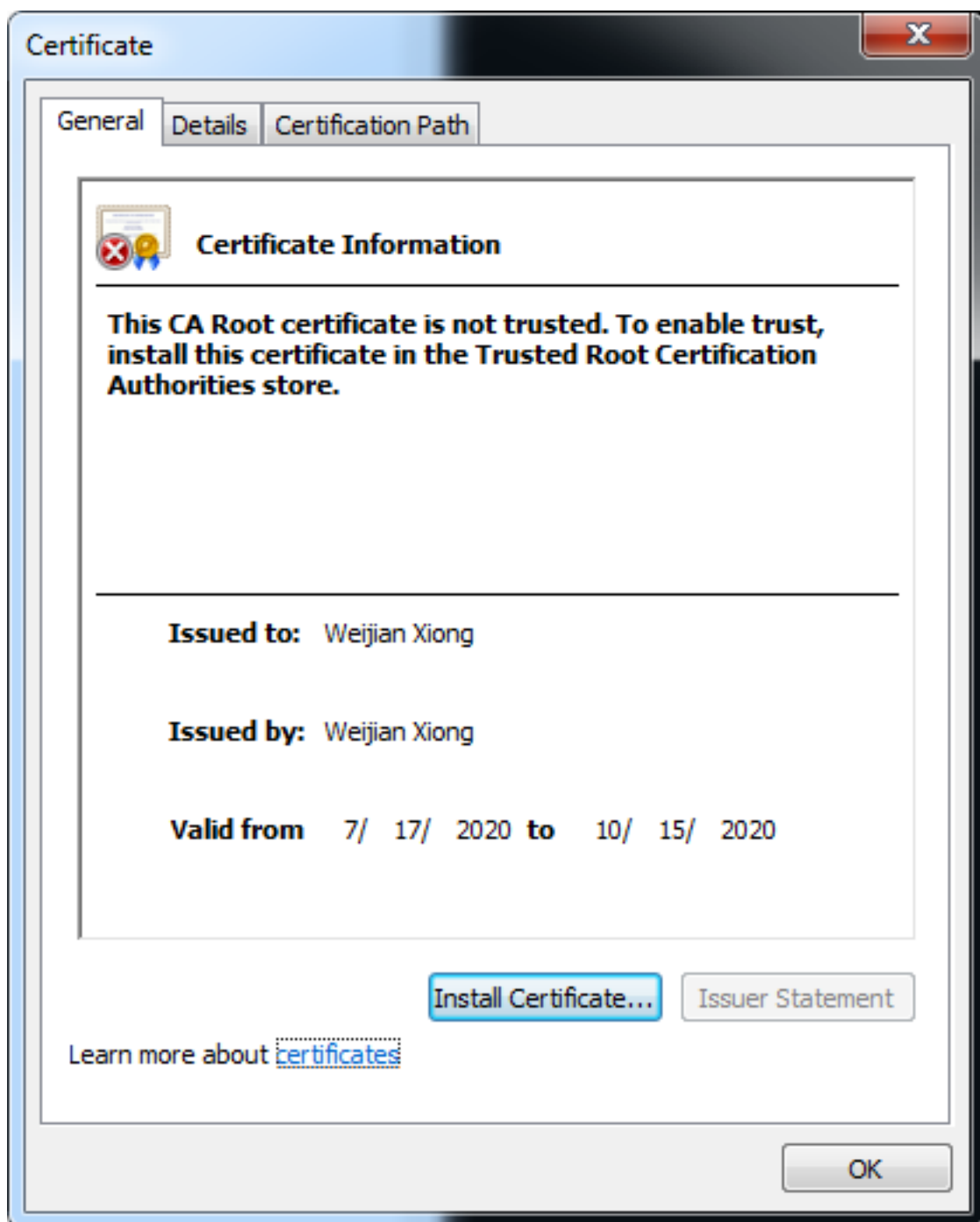
#1: ObjectId: 2.5.29.14 Criticality=false
SubjectKeyIdentifier [
KeyIdentifier [
0000: 5E 00 13 DE 18 52 CB A5    9F 1E C9 27 0E F5 28 56    ^....R.....'..<U
0010: 06 06 ED D3                ....
]
]

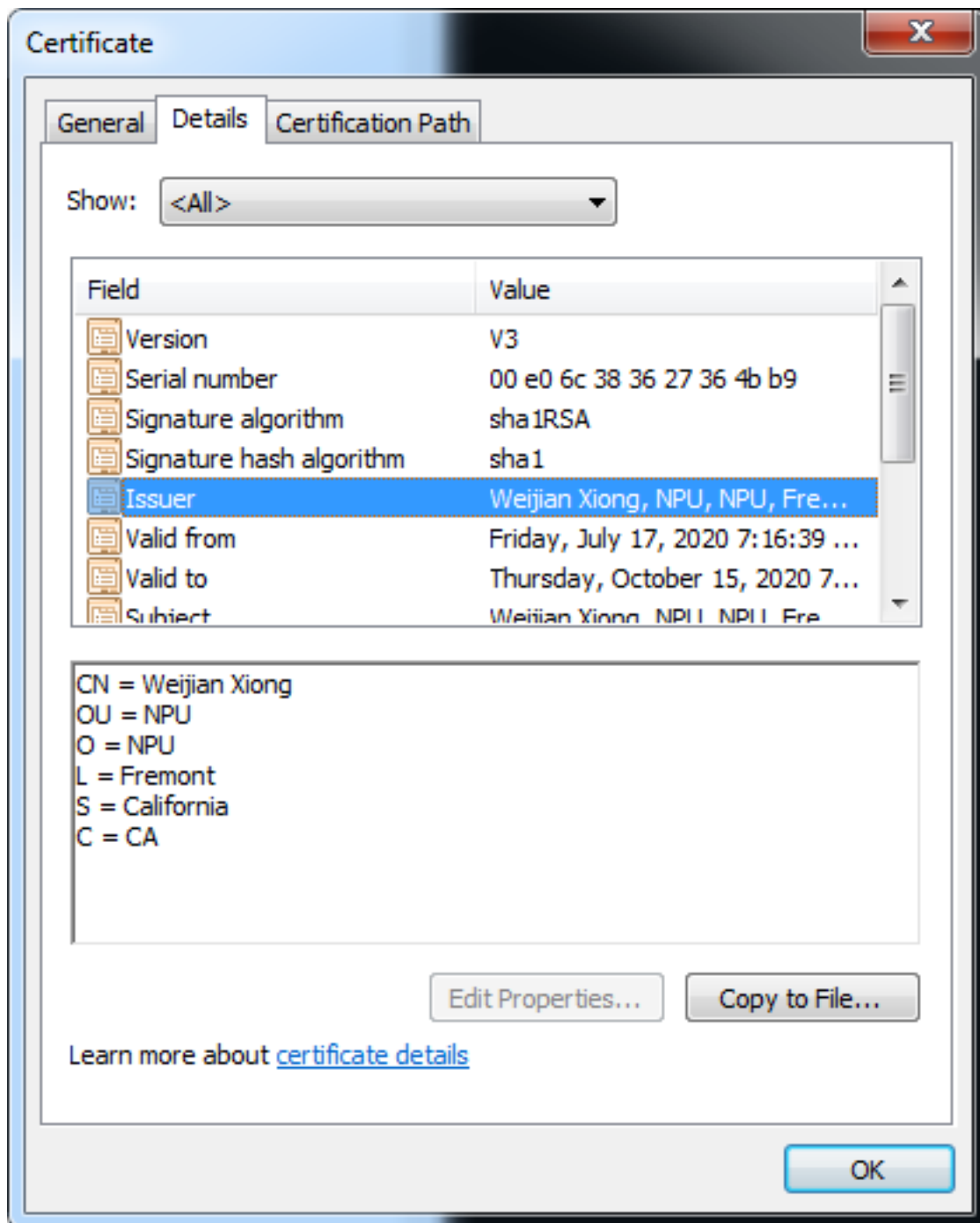
*****
*****
```

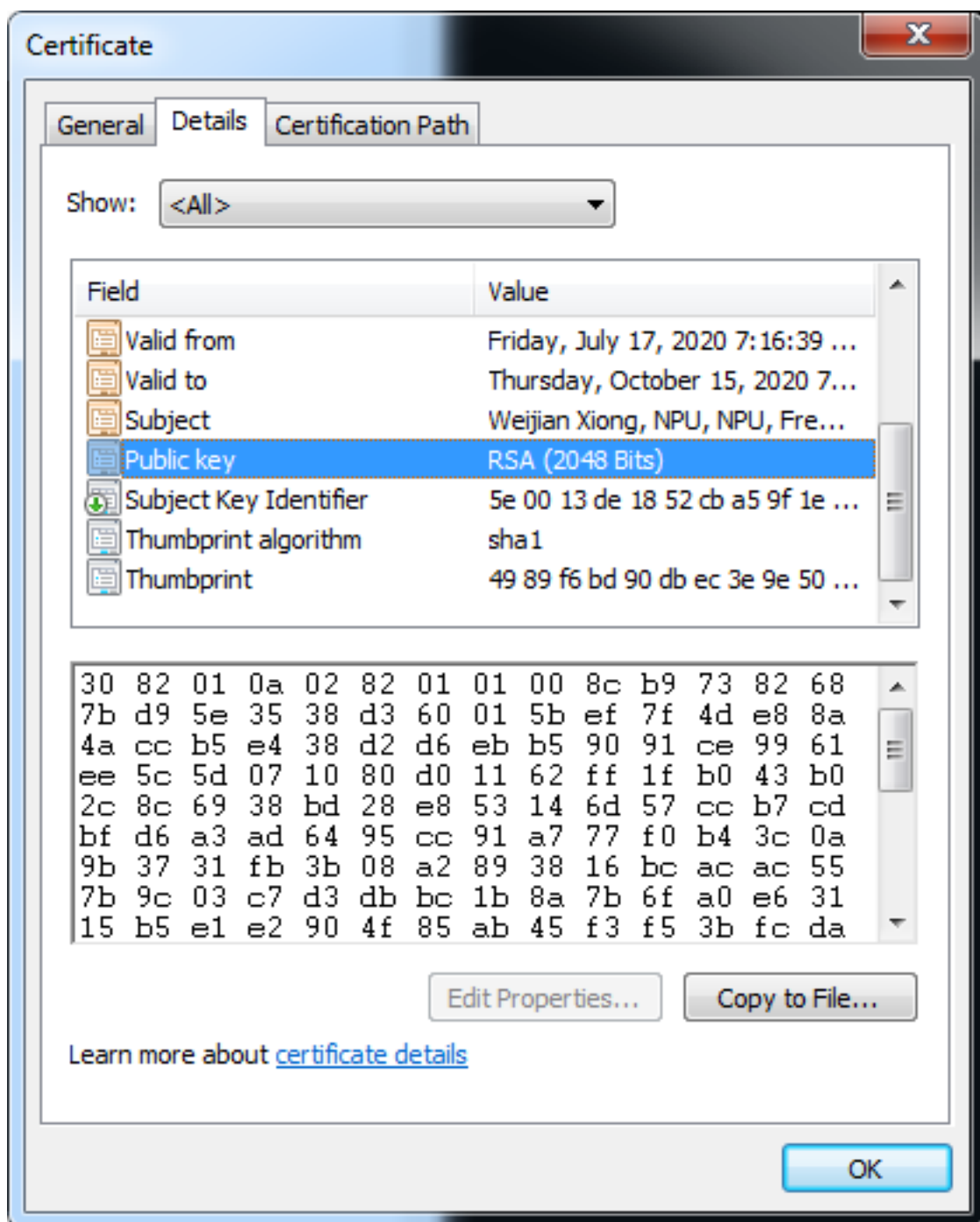
```
C:\Program Files\Java\jdk-14.0.2\bin>keytool -export -alias Deb -file Deb.cer -keystore DebKeyStore.jks
Enter keystore password:
Certificate stored in file <Deb.cer>
```

```
C:\Program Files\Java\jdk-14.0.2\bin>keytool -printcert -v -file Deb.cer
Owner: CN=Weijian Xiong, OU=NPU, O=NPU, L=Fremont, ST=California, C=CA
Issuer: CN=Weijian Xiong, OU=NPU, O=NPU, L=Fremont, ST=California, C=CA
Serial number: e06c383627364bb9
Valid from: Fri Jul 17 07:16:39 PDT 2020 until: Thu Oct 15 07:16:39 PDT 2020
Certificate fingerprints:
    SHA1: 49:89:F6:BD:90:DB:EC:3E:9E:50:8C:EF:E5:A7:58:AE:BE:34:16:4F
    SHA256: 10:C4:EB:F1:DC:1F:7D:27:12:C2:D8:80:C6:86:10:E1:81:6A:6F:6F:93:E6:2B:CA:66:F8:B6:9F:BB:9A:B7:11
Signature algorithm name: SHA1withRSA
Subject Public Key Algorithm: 2048-bit RSA key
Version: 3

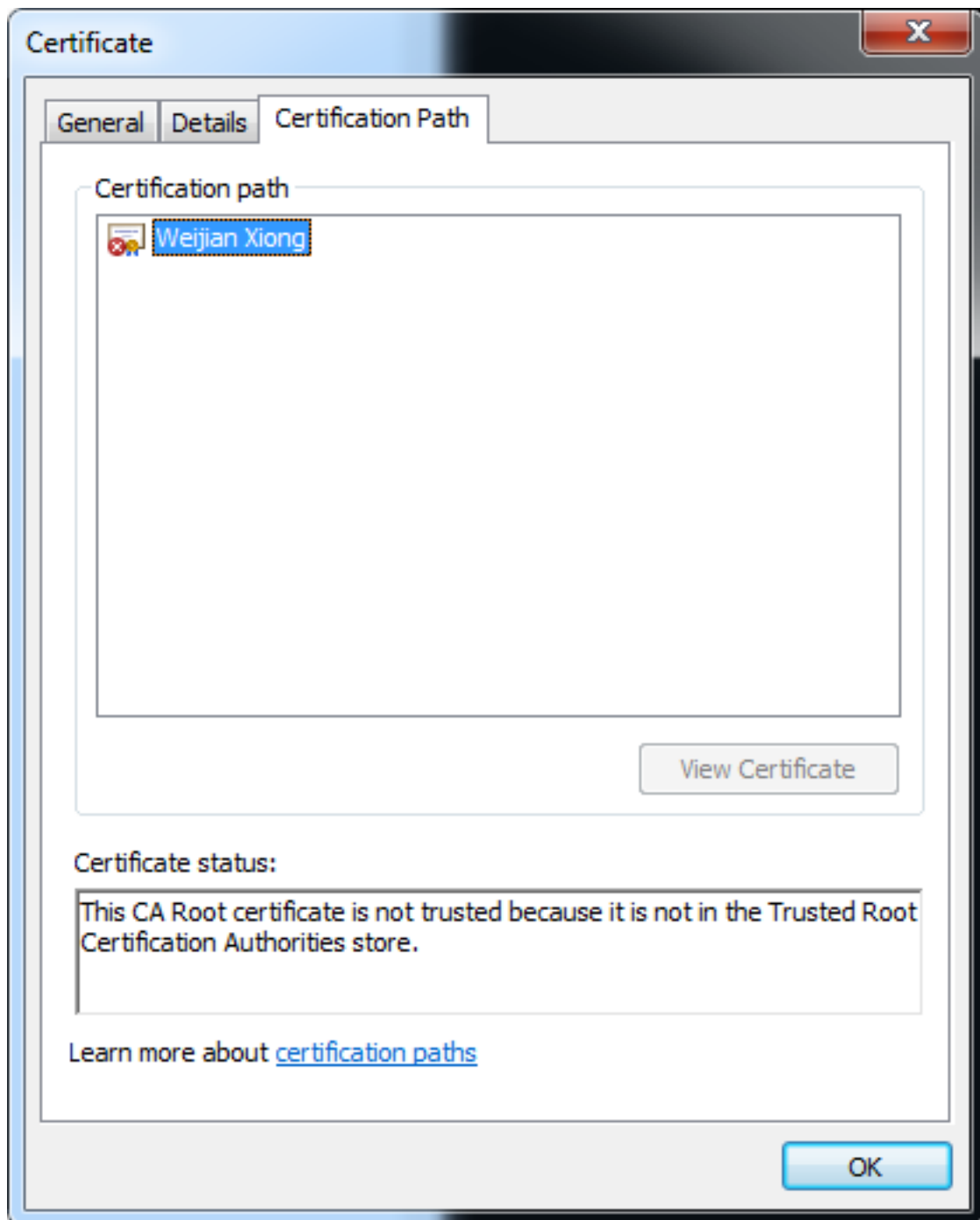
Extensions:
#1: ObjectId: 2.5.29.14 Criticality=false
SubjectKeyIdentifier [
KeyIdentifier [
0000: 5E 00 13 DE 18 52 CB A5    9F 1E C9 27 0E F5 28 56    ^....R.....'...<U
0010: 06 06 ED D3                ....
]
]
```











```
C:\>cd CA

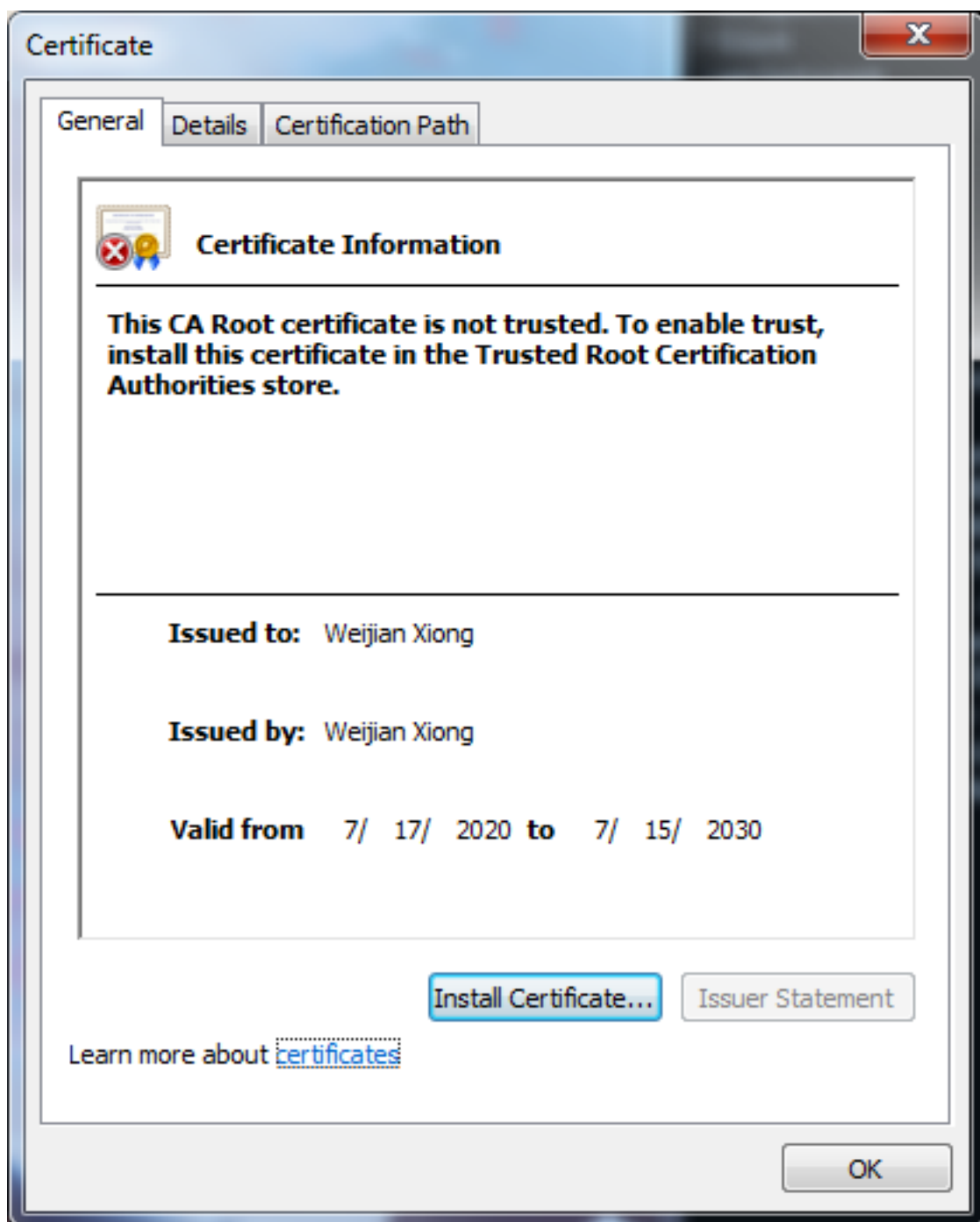
C:\CA>set RANDFILE=rand

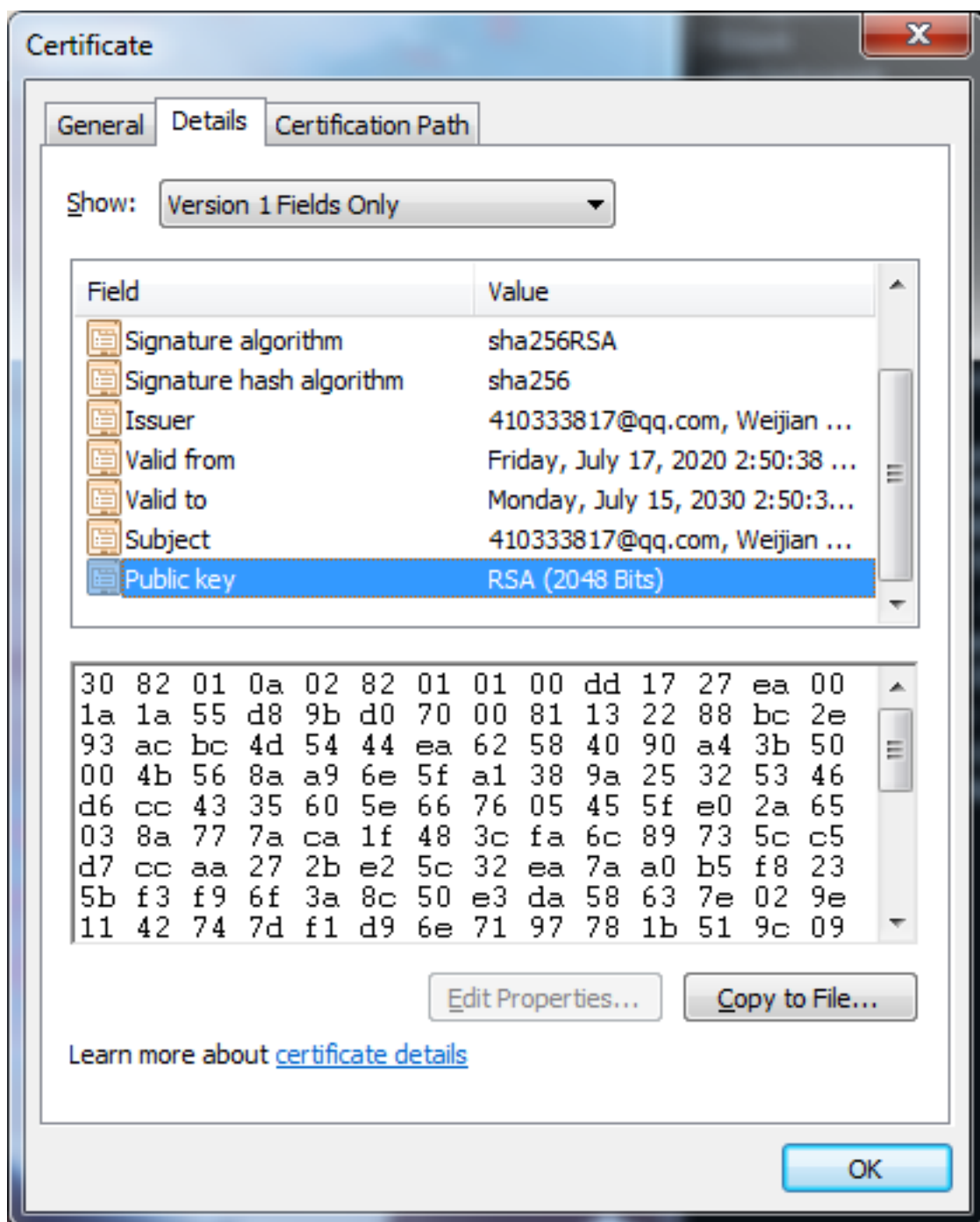
C:\CA>openssl req -new -keyout cakey.pem -out careq.pem -config C:\OpenSSL-Win64\bin\openssl.cfg
Generating a RSA private key
.....+++++
....+++++
writing new private key to 'cakey.pem'
Enter PEM pass phrase:
Verifying - Enter PEM pass phrase:
-----
You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a DN.
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
Country Name (2 letter code) [AU]:CA
State or Province Name (full name) [Some-State]:CA
Locality Name (eg, city) []:Fremont
Organization Name (eg, company) [Internet Widgits Pty Ltd]:NPU
Organizational Unit Name (eg, section) []:NPU
Common Name (e.g. server FQDN or YOUR name) []:Weijian Xiong
Email Address []:410333817@qq.com

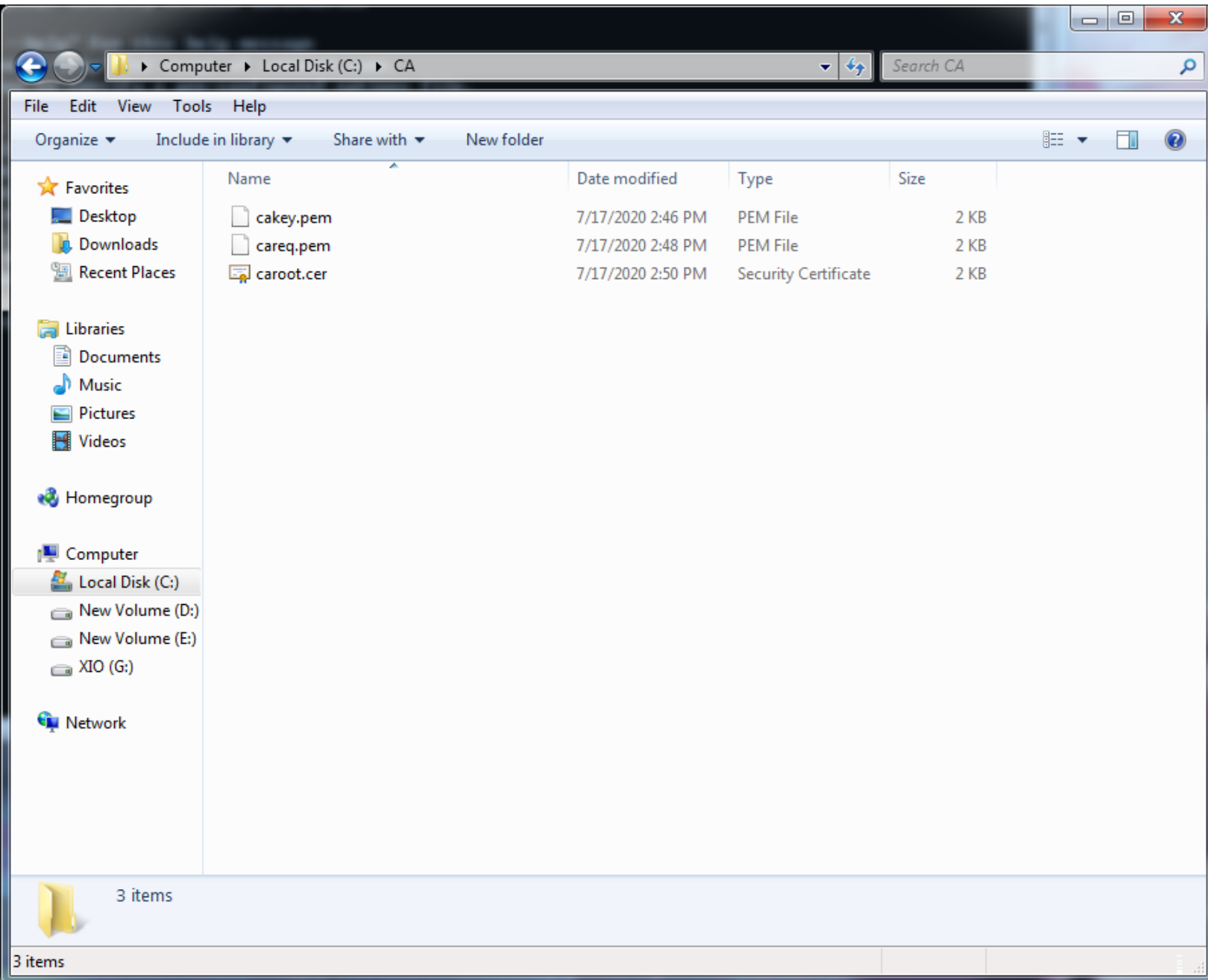
Please enter the following 'extra' attributes
to be sent with your certificate request
A challenge password []:Password
An optional company name []:NPU
```

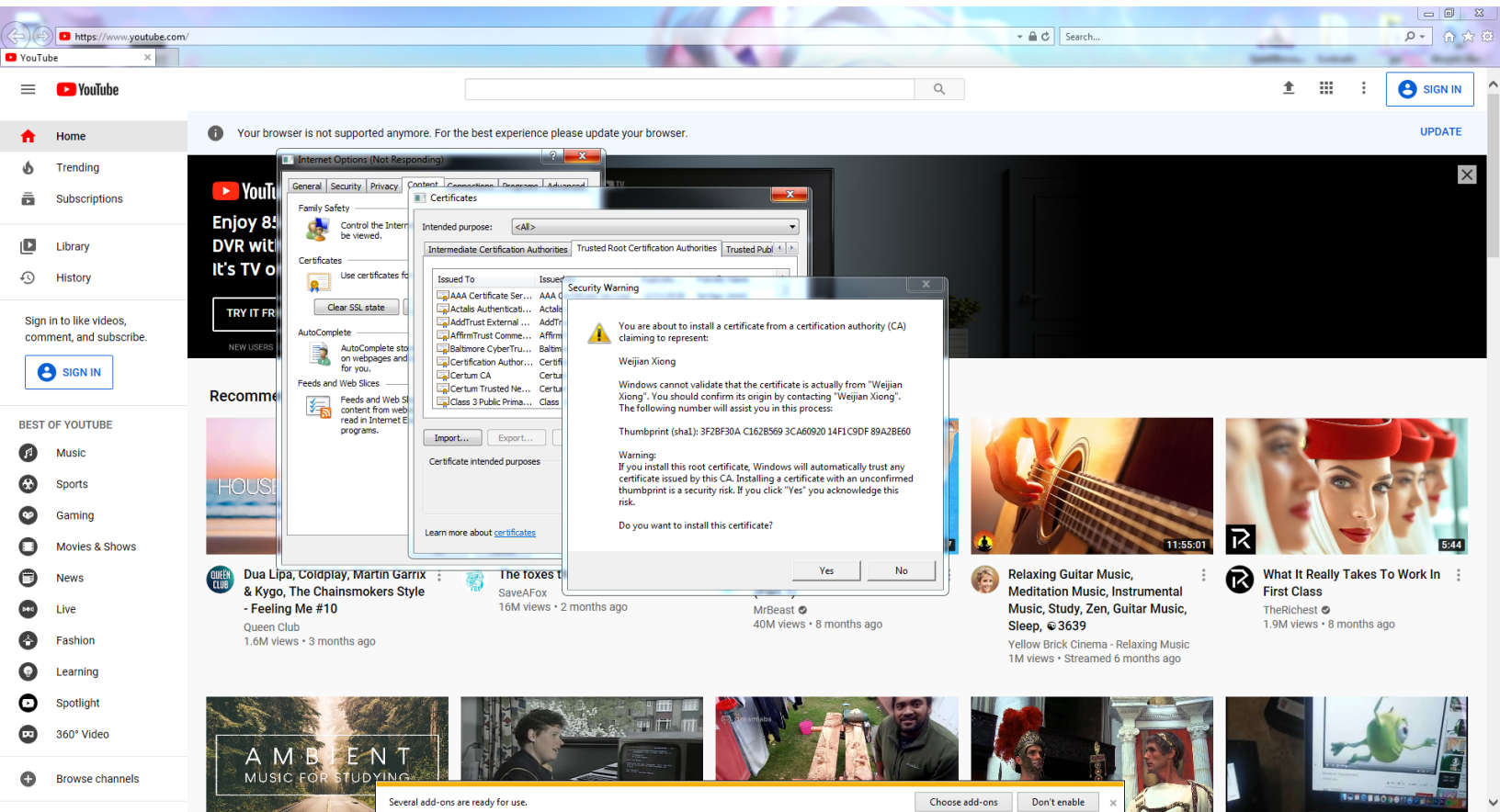
```
C:\CA>openssl x509 -signkey cakey.pem -req -days 3650 -in careq.pem -out caroot.cer -extensions v3_ca
Signature ok
subject=C = CA, ST = CA, L = Fremont, O = NPU, OU = NPU, CN = Weijian Xiong, emailAddress = 410333817@qq.com
Getting Private key
Enter pass phrase for cakey.pem:
```

```
C:\CA>keytool -printcert -v -file caroot.cer
Owner: EMAILADDRESS=410333817@qq.com, CN=Weijian Xiong, OU=NPU, O=NPU, L=Fremont, ST=CA, C=CA
Issuer: EMAILADDRESS=410333817@qq.com, CN=Weijian Xiong, OU=NPU, O=NPU, L=Fremont, ST=CA, C=CA
Serial number: 75baff7942343ba1f99fbb5b4ec62df274d64c30
Valid from: Fri Jul 17 14:50:38 PDT 2020 until: Mon Jul 15 14:50:38 PDT 2030
Certificate fingerprints:
    SHA1: 3F:2B:F3:0A:C1:62:B5:69:3C:A6:09:20:14:F1:C9:DF:89:A2:BE:60
    SHA256: 2A:4A:DA:24:98:BD:24:DE:E3:05:23:18:9A:06:B7:3A:B3:20:6F:75:82:46:8E:3E:F3:E6:74:40:60:2A:1F:29
Signature algorithm name: SHA256withRSA
Subject Public Key Algorithm: 2048-bit RSA key
Version: 1
```











```
C:\Program Files\Java\jdk-14.0.2\lib\security>keytool -list -protected -keystore cacerts
Warning: use -cacerts option to access cacerts keystore
```

```
***** WARNING WARNING WARNING *****
* The integrity of the information stored in your keystore *
* has NOT been verified! In order to verify its integrity, *
* you must provide your keystore password.                *
***** WARNING WARNING WARNING *****
```

```
Keystore type: JKS
Keystore provider: SUN
```

```
Your keystore contains 91 entries
```

```
actalisauthenticationrootca [jdk], Sep 22, 2011, trustedCertEntry,
Certificate fingerprint (SHA-256): 55:92:60:84:EC:96:3A:64:B9:6E:2A:BE:01:CE:0B:A8:6A:64:FB:FE:BC:C7:AA:B5:AF:C1:55:B3:7F:D7:60:66
addtrustexternalca [jdk], May 30, 2000, trustedCertEntry,
Certificate fingerprint (SHA-256): 68:7F:A4:51:38:22:78:FF:F0:C8:B1:1F:8D:43:D5:76:67:1C:6E:B2:BC:EA:B4:13:FB:83:D9:65:D0:6D:2F:F2
addtrustqualifiedca [jdk], May 30, 2000, trustedCertEntry,
Certificate fingerprint (SHA-256): 80:95:21:08:05:DB:4B:BC:35:5E:44:28:D8:FD:6E:C2:CD:E3:AB:5F:B9:7A:99:42:98:8E:B8:F4:DC:D0:60:16
affirmtrustcommercialca [jdk], Jan 29, 2010, trustedCertEntry,
Certificate fingerprint (SHA-256): 03:76:AB:1D:54:C5:F9:80:3C:E4:B2:E2:01:A0:EE:7E:EF:7B:57:B6:36:E8:A9:3C:9B:8D:48:60:C9:6F:5F:A7
affirmtrustnetworkingca [jdk], Jan 29, 2010, trustedCertEntry,
Certificate fingerprint (SHA-256): 0A:81:EC:5A:92:97:77:F1:45:90:4A:F3:8D:5D:50:9F:66:B5:E2:C5:8F:CD:B5:31:05:8B:0E:17:F3:F0:B4:1B
affirmtrustpremiumca [jdk], Jan 29, 2010, trustedCertEntry,
Certificate fingerprint (SHA-256): 70:A7:3F:7F:37:6B:60:07:42:48:90:45:34:B1:14:82:D5:BF:0E:69:8E:CC:49:8D:F5:25:77:EB:F2:E9:3B:9A
affirmtrustpremiumeccca [jdk], Jan 29, 2010, trustedCertEntry,
Certificate fingerprint (SHA-256): BD:71:FD:F6:DA:97:E4:CF:62:D1:64:7A:DD:25:81:B0:7D:79:AD:F8:39:7E:B4:EC:BA:9C:5E:84:88:82:14:23
amazonrootca1 [jdk], May 25, 2015, trustedCertEntry,
Certificate fingerprint (SHA-256): 8E:CD:E6:88:4F:3D:87:B1:12:5B:A3:1A:C3:FC:B1:3D:70:16:DE:7F:57:CC:90:4F:E1:CB:97:C6:AE:98:19:6E
amazonrootca2 [jdk], May 25, 2015, trustedCertEntry,
Certificate fingerprint (SHA-256): 1B:A5:B2:AA:8C:65:40:1A:82:96:01:18:F8:0B:EC:4F:62:30:4D:83:CE:C4:71:3A:19:C3:9C:01:1E:A4:6D:B4
amazonrootca3 [jdk], May 25, 2015, trustedCertEntry,
Certificate fingerprint (SHA-256): 18:CE:6C:FE:7B:F1:4E:60:B2:E3:47:B8:DF:E8:68:CB:31:D0:2E:BB:3A:DA:27:15:69:F5:03:43:B4:6D:B3:A4
amazonrootca4 [jdk], May 25, 2015, trustedCertEntry,
Certificate fingerprint (SHA-256): E3:5D:28:41:9E:D0:20:25:CF:A6:90:38:CD:62:39:62:45:8D:A5:C6:95:FB:DE:A3:C2:2B:0B:FB:25:89:70:92
baltimorecybertrustca [jdk], May 12, 2000, trustedCertEntry,
Certificate fingerprint (SHA-256): 16:AF:57:A9:F6:76:B0:AB:12:60:95:AA:5E:BA:DE:F2:2A:B3:11:19:D6:44:AC:95:CD:4B:93:DB:F3:F2:6A:EB
buypassclass2ca [jdk], Oct 26, 2010, trustedCertEntry,
Certificate fingerprint (SHA-256): 9A:11:40:25:19:7C:5B:B9:5D:94:E6:3D:55:CD:43:79:08:47:B6:46:B2:3C:DF:11:AD:A4:A0:0E:FF:15:FB:48
buypassclass3ca [jdk], Oct 26, 2010, trustedCertEntry,
Certificate fingerprint (SHA-256): ED:F7:EB:BC:A2:7A:2A:38:4D:38:7B:7D:40:10:C6:66:E2:ED:B4:84:3E:4C:29:B4:AE:1D:5B:93:32:E6:B2:4D
camerfirmachambersca [jdk], Aug 1, 2008, trustedCertEntry,
Certificate fingerprint (SHA-256): 06:3E:4A:FA:C4:91:DF:D3:32:F3:08:9B:85:42:E9:46:17:D8:93:D7:FE:94:4E:10:A7:93:7E:E2:9D:96:93:C0
camerfirmachamberscommerceca [jdk], Sep 30, 2003, trustedCertEntry,
Certificate fingerprint (SHA-256): 0C:25:8A:12:A5:67:4A:EF:25:F2:8B:A7:DC:FA:EC:EE:A3:48:E5:41:E6:F5:CC:4E:E6:3B:71:B3:61:60:6A:C3
camerfirmachamberssignca [jdk], Aug 1, 2008, trustedCertEntry,
```

```
C:\CA>openssl x509 -CA caroot.cer -CAkey cakey.pem -CAserial serial.txt -req -in ../Keys/Deb.csr -out ../Keys/DebTestCA.cer -days 365
Signature ok
subject=C = CA, ST = California, L = Fremont, O = NPU, OU = NPU, CN = Weijian Xiong
Getting CA Private Key
Enter pass phrase for cakey.pem:
```

Computer > Local Disk (C:) > Keys

Search Keys

File Edit View Tools Help

Organize Open New folder

★ Favorites

Desktop

Downloads

Recent Places

Libraries

Documents

Music

Pictures

Videos

Homegroup

Computer

Local Disk (C:)

New Volume (D:)

New Volume (E:)


XIO (G:)

Network

Name	Date modified	Type	Size
Deb.cer	7/17/2020 3:16 PM	Security Certificate	1 KB
Deb.csr	7/17/2020 3:17 PM	CSR File	2 KB
DebKeyStore.jks	7/17/2020 3:12 PM	JKS File	3 KB
DebTestCA.cer	7/17/2020 3:18 PM	Security Certificate	2 KB

Certificate

General Details Certification Path

 **Certificate Information**

**This certificate is intended for the following purpose(s):**

- All application policies

**Issued to:** Weijian Xiong

**Issued by:** Weijian Xiong

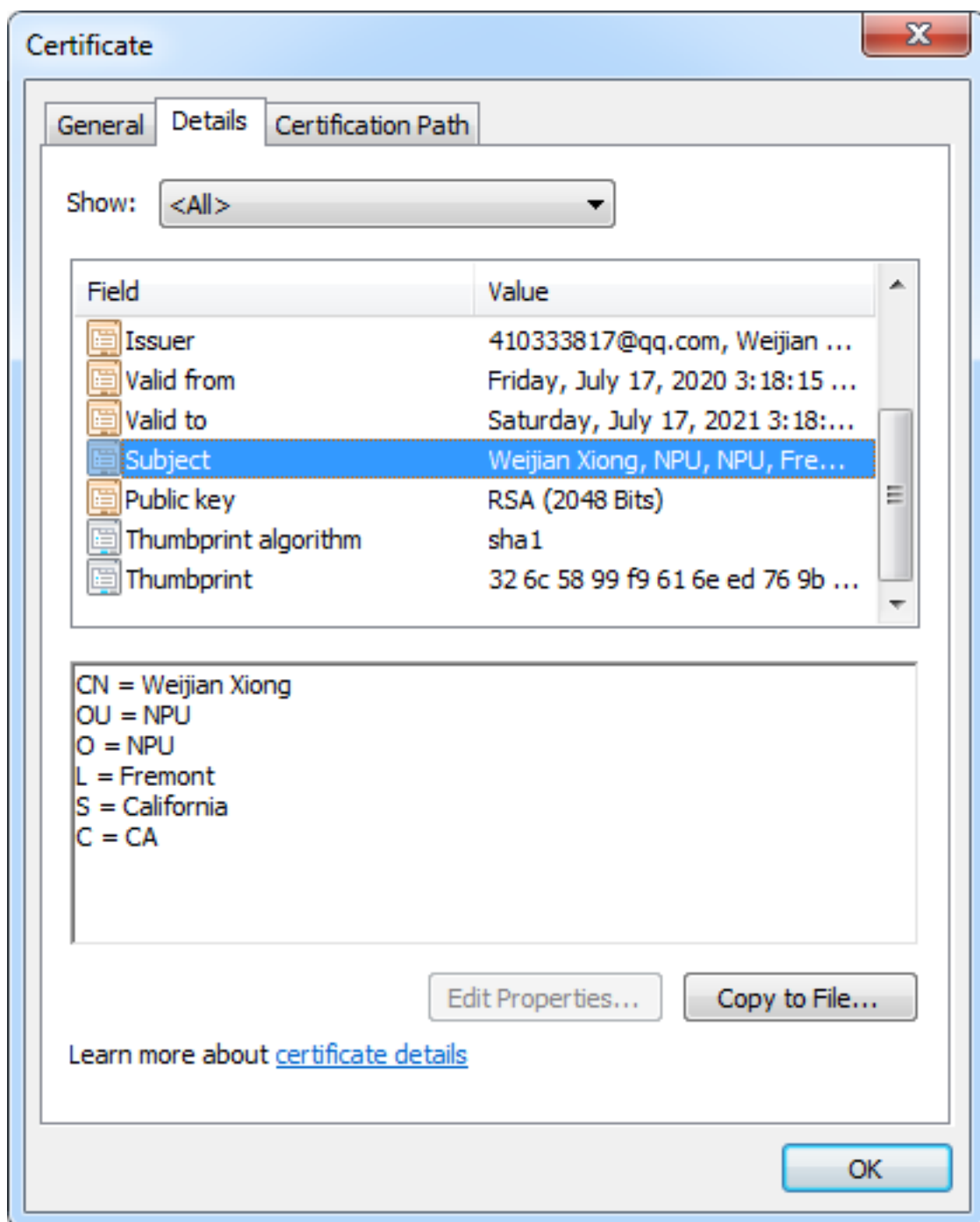
**Valid from** 7/ 17/ 2020 **to** 7/ 17/ 2021

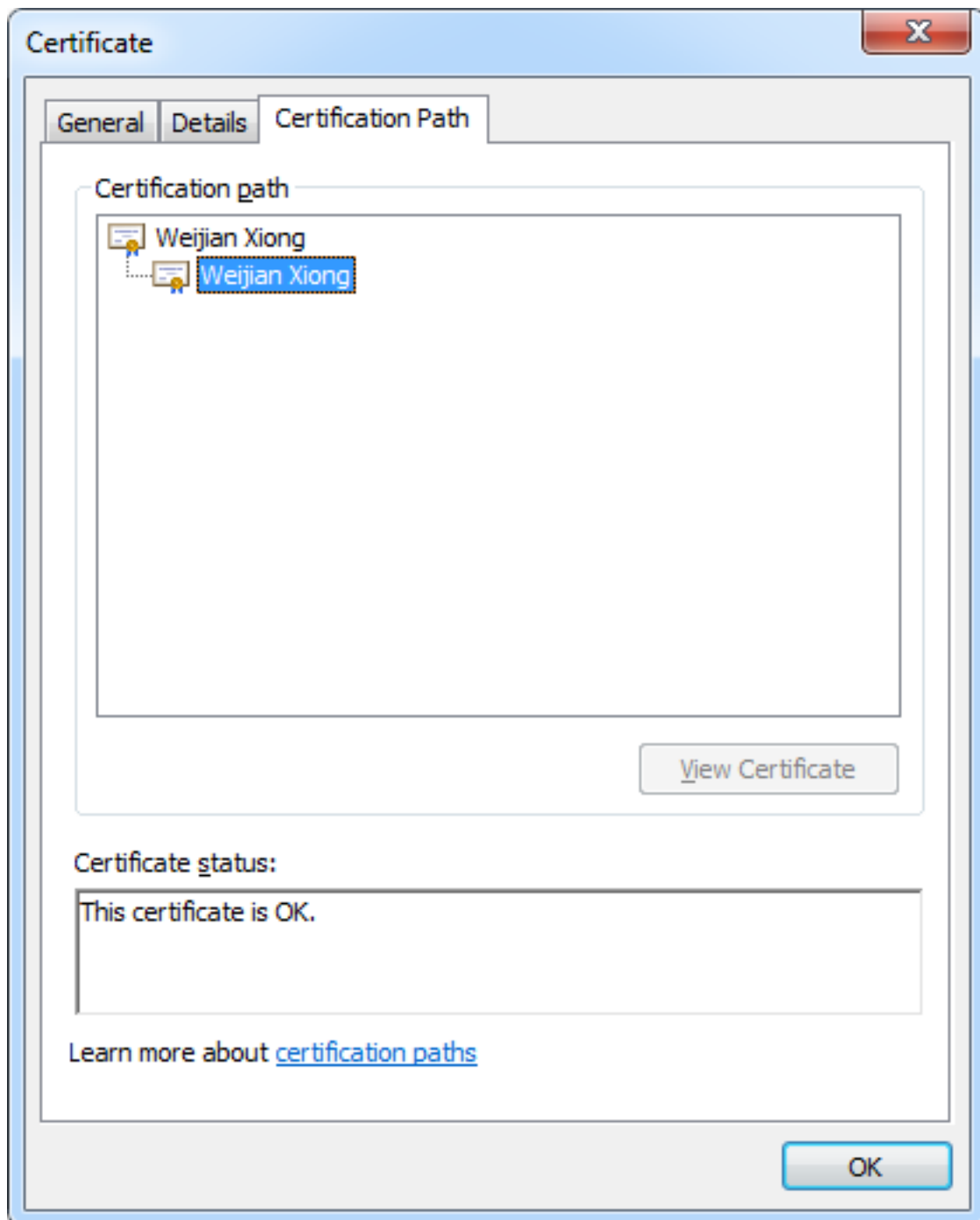
Install Certificate...

Issuer Statement

Learn more about [certificates](#)

OK





```
C:\Keys>keytool -import -alias TestCA -file ../CA/caroot.cer -keystore DebKeyStore.jks
Enter keystore password:
Owner: EMAILADDRESS=410333817@qq.com, CN=Weijian Xiong, OU=NPU, O=NPU, L=Fremont, ST=CA, C=CA
Issuer: EMAILADDRESS=410333817@qq.com, CN=Weijian Xiong, OU=NPU, O=NPU, L=Fremont, ST=CA, C=CA
Serial number: 75baff7942343ba1f99fbb5b4ec62df274d64c30
Valid from: Fri Jul 17 14:50:38 PDT 2020 until: Mon Jul 15 14:50:38 PDT 2030
Certificate fingerprints:
    SHA1: 3F:2B:F3:0A:C1:62:B5:69:3C:A6:09:20:14:F1:C9:DF:89:A2:BE:60
    SHA256: 2A:4A:DA:24:98:BD:24:DE:E3:05:23:18:9A:06:B7:3A:B3:20:6F:75:82:46:8E:3E:F3:E6:74:40:60:2A:1F:29
Signature algorithm name: SHA256withRSA
Subject Public Key Algorithm: 2048-bit RSA key
Version: 1
Trust this certificate? [no]: yes
Certificate was added to keystore
```

```
C:\Keys>keytool -import -alias Deb -file DebTestCA.cer -keystore DebKeyStore.jks
Enter keystore password:
Certificate reply was installed in keystore
```

```
C:\Keys>keytool -list -v -keystore DebKeyStore.jks
```

```
Enter keystore password:
```

```
Keystore type: PKCS12
```

```
Keystore provider: SUN
```

```
Your keystore contains 2 entries
```

```
Alias name: deb
```

```
Creation date: Jul 17, 2020
```

```
Entry type: PrivateKeyEntry
```

```
Certificate chain length: 2
```

```
Certificate[1]:
```

```
Owner: CN=Weijian Xiong, OU=NPU, O=NPU, L=Fremont, ST=California, C=CA
```

```
Issuer: EMAILADDRESS=410333817@qq.com, CN=Weijian Xiong, OU=NPU, O=NPU, L=Fremont, ST=CA, C=CA
```

```
Serial number: 1235
```

```
Valid from: Fri Jul 17 15:18:15 PDT 2020 until: Sat Jul 17 15:18:15 PDT 2021
```

```
Certificate fingerprints:
```

```
SHA1: 32:6C:58:99:F9:61:6E:ED:76:9B:AE:87:1B:80:17:FD:DF:98:0B:E6
```

```
SHA256: 9B:CD:9B:4D:91:A0:04:78:8B:7E:90:C9:EE:14:AC:0D:8D:17:A1:11:BC:32:8D:BA:C2:ED:3F:D4:17:3F:D6:10
```

```
Signature algorithm name: SHA256withRSA
```

```
Subject Public Key Algorithm: 2048-bit RSA key
```

```
Version: 1
```

```
Certificate[2]:
```

```
Owner: EMAILADDRESS=410333817@qq.com, CN=Weijian Xiong, OU=NPU, O=NPU, L=Fremont, ST=CA, C=CA
```

```
Issuer: EMAILADDRESS=410333817@qq.com, CN=Weijian Xiong, OU=NPU, O=NPU, L=Fremont, ST=CA, C=CA
```

```
Serial number: 75baff7942343ba1f99fbb5b4ec62df274d64c30
```

```
Valid from: Fri Jul 17 14:50:38 PDT 2020 until: Mon Jul 15 14:50:38 PDT 2030
```

```
Certificate fingerprints:
```

```
SHA1: 3F:2B:F3:0A:C1:62:B5:69:3C:A6:09:20:14:F1:C9:DF:89:A2:BE:60
```

```
SHA256: 2A:4A:DA:24:98:BD:24:DE:E3:05:23:18:9A:06:B7:3A:B3:20:6F:75:82:46:8E:3E:F3:E6:74:40:60:2A:1F:29
```

```
Signature algorithm name: SHA256withRSA
```

```
Subject Public Key Algorithm: 2048-bit RSA key
```

```
Version: 1
```

```
*****  
*****
```

```
Alias name: testca
```

```
Creation date: Jul 17, 2020
```

```
Entry type: trustedCertEntry
```

```
Owner: EMAILADDRESS=410333817@qq.com, CN=Weijian Xiong, OU=NPU, O=NPU, L=Fremont, ST=CA, C=CA
```

```
Issuer: EMAILADDRESS=410333817@qq.com, CN=Weijian Xiong, OU=NPU, O=NPU, L=Fremont, ST=CA, C=CA
```

```
Serial number: 75baff7942343ba1f99fbb5b4ec62df274d64c30
```

```
Valid from: Fri Jul 17 14:50:38 PDT 2020 until: Mon Jul 15 14:50:38 PDT 2030
```

```
Certificate fingerprints:
```

```
SHA1: 3F:2B:F3:0A:C1:62:B5:69:3C:A6:09:20:14:F1:C9:DF:89:A2:BE:60
```

```
SHA256: 2A:4A:DA:24:98:BD:24:DE:E3:05:23:18:9A:06:B7:3A:B3:20:6F:75:82:46:8E:3E:F3:E6:74:40:60:2A:1F:29
```

```
Signature algorithm name: SHA256withRSA
```

```
Subject Public Key Algorithm: 2048-bit RSA key
```

```
Version: 1
```

```
*****  
*****
```