



SMART CARD - PIV

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Smart Card - PIV

[smartcard](#) [yubikey](#) [PIV](#)

Authentication with a Yubikey Smart Card / PIV

In this How-To we will configure a user in WebADM for using a PIV key. We need a WebADM server already configured.

1. Import the Inventory

We need to create an inventory file like this:

```
"Type","Reference","Description","DN","Data","Status"
"PIV Device","<ID1>","PIV Yubikey","","PublicKey=<pub_key1>","Valid"
"PIV Device","<ID2>","PIV Yubikey","","PublicKey=<pub_key2>","Valid"
"PIV Device","<ID3>","PIV Yubikey","","PublicKey=<pub_key3>","Valid"
```

For my test, I have a Yubikey Nano with a PIV certificate and I use [yubico-piv-tool](#) for the management of the Yubikey, but it can work with other PIV keys.

We need to extract the public key. I do it with `yubico-piv-tool` and `openssl`:

```
[john@Mac-mini ~]$ yubico-piv-tool -aread-cert -s9a | openssl x509 -pubkey -noout
-----BEGIN PUBLIC KEY-----
MIIBIjANBgkqhkiG9w0BAQEFAAOCAQ8AMIIBCgKCAQEAwjYEZhuHF9rrxHdCDstG
J2ibVVrJhrZIfz4wwjrXtwEACJP2wWRe9dvNw5h3CrbguSc1l8mkKrfNwxAkGMOp
MIx5KgNBaDMcOggmjjFTOBIK4mujjdUZKhr3oFwBD/jjR7O1lGinYK873lYz01aS
nf7j00wgTI4kU3V+sjEbl9t3cQHfE6DMMWeG8w3Q03z+fVkNN9f30TvvBDua95Qg
G9m5eMtGqlrnPuovErHagfg8kd5IZFkYOakaoAhbOW6oQ8s8YKzCP1evcjLYe/o
8K4br8vwp0jnBaKNKbVpO8iAn1A0UTXWaKUytb3cYqMvzp9UYh5Vyfl4MtMh8ULP
wwIDAQAB
-----END PUBLIC KEY-----
```

Another way that works with other keys/cards (Feitian, electronic ID, ...) is to do this with `opensc` and `pesc-lite`. Once they are installed, you need to run these commands:

```
[root@fedora28 ~]# pkcs15-tool --list-key
Using reader with a card: Yubico Yubikey 4 OTP+CCID 00 00
Private RSA Key [PIV AUTH key]
Object Flags : [0x1], private
Usage       : [0x2E], decrypt, sign, signRecover, unwrap
Access Flags : [0x1D], sensitive, alwaysSensitive, neverExtract, local
ModLength   : 2048
Key ref     : 154 (0x9A)
Native      : yes
Auth ID     : 01
ID          : 01
```

```
[root@fedora28 ~]# pkcs15-tool --read-public-key 1
Using reader with a card: Yubico Yubikey 4 OTP+CCID 00 00
-----BEGIN PUBLIC KEY-----
MIIBIjANBgkqhkiG9w0BAQEFAAOCAQ8AMIIBCgKCAQEAwjYEZhuhF9rrxHdCDstG
J2ibVVrJhrZlfz4wwjrXtwEACJP2wWRe9dvNw5h3CrbguSc1I8mkKrfNwxAkGMOp
MIx5KgNBaDMcOggmjjFTOBIK4mujjdUZKhr3oFwBD/jjR7O1IGinYK873IYz01aS
nf7j00wgTI4kU3V+sJEbl9t3cQHfE6DMMWeG8w3Q03z+fVkNN9f30TvvBDua95Qg
G9m5eMtGqlrnPuovErHagfg8kd5IZFkYOakaoAhbOW6oQ8s8YKzCP1evcjfLYe/o
8K4br8vwp0jnBaKNKbVpO8iAn1A0UTXWaKUytb3cYqMvzp9UYh5Vyfl4MtMh8ULP
wwIDAQAB
-----END PUBLIC KEY-----
```

We can create a file called `piv.csv` with the serial number as ID and the right public key:

```
"Type","Reference","Description","DN","Data","Status"
"PIV Device","8671120","PIV
Yubikey","",""PublicKey=MIIBIjANBgkqhkiG9w0BAQEFAAOCAQ8AMIIBCgKCAQEAwjYEZhuhF9rrxHdCDstGJ2ibV
```

We import the file. Under the `Import` tab, we click on `Import Inventory File`:

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Import LDAP Objects

You can import LDAP objects to WebADM with both LDIF scripts or CSV files.
 You can import WebADM localized messages and inventory items with CSV files only.

- The LDAP Data Interchange Format (LDIF) is a standard for representing LDAP content and import requests. WebADM LDIF data may only contain "add" or "delete" directives and object updates are not supported.
- The Comma-Separated Values (CSV) format is a standard for storing attribute-based data in plain-text files.

Import LDAP Objects

Import LDIF Data File | Import CSV Data File

Import WebADM Localized Messages / Inventory Items

Import Message File | Import Inventory File

We choose the `piv.csv` file and click on **Import** :

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Inventory Items CSV Import

Import File: piv.csv

Type of File:

Import as Active: Yes No

Visibility Scope:

WebADM Inventory files are provided as cleartext or encrypted CSV files. Encrypted CSV file are available only if you own a valid Enterprise license.

If you are importing Yubikey Token data provided by Yubico or generated by the 'Yubikey Personalization Tool', then choose the 'Yubico CVS' above.

If you import a CSV file generated by the 'Yubikey Personalization Tool', please configure the 'Yubico format' under the settings tab in the tool.

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Inventory Items CSV Import

Processing record 1/1 PIV Device:8671120 (PIV Yubikey)... **Ok**

Now, the PIV key is present in the inventory:

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Database Viewer for **Inventoried Devices** (1 results out of 1 inventory items)

Filters (0)

Item Type Equals Add Filter

Valid Lost Broken Expired | Enabled Disabled

Display Options

Retrieve max Page results Refresh

Inventory Actions

- Delete selected items
- Scope selected items
- Re-encrypt inventory
- Check Links / Scopes
- Import from CSV file
- Export as CSV / XML

<input type="checkbox"/>	Item Type	Reference	Description	Import Date	User DN	Usage Scope	Inventory Data	Enabled	Status
<input type="checkbox"/>	PIV Device	8671120	PIV Yubikey	2020-11-09 14:49:23	<input type="button" value="Link"/> [NA]	<input type="button" value="Add"/> [NA]	2 Data (Software encryption)	<input checked="" type="checkbox"/>	Valid <input type="text"/>

2. Assign the Yubikey

We select the user in the LDAP tree on the left and add the `UNIX Account` extension:



Object **cn=test-user,o=Root**
test-user

LDAP Actions

- Delete this object
- Copy this object
- Move this object
- Export to LDIF
- Change password
- Create certificate
- Unlock WebApp access
- Advanced edit mode

Object Details

Object class(es): [webadmAccount](#), [person](#)

Account is unique: **Yes** (in o=root)

WebADM settings: **None** [CONFIGURE]

WebADM data: **None** [EDIT]

User activated: **Yes** Deactivate

Logs and inventory: [WebApp](#), [WebSrv](#), [Inventory](#), [Record](#)

Application Actions

- [MFA Authentication Server](#) (14 actions)
- [SMS Hub Server](#) (1 actions)

Object Name: test-user Rename

Add Attribute (8): Mobile Phone Number Add

Add Extension (1): UNIX Account Add

Login Name [add values] test-user

Last Name [add values] test-user

Email Address [add values] [delete attribute] a@b.c

Description / Note [add values] [delete attribute] test-user

First Name [add values] [delete attribute] test

Organization [add values] [delete attribute] local

Apply Changes | Re-Encrypt | Delete Selected

We click on **Proceed**:

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Add Extension **UNIX Account** to `cn=test-user,o=Root`

In order to add the objectclass **UNIX Account** you must specify at least **3** new mandatory attribute(s).

Mandatory attributes

UID Number

GID Number

Home Directory

Optional attributes

Login Shell

General Information

Proceed Cancel

We **Extend Object**:

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Add Extension **UNIX Account** to `cn=test-user,o=Root`

The object will be extended with the objectclass **UNIX Account**.
The following 4 new attribute(s) will be added during extension.

Attribute	Value
UID Number	502
GID Number	100
Home Directory	/home/test-user
Login Shell	/bin/bash

Extend Object Cancel

We click on **SSH Public key server**:

Object **cn=test-user,o=Root**
test-user

- LDAP Actions
- Delete this object
 - Copy this object
 - Move this object
 - Export to LDIF
 - Change password
 - Create certificate
 - Unlock WebApp access
 - Advanced edit mode

Object Details

Object class(es): [webadmAccount_person_posixAc...](#)

Account is unique: **Yes** (in o=root)

WebADM settings: **None** [CONFIGURE]

WebADM data: **None** [EDIT]

User activated: **Yes** Deactivate

Logs and inventory: [WebApp](#), [WebSrv](#), [Inventory](#), [Record](#)

- Application Actions
- [MFA Authentication Server](#) (14 actions)
 - [SMS Hub Server](#) (1 actions)
 - [SSH Public Key Server](#) (3 actions)

Object Name: test-user [Rename]

Add Attribute (9): General Information [Add]

Login Name: test-user [add values]

Last Name: test-user [add values]

Email Address: a@b.c [add values] [delete attribute]

Description / Note: test-user [add values] [delete attribute]

First Name: test [add values] [delete attribute]

Organization: local [add values] [delete attribute]

UID Number: 502

GID Number: 100

Home Directory: /home/test-user

Login Shell: /bin/bash [delete attribute]

Apply Changes | Re-Encrypt | Delete Selected

We click on **Register/Unregister SSH key** :

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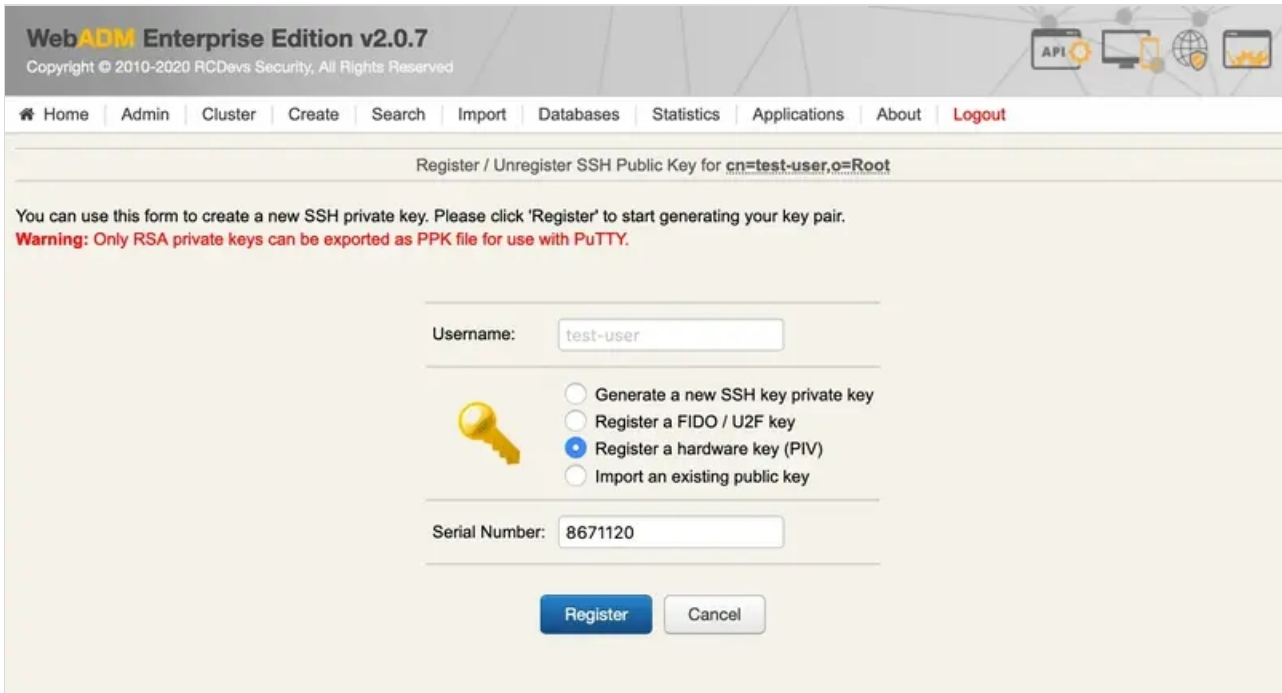
SpanKey User Actions for **cn=test-user,o=Root** (3)

Find below the user actions supported by **SSH Public Key Server** (SpanKey).

- Register / Unregister SSH Public Key**
You can use this action to generate an SSH key pair or register an inventoried PIV device.
- Set or Change Key Expiration**
You can use this action to update the expiration date for a registered SSH public key.
- Test Authorized Keys**
You can use this action to test public key retrieval with SpanKey.

Cancel

We select **Register a hardware key (Inventoried)**, enter the **Serial Number** (Reference) and **Register** :




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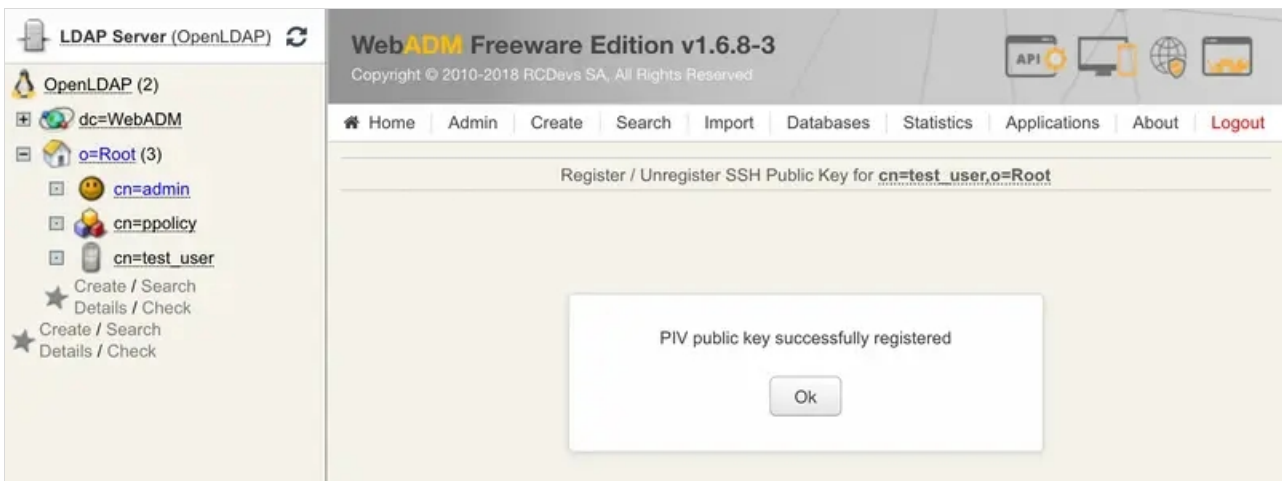
Register / Unregister SSH Public Key for **cn=test-user,o=Root**


You can use this form to create a new SSH private key. Please click 'Register' to start generating your key pair.
Warning: Only RSA private keys can be exported as PPK file for use with PuTTY.

Username:

 Generate a new SSH key private key
 Register a FIDO / U2F key
 Register a hardware key (PIV)
 Import an existing public key

Serial Number:



LDAP Server (OpenLDAP) 

- OpenLDAP (2)
 - dc=WebADM
 - o=Root (3)
 - cn=admin
 - cn=ppolicy
 - cn=test_user
 - Create / Search Details / Check
 - Create / Search Details / Check

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Register / Unregister SSH Public Key for **cn=test_user,o=Root**

PIV public key successfully registered

Now, the PIV key is well registered.

LDAP Server (OpenLDAP)

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API

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Register / Unregister SSH Public Key for **cn=test_user,o=Root**

An SSH public key is already registered for user and is **VALID**.
The key does not have an expiration date and will not automatically expire!

Public Key:

```
-----BEGIN PUBLIC KEY-----
MIIBIjANBgkqhkiG9w0BAQEFAAOCAQ8AMIIBCgKCAQEAwjYEZhuHF9rxxHdCDstGJ
2ibVVrJhrZIfz4wwjrxTweACJP2wRe9dvNw5h3CrbguSc118mkKrfNwxAkGMOpMI
x5KgNBaDMcOggmjFTOBiK4muJjdUZKhR3oFwBD/jjR7011GinYK8731Yz01aSnf7
j00wgT14kU3V+sJebI9t3cQHE6DMMWeG8w3Q03z+fVknN9f30TvvBDua95QgG9m5
eMtGq1rnPuovErHagfg8kd51ZFkYOakaoAhbOW6oQ8s8YKzCP1evcjfLYe
/o8K4br8vwp0jnBaKNKbVpO8iAn1A0UTXWaKUytb3cYqMvzp9UYh5Vyf14MtMh8UL
PwIDAQAB
-----END PUBLIC KEY-----
```

Authorized Key:

```
ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAQDCNgRmG6EX2uvEd0IOy0YnaJtVWsmGtKh/P
jDCote3AQAIk
/bBZF71283DmHcKtuC5JzWXyaQgt83DECQYw6kwjHkqA0FoMxw6CCA0MVM4EgrIa4
mN1RkqFHegXAEp+ONHs7WUaKdgrzveVjPTVpKd
/uPTTCBOXiRTdX6yMRsj23dxAd8ToMwxZ4bzDdDTfP59WQ031
/fRO+8EO5r3lCAB2b14y0aqWuc+6i8SsdqB+DyR3mVkwRG5qRggCFs5bqhDyzzqRM
T/u69v8+h7+urhuvu/CaSoEoo0ntMk7utCfiDPPMdzonPK1udviov
```

Key Format:

Key Length:

Serial Number:

Device Model:

3. Test with SSH

We'll try with a CentOS 7 as an ssh server.

We install and configure `spankey_client` on it:

```
[root@test_vm ~]$ yum install https://repos.rcdevs.com/redhat/base/rcdevs_release-1.1.1-1.noarch.rpm
[root@test_vm ~]$ yum clean all
[root@test_vm ~]$ yum install spankey_client -y
[root@test_vm ~]$ spankey_setup
This is the configuration tool for RCDevs SpanKey Agent.
It will configure SpanKey Server URL(s), SSH helper and NSS.
```

```
Do you have a WebADM cluster or standalone server (c/s)? s
Enter hostname or address for SpanKey server: my_webadm
Do you want to enable SpanKey for OpenSSH server (y/n)? y
Do you want SpanKey agent to auto-create home directories (y/n)? y
Do you want to enable SSH session management options (y/n)? y
Do you want to enable SpanKey NSS plugin (y/n)? y
SpanKey Agent for SpanKey standalone Server
Server URL: https://192.168.3.202:8443/spankey/ (Server Ok)
Enable SpanKey for OpenSSH server: Yes
Auto-create home directories: Yes
SSH session management options: Yes
Enable SpanKey NSS plugin: Yes
```

```
Do you confirm (y/n)? y
```

```
Updating /etc/spankey/spankey.conf... Ok
Updating /etc/ssh/sshd_config... Ok
Updating /etc/nsswitch.conf... Ok
Updating /etc/pam.d/password-auth... Ok
Created symlink from /etc/systemd/system/multi-user.target.wants/nscd.service to
/usr/lib/systemd/system/nscd.service.
Created symlink from /etc/systemd/system/sockets.target.wants/nscd.socket to
/usr/lib/systemd/system/nscd.socket.
```

```
SpanKey Agent has been successfully configured.
```

For the ssh client, we use a Mac mini. We configure it for using the smartcard:

```
[John@Mac-mini ~]$ brew install openc
[John@Mac-mini ~]$ export OPENSC_LIBS=$(brew --prefix openc)/lib
```

We try the authentication:

```
[John@Mac-mini ~]$ ssh -I $OPENS_LIBS/openc-pkcs11.so John@test_vm
Enter PIN for 'PIV Card Holder pin (./piv_II)':
bash-4.2$
```

I'm connected to the server with a user from the LDAP database and authenticated with my PIV key.

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