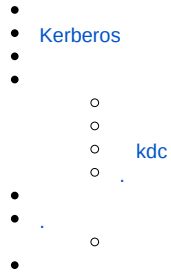


JaCarta: Astra Linux Directory



- Astra Linux Special Edition .10015-01 (1.7), .10015-10
- Astra Linux Special Edition .10015-17
- Astra Linux Special Edition .10015-37 (7.7)
- Astra Linux Special Edition .10015-03 (7.6)
- Astra Linux Special Edition .10152-02 (4.7)
- Astra Linux Special Edition .10015-01 (1.6)
[20190222SE16 \(2\)](#)
- Astra Linux Special Edition .10015-16 . 1
- Astra Linux Special Edition .10015-16 . 2
- Astra Linux Special Edition .10265-01 (8.1)
- Astra Linux Common Edition 2.12

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```



Kerberos

- (ticket) – , , ;
- (client) – (,), Kerberos;
- (key distribution center, KDC) – , Kerberos;
- (realm) – , Kerberos, KDC . realm , ;
- (principal) – , Kerberos. root[/instance]@REALM.

, (, ,) jcpkcs11-2. Astra Linux. : <https://www.aladdin-rd.ru>.

1. jcpkcs11-2 ;
2. Astra Linux:

```
sudo apt install -y opensc libengine-pkcs11-openssl1.1 pcsc-tools
```

OpenSSL — SSL/TLS. RSA, DH, DSA, X.509, , CSR CRT. SMARTCARD.ALD. , :

- SMARTCARD.ALD;
- - kdc;
- - client.

;

$$\vdots$$

1. 0:

```
sudo mkdir /etc/ssl/CA
```

2. :

```
cd /etc/ssl/CA
```

3. , -subst:

 Common name (CN) : SMARTCARD.ALD

```
sudo openssl genrsa -out cakey.pem 2048
sudo openssl req -batch -new -key cakey.pem -out cacert.pem -subj '
/C=RU/ST=M0/L=Moscow/O=Astra/OU=Wiki/emailAddress= /CN=SMARTCARD.ALD' -
x509 -days 3650
```

 days .

kdc

1. KDC, -subst:

 Common name (CN) kdc.

```
sudo openssl genrsa -out kdckey.pem 2048
sudo openssl req -batch -new -key kdckey.pem -out kdc.req -subj '
/C=RU/ST=M0/L=Moscow/O=Astra/OU=Wiki/emailAddress= /CN=kdc'
```

2. . , , :

```
export REALM=SMARTCARD.ALD
export CLIENT=kdc
```

3. , :

```
env | grep -wE "REALM|CLIENT"
```

4. pkinit_extensions : [pkinit_extensions](#).

```

[ kdc_cert ]
basicConstraints=CA:FALSE

# Here are some examples of the usage of nsCertType. If it is omitted
keyUsage = nonRepudiation, digitalSignature, keyEncipherment, keyAgreement

#Pkinit EKU
extendedKeyUsage = 1.3.6.1.5.2.3.5

subjectKeyIdentifier=hash
authorityKeyIdentifier=keyid,issuer

# Copy subject details

issuerAltName=issuer:copy

# Add id-pkinit-san (pkinit subjectAlternativeName)
subjectAltName=otherName:1.3.6.1.5.2.2;SEQUENCE:kdc_princ_name

[kdc_princ_name]
realm = EXP:0, GeneralString:${ENV::REALM}
principal_name = EXP:1, SEQUENCE:kdc_principal_seq

[kdc_principal_seq]
name_type = EXP:0, INTEGER:1
name_string = EXP:1, SEQUENCE:kdc_principals

[kdc_principals]
princ1 = GeneralString:krbtgt
princ2 = GeneralString:${ENV::REALM}

[ client_cert ]

# These extensions are added when 'ca' signs a request.

basicConstraints=CA:FALSE

keyUsage = digitalSignature, keyEncipherment, keyAgreement

extendedKeyUsage = 1.3.6.1.5.2.3.4
subjectKeyIdentifier=hash
authorityKeyIdentifier=keyid,issuer

subjectAltName=otherName:1.3.6.1.5.2.2;SEQUENCE:princ_name

# Copy subject details

issuerAltName=issuer:copy

[princ_name]
realm = EXP:0, GeneralString:${ENV::REALM}
principal_name = EXP:1, SEQUENCE:principal_seq

[principal_seq]
name_type = EXP:0, INTEGER:1
name_string = EXP:1, SEQUENCE:principals

[principals]
princ1 = GeneralString:${ENV::CLIENT}

```

5. KDC:

```

sudo openssl x509 -req -in kdc.req -CAkey cakey.pem -CA cacert.pem -out
kdc.pem -extfile pkinit_extensions -extensions kdc_cert -CAcreateserial
-days 365

```

1. , . (PKI GOST), (libjcpkcs11-2.so libASEP11.so), , :

```
dpkg -L jcpkcs11-2 | egrep "(libjcpkcs11-2.so|libASEP11.so)"  
  
/usr/lib/libASEP11.so  
/usr/lib/libjcpkcs11-2.so.2.7.3
```

, /usr/lib/.

2. JaCarta:

- a. libjcpkcs11-2.so (JaCarta PKI//FLASH):

```
pkcs11-tool --module /usr/lib/libjcpkcs11-2.so -T
```

- b. libASEP11.so (JaCarta PKI):

```
pkcs11-tool --module /usr/lib/libASEP11.so -T
```

3. :

! JaCarta PKI .

```
pkcs11-tool --slot 0x1ffff --init-token --so-pin 00000000 --label  
'JaCarta PKI' --module /usr/lib/libjcpkcs11-2.so
```

4. -:

```
pkcs11-tool --slot 0x1ffff --init-pin --so-pin 00000000 --login --pin  
11111111 --module /usr/lib/libjcpkcs11-2.so
```

i --slot 0x1ffff — . , 0, — 1,2 .; ;
--init-token — ;
--pin - JaCarta. 11111111;
--so-pin 00000000 — JaCarta PKI. 00000000;
--label 'JaCarta PKI' - ();
--module - libjcpkcs11-2.so

5. :

```
pkcs11-tool --slot 0x1ffff --login --pin 11111111 --keypairgen --key-  
type rsa:2048 --id 33 --label "2fa_test1_key" --module /usr/lib/libjcpkcs11-2.so
```

i --keypairgen --key-type rsa:2048 — , RSA 2048 ;
--id 33 — CKA_ID . CKA_ID ;
--label "test1 key" — CKA_LABEL() . ;

6. openssl. :



Astra Linux Special Edition .10015-01 (1.6) pkcs11 libengine-pkcs11-openssl 1.0.2 [libjcPKCS11-2.so](#) , :

- libengine-pkcs11-openssl1.1 0.4.4-4 Astra Linux Special Edition .10015-01 (1.6): [libengine-pkcs11-openssl1.1_0.4.4-4_amd64.deb](#)
- [Astra Linux Special Edition .10015-01 \(1.6\)](#)

<_>:<id>. 0x1, 0x2 ..., 0x1ffff, 0x2ffff .. 0x1ffff 131071 ():

openssl

```
OpenSSL> engine dynamic -pre SO_PATH:/usr/lib/x86_64-linux-gnu/engines-1.1/pkcs11.so -pre ID:pkcs11 -pre LIST_ADD:1 -pre LOAD -pre MODULE_PATH:/usr/lib/libjcPKCS11-2.so
(dynamic) Dynamic engine loading support
[Success]: SO_PATH:/usr/lib/x86_64-linux-gnu/engines-1.1/pkcs11.so
[Success]: ID:pkcs11
[Success]: LIST_ADD:1
[Success]: LOAD
[Success]: MODULE_PATH:/usr/lib/libjcPKCS11-2.so
Loaded: (pkcs11) pkcs11 engine
OpenSSL> req -engine pkcs11 -new -key 131071:33 -keyform engine -out client.req
engine "pkcs11" set.
Enter PKCS#11 token PIN for JaCarta ECP <AstraLinux>:
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]:RU
State or Province Name (full name) [Some-State]:Moscow
Locality Name (eg, city) []:
Organization Name (eg, company) [Internet Widgits Pty Ltd]: Rusbitech
Organizational Unit Name (eg, section) []: Astra
Common Name (e.g. server FQDN or YOUR name) []:test1 (!_!)
Email Address []:*****

OpenSSL> exit
```



-new -key 131071:33, 131071— (0x1ffff), 33— CKA_ID .

CN =

:

```
pkcs11-tool --module /usr/lib/libjcPKCS11-2.so -L
```



openssl , ,: 131071:33

7. :

a. :

```
export REALM=<_>
export CLIENT=<__>
```

b. :

```
env | grep -wE "REALM|CLIENT"
```

c. :

```
sudo openssl x509 -CAkey cakey.pem -CA cacert.pem -req -in client.
req -extensions client_cert -extfile pkinit_extensions -out client.
pem -days 365
```

d. PEM DER:

```
sudo openssl x509 -in client.pem -out client.cer -inform PEM -
outform DER
```

e. :

```
pkcs11-tool --slot 0x1ffff --login --pin 11111111 --write-object
client.cer --type 'cert' --label 'test1' --id 33 --module /usr/lib
/libjcpkcs11-2.so
```



```
--write-object ./client.cer—, ;
--type 'cert'—, -;
'cert' --label 'test1'— CKA_LABEL(). ;
```

1. kdc.pem, kdckey.pem, cacert.pem /var/lib/krb5kdc/ ;
2. /etc/krb5kdc/kdc.conf /etc/krb5kdc/kdc.conf, [kdcdefaults] :

```
pkinit_identity = FILE:/var/lib/krb5kdc/kdc.pem,/var/lib/krb5kdc/kdckey.pem
pkinit_anchors = FILE:/var/lib/krb5kdc/cacert.pem
```

, . :

```
sudo sed -i.`date +%Y-%m%d-%H:%M:%S` "/\[kdcdefaults\]/a \
pkinit_anchors = FILE:/var/lib/krb5kdc/cacert.pem" /etc/krb5kdc/kdc.conf
sudo sed -i "]/\[kdcdefaults\]/a \
pkinit_identity = FILE:/var/lib/krb5kdc/kdc.pem,/var/lib/krb5kdc/kdckey.
pem" /etc/krb5kdc/kdc.conf
```

3. :

```
sudo systemctl restart krb5-admin-server
sudo systemctl restart krb5-kdc
```

1. /etc/krb5/:

```
sudo mkdir /etc/krb5/
```

2. /etc/krb5/ (cacert.pem) c, ;
3. /etc/krb5.conf [libdefaults] :

```
[libdefaults]
default_realm = SMARTCARD.ALD
pkinit_anchors = FILE:/etc/krb5/cacert.pem
#
pkinit_identities = PKCS11:/usr/lib/libjcpkcs11-2.so
```

4. ;
5. :

```
kinit
```

6. PIN- - PIN-;
7. , Kerberos , :

```
klist
```

8. :

```
kdestroy
```



kinit :

```
env KRB5_TRACE=/dev/stdout kinit <_>
```

Login , Password <PIN> . , , <PIN>:

```
login <_>
```

pam_krb5.so /etc/pam.d/common-auth pam_krb5.so:

```
# here are the per-package modules (the "Primary" block)
auth      [success=4 default=ignore] pam_krb5.so minimum_uid=2500 use_pkinit
auth      [success=1 default=ignore] pam_succeed_if.so quiet user ingroup astra-admin
auth      [success=ignore default=die] pam_tally.so per_user deny=8
auth      [success=1 default=ignore] pam_unix.so nullok_secure try_first_pass
# here's the fallback if no module succeeds
```

```
- try_pkinit — PKCS-11, Kerberos ;
- use_pkinit — PKCS-11, ;
- pkinit_prompt — PKCS-11 .
```



pam-auth-update, pkinit . , , /usr/share/pam-configs/krb5 Auth-Initial .

```
Name: Kerberos authentication
Default: yes
Priority: 704
Conflicts: krb5-openafs
Auth-Type: Primary
Auth:
    [success=end default=ignore]    pam_krb5.so minimum_uid=2500 try_first_pass
Auth-Initial:
    [success=end default=ignore]    pam_krb5.so minimum_uid=2500 use_pkinit
```

. man.

-
- [Kerberos](#)
 -