privacyIDEA Documentation

Release 2.11

Cornelius Kölbel

March 29, 2016

Contents

privacyIDEA is a modular authentication system. Using privacyIDEA you can enhance your existing applications like *local login*, *VPN*, *remote access*, *SSH connections*, access to web sites or *web portals* with a second factor during authentication. Thus boosting the security of your existing applications. Originally it was used for OTP authentication devices. But other "devices" like challenge response and SSH keys are also available. It runs on Linux and is completely Open Source, licensed under the AGPLv3.

privacyIDEA can read users from many different sources like flat files, different LDAP services, SQL databases and SCIM services. (see *Realms*)

Authentication devices to provide two factor authentication can be assigned to those users, either by administrators or by the users themselves. *Policies* define what a user is allowed to do in the web UI and what an administrator is allowed to do in the management interface.

The system is written in python, uses flask as web framework and an SQL database as datastore. Thus it can be enrolled quite easily providing a lean installation. (see *Installation*)

CHAPTER 1

Table of Contents

1.1 Overview

privacyIDEA is a system that is used to manage devices for two factor authentication. Using privacyIDEA you can enhance your existing applications like local login, VPN, remote access, SSH connections, access to web sites or web portals with a second factor during authentication. Thus boosting the security of your existing applications.

In the beginning there were OTP tokens, but other means to authenticate like SSH keys are added. Other concepts like handling of machines or enrolling certificates are coming up, you may monitor this development on Github.

privacyIDEA is a web application written in Python based on the flask micro framework. You can use any webserver with a wsgi interface to run privacyIDEA. E.g. this can be Apache, Nginx or even werkzeug.

A device or item used to authenticate is still called a "token". All token information is stored in an SQL database, while you may choose, which database you want to use. privacyIDEA uses SQLAlchemy to map the database to internal objects. Thus you may choose to run privacyIDEA with SQLite, MySQL, PostgreSQL, Oracle, DB2 or other database.

The code is divided into three layers, the API, the library and the database layer. Read about it at *Code Documentation*. privacyIDEA provides a clean *REST API*.

Administrators can use a Web UI or a command line client to manage authentication devices. Users can log in to the Web UI to manage their own tokens.

Authentication is performed via the API or certain plugins for FreeRADIUS, simpleSAMLphp, Wordpress, Contao, Dokuwiki... to either provide default protocols like RADIUS or SAML or to integrate into applications directly.

Due to this flexibility there are also many different ways to install and setup privacyIDEA. We will take a look at common ways to setup privacyIDEA in the section *Installation* but there are still many others.

1.2 Installation

The ways described here to install privacyIDEA are

- the installation via the *Python Package Index*, which can be used on any Linux distribution and
- ready made *Ubuntu Packages* for Ubuntu 14.04LTS and
- ready made *Debian Packages* for Debian Wheezy.

If you want to upgrade from a privacyIDEA 1.5 installation please read *Upgrading*.

privacyIDEA needs python 2.7 to run properly!

1.2.1 Python Package Index

You can install privacyidea on usually any Linux distribution in a python virtual environment. This way you keep all privacyIDEA code in one defined subdirectory.

Note: privacyIDEA depends on python 2.7 to run properly.

You first need to install some development packages. E.g. on debian based distributions the packages are called

- libjpeg-dev
- libz-dev
- python-dev
- libffi-dev
- libssl-dev
- libxslt1-dev

Now you can install privacyIDEA like this:

```
virtualenv /opt/privacyidea

cd /opt/privacyidea
source bin/activate
```

Now you are within the python virtual environment. Within the environment you can now run:

```
pip install privacyidea
```

Please see the section *The Config File* for a quick setup of your configuration.

Then create the encryption key and the signing keys:

```
pi-manage create_enckey
pi-manage create_audit_keys
```

Create the database and the first administrator:

```
pi-manage createdb
pi-manage admin add admin admin@localhost
```

Now you can run the server for your first test:

```
pi-manage runserver
```

Depending on the database you want to use, you may have to install additional packages.

1.2.2 Ubuntu Packages

There are ready made packages for Ubuntu 14.04 LTS. These are available in a public ppa repository [1], so that the installation will automatically resolve all dependencies. Install it like this:

```
add-apt-repository ppa:privacyidea/privacyidea
apt-get update
apt-get install python-privacyidea privacyideaadm
```

[1] https://launchpad.net/~privacyidea

Optionally you can also install necessary configuration files to run privacyIDEA within the Nginx Webserver:

```
apt-get install privacyidea-nginx
```

Alternatively you can install privacyIDEA running in an Apache webserver:

```
apt-get install privacyidea-apache2
```

After installing in Nginx or Apache2 you only need to create your first administrator and you are done:

```
pi-manage admin add admin admin@localhost
```

Now you may proceed to *First Steps*.

FreeRADIUS

privacyIDEA has a perl module to "translate" RADIUS requests to the API of the privacyIDEA server. This module plugs into FreeRADIUS. The FreeRADIUS does not have to run on the same machine like privacyIDEA. To install this module run:

```
apt-get install privacyidea-radius
```

For further details see *FreeRADIUS Plugin*.

SimpleSAMLphp

Starting with 1.4 privacyIDEA also supports SAML via a plugin for simpleSAMLphp [2]. The simpleSAMLphp service does not need to run on the same machine like the privacyIDEA server.

To install it on a Ubuntu 14.04 system please run:

```
apt-get install privacyidea-simplesamlphp
```

For further details see *simpleSAMLphp Plugin*.

PAM

privacyIDEA also comes with a PAM library to add two factor authentication to any Linux system. You can run one central privacyIDEA server and configure all other systems using the PAM library to authenticate against this privacyIDEA.

To install it on a Ubuntu 14.04 system please run:

```
apt-get install privacyidea-pam
```

For further details see *Pluggable Authentication Module*.

OTRS

OTRS is an important Open Source Ticket Request System. It is written in Perl and privacyIDEA provides an authentication plugin to authenticate at OTRS with two factors.

To install it on Ubuntu 14.04 please run:

[2] https://github.com/privacyidea/privacyidea/tree/master/authmodules/simpleSAMLphp

```
apt-get install privacyidea-otrs
```

For further details and configuration see *OTRS*.

1.2.3 Debian Packages

Wheezy

You can install privacyIDEA on Debian Wheezy either via the *Python Package Index* or with a ready made Wheezy package.

The available Wheezy package privacyidea-venv_2.1~dev0_amd64.deb contains a complete virtual environment with all necessary dependent modules. To install it run:

```
dpkg -i privacyidea-venv_2.1~dev0_amd64.deb
```

This will install privacyIDEA into a virtual environment at `/opt/privacyidea/privacyidea-venv`.

You can enter the virtual environment by:

```
source /opt/privacyidea/privacyidea-venv/bin/activate
```

Jessie

At the moment you can use the Ubuntu Trusty packages with Debian Jessie.

Thus you can create a file `/etc/apt/sources.list.d/privacyidea.list` with the content:

```
deb http://ppa.launchpad.net/privacyidea/privacyidea/ubuntu trusty main
```

Add the GPG key to the keyring:

```
gpg --keyserver keyserver.ubuntu.com --recv-keys C24DCF7D
gpg --armor --export C24DCF7D | apt-key add -
```

Now run:

```
apt-get update
apt-get install privacyidea-apache2
```

Running privacyIDEA with Apache2 and MySQL

If you installed via pip or the Wheezy package you need to create and fill the config directory `/etc/privacyidea` manually:

```
cp /opt/privacyidea/privacyidea-venv/etc/privacyidea/dictionary \
/etc/privacyidea/
```

Create a config `/etc/privacyidea/pi.cfg` like this:

```
# Your database
SQLALCHEMY_DATABASE_URI = 'mysql://pi:password@localhost/pi'
# This is used to encrypt the auth_token
SECRET_KEY = 'choose one'
# This is used to encrypt the admin passwords
PI_PEPPER = "choose one"
```

```
# This is used to encrypt the token data and token passwords
PI_ENCFILE = '/etc/privacyidea/enckey'
# This is used to sign the audit log
PI_AUDIT_KEY_PRIVATE = '/etc/privacyidea/private.pem'
PI_AUDIT_KEY_PUBLIC = '/etc/privacyidea/public.pem'
PI_LOGFILE = '/var/log/privacyidea/privacyidea.log'
#CRITICAL = 50
#ERROR = 40
#WARNING = 30
#INFO = 20
#DEBUG = 10
PI_LOGLEVEL = 20
```

You need to create the above mentioned logging directory `/var/log/privacyidea`.

You need to create the above mentioned database with the corresponding user access:

```
mysql -u root -p -e "create database pi"
mysql -u root -p -e "grant all privileges on pi.* to 'pi'@'localhost' \
identified by 'password'"
```

With this config file in place you can create the database tables, the encryption key and the audit keys:

```
pi-manage createdb
pi-manage create_enckey
pi-manage create_audit_keys
```

Now you can create the first administrator:

```
pi-manage admin add administrator
```

The system is set up. You now only need to configure the Apache2 webserver.

The Apache2 needs a wsgi script that could be located at `/etc/privacyidea/piapp.wsgi` and look like this:

```
import sys
sys.stdout = sys.stderr
from privacyidea.app import create_app
# Now we can select the config file:
application = create_app(config_name="production", \
config_file="/etc/privacyidea/pi.cfg")
```

Finally you need to create a Apache2 configuration `/etc/apache2/sites-available/privacyidea.conf` which might look like this:

```
WSGIPythonHome /opt/privacyidea/privacyidea-venv
<VirtualHost _default_:443>
     ServerAdmin webmaster@localhost
     # You might want to change this
     ServerName localhost

     DocumentRoot /var/www
     <Directory />
             # For Apache 2.4 you need to set this:
             # Require all granted
             Options FollowSymLinks
             AllowOverride None
     </Directory>

     # We can run several instances on different paths with different configurations
```

```
    WSGIScriptAlias /      /etc/privacyidea/piapp.wsgi
    #
    # The daemon is running as user 'privacyidea'
    # This user should have access to the encKey database encryption file
    WSGIDaemonProcess privacyidea processes=1 threads=15 display-name=%{GROUP} user=privacyidea
    WSGIProcessGroup privacyidea
    WSGIPassAuthorization On

    ErrorLog /var/log/apache2/error.log

    LogLevel warn
    LogFormat "%h %l %u %t %>s \"%m %U %H\"  %b \"%{Referer}i\" \"%{User-agent}i\"" privacyIDEA
    CustomLog /var/log/apache2/ssl_access.log privacyIDEA

    #   SSL Engine Switch:
    #   Enable/Disable SSL for this virtual host.
    SSLEngine on

    #   If both key and certificate are stored in the same file, only the
    #   SSLCertificateFile directive is needed.
    SSLCertificateFile    /etc/ssl/certs/privacyideaserver.pem
    SSLCertificateKeyFile /etc/ssl/private/privacyideaserver.key

    <FilesMatch "\.(cgi|shtml|phtml|php)$">
            SSLOptions +StdEnvVars
    </FilesMatch>
    <Directory /usr/lib/cgi-bin>
            SSLOptions +StdEnvVars
    </Directory>
    BrowserMatch ".*MSIE.*" \
            nokeepalive ssl-unclean-shutdown \
            downgrade-1.0 force-response-1.0

</VirtualHost>
```

The configuration assumes, a user `privacyidea`, which you need to create:

```
useradd -r -m privacyidea
```

The files in `/etc/privacyidea` and the logfiles in `/var/log/privacyidea/` should be restricted to this user.

1.2.4 CentOS Installation

There is a detailed Howto [3] for installing privacyIDEA with FreeRADIUS 3 on CentOS 7.

1.2.5 Upgrading

Upgrade to privacyIDEA 2.11

In privacyIDEA 2.11 the RADIUS server definition was added. RADIUS servers can be used in RADIUS tokens and in the RADIUS passthru policy.

A new database table “radiusserver” was added.

You need to update the database models:

[3] https://www.privacyidea.org/two-factor-authentication-with-otp-on-centos-7/

```
pi-manage db stamp 4f32a4e1bf33 -d path/to/migrations
pi-manage db upgrade -d path/to/migrations
```

Upgrade to privacyIDEA 2.10

In privacyIDEA 2.10 SMTP servers were added. SMTP servers can be used for notifications, registration and also for Email token and SMS token.

SMTP servers need a new database table "smtpserver".

You need to update the database models:

```
pi-manage db stamp 4f32a4e1bf33 -d path/to/migrations
pi-manage db upgrade -d path/to/migrations
```

privacyIDEA 2.10 can import all kind of PSKC token files. These XML files need to be parsed. Therefore *BeautifulSoup4* and *lxml* is used. On pip installations you need to install a package like *libxslt1-dev*.

Upgrade From privacyIDEA 2.x to 2.3

In 2.3 the priority of resolvers in realms was added.

You need to update the database models:

```
pi-manage db stamp 4f32a4e1bf33 -d path/to/migrations
pi-manage db upgrade -d path/to/migrations
```

Note: You need to specify the path to the migrations scripts. This could be /usr/lib/privacyidea/migrations.

Note: When upgrading with the Ubuntu LTS packages, the database update is performed automatically.

Upgrade From privacyIDEA 1.5

Warning: privacyIDEA 2.0 introduces many changes in database schema, so at least perform a database backup!

Stopping Your Server

Be sure to stop your privacyIDEA server.

Upgrade Software

To upgrade the code enter your python virtualenv and run:

```
pip install --upgrade privacyidea
```

Configuration

Read about the configuration in the *The Config File*.

You can use the old *enckey*, the old *signing keys* and the old *database uri*. The values can be found in your old ini-file as `privacyideaSecretFile`, `privacyideaAudit.key.private`, `privacyideaAudit.key.public` and `sqlalchemy.url`. Your new config file might look like this:

```
config_path = "/home/cornelius/tmp/pi20/etc/privacyidea/"
# This is your old database URI
# Note the three slashes!
SQLALCHEMY_DATABASE_URI = "sqlite:///" + config_path + "token.sqlite"
# This is new!
SECRET_KEY = 't0p s3cr3t'
# This is new
#This is used to encrypt the admin passwords
PI_PEPPER = "Never know..."
# This is used to encrypt the token data and token passwords
# This is your old encryption key!
PI_ENCFILE = config_path + 'enckey'
# THese are your old signing keys
# This is used to sign the audit log
PI_AUDIT_KEY_PRIVATE = config_path + 'private.pem'
PI_AUDIT_KEY_PUBLIC = config_path + 'public.pem'
```

To verify the new configuration run:

```
pi-manage create_enckey
```

It should say, that the enckey already exists!

Migrate The Database

You need to upgrade the database to the new database schema:

```
pi-manage db upgrade -d lib/privacyidea/migrations
```

Note: In the Ubuntu package the migrations folder is located at `/usr/lib/privacyidea/migrations/`.

Create An Administrator

With privacyIDEA 2.0 the administrators are stored in the database. The password of the administrator is salted and also peppered, to avoid having a database administrator slip in a rogue password.

You need to create new administrator accounts:

```
pi-manage addadmin <email-address> <admin-name>
```

Start The Server

Run the server:

```
pi-manage runserver
```

or add it to your Apache or Nginx configuration.

1.2.6 The Config File

privacyIDEA reads its configuration from different locations:

1. default configuration from the module `privacyidea/config.py`
2. then from the config file `/etc/privacyidea/pi.cfg` if it exists and then
3. from the file specified in the environment variable `PRIVACYIDEA_CONFIGFILE`.

   export PRIVACYIDEA_CONFIGFILE=/your/config/file

The configuration is overwritten and extended in each step. I.e. values define in `privacyidea/config.py` that are not redefined in one of the other config files, stay the same.

You can create a new config file (either `/etc/privacyidea/pi.cfg`) or any other file at any location and set the environment variable. The file should contain the following contents:

```
# The realm, where users are allowed to login as administrators
SUPERUSER_REALM = ['super', 'administrators']
# Your database
SQLALCHEMY_DATABASE_URI = 'sqlite:////etc/privacyidea/data.sqlite'
# This is used to encrypt the auth_token
SECRET_KEY = 't0p s3cr3t'
# This is used to encrypt the admin passwords
PI_PEPPER = "Never know..."
# This is used to encrypt the token data and token passwords
PI_ENCFILE = '/etc/privacyidea/enckey'
# This is used to sign the audit log
PI_AUDIT_KEY_PRIVATE = '/home/cornelius/src/privacyidea/private.pem'
PI_AUDIT_KEY_PUBLIC = '/home/cornelius/src/privacyidea/public.pem'
# PI_LOGFILE = '....'
# PI_LOGLEVEL = 20
# PI_INIT_CHECK_HOOK = 'your.module.function'
# PI_CSS = '/location/of/theme.css'
```

Note: The config file is parsed as python code, so you can use variables to set the path and you need to take care for indentations.

`SQLALCHEMY_DATABASE_URI` defines the location of your database. You may want to use the MySQL database or Maria DB. There are two possible drivers, to connect to this database. Please read *MySQL database connect string*.

The `SUPERUSER_REALM` is a list of realms, in which the users get the role of an administrator.

`PI_INIT_CHECK_HOOK` is a function in an external module, that will be called as decorator to `token/init` and `token/assign`. This function takes the `request` and `action` (either "init" or "assing") as an arguments and can modify the request or raise an exception to avoid the request being handled.

There are three config entries, that can be used to define the logging. These are `PI_LOGLEVEL`, `PI_LOGFILE`, `PI_LOGCONFIG`. These are described in *Debugging and Logging*.

Themes

You can create your own CSS file to adapt the look and feel of the Web UI. The default CSS is the bootstrap CSS theme. Using `PI_CSS` you can specify the URL of your own CSS file. The default CSS file url is */static/contrib/css/bootstrap-theme.css*. The file in the file system is located at *privacyidea/static/contrib/css*. You might add a directory *privacyidea/static/custom/css/* and add your CSS file there.

A good stating point might be the themes at http://bootswatch.com.

Note: If you add your own CSS file, the file *bootstrap-theme.css* will not be loaded anymore. So you might start with a copy of the original file.

1.2.7 Debugging and Logging

You can set `PI_LOGLEVEL` to a value 10 (Debug), 20 (Info), 30 (Warngin), 40 (Error) or 50 (Critical). If you experience problems, set `PI_LOGLEVEL = 10` restart the web service and resume the operation. The log file `privacyidea.log` should contain some clues.

You can define the location of the logfile using the key `PI_LOGFILE`. Usually it is set to:

```
PI_LOGFILE = "/var/log/privacyidea/privacyidea.log"
```

Advanced Logging

You can also define a more detailed logging by specifying a log configuration file like this:

```
PI_LOGCONFIG = "/etc/privacyidea/logging.cfg"
```

Such a configuration could look like this:

```
[formatters]
keys=detail

[handlers]
keys=file,mail

[formatter_detail]
class=privacyidea.lib.log.SecureFormatter
format=[%(asctime)s][%(process)d][%(thread)d][%(levelname)s][%(name)s:%(lineno)d] %(message)s

[handler_mail]
class=logging.handlers.SMTPHandler
level=ERROR
formatter=detail
args=('mail.example.com', 'privacyidea@example.com', ['admin1@example.com',\
   'admin2@example.com'], 'PI Error')

[handler_file]
# Rollover the logfile at midnight
class=logging.handlers.RotatingFileHandler
backupCount=14
maxBytes=10000000
formatter=detail
level=DEBUG
args=('/var/log/privacyidea/privacyidea.log',)

[loggers]
keys=root,privacyidea

[logger_privacyidea]
handlers=file,mail
qualname=privacyidea
level=DEBUG
```

```
[logger_root]
level=NOTSET
handlers=file
```

The file structure follows [4] and can be used to define additional handlers like logging errors to email addresses.

Note: In this example a mail handler is defined, that will send emails to certain email addresses, if an ERROR occurs.

1.2.8 The WSGI Script

Apache2 and Nginx are using a WSGI script to start the application.

This script is usually located at `/etc/privacyidea/privacyideaapp.py` or `/etc/privacyidea/privacyideaapp.wsgi` and has the following contents:

```
import sys
sys.stdout = sys.stderr
from privacyidea.app import create_app
# Now we can select the config file:
application = create_app(config_name="production",
                         config_file="/etc/privacyidea/pi.cfg")
```

In the `create_app`-call you can also select another config file.

Note: This way you can run several instances of privacyIDEA in one Apache2 server by defining several WSGIScriptAlias definitions pointing to different wsgi-scripts, that again reference different config files with different database definitions.

Running Apache instances

To run further Apache instances add additional lines in your Apache config:

```
WSGIScriptAlias /instance1 /etc/privacyidea1/privacyideaapp.wsgi
WSGIScriptAlias /instance2 /etc/privacyidea2/privacyideaapp.wsgi
WSGIScriptAlias /instance3 /etc/privacyidea3/privacyideaapp.wsgi
WSGIScriptAlias /instance4 /etc/privacyidea4/privacyideaapp.wsgi
```

It is a good idea to create a subdirectory in */etc* for each instance. Each wsgi script needs to point to the corresponding config file *pi.cfg*.

Each config file can define its own

- database
- encryption key
- signing key
- ...

To create the new database you need the command *pi-manage*. The command *pi-manage* reads the configuration from */etc/privacyidea/pi.cfg*.

If you want to use another instance with another config file, you need to set an environment variable and create the database like this:

[4] https://docs.python.org/2/library/logging.config.html#configuration-file-format

```
PRIVACYIDEA_CONFIGFILE=/etc/privacyidea3/pi.cfg pi-manage createdb
```

This way you can use *pi-manage* for each instance.

1.2.9 The pi-manage Script

pi-manage is the script that is used during the installation process to setup the database and do many other tasks.

Note: The interesting thing about pi-manage is, that it does not need the server to run as it acts directly on the database. Therefor you need read access to /etc/privacyidea/pi.cfg and the encryption key.

If you want to use a config file other than /etc/privacyidea/pi.cfg, you can set an environment variable:

```
PRIVACYIDEA_CONFIGFILE=/home/user/pi.cfg pi-manage
```

pi-manage always takes a command and sometimes a sub command:

```
pi-manage <command> [<subcommand>] [<parameters>]
```

For a complete list of commands and sub commands use the *-h* parameter.

You can do the following tasks.

Encryption Key

You can create an encryption key and encrypt the encryption key.

Create encryption key:

```
pi-manage create_enckey
```

Note: This command takes no parameters. The filename of the encryption key is read from the configuration. The key will not be created, if it already exists.

The encryption key is a plain file on your hard drive. You need to take care, to set the correct access rights.

You can also encrypt the encryption key with a passphrase. To do this do:

```
pi-manage encrypt_enckey /etc/privacyidea/enckey
```

and pipe the encrypted *enckey* to a new file.

Read more about the database encryption and the enckey in *Security Modules*.

Backup and Restore

You can create a backup which will be save to */var/lib/privacyidea/backup/*.

The backup will contain the database dump and the complete directory */etc/privacyidea* which also includes the encryption key.

Warning: As the backup includes the database dump and the encryption key all seeds of the OTP tokens can be read from the backup.

As the backup contains the etc directory and the database you only need this tar archive backup to perform a complete restore.

Rotate Audit Log

Audit logs are written to the database. You can use pi-manage to perform a log rotation.

```
pi-manage rotate_audit
```

You can specify a highwatermark and a lowwatermark.

1.2.10 Security Modules

Note: For a normal installation this section can be safely ignored.

privacyIDEA provides a security module that takes care of

- encrypting the token seeds,
- encrypting passwords from the configuration like the LDAP password,
- creating random numbers,
- and hashing values.

Note: The Security Module concept can also be used to add a Hardware Security Module to perform the above mentioned tasks.

The `default` security module is implemented with the operating systems capabilities. The encryption key is located in a file *enckey* specified via `PI_ENCFILE` in the configuration file (*The Config File*).

This *enckey* contains three 32byte keys and is thus 96 bytes. This file has to be protected. So the access rights to this file are set accordingly.

In addition you can encrypt this encryption key with an additional password. In this case, you need to enter the password each time the privacyIDEA server is restarted and the password for decrypting the *enckey* is kept in memory.

The pi-manage Script contains the instruction how to encrypt the *enckey*

After starting the server, you can check, if the encryption key is accessible. To do so run:

```
privacyidea -U <yourserver> --admin=<youradmin> securitymodule
```

The output will contain `"is_ready": True` to signal that the encryption key is operational.

If it is not yet operational, you need to pass the password to the privacyIDEA server to decrypt the encryption key. To do so run:

```
privacyidea -U <yourserver> --admin=<youradmin> securitymodule  \
--module=default
```

Note: If the security module is not operational yet, you might get an error message “HSM not ready.”.

After installation you might want to take a look at *First Steps*.

1.3 First Steps

You installed privacyIDEA successfully according to *Installation* and created an administrator using the command `pi-manage admin` as e.g. described in *Ubuntu Packages*.

These first steps will guide you through the tasks of logging in to the management web UI, attaching your first users and enrolling the first token.

1.3.1 Login to the Web UI

privacyIDEA has only one login form that is used by administrators and normal users to login. Administrators will be able to configure the system and to manage all tokens, while normal users will only be able to manage their own tokens.

You should enter your username with the right realm. You need to append the realm to the username like `username@realm`.

Login for administrators

Administrators can authenticate at this login form to access the management UI.

Administrators are stored in the database table `Admin` and can be managed with the tool:

```
pi-manage admin ...
```

The administrator just logs in with his username.

Note: You can configure privacyIDEA to authenticate administrators against privacyIDEA itself, so that administrators need to login with a second factor. See SUPERUSER_REALM in inifile_superusers how to do this.

Login for normal users

Normal users authenticate at the login form to be able to manage their own tokens. By default users need to authenticate with the password from their user source.

E.g. if the users are located in an LDAP or Active Directory the user needs to authenticate with his LDAP/AD password.

But before a user can login, the administrator needs to configure realms, which is described in the next step *Creating your first realm*.

Note: The user my either login with his password from the userstore or with any of his tokens.

Note: The administrator may change this behaviour by creating an according policy, which then requires the user to authenticate against privacyIDEA itself. I.e. this way the user needs to authenticate with a second factor/token to access the self service portal. (see the policy section *login_mode*)

1.3.2 Creating your first realm

Note: When the administrator logs in and no useridresolver and no realm is defined, a popup appears, which asks you to create a default realm. During these first steps you may say "No", to get a better understanding.

Users in privacyIDEA are read from existing sources. See *Realms* for more information.

In these first steps we will simply read the users from your */etc/passwd* file.

Create a UserIdResolver

The UserIdResolver is the connector to the user source. For more information see *UserIdResolvers*.

- Go to *Config* -> *Users* to create a UserIdResolver.

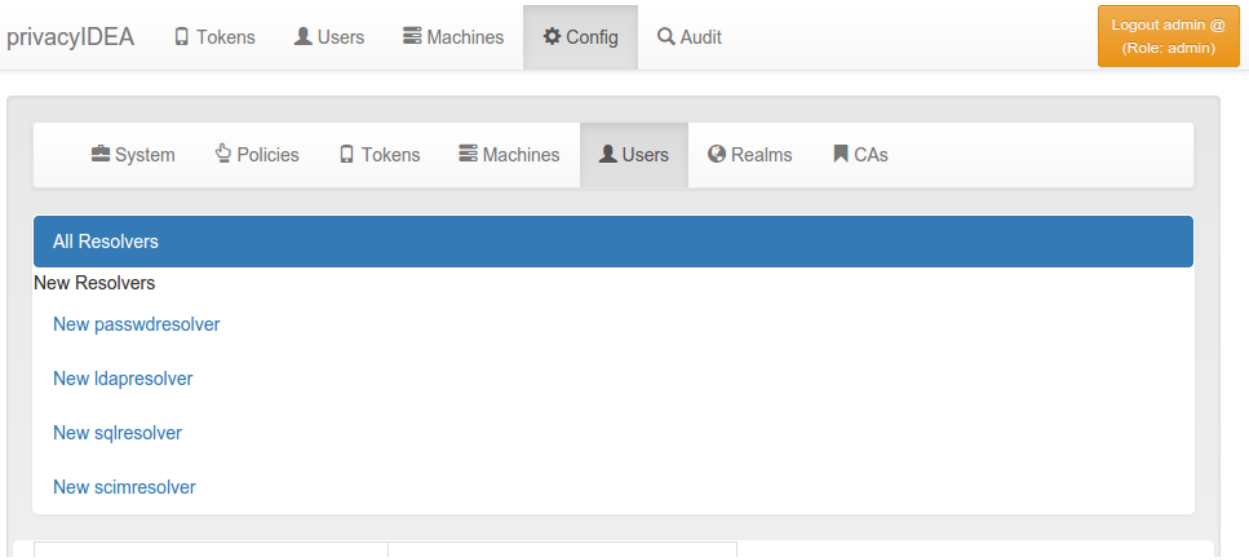


Fig. 1.1: *Create the first UserIdResolver*

- Choose *New passwdresolver* and
- Enter the name “myusers”.
- Save it.

You just created your first connection to a user source.

Create a Realm

User sources are grouped togeather to a so called “realm”. For more information see *Realms*.

- Go to *Config* -> *Realms*
- Enter “realm1” as the new realm name and select the priority 1.
- Check the resolver “myusers” to be included into this realm.
- Save it.
- Go to *Users* and you will see the users from the */etc/passwd*.

Congratulation! You created your first realm.

You are now ready to enroll a token to a user. Read *Enrolling your first token*.

1.3.3 Enrolling your first token

You may now enroll a new token. In this example we are using the Google Authenticator App, that you need to install on your smartphone.

- Go to *Tokens* -> *Enroll Token*

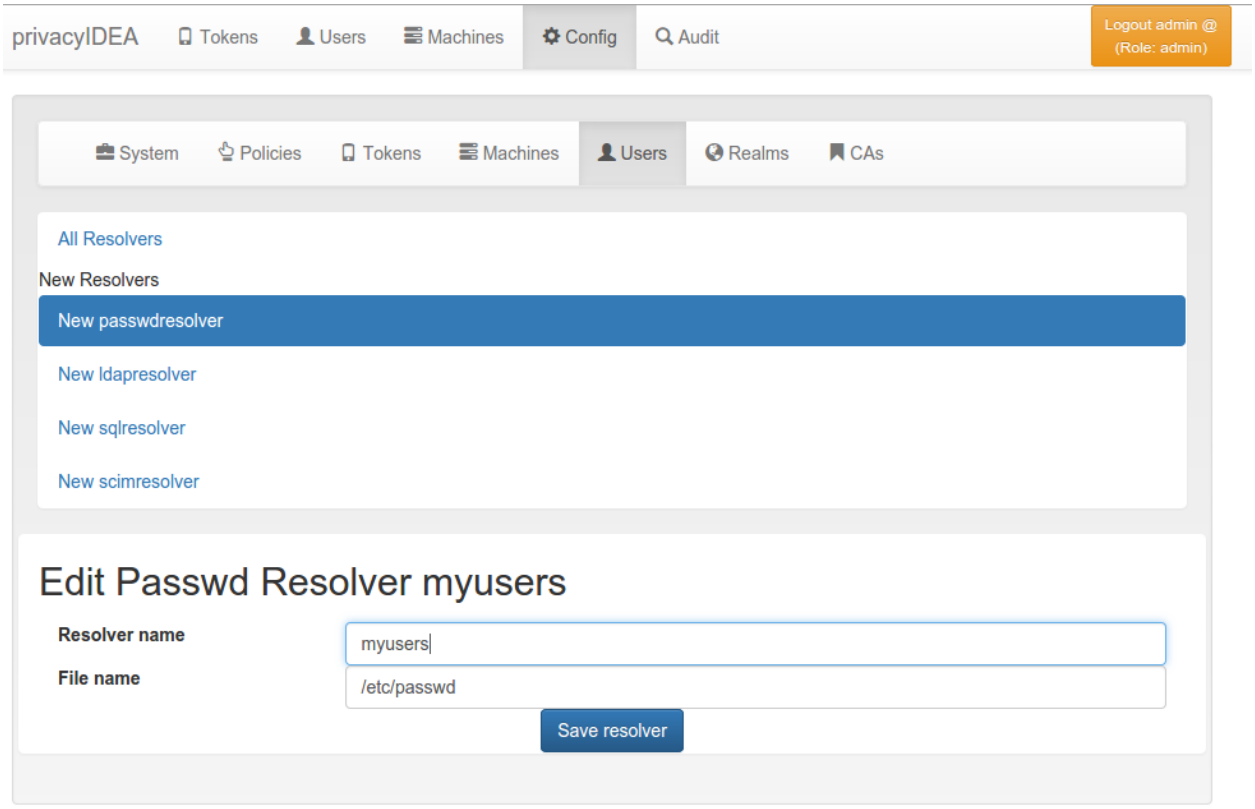


Fig. 1.2: *Create the first UserIdResolver*

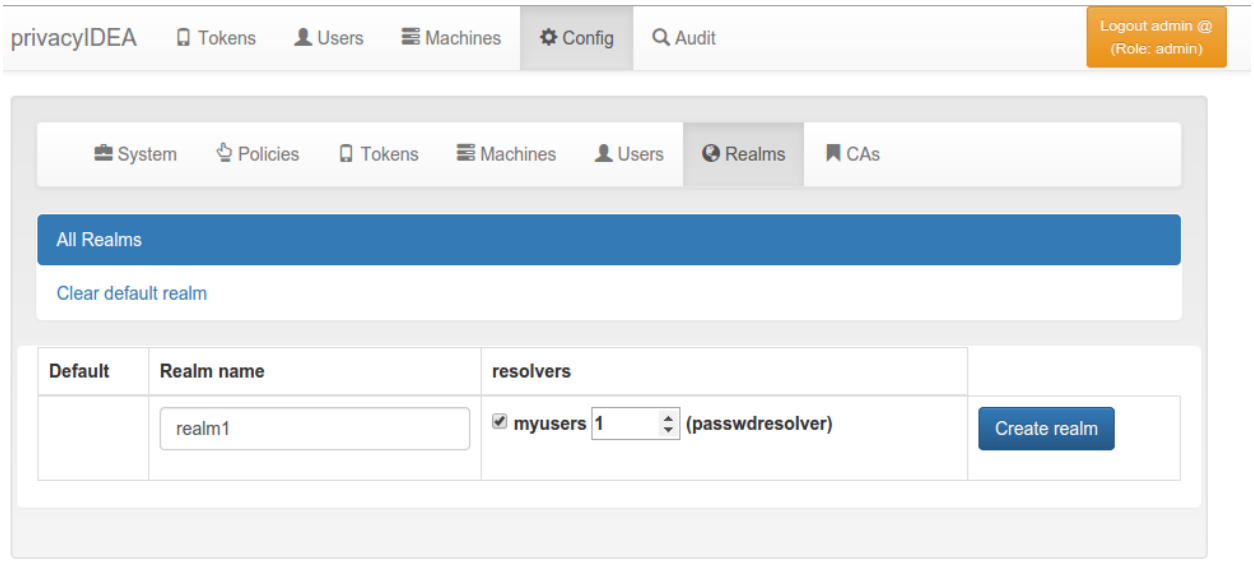


Fig. 1.3: *Create the first Realm*

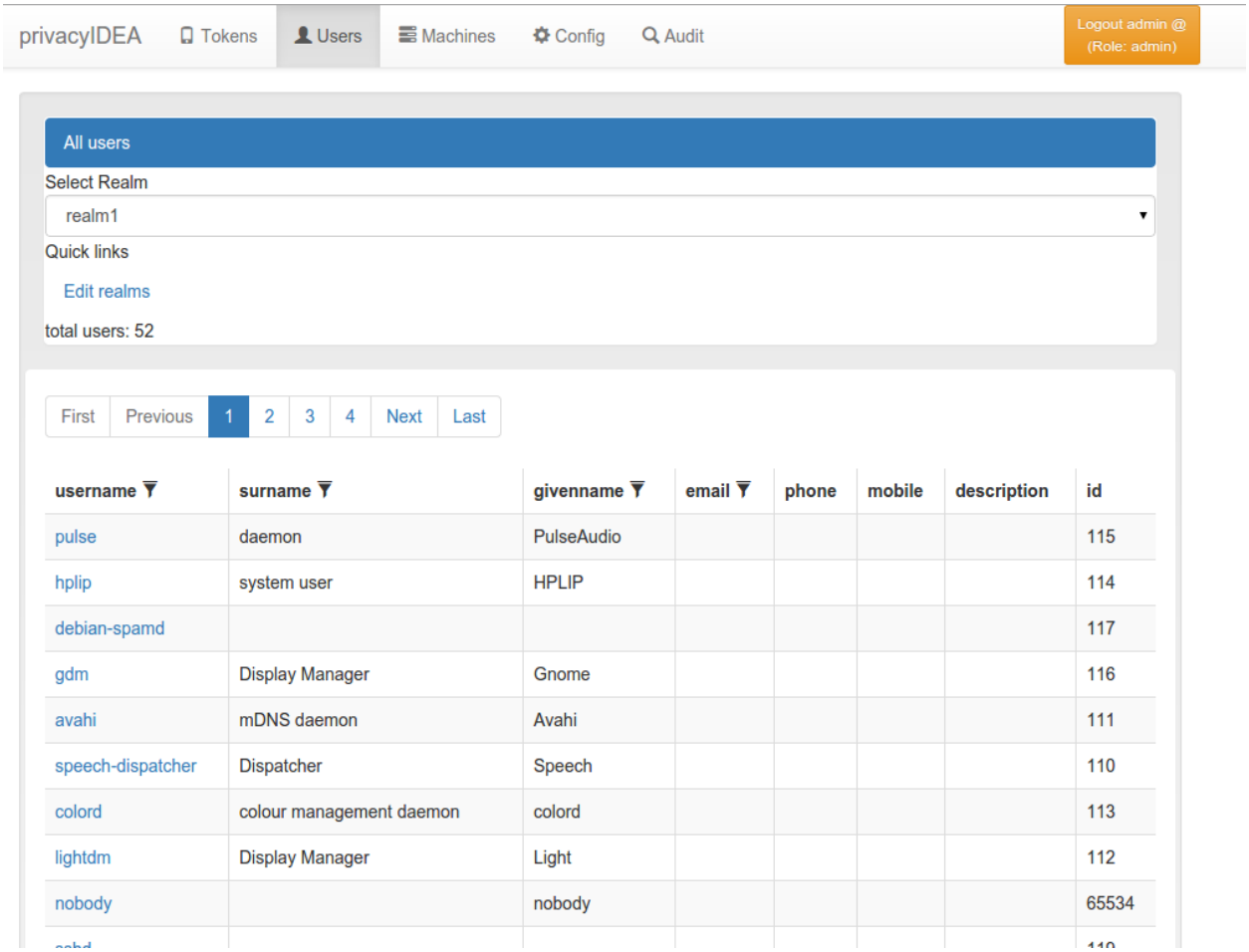


Fig. 1.4: *The users from /etc/passwd*

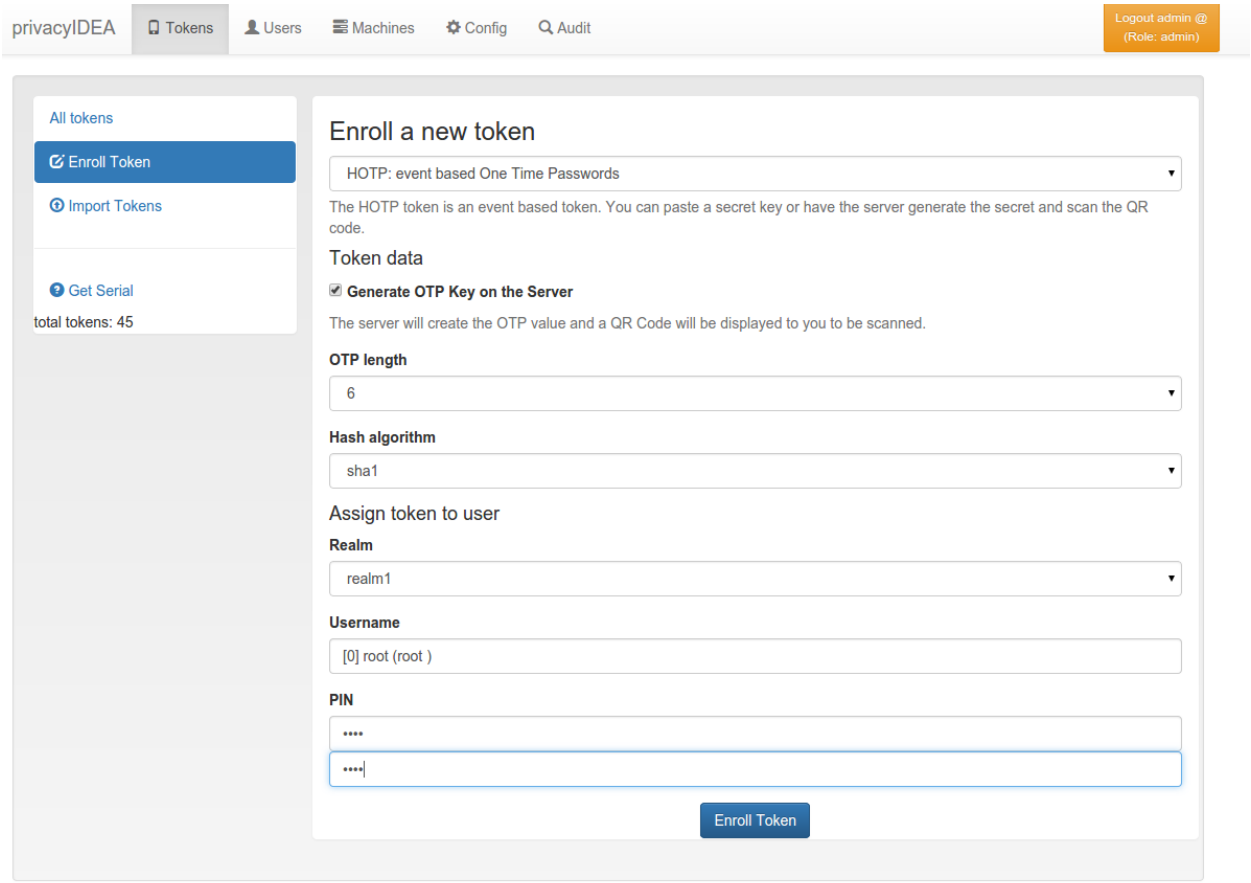


Fig. 1.5: *The Token Enrollment Dialog*

- Select the username *root*. When you start typing “r”, “o”... the system will find the user root automatically.
- Enter a PIN. I entered “test” ...
- ... and click “Enroll Token”.

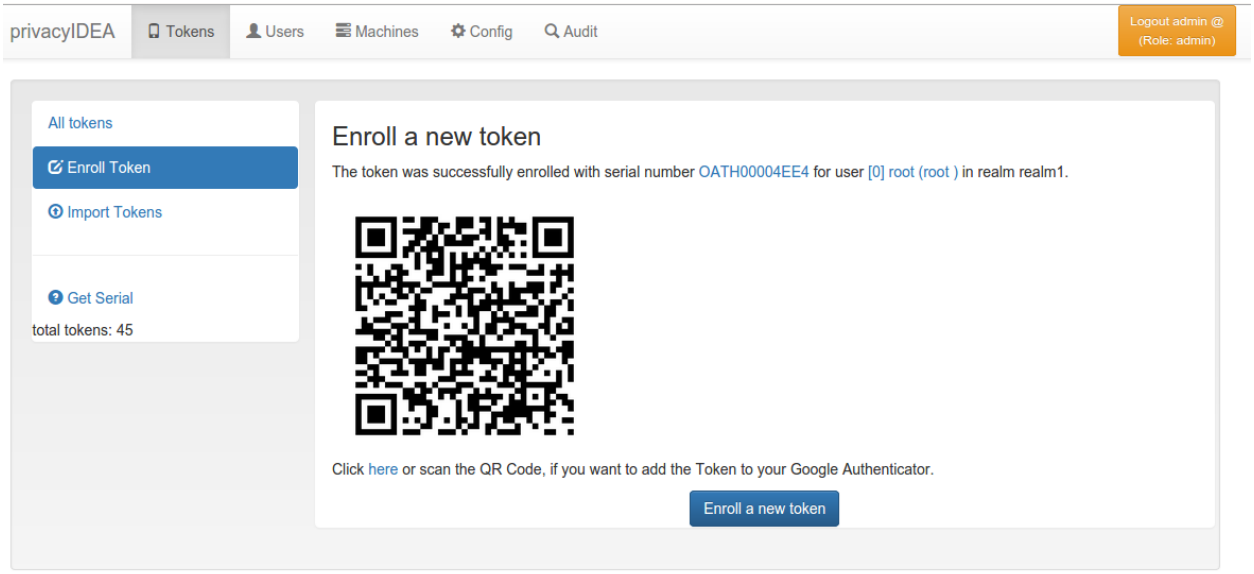


Fig. 1.6: *Enrollment Success*

- After enrolling the token you will see a QR code, that you need to scan with the Google Authenticator App.
- Click on the serial number link at the top of the dialog.
- Now you see the token details.
- Left to the button “Test Token” you can enter the PIN and the OTP value generated by the Google Authenticator.
- Click the button “Test Token”. You should see a green “matching 1 tokens”.

Congratulations! You just enrolled your first token to a user.

Now you are ready to attach applications to privacyIDEA in order to add two factor authentication to those applications. To attach applications read the chapter *Application Plugins*.

You may also go on reading the chapter *Configuration* to get a deeper insight in the configuration possibilities.

After these first steps you will be able to start attaching applications to privacyIDEA in order to add two factor authentication to those applications. You can

- use a PAM module to authenticate with OTP at SSH or local login
- or the RADIUS plugin to configure your firewall or VPN to use OTP,
- or use an Apache2 plugin to do Basic Authentication with OTP.
- You can also setup different web applications to use OTP.

To attach applications read the chapter *Application Plugins*.

You may also go on reading the chapter *Configuration* to get a deeper insight in the configuration possibilities.

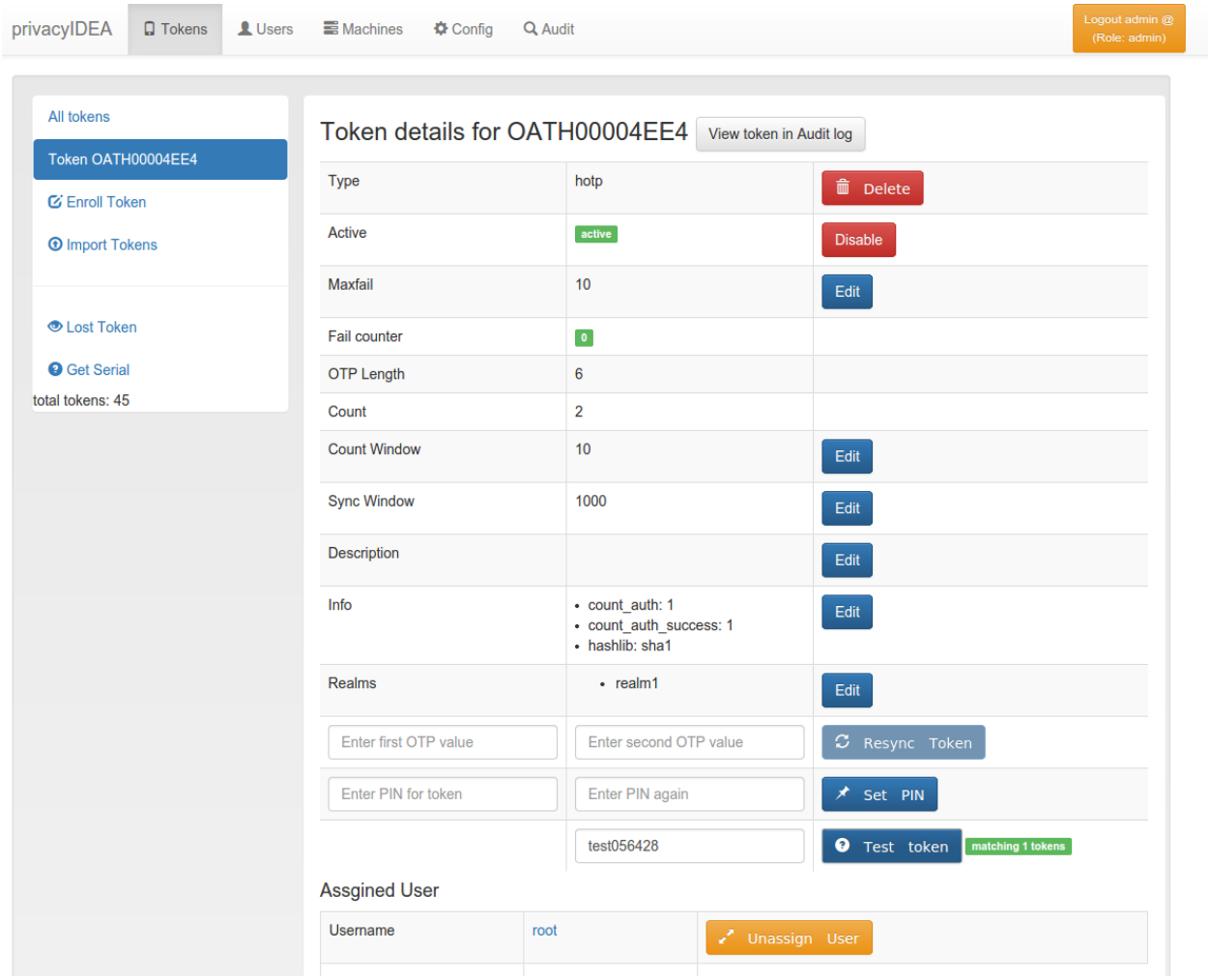


Fig. 1.7: *Test the Token*

1.4 Configuration

The configuration menu can be used to define useridresolvers and realms, set the system config and the token config.

It also contains a shortcut to the policy tab (see *Policies*).

1.4.1 UserIdResolvers

Each organisation or company usually has its users managed at a central location. This is why privacyIDEA does not provide its own user management but rather connects to existing user stores.

UserIdResolvers are connectors to those user stores, the locations, where the users are managed. Nowadays this can be LDAP directories or especially Active Directory, some times FreeIPA or the Redhat 389 service. But classically users are also located in files like /etc/passwd on standalone unix systems. Web services often use SQL databases as user store.

Today with many more online cloud services SCIM is also an uprising protocol to access userstores.

privacyIDEA already comes with UserIdResolvers to talk to all these user stores:

- Flatfile resolver,
- LDAP resolver,
- SQL resolver,
- SCIM resolver.

Note: New resolver types (python modules) can be added easily. See the module section for this (*UserIdResolvers*).

You can create as many UserIdResolvers as you wish and edit existing resolvers. When you have added all configuration data, most UIs of the UserIdResolvers have a button "Test resolver", so that you can test your configuration before saving it.

Starting with privacyIDEA 2.4 resolvers can be editable, i.e. you can edit the users in the user store. Read more about this at *Manage Users*.

Note: Using the policy `authentication:otppin=userstore` users can authenticate with the password from their user store, being the LDAP password, SQL password or password from flat file.

Flatfile resolver

Flatfile resolvers read files like `/etc/passwd`.

Note: The file `/etc/passwd` does not contain the unix password. Thus, if you create a flatfile resolver from this file the functionality with `otppin=userstore` is not available. You can create a flatfile with passwords using the tool `privacyidea-create-pwidresolver-user`.

Create a flat file like this:

```
privacyidea-create-pwidresolver-user -u user2 -i 1002 >> /your/flat/file
```

LDAP resolver

The LDAP resolver can be used to access any kind of LDAP service like OpenLDAP, Active Directory, FreeIPA, Penrose, Novell eDirectory.

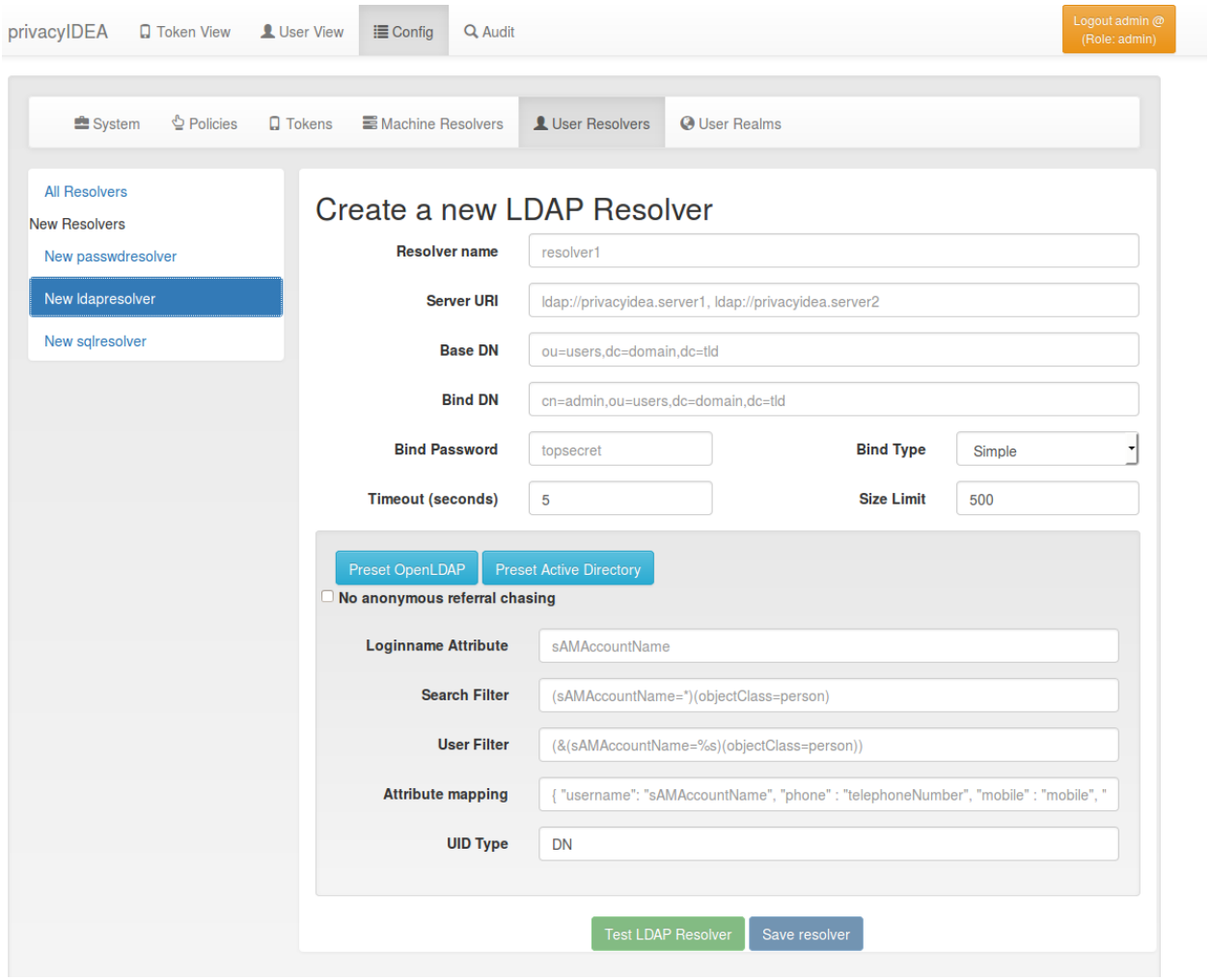


Fig. 1.8: *LDAP resolver configuration*

In case of Active Directory connections you might need to check the box `No anonymous referral chasing`. The underlying LDAP library is only able to do anonymous referral chasing. Active Directory will produce an error in this case [5].

The `Server URI` can contain a comma separated list of servers. The servers are used to create a server pool and are used with a round robin strategy [6].

Example:

```
ldap://server1, ldaps://server2:1636, server3, ldaps://server4
```

This will create LDAP requests to

- server1 on port 389

[5] http://blogs.technet.com/b/ad/archive/2009/07/06/referral-chasing.aspx
[6] https://github.com/cannatag/ldap3/blob/master/docs/manual/source/servers.rst#server-pool

- server2 on port 1636 using SSL
- server3 on port 389
- server4 on port 636 using SSL.

The `Bind Type` with Active Directory can either be chosen as "Simple" or as "NTLM".

Note: When using bind type "Simple" you need to specify the Bind DN like *cn=administrator,cn=users,dc=domain,dc=name*. When using bind type "NTLM" you need to specify Bind DN like *DOMAINNAME\username*.

The `LoginName` attribute is the attribute that holds the loginname. It can be changed to your needs.

The searchfilter and the userfilter are used for forward and backward search the object in LDAP.

The `searchfilter` is used to list all possible users, that can be used in this resolver.

The `userfilter` is used to find the LDAP object for a given loginname. This is why the `userfilter` contains the python string replacement parameter `%s`, which will be filled with the given loginname to find the LDAP object.

The `attribute mapping` maps LDAP object attributes to user attributes in privacyIDEA. privacyIDEA knows the following attributes:

- username *(mandatory)*,
- phone,
- mobile,
- email,
- surname,
- givenname,
- password
- accountExpires.

The above attributes are used for privacyIDEA's normal functionality and are listed in the userview. However, with a SAML authentication request user attributes can be returned. (see *SAML Attributes*). To return arbitrary attributes from the LDAP you can add additional keys to the attribute mapping with a key, you make up and the LDAP attribute like:

"homedir": "homeDirectory", "studentID": "objectGUID"

"homeDirectory" and "objectGUID" being the attributes in the LDAP directory and "homedir" and "studentID" the keys returned in a SAML authentication request.

The `UID Type` is the unique identifier for the LDAP object. If it is left blank, the distinguished name will be used. In case of OpenLDAP this can be *entryUUID* and in case of Active Directory *objectGUID*.

Expired Users

You may set

"accountExpires": "accountExpires"

in the attribute mapping for Microsoft Active Directories. You can then call the user listing API with the parameter *accountExpires=1* and you will only see expired accounts.

This functionality is used with the script *privacyidea-expired-users*.

SQL resolver

The SQL resolver can be used to retrieve users from any kind of SQL database like MySQL, PostgreSQL, Oracle, DB2 or sqlite.

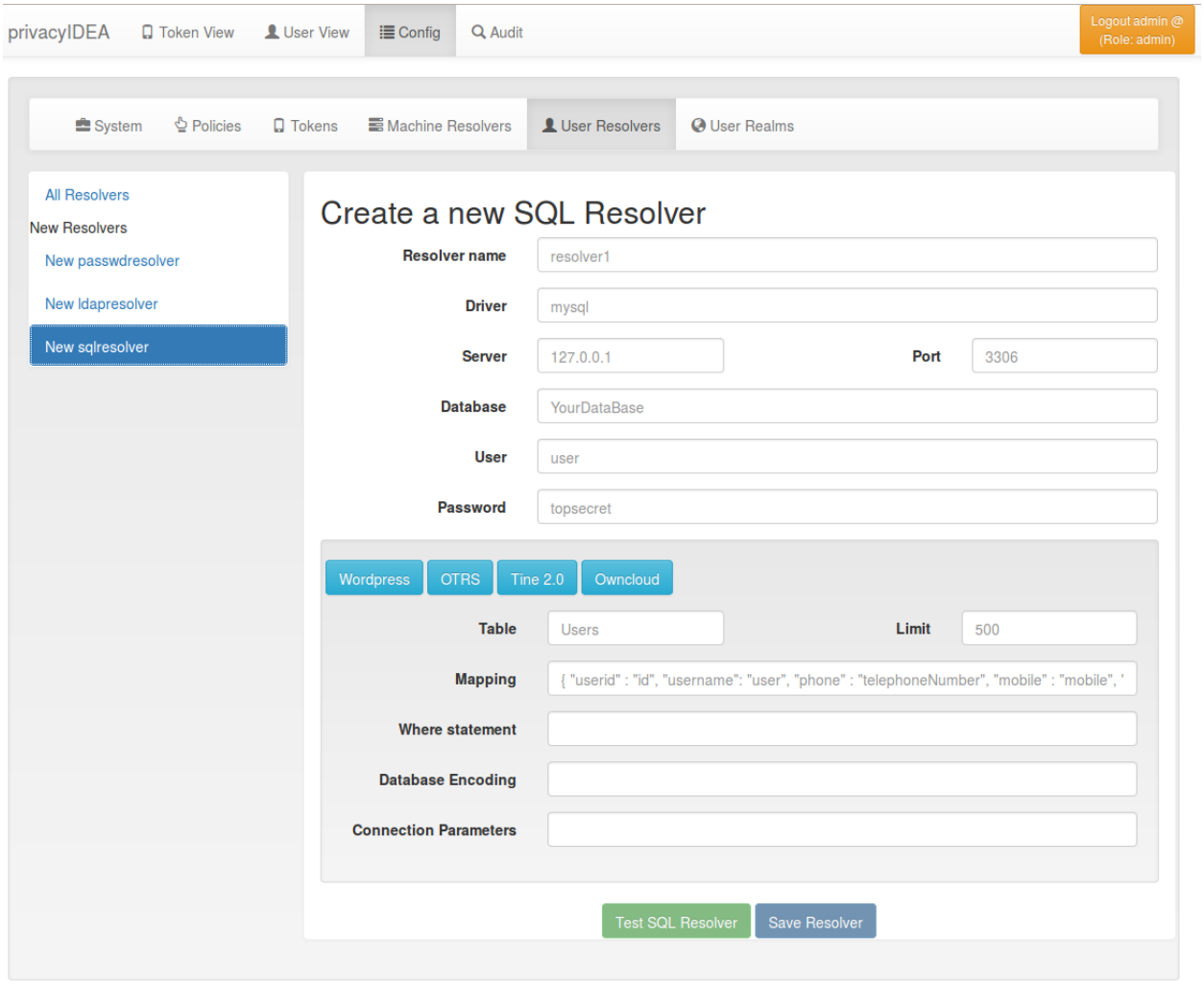


Fig. 1.9: *SQL resolver configuration*

In the upper frame you need to configure the SQL connection. The SQL resolver uses SQLAlchemy internally. In the field `Driver` you need to set a driver name as defined by the SQLAlchemy dialects like “mysql” or “postgres”.

In the `SQL attributes` frame you can specify how the users are identified.

The `Database table` contains the users.

Note: At the moment only one table is supported, i.e. if some of the user data like email address or telephone number is located in a second table, those data can not be retrieved.

The `Limit` is the SQL limit for a userlist request. This can be important if you have several thousand user entries in the table.

The `Attribute mapping` defines which table column should be mapped to which privayIDEA attribute. The known attributes are:

- userid *(mandatory)*,
- username *(mandatory)*,
- phone,
- mobile,
- email,
- givenname,
- surname,
- password.

The `password` attribute is the database column that contains the user password. This is used, if you are doing user authentication against the SQL database.

Note: There is no standard way to store passwords in an SQL database. There are several different ways to do this. privacyIDEA supports the most common ways like Wordpress hashes starting with *$P* or *$S*. Secure hashes starting with *{SHA}* or salted secure hashes starting with *{SSHA}*, *{SSHA256}* or *{SSHA512}*. Password hashes of length 64 are interpreted as OTRS sha256 hashes.

You can add an additional `Where statement` if you do not want to use all users from the table.

The `poolSize` and `poolTimeout` determine the pooling behaviour. The `poolSize` (default 5) determine how many connections are kept open in the pool. The `poolTimeout` (default 10) specifies how long the application waits to get a connection from the pool.

Note: The `Additional connection parameters` refer to the SQLAlchemy connection but are not used at the moment.

SCIM resolver

SCIM is a "System for Cross-domain Identity Management". SCIM is a REST-based protocol that can be used to ease identity management in the cloud.

The SCIM resolver is tested in basic functions with OSIAM [7], the "Open Source Idenitty & Access Management".

To connect to a SCIM service you need to provide a URL to an authentication server and a URL to the resource server. The authentication server is used to authenticate the privacyIDEA server. The authentication is based on a `client` name and the `Secret` for this client.

Userinformation is then retrieved from the resource server.

The available attributes for the `Attribute mapping` are:

- username *(mandatory)*,
- givenname,
- surname,
- phone,
- mobile,
- email.

[7] http://www.osiam.org

1.4.2 Realms

Users need to be in realms to have tokens assigned. A user, who is not member of a realm can not have a token assigned and can not authenticate.

You can combine several different UserIdResolvers (see *UserIdResolvers*) into a realm. The system knows one default realm. Users within this default realm can authenticate with their username.

Users in realms, that are not the default realm, need to be additionally identified. Therefor the users need to authenticate with their username and the realm like this:

```
user@realm
```

List of Realms

The realms dialog gives you a list of the already defined realms.

It shows the name of the realms, whether it is the default realm and the names of the resolvers, that are combined to this realm.

You can delete or edit an existing realm or create a new realm.

Edit Realm

Each realm has to have a unique name. The name of the realm is case insensitive. If you create a new realm with the same name like an existing realm, the existing realm gets overwritten.

If you click *Edit Realm* you can select which userresolver should be contained in this realm. A realm can contain several resolvers.

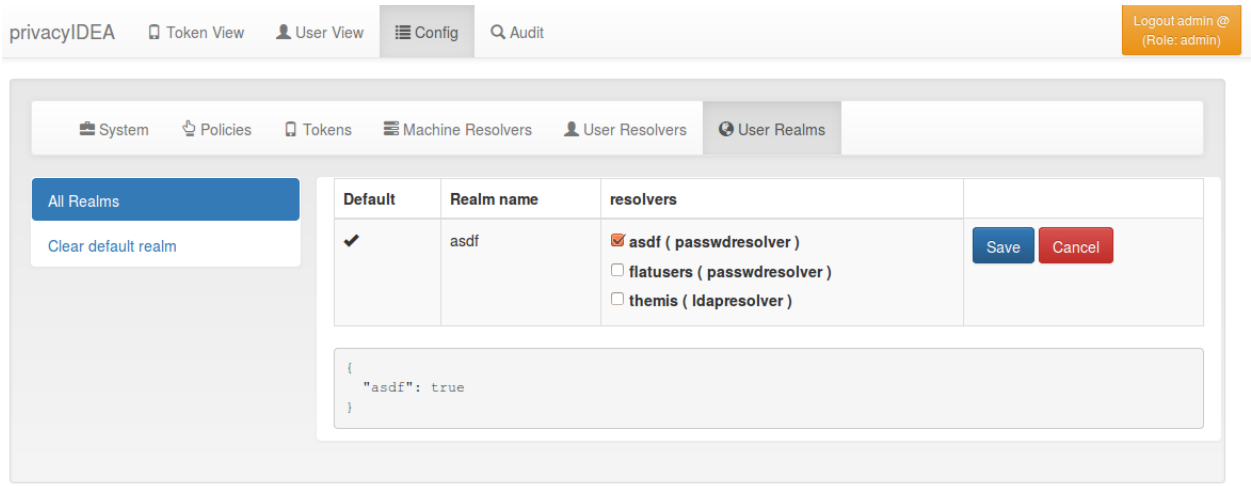


Fig. 1.10: *Edit a realm*

Resolver Priority

Within a realm you can give each resolver a priority. The priority is used to find a user that is located in several resolvers. If a user is located in more than one resolver, the user will be taken from the resolver with the lowest number in the priority.

Priorities are numbers between 1 and 999. The lower the number the higher the priority.

Example:

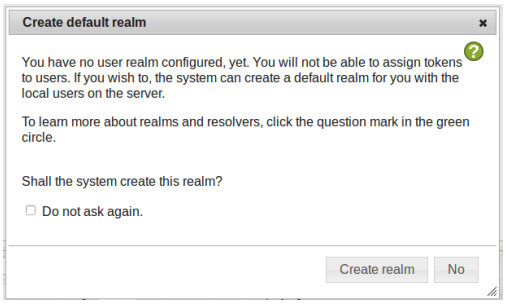
A user “administrator” is located in a resolver “users” which contains all Active Directory users. And the “administrator” is located in a resolver “admins”, which contains all users in the Security Group “Domain Admins” from the very same domain. Both resolvers are in the realm “AD”, “admins” with priority 1 and “users” with priority 2.

Thus the user “administrator@AD” will always resolve to the user located in resolver “admins”.

This is useful to create policies for the security group “Domain Admins”.

Note: A resolver has a priority per realm. I.e. a resolver can have a different priority in each realm.

Autocreate Realm



If you have a fresh installation, no resolver and no realm is defined. To get you up and running faster, the system will ask you, if it should create the first realm for you.

If you answer “yes”, it will create a resolver named “deflocal” that contains all users from /etc/passwd and a realm named “defrealm” with this very resolver.

Thus you can immediately start assigning and enrolling tokens.

If you check “Do not ask again” this will be stored in a cookie in your browser.

Note: The realm “defrealm” will be the default realm. So if you create a new realm manually and want this new realm to be the default realm, you need to set this new realm to be default manually.

1.4.3 System Config

The system configuration has three logical topics: Settings, token default settings and GUI settings.

Settings

Split @ Sign

`splitAtSign` defines if the username like *user@company* given during authentication should be split into the loginname *user* and the realm name *company*. In most cases this is the wanted behaviour.

But given your users log in with email addresses like *user@gmail.com* and *otheruser@outlook.com* you probably do not want to split.

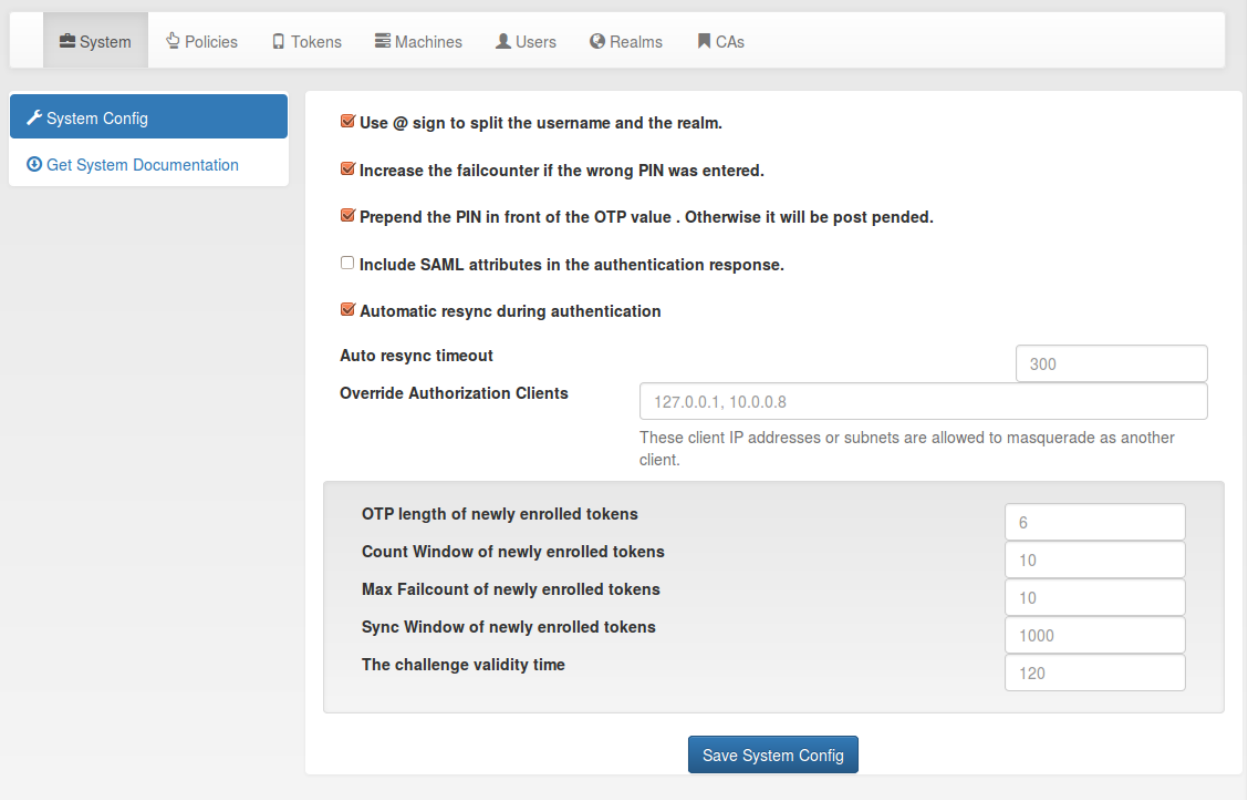


Fig. 1.11: *The system config*

SAML Attributes

`Return SAML attributes` defines if during an SAML authentication request additional SAML attributes should be returned. Usually an authentication response only returns *true* or *false*.

The SAML attributes are the known attributes that are defined in the attribute mapping e.g. of the LDAP resolver like *email*, *phone*, *givenname*, *surname* or any other attributes you fetch from the LDAP directory. For more information read *LDAP resolver*.

FailCounterIncOnFalsePin

If during authentication the given PIN matches a token but the OTP value is wrong the failcounter of the tokens for which the PIN matches, is increased. If the given PIN does not match any token, by default no failcounter is increased. The later behaviour can be adapted by `FailCounterIncOnFalsePin`. If `FailCounterIncOnFalsePin` is set and the given OTP PIN does not match any token, the failcounter of *all* tokens is increased.

Prepend PIN

`PrependPin` defines if the OTP PIN should be given in front ("pin123456") or in the back ("12345pin") of the OTP value.

AutoResync

`Auto resync` defines if the system should try to resync a token if a user provides a wrong OTP value. AutoResync works like this:

- If the counter of a wrong OTP value is within the resync window, the system remembers the counter of the OTP value for this token in the token info field `otp1c`.
- Now the user needs to authenticate a second time within `auto resync timeout` with the next successive OTP value.
- The system checks if the counter of the second OTP value is the successive value to `otp1c`.
- If it is, the token counter is set and the user is successfully authenticated.

Note: AutoResync works for all HOTP and TOTP based tokens including SMS and Email tokens.

Override Authentication Client

`Override Authentication client` is important with client specific policies (see *Policies*) and RADIUS servers. In case of RADIUS the authenticating client for the privacyIDEA system will always be the RADIUS serve, which issues the authentication request. But you can allow the RADIUS server IP to send another client information (in this case the RADIUS client) so that the policy is evaluated for the RADIUS client. This field takes a comma separated list of IP addresses.

Token default settings

Reset Fail Counter

`DefaultResetFailCount` will reset the failcounter of a token if this token was used for a successful authentication. If not checked, the failcounter will not be resetted and must be resetted manually.

Note: The following settings are token specific value which are set during enrollment. If you want to change this value of a token later on, you need to change this at the tokeninfo dialog.

Maximum Fail Counter

`DefaultMaxFailCount` is the maximum failcounter a token way get. If the failcounter exceeds this number the token can not be used unless the failcounter is resetted.

Note: In fact the failcounter will only increase till this maxfailcount. Even if more failed authentication request occur, the failcounter will not increase anymore.

Sync Window

`DefaultSyncWindow` is the window how many OTP values will be calculated during resync of the token.

OTP Length

`DefaultOtpLen` is the length of the OTP value. If no OTP length is specified during enrollment, this value will be used.

Count Window

`DefaultCountWindow` defines how many OTP values will be calculated during an authentication request.

Challenge Validity Time

`DefaultChallengeValidityTime` is the timeout for a challenge response authentication. If the response is set after the ChallengeValidityTime, the response is not accepted anymore.

1.4.4 Tokens

Supported Tokens

privacyIDEA supports a wide variety of tokens by different hardware vendors. It also supports token apps on the smartphone.

Tokens not listed, will be probably supported, too, since most tokens use standard algorithms.

If in doubt drop your question on the mailing list.

Hardware Tokens

The following hardware tokens are known to work well.

Yubikey. The Yubikey is supported in all modes: AES (*Yubikey*), *HOTP* and *Yubico* Cloud. You can initialize the Yubikey yourself, so that the secret key is not known to the vendor.

eToken Pass. The eToken Pass is a push button token by SafeNet. It can be initialized with a special hardware device. Or you get a seed file, that you need to import to privacyIDEA. The eToken Pass can run as *HOTP* or *TOTP* token.

eToken NG OTP. The eToken NG OTP is a push button token by SafeNet. As it has a USB connector, you can initialize the token via the USB connector. Thus the hardware vendor does not know the secret key.

DaPlug. The DaPlug token is similar to the Yubikey and can be initialized via the USB connector. The secret key is not known to the hardware vendor.

Smartdisplayer OTP Card. This is a push button card. It features an eInk display, that can be read very good in all light condition at all angles. The Smartdisplayer OTP card is initialized at the factory and you get a seed file, that you need to import to privacyIDEA.

Feitian. The C100 and C200 tokens are classical, reasonably priced push button tokens. The C100 is an *HOTP* token and the C200 a *TOTP* token. These tokens are initialized at the factory and you get a seed file, that you need to import to privacyIDEA.

U2F. The Yubikey and the Daplug token are known U2F devices to work well with privacyIDEA. See *U2F*.

Smartphone Apps

Google Authenticator. The Google Authenticator is working well in *HOTP* and *TOTP* mode. If you choose "Generate OTP Key on the Server" durcing enrollment, you can scan a QR Code with the Google Authenticator. See *Enrolling your first token* to learn how to do this.

FreeOTP. privacyIDEA is known to work well with the FreeOTP App. The FreeOTP App is a *TOTP* token. So if you scan the QR Code of an HOTP token, the OTP will not validate.

mOTP. Several mOTP Apps like "Potato", "Token2" or "DroidOTP" are supported.

Supported Tokentypes

At the moment the following tokentypes are supported:

- *HOTP* - event based One Time Password tokens based on RFC4225.
- *TOTP* - time based One Time Password tokens based on RFC6238.
- mOTP - time based One Time Password tokens for mobile phones based on an a public Algorithm.
- *Paper Token* - event based One Time Password tokens that get you list of one time passwords on a sheet of paper.
- *Questionnaire Token* - A token that contains a list of answered questions. During authentication a random question is presented as challenge from the list of answered questions is presented. The user must give the right answer.
- *EMail* - A token that sends the OTP value to the EMail address of the user.
- *Four Eyes* - Meta token that can be used to create a Two Man Rule.
- password - A password token used for *losttoken* scenario.
- *Registration* - A special token type used for enrollment scenarios (see *Registration Code*).

- Simple Pass - A token that only consists of the Token PIN.
- *Certificates* - A token that represents a client certificate.
- *SSH Keys* - An SSH public key that can be managed and used in conjunction with the *Client machines* concept.
- *Remote* - A virtual token that forwards the authentication request to another privacyIDEA server.
- *RADIUS* - A virtual token that forwards the authentication request to a RADIUS server.
- *SMS* - A token that sends the OTP value to the mobile phone of the user.
- *TiQR* - A Smartphone token that can be used to login by only scanning a QR code.
- *U2F* - A U2F device as specified by the FIDO Alliance. This is a USB device to be used for challenge response authentication.
- *Yubico* - A Yubikey hardware that authenticates against the Yubico Cloud service.
- *Yubikey* - A Yubikey hardware initialized in the AES mode, that authenticates against privacyIDEA.
- Daplug - A hardware OTP token similar to the Yubikey.

The Tokentypes:

Four Eyes

Starting with version 2.6 privacyIDEA supports 4 Eyes Token. This is a meta token, that can be used to define, that two or more token must be used to authenticate. This way, you can set up a "two man rule".

You can define, from which realm how many unique tokens need to be present, when authenticating:

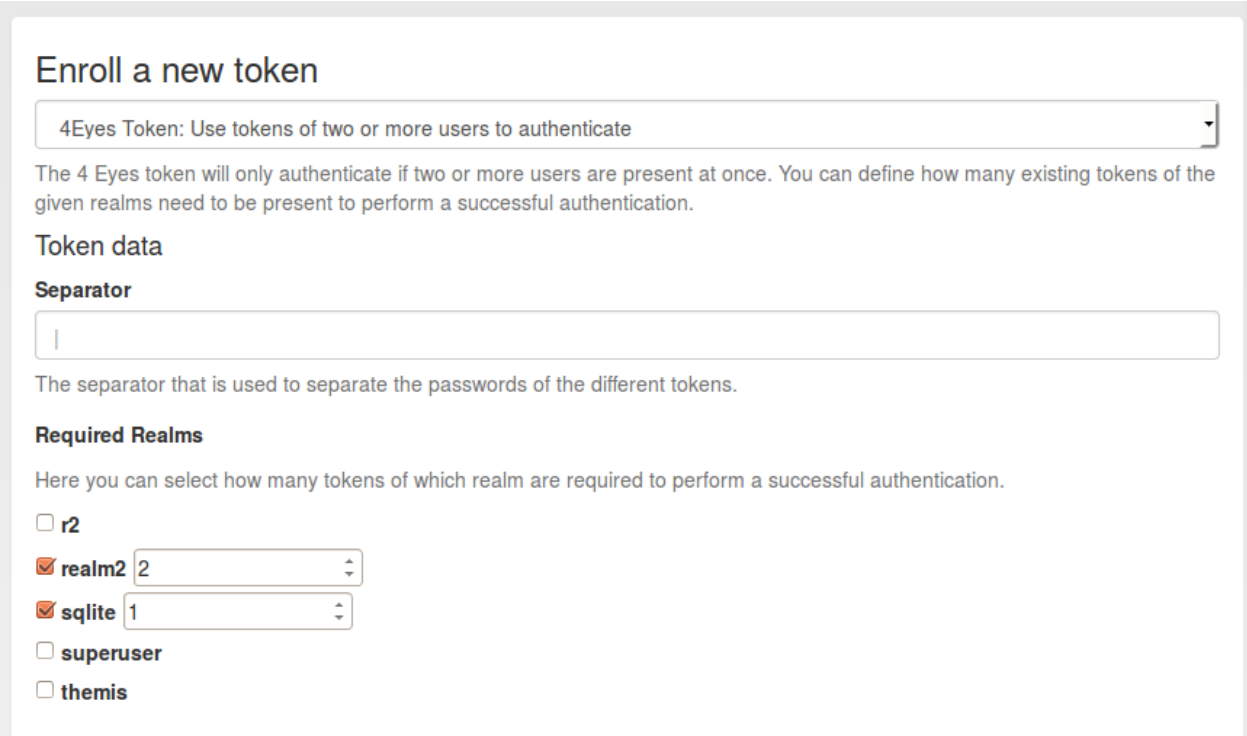


Fig. 1.12: *Enroll a 4 eyes token*

In this example authentication will only be possbile if at least two tokens from *realm2* and one token from realm *sqlite* are present.

Authentication is done by concatenating the OTP PINs and the OTP values of all tokens. The concatenation is split by the *separator* character.

It does not matter, in which order the tokens from the realms are entered.

Example

Authentication as:

```
username: "root@r2"
password: "pin123456 secret789434 key098123"
```

The three blocks separated by the *blank* are checked, if they match tokens in the realms *realm2* and *sqlite*.

The response looks like this in case of success:

```
{
  "detail": {
    "message": "matching 1 tokens",
    "serial": "PI4E000219E1",
    "type": "4eyes"
  },
  "id": 1,
  "jsonrpc": "2.0",
  "result": {
    "status": true,
    "value": true
  },
  "version": "privacyIDEA 2.6dev0",
  "versionnumber": "2.6dev0"
}
```

In case of a failed authentication the response looks like this:

```
{
  "detail": {
    "foureyes": "Only found 0 tokens in realm themis",
    "message": "wrong otp value",
    "serial": "PI4E000219E1",
    "type": "4eyes"
  },
  "id": 1,
  "jsonrpc": "2.0",
  "result": {
    "status": true,
    "value": false
  },
  "version": "privacyIDEA 2.6dev0",
  "versionnumber": "2.6dev0"
}
```

Note: The 4Eyes Token verifies that unique tokens from each realm are used. I.e. if you require 2 tokens from a realm, you can not use the same token twice.

Warning: But it does not verify, if these two unique tokens belong to the same user. Thus you should create a poliy, that in such a realm a user may only have on token.

Certificates

Starting with version 2.3 privacyIDEA supports certificates. A user can

- upload a certificate request,
- upload a certificate or
- he can generate a certificate request in the browser.

privacyIDEA does not sign certificate requests itself but connects to existing certificate authorities. To do so, you need to define *CA Connectors*.

Certificates are attached to the user just like normal tokens. One token of type *certificate* always contains only one certificate.

If you have defined a CA connector you can upload a certificate signing request (CSR) via the *Token Enroll Dialog* in the WebUI.

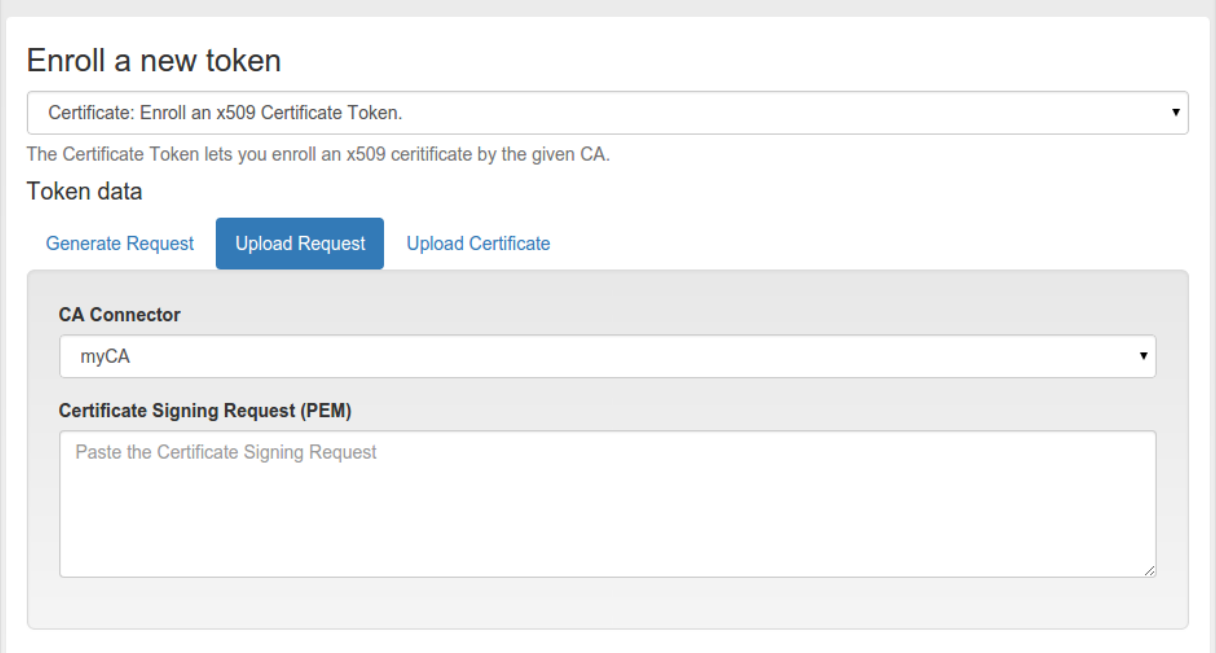


Fig. 1.13: *Upload a certificate signing request*

You need to choose the CA connector. The certificate will be signed by the CA accordingly. Just like all other tokens the certificate token can be attached to a user.

Generating Signing Requests You can also generate the signing request directly in your browser.

Note: This uses the keygen HTML-tag that is not supported by the Internet Explorer!

When generating the certificate signing request this way the RSA keypair is generated on the client side in the browser.

The certificate is signed by the CA connected by the chosen CA connector.

Afterwards the user can install the certificate into the browser.

Note: By requiring OTP authentication for the users to login to the WebUI (see *login_mode*) you can have two factor

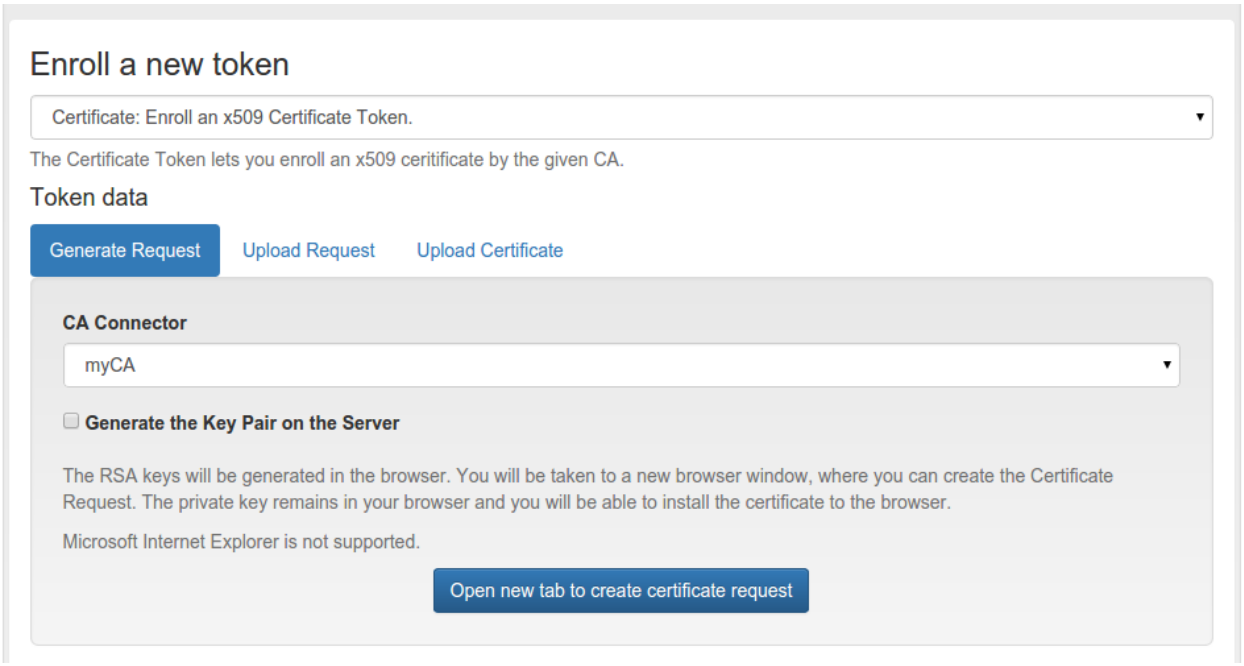


Fig. 1.14: *Generate a certificate signing request*

Fig. 1.15: *Download or install the client certificate*

authentication required for the user to be allowed to enroll a certificate.

EMail

The token type *email* sends the OTP value in an EMail to the user. You can configure the EMail server in *Email OTP Token*.

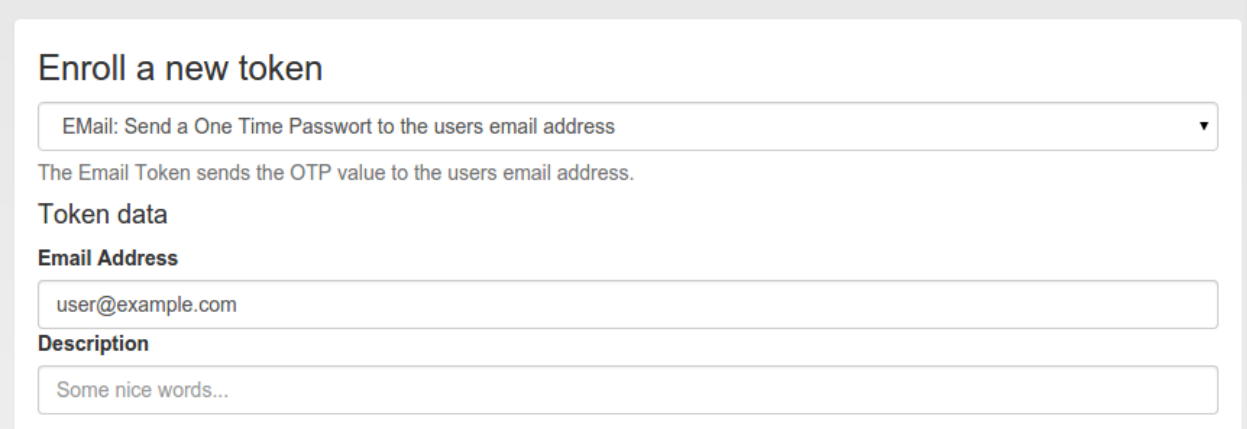


Fig. 1.16: *Enroll an EMail token*

When enrolling an EMail token, you only need to specify the email address of the user.

The EMail token is a challenge response token. I.e. when using the OTP PIN in the first authentication request, the sending of the EMail will be triggered and in a second authentication request the OTP value from the EMail needs to be presented.

For a more detailed insight see the code documentation *Email Token*.

HOTP

The HOTP token is - together with the *TOTP* - the most common token. The HOTP Algorithm is defined in RFC4225. The HOTP token is an event base token. The HOTP algorithm has some parameter, like if the generated OTP value will be 6 digits or 8 digits or if the SHA1 oder the SHA256 hashing algorithm is used.

Hardware tokens There are many token vendors out there who are using the official algorithm to build and sell hardware tokens. You can get HOTP based hardware tokens in different form factors, as a normal key fob for your key ring or as a display card for your purse.

Preseeded or Seedable Usually the hardware tokens like keyfobs or display cards contain a secret key that was generated and implanted at the vendors factory. The vender ships the tokens and a seed file.

> **Warning:** In this case privacyIDEA can not guarantee that the secret seed of the token is unique and if you are using a real strong factor.

privacyIDEA also supports the following seedable HOTP tokens:

- SafeNet eToken NG OTP

- SafeNet eToken Pass
- Yubikey in OATH mode
- Daplug

Those tokens can be initialized by privacyIDEA. Thus you can be sure, that only you are in possession of the secret seed.

Experiences The above mentioned hardware tokens are known to play well with privacyIDEA. In theory all OATH/HOTP tokens should work well with privacyIDEA. However, there are good experiences with Smartdisplayer OTP cards [8] and Feitian C200 [9] tokens.

Software tokens Besides the hardware tokens there are also software tokens, implemented as Apps for your smartphone. These software tokens allow are seedable, so there is no vendor, knowing the secret seed of your OTP tokens.

But software tokens are software after all on device prone to security issues.

Experiences The Google Authenticator can be enrolled easily in HOTP mode using the QR-Code enrollment Feature.

The Google Authenticator is available for iOS, Android and Blackberry devices.

Enrollment Default settings for HOTP tokens can be configured at *HOTP Token Config*.

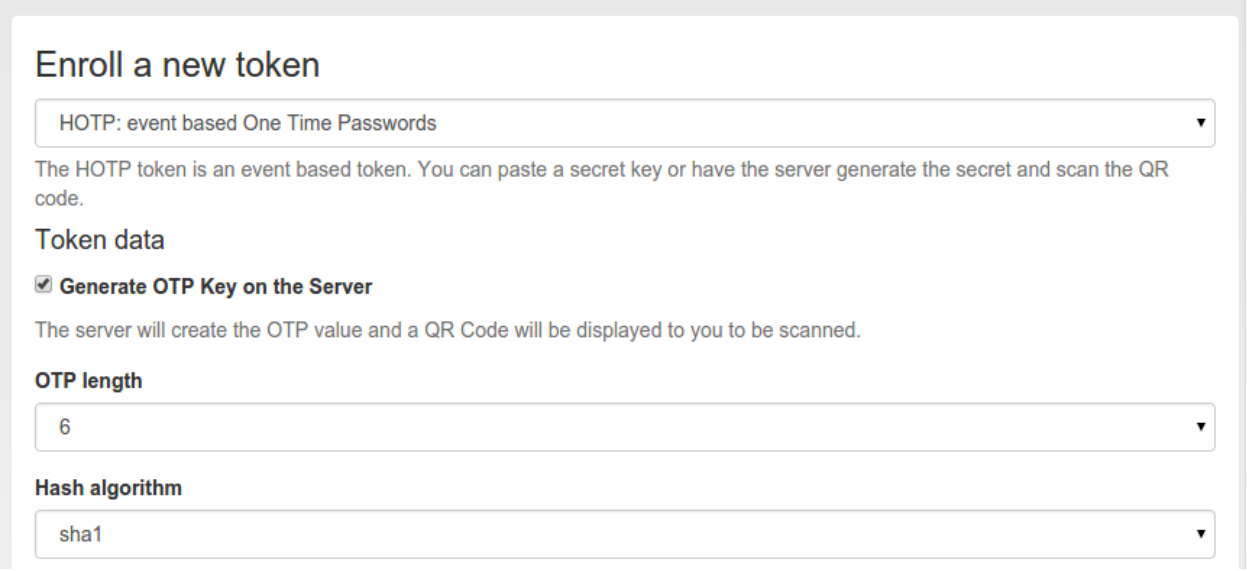


Fig. 1.17: *Enroll an HOTP token*

During enrollment you can choose, if the server should generate the key or if you have a key, that you can enter into the enrollment page.

As mentioned earlier, you can also choose the **OTP length** and the **hash algoriothm**.

After enrolling the token, the QR-Code, containing the secret seed, is displayed, so that you can scan this with your smartphone and import it to your app.

[8] https://netknights.it/en/produkte/smartdisplayer/
[9] https://netknights.it/en/produkte/oath-hotptotp/

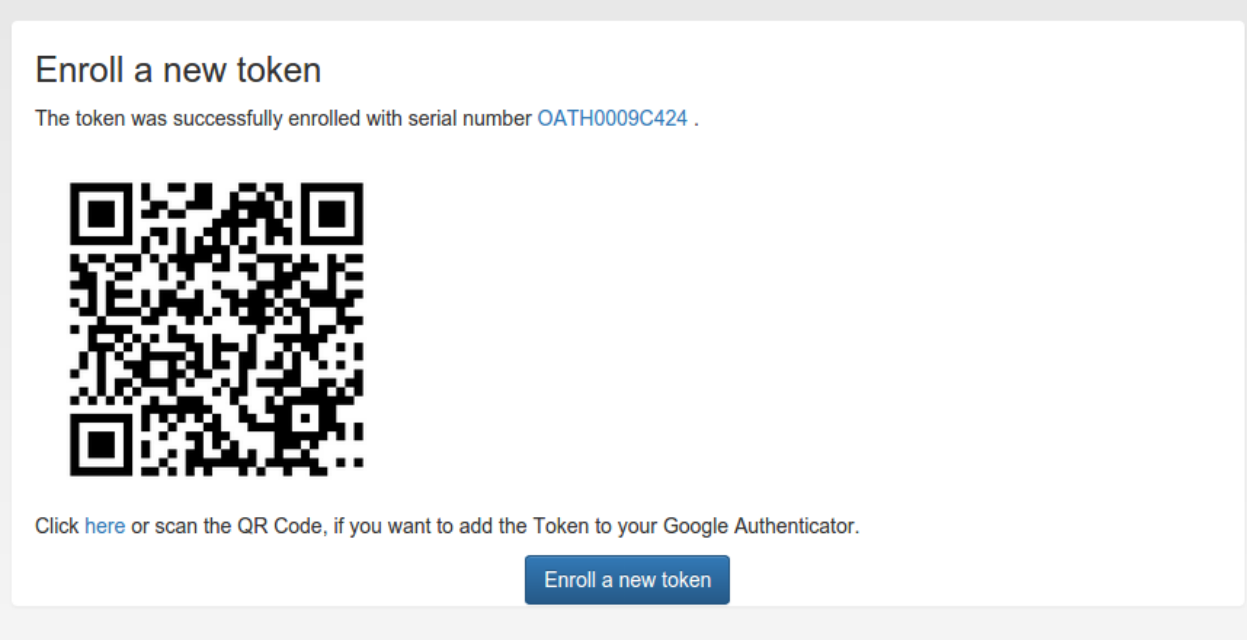


Fig. 1.18: *If the server generated the secret seed, you can scan the QR-Code*

Paper Token

The token type *paper* lets you print out a list of OTP values, which you can use to authenticate and cross of the list.

The paper token is based on the *HOTP*. I.e. you need to use one value after the other.

Questionnaire Token

The administrator can define a list of questions and also how many answers to the questions a user needs to define.

During enrollment of such a *question* type token the user answers at least as many questions as specified with answers only he knows.

This token is a challenge response token. During authentication the user must give the token PIN and the a random question from the answered question is chosen. The user has to answer with the same answer he defined earlier.

Note: If the administrator changes the questions _after_ a token was enrolled, the enrolled token still works with the old questions and answers. I.e. an enrolled token is not affected by changing the questions by the administrator.

RADIUS

The token type *RADIUS* forwards the authentication request to a RADIUS Server.

When forwarding the authentication request, you can change the username and mangle the password.

Check the PIN locally

If checked, the PIN of the token will be checked on the local server. If the PIN matches only the remaining part of the issued password will be sent to the RADIUS server.

RADIUS Server

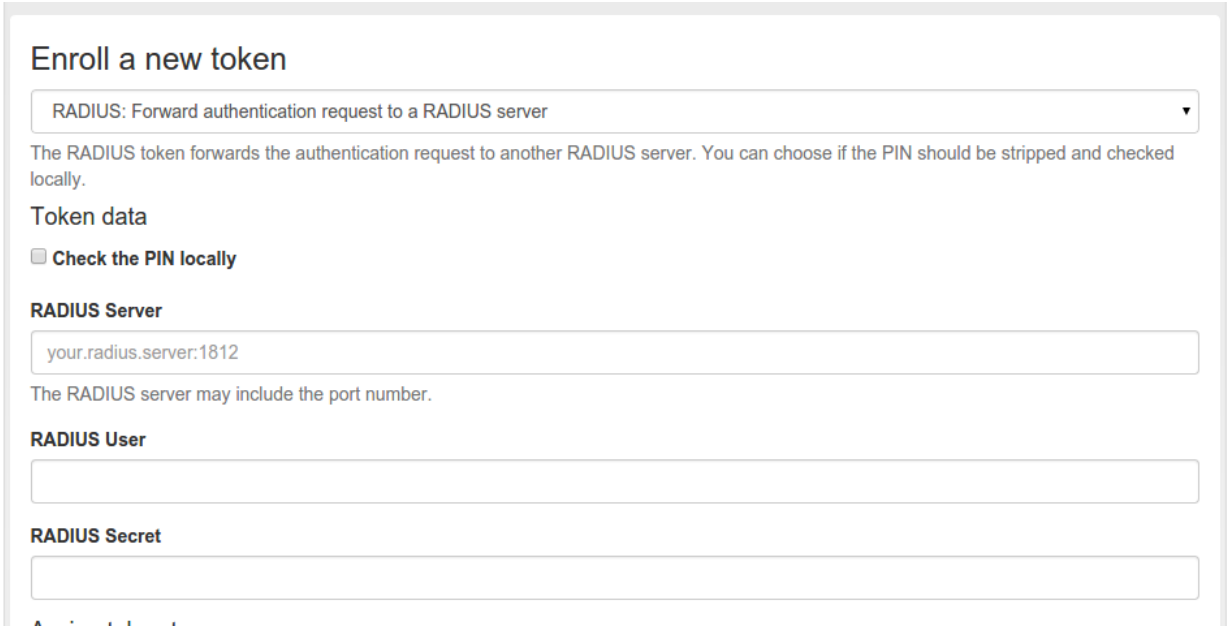


Fig. 1.19: *Enroll a RADIUS token*

The RADIUS server, to which the authentication request will be forwarded. You can specify the port like `my.radius.server:1812`.

RADIUS User

When forwarding the request to the RADIUS server, the authentication request will be issued for this user. If the user is left empty, the RADIUS request will be sent with the same user.

RADIUS Secret

The RADIUS secret for this RADIUS client.

Note: Using the RADIUS token you can design migration scenarios. When migrating from other (proprietary) OTP solutions, you can enroll a RADIUS token for the users. The RADIUS token points to the RADIUS server of the old solution. Thus the user can authenticate against privacyIDEA with the old, proprietary token, till he is enrolled a new token in privacyIDEA. The interesting thing is, that you also get the authentication request with the proprietary token in the audit log of privacyIDEA. This way you can have a scenario, where users are still using old tokens and other users are already using new (privacyIDEA) tokens. You will see all authentication requests in the pricacyIDEA system.

Registration

(See *Registration Code*)

The registration token can be used to create a registration code for a user. This registration code can be sent via postal mail to the user, so that the user can use this registration code as a second factor to login to a portal.

After a one single use, the registration code is deleted and can not be used a second time.

Note: The registration code can only be enrolled via the API to provide automated smooth workflow to your needs.

For a more detailed insight see the code documentation *Registration Code Token*.

Remote

The token type *remote* forwards the authentication request to another privacyIDEA Server.

When forwarding the authentication request, you can

- change the username
- change the resolver
- change the realm
- change the serial number

and mangle the password.

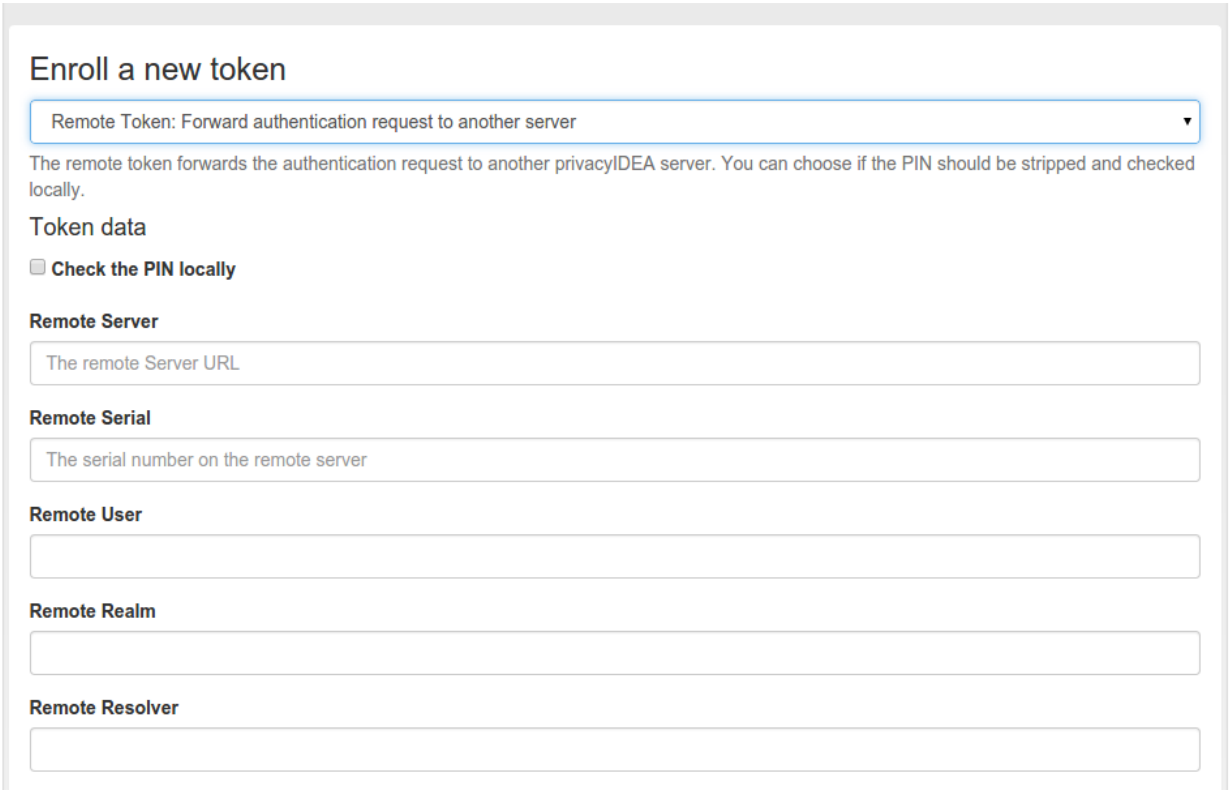


Fig. 1.20: *Enroll a Remote token*

Check the PIN locally

If checked, the PIN of the token will be checked on the local server. If the PIN matches only the remaining part of the issued password will be sent to the remote privacyIDEA server.

Remote Server

The privacyIDEA server, to which the authentication request will be forwarded. The path `/validate/check` will be added automatically. So a sensible input would be `https://my.other.server/`.

Remote Serial

If the *Remote Serial* is specified the given password will be checked against the serial number on the remote privacyIDEA server. Usernames will be ignored.

Remote User

When forwarding the request to the remote server, the authentication request will be issued for this user.

Remote Realm

When forwarding the request to the remote server, the authentication request will be issued for this realm.

Remote Resolver

When forwarding the request to the remote server, the authentication request will be issued for this resolver.

Note: You can use *Remote Serial* to forward the request to a central privacyIDEA server, that only knows tokens but has no knowledge of users. Or you can use *Remote Serial* to forward the request to an existing to on *localhost* thus adding a second user to the same token.

SMS

The token type *sms* sends the OTP value via an SMS service. You can configure the SMS service in *SMS OTP Token*.

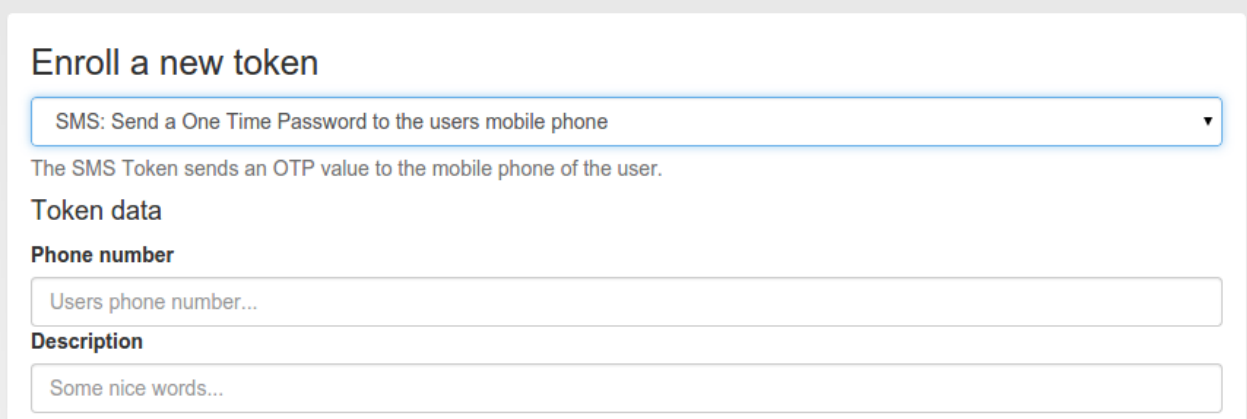


Fig. 1.21: *Enroll an SMS token*

When enrolling an SMS token, you only need to specify the mobile phone number.

SMS token is a challenge response token. I.e. when sending the OTP PIN in the first authentication request, the sending of the SMS will be triggered and in a second authentication request the OTP value from the SMS needs to be presented.

For a more detailed insight see the code documentation *SMS Token*.

SSH Keys

The token type *sshkey* is the public SSH key, that you can upload and assign to a user. The SSH key is only used for the application type **SSH** in conjunction with the *Client machines* concept.

A user or the administrator can upload the public SSH key and assign to a user.

Paste the SSH key into the text area. The comment in the SSH key will be used as token comment. You can assign the SSH key to a user and then use the SSH key in Application Definitions *SSH*.

Note: This way you can manage SSH keys centrally, as you do not need to distribute the SSH keys to all machines. You rather store the SSH keys centrally in privacyIDEA and use **privacyidea-authorizedkeys** to fetch the keys in real time during the login process.

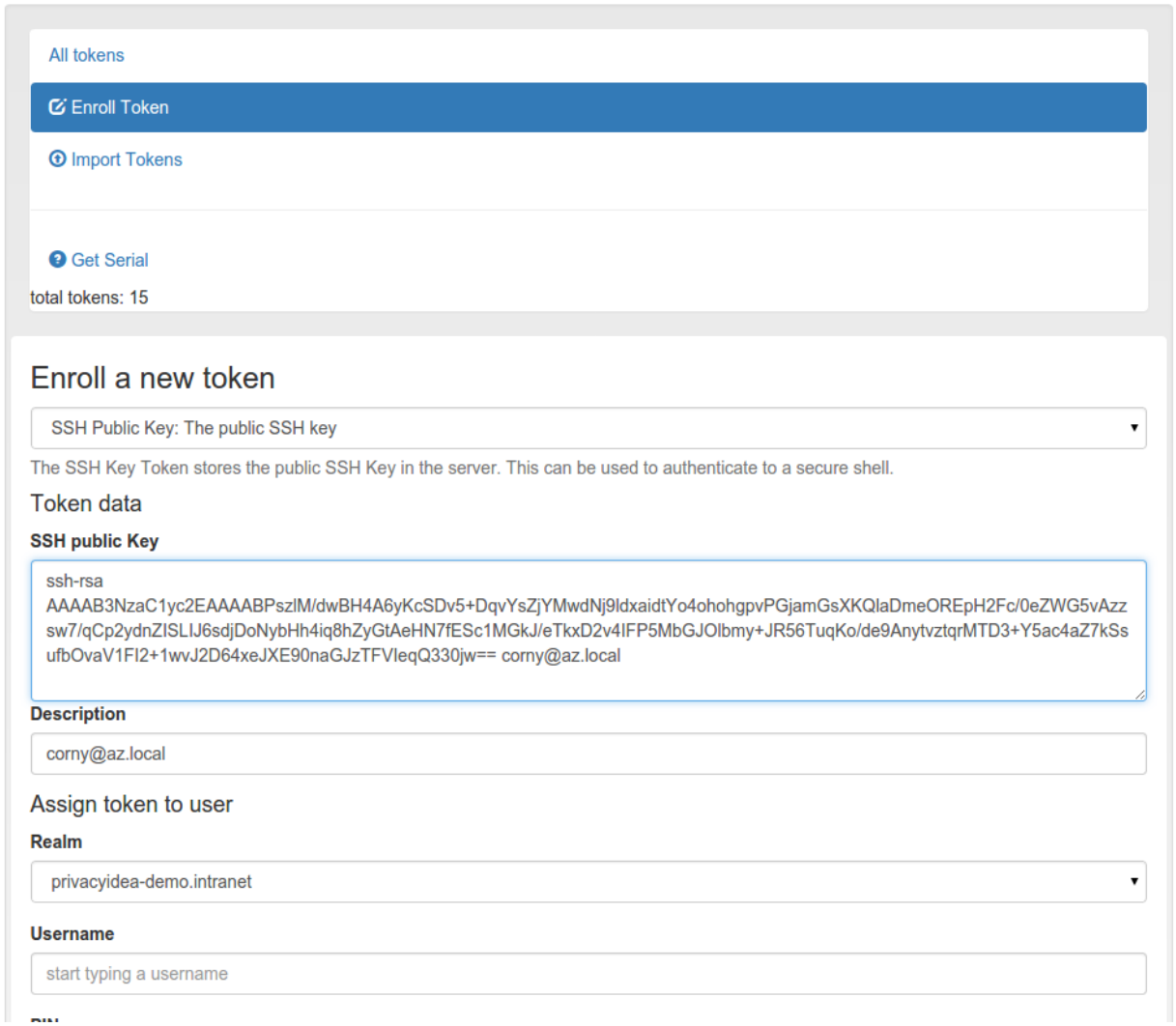


Fig. 1.22: *Enroll an SSH key token*

TiQR

Starting with version 2.6 privacyIDEA supports the TiQR token. The TiQR token is a smartphone token, that can be used to login by only scanning a QR code.

The token is also enrolled by scanning a QR code.

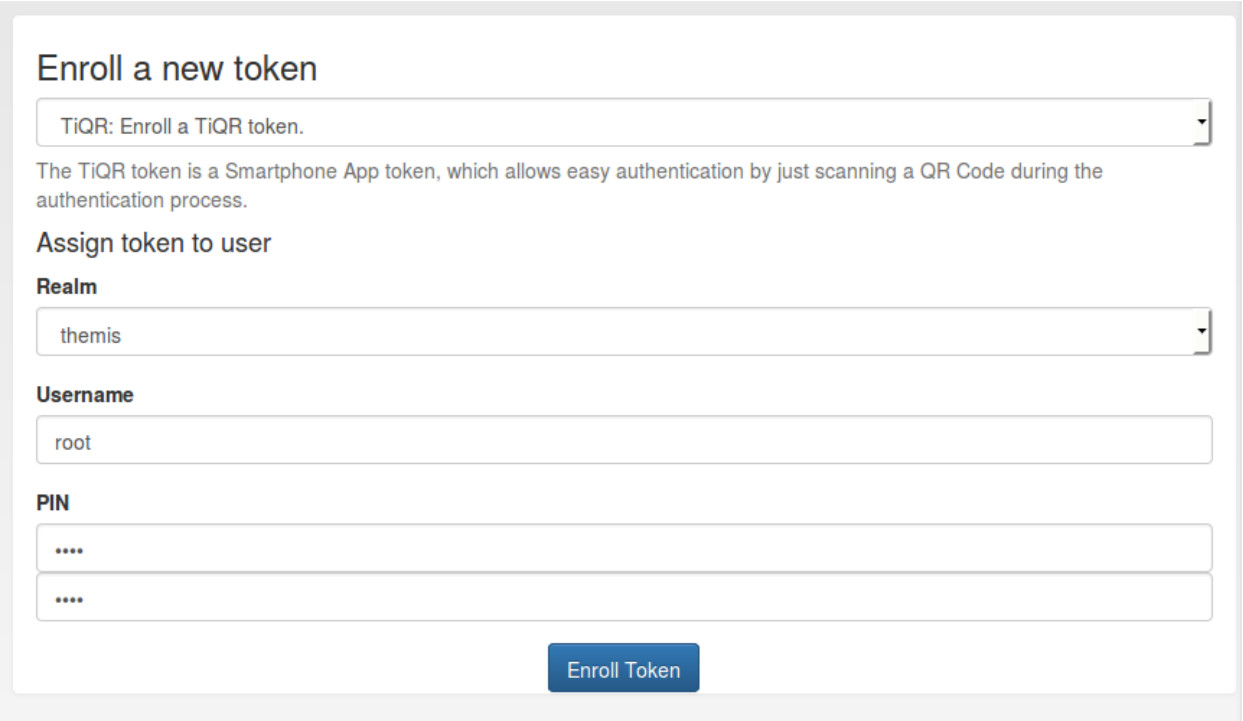


Fig. 1.23: *Choose a user for the TiQR token*

You can only enroll a TiQR token, when a user is selected.

Note: You can not enroll a TiQR token without assign the token to a user.

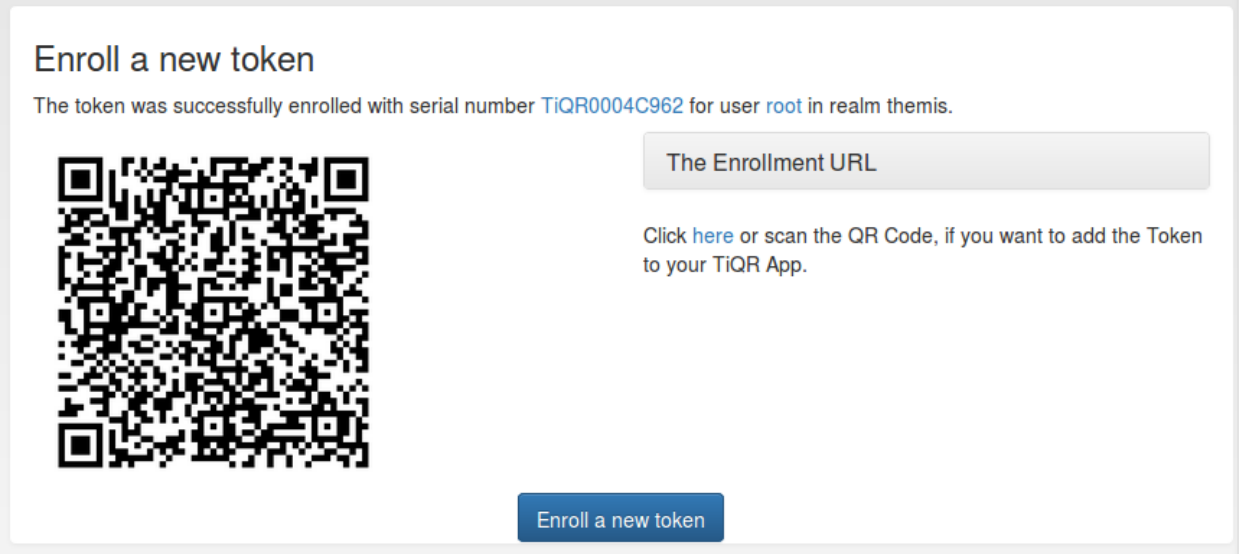
For more technical information about the TiQR token please see *TiQR Token*.

TOTP

The TOTP token is - together with the *HOTP* - the most common token. The TOTP Algorithm is defined in RFC6238. The TOTP token is a time based token. Roughly speaking the TOTP algorithm is the same algorithm like the HOTP, where the event based counter is replaced by the unix timestamp.

The TOTP algorithm has some parameter, like if the generated OTP value will be 6 digits or 8 digits or if the SHA1 oder the SHA256 hashing algorithm is used and the timestep being 30 or 60 seconds.

Hardware tokens The information about preseeded token and seedable tokens is the same as described in the section about *HOTP*.



The only available seedable pushbutton TOTP token is the *SafeNet eToken Pass*. The Yubikey can be used as a TOTP token, but only in conjunction with a smartphone app, since the yubikey has not its own clock.

Software tokens

Experiences The Google Authenticator and the FreeOTP token can be enrolled easily in TOTP mode using the QR-Code enrollment Feature.

The Google Authenticator is available for iOS, Android and Blackberry devices.

Enrollment Default settings for TOTP tokens can be configured at *TOTP Token Config*.

The enrollment is the same as described in *HOTP*. However, when enrolling TOTP token, you can specify some additional parameters.

U2F

Starting with version 2.7 privacyIDEA supports U2F tokens. The administrator or the user himself can register a U2F device and use this U2F token to login to the privacyIDEA web UI or to authenticate at applications.

When enrolling the token a key pair is generated and the public key is sent to privacyIDEA. During this process the user needs to prove that he is present by either pressing the button (Yubikey) or by replugging the device (Plug-up token).

The device is identified and assigned to the user.

Note: This is a normal token object which can also be reassigned to another user.

Note: As the key pair is only generated virtually, you can register one physical device for several users.

For configuring privacyIDEA for the use of U2F token, please see *U2F Token Config*.

For further details and for information how to add this to your application you can see the code documentation at *U2F Token*.

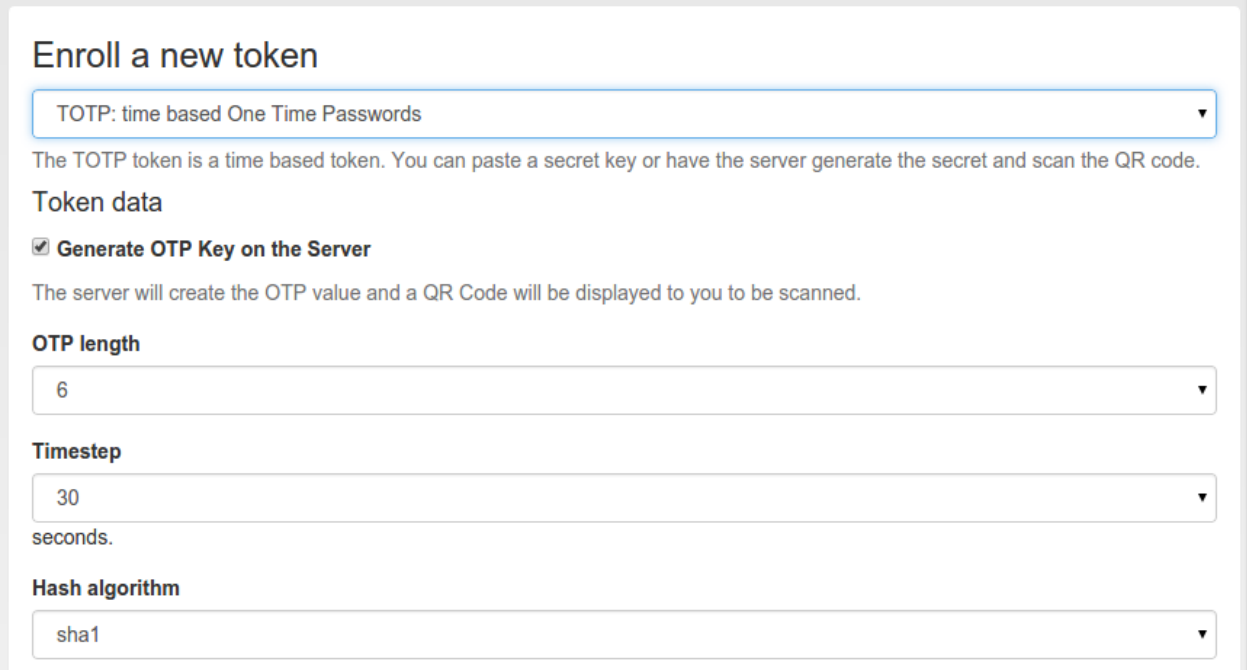


Fig. 1.24: *Enroll an TOTP token*

Yubico

The token type *yubico* authenticates against the Yubico Cloud mode. You need to configure this at *Yubico Cloud mode*.

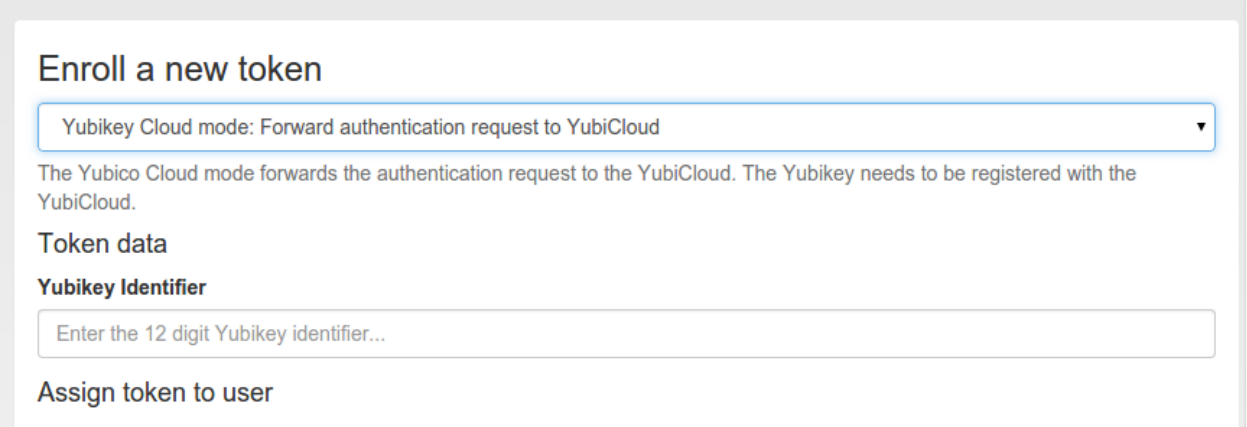


Fig. 1.25: *Enroll a Yubico token*

The token is enrolled by simply saving the Yubikey token ID in the token object. You can either enter the 12 digit ID or you can simply press the Yubikey button in the input field, which will also assign the token.

Yubikey

The Yubikey is initialized with privacyIDEA and works in Yubicos own AES mode. It outputs a 44 digit OTP value. But in contrast to the *Yubico* Cloud mode, in this mode the secret key is contained within the token and your own privacyIDEA installation.

If you have the time and care about privacy, you should prefer the Yubikey AES mode over the *Yubico* Cloud mode.

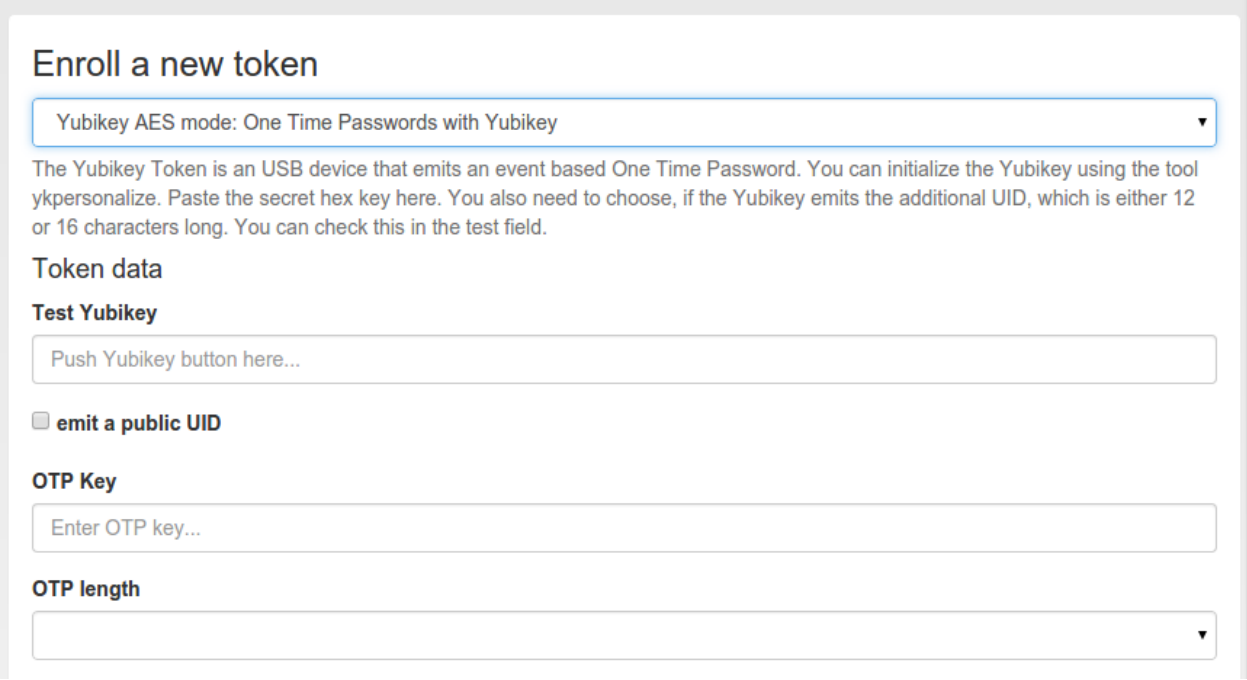


Fig. 1.26: *Enroll a Yubikey AES mode token*

You can use this dialog to enroll a Yubikey AES mode token, if you have initialized the yubikey with the external *ykpersonalize* tool.

Note: However, we recommend that you use the `privacyidea` command line client, to initialize the Yubikeys. You can use the mass enrollment, which eases the process of initializing a whole bunch of tokens.

Run the command like this:

```
privacyidea -U https://your.privacyidea.server -a admin token \
yubikey_mass_enroll --yubimode YUBICO
```

Token configuration

Each token type can provide its own configuration dialog.

In this configuration dialog you can define default values for these token types.

Email OTP Token

The Email OTP token creates a OTP value and sends this OTP value to the email address of the uses. The Email can be triggered by authenticating with only the OTP PIN:

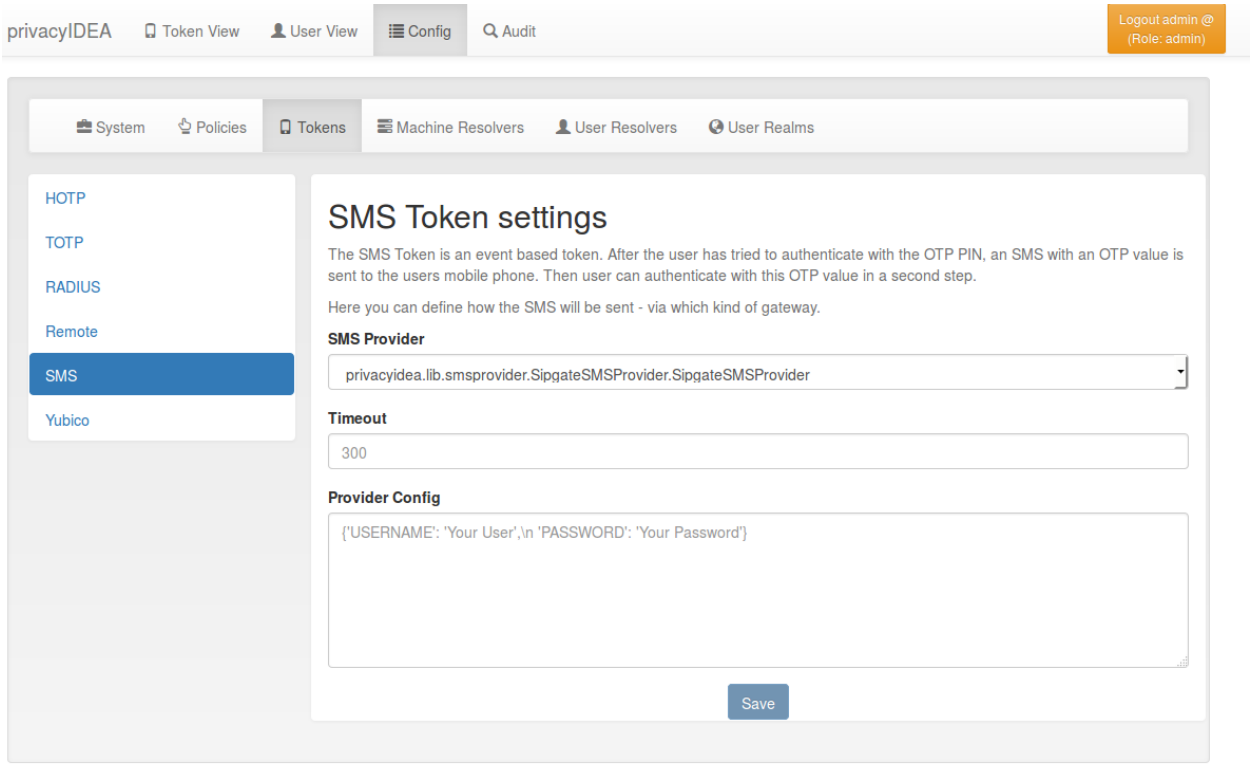


Fig. 1.27: *Token Configuration: SMS*

First step In the first step the user will enter his OTP PIN and the sending of the Email is triggered. The user is denied the access.

Seconds step In the second step the user authenticates with the OTP PIN and the OTP value he received via Email. The user is granted access.

Alternatively the user can authenticate with the *transaction_id* that was sent to him in the response during the first step and only the OTP value. The *transaction_id* assures that the user already presented the first factor (OTP PIN) successfully.

Configuration Parameters You can configure the mail parameters for the Email Token centrally at `Config -> Tokens -> Email`.

Mail Server

The name or IP address of the mail server that is used to send emails.

Port

The port of the mail server.

Mail User

If the mail server requires authentication you need to enter a username. If no username is entered, no authentication is performed on the mail server.

Mail User Password

The password of the mail username to send emails.

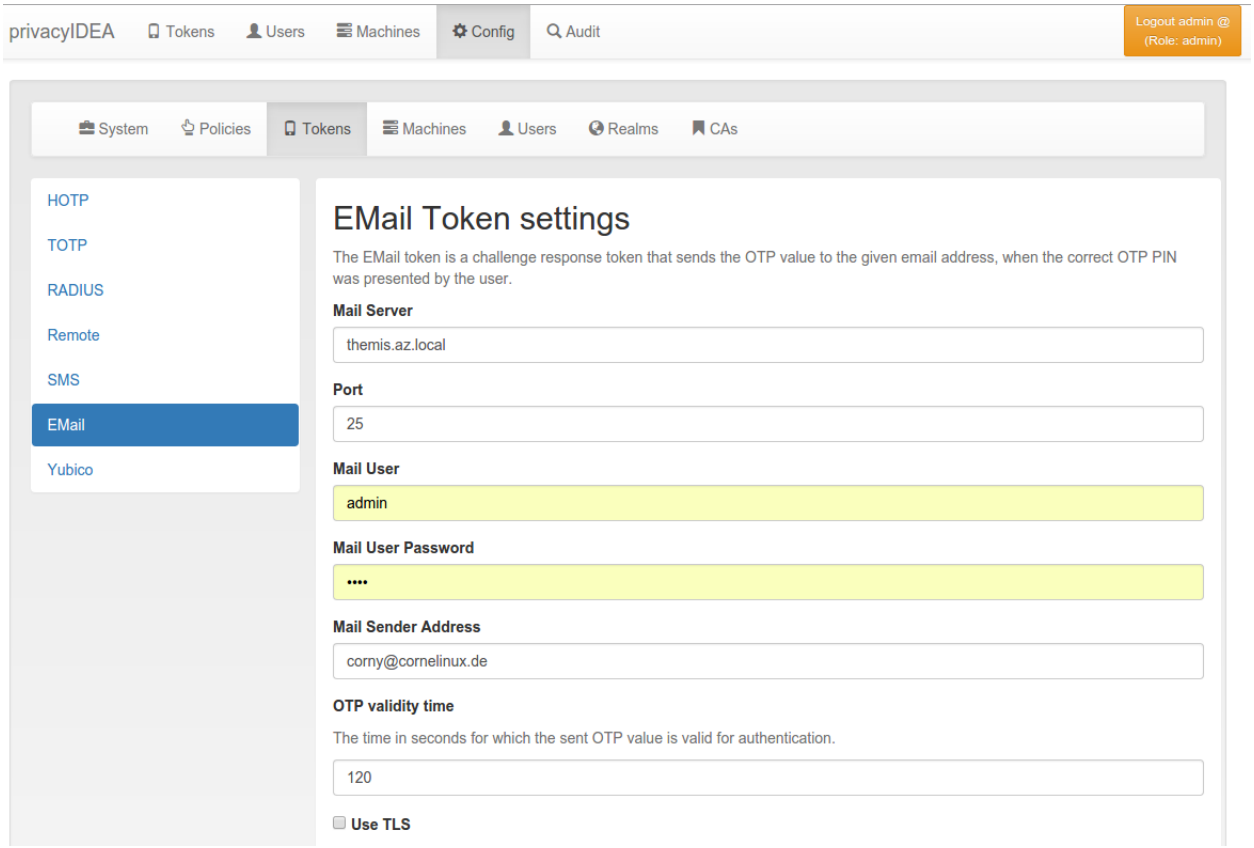


Fig. 1.28: *Email Token configuration*

Mail Sender Address

The mail address of the mail sender. This needs to correspond to the *Mail User*.

OTP validity time

This is the time in seconds, for how long the sent OTP value is valid. If a user tries to authenticate with the sent OTP value after this time, authentication will fail.

Use TLS

Whether the mail server should use TLS.

HOTP Token Config

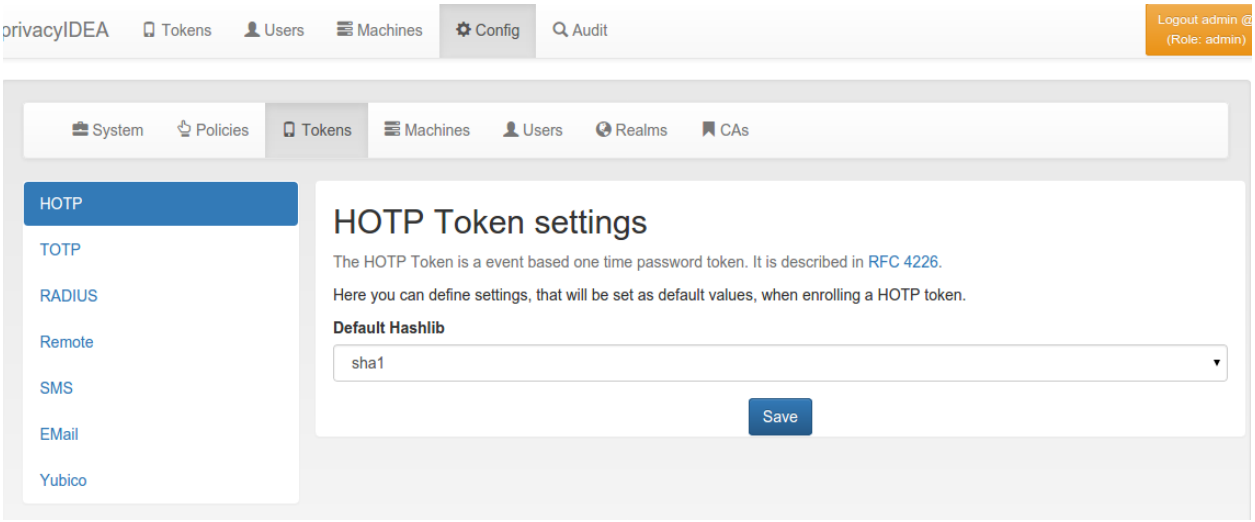


Fig. 1.29: *HOTP Token configuration*

SMS OTP Token

The SMS OTP token creates a OTP value and sends this OTP value to the mobile phone of the user. The SMS can be triggered by authenticating with only the OTP PIN:

First step In the first step the user will enter his OTP PIN and the sending of the SMS is triggered. The user is denied the access.

Second step In the second step the user authenticates with the OTP PIN and the OTP value he received via SMS. The user is granted access.

Alternatively the user can authenticate with the *transaction_id* that was sent to him in the response during the first step and only the OTP value. The *transaction_id* assures that the user already presented the first factor (OTP PIN) successfully.

A python SMS provider module defines how the SMS is sent. This can be done using an HTTP SMS Gateway. Most services like Clickatel or sendsms.de provide such a simple HTTP gateway. Another possibility is to send SMS via sipgate, which provides an XMLRPC API. The third possibility is to send the SMS via an SMTP gateway. The

proovider receives a specially designed email and sends the SMS accordingly. The last possibility to send SMS is to use an attached GSM modem.

In the field `SMS provider` you can enter the SMS provider module, you wish to use. In the *empty* field hit the arrow-down key and you will get a list of the ready made modules.

In the `SMS configuration` text area you can enter the configuration, which contents is very much dependent on the selected provider module.

The HTTP and the Sipgate module provide a preset-button, which give you an idea of the configuration.

HTTP provider The HTTP provider can be used for any SMS gateway that provides a simple HTTP POST or GET request.

The following parameters can be used:

URL

This is the URL for the gateway.

HTTP_Method

Can be GET or POST.

USERNAME and **PASSWORD**

These are the username and the password if the HTTP request requires basic authentication.

SMS_PHONENUMBER_KEY

This is the name of the HTTP parameter that holds the mobile phone number of the recipient.

SMS_TEXT_KEY

This is the name of the HTTP parameter that holds the SMS text.

RETURN_SUCCESS

You can either use `RETURN_SUCCESS` or `RETURN_FAIL`. If the text of `RETURN_SUCCESS` is found in the HTTP response of the gateway privacyIDEA assumes that the SMS was sent successfully.

RETURN_FAIL

If the text of `RETURN_FAIL` is found in the HTTP response of the gateway privacyIDEA assumes that the SMS could not be sent and an error occurred.

PROXY

You can specify a proxy to connect to the HTTP gateway.

PARAMETER

This can contain a dictionary of arbitrary fixed additional parameters. Usually this would also contain an ID or a password to identify you as a sender.

Example: In case of the Clicaktell provider the configuration will look like this:

```
{ "URL" : "http://api.clickatell.com/http/sendmsg",
  "PARAMETER" : {
                  "user":"YOU",
                  "password":"YOUR PASSWORD",
                  "api_id":"YOUR API ID"
                },
  "SMS_TEXT_KEY":"text",
```

```
  "SMS_PHONENUMBER_KEY":"to",
  "HTTP_Method":"GET",
  "RETURN_SUCCESS" : "ID"
}
```

This will consturct an HTTP GET request like this:

```
http://api.clickatell.com/http/sendmsg?user=YOU&password=YOU&\
     api_id=YOUR API ID&text=....&to=....
```

where `text` and `to` will contain the OTP value and the mobile phone number. privacyIDEA will assume a successful sent SMS if the response contains the text "ID".

Sipgate provider The sipgate provider connects to https://samurai.sipgate.net/RPC2 and takes only two arguments *USERNAME* and *PASSWORD*. The arguments have to be passed in a dictionary like this:

```
{ "USERNAME" : "youruser",
  "PASSWORD" : "yourpassword" }
```

Note: You need to use double quotes around the values.

If you activate debug log level you will see the submitted SMS and the response content from the Sipgate gateway.

SMTP provider The SMTP provider sends an email to an email gateway. This is a specified, fixed mail address.

The mail should contain the phone number and the OTP value. The email gateway will send the OTP via SMS to the given phone number.

Up to version 2.9 the SMTP provider needs to be configured like this:

```
{"MAILSERVER": "localhost:25",
 "MAILTO": "recp@example.com",
 "MAILSENDER": "pi@example.com",
 "MAILUSER": "username",
 "MAILPASSWORD": "sosecret"}
```

Optional parameters are *MAILUSER* and *MAILPASSWORD* if the mailserver to send the email needs authentication.

This configuration is *DEPRECATED*.

Starting with privacyIDEA 2.10 you can use the system wide *SMTP server configuration*. The configuration looks like this:

```
{"MAILTO": "recp@example.com",
 "IDENTIFIER": "name-of-smtp-config"}
```

The default *SUBJECT* is set to <*phone*> and the default *BODY* to <*otp*>. You may change the *SUBJECT* and the *BODY* accordingly.

TiQR Token Config

TiQR Registration Server You need at least enter the *TiQR Registration Server*. This is the URL of your privacyIDEA installation, that can be reached from the smartphone during enrollment. So your smartphone needs to be on the same LAN (WLAN) like the privacyIDEA server or the enrollment URL needs to be accessible from the internet.

You also need to specify the path, which is usually */ttype/tiqr*.

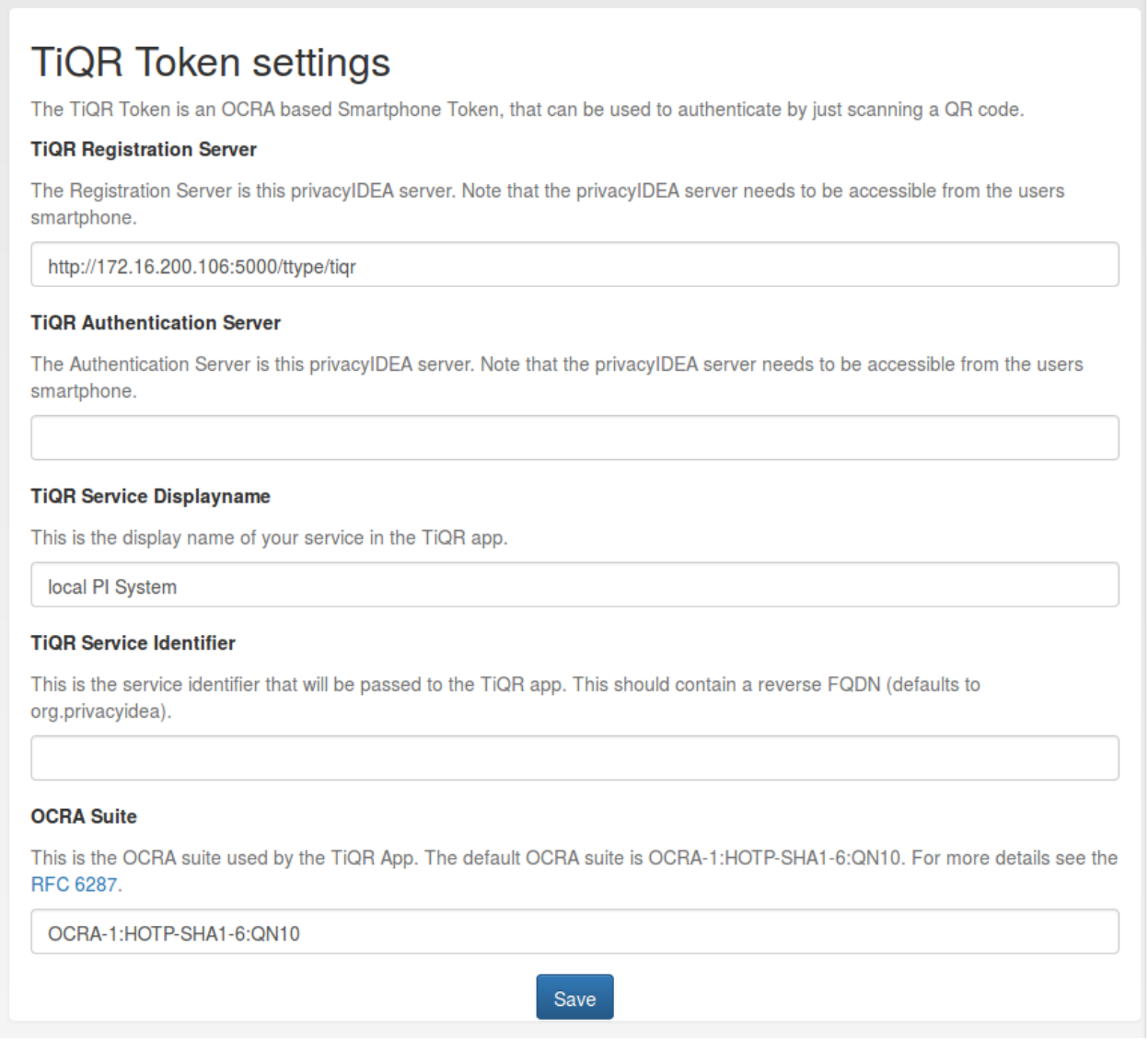


Fig. 1.30: *TiQR Token configuration*

During enrollment the parameter *action=metadata* and *action=enrollment* is added.

Note: We do not recommend putting the registration URL on the internet.

TiQR Authentication Server This is the URL that is used during authentication. This can be another URL than the *Registration Server*. If it is left blank, the URL of the *Registration Server* is used.

During authentication the parameter *operation=login* is added.

TOTP Token Config

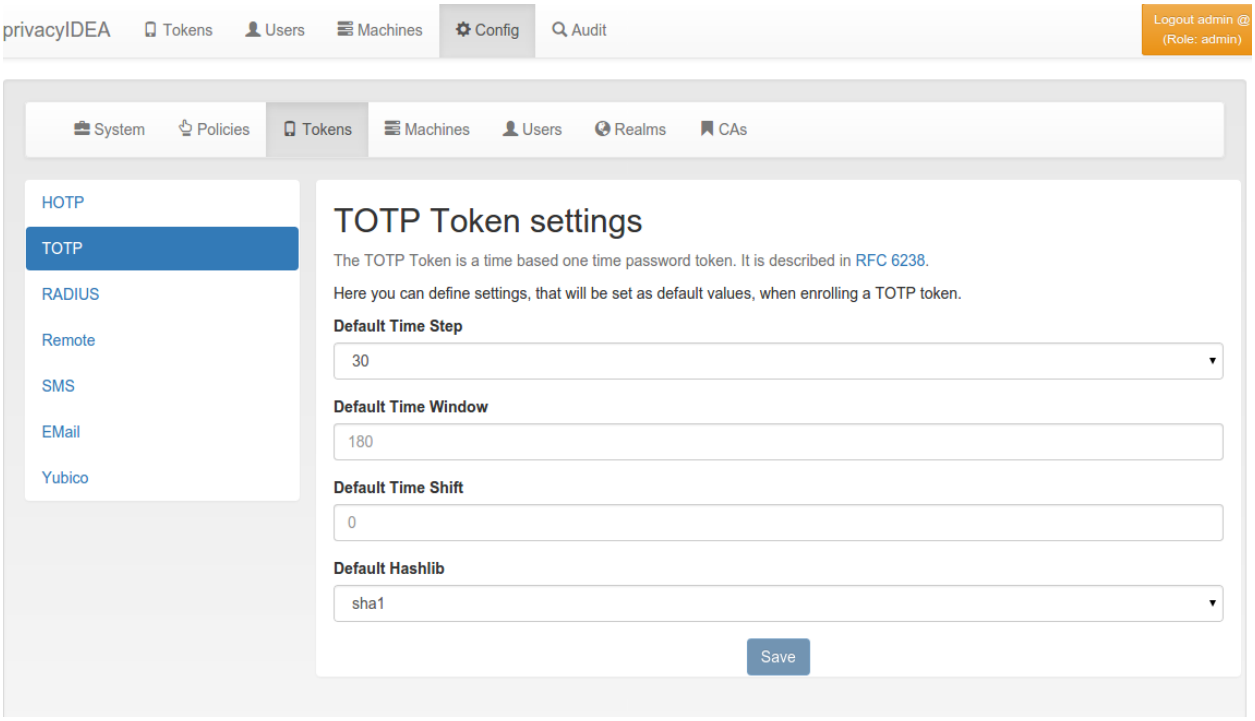


Fig. 1.31: *TOTP Token configuration*

U2F Token Config

AppId You need to configure the AppId of the privacyIDEA server. The AppId is define in the FIDO specification [10].

The AppId is the URL of your privacyIDEA and used to find or create the right key pair on the U2F device. The AppId must correspond the the URL that is used to call the privacyIDEA server.

Note: if you register a U2F device with an AppId https://privacyidea.example.com and try to authenticate at https://10.0.0.1, the U2F authentication will fail.

Note: The AppId must not contain any trailing slashes!

[10] https://fidoalliance.org/specs/fido-u2f-v1.0-nfc-bt-amendment-20150514/fido-appid-and-facets.html

Facets If specifying the AppId as the FQDN you will only be able to authenticate at the privacyIDEA server itself or at any application in a sub directory on the privacyIDEA server. This is OK, if you are running a SAML IdP on the same server.

But if you also want to use the U2F token with other applications, you need to specify the AppId like this:

> https://privacyidea.example.com/pi-url/ttype/u2f

pi-url is the path, if you are running the privacyIDEA instance in a sub folder.

/ttype/u2f is the endpoint that returns a trusted facets list. Trusted facets are other hosts in the domain *example.com*. You need to define a policy that contains a list of the other hosts (*u2f_facets*).

For more information on AppId and trusted facets see [1].

For further details and for information how to add U2F to your application you can see the code documentation at *U2F Token*.

Workflow You can use a U2F token on privacyIDEA and other hosts in the same Domain. To do so you need to do the following steps:

1. Configure the AppId to reflect your privacyIDEA server:

   > https://pi.your-network.com/ttype/u2f

   Add the path */ttype/u2f* is crucial. Otherwise privacyIDEA will not return the trusted facets.

2. Define a policy with the list of trusted facets. (see *u2f_facets*). Add the FQDNs of the hosts to the policy:

   > saml.your-network.com otherapp.your-network.com vpn.your-network.com

   ---

   Note: The privacyIDEA plugin for simpleSAMLphp supports U2F with privacyIDEA starting with version 2.8.

   ---

3. Now register a U2F token on https://pi.your-network.com. Due to the trusted facets you will also be able to use this U2F token on the other hosts.
4. Now got to https://saml.your-network.com and you will be able to authenticate with the very U2F token without any further registering.

Yubico Cloud mode

The Yubico Cloud mode sends the One Time Password emitted by the yubikey to the Yubico Cloud service.

To contact the Yubico Cloud service you need to get an API key and a Client ID from Yubico and enter these here in the config dialog.

You can get your own API key at [11].

1.4.5 CA Connectors

You can use privacyIDEA to enroll certificates and assign certificates to users.

You can define connections to Certifacte Authorities, that are used when enrolling certificates.

When you enroll a Token of type *certificate* the Certificate Signing Request gets signed by one of the CAs attached to privacyIDEA by the CA connectors.

[11] https://upgrade.yubico.com/getapikey/.

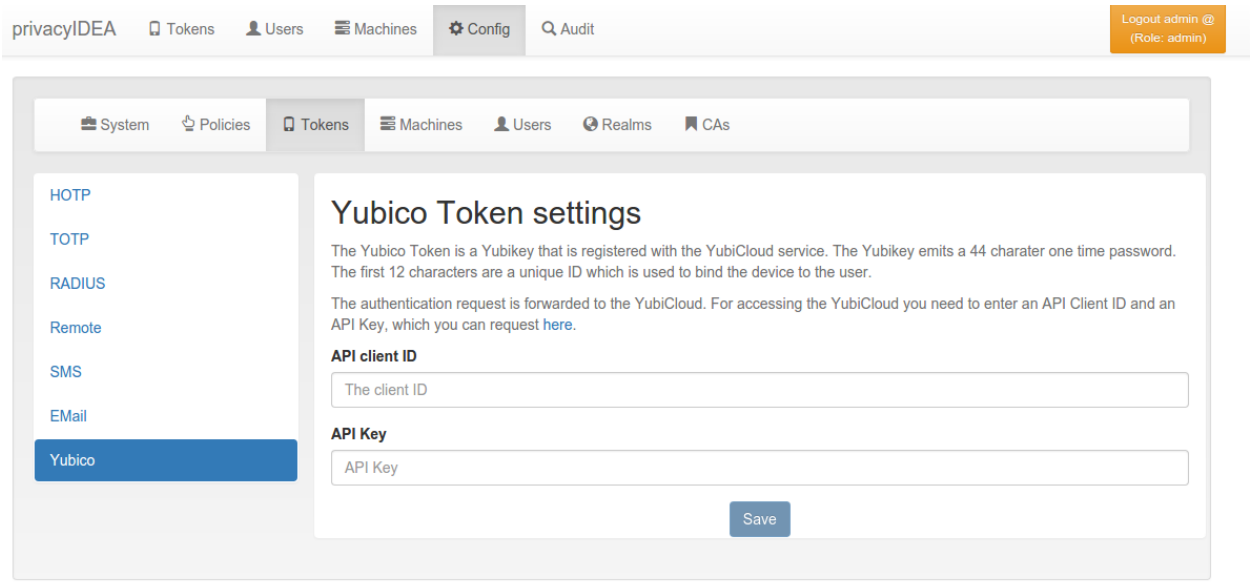


Fig. 1.32: *Configure the Yubico Cloud mode*

The first CA connector that ships with privacyIDEA is a connector to a local openSSL based Certificate Authority as shown in figure *A local CA definition*.

When enrolling a certificate token you can choose, which CA should sign the certificate request.

1.4.6 SMTP server configuration

Starting with privacyIDEA 2.10 you can define SMTP server configurations. *SMTP server endpoints*.

An SMTP server configuration contains the

- server as FQDN or IP address,
- the port,
- the sender email address,
- a username and password in case of authentication and
- a TLS flag.

Each SMTP server configuration is address via a *unique identifier*. You can then use such a configuration for Email or SMS token, for PIN handling or for *User registration*.

Under *Config->Sytem->SMTP servers* you can get a list of all configured SMTP servers, create new server definitions and delete them.

Using the unique identifier like *themis* you can use this SMTP server definition in e.g. a policy for user registraion.

In the edit dialog you can enter all necessary attributes to talk to the SMTP server. You can also send a test email, to verify if your settings are correct.

1.4.7 privacyIDEA setup tool

(TODO): Not yet migrated.

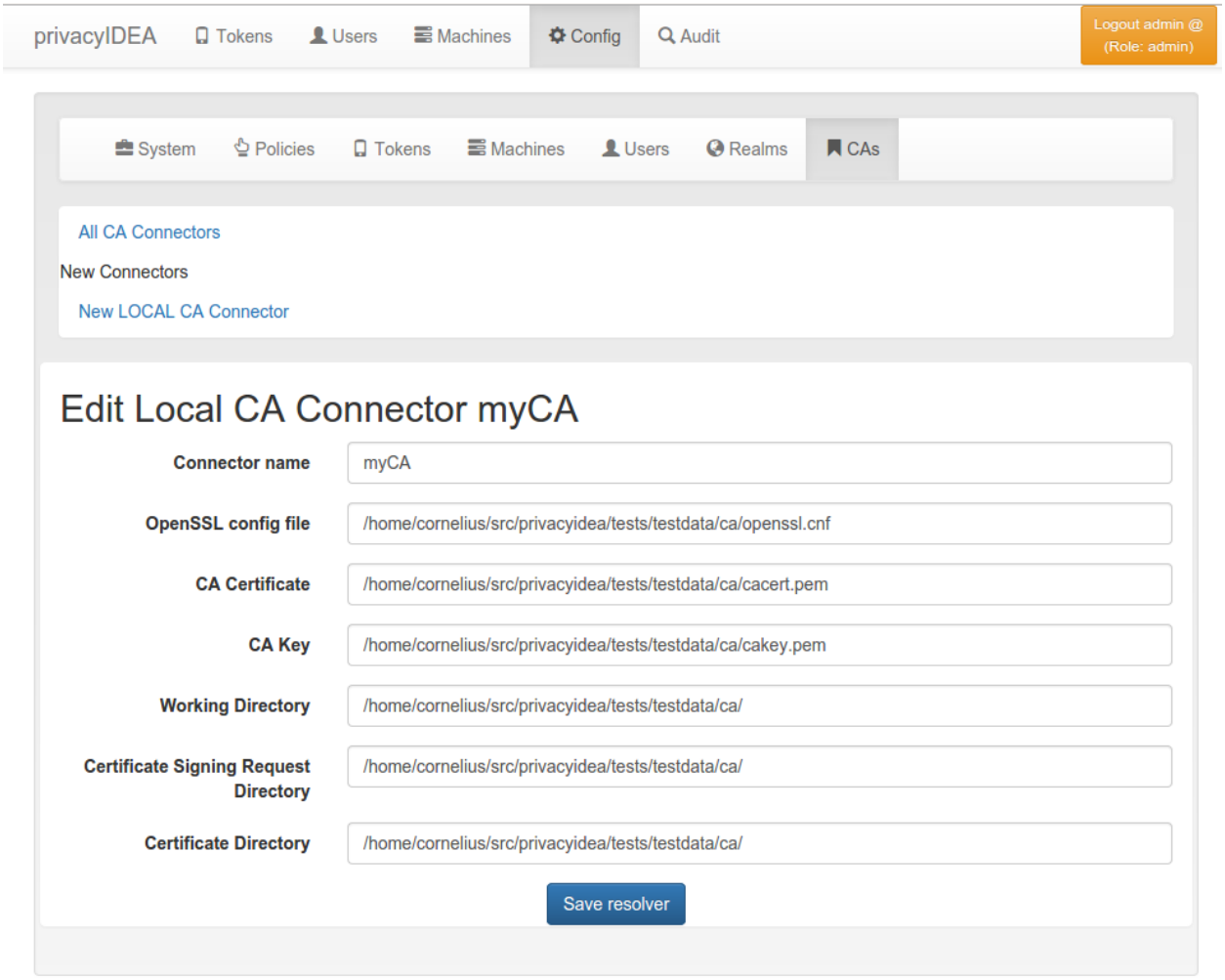


Fig. 1.33: *A local CA definition*

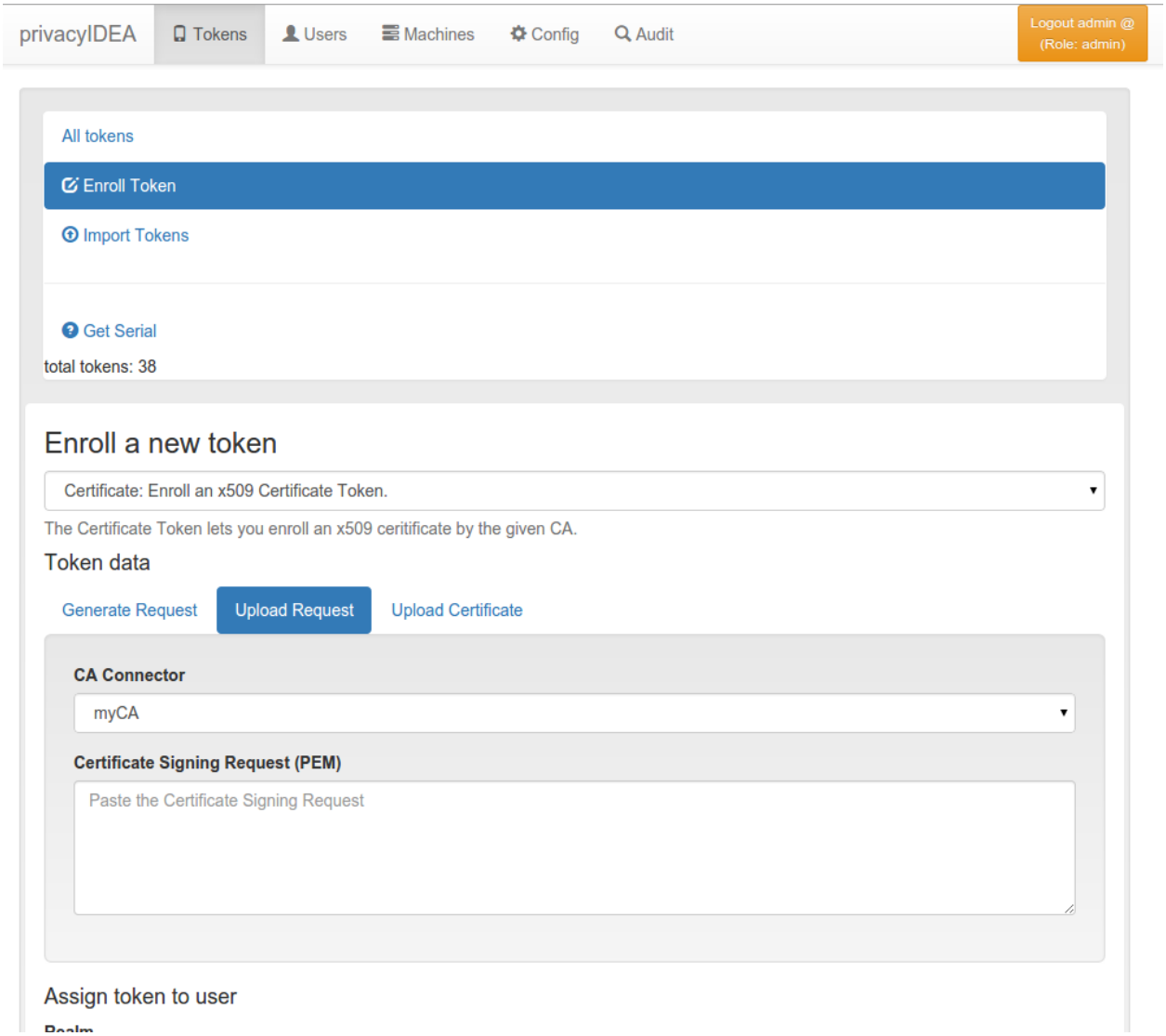


Fig. 1.34: *Enrolling a certificate token*

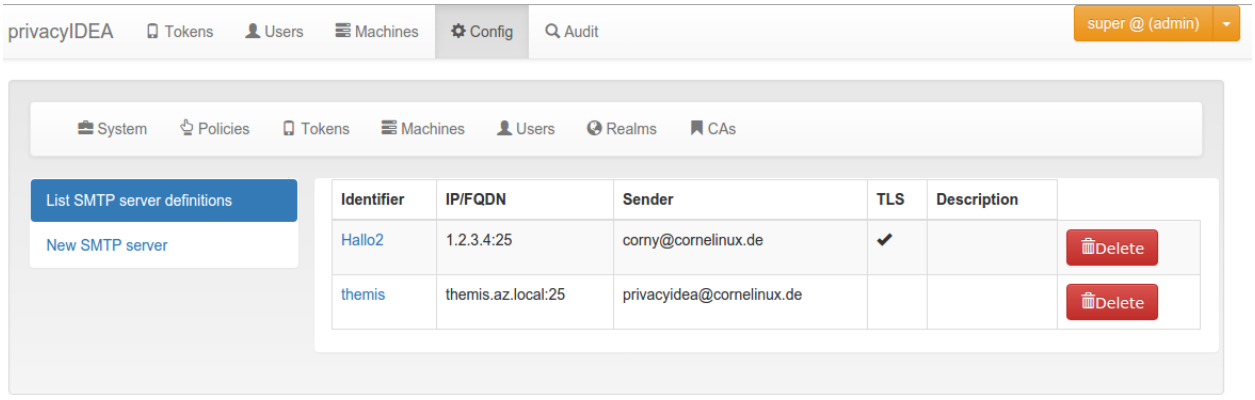


Fig. 1.35: *The list of SMTP servers.*

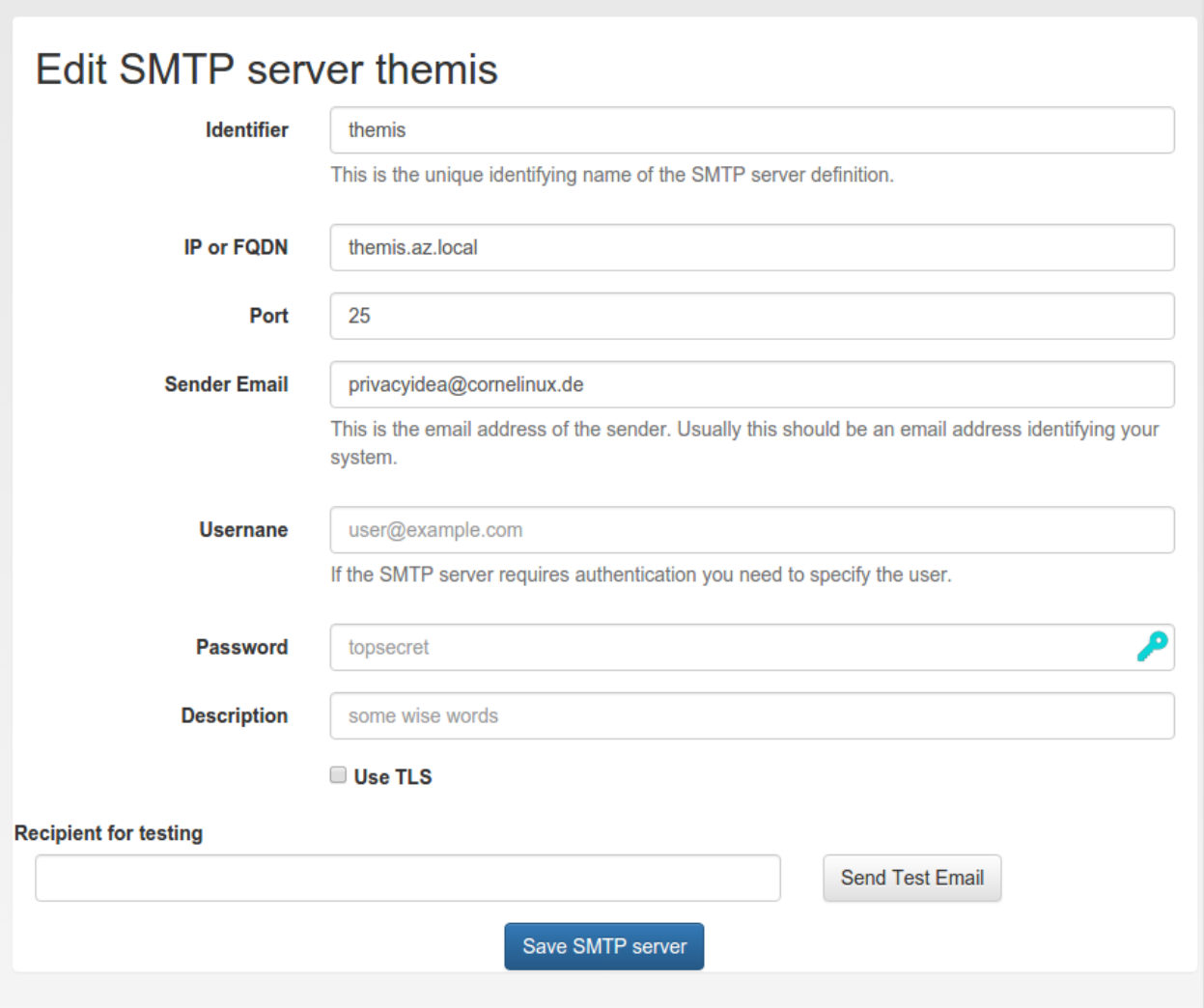


Fig. 1.36: *Edit an existing SMTP server definition.*

Starting with 1.3.3 privacyIDEA comes with a graphical setup tool to manage your token administrators and RADIUS clients. Thus you will get a kind of appliance experience. To install all necessary components read appliance.

To configure the system, login as the user root on your machine and run the command:

```
privacyidea-setup-tui
```

This will bring you to this start screen.

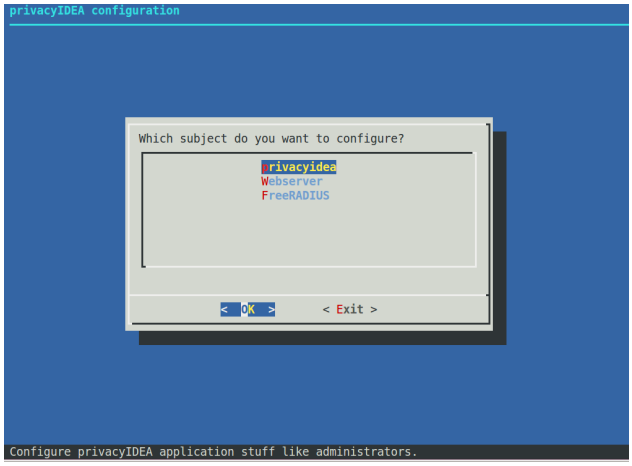


Fig. 1.37: Start screen of the appliance setup tool.

You can configure privacyidea settings, the log level, administrators, encryption key and much more. You can configure the webserver settings and RADIUS clients.

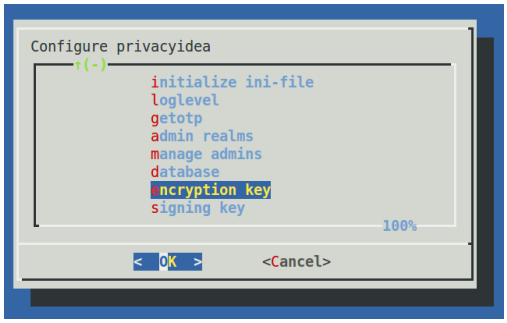


Fig. 1.38: Configure privacyidea

All changes done in this setup tool are directly read from and written to the corresponding configuration files. The setup tool parses the original nginx and freeradius configuration files. So there is no additional place where this data is kept.

Note: You can also edit the clients.conf and other configuration files manually. The setup tool will also read those manual changes!

Backup and Restore

Starting with version 1.5 the setup tool also supports backup and restore. Backups are written to the directory */var/lib/privacyidea/backup*.

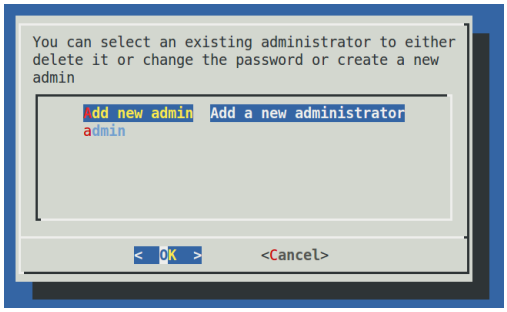


Fig. 1.39: You can create new token administrators, delete them and change their passwords.

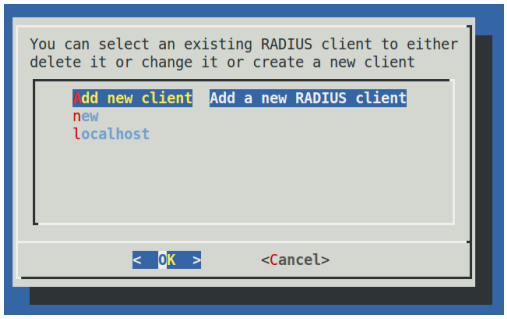
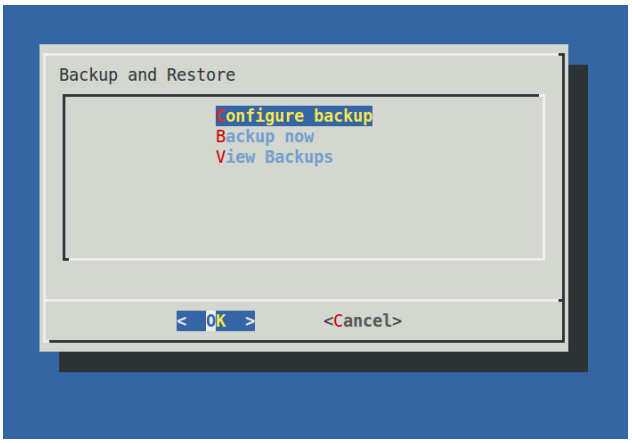


Fig. 1.40: In the FreeRADIUS settings you can create and delete RADIUS clients.

The backup contains all privacyIDEA configuration, the contents of the directory */etc/privacyidea*, the encryption key, the configured administrators, the complete token database (MySQL) and Audit log. Furthermore if you are running FreeRADIUS the backup also contains the */etc/freeradius/clients.conf* file.



Schedulded backup

At the configuration point *Configure Backup* you can define times when a scheduled backup should be performed. This information is written to the file */etc/crontab*.

You can enter minutes, hours, day of month, month and day of week. If the entry should be valid for each e.g. month or hour, you need to enter a '*'.

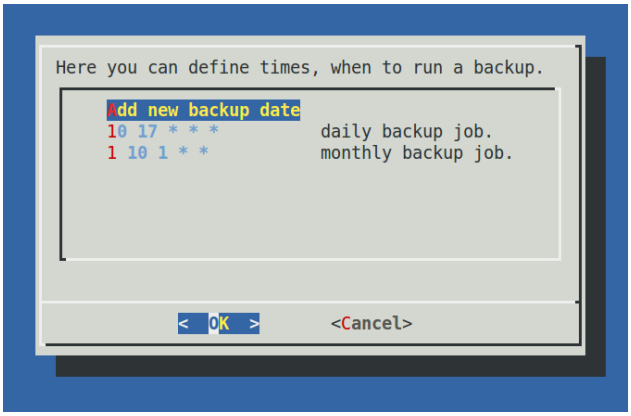


Fig. 1.41: Scheduled backup

In this example the *10 17 * * ** (minute=10, hour=17) means to perform a backup each day and each month at 17:10 (5:10pm).

The example *1 10 1 * ** (minute=1, hour=10, day of month=1) means to perform a backup on the first day of each month at 10:01 am.

Thus you could also perform backups only once a week at the weekend.

Immediate backup

If you want to run a backup right now you can choose the entry *Backup now*.

Restore

The entry *View Backups* will list all the backups available.

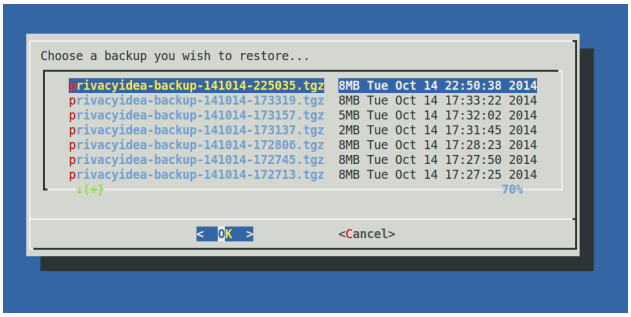


Fig. 1.42: All available backups

You can select a backup and you are asked if you want to restore the data.

Warning: Existing data is overwritten and will be lost.

1.5 Tokenview

The administrator can see all the tokens of all realms he is allowed to manage in the tokenview. Each token can be located in several realms and be assigned to one user. The administrator can see all the details of the token.

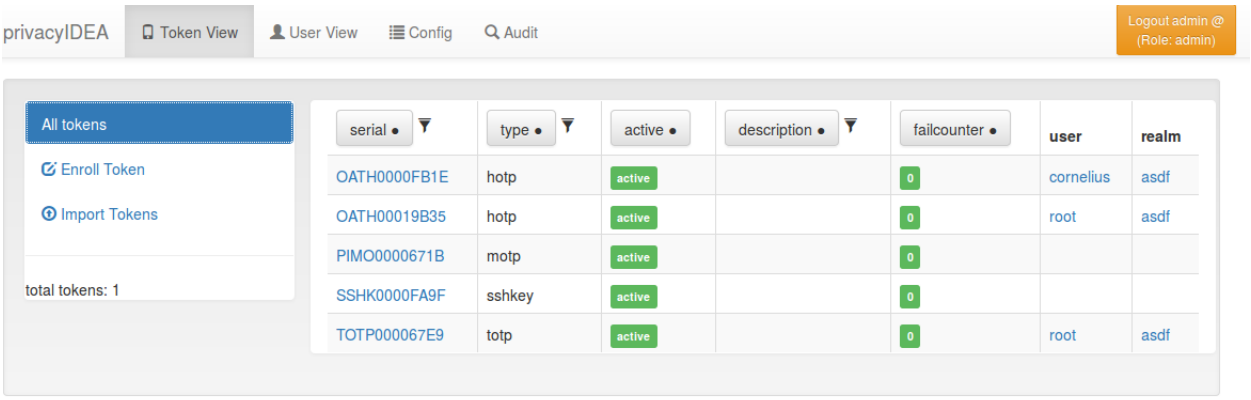


Fig. 1.43: *Token View*

The administrator can click on one token, to show more details of this token and to perform actions on this token.

1.5.1 Token Details

The Token Details give you more information about the token and also let the administrator perform specific tasks for this token.

At the bottom you see the assigned user. You can click on the username and change to the *User Details*.

Lost token

When a user has lost a token, the administrator or the user can create a temporary password token for the user to login.

The administrator has to select the token that was lost and click the button `Lost token`. A new token of type *PW* is generated. The OTP PIN of the old token is automatically copied to the new token. Thus the administrator does not know the OTP PIN, while the user can use his old PIN.

A long password is displayed to the administrator and the administrator can read this password to the user. The user now can authenticate with his old OTP PIN and the long password.

The lost token is deactivated.

Get Serial

The administrator can enter a OTP value that was generated by an unknown token. Then the serial number for the corresponding token is search and displayed.

Note: Since OTP values for all matching tokens need to be calculated,

---

this can be time consuming!

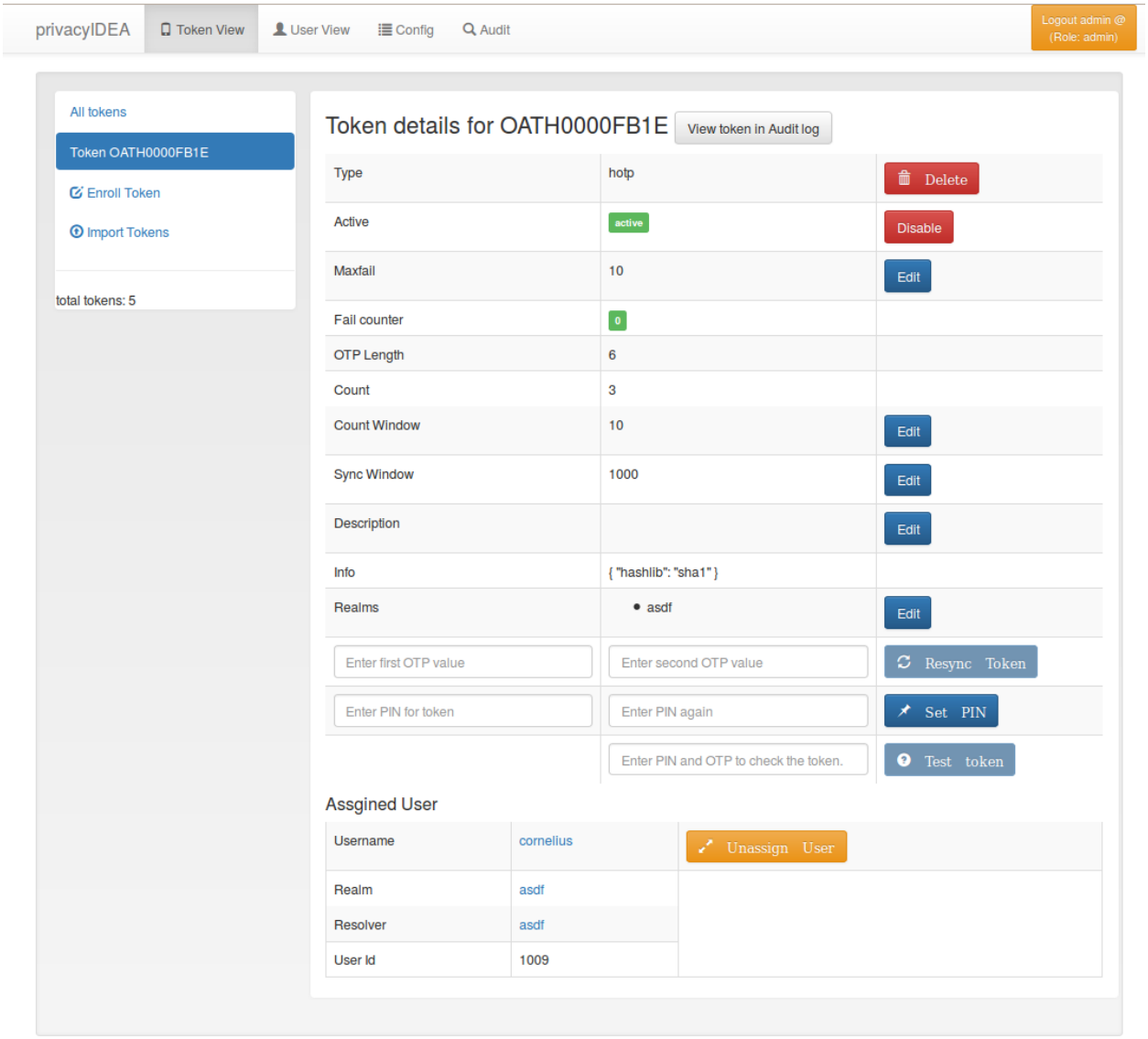


Fig. 1.44: *Token Detail*

Token settings

You can change the following token settings.

MaxFail and FailCount

If the login fail counter reaches the `MaxFail` the user can not login with this token anymore. The Failcounter `FailCount` has to be reset to zero.

TokenDesc

The token description is also displayed in the tokenview. You can set a description to make it easier to identify a token.

CountWindow

The `CountWindow` is the look ahead window of event based tokens. If the user pressed the button on an event based token the counter in the token is increased. If the user does not use this otp value to authenticate, the server does not know, that the counter in the token was increased. This way the counter in the token can get out of sync with the server.

SyncWindow

If a token was out of sync (see `CountWindow`), then it needs to be synchronized. This is done by entering two consecutive OTP values. The server searches these two values within the next `CountWindow` (default 1000) values.

OtpLen

This is the length of the OTP value that is generated by the token. The password that is entered by the user is split according to this length. 6 or 8 characters are split as OTP value and the rest is used as static password (OTP PIN).

Hashlib

The HOTP algorithm can be used with SHA1 or SHA256.

Tokeninfo - Auth max

The administrator can set a value how often this token may be used for authentication. If the number of authentication try exceed this value, the token can not be used, until this `Auth max` value is increased.

Note: This way you could create tokens, that can be used only once.

Tokeninfo - Auth max success

The administrator can set a value how often this token may be used to successfully authenticate.

Tokeninfo - Valid start

A timestamp can be set. The token will only be usable for authentication after this start time.

Tokeninfo - Valid end

A timestamp can be set. The token can only be used before this end time.

Note: This way you can create temporary tokens for guests or short time or season employees.

Resync Token

The administrator can select one token and then enter two consecutive OTP values to resynchonize the token if it was out of sync.

set token realm

A token can be assigned to several realms. This is important if you have administrators for different realms. A realm administrator is only allowed to see tokens within his realms. He will not see tokens, that are not in his realm. So you can assign a token to realm A and realm B, thus the administrator A and the administrator B will be able to see the token.

get OTP

If the corresponding getOTP policy (*Policies*) is set, the administrator can get the OTP values of a token from the server without having the token with him.

Note: Of course this is a potential backdoor, since the administrator could login as the user/owner of this very token.

---

enroll

You can enroll a token either from the Token View or from the *User Details*. When enrolling a token from the User Details the token is directly assigned to the user.

If you enroll the token from the token view, you can select a user, to whom the token will be assigned.

When enrolling a token, you can select the token type and according to the token type other necessary information.

assign

This function is used to assign a token to a user. Select a realm and start typing a username to find the user, to whom the token should be assigned.

unassign

In the token details view you can unassign the token. After that, the token can be assigned to a new user.

enable

If a token is disabled, it can be enabled again.

disable

Tokens can be disabled. Disabled tokens still belong to the assigned user but those tokens can not be used to authenticate. Disabled tokens can be enabled again.

set PIN

You can set the OTP PIN or the mOTP PIN for tokens.

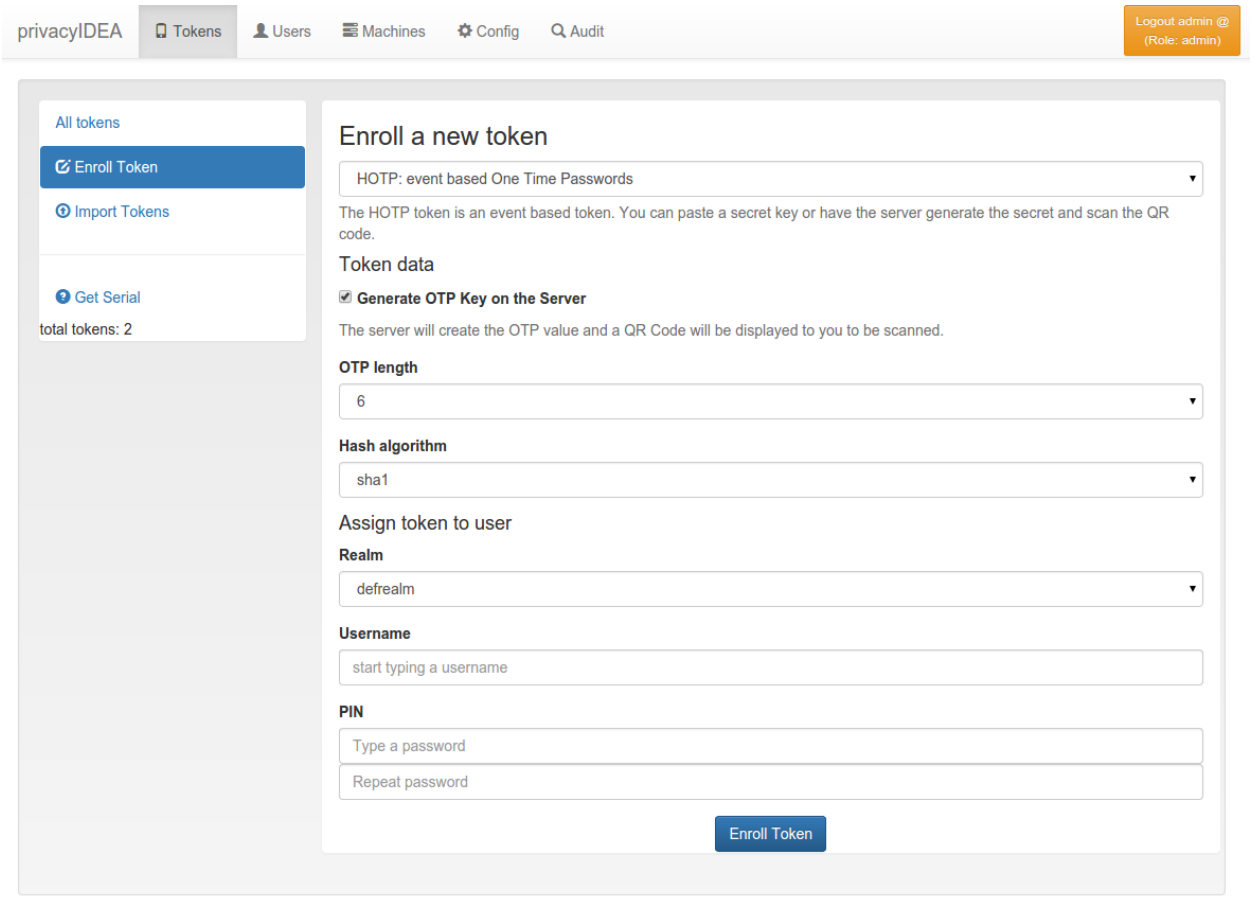


Fig. 1.45: *Token enrollment dialog*

Reset Failcounter

If a used locked his token, since he entered wrong OTP values or wrong OTP PINs, the fail counter has reached the mail failcount. The administrator or help desk user can select those tokens and click the button `reset failcounter` to reset the fail counter to zero. The tokens can be used for authentication again.

delete

Deleting a token will remove the token from the database. The token information can not be recovered. But all events that occurred with this token still remain in the audit log.

1.6 Userview

The administrator can see all users in **realms** he is allowed to manage.

Note: Users are only visible, if the useridresolver is located within a realm. If you only define a useridresolver but no realm, you will not be able to see the users!

You can select one of the realms in the left drop down box. The administrator will only see the realms in the drop down box, that he is allowed to manage. **(TODO)** No migrated, yet.

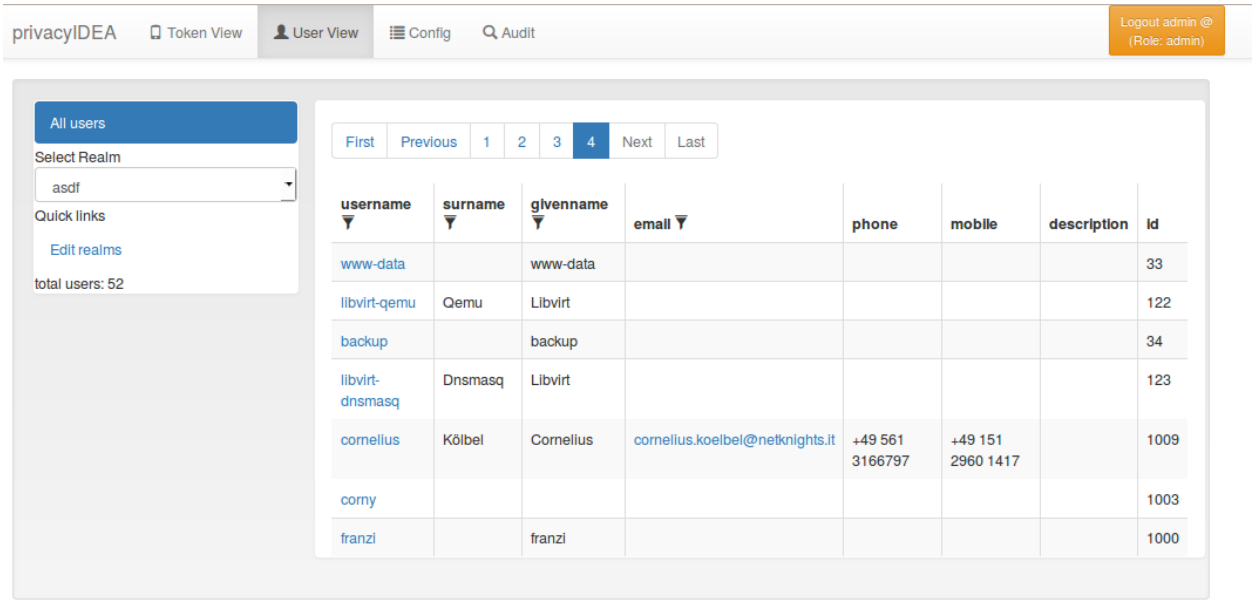


Fig. 1.46: *User View. List all users in a realm.*

The list shows the users from the select realm. The username, surname, given name, email and phone are filled according to the definition of the useridresolver.

Even if a realm contains several useridresolvers all users from all resolvers within this realm are displayed.

1.6.1 User Details

When clicking on a username, you can see the users details and perform several actions on the user.

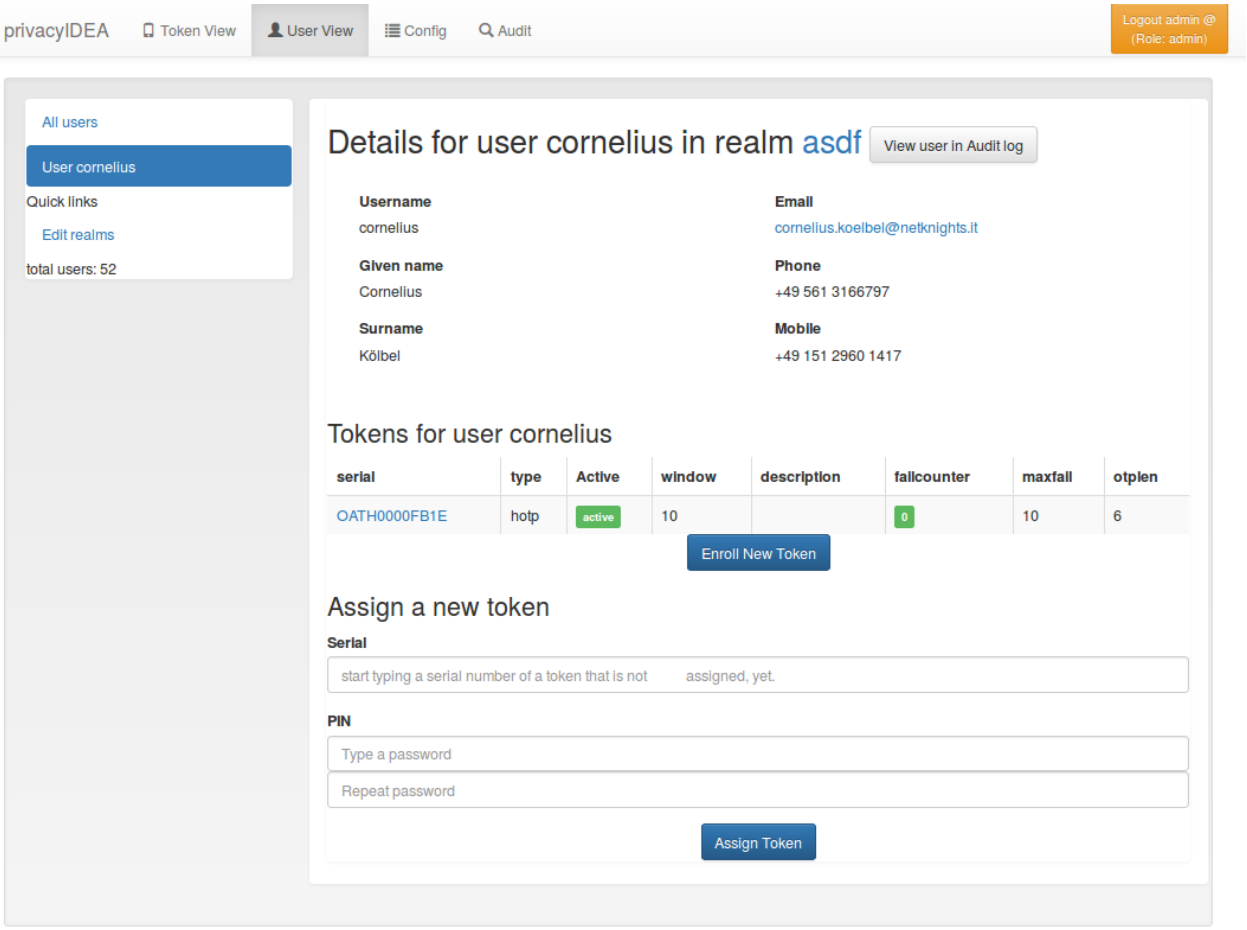


Fig. 1.47: *User Details.*

You see a list of the users tokens and change to the *Token Details*.

Enroll tokens

In the users details view you can enroll additional tokens to the user. In the enrollment dialog the user will be selected and you only need to choose what tokentype you wish to enroll for this user.

Assign tokens

You can assign a new, already existing token to the user. Just start typing the token serial number. The system will search for tokens, that are not assigned yet and present you a list to choose from.

View Audit Log

You can also click *View user in Audit log* which will take you to the *Audit* log with a filter on this very user, so that you will only see audit entries regarding this user.

Edit user

If the user is located in a resolver, that is marked as editable, the administrator will also see a button “Edit User”. To read more about this, see *Manage Users*.

1.6.2 Manage Users

Since version 2.4 privacyIDEA allows you to edit users in the configured resolvers. At the moment this is possible for SQL resolvers.

In the resolver definition you need to check the new checkbox **Edit user store**.

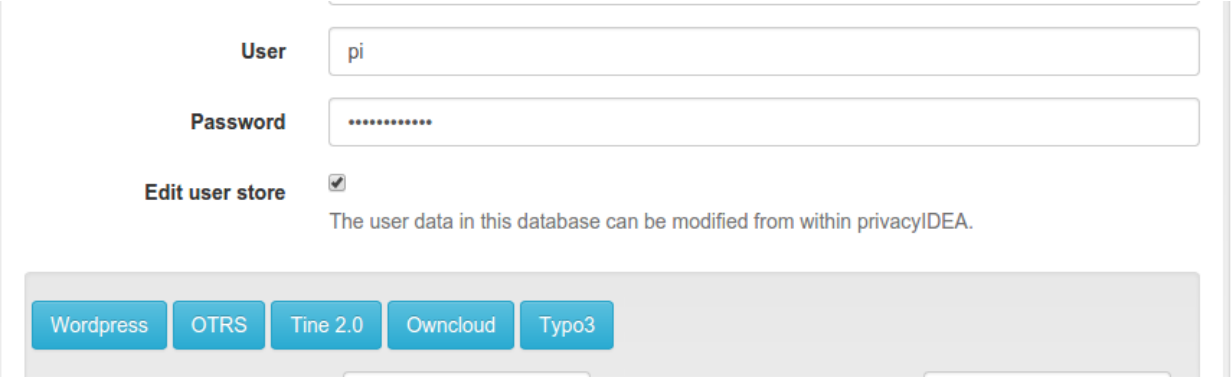


Fig. 1.48: *Users in SQL can be edited, when checking the checkbox.*

In the Users Detail view, the administrator then can click the button “Edit” and modify the user data and also set a new password.

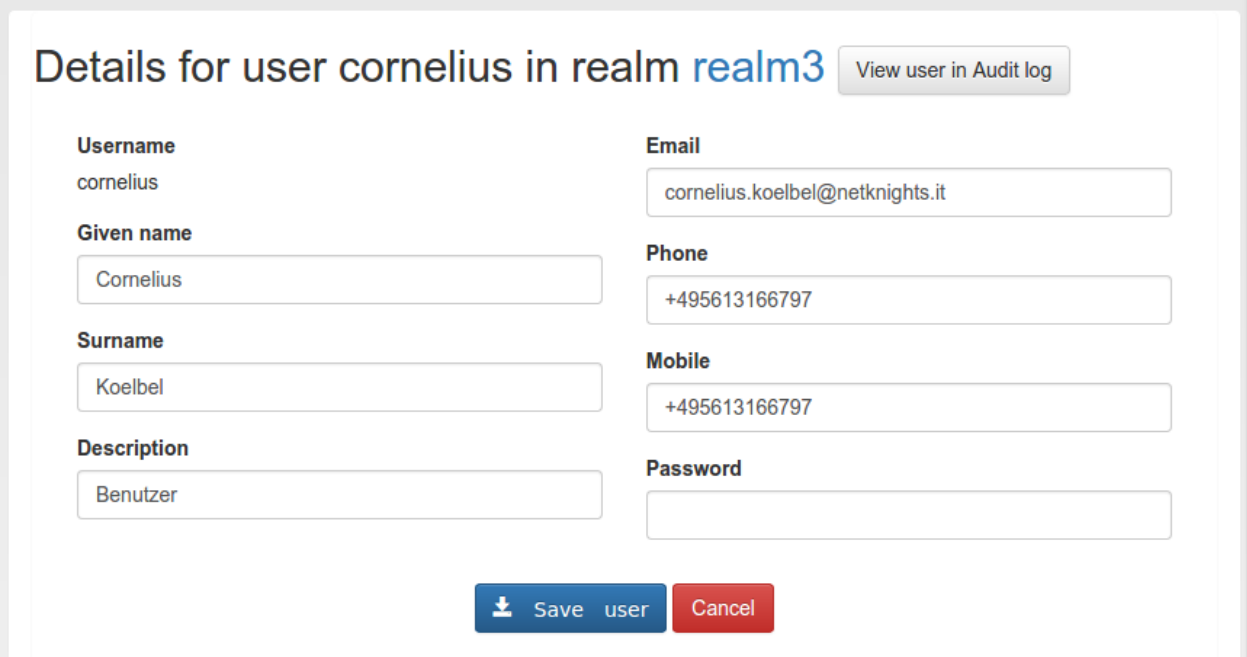


Fig. 1.49: *Edit the attributes of an existing user.*

Note: The data of the user will be modified in the user store (database). Thus the users data, which will be returned by a resolver, is changed. If the resolver is contained in several realms these changes will reflect in all realms.

If you want to add a user, you can click on *Add User* in the *User View*.

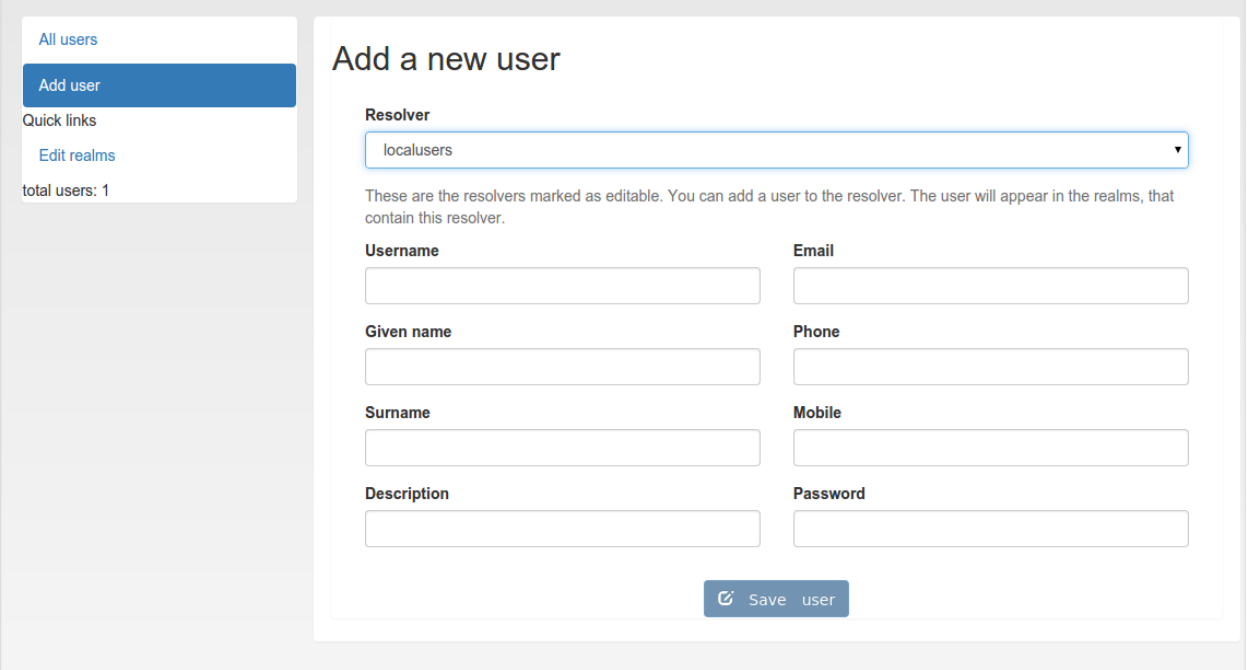


Fig. 1.50: *Add a new user.*

Users are contained in resolvers and added to resolvers. So you need to choose an existing resolver and not a realm. The user will be visible in all realms, the resolver is contained in.

Note: Of course you can set policies to allow or deny the administrator these rights.

Simple local users setup

You can setup a local users definition quite easily. Run:

```
pi-manage resolver create_internal test
```

This will create a database table "users_test" in your token database. And it will create a resolver "test" that refers to this database table.

Then you can add this resolver to realm:

```
pi-manage realm create internal_realm test
```

Which will create a realm "internal_realm" containing the resolver "test". Now you can start adding users to this resolver as described above.

Note: This is an example of how to get started with users quite quickly. Of course you do not need to save the users table in the same database as the tokens. But in scenarios, where you do not have existing user stores or the user stores are managed by another department or are not accessible easily this may be sensible way.

1.7 Policies

Policies can be used to define the reaction and behaviour of the system.

Each policy defines the behaviour in a certain area, called scope. privacyIDEA knows the scopes:

1.7.1 Admin policies

Admin policies are used to regulate the actions that administrators are allowed to do. Technically admin policies control the use of the REST API *Token endpoints*, *System endpoints*, *Realm endpoints* and *Resolver endpoints*.

Admin policies are implemented as decorators in *Policy Module* and *Policy Decorators*.

The `user` in the admin policies refers to the name of the administrator.

Starting with privacyIDEA 2.4 admin policies can also store a field "admin realm". This is used, if you define realms to be superuser realms. See *The Config File* for information how to do this.

This way it is easy to define administrative rights for big groups of administrative users like help desk users in the IT department.

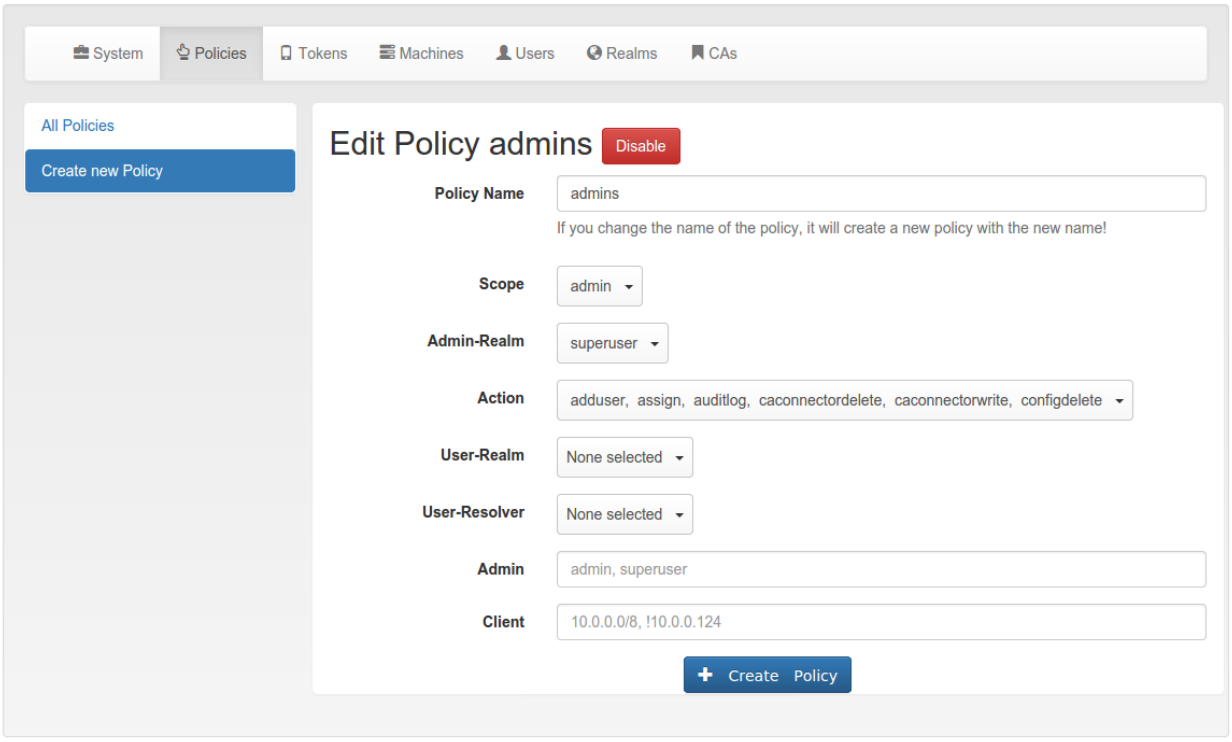


Fig. 1.51: *Admin scope provides and additional field 'admin realm'.*

All administrative actions also refer to the defined user realm. Meaning an administrator may have many rights in one user realm and only a few rights in another realm.

Creating a policy with `scope:admin`, `admin-realm:helpdesk`, `user:frank`, `action:enable` and `realm:sales` means that the administrator *frank* in the admin-realm *helpdesk* is allowed to enable tokens in the user-realm *sales*.

Note: As long as no admin policy is defined all administrators are allowed to do everything.

The following actions are available in the scope *admin*:

init

type: bool

There are `init` actions per token type. Thus you can create policy that allow an administrator to enroll SMS tokens but not to enroll HMAC tokens.

enable

type: bool

The `enable` action allows the administrator to activate disabled tokens.

disable

type: bool

Tokens can be enabled and disabled. Disabled tokens can not be used to authenticate. The `disable` action allows the administrator to disable tokens.

revoke

type: bool

Tokens can be revoked. Usually this means the token is disabled and locked. A locked token can not be modified anymore. It can only be deleted.

Certain token types like *certificate* may define special actions when revoking a token.

set

type: bool

Tokens can have additional token information, which can be viewed in the *Token Details*.

If the `set` action is defined, the administrator allowed to set those token information.

setOTPPIN

type: bool

If the `setOTPPIN` action is defined, the administrator is allowed to set the OTP PIN of a token.

setMOTPPIN

type: bool

If the `setMOTPPIN` action is defined, the administrator is allowed to set the mOTP PIN of an mOTP token.

resync

type: bool

If the `resync` action is defined, the administrator is allowed to resynchronize a token.

assign

type: bool

If the `assign` action is defined, the administrator is allowed to assign a token to a user. This is used for assigning an existing token to a user but also to enroll a new token to a user.

Without this action, the administrator can not create a connection (assignment) between a user and a token.

unassign

type: bool

If the `unassign` action is defined, the administrator is allowed to unassign tokens from a user. I.e. the administrator can remove the link between the token and the user. The token still continues to exist in the system.

import

type: bool

If the `import` action is defined, the administrator is allowed to import token seeds from a token file, thus creating many new token objects in the systems database.

remove

type: bool

If the `remove` action is defined, the administrator is allowed to delete a token from the system.

Note: If a token is removed, it can not be recovered.

Note: All audit entries of this token still exist in the audit log.

---

userlist

type: bool

If the `userlist` action is defined, the administrator is allowed to view the user list in a realm. An administrator might not be allowed to list the users, if he should only work with tokens, but not see all users at once.

Note: If an administrator has any right in a realm, the administrator is also allowed to view the token list.

checkstatus

type: bool

If the `checkstatus` action is defined, the administrator is allowed to check the status of open challenge requests.

manageToken

type: bool

If the `manageToken` action is defined, the administrator is allowed to manage the realms of a token.

A token may be located in multiple realms. This can be interesting if you have a pool of spare tokens and several realms but want to make the spare tokens available to several realm administrators. (Administrators, who have only rights in one realm)

Then all administrators can see these tokens and assign the tokens. But as soon as the token is assigned to a user in one realm, the administrator of another realm can not manage the token anymore.

getserial

type: bool

If the `getserial` action is defined, the administrator is allowed to calculate the token serial number for a given OTP value.

getrandom

type: bool

The `getrandom` action allows the administrator to retrieve random keys from the endpoint *getrandom*. This is an endpoint in *System endpoints*.

getrandom can be used by the client, if the client has no reliable random number generator. Creating API keys for the Yubico Validation Protocol uses this endpoint.

getchallenges

type: bool

This policy allows the administrator to retrieve a list of active challenges of a challenge response tokens. The administrator can view these challenges in the web UI.

losttoken

type: bool

If the `losttoken` action is defined, the administrator is allowed to perform the lost token process.

To only perform the lost token process the actions `copytokenuser` and `copytokenpin` are not necessary!

adduser

type: bool

If the `adduser` action is defined, the administrator is allowed to add users to a user store.

Note: The user store still must be defined as editable, otherwise no users can be added, edited or deleted.

updateuser

type: bool

If the `updateuser` action is defined, the administrator is allowed to edit users in the user store.

deleteuser

type: bool

If the `deleteuser` action is defined, the administrator is allowed to delete an existing user from the user store.

copytokenuser

type: bool

If the `copytokenuser` action is defined, the administrator is allowed to copy the user assignment of one token to another.

This functionality is also used during the lost token process. But you only need to define this action, if the administrator should be able to perform this task manually.

copytokenpin

type: bool

If the `copytokenpin` action is defined, the administrator is allowed to copy the OTP PIN from one token to another without knowing the PIN.

This functionality is also used during the lost token process. But you only need to define this action, if the administrator should be able to perform this task manually.

smtpserver_write

type: bool

To be able to define new *SMTP server configuration* or delete existing ones, the administrator needs this rights `smtpserver_write`.

1.7.2 User Policies

In the Web UI users can manage their own tokens. User can login to the Web UI with the username of their useridresolver. I.e. if a user is found in an LDAP resolver pointing to Active Directory the user needs to login with his domain password.

User policies are used to define, which actions users are allowed to perform.

The user policies also respect the `client` input, where you can enter a list of IP addresses and subnets (like 10.2.0.0/16).

Using the `client` parameter you can allow different actions in if the user either logs in from the internal network or remotely from the internet via the firewall.

Technically user policies control the use of the REST API *Token endpoints* and are checked using *Policy Module* and *Policy Decorators*.

Note: If no user policy is defined, the user has all actions available to him, to manage his tokens.

The following actions are available in the scope *user*:

enroll

type: bool

There are `enroll` actions per token type. Thus you can create policies that allow the user to enroll SMS tokens but not to enroll HMAC tokens.

assgin

type: bool

The user is allowed to assgin an existing token, that is located in his realm and that does not belong to any other user, by entering the serial number.

disable

type: bool

The user is allowed to disable his own tokens. Disabled tokens can not be used to authenticate.

enable

type: bool

The user is allowed to enable his own tokens.

delete

type: bool

The user is allowed to delete his own tokens from the database. Those tokens can not be recovered. Anyway, the audit log concerning these tokens remains.

unassign

type: bool

The user is allowed to drop his ownership of the token. The token does not belong to any user anymore and can be reassigned.

resync

type: bool

The user is allowed to resynchronize the token if it has got out of synchronization.

reset

type: bool

The user is allowed to reset the failcounter of the token.

setOTPPIN

type: bool

The user ist allowed to set the OTP PIN for his tokens.

setMOTPPIN

type: bool

The user is allowed to set the mOTP PIN of mOTP tokens.

otp_pin_maxlength

type: integer

range: 0 - 31

This is the maximum allowed PIN length the user is allowed to use when setting the OTP PIN.

otp_pin_minlength

type: integer

range: 0 - 31

This is the minimum required PIN the user must use when setting the OTP PIN.

otp_pin_contents

type: string

contents: cns

This defines what characters an OTP PIN should contain when the user sets it.

c are letters matching [a-zA-Z].

n are digits matching [0-9].

s are special characters matching [.:,;-_<>+*!/()=?$§%&#~^].

Example: The policy action `otp_pin_contents=cn, otp_pin_minlength=8` would require the user to choose OTP PINs that consist of letters and digits which have a minimum length of 8.

`cn`

test1234 and *test12$$* would be valid OTP PINs. *testABCD* would not be a valid OTP PIN.

The logic of the `otp_pin_contents` can be enhanced and reversed using the characters `+` and `-`.

`-cn` would still mean, that the OTP PIN needs to contain letters and digits and it must not contain any other characters.

`-cn` (substraction)

test1234 would be a valid OTP PIN, but *test12$$* and *testABCS* would not be valid OTP PINs. The later since it does not contain digits, the first (*test12$$*) since it does contain a special character ($), which it should not.

`+cn` (grouping)

combines the two required groups. I.e. the OTP PIN should contain characters from the sum of the two groups. *test1234*, *test12$$*, *test* and *1234* would all be valid OTP PINs.

(**TODO**) grouping and substraction are not implemented, yet.

Note: You can change these character definitions in the privacyidea.ini file using `privacyideaPolicy.pin_c`, `privacyideaPolicy.pin_n` and `privacyideaPolicy.pin_s`. (**Not migrated, yet**)

---

auditlog

type: bool

This action allows the user to view and search the audit log for actions with his own tokens.

updateuser

type: bool

If the `updateuser` action is defined, the user is allowed to change his attributes in the user store.

Note: To be able to edit the attributes, the resolver must be defined as editable.

---

revoke

type: bool

Tokens can be revoked. Usually this means the token is disabled and locked. A locked token can not be modified anymore. It can only be deleted.

Certain token types like *certificate* may define special actions when revoking a token.

password_reset

type: bool

Introduced in version 2.10.

If the user is located in an editable user store, this policy can define, if the user is allowed to perform a password reset. During the password reset an email with a link to reset the password is sent to the user.

1.7.3 Authentication policies

The scope *authentication* gives you more detailed possibilities to authenticate the user or to define what happens during authentication.

Technically the authentication policies apply to the REST API *Validate endpoints* and are checked using *Policy Module* and *Policy Decorators*.

The following actions are available in the scope *authentication*:

otppin

type: string

This action defines how the fixed password part during authentication should be validated. Each token has its own OTP PIN, but you can choose how the authentication should be processed:

`otppin=tokenpin`

This is the default behaviour. The user needs to pass the OTP PIN concatenated with the OTP value.

`otppin=userstore`

The user needs to pass the user store password concatenated with the OTP value. It does not matter if the OTP PIN is set or not. If the user is located in an Active Directory the user needs to pass his domain password together with the OTP value.

Note: The domain password is checked with an LDAP bind right at the moment of authentication. So if the user is locked or the password was changed authentication will fail.

`otppin=none`

The user does not have to pass any fixed password. Authentication is only done via the OTP value.

passthru

type: str

If the user has no token assigned, he will be authenticated against the userstore or against the given RADIUS configuration. I.e. the user needs to provide the LDAP- or SQL-password or valid credentials for the RADIUS server.

Note: This is a good way to do a smooth enrollment. Users having a token enrolled will have to use the token, users not having a token, yet, will be able to authenticate with their domain password.

It is also a way to do smooth migrations from other OTP systems. The authentication request of users without a token is forwarded to the specified RADIUS server.

Warning: If the user has the right to delete his tokens in selfservice portal, the user could delete all his tokens and then authenticate with his static password again.

passOnNoToken

type: bool

If the user has no token assigned an authentication request for this user will always be true.

Warning: Only use this if you know exactly what you are doing.

passOnNoUser

type: bool

If the user does not exist, the authentication request is successful.

Warning: Only use this if you know exactly what you are doing.

smstext

type: string

This is the text that is sent via SMS to the user trying to authenticate with an SMS token. You can use the tags <*otp*> and <*serial*>.

Default: <*otp*>

smsautosend

type: bool

A new OTP value will be sent via SMS if the user authenticated successfully with his SMS token. Thus the user does not have to trigger a new SMS when he wants to login again.

emailtext

type: string

This is the text that is sent via Email to be used with Email Token. This text should contain the OTP value. You can use the tags <*otp*> and <*serial*>.

Default: <*otp*>

emailsubject

type: string

This is the subject of the Email sent by the Email Token. You can use the tags <*otp*> and <*serial*>.

Default: Your OTP

emailautosend

type: bool

If set, a new OTP Email will be sent, when successfully authenticated with an Email Token.

mangle

type: string

The `mangle` policy can mangle the authentication request data before they are processed. I.e. the parameters `user`, `pass` and `realm` can be modified prior to authentication.

This is useful if either information needs to be stripped or added to such a parameter. To accomplish that, the mangle policy can do a regular expression search and replace using the keyword *user*, *pass* (password) and *realm*.

A valid action could look like this:

```
action: mangle=user/.*(.{4})/user\\1/
```

This would modify a username like "userwithalongname" to "username", since it would use the last four characters of the given username ("name") and prepend the fixed string "user".

This way you can add, remove or modify the contents of the three parameters. For more information on the regular expressions see [12].

Note: You must escape the backslash as \\ to refer to the found substrings.

Example: A policy to remove whitespace characters from the realm name would look like this:

```
action: mangle=realm/\\s//
```

Example: If you want to authenticate the user only by the OTP value, no matter what OTP PIN he enters, a policy might look like this:

```
action: mangle=pass/.*(.{6})/\\1/
```

challenge_response

type: string

This is a list of token types for which challenge response can be used during authentication. The list is separated by whitespaces like *"hotp totp"*.

Note: The TiQR token does not need this setting, since it always works with challenge response.

u2f_facets

type: string

This is a white space separated list of domain names, that are trusted to also use a U2F device that was registered with privacyIDEA.

You need to specify a list of FQDNs without the https scheme like:

"host1.example.com host2.exmaple.com firewall.example.com"

For more information on configuring U2F see *U2F Token Config*.

[12] https://docs.python.org/2/library/re.html

1.7.4 Authorization policies

The scope *authorization* provides means to define what should happen if a user proved his identity and authenticated successfully.

Authorization policies take the realm, the user and the client into account.

Technically the authorization policies apply to the *Validate endpoints* and are checked using *Policy Module* and *Policy Decorators*.

The following actions are available in the scope *authorization*:

tokentype

type: string

Users will only be authorized with this very tokentype. The string can hold a comma separated list of case insensitive tokentypes.

This is checked after the authentication request, so that a valid OTP value is wasted, so that it can not be used, even if the user was not authorized at this request

---

Note: Combining this with the client IP you can use this to allow remote access to sensitive areas only with one special token type while allowing access to less sensitive areas with other token types.

---

serial

type: string

Users will only be authorized with the serial number. The string can hold a regular expression as serial number.

This is checked after the authentication request, so that a valid OTP value is wasted, so that it can not be used, even if the user was not authorized at this request

---

Note: Combining this with the client IP you can use this to allow remote access to sensitive areas only with hardware tokens like the Yubikey, while allowing access to less secure areas also with a Google Authenticator.

---

setrealm

type: string

This policy is checked before the user authenticates. The realm of the user matching this policy will be set to the realm in this action.

Note: This can be used if the user can not pass his realm when authenticating at a certain client, but the realm needs to be available during authentication since the user is not located in the default realm.

---

no_detail_on_success

type: bool

Usually an authentication response returns additional information like the serial number of the token that was used to authenticate or the reason why the authentication request failed.

If this action is set and the user authenticated successfully this additional information will not be returned.

no_detail_on_fail

type: bool

Usually an authentication response returns additional information like the serial number of the token that was used to authenticate or the reason why the authentication request failed.

If this action is set and the user fails to authenticate this additional information will not be returned.

api_key_required

type: bool

This policy is checked *before* the user is validated.

You can create an API key, that needs to be passed to use the validate API. If an API key is required, but no key is passed, the authentication request will not be processed. This is used to avoid denial of service attacks by a rogue user sending arbitrary requests, which could result in the token of a user being locked.

You can also define a policy with certain IP addresses without issuing API keys. This would result in "blocking" those IP addresses from using the *validate* endpoint.

You can issue API keys like this:

```
pi-manage api createtoken -r validate
```

The API key (Authorization token) which is generated is valid for 365 days.

The authorization token has to be used as described in *Authentication endpoints*.

auth_max_success

type: string

Here you can specify how many successful authentication requests a user is allowed to perform during a given time. If this value is exceeded, the authentication attempt is canceled.

Specify the value like `2/5m` meaning 2 successful authentication requests per 5 minutes. If during the last 5 minutes 2 successful authentications were performed the authentication request is discarded. The used OTP value is invalidated.

Allowed time specifiers are *s* (second), *m* (minute) and *h* (hour).

auth_max_fail

type: string

Here you can specify how many failed authentication requests a user is allowed to perform during a given time.

If this value is exceeded, authentication is not possible anymore. The user will have to wait.

If this policy is not defined, the normal behaviour of the failcounter applies. (see *Reset Fail Counter*)

Specify the value like `2/1m` meaning 2 successful authentication requests per minute. If during the last 5 minutes 2 successful authentications were performed the authentication request is discarded. The used OTP value is invalidated.

Allowed time specifiers are *s* (second), *m* (minute) and *h* (hour).

last_auth

type: string

You can define if an authentication should fail, if the token was not successfully used for a certain time.

Specify a value like `12h`, `123d` or `2y` to disallow authentication, if the token was not successfully used for 12 hours, 123 days or 2 years.

The date of the last successful authentication is store in the *tokeninfo* field of a token and denoted in UTC.

1.7.5 Enrollment policies

The scope *enrollment* defines what happens during enrollment either by an administrator or during the user self enrollment.

Enrollment policies take the realms, the client (see *Policies*) and the user settings into account.

Technically enrollment policies control the use of the REST API *Token endpoints* and specially the *init* and *assign*-methods.

Technically the decorators in *API Policies* are used.

The following actions are available in the scope *enrollment*:

max_token_per_realm

type: int

This is the maximum allowed number of tokens in the specified realm.

Note: If you have several realms with realm admins and you imported a pool of hardware tokens you can thus limit the consumed hardware tokens per realm.

---

max_token_per_user

type: int

Limit the maximum number of tokens per user in this realm.

Note: If you do not set this action, a user may have unlimited tokens assigned.

---

tokenissuer

type: string

This sets the issuer label for a newly enrolled Google Authenticator. This policy takes a fixed string, to add additional information about the issuer of the soft token.

Note: A good idea is to set this to the instance name of your privacyIDEA installation.

---

tokenlabel

type: string

This sets the label for a newly enrolled Google Authenticator. Possible tags to be replaces are <u> for user, <r> for realm an <s> for the serial number.

The default behaviour is to use the serial number.

Note: This is useful to identify the token in the Authenticator App.

Warning: If you are only using <u> as tokenlabel and you enroll the token without a user, this will result in an invalid QR code, since it will have an empty label. You should rather use a label like "user: <u>", which would result in "user: ".

autoassignment

type: string

allowed values: any_pin, userstore

Users can assign a token just by using this token. The user can take a token from a pool of unassigned tokens. When this policy is set, and the user has no token assigned, autoassignment will be done: The user authenticates with a new PIN or his userstore password and an OTP value from the token. If the OTP value is correct the token gets assigned to the user and the given PIN is set as the OTP PIN.

Note: Requirements are:

1. The user must have no other tokens assigned.
2. The token must be not assigned to any user.
3. The token must be located in the realm of the authenticating user.
4. (The user needs to enter the correct userstore password)

Warning: If you set the policy to *any_pin* the token will be assigned to the user no matter what pin he enters. In this case assigning the token is only a one-factor-authentication: the possession of the token.

otp_pin_random

type: int

Generates a random OTP PIN of the given length during enrollment. Thus the user is forced to set a certain OTP PIN.

Note: To use the random PIN, you also need to define a *pinhandling* policy.

pinhandling

type: string

If the `otp_pin_random` policy is defined, you can use this policy to define, what should happen with the random pin. The action value take the class of a PinHandler like `privacyidea.lib.pinhandling.base.PinHandler`.

The base PinHandler just logs the PIN to the log file. You can add classes to send the PIN via EMail or print it in a letter.

For more information see the base class *PinHandler*.

otp_pin_encrypt

type: bool

If set the OTP PIN of a token will be encrypted. The default behaviour is to hash the OTP PIN, which is safer.

lostTokenPWLen

type: int

This is the length of the generated password for the lost token process.

lostTokenPWContents

type: string

This is the contents that a generated password for the lost token process should have. You can use

- c: for lowercase letters
- n: for digits
- s: for special characters (!#$%&()*+,-./:;<=>?@[]^_)
- C: for uppercase letters

Example:

The action *lostTokenPWLen=10, lostTokenPWContents=Cns* could generate a password like *AC#!49MK))*.

lostTokenValid

type: int

This is how many days the replacement token for the lost token should be valid. After this many days the replacement can not be used anymore.

1.7.6 WebUI Policies

login_mode

type: string

allowed values: “userstore”, “privacyIDEA”, “disable”

If set to *userstore* (default), users and administrators need to authenticate with the password of their userstore, being an LDAP service or an SQL database.

If this action is set to *login_mode=privacyIDEA*, the users and administrators need to authenticate against privacyIDEA when logging into the WebUI. I.e. they can not login with their domain password anymore but need to authenticate with one of their tokens.

If set to *login_mode=disable* the users and administrators of the specified realms can not login to the UI anymore.

Warning: If you set this action and the user deletes or disables all his tokens, he will not be able to login anymore.

Note: Administrators defined in the database using the pi-manage command can still login with their normal passwords.

Note: A sensible way to use this, is to combine this action in a policy with the `client` parameter: requiring the users to login to the Web UI remotely from the internet with OTP but still login from within the LAN with the domain password.

Note: Another sensible way to use this policy is to *disable* the login to the web UI either for certain IP addresses (`client`) or for users in certain realms.

remote_user

type: string

This policy defines, if the login to the privacyIDEA using the web servers integrated authentication (like basic authentication or digest authentication) should be allowed.

Possible values are “disable” and “allowed”.

Note: The policy *login_mode* and *remote_user* work independent of each other. I.e. you can disable *login_mode* and allow *remote_user*.

You can use this policy to enable Single-Sign-On and integration into Kerberos or Active Directory. Add the following template into you apache configuration in /etc/apache2/sites-available/privacyidea.conf:

```
<Directory />
        # For Apache 2.4 you need to set this:
        # Require all granted
        Options FollowSymLinks
        AllowOverride None

        SSLRequireSSL
        AuthType Kerberos
        AuthName "Kerberos Login"
        KrbMethodNegotiate On
        KrbMethodK5Passwd On
        KrbAuthRealms YOUR-REALM
        Krb5KeyTab /etc/apache2/http.keytab
        KrbServiceName HTTP
        KrbSaveCredentials On
        require valid-user
</Directory>

<Location /validate/check>
        Require all granted
        Options FollowSymLinks
        AllowOverride None
</Location>

<Location /ttype>
        Require all granted
```

```
        Options FollowSymLinks
        AllowOverride None
</Location>
```

logout_time

type: int

Set the timeout, after which a user in th WebUI will be logged out. The default timeout is 120 seconds.

Being a policy this time can be set based on clients, realms and users.

token_page_size

type: int

By default 15 tokens are displayed on one page in the token view. On big screens you might want to display more tokens. Thus you can define in this policy how many tokens should be displayed.

user_page_size

type: int

By default 15 users are displayed on one page in the user view. On big screens you might want to display more users. Thus you can define in this policy how many users should be displayed.

policy_template_url

type: str

Here you can define a URL from where the policies should be fetched. The default URL is a Github repository **[#defaulturl]_**.

Note: When setting a template_url policy the modified URL will only get active after the user has logged out and in again.

---

default_tokentype

type: str

You can define which is the default tokentype when enrolling a new token in the Web UI. This is the token, which will be selected, when entering the enrollment dialog.

tokenwizard

type: bool

If this policy is set and the user has no token, then the user will only see an easy token wizard to enroll his first token. If the user has enrolled his first token and he logs in to the web UI, he will see the normal view.

The user will enroll a token defined in *default_tokentype*.

Other sensible policies to combine are in *User Policies* the OTP length, the TOTP timestep and the HASH-lib.

You can add a prologue and epilog to the enrollment wizard in the greeting and after the token is enrolled and e.g. the QR code is displayed.

Create the files

- static/customize/views/includes/token.enroll.pre.top.html
- static/customize/views/includes/token.enroll.pre.bottom.html
- static/customize/views/includes/token.enroll.post.top.html
- static/customize/views/includes/token.enroll.post.bottom.html

to display the contents in the first step (pre) or in the second step (post).

Note: You can change the directory *static/customize* to a URL that fits your needs the best by defining a variable *PI_CUSTOMIZATION* in the file *pi.cfg*. This way you can put all modifications in one place apart from the original code.

1.7.7 Audit policies

The scope *audit* onlcy contains one action. It handles the access to the audit_controller.

The user attribute of the policy contains a list of administrator names.

To learn more about the audit log, see *Audit*.

view

type: bool

The administrators are allowed to view the audit log.

1.7.8 Gettoken policies

The scope *gettoken* defines the maximum number of OTP values that may be retrieved from an OTP token by an administrator.

The user attribute may hold a list of administrators.

Technically the gettoken policies control the use of the gettoken_controller.

The following actions are available in the scope *gettoken*:

max_count_dpw

type: int

This is the maximum number of OTP values that are allowed to be retrieved from a DPW token.

Note: Issuing only one OTP value per day, this means that this is the number of days, this OTP list can be used.

max_count_hotp

type: int

This is the maximum number of OTP values that are allowed to be retrieved from an HOTP (HMAC) token.

Note: As hotp values only expire, when they are used, you can use this to create an OTP list, that can be used from the first to the last OTP value.

---

max_count_totp

type: int

This is the maximum number of OTP balues that are allowed to be retrieved from a TOTP token.

Note: As the default TOTP token generates a new OTP value all 30 seconds, retrieving 100 OTP values will only give you OTP values, that are usable for 50 minutes.

1.7.9 Register Policy

User registration

Starting with privacyIDEA 2.10 users are allowed to register with privacyIDEA. I.e. a user that does not exist in a given realm and resolver can create a new account.

Note: Registering new users is only possible, if there is a writeable resolver and if the necessary policy in the scope *register* is defined. For editable UserIdResolvers see *UserIdResolvers*.

If a register policy is defined, the login window of the Web UI gets a new link “Register”.

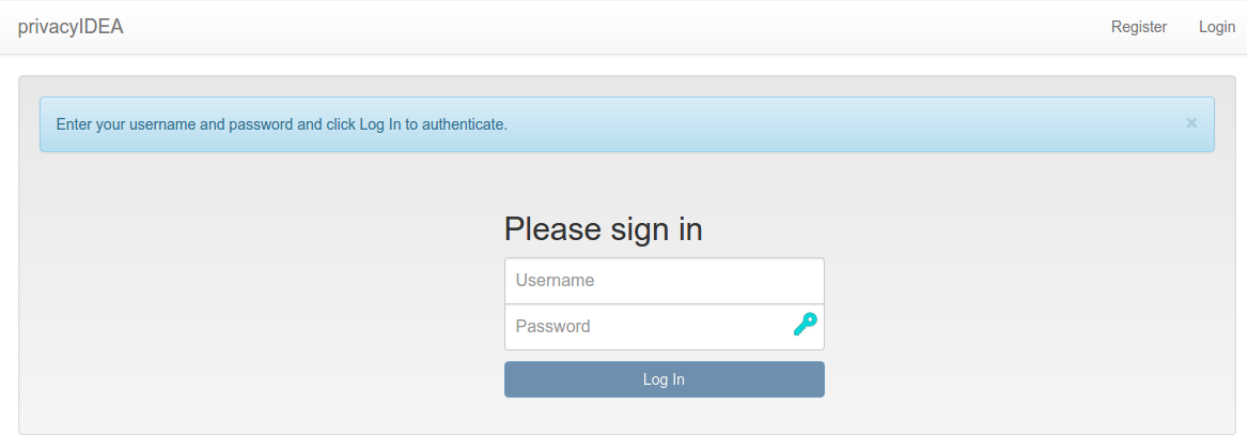


Fig. 1.52: *Next to the login button is a new link ‘register’, so that new users are able to register.*

A user who clicks the link to register a new account gets this registration dialog:

During registration the user is also enrolled *Registration* token. This registration code is sent to the user via a notification email.

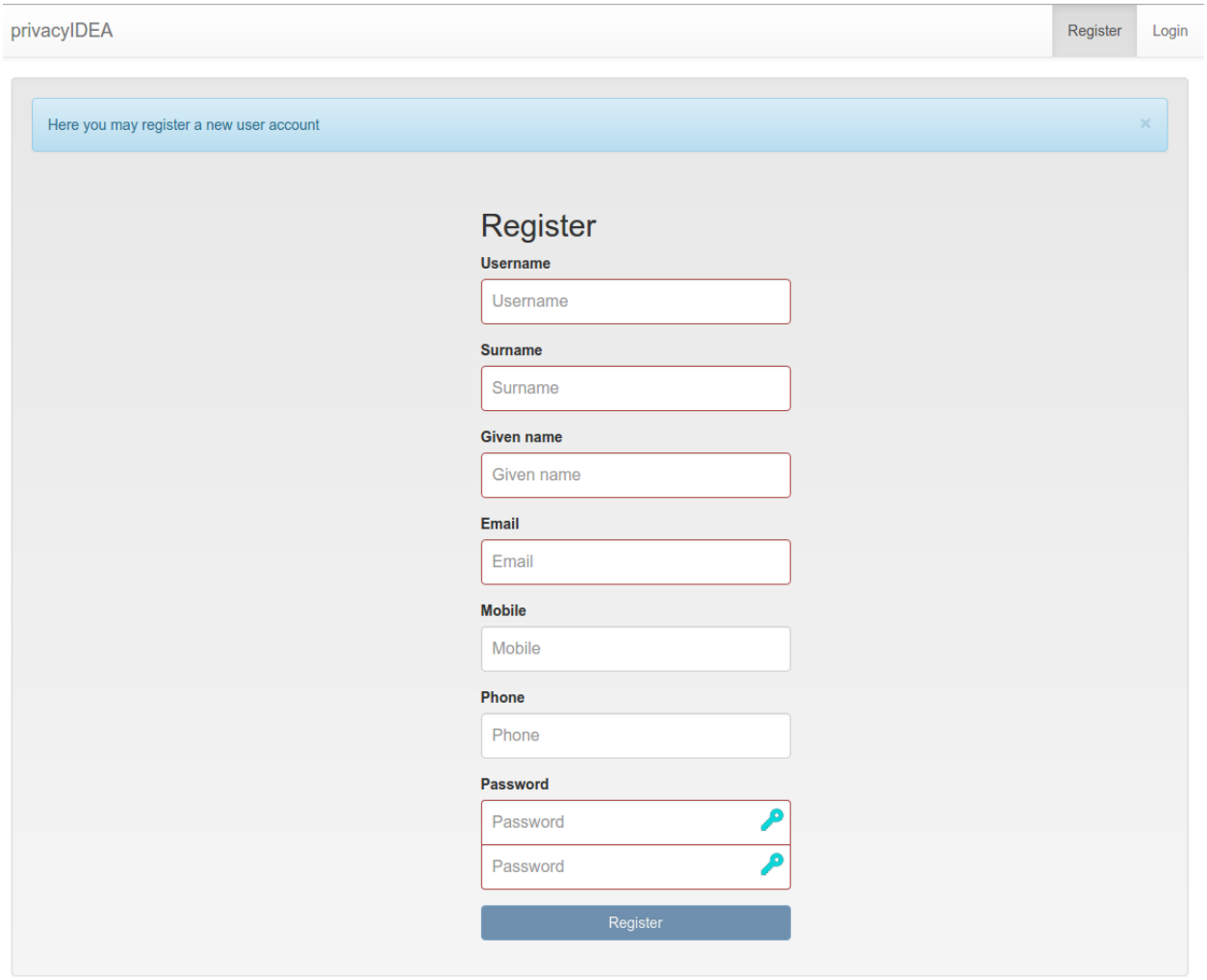


Fig. 1.53: *Registration form*

Note: Thus - using the right policies in scope *webui* and *authentication* - the user could login with the password he set during registration an the registration code he received via email.

Policy settings

In the scope *register* several settings define the behaviour of the registration process.

realm

type: string

This is the realm, in which a new user will be registered. If this realm is not specified, the user will be registered in the default realm.

resolver

type: string

This is the resolver, in which the new user will be registered. If this resolver is not specified, **registration is not possible!**

Note: This resolver must be an editable resolver, otherwise the user can not be created in this resolver.

smtpconfig

type: string

This is the unique identifier of the *SMTP server configuration*. This SMTP server is used to send the notification email with the registration code during the registration process.

Note: If there is no *smtpconfig* or set to a wrong identifier, the user will get no notification email.

requiredemail

type: string

This is a regular expression according to [13].

Only email addresses matching this regular expression are allowed to register.

Example: If you want to authenticate the user only by the OTP value, no matter what OTP PIN he enters, a policy might look like this:

```
action: requiredemail=/.*@mydomain\..*/
```

This will allow all email addresses from the domains *mydomain.com*, *mydomain.net* etc...

You can define as many policies as you wish to. The logic of the policies in the scopes is additive.

Starting with privacyIDEA 2.5 you can use policy templates to ease the setup.

[13] https://docs.python.org/2/library/re.html

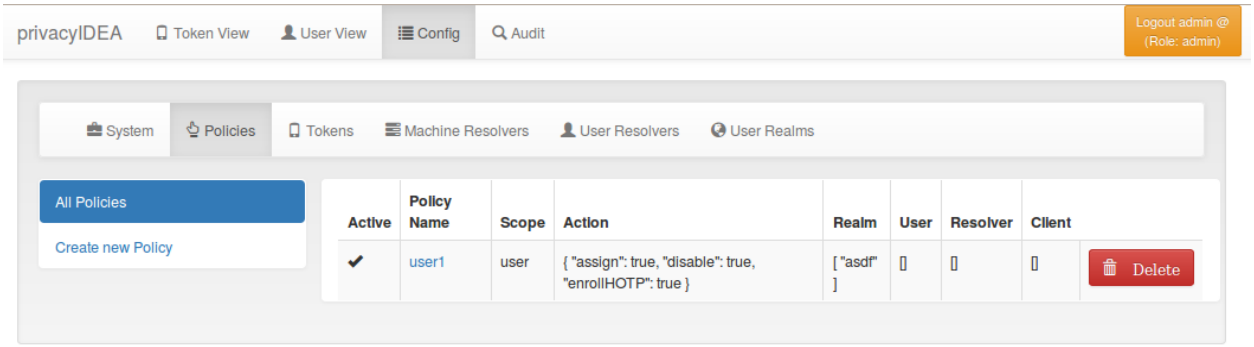


Fig. 1.54: *Policy Definition*

1.7.10 Policy Templates

Policy templates are defined in a Github repository which can be changed using a WebUI policy *policy_template_url*.

The policy templates are json files, which can contain common settings, that can be used to start your own polcies. When creating a new policy, you can select an existing policy template as a starting point.

You may also fork the github repository and commit pull request to improve the policy templates. Or you may fork the github repositry and use your own policy template URL for your policy templates.

A policy templates looks like this:

```
{
 "name": "template_name1",
 "scope": "enrollment",
 "action": {
            "tokenlabel": "<u>@<r>/<s>",
            "autoassignment": true
           }
}
```

realms, *resolver* and *clients* are not used in the templates.

A template must be referenced in a special `index.json` file:

```
{
  "template_name1": "description1",
  "template_name2": "description2"
}
```

where the key is the name of the template file and the value is a description displayed in the WebUI.

Each policy can contain the following attributes:

policy name

A unique name of the policy. The name is the identifier of the policy. If you create a new policy with the same name, the policy is overwritten.

scope

The scope of the policy as described above.

action

This is the important part of the policy. Each scope provides its own set of actions. An action describes that something is *allowed* or that some behaviour is configured. A policy can contain several actions. Actions can be of type *boolean*, *string* or *integer*. Boolean actions are enabled by just adding this action - like `scope=user:action=disable`, which allows the user to disable his own tokens. *string* and *integer* actions require an additional value - like `scope=authentication:action='otppin=userstore'`.

user

This is the user, for whom this policy is valid. Depending on the scope the user is either an administrator or a normal authenticating user.

If this field is left blank, this policy is valid for all users.

resolver

This policy will be valid for all users in this resolver.

If this field is left blank, this policy is valid for all resolvers.

realm

This is the realm, for which this policy is valid.

If this field is left blank, this policy is valid for all realms.

client

This is the requesting client, for which this action is valid. I.e. you can define different policies if the user access is allowed to manage his tokens from different IP addresses like the internal network or remotely via the firewall.

You can enter several IP addresses or subnets divided by comma (like `10.2.0.0/16`, `192.168.0.1`).

time

Not used, yet.

Note: Policies can be active or inactive. So be sure to activate a policy to get the desired effect.

1.8 Audit

The systems provides a sophisticated audit log, that can be viewed in the WebUI.

privacyIDEA comes with an SQL audit module. (see *Audit log*)

1.8.1 Cleaning up entries

The `sqlaudit` module writes audit entries to an SQL database. For performance reasons the audit module does no log rotation during the logging process.

But you can set up a cron job to clean up old audit entries.

You can specify a *highwatermark* and a *lowwatermark*. To clean up the audit log table, you can call `pi-manage` at command line:

```
pi-manage rotate_audit --highwatermark 20000 --lowwatermark 18000
```

This will, if there are more than 20.000 log entries, clean all old log entries, so that only 18000 log entries remain.

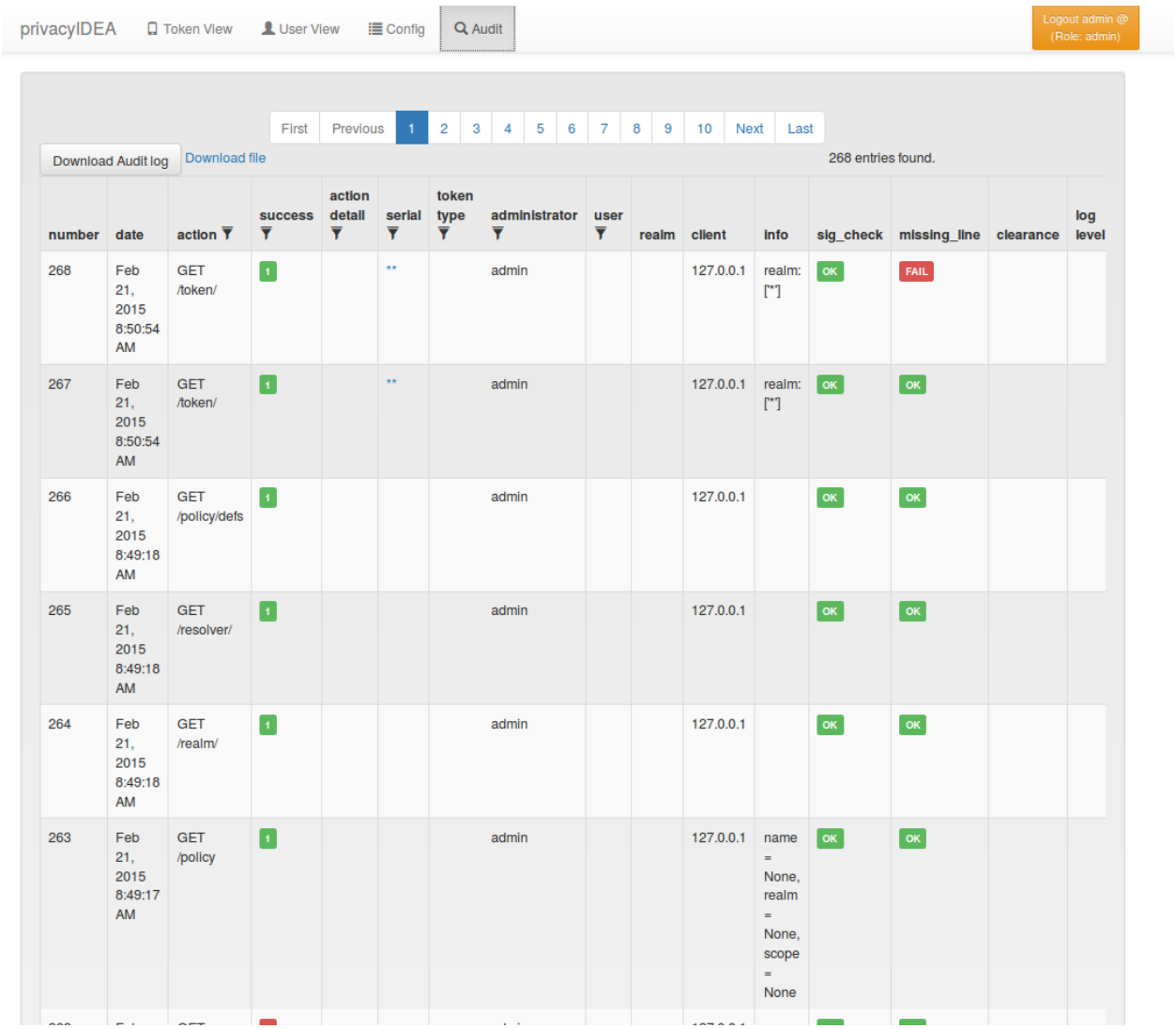


Fig. 1.55: *Audit Log*

Access rights

You may also want to run the cron job with reduced rights. I.e. a user who has no read access to the original pi.cfg file, since this job does not need read access to the SECRET or PEPPER in the pi.cfg file.

So you can simply specify a config file with only the content:

```
PI_AUDIT_SQL_URI = <your database uri>
```

Then you can call `pi-manage` like this:

```
PRIVACYIDEA_CONFIGFILE=/home/cornelius/src/privacyidea/audit.cfg \
pi-manage rotate_audit
```

This will read the configuration (only the database uri) from the config file `audit.cfg`.

1.9 Client machines

privacyIDEA lets you define Machine Resolvers to connect to existing machine stores. The idea is for users to be able to authenticate on those client machines. Not in all cases an online authentication request is possible, so that authentication items can be passed to those client machines.

In addition you need to define, which application on the client machine the user should authenticate to. Different application require different authentication items.

Therefore privacyIDEA can define application types. At the moment privacyIDEA knows the application `luks`, `offline` and `ssh`. You can write your own application class, which is defined in *Application Class*.

You need to assign an application and a token to a client machine. Each application type can work with certain token types and each application type can use additional parameters.

Note: Not all tokens work well with all applications!

1.9.1 SSH

Currently working token types: SSH

Parameters:

`user` (optional, default=root)

When the SSH token type is assigned to a client, the user specified in the user parameter can login with the private key of the SSH token.

In the `sshd_config` file you need to configure the `AuthorizedKeysCommand`. Set it to:

```
privacyidea-authorizedkeys
```

This will fetch the SSH public keys for the requesting machine.

The command expects a configuration file */etc/privacyidea/authorizedkeyscommand* which looks like this:

```
[Default]
url=https://localhost
admin=admin
password=test
nosslcheck=False
```

Note: To disable a SSH key for all servers, you simple can disable the

SSH token in privacyIDEA.

Warning: In a productive environment you should not set **nosslcheck** to

true, otherwise you are vulnerable to man in the middle attacks.

1.9.2 LUKS

Currently working token types: Yubikey Challenge Response

Parameters:

`slot` The slot to which the authentication information should be written

`partition` The encrypted partition (usually /dev/sda3 or /dev/sda5)

These authentication items need to be pulled on the client machine from the privacyIDEA server.

Thus, the following script need to be executed with root rights (able to write to LUKS) on the client machine:

```
privacyidea-luks-assign @secrets.txt --clearslot --name salt-minion
```

For more information please see the man page of this tool.

1.9.3 Offline

Currently working token types: HOTP.

Parameters:

`user` The local user, who should authenticate. (Only needed when calling machine/get_auth_items)

`count` The number of OTP values passed to the client.

The offline application also triggers when the client calls a /validate/check. If the user authenticates successfully with the correct token (serial number) and this very token is attached to the machine with an offline application the response to validate/check is enriched with a "auth_items" tree containing the salted SHA512 hashes of the next OTP values.

The client can cache these values to enable offline authentication. The caching is implemented in the privacyIDEA PAM module.

The server increases the counter to the last offline cached OTP value, so that it will not be possible to authenticate with those OTP values available offline on the client side.

1.10 Application Plugins

privacyIDEA comes with application plugins. These are plugins for applications like PAM, OTRS, Apache2, FreeRADIUS, ownCloud or simpleSAMLphp which enable these application to authenticate users against privacyIDEA.

You may also write your own application plugin or connect your own application to privacyIDEA. This is quite simple using a REST API *Validate endpoints*.

1.10.1 Pluggable Authentication Module

The PAM module of privacyIDEA directly communicates with the privacyIDEA server via the API. The PAM module also supports offline authentication. In this case you need to configure an offline machine application. (See *Offline*)

You can install the PAM module with a ready made Debian package for Ubuntu or just use the source code file. It is a python module, that requires pam-python.

The configuration could look like this:

```
... pam_python.so /path/to/privacyidea_pam.py
url=https://localhost prompt=privacyIDEA_Authentication
```

The URL parameter defaults to `https://localhost`. You can also add the parameters `realm=` and `debug`.

If you want to disable certificate validation, which you should not do in a productive environment, you can use the parameter `nosslverify`.

A new parameter `cacerts=` lets you define a CA Cert-Bundle file, that contains the trusted certificate authorities in PEM format.

The default behaviour is to trigger an online authentication request. If the request was successful, the user is logged in. If the request was done with a token defined for offline authentication, then in addition all offline information is passed to the client and cached on the client so that the token can be used to authenticate without the privacyIDEA server available.

try_first_pass

Starting with version 2.8 privacyidea_pam supports *try_first_pass*. In this case the password that exists in the PAM stack will be sent to privacyIDEA. If this password is successfully validated, than the user is logged in without additional requests. If the password is not validated by privacyIDEA, the user is asked for an additional OTP value.

Note: This can be used in conjunction with the *passthru* policy. In this case users with no tokens will be able to login with only the password in the PAM stack.

Read more about how to use PAM to do openvpn.

1.10.2 FreeRADIUS Plugin

If you want to install the FreeRADIUS Plugin on Ubuntu 14.04 LTS this can be easily done, since there is a ready made package (see *FreeRADIUS*).

If you want to run your FreeRADIUS server on another distribution, you may download the module at [14].

Then you need to configure your FreeRADIUS site and the perl module. The latest FreeRADIUS plugin uses the `/validate/check` REST API of privacyIDEA.

You need to configure the perl module in FreeRADIUS `modules/perl` to look something like this:

```
perl {
    module = /usr/share/privacyidea/freeradius/privacyidea_radius.pm
}
```

Your freeradius enabled site config should contain something like this:

[14] https://github.com/privacyidea/privacyidea/tree/master/authmodules/FreeRADIUS

```
authenticate {
     Auth-Type Perl {
        perl
     }
     digest
     unix
}
```

While you define the default authenticate type to be `Perl` in the `users` file:

```
DEFAULT Auth-Type := Perl
```

Note: The privacyIDEA module uses other perl modules that were not thread safe in the past. So in case you are using old perl dependencies and are experiencing thread problems, please start FreeRADIUS with the -t switch. (Everything works fine with Ubuntu 14.04 and Debian 7.)

You can test the RADIUS setup using a command like this:

```
echo "User-Name=user, Password=password" | radclient -sx yourRadiusServer \
   auth topsecret
```

Note: Do not forget to configure the `clients.conf` accordingly.

Read more about radius_and_realms or rlm_perl_ini.

1.10.3 simpleSAMLphp Plugin

You can install the plugin for simpleSAMLphp on Ubuntu 14.04 LTS (see *SimpleSAMLphp*) or on any other distribution using the source files from [15].

Follow the simpleSAMLphp instructions to configure your authsources.php. A usual configuration will look like this:

```
'example-privacyidea' => array(
    'privacyidea:privacyidea',

    /*
     * The name of the privacyidea server and the protocol
     * A port can be added by a colon
     * Required.
     */
    'privacyideaserver' => 'https://your.server.com',

    /*
     * Check if the hostname matches the name in the certificate
     * Optional.
     */
    'sslverifyhost' => False,

    /*
     * Check if the certificate is valid, signed by a trusted CA
     * Optional.
     */
    'sslverifypeer' => False,
```

[15] https://github.com/privacyidea/simplesamlphp-module-privacyidea

```
    /*
     * The realm where the user is located in.
     * Optional.
     */
    'realm' => '',

    /*
     * This is the translation from privacyIDEA attribute names to
     * SAML attribute names.
     */
     'attributemap' => array('username' => 'samlLoginName',
                             'surname' => 'surName',
                             'givenname' => 'givenName',
                             'email' => 'emailAddress',
                             'phone' => 'telePhone',
                             'mobile' => 'mobilePhone',
                             ),
),
```

1.10.4 TYPO3

You can install the privacyIDEA extension from the TYPO3 Extension Repository. The privacyIDEA extension is easily configured.

privacyIDEA Server URL

This is the URL of your privacyIDEA installation. You do not need to add the path *validate/check*. Thus the URL for a common installation would be *https://yourServer/*.

Check certificate

Whether the validity of the SSL certificate should be checked or not.

Warning: If the SSL certificate is not checked, the authentication

request could be modified and the answer to the request can be modified, easily granting access to an attacker.

Enable privacyIDEA for backend users

If checked, a user trying to authenticate at the backend, will need to authenticate against privacyIDEA.

Enable privacyIDEA for frontend users

If checked, a user trying to authenticate at the frontend, will need to authenticate against privacyIDEA.

Pass to other authentication module

If the authentication at privacyIDEA fails, the credential the user entered will be verified against the next authentication module.

This can come in handy, if you are setting up the system and if you want to avoid locking yourself out.

Anyway, in a productive environment you probably want to uncheck this feature.

1.10.5 OTRS

There are two plugins for OTRS. For OTRS version 4.0 and higher use *privacyIDEA-4_0.pm*.

This perl module needs to be installed to the directory `Kernel/System/Auth`.

On Ubuntu 14.04 LTS you can also install the module using the PPA repository and installing:

```
apt-get install privacyidea-otrs
```

To activate the OTP authentication you need to add the following to `Kernel/Config.pm`:

```
$Self->{'AuthModule'} = 'Kernel::System::Auth::privacyIDEA';
$Self->{'AuthModule::privacyIDEA::URL'} = \
        "https://localhost/validate/check";
$Self->{'AuthModule::privacyIDEA::disableSSLCheck'} = "yes";
```

Note: As mentioned earlier you should only disable the checking of the SSL certificate if you are in a test environment. For productive use you should never disable the SSL certificate checking.

Note: This plugin requires, that you also add the path *validate/check* to the URL.

1.10.6 Apache2

The Apache plugin uses `mod_wsgi` and `redis` to provide a basic authentication on Apache2 side and validating the credentials against privacyIDEA.

On Ubuntu 14.04 LTS you can easily install the module from the PPA repository by issuing:

```
apt-get install privacyidea-apache-client
```

To activate the OTP authentication on a "Location" or "Directory" you need to configure Apache2 like this:

```
<Directory /var/www/html/secretdir>
     AuthType Basic
     AuthName "Protected Area"
     AuthBasicProvider wsgi
     WSGIAuthUserScript /usr/share/pyshared/privacyidea_apache.py
     Require valid-user
</Directory>
```

Note: Basic Authentication sends the base64 encoded password on each request. So the browser will send the same one time password with each reqeust. Thus the authentication module needs to cache the password as the successful authentication. Redis is used for caching the password.

Warning: As redis per default is accessible by every user on the machine, you need to use this plugin with caution! Every user on the machine can access the redis database to read the passwords of the users. The cached credentials are stored as pbkdf2+sha512 hash.

1.10.7 NGINX

The NGINX plugin uses the internal scripting language `lua` of the NGINX webserver and `redis` as caching backend to provide basic authentication against privacyIDEA.

On Ubuntu 14.04 LTS or Debian Jessi 8 you can easyly install the module by installing the following packages:

```
nginx-extras lua-nginx-redis lua-cjson redis-server
```

You can retrieve the nginx plugin here: [16]

To activate the OTP authentication on a "Location" you need to include the `lua` script that basically verifies the given credentials against the caching backend. New authentications will be sent to a different (internal) location via subrequest which points to the privacyIDEA authentication backend (via proxy_pass).

For the basic configuration you need to include the following lines to your `location` block

location / { # additional plugin configuration goes here # access_by_lua_file 'privacyidea.lua';

} location /privacyidea-validate-check {

internal; proxy_pass https://privacyidea/validate/check;

}

You can customize the authentication plugin by setting some of the following variables in the secured `location` block:

```
# redis host:port
# set $privacyidea_redis_host "127.0.0.1";
set $privacyidea_redis_post 6379;

# how long are accepted authentication allowed to be cached
# if expired, the user has to reauthenticate
set $privacyidea_ttl 900;

# privacyIDEA realm. leave empty == default
set $privacyidea_realm 'somerealm'; # (optional)

# pointer to the internal validation proxy pass
set $privacyidea_uri "/privacyidea-validate-check";

# the http realm presented to the user
set $privacyidea_http_realm "Secure zone (use PIN + OTP)";
```

Note: Basic Authentication sends the base64 encoded password on each request. So the browser will send the same one time password with each reqeust. Thus the authentication module needs to cache the password as the successful authentication. Redis is used for caching the password similar to the Apache2 plugin.

Warning: As redis per default is accessible by every user on the machine, you need to use this plugin with caution! Every user on the machine can access the redis database to read the passwords of the users. The cached credentials are stored as SHA1_HMAC hash. If you prefer a stronger hashing method feel free to extend the given `password_hash/verify` functions using additional lua libraries (for example by using `lua-resty-string`).

1.10.8 ownCloud

The ownCloud plugin is a ownCloud user backend. The directory `user_privacyidea` needs to be copied to your owncloud `apps` directory.

You can then activate the privacyIDEA ownCloud plugin by checking *Use privacyIDEA to authenticate the users.* All users now need to be known to privacyIDEA and need to authenticate using the second factor enrolled in privacyIDEA - be it an OTP token, Google Authenticator or SMS/Smartphone.

[16] https://github.com/dhoffend/lua-nginx-privacyidea

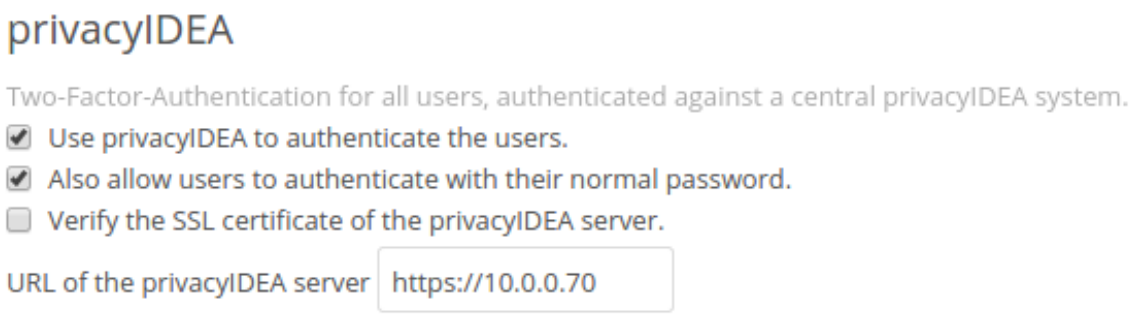


Fig. 1.56: *Activating the ownCloud plugin*

Checking *Also allow users to authenticate with their normal passwords.* lets the user choose if he wants to authenticate with the OTP token or with his original password from the original user backend.

Note: At the moment using a desktop client with a static password is not supported.

1.10.9 OpenVPN

Read more about how to use OpenVPN with privacyidea at openvpn.

1.10.10 Further plugins

You can find further plugins for Dokuwiki, Wordpress, Contao and Django at [17].

1.11 Tools

(TODO): Not yet migrated.

The menu `tools` contains some helpful tools to manage your tokens.

1.11.1 Get Serial by OTP value

Here you can enter an OTP value and have the system identify the token. This can be useful if the printed serial number on the token can not be read anymore or if the hardware token has not serial number printed on it at all.

You can choose the

- tokentype
- whether the token is an assigned token or not
- and the realm of the token

[17] https://github.com/cornelinux?tab=repositories

to set limits to the token search.

Warning: The system needs to got to all tokens and calculate the next (default) 10 OTP values. Depending on the number of tokens you have in the system this can be very time consuming!

1.11.2 Copy token PIN

Here you can enter a token serial number of the token from which you want to copy the OTP PIN and the serial number of the token to which you want to copy it.

This function is also used in the lost token scenario.

But the help desk can also use it if the administrator enrolls a new token to the user and

1. the user can not set the OTP PIN and
2. the administrator should not set or know the OTP PIN.

Then the administrator can create a second token for the user and copy the OTP PIN (which only the user knows) of the old token to the new, second token.

1.11.3 Check Policy

If you have complicated policy settings you can use this dialog to determine if the policies behave as expected. You can enter the scope, the real, action user and client to "simulate" e.g. an authentication request.

The system will tell you if any policy is triggered.

1.11.4 Export token information

Here you can export the list of the tokens to a CSV file.

Note: In the resolver you can define additional fields, that are usually not used by privacyIDEA. But you can add those fields to the export. Thus you can e.g. add special LDAP attributes in the list of the exported tokens.

1.11.5 Export audit information

Here you can export the audit information.

Warning: You should limit the export to a number of audit entries. As the audit log can grow very big, the export of 20.000 audit lines could result in blocking the system.

1.12 Import

Seed files that contain the secret keys of hardware tokens can be imported to the system via the menu *Import*.

The default import options are to import *SafeNet XML* file, *OATH CSV* files, *Yubikey CSV* files or *PSKC* files.

1.12.1 OATH CSV

This is a very simple CSV file to import HOTP, TOTP or OATH tokens. You can also convert your seed easily to this file format, to import the tokens.

The file format looks like this:

```
<serial>, <seed>, <type>, <otp length>, <time step>
```

For OCRA tokens it looks like this:

```
<serial>, <seed>, OCRA, <ocra suite>
```

serial is the serial number of the token that will also be used to identify the token in the database. Importing the same serial number twice will overwrite the token data.

seed is the secret key, that is used to calculate the OTP value. The seed is provided in a hexadecimal notation. Depending on the length either the SHA1 or SHA256 hash algorithm is identified.

type is either HOTP, TOTP or OCRA.

otp length is the length of the OTP value generated by the token. This is usually 6 or 8.

time step is the time step of TOTP tokens. This is usually 30 or 60.

ocra suite is the ocra suite of the OCRA token according to [18].

1.12.2 Yubikey CSV

Here you can import the CSV file that is written by the Yubikey personalization tool [19]. privacyIDEA can import all Yubikey modes, either Yubico mode or HOTP mode.

Note: There is an annoying drawback of the personalization tool: If you a initializing several HOTP yubikeys it will not write the serial number to the file.

1.12.3 PSKC

The *Portable Symmetric Key Container* is specified in [20]. OATH compliant token vendors provide the token seeds in a PSKC file. privacyIDEA lets you import PSKC files. All necessary information (OTP length, Hash algorithm, token type) are read from the file.

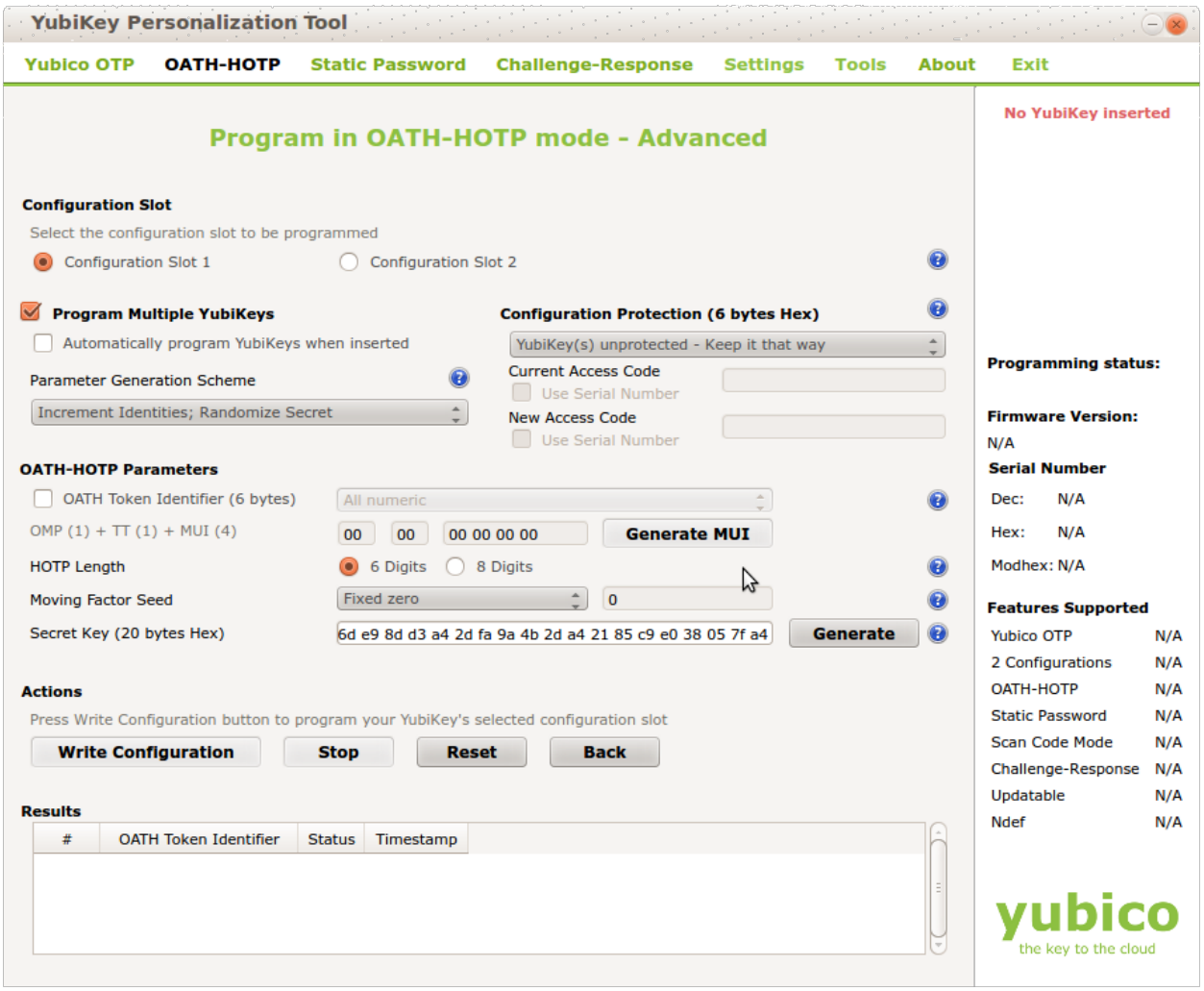
1.13 Code Documentation

The code roughly has three levels.

1.13.1 API level

The API level is used to access the system. For some calls you need to be authenticated as administrator, for some calls you can be authenticated as normal user. These are the `token` and the `audit` endpoint. For calls to the `validate` API you do not need to be authenticated at all.

[18] http://tools.ietf.org/html/rfc6287#section-6
[19] http://www.yubico.com/products/services-software/personalization-tools/use/
[20] https://tools.ietf.org/html/rfc6030


YubiKey Personalization Tool
Yubico OTP
OATH-HOTP
Static Password
Challenge-Response
Settings
Tools
About
Exit
Program in OATH-HOTP mode - Advanced
No YubiKey inserted
Configuration Slot
Select the configuration slot to be programmed
Configuration Slot 1
Configuration Slot 2
Program Multiple YubiKeys
Automatically program YubiKeys when inserted
Parameter Generation Scheme
Increment Identities; Randomize Secret
Configuration Protection (6 bytes Hex)
YubiKey(s) unprotected - Keep it that way
Current Access Code
Use Serial Number
New Access Code
Use Serial Number
OATH-HOTP Parameters
OATH Token Identifier (6 bytes)
All numeric
OMP (1) + TT (1) + MUI (4)
00
00
00 00 00 00
Generate MUI
HOTP Length
6 Digits
8 Digits
Moving Factor Seed
Fixed zero
0
Secret Key (20 bytes Hex)
6d e9 8d d3 a4 2d fa 9a 4b 2d a4 21 85 c9 e0 38 05 7f a4
Generate
Actions
Press Write Configuration button to program your YubiKey's selected configuration slot
Write Configuration
Stop
Reset
Back
Results
#
OATH Token Identifier
Status
Timestamp
Programming status:
Firmware Version:
N/A
Serial Number
Dec: N/A
Hex: N/A
Modhex: N/A
Features Supported
Yubico OTP N/A
2 Configurations N/A
OATH-HOTP N/A
Static Password N/A
Scan Code Mode N/A
Challenge-Response N/A
Updatable N/A
Ndef N/A
yubico
the key to the cloud

At this level `Authentication` is performed. In the lower levels there is no authentication anymore.

The object `g.logged_in_user` is used to pass the authenticated user. The client gets a JSON Web Token to authenticate every request.

API functions are decorated with the decorators `admin_required` and `user_required` to define access rules.

REST API

This is the REST API for privacyidea. It lets you create the system configuration, which is denoted in the system endpoints.

Special system configuration is the configuration of

- the resolvers
- the realms
- the defaultrealm
- the policies.

Resolvers are dynamic links to existing user sources. You can find users in LDAP directories, SQL databases, flat files or SCIM services. A resolver translates a loginname to a user object in the user source and back again. It is also responsible for fetching all additional needed information from the user source.

Realms are collections of resolvers that can be managed by administrators and where policies can be applied.

Defaultrealm is a special endpoint to define the default realm. The default realm is used if no user realm is specified. If a user from realm1 tries to authenticate or is addressed, the notation user@realm1 is used. If the @realm1 is omitted, the user is searched in the default realm.

Policies are rules how privacyidea behaves and which user and administrator is allowed to do what.

Start to read about authentication to the API at *Authentication endpoints*.

Now you can take a look at the several REST endpoints. This REST API is used to authenticate the users. A user needs to authenticate when he wants to use the API for administrative tasks like enrolling a token.

This API must not be confused with the validate API, which is used to check, if a OTP value is valid. See *Validate endpoints*.

Authentication of users and admins is tested in tests/test_api_roles.py

You need to authenticate for all administrative tasks. If you are not authenticated, the API returns a 401 response.

To authenticate you need to send a POST request to /auth containing username and password.

Audit endpoint

GET /audit/statistics
get the statistics values from the audit log

Example request:

```
GET /audit/statistics HTTP/1.1
Host: example.com
Accept: application/json
```

Example response:

```
HTTP/1.1 200 OK
Content-Type: text/csv

 {
   "id": 1,
   "jsonrpc": "2.0",
   "result": {
     "status": true,
     "value": [
       {
          "serial_plot": "...image data...",
       }
     ]
   },
   "version": "privacyIDEA unknown"
 }
```

GET /audit/
return a paginated list of audit entries.

Params can be passed as key-value-pairs.

Example request:

```
GET /audit?realm=realm1 HTTP/1.1
Host: example.com
Accept: application/json
```

Example response:

```
HTTP/1.1 200 OK
Content-Type: application/json

 {
   "id": 1,
   "jsonrpc": "2.0",
   "result": {
     "status": true,
     "value": [
       {
          "serial": "....",
          "missing_line": "..."
       }
     ]
   },
   "version": "privacyIDEA unknown"
 }
```

GET /audit/ (*csvfile*)
Download the audit entry as CSV file.

Params can be passed as key-value-pairs.

Example request:

```
GET /audit/audit.csv?realm=realm1 HTTP/1.1
Host: example.com
Accept: text/csv
```

Example response:

```
HTTP/1.1 200 OK
Content-Type: text/csv

 {
   "id": 1,
   "jsonrpc": "2.0",
   "result": {
     "status": true,
     "value": [
       {
          "serial": "....",
          "missing_line": "..."
       }
     ]
   },
   "version": "privacyIDEA unknown"
 }
```

Authentication endpoints

This REST API is used to authenticate the users. A user needs to authenticate when he wants to use the API for administrative tasks like enrolling a token.

This API must not be confused with the validate API, which is used to check, if a OTP value is valid. See *Validate endpoints*.

Authentication of users and admins is tested in tests/test_api_roles.py

You need to authenticate for all administrative tasks. If you are not authenticated, the API returns a 401 response.

To authenticate you need to send a POST request to /auth containing username and password.

GET /auth/rights

This returns the rights of the logged in user.

Request Headers

- Authorization – The authorization token acquired by /auth request

POST /auth

This call verifies the credentials of the user and issues an authentication token, that is used for the later API calls. The authentication token has a validity, that is usually 1 hour.

JSON Parameters

- **username** – The username of the user who wants to authenticate to the API.
- **password** – The password/credentials of the user who wants to authenticate to the API.

Return A json response with an authentication token, that needs to be used in any further request.

Status Codes

- 200 OK – in case of success
- 401 Unauthorized – if authentication fails

Example Authentication Request:

```
POST /auth HTTP/1.1
Host: example.com
Accept: application/json
```

```
username=admin
password=topsecret
```

Example Authentication Response:

```
HTTP/1.0 200 OK
Content-Length: 354
Content-Type: application/json

{
      "id": 1,
      "jsonrpc": "2.0",
      "result": {
          "status": true,
          "value": {
              "token": "eyJhbGciOiJIUz....jdpn9kIjuGRnGejmbFbM"
          }
      },
      "version": "privacyIDEA unknown"
}
```

Response for failed authentication:

```
HTTP/1.1 401 UNAUTHORIZED
Content-Type: application/json
Content-Length: 203

{
   "id": 1,
   "jsonrpc": "2.0",
   "result": {
     "error": {
       "code": -401,
       "message": "missing Authorization header"
     },
     "status": false
   },
   "version": "privacyIDEA unknown",
   "config": {
     "logout_time": 30
   }
}
```

Example Request:

Requests to privacyidea then should use this security token in the Authorization field in the header.

```
GET /users/ HTTP/1.1
Host: example.com
Accept: application/json
Authorization: eyJhbGciOiJIUz....jdpn9kIjuGRnGejmbFbM
```

Validate endpoints

This module contains the REST API for doing authentication. The methods are tested in the file tests/test_api_validate.py

Authentication is either done by providing a username and a password or a serial number and a password.

Authentication workflow

Authentication workflow is like this:

In case of authenticating a user:

- lib/token/check_user_pass (user, passw, options)
- lib/token/check_token_list(list, passw, user, options)
- lib/tokenclass/authenticate(pass, user, options)
- lib/tokenclass/check_pin(pin, user, options)
- lib/tokenclass/check_otp(otpval, options)

IN case if authenitcating a serial number:

- lib/token/check_serial_pass(serial, passw, options)
- lib/token/check_token_list(list, passw, user, options)
- lib/tokenclass/authenticate(pass, user, options)
- lib/tokenclass/check_pin(pin, user, options)
- lib/tokenclass/check_otp(otpval, options)

GET /validate/samlcheck
Authenticate the user and return the SAML user information.

Parameters

- **user** – The loginname/username of the user, who tries to authenticate.
- **realm** – The realm of the user, who tries to authenticate. If the realm is omitted, the user is looked up in the default realm.
- **pass** – The password, that consists of the OTP PIN and the OTP value.

Return a json result with a boolean "result": true

Example response for a successful authentication:

```
HTTP/1.1 200 OK
Content-Type: application/json

 {
   "detail": {
     "message": "matching 1 tokens",
     "serial": "PISP0000AB00",
     "type": "spass"
   },
   "id": 1,
   "jsonrpc": "2.0",
   "result": {
     "status": true,
     "value": {"attributes": {
                  "username": "koelbel",
                  "realm": "themis",
                  "mobile": null,
                  "phone": null,
                  "myOwn": "/data/file/home/koelbel",
                  "resolver": "themis",
                  "surname": "Kölbel",
                  "givenname": "Cornelius",
```

```
                        "email": null},
                    "auth": true}
        },
        "version": "privacyIDEA unknown"
      }
```

The response in value->attributes can contain additional attributes (like "myOwn") which you can define in the LDAP resolver in the attribute mapping.

POST /validate/samlcheck

Authenticate the user and return the SAML user information.

Parameters

- **user** – The loginname/username of the user, who tries to authenticate.
- **realm** – The realm of the user, who tries to authenticate. If the realm is omitted, the user is looked up in the default realm.
- **pass** – The password, that consists of the OTP PIN and the OTP value.

Return a json result with a boolean "result": true

Example response for a successful authentication:

```
      HTTP/1.1 200 OK
      Content-Type: application/json

       {
        "detail": {
          "message": "matching 1 tokens",
          "serial": "PISP0000AB00",
          "type": "spass"
        },
        "id": 1,
        "jsonrpc": "2.0",
        "result": {
          "status": true,
          "value": {"attributes": {
                      "username": "koelbel",
                      "realm": "themis",
                      "mobile": null,
                      "phone": null,
                      "myOwn": "/data/file/home/koelbel",
                      "resolver": "themis",
                      "surname": "Kölbel",
                      "givenname": "Cornelius",
                      "email": null},
                    "auth": true}
        },
        "version": "privacyIDEA unknown"
      }
```

The response in value->attributes can contain additional attributes (like "myOwn") which you can define in the LDAP resolver in the attribute mapping.

GET /validate/check

check the authentication for a user or a serial number. Either a `serial` or a `user` is required to authenticate. The PIN and OTP value is sent in the parameter `pass`.

Parameters

- **serial** – The serial number of the token, that tries to authenticate.
- **user** – The loginname/username of the user, who tries to authenticate.
- **realm** – The realm of the user, who tries to authenticate. If the realm is omitted, the user is looked up in the default realm.
- **pass** – The password, that consists of the OTP PIN and the OTP value.
- **transaction_id** – The transaction ID for a response to a challenge request
- **state** – The state ID for a response to a challenge request

Return a json result with a boolean "result": true

Example response for a successful authentication:

```
HTTP/1.1 200 OK
Content-Type: application/json

 {
   "detail": {
     "message": "matching 1 tokens",
     "serial": "PISP0000AB00",
     "type": "spass"
   },
   "id": 1,
   "jsonrpc": "2.0",
   "result": {
     "status": true,
     "value": true
   },
   "version": "privacyIDEA unknown"
 }
```

POST /validate/check

check the authentication for a user or a serial number. Either a `serial` or a `user` is required to authenticate. The PIN and OTP value is sent in the parameter `pass`.

Parameters

- **serial** – The serial number of the token, that tries to authenticate.
- **user** – The loginname/username of the user, who tries to authenticate.
- **realm** – The realm of the user, who tries to authenticate. If the realm is omitted, the user is looked up in the default realm.
- **pass** – The password, that consists of the OTP PIN and the OTP value.
- **transaction_id** – The transaction ID for a response to a challenge request
- **state** – The state ID for a response to a challenge request

Return a json result with a boolean "result": true

Example response for a successful authentication:

```
HTTP/1.1 200 OK
Content-Type: application/json

 {
   "detail": {
     "message": "matching 1 tokens",
     "serial": "PISP0000AB00",
```

```
            "type": "spass"
          },
          "id": 1,
          "jsonrpc": "2.0",
          "result": {
            "status": true,
            "value": true
          },
          "version": "privacyIDEA unknown"
        }
```

System endpoints

This is the REST API for system calls to create and read system configuration.

The code of this module is tested in tests/test_api_system.py

GET /system/documentation
returns an restructured text document, that describes the complete configuration.

POST /system/setDefault
define default settings for tokens. These default settings are used when new tokens are generated. The default settings will not affect already enrolled tokens.

JSON Parameters

- **DefaultMaxFailCount** – Default value for the maximum allowed authentication failures
- **DefaultSyncWindow** – Default value for the synchronization window
- **DefaultCountWindow** – Default value for the counter window
- **DefaultOtpLen** – Default value for the OTP value length – usually 6 or 8
- **DefaultResetFailCount** – Default value, if the FailCounter should be reset on successful authentication [True|False]

Return a json result with a boolean "result": true

POST /system/setConfig
set a configuration key or a set of configuration entries

parameter are generic keyname=value pairs.

remark In case of key-value pairs the type information could be provided by an additional parameter with same keyname with the postfix ".type". Value could then be 'password' to trigger the storing of the value in an encrypted form

JSON Parameters

- **key** – configuration entry name
- **value** – configuration value
- **type** – type of the value: int or string/text or password. password will trigger to store the encrypted value
- **description** – additional information for this config entry

or

JSON Parameters

- **pairs** (*key-value*) – pair of &keyname=value pairs

Return a json result with a boolean "result": true

Example request 1:

```
POST /system/setConfig
key=splitAtSign
value=true

Host: example.com
Accept: application/json
```

Example request 2:

```
POST /system/setConfig
BINDDN=myName
BINDPW=mySecretPassword
BINDPW.type=password

Host: example.com
Accept: application/json
```

GET /system/random

This endpoint can be used to retrieve random keys from privacyIDEA. In certain cases the client might need random data to initialize tokens on the client side. E.g. the command line client when initializing the yubikey or the WebUI when creating Client API keys for the yubikey.

In this case, privacyIDEA can created the random data/keys.

Query Parameters

- **len** – The length of a symmetric key (byte)
- **encode** – The type of encoding. Can be "hex" or "b64".

Return key material

POST /system/hsm

Set the password for the security module

GET /system/hsm

Get the status of the security module.

GET /system/

This endpoint either returns all config entries or only the value of the one config key.

This endpoint can be called by the administrator but also by the normal user, so that the normal user gets necessary information about the system config

Parameters

- **key** – The key to return.

Return A json response or a single value, when queried with a key.

Rtype json or scalar

POST /system/test/(*tokentype*)

The call /system/test/email tests the configuration of the email token.

GET /system/(*key*)

This endpoint either returns all config entries or only the value of the one config key.

This endpoint can be called by the administrator but also by the normal user, so that the normal user gets necessary information about the system config

Parameters

- **key** – The key to return.

Return A json response or a single value, when queried with a key.

Rtype json or scalar

DELETE /system/ (*key*)
delete a configuration key

JSON Parameters

- **key** – configuration key name

Returns a json result with the deleted value

Resolver endpoints

The code of this module is tested in tests/test_api_system.py

POST /resolver/test

Return a json result with True, if the given values can create a working resolver and a description.

GET /resolver/
returns a json list of all resolver.

Parameters

- **type** (*basestring*) – Only return resolvers of type (like passwdresolver..)
- **editable** (*basestring*) – Set to "1" if only editable resolvers should be returned.

POST /resolver/ (*resolver*)
This creates a new resolver or updates an existing one. A resolver is uniquely identified by its name.

If you update a resolver, you do not need to provide all parameters. Parameters you do not provide are left untouched. When updating a resolver you must not change the type! You do not need to specify the type, but if you specify a wrong type, it will produce an error.

Parameters

- **resolver** (*basestring*) – the name of the resolver.
- **type** – the type of the resolver. Valid types are passwdresolver,

ldapresolver, sqlresolver, scimresolver :type type: string :return: a json result with the value being the database id (>0)

Additional parameters depend on the resolver type.

LDAP:

- LDAPURI
- LDAPBASE
- BINDDN
- BINDPW
- TIMEOUT

- SIZELIMIT
- LOGINNAMEATTRIBUTE
- LDAPSEARCHFILTER
- LDAPFILTER
- USERINFO
- NOREFERRALS - True|False

SQL:

- Database
- Driver
- Server
- Port
- User
- Password
- Table
- Map

Passwd

- Filename

DELETE /resolver/ (*resolver*)
This function deletes an existing resolver. A resolver can not be deleted, if it is contained in a realm

Parameters

- **resolver** – the name of the resolver to delete.

Return json with success or fail

GET /resolver/ (*resolver*)
This function retrieves the definition of a single resolver.

Parameters

- **resolver** – the name of the resolver

Return a json result with the configuration of a specified resolver

Realm endpoints

The realm endpoints are used to define realms. A realm groups together many users. Administrators can manage the tokens of the users in such a realm. Policies and tokens can be assigned to realms.

A realm consists of several resolvers. Thus you can create a realm and gather users from LDAP and flat file source into one realm or you can pick resolvers that collect users from different points from your vast LDAP directory and group these users into a realm.

You will only be able to see and use user object, that are contained in a realm.

The code of this module is tested in tests/test_api_system.py

GET /realm/superuser

This call returns the list of all superuser realms as they are defined in *pi.cfg*. See *The Config File* for more information about this.

Return a json result with a list of realms

Example request:

```
GET /superuser HTTP/1.1
Host: example.com
Accept: application/json
```

Example response:

```
HTTP/1.1 200 OK
Content-Type: application/json

{
  "id": 1,
  "jsonrpc": "2.0",
  "result": {
    "status": true,
    "value": ["superuser",
              "realm2"]
    }
  },
  "version": "privacyIDEA unknown"
}
```

GET /realm/

This call returns the list of all defined realms. It takes no arguments.

Return a json result with a list of realms

Example request:

```
GET / HTTP/1.1
Host: example.com
Accept: application/json
```

Example response:

```
HTTP/1.1 200 OK
Content-Type: application/json

{
  "id": 1,
  "jsonrpc": "2.0",
  "result": {
    "status": true,
    "value": {
      "realm1_with_resolver": {
        "default": true,
        "resolver": [
          {
            "name": "reso1_with_realm",
            "type": "passwdresolver"
          }
        ]
      }
    }
```

```
    },
    "version": "privacyIDEA unknown"
}
```

POST /realm/ (*realm*)

This call creates a new realm or reconfigures a realm. The realm contains a list of resolvers.

In the result it returns a list of added resolvers and a list of resolvers, that could not be added.

Parameters

- **realm** – The unique name of the realm
- **resolvers** (*string or list*) – A comma separated list of unique resolver names or a list object
- **priority** – Additional parameters priority.<resolvername> define the priority of the resolvers within this realm.

Return a json result with a list of Realms

Example request:

To create a new realm "newrealm", that consists of the resolvers "reso1_with_realm" and "reso2_with_realm" call:

```
POST /realm/newrealm HTTP/1.1
Host: example.com
Accept: application/json
Content-Length: 26
Content-Type: application/x-www-form-urlencoded

resolvers=reso1_with_realm, reso2_with_realm
priority.reso1_with_realm=1
priority.reso2_with_realm=2
```

Example response:

```
HTTP/1.1 200 OK
Content-Type: application/json

{
   "id": 1,
   "jsonrpc": "2.0",
   "result": {
             "status": true,
             "value": {
                 "added": ["reso1_with_realm", "reso2_with_realm"],
                 "failed": []
             }
   }
   "version": "privacyIDEA unknown"
}
```

DELETE /realm/ (*realm*)

This call deletes the given realm.

Parameters

- **realm** – The name of the realm to delete

Return a json result with value=1 if deleting the realm was successful

Example request:

```
DELETE /realm/realm_to_delete HTTP/1.1
Host: example.com
Accept: application/json
```

Example response:

```
HTTP/1.1 200 OK
Content-Type: application/json

 {
   "id": 1,
   "jsonrpc": "2.0",
   "result": {
     "status": true,
     "value": 1
   },
   "version": "privacyIDEA unknown"
 }
```

Default Realm endpoints

These endpoints are used to define the default realm, retrieve it and delete it.

DELETE /defaultrealm

This call deletes the default realm.

Return a json result with either 1 (success) or 0 (fail)

Example response:

```
 {
  "id": 1,
  "jsonrpc": "2.0",
  "result": {
    "status": true,
    "value": 1
  },
  "version": "privacyIDEA unknown"
}
```

GET /defaultrealm

This call returns the default realm

Return a json description of the default realm with the resolvers

Example response:

```
{
  "id": 1,
  "jsonrpc": "2.0",
  "result": {
    "status": true,
    "value": {
      "defrealm": {
        "default": true,
        "resolver": [
          {
            "name": "defresolver",
```

```
                "type": "passwdresolver"
              }
            ]
          }
        }
      },
      "version": "privacyIDEA unknown"
    }
```

POST /defaultrealm/ (*realm*)
This call sets the default realm.

Parameters

- **realm** – the name of the realm, that should be the default realm

Return a json result with either 1 (success) or 0 (fail)

Token endpoints

The token API can be accessed via /token.

You need to authenticate to gain access to these token functions. If you are authenticated as administrator, you can manage all tokens. If you are authenticated as normal user, you can only manage your own tokens. Some API calls are only allowed to be accessed by adminitrators.

To see how to authenticate read *Authentication endpoints*.

GET /token/challenges/
This endpoint returns the active challenges in the database or returns the challenges for a single token by its serial number

Query Parameters

- **serial** – The optional serial number of the token for which the challenges should be returned
- **sortby** – sort the output by column
- **sortdir** – asc/desc
- **page** – request a certain page
- **pagesize** – limit the number of returned tokens

Return json

POST /token/unassign
Unssign a token from a user. You can either provide "serial" as an argument to unassign this very token or you can provide user and realm, to unassign all tokens of a user.

Return In case of success it returns "value": True.

Rtype json object

POST /token/copyuser
Copy the token user from one token to the other.

JSON Parameters

- **from** (*basestring*) – the serial number of the token, from where you want to copy the pin.
- **to** (*basestring*) – the serial number of the token, from where you want to copy the pin.

Return returns value=True in case of success

Rtype bool

POST /token/disable

Disable a single token or all the tokens of a user either by providing the serial number of the single token or a username and realm.

Disabled tokens can not be used to authenticate but can be enabled again.

JSON Parameters

- **serial** (*basestring*) – the serial number of the single token to disable
- **user** (*basestring*) – The login name of the user
- **realm** (*basestring*) – the realm name of the user

Return In case of success it returns the number of disabled tokens in "value".

Rtype json object

POST /token/copypin

Copy the token PIN from one token to the other.

JSON Parameters

- **from** (*basestring*) – the serial number of the token, from where you want to copy the pin.
- **to** (*basestring*) – the serial number of the token, from where you want to copy the pin.

Return returns value=True in case of success

Rtype bool

POST /token/assign

Assign a token to a user.

JSON Parameters

- **serial** – The token, which should be assigned to a user
- **user** – The username of the user
- **realm** – The realm of the user

Return In case of success it returns "value": True.

Rtype json object

POST /token/revoke

Revoke a single token or all the tokens of a user. A revoked token will usually be locked. A locked token can not be used anymore. For certain token types additional actions might occur when revoking a token.

JSON Parameters

- **serial** (*basestring*) – the serial number of the single token to revoke
- **user** (*basestring*) – The login name of the user
- **realm** (*basestring*) – the realm name of the user

Return In case of success it returns the number of revoked tokens in "value".

Rtype JSON object

POST /token/enable

Enable a single token or all the tokens of a user.

JSON Parameters

- **serial** (*basestring*) – the serial number of the single token to enable
- **user** (*basestring*) – The login name of the user
- **realm** (*basestring*) – the realm name of the user

Return In case of success it returns the number of enabled tokens in "value".

Rtype json object

POST /token/resync

Resync the OTP token by providing two consecutive OTP values.

JSON Parameters

- **serial** (*basestring*) – the serial number of the single token to reset
- **otp1** (*basestring*) – First OTP value
- **otp2** (*basestring*) – Second OTP value

Return In case of success it returns "value"=True

Rtype json object

POST /token/setpin

Set the the user pin or the SO PIN of the specific token. Usually these are smartcard or token specific PINs. E.g. the userpin is used with mOTP tokens to store the mOTP PIN.

The token is identified by the unique serial number.

JSON Parameters

- **serial** (*basestring*) – the serial number of the single token to reset
- **userpin** (*basestring*) – The user PIN of a smartcard
- **sopin** (*basestring*) – The SO PIN of a smartcard
- **otppin** (*basestring*) – The OTP PIN of a token

Return In "value" returns the number of PINs set.

Rtype json object

POST /token/reset

Reset the failcounter of a single token or of all tokens of a user.

JSON Parameters

- **serial** (*basestring*) – the serial number of the single token to reset
- **user** (*basestring*) – The login name of the user
- **realm** (*basestring*) – the realm name of the user

Return In case of success it returns "value"=True

Rtype json object

POST /token/init

create a new token.

JSON Parameters

- **otpkey** – required: the secret key of the token
- **genkey** – set to =1, if key should be generated. We either need otpkey or genkey

- **keysize** – the size (byte) of the key. Either 20 or 32. Default is 20
- **serial** – required: the serial number/identifier of the token
- **description** – A description for the token
- **pin** – the pin of the user pass
- **user** – the login user name. This user gets the token assigned
- **realm** – the realm of the user.
- **type** – the type of the token
- **tokenrealm** – additional realms, the token should be put into
- **otplen** – length of the OTP value
- **hashlib** – used hashlib sha1, sha256 or sha512
- **validity_period_start** – The beginning of the validity period
- **validity_period_end** – The end of the validity period

Return a json result with a boolean "result": true

Example response:

```
HTTP/1.1 200 OK
Content-Type: application/json

{
   "detail": {
     "googleurl": {
       "description": "URL for google Authenticator",
       "img": "<img    width=250   src="
       "value": "otpauth://hotp/mylabel?secret=GEZDGNBVGY3TQOJQGEZDGNBVGY3TQOJQ&counter=0"
     },
     "oathurl": {
       "description": "URL for OATH token",
       "img": "<img    width=250   src="
       "value": "oathtoken:///addToken?name=mylabel&lockdown=true&key=313233343536373839303
     },
     "otpkey": {
       "description": "OTP seed",
       "img": "<img    width=200   src="
       "value": "seed://31323334353637383930313233343536373839 30"
     },
     "serial": "OATH00096020"
   },
   "id": 1,
   "jsonrpc": "2.0",
   "result": {
     "status": true,
     "value": true
   },
   "version": "privacyIDEA unknown"
 }
```

POST /token/set

This API is only to be used by the admin! This can be used to set token specific attributes like

•description

•count_window

•sync_window

•count_auth_max

•count_auth_success_max

•hashlib,

•max_failcount

The token is identified by the unique serial number or by the token owner. In the later case all tokens of the owner will be modified.

JSON Parameters

- **serial** (*basestring*) – the serial number of the single token to reset
- **user** (*basestring*) – The username of the token owner
- **realm** (*basestring*) – The realm name of the token owner

Return returns the number of attributes set in "value"

Rtype json object

GET /token/

Display the list of tokens. Using different parameters you can choose, which tokens you want to get and also in which format you want to get the information (*outform*).

Query Parameters

- **serial** – Display the token data of this single token. You can do a not strict matching by specifying a serial like "*OATH*".
- **type** – Display only token of type. You ca do a non strict matching by specifying a token-type like "*otp*", to file hotp and totp tokens.
- **user** – display tokens of this user
- **viewrealm** – takes a realm, only the tokens in this realm will be displayed
- **description** (*basestring*) – Display token with this kind of description
- **sortby** – sort the output by column
- **sortdir** – asc/desc
- **page** – request a certain page
- **assigned** – Only return assigned (True) or not assigned (False) tokens
- **pagesize** – limit the number of returned tokens
- **user_fields** – additional user fields from the userid resolver of the owner (user)
- **outform** – if set to "csv", than the token list will be given in CSV

Return a json result with the data being a list of token dictionaries:

```
{ "data": [ { <token1> }, { <token2> } ]}
```

Rtype json

GET /token/challenges/ (*serial*)

This endpoint returns the active challenges in the database or returns the challenges for a single token by its serial number

Query Parameters

- **serial** – The optional serial number of the token for which the challenges should be returned
- **sortby** – sort the output by column
- **sortdir** – asc/desc
- **page** – request a certain page
- **pagesize** – limit the number of returned tokens

Return json

GET /token/getserial/ (*otp*)

Get the serial number for a given OTP value. If the administrator has a token, he does not know to whom it belongs, he can type in the OTP value and gets the serial number of the token, that generates this very OTP value.

Query Parameters

- **otp** – The given OTP value
- **type** – Limit the search to this token type
- **unassigned** – If set=1, only search in unassigned tokens
- **assigned** – If set=1, only search in assigned tokens
- **serial** – This can be a substring of serial numbers to search in.
- **window** – The number of OTP look ahead (default=10)

Return The serial number of the token found

POST /token/disable/ (*serial*)

Disable a single token or all the tokens of a user either by providing the serial number of the single token or a username and realm.

Disabled tokens can not be used to authenticate but can be enabled again.

JSON Parameters

- **serial** (*basestring*) – the serial number of the single token to disable
- **user** (*basestring*) – The login name of the user
- **realm** (*basestring*) – the realm name of the user

Return In case of success it returns the number of disabled tokens in "value".

Rtype json object

POST /token/revoke/ (*serial*)

Revoke a single token or all the tokens of a user. A revoked token will usually be locked. A locked token can not be used anymore. For certain token types additional actions might occur when revoking a token.

JSON Parameters

- **serial** (*basestring*) – the serial number of the single token to revoke
- **user** (*basestring*) – The login name of the user
- **realm** (*basestring*) – the realm name of the user

Return In case of success it returns the number of revoked tokens in "value".

Rtype JSON object

POST /token/enable/ (*serial*)
Enable a single token or all the tokens of a user.

JSON Parameters

- **serial** (*basestring*) – the serial number of the single token to enable
- **user** (*basestring*) – The login name of the user
- **realm** (*basestring*) – the realm name of the user

Return In case of success it returns the number of enabled tokens in "value".

Rtype json object

POST /token/resync/ (*serial*)
Resync the OTP token by providing two consecutive OTP values.

JSON Parameters

- **serial** (*basestring*) – the serial number of the single token to reset
- **otp1** (*basestring*) – First OTP value
- **otp2** (*basestring*) – Second OTP value

Return In case of success it returns "value"=True

Rtype json object

POST /token/setpin/ (*serial*)
Set the the user pin or the SO PIN of the specific token. Usually these are smartcard or token specific PINs. E.g. the userpin is used with mOTP tokens to store the mOTP PIN.

The token is identified by the unique serial number.

JSON Parameters

- **serial** (*basestring*) – the serial number of the single token to reset
- **userpin** (*basestring*) – The user PIN of a smartcard
- **sopin** (*basestring*) – The SO PIN of a smartcard
- **otppin** (*basestring*) – The OTP PIN of a token

Return In "value" returns the number of PINs set.

Rtype json object

POST /token/reset/ (*serial*)
Reset the failcounter of a single token or of all tokens of a user.

JSON Parameters

- **serial** (*basestring*) – the serial number of the single token to reset
- **user** (*basestring*) – The login name of the user
- **realm** (*basestring*) – the realm name of the user

Return In case of success it returns "value"=True

Rtype json object

POST /token/realm/ (*serial*)
Set the realms of a token. The token is identified by the unique serial number

You can call the function like this: POST /token/realm?serial=<serial>&realms=<something> POST /token/realm/<serial>?realms=<hash>

JSON Parameters

- **serial** (*basestring*) – the serial number of the single token to reset
- **realms** (*basestring*) – The realms the token should be assigned to. Comma separated

Return returns value=True in case of success

Rtype bool

POST /token/load/ (*filename*)

The call imports the given file containing token definitions. The file can be an OATH CSV file, an aladdin XML file or a Yubikey CSV file exported from the yubikey initialization tool.

The function is called as a POST request with the file upload.

JSON Parameters

- **filename** – The name of the token file, that is imported
- **type** – The file type. Can be "aladdin-xml", "oathcsv" or "yubikeycsv".
- **tokenrealms** – comma separated list of tokens.
- **psk** – Pre Shared Key, when importing PSKC

Return The number of the imported tokens

Rtype int

POST /token/lost/ (*serial*)

Mark the specified token as lost and create a new temporary token. This new token gets the new serial number "lost<old-serial>" and a certain validity period and the PIN of the lost token.

This method can be called by either the admin or the user on his own tokens.

You can call the function like this: POST /token/lost/serial

JSON Parameters

- **serial** (*basestring*) – the serial number of the lost token.

Return returns value=dictionary in case of success

Rtype bool

POST /token/set/ (*serial*)

This API is only to be used by the admin! This can be used to set token specific attributes like

•description

•count_window

•sync_window

•count_auth_max

•count_auth_success_max

•hashlib,

•max_failcount

The token is identified by the unique serial number or by the token owner. In the later case all tokens of the owner will be modified.

JSON Parameters

- **serial** (*basestring*) – the serial number of the single token to reset
- **user** (*basestring*) – The username of the token owner
- **realm** (*basestring*) – The realm name of the token owner

Return returns the number of attributes set in "value"

Rtype json object

DELETE /token/ (*serial*)

Delete a token by its serial number or delete all tokens of a user.

JSON Parameters

- **serial** – The serial number of a single token.
- **user** – The username of the user, whose tokens should be deleted.
- **realm** – The realm of the user.

Return In case of success it return the number of deleted tokens in "value"

Rtype json object

User endpoints

The user endpoints is a subset of the system endpoint.

GET /user/

list the users in a realm

A normal user can call this endpoint and will get information about his own account.

Parameters

- **realm** – a realm that contains several resolvers. Only show users from this realm
- **resolver** – a distinct resolvername
- **<searchexpr>** – a search expression, that depends on the ResolverClass

Return json result with "result": true and the userlist in "value".

Example request:

```
GET /user?realm=realm1 HTTP/1.1
Host: example.com
Accept: application/json
```

Example response:

```
HTTP/1.1 200 OK
Content-Type: application/json

 {
   "id": 1,
   "jsonrpc": "2.0",
   "result": {
     "status": true,
```

```
        "value": [
          {
            "description": "Cornelius K\u00f6lbel,,+49 151 2960 1417,+49 561 3166797,cornelius.koel
            "email": "cornelius.koelbel@netknights.it",
            "givenname": "Cornelius",
            "mobile": "+49 151 2960 1417",
            "phone": "+49 561 3166797",
            "surname": "K\u00f6lbel",
            "userid": "1009",
            "username": "cornelius",
            "resolver": "name-of-resolver"
          }
        ]
      },
      "version": "privacyIDEA unknown"
    }
```


POST /user/

Create a new user in the given resolver.

Example request:

```
POST /user
user=new_user
resolver=<resolvername>
surname=...
givenname=...
email=...
mobile=...
phone=...
password=...
description=...

Host: example.com
Accept: application/json
```

PUT /user/

Edit a user in the user store. The resolver must have the flag editable, so that the user can be deleted. Only administrators are allowed to edit users.

Example request:

```
PUT /user
user=existing_user
resolver=<resolvername>
surname=...
givenname=...
email=...
mobile=...
phone=...
password=...
description=...

Host: example.com
Accept: application/json
```

Note: Also a user can call this function to e.g. change his password. But in this case the parameter "user" and "resolver" get overwritten by the values of the authenticated user, even if he specifies another username.

DELETE /user/ (*resolvername*) **/**
username Delete a User in the user store. The resolver must have the flag editable, so that the user can be deleted. Only administrators are allowed to delete users.

Delete a user object in a user store by calling

Example request:

```
DELETE /user/<resolvername>/<username>
Host: example.com
Accept: application/json
```

The code of this module is tested in tests/test_api_system.py

Policy endpoints

The policy endpoints are a subset of the system endpoint.

You can read more about policies at *Policies*.

GET /policy/check
This function checks, if the given parameters would match a defined policy or not.

Query Parameters

- **user** – the name of the user
- **realm** – the realm of the user or the realm the administrator want to do administrative tasks on.
- **resolver** – the resolver of a user
- **scope** – the scope of the policy
- **action** – the action that is done - if applicable
- **client** (*IP_Address*) – the client, from which this request would be issued

Return a json result with the keys allowed and policy in the value key

Rtype json

Status Codes

- 200 OK – Policy created or modified.
- 401 Unauthorized – Authentication failed

Example request:

```
GET /policy/check?user=admin&realm=r1&client=172.16.1.1 HTTP/1.1
Host: example.com
Accept: application/json
```

Example response:

```
HTTP/1.0 200 OK
Content-Type: application/json

 {
   "id": 1,
   "jsonrpc": "2.0",
   "result": {
     "status": true,
```

```
          "value": {
            "pol_update_del": {
              "action": "enroll",
              "active": true,
              "client": "172.16.0.0/16",
              "name": "pol_update_del",
              "realm": "r1",
              "resolver": "test",
              "scope": "selfservice",
              "time": "",
              "user": "admin"
            }
          }
        },
        "version": "privacyIDEA unknown"
      }
```


GET /policy/defs

This is a helper function that returns the POSSIBLE policy definitions, that can be used to define your policies.

Query Parameters

- **scope** – if given, the function will only return policy definitions for the given scope.

Return The policy definitions of the allowed scope with the actions and action types. The top level key is the scope.

Rtype dict

GET /policy/

this function is used to retrieve the policies that you defined. It can also be used to export the policy to a file.

Query Parameters

- **name** – will only return the policy with the given name
- **export** – The filename needs to be specified as the third part of the URL like policy.cfg. It will then be exported to this file.
- **realm** – will return all policies in the given realm
- **scope** – will only return the policies within the given scope
- **active** – Set to true or false if you only want to display active or inactive policies.

Return a json result with the configuration of the specified policies

Rtype json

Status Codes

- 200 OK – Policy created or modified.
- 401 Unauthorized – Authentication failed

Example request:

In this example a policy "pol1" is created.

```
GET /policy/pol1 HTTP/1.1
Host: example.com
Accept: application/json
```

Example response:

```
    HTTP/1.0 200 OK
    Content-Type: application/json

     {
       "id": 1,
       "jsonrpc": "2.0",
       "result": {
         "status": true,
         "value": {
           "pol_update_del": {
             "action": "enroll",
             "active": true,
             "client": "1.1.1.1",
             "name": "pol_update_del",
             "realm": "r1",
             "resolver": "test",
             "scope": "selfservice",
             "time": "",
             "user": "admin"
           }
         }
       },
       "version": "privacyIDEA unknown"
     }
```

POST /policy/disable/ (*name*)
Disable a given policy by its name.

JSON Parameters

- **name** – The name of the policy

Return ID in the database

POST /policy/enable/ (*name*)
Enable a given policy by its name.

JSON Parameters

- **name** – Name of the policy

Return ID in the database

GET /policy/export/ (*export*)
this function is used to retrieve the policies that you defined. It can also be used to export the policy to a file.

Query Parameters

- **name** – will only return the policy with the given name
- **export** – The filename needs to be specified as the third part of the URL like policy.cfg. It will then be exported to this file.
- **realm** – will return all policies in the given realm
- **scope** – will only return the policies within the given scope
- **active** – Set to true or false if you only want to display active or inactive policies.

Return a json result with the configuration of the specified policies

Rtype json

Status Codes

- 200 OK – Policy created or modified.
- 401 Unauthorized – Authentication failed

Example request:

In this example a policy "pol1" is created.

```
GET /policy/pol1 HTTP/1.1
Host: example.com
Accept: application/json
```

Example response:

```
HTTP/1.0 200 OK
Content-Type: application/json

 {
   "id": 1,
   "jsonrpc": "2.0",
   "result": {
     "status": true,
     "value": {
       "pol_update_del": {
         "action": "enroll",
         "active": true,
         "client": "1.1.1.1",
         "name": "pol_update_del",
         "realm": "r1",
         "resolver": "test",
         "scope": "selfservice",
         "time": "",
         "user": "admin"
       }
     }
   },
   "version": "privacyIDEA unknown"
 }
```

POST /policy/import/ (*filename*)

This function is used to import policies from a file.

JSON Parameters

- **filename** – The name of the file in the request

Form Parameters

- **file** – The uploaded file contents

Return A json response with the number of imported policies.

Status Codes

- 200 OK – Policy created or modified.
- 401 Unauthorized – Authentication failed

Example request:

```
POST /policy/import/backup-policy.cfg HTTP/1.1
Host: example.com
Accept: application/json
```

Example response:

```
HTTP/1.0 200 OK
Content-Type: application/json

 {
   "id": 1,
   "jsonrpc": "2.0",
   "result": {
     "status": true,
     "value": 2
   },
   "version": "privacyIDEA unknown"
 }
```

GET /policy/defs/ (*scope*)

This is a helper function that returns the POSSIBLE policy definitions, that can be used to define your policies.

Query Parameters

- **scope** – if given, the function will only return policy definitions for the given scope.

Return The policy definitions of the allowed scope with the actions and action types. The top level key is the scope.

Rtype dict

POST /policy/ (*name*)

Creates a new policy that defines access or behaviour of different actions in privacyIDEA

JSON Parameters

- **name** (*basestring*) – name of the policy
- **scope** – the scope of the policy like “admin”, “system”, “authentication” or “selfservice”
- **adminrealm** – Realm of the administrator. (only for admin scope)
- **action** – which action may be executed
- **realm** – For which realm this policy is valid
- **resolver** – This policy is valid for this resolver
- **user** – The policy is valid for these users. string with wild cards or list of strings
- **time** – on which time does this policy hold
- **client** (*IP address with subnet*) – for which requesting client this should be

Return a json result with success or error

Status Codes

- 200 OK – Policy created or modified.
- 401 Unauthorized – Authentication failed

Example request:

In this example a policy “pol1” is created.

```
POST /policy/pol1 HTTP/1.1
Host: example.com
Accept: application/json
```

```
scope=admin
realm=realm1
action=enroll, disable
```

Example response:

```
HTTP/1.0 200 OK
Content-Length: 354
Content-Type: application/json

 {
   "id": 1,
   "jsonrpc": "2.0",
   "result": {
     "status": true,
     "value": {
       "setPolicy pol1": 1
     }
   },
   "version": "privacyIDEA unknown"
 }
```

GET /policy/ (*name*)
this function is used to retrieve the policies that you defined. It can also be used to export the policy to a file.

Query Parameters

- **name** – will only return the policy with the given name
- **export** – The filename needs to be specified as the third part of the URL like policy.cfg. It will then be exported to this file.
- **realm** – will return all policies in the given realm
- **scope** – will only return the policies within the given scope
- **active** – Set to true or false if you only want to display active or inactive policies.

Return a json result with the configuration of the specified policies

Rtype json

Status Codes

- 200 OK – Policy created or modified.
- 401 Unauthorized – Authentication failed

Example request:

In this example a policy "pol1" is created.

```
GET /policy/pol1 HTTP/1.1
Host: example.com
Accept: application/json
```

Example response:

```
HTTP/1.0 200 OK
Content-Type: application/json

 {
   "id": 1,
   "jsonrpc": "2.0",
```

```
        "result": {
          "status": true,
          "value": {
            "pol_update_del": {
              "action": "enroll",
              "active": true,
              "client": "1.1.1.1",
              "name": "pol_update_del",
              "realm": "r1",
              "resolver": "test",
              "scope": "selfservice",
              "time": "",
              "user": "admin"
            }
          }
        },
        "version": "privacyIDEA unknown"
      }
```


DELETE /policy/ (*name*)

This deletes the policy of the given name.

JSON Parameters

- **name** – the policy with the given name

Return a json result about the delete success. In case of success value > 0

Status Codes

- 200 OK – Policy created or modified.
- 401 Unauthorized – Authentication failed

Example request:

In this example a policy "pol1" is created.

```
DELETE /policy/pol1 HTTP/1.1
Host: example.com
Accept: application/json
```

Example response:


```
HTTP/1.0 200 OK
Content-Type: application/json

{
    "id": 1,
    "jsonrpc": "2.0",
    "result": {
      "status": true,
      "value": 1
    },
    "version": "privacyIDEA unknown"
}
```


This endpoint is used to create, modify, list and delete Machine Resolvers. Machine Resolvers fetch machine information from remote machine stores like a hosts file or an Active Directory.

The code of this module is tested in tests/test_api_machineresolver.py

Machine Resolver endpoints

POST /machineresolver/test
This function tests, if the given parameter will create a working machine resolver. The Machine Resolver Class itself verifies the functionality. This can also be network connectivity to a Machine Store.

Return a json result with bool

GET /machineresolver/
returns a json list of all machine resolver.

Parameters

- **type** – Only return resolvers of type (like "hosts"...)

POST /machineresolver/ (*resolver*)
This creates a new machine resolver or updates an existing one. A resolver is uniquely identified by its name.

If you update a resolver, you do not need to provide all parameters. Parameters you do not provide are left untouched. When updating a resolver you must not change the type! You do not need to specify the type, but if you specify a wrong type, it will produce an error.

Parameters

- **resolver** (*basestring*) – the name of the resolver.
- **type** (*string*) – the type of the resolver. Valid types are... "hosts"

Return a json result with the value being the database id (>0)

Additional parameters depend on the resolver type.

hosts:

- filename

DELETE /machineresolver/ (*resolver*)
this function deletes an existing machine resolver

Parameters

- **resolver** – the name of the resolver to delete.

Return json with success or fail

GET /machineresolver/ (*resolver*)
This function retrieves the definition of a single machine resolver.

Parameters

- **resolver** – the name of the resolver

Return a json result with the configuration of a specified resolver

This REST API is used to list machines from Machine Resolvers.

The code is tested in tests/test_api_machines

Machine endpoints

POST /machine/tokenoption
This sets a Machine Token option or deletes it, if the value is empty.

Parameters

- **hostname** – identify the machine by the hostname
- **machineid** – identify the machine by the machine ID and the resolver name
- **resolver** – identify the machine by the machine ID and the resolver name
- **serial** – identify the token by the serial number
- **application** – the name of the application like “luks” or “ssh”.

Parameters not listed will be treated as additional options.

Return

GET /machine/authitem

This fetches the authentication items for a given application and the given client machine.

Parameters

- **challenge** (*basestring*) – A challenge for which the authentication item is calculated. In case of the Yubikey this can be a challenge that produces a response. The authentication item is the combination of the challenge and the response.
- **hostname** (*basestring*) – The hostname of the machine

Return dictionary with lists of authentication items

Example response:

```
HTTP/1.1 200 OK
Content-Type: application/json

 {
   "id": 1,
   "jsonrpc": "2.0",
   "result": {
     "status": true,
     "value": { "ssh": [ { "username": "....",
                           "sshkey": "...."
                         }
                       ],
                "luks": [ { "slot": ".....",
                            "challenge": "...",
                            "response": "...",
                            "partition": "..."
                          ]
              }
   },
   "version": "privacyIDEA unknown"
 }
```

POST /machine/token

Attach an existing token to a machine with a certain application.

Parameters

- **hostname** – identify the machine by the hostname
- **machineid** – identify the machine by the machine ID and the resolver name
- **resolver** – identify the machine by the machine ID and the resolver name
- **serial** – identify the token by the serial number
- **application** – the name of the application like “luks” or “ssh”.

Parameters not listed will be treated as additional options.

Return json result with "result": true and the machine list in "value".

Example request:

```
POST /token HTTP/1.1
Host: example.com
Accept: application/json

{ "hostname": "puckel.example.com",
  "machienid": "12313098",
  "resolver": "machineresolver1",
  "serial": "tok123",
  "application": "luks" }
```

GET /machine/token

Return a list of MachineTokens either for a given machine or for a given token.

Parameters

- **serial** – Return the MachineTokens for a the given Token
- **hostname** – Identify the machine by the hostname
- **machineid** – Identify the machine by the machine ID and the resolver name
- **resolver** – Identify the machine by the machine ID and the resolver name

Return

GET /machine/

List all machines that can be found in the machine resolvers.

Parameters

- **hostname** – only show machines, that match this hostname as substring
- **ip** – only show machines, that exactly match this IP address
- **id** – filter for substring matching ids
- **resolver** – filter for substring matching resolvers
- **any** – filter for a substring either matching in "hostname", "ip" or "id"

Return json result with "result": true and the machine list in "value".

Example request:

```
GET /hostname?hostname=on HTTP/1.1
Host: example.com
Accept: application/json
```

Example response:

```
HTTP/1.1 200 OK
Content-Type: application/json

 {
   "id": 1,
   "jsonrpc": "2.0",
   "result": {
     "status": true,
     "value": [
```

```
            {
              "id": "908asljdas90ad0",
              "hostname": [ "flavon.example.com", "test.example.com" ],
              "ip": "1.2.3.4",
              "resolver_name": "machineresolver1"
            },
            {
              "id": "1908209x48x2183",
              "hostname": [ "london.example.com" ],
              "ip": "2.4.5.6",
              "resolver_name": "machineresolver1"
            }
          ]
        },
        "version": "privacyIDEA unknown"
      }
```

DELETE /machine/token/ (*serial*) **/**
machineid/*resolver*/*application* Detach a token from a machine with a certain application.

Parameters

- **machineid** – identify the machine by the machine ID and the resolver name
- **resolver** – identify the machine by the machine ID and the resolver name
- **serial** – identify the token by the serial number
- **application** – the name of the application like “luks” or “ssh”.

Return json result with “result”: true and the machine list in “value”.

Example request:

```
DELETE /token HTTP/1.1
Host: example.com
Accept: application/json

{ "hostname": "puckel.example.com",
  "resolver": "machineresolver1",
  "application": "luks" }
```

GET /machine/authitem/ (*application*)
This fetches the authentication items for a given application and the given client machine.

Parameters

- **challenge** (*basestring*) – A challenge for which the authentication item is calculated. In case of the Yubikey this can be a challenge that produces a response. The authentication item is the combination of the challenge and the response.
- **hostname** (*basestring*) – The hostname of the machine

Return dictionary with lists of authentication items

Example response:

```
HTTP/1.1 200 OK
Content-Type: application/json

 {
   "id": 1,
   "jsonrpc": "2.0",
```

```
        "result": {
          "status": true,
          "value": { "ssh": [ { "username": "....",
                                "sshkey": "...."
                              }
                            ],
                     "luks": [ { "slot": ".....",
                                 "challenge": "...",
                                 "response": "...",
                                 "partition": "..."
                               ]
                   }
        },
        "version": "privacyIDEA unknown"
      }
```

This endpoint is used to get the information from the server, which application types are known and which options these applications provide.

Applications are used to attach tokens to machines.

The code of this module is tested in tests/test_api_applications.py

Application endpoints

GET /application/
returns a json list of the available applications

Tokentype endpoints

This API endpoint is a generic endpoint that can be used by any token type.

The tokentype needs to implement a classmethod *api_endpoint* and can then be called by /ttype/<tokentype>. This way, each tokentype can create its own API without the need to change the core API.

The TiQR Token uses this API to implement its special functionalities. See *TiQR Token*.

GET /ttype/(*ttype*)
This is a special token function. Each token type can define an additional API call, that does not need authentication on the REST API level.

Return Token Type dependent

POST /ttype/(*ttype*)
This is a special token function. Each token type can define an additional API call, that does not need authentication on the REST API level.

Return Token Type dependent

SMTP server endpoints

This endpoint is used to create, update, list and delete SMTP server definitions. SMTP server definitions can be used for several purposes like EMail-Token, SMS Token with SMTP gateway, notification like PIN handler and registration.

The code of this module is tested in tests/test_api_smtpserver.py

POST /smtpserver/send_test_email
Test the email configuration :return:

GET /smtpserver/
This call gets the list of SMTP server definitions

POST /smtpserver/ (*identifier*)
This call creates or updates an SMTP server definition.

Parameters

- **identifier** – The unique name of the SMTP server definition
- **server** – The FQDN or IP of the mail server
- **port** – The port of the mail server
- **username** – The mail username for authentication at the SMTP server
- **password** – The password for authentication at the SMTP server
- **tls** – If the server should do TLS
- **description** – A description for the definition

DELETE /smtpserver/ (*identifier*)
This call deletes the specified SMTP server configuration

Parameters

- **identifier** – The unique name of the SMTP server definition

1.13.2 LIB level

At the LIB level all library functions are defined. There is no authentication on this level. Also there is no flask/Web/request code on this level.

Request information and the `logged_in_user` need to be passed to the functions as parameters, if they are needed.

If possible, policies are checked with policy decorators.

library functions

Based on the database models, which are tested in tests/test_db_model.py, there are different modules.

resolver.py contains functions to simply deal with resolver definitions. On this level users and realms are not know, yet.

realm.py contains functions to deal with realm. Realms are a list of several resolvers. So prior to bother the realm.py, the resolver.py should be understood and working. On this level, users are not known, yet.

user.py contains functions to deal with users. A user object is an entity in a realm. And of course the user object itself can be found in a resolver. But you need to have working resolver.py and realm.py to be able to work with user.py

For further details see the following modules:

Users

There are the library functions for user functions. It depends on the lib.resolver and lib.realm.

There are and must be no dependencies to the token functions (lib.token) or to webservices!

This code is tested in tests/test_lib_user.py

privacyidea.lib.user.**User**(**args*, ***kwds*)

The user has the attributes login, realm and resolver.

Usually a user can be found via "login@realm".

A user object with an empty login and realm should not exist, whereas a user object could have an empty resolver.

privacyidea.lib.user.**create_user**(**args*, ***kwds*)

This creates a new user in the given resolver. The resolver must be editable to do so.

The attributes is a dictionary containing the keys "username", "email", "phone", "mobile", "surname", "givenname", "password".

We return the UID and not the user object, since the user could be located in several realms!

Parameters

- **resolvername** (*basestring*) – The name of the resolver, in which the user should be created
- **attributes** (*dict*) – Attributes of the user

Returns The uid of the user object

privacyidea.lib.user.**get_user_from_param**(*param*, *optionalOrRequired=True*)

Find the parameters user, realm and resolver and create a user object from these parameters.

An exception is raised, if a user in a realm is found in more than one resolvers.

Parameters **param** (*dict*) – The dictionary of request parameters

Returns User as found in the parameters

Return type User object

privacyidea.lib.user.**get_user_info**(**args*, ***kwds*)

return the detailed information for a user in a resolver

Parameters

- **userid** (*string*) – The id of the user in a resolver
- **resolvername** – The name of the resolver

Returns a dict with all the userinformation

Return type dict

privacyidea.lib.user.**get_user_list**(**args*, ***kwds*)

privacyidea.lib.user.**get_username**(**args*, ***kwds*)

Determine the username for a given id and a resolvername.

Parameters

- **userid** (*string*) – The id of the user in a resolver
- **resolvername** – The name of the resolver

Returns the username or "" if it does not exist

Return type string

privacyidea.lib.user.**split_user**(**args*, ***kwds*)

Split the username of the form user@realm into the username and the realm splitting myemail@emailprovider.com@realm is also possible and will return (myemail@emailprovider, realm).

If for a user@domain the "domain" does not exist as realm, the name is not split, since it might be the user@domain in the default realm

We can also split realmuser to (user, realm)

Parameters **username** (*string*) – the username to split

Returns username and realm

Return type tuple

Token Class

The following token types are known to privacyIDEA. All are inherited from the base tokenclass describe below.

4 Eyes Token

Certificate Token

class privacyidea.lib.tokens.certificatetoken.**CertificateTokenClass**(*aToken*)

Token to implement an X509 certificate. The certificate can be enrolled by sending a CSR to the server. privacyIDEA is capable of working with different CA connectors.

Valid parameters are *request* or *certificate*, both PEM encoded. If you pass a *request* you also need to pass the *ca* that should be used to sign the request. Passing a *certificate* just uploads the certificate to a new token object.

A certificate token can be created by an administrative task with the token/init api like this:

Example Authentication Request:

```
POST /auth HTTP/1.1
Host: example.com
Accept: application/json

type=certificate
user=cornelius
realm=realm1
request=<PEM encoded request>
ca=<name of the ca connector>
```

Example response:

```
HTTP/1.1 200 OK
Content-Type: application/json

{
   "detail": {
     "certificate": "...PEM..."
   },
   "id": 1,
   "jsonrpc": "2.0",
   "result": {
     "status": true,
     "value": true
```

```
            },
            "version": "privacyIDEA unknown"
        }
```

static get_class_info (**args*, ***kwds*)
returns a subtree of the token definition

Parameters

- **key** (*string*) – subsection identifier
- **ret** (*user defined*) – default return value, if nothing is found

Returns subsection if key exists or user defined

Return type dict or scalar

static get_class_prefix ()

static get_class_type ()

get_init_detail (**args*, ***kwds*)
At the end of the initialization we return the certificate

hKeyRequired = False

update (*param*)
This method is called during the initialization process. :param param: parameters from the token init :type param: dict :return: None

using_pin = False

Daplug Token

class privacyidea.lib.tokens.daplugtoken.**DaplugTokenClass** (**args*, ***kwds*)
daplug token class implementation

check_otp (**args*, ***kwds*)
checkOtp - validate the token otp against a given otpvalue

Parameters

- **anOtpVal** (*string, format: efekeiebekeh*) – the otpvalue to be verified
- **counter** (*int*) – the counter state, that should be verified
- **window** (*int*) – the counter +window, which should be checked
- **options** (*dict*) – the dict, which could contain token specific info

Returns the counter state or -1

Return type int

check_otp_exist (**args*, ***kwds*)
checks if the given OTP value is/are values of this very token. This is used to autoassign and to determine the serial number of a token.

Parameters

- **otp** (*string*) – the to be verified otp value
- **window** (*int*) – the lookahead window for the counter

Returns counter or -1 if otp does not exist

Return type int

static **get_class_info**(**args*, ***kwds*)
returns a subtree of the token definition

Parameters

- **key** (*string*) – subsection identifier
- **ret** (*user defined*) – default return value, if nothing is found

Returns subsection if key exists or user defined

Return type dict or string

static **get_class_prefix**()

static **get_class_type**()

get_multi_otp(**args*, ***kwds*)

get_otp(**args*, ***kwds*)

resync(**args*, ***kwds*)
resync the token based on two otp values - external method to do the resync of the token

Parameters

- **otp1** (*string*) – the first otp value
- **otp2** (*string*) – the second otp value
- **options** (*dict or None*) – optional token specific parameters

Returns counter or -1 if otp does not exist

Return type int

split_pin_pass(*passw*, *user=None*, *options=None*)

Email Token

class privacyidea.lib.tokens.emailtoken.**EmailTokenClass**(*aToken*)
Implementation of the EMail Token Class, that sends OTP values via SMTP. (Similar to SMSTokenClass)

EMAIL_ADDRESS_KEY = 'email'

check_otp(**args*, ***kwds*)
check the otpval of a token against a given counter and the window

Parameters **passw** (*string*) – the to be verified passw/pin

Returns counter if found, -1 if not found

Return type int

create_challenge(**args*, ***kwds*)
create a challenge, which is submitted to the user

Parameters

- **transactionid** – the id of this challenge
- **options** – the request context parameters / data

Returns

tuple of (bool, message and data) bool, if submit was successful message is submitted to the user data is preserved in the challenge attributes - additional attributes, which are displayed in the

output

static get_class_info(*key=None*, *ret='all'*)
returns all or a subtree of the token definition

Parameters

- **key** (*string*) – subsection identifier
- **ret** (*user defined*) – default return value, if nothing is found

Returns subsection if key exists or user defined

:rtype : s.o.

static get_class_prefix()

static get_class_type()
return the generic token class identifier

is_challenge_request(**args*, ***kwds*)
check, if the request would start a challenge

We need to define the function again, to get rid of the is_challenge_request-decorator of the HOTP-Token

Parameters

- **passw** – password, which might be pin or pin+otp
- **options** – dictionary of additional request parameters

Returns returns true or false

classmethod test_config(*params=None*)

update(**args*, ***kwds*)
update - process initialization parameters

Parameters **param** (*dict*) – dict of initialization parameters

Returns nothing

HOTP Token

class privacyidea.lib.tokens.hotptoken.**HotpTokenClass**(**args*, ***kwds*)
hotp token class implementation

check_otp(**args*, ***kwds*)
check if the given OTP value is valid for this token.

Parameters

- **anOtpVal** (*string*) – the to be verified otpvalue
- **counter** (*int*) – the counter state, that should be verified
- **window** (*int*) – the counter +window, which should be checked
- **options** (*dict*) – the dict, which could contain token specific info

Returns the counter state or -1

Return type int

check_otp_exist(**args*, ***kwds*)
checks if the given OTP value is/are values of this very token. This is used to autoassign and to determine the serial number of a token.

Parameters

- **otp** (*string*) – the to be verified otp value
- **window** (*int*) – the lookahead window for the counter

Returns counter or -1 if otp does not exist

Return type int

static get_class_info(**args*, ***kwds*)
returns a subtree of the token definition Is used by lib.token.get_token_info

Parameters

- **key** (*string*) – subsection identifier
- **ret** (*user defined*) – default return value, if nothing is found

Returns subsection if key exists or user defined

Return type dict

static get_class_prefix()
Return the prefix, that is used as a prefix for the serial numbers. :return: oath

static get_class_type()
return the token type shortname

Returns 'hotp'

Return type string

get_init_detail(**args*, ***kwds*)
to complete the token initialization some additional details should be returned, which are displayed at the end of the token initialization. This is the e.g. the enrollment URL for a Google Authenticator.

get_multi_otp(**args*, ***kwds*)
return a dictionary of multiple future OTP values of the HOTP/HMAC token

WARNING: the dict that is returned contains a sequence number as key. This it NOT the otp counter!

Parameters **count** (*int*) – how many otp values should be returned

Epoch_start Not used in HOTP

Epoch_end Not used in HOTP

CurTime Not used in HOTP

Timestamp not used in HOTP

Returns tuple of status: boolean, error: text and the OTP dictionary

get_otp(**args*, ***kwds*)
return the next otp value

Parameters **curTime** – Not Used in HOTP

Returns next otp value and PIN if possible

Return type tuple

static get_sync_timeout()
get the token sync timeout value

Returns timeout value in seconds

Return type int

hashlib

is_challenge_request(**args*, ***kwds*)
check, if the request would start a challenge

•default: if the passw contains only the pin, this request would

trigger a challenge

•in this place as well the policy for a token is checked

Parameters

- **passw** – password, which might be pin or pin+otp
- **options** – dictionary of additional request parameters

Returns returns true or false

is_previous_otp(**args*, ***kwds*)
Check if the OTP values was previously used.

Parameters

- **otp** –
- **window** –

Returns

resync(**args*, ***kwds*)
resync the token based on two otp values

Parameters

- **otp1** (*string*) – the first otp value
- **otp2** (*string*) – the second otp value
- **options** (*dict or None*) – optional token specific parameters

Returns counter or -1 if otp does not exist

Return type int

update(**args*, ***kwds*)
process the initialization parameters

Do we really always need an otpkey? the otpKey is handled in the parent class :param param: dict of initialization parameters :type param: dict

Returns nothing

mOTP Token
class privacyidea.lib.tokens.motptoken.**MotpTokenClass**(**args*, ***kwds*)

check_otp(**args*, ***kwds*)
validate the token otp against a given otpvalue

Parameters

- **anOtpVal** (*string*) – the to be verified otpvalue
- **counter** (*int*) – the counter state, that should be verified
- **window** (*int*) – the counter +window, which should be checked
- **options** (*dict*) – the dict, which could contain token specific info

Returns the counter state or -1

Return type int

static get_class_info(*key=None*, *ret='all'*)
returns a subtree of the token definition Is used by lib.token.get_token_info

Parameters

- **key** (*string*) – subsection identifier
- **ret** (*user defined*) – default return value, if nothing is found

Returns subsection if key exists or user defined

:rtype : dict or string

static get_class_prefix()

static get_class_type()

get_init_detail(**args*, ***kwds*)
to complete the token normalisation, the response of the initialization should be build by the token specific method, the getInitDetails

update(**args*, ***kwds*)
update - process initialization parameters

Parameters **param** (*dict*) – dict of initialization parameters

Returns nothing

Paper Token

class privacyidea.lib.tokens.papertoken.**PaperTokenClass**(**args*, ***kwds*)
The Paper Token allows to print out the next e.g. 100 OTP values. This sheet of paper can be used to authenticate and strike out the used OTP values.

static get_class_info(**args*, ***kwds*)
returns a subtree of the token definition

Parameters

- **key** (*string*) – subsection identifier
- **ret** (*user defined*) – default return value, if nothing is found

Returns subsection if key exists or user defined

Return type dict or scalar

static get_class_prefix()
Return the prefix, that is used as a prefix for the serial numbers. :return: PPR

static get_class_type()
return the token type shortname

Returns 'paper'

Return type string

update(*param*, *reset_failcount=True*)

PasswordToken

class privacyidea.lib.tokens.passwordtoken.**PasswordTokenClass**(*aToken*)

This Token does use a fixed Password as the OTP value. In addition, the OTP PIN can be used with this token. This Token can be used for a scenario like losttoken

class SecretPassword(*secObj*)

check_password(*password*)

get_password()

PasswordTokenClass.**check_otp**(**args*, ***kwds*)

This checks the static password

Parameters **anOtpVal** – This contains the "OTP" value, which is the static

password :return: result of password check, 0 in case of success, -1 if fail :rtype: int

static PasswordTokenClass.**get_class_info**(**args*, ***kwds*)

returns a subtree of the token definition

Parameters

- **key** (*string*) – subsection identifier
- **ret** (*user defined*) – default return value, if nothing is found

Returns subsection if key exists or user defined

Return type dict or scalar

static PasswordTokenClass.**get_class_prefix**()

static PasswordTokenClass.**get_class_type**()

PasswordTokenClass.**set_otplen**(**args*, ***kwds*)

sets the OTP length to the length of the password

Parameters **otplen** (*int*) – This is ignored in this class

Result None

PasswordTokenClass.**update**(*param*)

This method is called during the initialization process. :param param: parameters from the token init :type param: dict :return: None

Questionnaire Token

class privacyidea.lib.tokens.questionnairetoken.**QuestionnaireTokenClass**(**args*, ***kwds*)

This is a Questionnaire Token. The token stores a list of questions and answers in the tokeninfo database table. The answers are encrypted. During authentication a random answer is selected and presented as challenge. The user has to remember and pass the right answer.

check_answer(*given_answer*, *challenge_object*)

Check if the given answer is the answer to the sent question. The question for this challenge response was stored in the challenge_object.

Then we get the answer from the tokeninfo.

Parameters

- **given_answer** – The answer given by the user
- **challenge_object** – The challenge object as stored in the database

Returns in case of success: 1

check_challenge_response(**args*, ***kwds*)

This method verifies if there is a matching question for the given passw and also verifies if the answer is correct.

It then returns the the otp_counter = 1

Parameters

- **user** (*User object*) – the requesting user
- **passw** (*string*) – the password - in fact it is the answer to the question
- **options** (*dict*) – additional arguments from the request, which could be token specific. Usually "transaction_id"

Returns return otp_counter. If -1, challenge does not match

Return type int

create_challenge(*transactionid=None*, *options=None*)

This method creates a challenge, which is submitted to the user. The submitted challenge will be preserved in the challenge database.

The challenge is a randomly selected question of the available questions for this token.

If no transaction id is given, the system will create a transaction id and return it, so that the response can refer to this transaction.

Parameters

- **transactionid** – the id of this challenge
- **options** (*dict*) – the request context parameters / data

Returns tuple of (bool, message, transactionid, attributes)

Return type tuple

The return tuple builds up like this: `bool` if submit was successful; `message` which is displayed in the JSON response; additional `attributes`, which are displayed in the JSON response.

classmethod get_class_info(**args*, ***kwds*)

returns a subtree of the token definition

Parameters

- **key** (*string*) – subsection identifier
- **ret** (*user defined*) – default return value, if nothing is found

Returns subsection if key exists or user defined

Return type dict or scalar

static get_class_prefix()

Return the prefix, that is used as a prefix for the serial numbers. :return: QUST :rtype: basestring

static get_class_type()

Returns the internal token type identifier :return: qust :rtype: basestring

static get_setting_type(*key*)

The setting type of questions is public, so that the user can also read the questions.

Parameters **key** – The key of the setting

Returns "public" string

is_challenge_request(*passw*, *user=None*, *options=None*)
The questionnaire token is always a challenge response token. The challenge is triggered by providing the PIN as the password.

Parameters

- **passw** (*string*) – password, which might be pin or pin+otp
- **user** (*User object*) – The user from the authentication request
- **options** (*dict*) – dictionary of additional request parameters

Returns true or false

Return type bool

update(*param*)
This method is called during the initialization process.

Parameters **param** (*dict*) – parameters from the token init

Returns None

RADIUS Token

class privacyidea.lib.tokens.radiustoken.**RadiusTokenClass**(*db_token*)

check_otp(**args*, ***kwds*)
run the RADIUS request against the RADIUS server

Parameters

- **otpval** – the OTP value
- **counter** (*int*) – The counter for counter based otp values
- **window** – a counter window
- **options** (*dict*) – additional token specific options

Returns counter of the matching OTP value.

Return type int

check_pin_local
lookup if pin should be checked locally or on radius host

Returns bool

static get_class_info(**args*, ***kwds*)
returns a subtree of the token definition

Parameters

- **key** (*string*) – subsection identifier
- **ret** (*user defined*) – default return value, if nothing is found

Returns subsection if key exists or user defined

Return type dict or string

static get_class_prefix()

static get_class_type()

split_pin_pass(**args*, ***kwds*)
Split the PIN and the OTP value. Only if it is locally checked and not remotely.

update(*param*)

Registration Code Token

class privacyidea.lib.tokens.registrationtoken.**RegistrationTokenClass**(*aToken*)
Token to implement a registration code. It can be used to create a registration code or a "TAN" which can be used once by a user to authenticate somewhere. After this registration code is used, the token is automatically deleted.

The idea is to provide a workflow, where the user can get a registration code by e.g. postal mail and then use this code as the initial first factor to authenticate to the UI to enroll real tokens.

A registration code can be created by an administrative task with the token/init api like this:

Example Authentication Request:

```
POST /token/init HTTP/1.1
Host: example.com
Accept: application/json

type=register
user=cornelius
realm=realm1
```

Example response:

```
HTTP/1.1 200 OK
Content-Type: application/json

{
   "detail": {
     "registrationcode": "12345808124095097608"
   },
   "id": 1,
   "jsonrpc": "2.0",
   "result": {
     "status": true,
     "value": true
   },
   "version": "privacyIDEA unknown"
 }
```

static get_class_info(**args*, ***kwds*)
returns a subtree of the token definition

Parameters

- **key** (*string*) – subsection identifier
- **ret** (*user defined*) – default return value, if nothing is found

Returns subsection if key exists or user defined

Return type dict or scalar

static get_class_prefix()

static get_class_type()

get_init_detail(**args*, ***kwds*)
At the end of the initialization we return the registration code.

inc_count_auth_success(**args*, ***kwds*)
Increase the counter, that counts successful authentications In case of successful authentication the token does needs to be deleted.

update(*param*)
This method is called during the initialization process. :param param: parameters from the token init :type param: dict :return: None

Remote Token

class privacyidea.lib.tokens.remotetoken.**RemoteTokenClass**(*db_token*)
The Remote token forwards an authentication request to another privacyIDEA server. The request can be forwarded to a user on the other server or to a serial number on the other server. The PIN can be checked on the local privacyIDEA server or on the remote server.

Using the Remote token you can assign one physical token to many different users.

authenticate(**args*, ***kwds*)
do the authentication on base of password / otp and user and options, the request parameters.

Here we contact the other privacyIDEA server to validate the OtpVal.

Parameters

- **passw** – the password / otp
- **user** – the requesting user
- **options** – the additional request parameters

Returns tuple of (success, otp_count - 0 or -1, reply)

check_otp(**args*, ***kwds*)
run the http request against the remote host

Parameters

- **otpval** – the OTP value
- **counter** (*int*) – The counter for counter based otp values
- **window** – a counter window
- **options** (*dict*) – additional token specific options

Returns counter of the matching OTP value.

Return type int

check_pin_local
lookup if pin should be checked locally or on remote host

Returns bool

static get_class_info(**args*, ***kwds*)

Parameters

- **key** (*string*) – subsection identifier
- **ret** (*user defined*) – default return value, if nothing is found

Returns subsection if key exists or user defined

Return type dict or string

static get_class_prefix()
return the token type prefix

static get_class_type()
return the class type identifier

is_challenge_request(**args*, ***kwds*)
This method checks, if this is a request, that triggers a challenge. It depends on the way, the pin is checked - either locally or remote

Parameters

- **passw** (*string*) – password, which might be pin or pin+otp
- **user** (*User object*) – The user from the authentication request
- **options** (*dict*) – dictionary of additional request parameters

Returns true or false

update(*param*)
second phase of the init process - updates parameters

Parameters **param** – the request parameters

Returns

- nothing -

SMS Token

class privacyidea.lib.tokens.smstoken.**SmsTokenClass**(*db_token*)
The SMS token sends an SMS containing an OTP via some kind of gateway. The gateways can be an SMTP or HTTP gateway or the special sipgate protocol. The Gateways are defined in the SMSProvider Modules.

The SMS token is a challenge response token. I.e. the first request needs to contain the correct OTP PIN. If the OTP PIN is correct, the sending of the SMS is triggered. The second authentication must either contain the OTP PIN and the OTP value or the transaction_id and the OTP value.

Example 1st Authentication Request:

```
POST /validate/check HTTP/1.1
Host: example.com
Accept: application/json

user=cornelius
pass=otppin
```

Example 1st response:

```
HTTP/1.1 200 OK
Content-Type: application/json

{
   "detail": {
     "transaction_id": "xyz"
   },
   "id": 1,
   "jsonrpc": "2.0",
```

```
    "result": {
      "status": true,
      "value": false
    },
    "version": "privacyIDEA unknown"
}
```

After this, the SMS is triggered. When the SMS is received the second part of authentication looks like this:

Example 2nd Authentication Request:

```
POST /validate/check HTTP/1.1
Host: example.com
Accept: application/json

user=cornelius
transaction_id=xyz
pass=otppin
```

Example 1st response:

```
HTTP/1.1 200 OK
Content-Type: application/json

{
    "detail": {
    },
    "id": 1,
    "jsonrpc": "2.0",
    "result": {
      "status": true,
      "value": true
    },
    "version": "privacyIDEA unknown"
}
```

check_otp(**args*, ***kwds*)
check the otpval of a token against a given counter and the window

Parameters **passw** (*string*) – the to be verified passw/pin

Returns counter if found, -1 if not found

Return type int

create_challenge(**args*, ***kwds*)
create a challenge, which is submitted to the user

Parameters

- **transactionid** – the id of this challenge
- **options** – the request context parameters / data

Returns

tuple of (bool, message and data) bool, if submit was successful message is submitted to the user data is preserved in the challenge attributes - additional attributes, which are displayed in the

output

static get_class_info(*key=None*, *ret='all'*)
returns all or a subtree of the token definition

Parameters

- **key** (*string*) – subsection identifier
- **ret** (*user defined*) – default return value, if nothing is found

Returns subsection if key exists or user defined

:rtype : s.o.

static get_class_prefix()

static get_class_type()
return the generic token class identifier

is_challenge_request(**args*, ***kwds*)
check, if the request would start a challenge

We need to define the function again, to get rid of the is_challenge_request-decorator of the HOTP-Token

Parameters

- **passw** – password, which might be pin or pin+otp
- **options** – dictionary of additional request parameters

Returns returns true or false

update(**args*, ***kwds*)
process initialization parameters

Parameters **param** (*dict*) – dict of initialization parameters

Returns nothing

SPass Token

class privacyidea.lib.tokens.spasstoken.**SpassTokenClass**(*db_token*)
This is a simple pass token. It does have no OTP component. The OTP checking will always succeed. Of course, an OTP PIN can be used.

authenticate(**args*, ***kwds*)
in case of a wrong passw, we return a bad matching pin, so the result will be an invalid token

check_otp(**args*, ***kwds*)
As we have no otp value we always return true == 0

static get_class_info(**args*, ***kwds*)
returns a subtree of the token definition Is used by lib.token.get_token_info

Parameters

- **key** (*string*) – subsection identifier
- **ret** (*user defined*) – default return value, if nothing is found

Returns subsection if key exists or user defined

Return type dict

static get_class_prefix()

static get_class_type()

static is_challenge_request(*passw*, *user*, *options=None*)
The spass token does not support challenge response :param passw: :param user: :param options: :return:

static is_challenge_response(*passw*, *user*, *options=None*, *challenges=None*)

update(*param*)

SSHKey Token

class privacyidea.lib.tokens.sshkeytoken.**SSHkeyTokenClass**(*db_token*)
The SSHKeyTokenClass provides a TokenClass that stores the public SSH key and can give the public SSH key via the getotp function. This can be used to manage SSH keys and retrieve the public ssh key to import it to authorized keys files.

static get_class_info(**args*, ***kwds*)
returns a subtree of the token definition

Parameters

- **key** (*string*) – subsection identifier
- **ret** (*user defined*) – default return value, if nothing is found

Returns subsection if key exists or user defined

Return type dictionary

static get_class_prefix()

static get_class_type()

get_sshkey(**args*, ***kwds*)
returns the public SSH key

Returns SSH pub key

Return type string

mode = ['authenticate']

update(*param*)
The key holds the public ssh key and this is required

The key probably is of the form "ssh-rsa BASE64 comment"

using_pin = False

TiQR Token The TiQR token is a special App based token, which allows easy login and which is based on OCRA.

It generates an enrollment QR code, which contains a link with the more detailed enrollment information.

For a description of the TiQR protocol see

- https://www.usenix.org/legacy/events/lisa11/tech/full_papers/Rijswijk.pdf
- https://github.com/SURFnet/tiqr/wiki/Protocol-documentation.
- https://tiqr.org

The TiQR token is based on the OCRA algorithm. It lets you authenticate with your smartphone by scanning a QR code.

The TiQR token is enrolled via /token/init, but it requires no otpkey, since the otpkey is generated on the smartphone and pushed to the privacyIDEA server in a seconds step.

Enrollment

1. Start enrollment with /token/init
2. Scan the QR code in the details of the JSON result. The QR code contains a link to /ttype/tiqr?action=metadata
3. The TiQR Smartphone App will fetch this link and get more information
4. The TiQR Smartphone App will push the otpkey to a link /ttype/tiqr?action=enrollment and the token will be ready for use.

Authentication An application that wants to use the TiQR token with privacyIDEA has to use the token in challenge response.

1. Call `/validate/check?user=<user>&pass=<pin>` with the PIN of the TiQR token
2. The details of the JSON response contain a QR code, that needs to be shown to the user. In addition the application needs to save the `transaction_id` in the response.
3. The user scans the QR code.
4. The TiQR App communicates with privacyIDEA via the API /ttype/tiqr. In this step the response of the App to the challenge is verified. The successful authentication is stored in the Challenge DB table. (No need for the application to take any action)
5. Now, the application needs to poll `/validate/check?user=<user>&transaction_id=*&pass=` to verifiy the successful authentication. The `pass` can be empty. If `value=true` is returned, the user authenticated successfully with the TiQR token.

This code is tested in tests/test_lib_tokens_tiqr.

Implementation

class `privacyidea.lib.tokens.tiqrtoken.`**`TiqrTokenClass`**(**args*, ***kwds*)

The TiQR Token implementation.

static `api_endpoint`(*request*, *g*)

This provides a function to be plugged into the API endpoint /ttype/<tokentype> which is defined in api/ttype.py See *Tokentype endpoints*.

Parameters

- **`request`** – The Flask request
- **`g`** – The Flask global object g

Returns Flask Response or text

`check_challenge_response`(**args*, ***kwds*)

This function checks, if the challenge for the given transaction_id was marked as answered correctly. For this we check the otp_status of the challenge with the transaction_id in the database.

We do not care about the password

Parameters

- **`user`** (*User object*) – the requesting user
- **`passw`** (*string*) – the password (pin+otp)
- **`options`** (*dict*) – additional arguments from the request, which could be token specific. Usually "transaction_id"

Returns return otp_counter. If -1, challenge does not match

Return type int

create_challenge(*transactionid=None*, *options=None*)
This method creates a challenge, which is submitted to the user. The submitted challenge will be preserved in the challenge database.

If no transaction id is given, the system will create a transaction id and return it, so that the response can refer to this transaction.

Parameters

- **transactionid** – the id of this challenge
- **options** (*dict*) – the request context parameters / data

Returns tuple of (bool, message, transactionid, attributes)

Return type tuple

The return tuple builds up like this: `bool` if submit was successful; `message` which is displayed in the JSON response; additional `attributes`, which are displayed in the JSON response.

static **get_class_info**(**args*, ***kwds*)
returns a subtree of the token definition

Parameters

- **key** (*string*) – subsection identifier
- **ret** (*user defined*) – default return value, if nothing is found

Returns subsection if key exists or user defined

Return type dict or scalar

static **get_class_prefix**()
Return the prefix, that is used as a prefix for the serial numbers. :return: TiQR :rtype: basestring

static **get_class_type**()
Returns the internal token type identifier :return: tiqr :rtype: basestring

get_init_detail(**args*, ***kwds*)
At the end of the initialization we return the URL for the TiQR App.

is_challenge_request(**args*, ***kwds*)
check, if the request would start a challenge In fact every Request that is not a response needs to start a challenge request.

At the moment we do not think of other ways to trigger a challenge.

This function is not decorated with @challenge_response_allowed

as the TiQR token is always a challenge response token!

Parameters

- **passw** – The PIN of the token.
- **options** – dictionary of additional request parameters

Returns returns true or false

update(*param*)
This method is called during the initialization process.

Parameters **param** (*dict*) – parameters from the token init

Returns None

verify_response(*passw=None*, *challenge=None*)
This method verifies if the *passw* is the valid OCRA response to the *challenge*. In case of success we return a value > 0

Parameters **passw** (*string*) – the password (pin+otp)

Returns return otp_counter. If -1, challenge does not match

Return type int

TOTP Token

class privacyidea.lib.tokens.totptoken.**TotpTokenClass**(**args*, ***kwds*)

check_otp(**args*, ***kwds*)
validate the token otp against a given otpvalue

Parameters

- **anOtpVal** (*string*) – the to be verified otpvalue
- **counter** – the counter state, that should be verified. For TOTP

this is the unix system time (seconds) divided by 30/60 :type counter: int :param window: the counter +window (sec), which should be checked :type window: int :param options: the dict, which could contain token specific info :type options: dict :return: the counter or -1 :rtype: int

check_otp_exist(**args*, ***kwds*)
checks if the given OTP value is/are values of this very token at all. This is used to autoassign and to determine the serial number of a token. In fact it is a check_otp with an enhanced window.

Parameters

- **otp** (*string*) – the to be verified otp value
- **window** (*int*) – the lookahead window for the counter in seconds!!!

Returns counter or -1 if otp does not exist

Return type int

static get_class_info(**args*, ***kwds*)
returns a subtree of the token definition

Parameters

- **key** (*string*) – subsection identifier
- **ret** (*user defined*) – default return value, if nothing is found

Returns subsection if key exists or user defined

Return type dict or scalar

static get_class_prefix()
Return the prefix, that is used as a prefix for the serial numbers. :return: TOTP

static get_class_type()
return the token type shortname

Returns 'totp'

Return type string

get_multi_otp(**args*, ***kwds*)
return a dictionary of multiple future OTP values of the HOTP/HMAC token

Parameters

- **count** (*int*) – how many otp values should be returned
- **epoch_start** – not implemented
- **epoch_end** – not implemented
- **curTime** (*datetime*) – Simulate the servertime
- **timestamp** (*epoch time*) – Simulate the servertime

Returns tuple of status: boolean, error: text and the OTP dictionary

get_otp(*current_time=None*, *do_truncation=True*, *time_seconds=None*, *challenge=None*)
get the next OTP value

Parameters **current_time** – the current time, for which the OTP value

should be calculated for. :type current_time: datetime object :param time_seconds: the current time, for which the OTP value should be calculated for (date +%s) :type: time_seconds: int, unix system time seconds :return: next otp value, and PIN, if possible :rtype: tuple

static get_setting_type(*key*)

hashlib

resync(**args*, ***kwds*)
resync the token based on two otp values external method to do the resync of the token

Parameters

- **otp1** (*string*) – the first otp value
- **otp2** (*string*) – the second otp value
- **options** (*dict or None*) – optional token specific parameters

Returns counter or -1 if otp does not exist

Return type int

resyncDiffLimit = 1

timeshift

timestep

timewindow

update(**args*, ***kwds*)
This is called during initialzaton of the token to add additional attributes to the token object.

Parameters **param** (*dict*) – dict of initialization parameters

Returns nothing

U2F Token U2F is the "Universal 2nd Factor" specified by the FIDO Alliance. The register and authentication process is described here:

https://fidoalliance.org/specs/fido-u2f-v1.0-nfc-bt-amendment-20150514/fido-u2f-raw-message-formats.html

But you do not need to be aware of this. privacyIDEA wraps all FIDO specific communication, which should make it easier for you, to integrate the U2F tokens managed by privacyIDEA into your application.

U2F Tokens can be either

- registered by administrators for users or

- registered by the users themselves.

Enrollment The enrollment/registering can be completely performed within privacyIDEA.

But if you want to enroll the U2F token via the REST API you need to do it in two steps:

1. Step

```
POST /token/init HTTP/1.1
Host: example.com
Accept: application/json

type=utf
```

This step returns a serial number.

2. Step

```
POST /token/init HTTP/1.1
Host: example.com
Accept: application/json

type=utf
serial=U2F1234578
clientdata=<clientdata>
regdata=<regdata>
```

clientdata and *regdata* are the values returned by the U2F device.

You need to call the javascript function

u2f.register([registerRequest], [], function(u2fData) {});

and the responseHandler needs to send the *clientdata* and *regdata* back to privacyIDEA (2. step).

Authentication The U2F token is a challenge response token. I.e. you need to trigger a challenge e.g. by sending the OTP PIN/Password for this token.

Get the challenge

```
POST /validate/check HTTP/1.1
Host: example.com
Accept: application/json

user=cornelius
pass=tokenpin
```

Response

```
HTTP/1.1 200 OK
Content-Type: application/json

{
   "detail": {
     "attributes": {
                     "hideResponseInput": true,
                     "img": ...imageUrl...
                     "u2fSignRequest": {
```

```
                        "challenge": "...",
                        "appId": "...",
                        "keyHandle": "...",
                        "version": "U2F_V2"
                    }
                },
    "message": "Please confirm with your U2F token (Yubico U2F EE ...)"
    "transaction_id": "02235076952647019161"
  },
  "id": 1,
  "jsonrpc": "2.0",
  "result": {
      "status": true,
      "value": false,
  },
  "version": "privacyIDEA unknown"
}
```

Send the Response The application now needs to call the javascript function *u2f.sign* with the *u2fSignRequest* from the response.

> var signRequests = [error.detail.attributes.u2fSignRequest]; u2f.sign(signRequests, function(u2fResult) {});

The response handler function needs to call the */validate/check* API again with the signatureData and clientData returned by the U2F device in the *u2fResult*:

```
POST /validate/check HTTP/1.1
Host: example.com
Accept: application/json

user=cornelius
pass=
transaction_id=<transaction_id>
signaturedata=signatureData
clientdata=clientData
```

Implementation

class privacyidea.lib.tokens.u2ftoken.**U2fTokenClass**(**args*, ***kwds*)

The U2F Token implementation.

static api_endpoint(*request*, *g*)

This provides a function to be plugged into the API endpoint /ttype/u2f

The u2f token can return the facet list at this URL.

Parameters

- **request** – The Flask request
- **g** – The Flask global object g

Returns Flask Response or text

check_otp(**args*, ***kwds*)

This checks the response of a previous challenge. :param otpval: N/A :param counter: The authentication counter :param window: N/A :param options: contains “clientdata”, “signaturedata” and

“transaction_id”

Returns A value > 0 in case of success

create_challenge(*transactionid=None*, *options=None*)
This method creates a challenge, which is submitted to the user. The submitted challenge will be preserved in the challenge database.

If no transaction id is given, the system will create a transaction id and return it, so that the response can refer to this transaction.

Parameters

- **transactionid** – the id of this challenge
- **options** (*dict*) – the request context parameters / data

Returns tuple of (bool, message, transactionid, attributes)

Return type tuple

The return tuple builds up like this: `bool` if submit was successful; `message` which is displayed in the JSON response; additional `attributes`, which are displayed in the JSON response.

static get_class_info(**args*, ***kwds*)
returns a subtree of the token definition

Parameters

- **key** (*string*) – subsection identifier
- **ret** (*user defined*) – default return value, if nothing is found

Returns subsection if key exists or user defined

Return type dict or scalar

static get_class_prefix()
Return the prefix, that is used as a prefix for the serial numbers. :return: U2F :rtype: basestring

static get_class_type()
Returns the internal token type identifier :return: u2f :rtype: basestring

get_init_detail(**args*, ***kwds*)
At the end of the initialization we ask the user to press the button

is_challenge_request(**args*, ***kwds*)
check, if the request would start a challenge In fact every Request that is not a response needs to start a challenge request.

At the moment we do not think of other ways to trigger a challenge.

This function is not decorated with @challenge_response_allowed

as the U2F token is always a challenge response token!

Parameters

- **passw** – The PIN of the token.
- **options** – dictionary of additional request parameters

Returns returns true or false

update(*param*, *reset_failcount=True*)
This method is called during the initialization process.

Parameters **param** (*dict*) – parameters from the token init

Returns None

Yubico Token

class privacyidea.lib.tokens.yubicotoken.**YubicoTokenClass**(*db_token*)

check_otp(**args*, ***kwds*)
Here we contact the Yubico Cloud server to validate the OtpVal.

static get_class_info(**args*, ***kwds*)

Parameters

- **key** (*string*) – subsection identifier
- **ret** (*user defined*) – default return value, if nothing is found

Returns subsection if key exists or user defined

Return type dict or string

static get_class_prefix()

static get_class_type()

update(*param*)

Yubikey Token

class privacyidea.lib.tokens.yubikeytoken.**YubikeyTokenClass**(*db_token*)
The Yubikey Token in the Yubico AES mode

classmethod api_endpoint(*request*, *g*)
This provides a function to be plugged into the API endpoint /ttype/yubikey which is defined in api/ttype.py

The endpoint /ttype/yubikey is used for the Yubico validate request according to https://developers.yubico.com/yubikey-val/Validation_Protocol_V2.0.html

Parameters

- **request** – The Flask request
- **g** – The Flask global object g

Returns Flask Response or text

Required query parameters

Query id The id of the client to identify the correct shared secret

Query otp The OTP from the yubikey in the yubikey mode

Query nonce 16-40 bytes of random data

Optional parameters h, timestamp, sl, timeout are not supported at the moment.

check_otp(**args*, ***kwds*)
validate the token otp against a given otpvalue

Parameters

- **anOtpVal** (*string*) – the to be verified otpvalue
- **counter** (*int*) – the counter state. It is not used by the Yubikey because the current counter value is sent encrypted inside the OTP value

- **window** (*int*) – the counter +window, which is not used in the Yubikey because the current counter value is sent encrypted inside the OTP, allowing a simple comparison between the encrypted counter value and the stored counter value
- **options** (*dict*) – the dict, which could contain token specific info

Returns the counter state or an error code (< 0):

-1 if the OTP is old (counter < stored counter) -2 if the private_uid sent in the OTP is wrong (different from the one stored with the token) -3 if the CRC verification fails :rtype: int

check_otp_exist(**args*, ***kwds*)
checks if the given OTP value is/are values of this very token. This is used to autoassign and to determine the serial number of a token.

static check_yubikey_pass(*passw*)
if the Token has set a PIN the user must also enter the PIN for authentication!

This checks the output of a yubikey in AES mode without providing the serial number. The first 12 (of 44) or 16 of 48) characters are the tokenid, which is stored in the tokeninfo yubikey.tokenid or the prefix yubikey.prefix.

Parameters **passw** (*string*) – The password that consist of the static yubikey prefix and the otp

Returns True/False and the User-Object of the token owner

Return type dict

static get_class_info(**args*, ***kwds*)
returns a subtree of the token definition

Parameters

- **key** (*string*) – subsection identifier
- **ret** (*user defined*) – default return value, if nothing is found

Returns subsection if key exists or user defined

Return type s.o.

static get_class_prefix()

static get_class_type()

is_challenge_request(**args*, ***kwds*)
This method checks, if this is a request, that triggers a challenge.

Parameters

- **passw** (*string*) – password, which might be pin or pin+otp
- **user** (*User object*) – The user from the authentication request
- **options** (*dict*) – dictionary of additional request parameters

Returns true or false

class privacyidea.lib.tokenclass.**TokenClass**(**args*, ***kwds*)

add_init_details(**args*, ***kwds*)
(was addInfo) Adds information to a volatile internal dict

add_tokeninfo(**args*, ***kwds*)
Add a key and a value to the DB tokeninfo :param key: :param value: :return:

classmethod **api_endpoint**(*request*, *g*)
This provides a function to be plugged into the API endpoint /ttype/<tokentype> which is defined in api/ttype.py

Parameters

- **request** – The Flask request
- **g** – The Flask global object g

Returns Flask Response or text

authenticate(**args*, ***kwds*)
High level interface which covers the check_pin and check_otp This is the method that verifies single shot authentication like they are done with push button tokens.

It is a high level interface to support other tokens as well, which do not have a pin and otp separation - they could overwrite this method

If the authentication succeeds an OTP counter needs to be increased, i.e. the OTP value that was used for this authentication is invalidated!

Parameters

- **passw** (*string*) – the password which could be pin+otp value
- **user** (*User object*) – The authenticating user
- **options** (*dict*) – dictionary of additional request parameters

Returns

returns tuple of 1. true or false for the pin match, 2. the otpcounter (int) and the 3. reply (dict) that will be added as

additional information in the JSON response of `/validate/check`.

Return type tuple

static **challenge_janitor**()
Just clean up all challenges, for which the expiration has expired.

Returns None

check_all(*message_list*)
Perform all checks on the token. Returns False if the token is either: * auth counter exceeded * not active * fail counter exceeded * validity period exceeded

This is used in the function token.check_token_list

Parameters **message_list** – A list of messages

Returns False, if any of the checks fail

check_auth_counter()
This function checks the count_auth and the count_auth_success. If the count_auth is less than count_auth_max and count_auth_success is less than count_auth_success_max it returns True. Otherwise False.

Returns success if the counter is less than max

Return type bool

check_challenge_response(**args*, ***kwds*)
This method verifies if there is a matching challenge for the given passw and also verifies if the response is correct.

It then returns the new otp_counter of the token.

In case of success the otp_counter will be >= 0.

Parameters

- **user** (*User object*) – the requesting user
- **passw** (*string*) – the password (pin+otp)
- **options** (*dict*) – additional arguments from the request, which could be token specific. Usually "transactionid"

Returns return otp_counter. If -1, challenge does not match

Return type int

check_failcount()

Checks if the failcounter is exceeded. It returns True, if the failcounter is less than maxfail :return: True or False

check_otp(**args*, ***kwds*)

This checks the OTP value, AFTER the upper level did the checkPIN

In the base class we do not know, how to calculate the OTP value. So we return -1. In case of success, we should return >=0, the counter

Parameters

- **otpval** – the OTP value
- **counter** (*int*) – The counter for counter based otp values
- **window** – a counter window
- **options** (*dict*) – additional token specific options

Returns counter of the matching OTP value.

Return type int

check_otp_exist(*otp*, *window=None*)

checks if the given OTP value is/are values of this very token. This is used to autoassign and to determine the serial number of a token.

Parameters

- **otp** – the OTP value
- **window** (*int*) – The look ahead window

Returns True or a value > 0 in case of success

check_pin(**args*, ***kwds*)

Check the PIN of the given Password. Usually this is only dependent on the token itself, but the user object can cause certain policies.

Each token could implement its own PIN checking behaviour.

Parameters

- **pin** (*string*) – the PIN (static password component), that is to be checked.
- **user** (*User object*) – for certain PIN policies (e.g. checking against the user store) this is the user, whose password would be checked. But at the moment we are checking against the userstore in the decorator "auth_otppin".
- **options** – the optional request parameters

Returns If the PIN is correct, return True

Return type bool

check_validity_period()
This checks if the datetime.datetime.now() is within the validity period of the token.

Returns success

Return type bool

create_challenge(*transactionid=None*, *options=None*)
This method creates a challenge, which is submitted to the user. The submitted challenge will be preserved in the challenge database.

If no transaction id is given, the system will create a transaction id and return it, so that the response can refer to this transaction.

Parameters

- **transactionid** – the id of this challenge
- **options** (*dict*) – the request context parameters / data

Returns tuple of (bool, message, transactionid, attributes)

Return type tuple

The return tuple builds up like this: `bool` if submit was successful; `message` which is displayed in the JSON response; additional `attributes`, which are displayed in the JSON response.

del_tokeninfo(*key=None*)

delete_token()
delete the database token

enable(**args*, ***kwds*)

get_QRimage_data(*response_detail*)
FIXME: Do we really use this?

get_as_dict()
This returns the token data as a dictionary. It is used to display the token list at /token/list.

Returns The token data as dict

Return type dict

static get_class_info(*key=None*, *ret='all'*)

static get_class_prefix()

static get_class_type()

get_count_auth()
Return the number of all authentication tries

get_count_auth_max()
Return the number of maximum allowed authentications

get_count_auth_success()
Return the number of successful authentications

get_count_auth_success_max()
Return the maximum allowed successful authentications

get_count_window()

get_failcount()

static get_hashlib(*hLibStr*)
Returns a hashlib function for a given string :param hLibStr: the hashlib :type hLibStr: string :return: the hashlib :rtype: function

get_init_detail(*params=None*, *user=None*)
to complete the token initialization, the response of the initialisation should be build by this token specific method. This method is called from api/token after the token is enrolled

get_init_detail returns additional information after an admin/init like the QR code of an HOTP/TOTP token. Can be anything else.

Parameters

- **params** (*dict*) – The request params during token creation token/init
- **user** (*User object*) – the user, token owner

Returns additional descriptions

Return type dict

get_init_details(**args*, ***kwds*)
return the status of the token rollout

Returns return the status dict.

Return type dict

get_max_failcount()

get_multi_otp(*count=0*, *epoch_start=0*, *epoch_end=0*, *curTime=None*, *timestamp=None*)
This returns a dictionary of multiple future OTP values of a token.

Parameters

- **count** – how many otp values should be returned
- **epoch_start** – time based tokens: start when
- **epoch_end** – time based tokens: stop when
- **curTime** (*datetime object*) – current time for TOTP token (for selftest)
- **timestamp** (*int*) – unix time, current time for TOTP token (for selftest)

Returns True/False, error text, OTP dictionary

Return type Tuple

get_otp(*current_time=''*)
The default token does not support getting the otp value will return a tuple of four values a negative value is a failure.

Returns something like: (1, pin, otpval, combined)

get_otp_count()

get_otp_count_window()

get_otplen(**args*, ***kwds*)

get_pin_hash_seed()

get_realms()
Return a list of realms the token is assigned to :return: realms :rtype:l list

get_serial()

static get_setting_type(*key*)
This function returns the type of the token specific config/setting. This way a tokenclass can define settings, that can be "public" or a "password". If this setting is written to the database, the type of the setting is set automatically in set_privacyidea_config

The key name needs to start with the token type.

Parameters **key** – The token specific setting key

Returns A string like "public"

get_sync_window()

get_tokeninfo(*key=None*, *default=None*)
return the complete token info or a single key of the tokeninfo. When returning the complete token info dictionary encrypted entries are not decrypted. If you want to receive a decrypted value, you need to call it directly with the key.

Parameters

- **key** (*string*) – the key to return
- **default** (*string*) – the default value, if the key does not exist

Returns the value for the key

Return type int or string

get_tokentype()

get_type()

get_user_displayname()
Returns a tuple of a user identifier like user@realm and the displayname of "givenname surname".

Returns tuple

get_user_id()

get_validity_period_end()
returns the end of validity period (if set) if not set, "" is returned. :return: the end of the validity period :rtype: string

get_validity_period_start()
returns the start of validity period (if set) if not set, "" is returned. :return: the start of the validity period :rtype: string

hKeyRequired = False

inc_count_auth(**args*, ***kwds*)
Increase the counter, that counts authentications - successful and unsuccessful

inc_count_auth_success(**args*, ***kwds*)
Increase the counter, that counts successful authentications

inc_failcount(**args*, ***kwds*)

inc_otp_counter(**args*, ***kwds*)
Increase the otp counter and store the token in the database :param counter: the new counter value. If counter is given, than

the counter is increased by (counter+1) If the counter is not given, the counter is increased by +1

Parameters **reset** (*bool*) – reset the failcounter if set to True

Returns the new counter value

is_active()

is_challenge_request(**args*, ***kwds*)

This method checks, if this is a request, that triggers a challenge.

The default behaviour to trigger a challenge is, if the `passw` parameter only contains the correct token pin *and* the request contains a `data` or a `challenge` key i.e. if the `options` parameter contains a key `data` or `challenge`.

Each token type can decide on its own under which condition a challenge is triggered by overwriting this method.

please note: in case of pin policy == 2 (no pin is required) the `check_pin` would always return true! Thus each request containing a `data` or `challenge` would trigger a challenge!

The Challenge workflow is like this.

When an authentication request is issued, first it is checked if this is a request which will create a new challenge (is_challenge_request) or if this is a response to an existing challenge (is_challenge_response). In these two cases during request processing the following functions are called.

is_challenge_request or is_challenge_response

|

V V

create_challenge check_challenge

|

V V

challenge_janitor challenge_janitor

Parameters

- **passw** (*string*) – password, which might be pin or pin+otp
- **user** (*User object*) – The user from the authentication request
- **options** (*dict*) – dictionary of additional request parameters

Returns true or false

Return type bool

is_challenge_response(*passw*, *user=None*, *options=None*)

This method checks, if this is a request, that is the response to a previously sent challenge.

The default behaviour to check if this is the response to a previous challenge is simply by checking if the request contains a parameter `state` or `transactionid` i.e. checking if the `options` parameter contains a key `state` or `transactionid`.

This method does not try to verify the response itself! It only determines, if this is a response for a challenge or not. The response is verified in check_challenge_response.

Parameters

- **passw** (*string*) – password, which might be pin or pin+otp
- **user** (*User object*) – the requesting user
- **options** (*dict*) – dictionary of additional request parameters

Returns true or false

Return type bool

is_locked()
Check if the token is in a locked state A locked token can not be modified

Returns True, if the token is locked.

is_previous_otp(*otp*, *window=10*)
checks if a given OTP value is a previous OTP value, that lies in the past or has a lower counter.

This is used in case of a failed authentication to return the information, that this OTP values was used previously and is invalid.

Parameters

- **otp** (*basestring*) – The OTP value.
- **window** (*int*) – A counter window, how far we should look into the past.

Returns bool

is_revoked()
Check if the token is in the revoked state

Returns True, if the token is revoked

mode = ['authenticate', 'challenge']

reset(**args*, ***kwds*)
Reset the failcounter

resync(*otp1*, *otp2*, *options=None*)

revoke()
This revokes the token. By default it 1. sets the revoked-field 2. set the locked field 3. disables the token.

Some token types may revoke a token without locking it.

save()
Save the database token

set_count_auth(**args*, ***kwds*)
Sets the counter for the occurred login attepms as key "count_auth" in token info :param count: a number :type count: int

set_count_auth_max(**args*, ***kwds*)
Sets the counter for the maximum allowed login attempts as key "count_auth_max" in token info :param count: a number :type count: int

set_count_auth_success(**args*, ***kwds*)
Sets the counter for the occurred successful logins as key "count_auth_success" in token info :param count: a number :type count: int

set_count_auth_success_max(**args*, ***kwds*)
Sets the counter for the maximum allowed successful logins as key "count_auth_success_max" in token info :param count: a number :type count: int

set_count_window(**args*, ***kwds*)

set_defaults()
Set the default values on the database level

set_description(**args*, ***kwds*)
Set the description on the database level

Parameters **description** (*string*) – description of the token

set_failcount(*failcount*)
Set the failcounter in the database

set_hashlib(**args*, ***kwds*)

set_init_details(**args*, ***kwds*)

set_maxfail(**args*, ***kwds*)

set_otp_count(**args*, ***kwds*)

set_otpkey(**args*, ***kwds*)

set_otplen(**args*, ***kwds*)

set_pin(**args*, ***kwds*)
set the PIN of a token. Usually the pin is stored in a hashed way. :param pin: the pin to be set for the token :type pin: basestring :param encrypt: If set to True, the pin is stored encrypted and

can be retrieved from the database again

set_pin_hash_seed(**args*, ***kwds*)

set_realms(*realms*)
Set the list of the realms of a token. :param realms: realms the token should be assigned to :type realms: list

set_so_pin(**args*, ***kwds*)

set_sync_window(**args*, ***kwds*)

set_tokeninfo(**args*, ***kwds*)
Set the tokeninfo field in the DB. Old values will be deleted. :param info: dictionary with key and value :type info: dict :return:

set_type(*tokentype*)
Set the tokentype in this object and also in the underlying database-Token-object.

Parameters **tokentype** (*string*) – The type of the token like HOTP or TOTP

set_user(**args*, ***kwds*)
Set the user attributes (uid, resolvername, resolvertype) of a token.

Parameters

- **user** – a User() object, consisting of loginname and realm
- **report** – tbdf.

Returns None

set_user_identifiers(**args*, ***kwds*)
(was setUid) Set the user attributes of a token :param uid: The user id in the user source :param resolvername: The name of the resolver :param resolvertype: The type of the resolver :return: None

set_user_pin(**args*, ***kwds*)

set_validity_period_end(**args*, ***kwds*)
sets the end date of the validity period for a token :param end_date: the end date in the format "%d/%m/%y %H:%M"

if the format is wrong, the method will throw an exception

set_validity_period_start(**args*, ***kwds*)
sets the start date of the validity period for a token :param start_date: the start date in the format "%d/%m/%y %H:%M"

if the format is wrong, the method will throw an exception

split_pin_pass(*passw*, *user=None*, *options=None*)
Split the password into the token PIN and the OTP value

take the given password and split it into the PIN and the OTP value. The splitting can be dependent of certain policies. The policies may depend on the user.

Each token type may define its own way to slit the PIN and the OTP value.

Parameters

- **passw** – the password to split
- **user** (*User object*) – The user/owner of the token
- **options** (*dict*) – can be used be the token types.

Returns tuple of pin and otp value

Returns tuple of (split status, pin, otp value)

Return type tuple

status_validation_fail()
callback to enable a status change, if auth failed

status_validation_success()
callback to enable a status change, if auth succeeds

static test_config(*params=None*)
This method is used to test the token config. Some tokens require some special token configuration like the SMS-Token or the Email-Token. To test this configuration, this classmethod is used.

It takes token specific parameters and returns a tuple of a boolean and a result description.

Parameters **params** (*dict*) – token specific parameters

Returns success, description

Return type tuple

update(*param*, *reset_failcount=True*)
Update the token object

Parameters **param** – a dictionary with different params like keysize, description, genkey, otpkey, pin

Type param: dict

user
return the user (owner) of a token If the token has no owner assigned, we return None

Returns The owner of the token

Return type User object

using_pin = True

Token Functions

This module contains all top level token functions. It depends on the models, lib.user and lib.tokenclass (which depends on the tokenclass implementations like lib.tokens.hotptoken)

This is the middleware/glue between the HTTP API and the database

privacyidea.lib.token.**add_tokeninfo**(**args*, ***kwds*)

Sets a token info field in the database. The info is a dict for each token of key/value pairs.

Parameters

- **serial** (*basestring*) – The serial number of the token
- **info** – The key of the info in the dict
- **value** – The value of the info
- **value_type** – The type of the value. If set to "password" the value

is stored encrypted :type value_type: basestring :param user: The owner of the tokens, that should be modified :type user: User object :return: the number of modified tokens :rtype: int

privacyidea.lib.token.**assign_token**(**args*, ***kwds*)

Assign token to a user. If the PIN is given, the PIN is reset.

Parameters

- **serial** (*basestring*) – The serial number of the token
- **user** (*User object*) – The user, to whom the token should be assigned.
- **pin** (*basestring*) – The PIN for the newly assigned token.
- **encrypt_pin** (*bool*) – Whether the PIN should be stored in an encrypted way

Returns True if the token was assigned, in case of an error an exception

is thrown :rtype: bool

privacyidea.lib.token.**check_realm_pass**(**args*, ***kwds*)

This function checks, if the given passw matches any token in the given realm. This can be used for the 4-eyes token. Only tokens that are assigned are tested.

It returns the res True/False and a reply_dict, which contains the serial number of the matching token.

Parameters

- **realm** – The realm of the user
- **passw** – The password containing PIN+OTP
- **options** (*dict*) – Additional options that are passed to the tokens

Returns tuple of bool and dict

privacyidea.lib.token.**check_serial**(**args*, ***kwds*)

This checks, if the given serial number can be used for a new token. it returns a tuple (result, new_serial) result being True if the serial does not exist, yet. new_serial is a suggestion for a new serial number, that does not exist, yet.

Parameters **serial** – Seral number that is to be checked, if it can be used for

a new token. :type serial: string :result: bool and serial number :rtype: tuple

privacyidea.lib.token.**check_serial_pass**(**args*, ***kwds*)

This function checks the otp for a given serial

If the OTP matches, True is returned and the otp counter is increased.

The function tries to determine the user (token owner), to derive possible additional policies from the user.

Parameters

- **serial** (*basestring*) – The serial number of the token
- **passw** (*basestring*) – The password usually consisting of pin + otp
- **options** (*dict*) – Additional options. Token specific.

Returns tuple of result (True, False) and additional dict

Return type tuple

privacyidea.lib.token.**check_token_list**(**args*, ***kwds*)

this takes a list of token objects and tries to find the matching token for the given passw. It also tests, * if the token is active or * the max fail count is reached, * if the validity period is ok...

This function is called by check_serial_pass, check_user_pass and check_yubikey_pass.

Parameters

- **tokenobject_list** – list of identified tokens
- **passw** – the provided passw (mostly pin+otp)
- **user** – the identified use - as class object
- **options** – additional parameters, which are passed to the token

Returns tuple of success and optional response

Return type (bool, dict)

privacyidea.lib.token.**check_user_pass**(**args*, ***kwds*)

This function checks the otp for a given user. It is called by the API /validate/check

If the OTP matches, True is returned and the otp counter is increased.

Parameters

- **user** (*User object*) – The user who is trying to authenticate
- **passw** (*basestring*) – The password usually consisting of pin + otp
- **options** (*dict*) – Additional options. Token specific.

Returns tuple of result (True, False) and additional dict

Return type tuple

privacyidea.lib.token.**copy_token_pin**(**args*, ***kwds*)

This function copies the token PIN from one token to the other token. This can be used for workflows like lost token.

In fact the PinHash and the PinSeed are transferred

Parameters

- **serial_from** (*basestring*) – The token to copy from
- **serial_to** (*basestring*) – The token to copy to

Returns True. In case of an error raise an exception

Return type bool

privacyidea.lib.token.**copy_token_realms**(**args*, ***kwds*)
Copy the realms of one token to the other token

Parameters

- **serial_from** – The token to copy from
- **serial_to** – The token to copy to

Returns None

privacyidea.lib.token.**copy_token_user**(**args*, ***kwds*)
This function copies the user from one token to the other token. In fact the user_id, resolver and resolver type are transferred.

Parameters

- **serial_from** (*basestring*) – The token to copy from
- **serial_to** (*basestring*) – The token to copy to

Returns True. In case of an error raise an exception

Return type bool

privacyidea.lib.token.**create_tokenclass_object**(**args*, ***kwds*)
(was createTokenClassObject) create a token class object from a given type If a tokenclass for this type does not exist, the function returns None.

Parameters **db_token** (*database token object*) – the database referenced token

Returns instance of the token class object

Return type tokenclass object

privacyidea.lib.token.**enable_token**(**args*, ***kwds*)
Enable or disable a token. This can be checked with is_token_active

Enabling an already active token will return 0.

Parameters

- **serial** (*basestring*) – The serial number of the token
- **enable** (*bool*) – False is the token should be disabled
- **user** (*User object*) – all tokens of the user will be enabled or disabled

Returns Number of tokens that were enabled/disabled

Return type

privacyidea.lib.token.**gen_serial**(**args*, ***kwds*)
generate a serial for a given tokentype

Parameters

- **tokentype** – the token type prefix is done by a lookup on the tokens
- **prefix** – A prefix to the serial number

Returns serial number

Return type string

privacyidea.lib.token.**get_all_token_users**(**args*, ***kwds*)
return a dictionary with all tokens, that are assigned to users. This returns a dictionary with the key being the serial number of the token and the user information as dict.

Returns dictionary of serial numbers

Return type dict

privacyidea.lib.token.**get_dynamic_policy_definitions**(*scope=None*)
This returns the dynamic policy definitions that come with the new loaded token classes.

Parameters **scope** – an optional scope parameter. Only return the policies of

this scope. :return: The policy definition for the token or only for the scope.

privacyidea.lib.token.**get_multi_otp**(**args*, ***kwds*)
This function returns a list of OTP values for the given Token. Please note, that the tokentype needs to support this function.

Parameters

- **serial** (*basestring*) – the serial number of the token
- **count** – number of the next otp values (to be used with event or time based tokens)
- **epoch_start** – unix time start date (used with time based tokens)
- **epoch_end** – unix time end date (used with time based tokens)
- **curTime** (*datetime*) – Simulate the servertime
- **timestamp** (*int*) – Simulate the servertime (unix time in seconds)

Returns dictionary of otp values

Return type dictionary

privacyidea.lib.token.**get_num_tokens_in_realm**(**args*, ***kwds*)
This returns the number of tokens in one realm. :param realm: The name of the realm :type realm: basestring :param active: If only active tokens should be taken into account :type active: bool :return: The number of tokens in the realm :rtype: int

privacyidea.lib.token.**get_otp**(**args*, ***kwds*)
This function returns the current OTP value for a given Token. The tokentype needs to support this function. if the token does not support getting the OTP value, a -2 is returned.

Parameters

- **serial** – serial number of the token
- **current_time** (*datetime*) – a fake servertime for testing of TOTP token

Returns tuple with (result, pin, otpval, passw)

Return type tuple

privacyidea.lib.token.**get_realms_of_token**(**args*, ***kwds*)
This function returns a list of the realms of a token

Parameters **serial** (*basestring*) – the serial number of the token

Returns list of the realm names

Return type list

privacyidea.lib.token.**get_serial_by_otp**(**args*, ***kwds*)
Returns the serial for a given OTP value The tokenobject_list would be created by get_tokens()

Parameters

- **token_list** (*list of token objects*) – the list of token objects to be investigated
- **otp** – the otp value, that needs to be found
- **window** (*int*) – the window of search

Returns the serial for a given OTP value and the user

Return type basestring

privacyidea.lib.token.**get_token_by_otp**(**args*, ***kwds*)

search the token in the token_list, that creates the given OTP value. The tokenobject_list would be created by get_tokens()

Parameters

- **token_list** (*list of token objects*) – the list of token objects to be investigated
- **otp** (*basestring*) – the otp value, that needs to be found
- **window** (*int*) – the window of search

Returns The token, that creates this OTP value

Return type Tokenobject

privacyidea.lib.token.**get_token_owner**(**args*, ***kwds*)

returns the user object, to which the token is assigned. the token is identified and retrieved by it's serial number

If the token has no owner, None is returned

Parameters **serial** (*basestring*) – serial number of the token

Returns The owner of the token

Return type User object or None

privacyidea.lib.token.**get_token_type**(**args*, ***kwds*)

Returns the tokentype of a given serial number

Parameters **serial** (*string*) – the serial number of the to be searched token

Returns tokentype

Return type string

privacyidea.lib.token.**get_tokenclass_info**(**args*, ***kwds*)

return the config definition of a dynamic token

Parameters

- **tokentype** (*basestring*) – the tokentype of the token like "totp" or "hotp"
- **section** (*basestring*) – subsection of the token definition - optional

Returns dict - if nothing found an empty dict

Return type dict

privacyidea.lib.token.**get_tokens**(**args*, ***kwds*)

(was getTokensOfType) This function returns a list of token objects of a * given type, * of a realm * or tokens with assignment or not * for a certain serial number or * for a User

E.g. thus you can get all assigned tokens of type totp.

Parameters

- **tokentype** (*basestring*) – The type of the token. If None, all tokens are returned.
- **realm** (*basestring*) – get tokens of a realm. If None, all tokens are returned.
- **assigned** (*bool*) – Get either assigned (True) or unassigned (False) tokens. If None get all tokens.
- **user** (*User Object*) – Filter for the Owner of the token
- **serial** (*basestring*) – The serial number of the token
- **active** (*bool*) – Whether only active (True) or inactive (False) tokens should be returned
- **resolver** (*basestring*) – filter for the given resolver name
- **rollout_state** – returns a list of the tokens in the certain rollout state. Some tokens are not enrolled in a single step but in multiple steps. These tokens are then identified by the DB-column rollout_state.
- **count** (*bool*) – If set to True, only the number of the result and not the list is returned.
- **revoked** (*bool*) – Only search for revoked tokens or only for not revoked tokens
- **locked** (*bool*) – Only search for locked tokens or only for not locked tokens
- **tokeninfo** (*dict*) – Return tokens with the given tokeninfo. The tokeninfo is a key/value dictionary

Returns A list of tokenclasses (lib.tokenclass)

Return type list

privacyidea.lib.token.**get_tokens_in_resolver**(**args*, ***kwds*)

Return a list of the token ojects, that contain this very resolver

Parameters **resolver** (*basestring*) – The resolver, the tokens should be in

Returns list of tokens with this resolver

Return type list of token objects

privacyidea.lib.token.**get_tokens_paginate**(**args*, ***kwds*)

This function is used to retrieve a token list, that can be displayed in the Web UI. It supports pagination. Each retrieved page will also contain a "next" and a "prev", indicating the next or previous page. If either does not exist, it is None.

Parameters

- **tokentype** –
- **realm** –
- **assigned** (*bool*) – Returns assigned (True) or not assigned (False) tokens
- **user** (*User object*) – The user, whose token should be displayed
- **serial** –
- **active** –
- **resolver** (*basestring*) – A resolver name, which may contain "*" for filtering.
- **userid** (*basestring*) – A userid, which may contain "*" for filtering.
- **rollout_state** –
- **sortby** (*A Token column or a string.*) – Sort by a certain Token DB field. The default is Token.serial. If a string like "serial" is provided, we try to convert it to the DB column.

- **sortdir** (*basestring*) – Can be "asc" (default) or "desc"
- **psize** (*int*) – The size of the page
- **page** (*int*) – The number of the page to view. Starts with 1 ;-)

Returns dict with tokens, prev, next and count

Return type dict

privacyidea.lib.token.**get_tokenserial_of_transaction**(**args*, ***kwds*)
get the serial number of a token from a challenge state / transaction

Parameters **transaction_id** (*basestring*) – the state / transaction id

Returns the serial number or None

Return type basestring

privacyidea.lib.token.**init_token**(**args*, ***kwds*)
create a new token or update an existing token

Parameters

- **param** (*dict*) – initialization parameters like: serial (optional) type (optionl, default=hotp) otpkey
- **user** (*User Object*) – the token owner
- **tokenrealms** (*list*) – the realms, to which the token should belong

Returns token object or None

Return type TokenClass object

privacyidea.lib.token.**is_token_active**(*serial*)
Return True if the token is active, otherwise false Returns None, if the token does not exist.

Parameters **serial** (*basestring*) – The serial number of the token

Returns True or False

Return type bool

privacyidea.lib.token.**is_token_owner**(**args*, ***kwds*)
Check if the given user is the owner of the token with the given serial number :param serial: The serial number of the token :type serial: str :param user: The user that needs to be checked :type user: User object :return: Return True or False :rtype: bool

privacyidea.lib.token.**lost_token**(**args*, ***kwds*)
This is the workflow to handle a lost token. The token <serial> is lost and will be disabled. A new token of type password token will be created and assigned to the user. The PIN of the lost token will be copied to the new token. The new token will have a certain validity period.

Parameters

- **serial** – Token serial number
- **new_serial** – new serial number
- **password** – new password
- **validity** (*int*) – Number of days, the new token should be valid
- **contents** – The contents of the generated password. "C": upper case

characters, “c”: lower case characters, “n”: digits and “s”: special characters :type contents: A string like “Ccn” :param pw_len: The length of the generated password :type pw_len: int :param options: optional values for the decorator passed from the upper API level :type options: dict

Returns result dictionary

privacyidea.lib.token.**remove_token**(**args*, ***kwds*)

remove the token that matches the serial number or all tokens of the given user and also remove the realm associations and all its challenges

Parameters

- **user** (*User object*) – The user, who’s tokens should be deleted.
- **serial** (*basestring*) – The serial number of the token to delete

Returns The number of deleted token

Return type int

privacyidea.lib.token.**reset_token**(**args*, ***kwds*)

Reset the failcounter :param serial: :param user: :return: The number of tokens, that were resetted :rtype: int

privacyidea.lib.token.**resync_token**(**args*, ***kwds*)

Resyncronize the token of the given serial number by searching the otp1 and otp2 in the future otp values.

Parameters

- **serial** (*basestring*) – token serial number
- **otp1** (*basestring*) – first OTP value
- **otp2** (*basestring*) – second OTP value, directly after the first
- **options** (*dict*) – additional options like the servertime for TOTP token

Returns

privacyidea.lib.token.**revoke_token**(**args*, ***kwds*)

Revoke a token.

Parameters

- **serial** (*basestring*) – The serial number of the token
- **enable** (*bool*) – False is the token should be disabled
- **user** (*User object*) – all tokens of the user will be enabled or disabled

Returns Number of tokens that were enabled/disabled

Return type

privacyidea.lib.token.**set_count_auth**(**args*, ***kwds*)

The auth counters are stored in the token info database field. There are different counters, that can be set

count_auth -> max=False, success=False count_auth_max -> max=True, success=False count_auth_success -> max=False, success=True count_auth_success_max -> max=True, success=True

Parameters

- **count** (*int*) – The counter value
- **user** (*User object*) – The user owner of the tokens tokens to modify
- **serial** (*basestring*) – The serial number of the one token to modifiy

- **max** – True, if either count_auth_max or count_auth_success_max are

to be modified :type max: bool :param success: True, if either count_auth_success or count_auth_success_max are to be modified :type success: bool :return: number of modified tokens :rtype: int

privacyidea.lib.token.**set_count_window**(**args*, ***kwds*)
The count window is used during authentication to find the matching OTP value. This sets the count window per token.

Parameters

- **serial** (*basestring*) – The serial number of the token
- **countwindow** (*int*) – the size of the window
- **user** (*User object*) – The owner of the tokens, which should be modified

Returns number of modified tokens

Return type int

privacyidea.lib.token.**set_defaults**(**args*, ***kwds*)
Set the default values for the token with the given serial number :param serial: token serial :type serial: basestring :return: None

privacyidea.lib.token.**set_description**(**args*, ***kwds*)
Set the description of a token

Parameters

- **serial** (*basestring*) – The serial number of the token
- **description** (*int*) – The description for the token
- **user** (*User object*) – The owner of the tokens, which should be modified

Returns number of modified tokens

Return type int

privacyidea.lib.token.**set_hashlib**(**args*, ***kwds*)
Set the hashlib in the tokeninfo. Can be something like sha1, sha256...

Parameters

- **serial** (*basestring*) – The serial number of the token
- **hashlib** (*basestring*) – The hashlib of the token
- **user** (*User object*) – The User, for who's token the hashlib should be set

Returns the number of token infos set

Return type int

privacyidea.lib.token.**set_max_failcount**(**args*, ***kwds*)
Set the maximum fail counts of tokens. This is the maximum number a failed authentication is allowed.

Parameters

- **serial** (*basestring*) – The serial number of the token
- **maxfail** (*int*) – The maximum allowed failed authentications
- **user** (*User object*) – The owner of the tokens, which should be modified

Returns number of modified tokens

Return type int

privacyidea.lib.token.**set_otplen**(**args*, ***kwds*)
Set the otp length of the token defined by serial or for all tokens of the user. The OTP length is usually 6 or 8.

Parameters

- **serial** (*basestring*) – The serial number of the token
- **otplen** (*int*) – The length of the OTP value
- **user** (*User object*) – The owner of the tokens

Returns number of modified tokens

Return type int

privacyidea.lib.token.**set_pin**(**args*, ***kwds*)
Set the token PIN of the token. This is the static part that can be used to authenticate.

Parameters

- **pin** (*basestring*) – The pin of the token
- **user** – If the user is specified, the pins for all tokens of this

user will be set :type used: User object :param serial: If the serial is specified, the PIN for this very token will be set. :return: The number of PINs set (usually 1) :rtype: int

privacyidea.lib.token.**set_pin_so**(**args*, ***kwds*)
Set the SO PIN of a smartcard. The SO Pin can be used to reset the PIN of a smartcard. The SO PIN is stored in the database, so that it could be used for automatic processes for User PIN resetting.

Parameters

- **serial** (*basestring*) – The serial number of the token
- **so_pin** – The Security Officer PIN

Returns The number of SO PINs set. (usually 1)

Return type int

privacyidea.lib.token.**set_pin_user**(**args*, ***kwds*)
This sets the user pin of a token. This just stores the information of the user pin for (e.g. an eTokenNG, Smartcard) in the database

Parameters

- **serial** (*basestring*) – The serial number of the token
- **user_pin** (*basestring*) – The user PIN

Returns The number of PINs set (usually 1)

Return type int

privacyidea.lib.token.**set_realms**(**args*, ***kwds*)
Set all realms of a token. This sets the realms new. I.e. it does not add realms. So realms that are not contained in the list will not be assigned to the token anymore.

Thus, setting realms=[] clears all realms assignments.

Parameters

- **serial** (*basestring*) – the serial number of the token
- **realms** (*list*) – A list of realm names

Returns the number of tokens, to which realms where added. As a serial

number should be unique, this is either 1 or 0. :rtype: int

privacyidea.lib.token.**set_sync_window**(**args*, ***kwds*)
The sync window is the window that is used during resync of a token. Such many OTP values are calculated ahead, to find the matching otp value and counter.

Parameters

- **serial** (*basestring*) – The serial number of the token
- **syncwindow** (*int*) – The size of the sync window
- **user** (*User object*) – The owner of the tokens, which should be modified

Returns number of modified tokens

Return type int

privacyidea.lib.token.**set_validity_period_end**(**args*, ***kwds*)
Set the validity period for the given token.

Parameters

- **serial** –
- **user** –
- **end** (*basestring*) – Timestamp in the format DD/MM/YY HH:MM

privacyidea.lib.token.**set_validity_period_start**(**args*, ***kwds*)
Set the validity period for the given token.

Parameters

- **serial** –
- **user** –
- **start** (*basestring*) – Timestamp in the format DD/MM/YY HH:MM

privacyidea.lib.token.**token_exist**(**args*, ***kwds*)
returns true if the token with the given serial number exists

Parameters **serial** – the serial number of the token

privacyidea.lib.token.**token_has_owner**(**args*, ***kwds*)
returns true if the token is owned by any user

privacyidea.lib.token.**unassign_token**(**args*, ***kwds*)
unassign the user from the token

Parameters **serial** – The serial number of the token to unassign

Returns True

Application Class

privacyidea.lib.applications.**MachineApplicationBase**
alias of MachineApplication

Policy Module

Base function to handle the policy entries in the database. This module only depends on the db/models.py

The functions of this module are tested in tests/test_lib_policy.py

A policy has the attributes

- name
- scope
- action
- realm
- resolver
- user
- client
- active

`name` is the unique identifier of a policy. `scope` is the area, where this policy is meant for. This can be values like admin, selfservice, authentication... `scope` takes only one value.

`active` is bool and indicates, whether a policy is active or not.

`action`, `realm`, `resolver`, `user` and `client` can take a comma separated list of values.

realm and resolver If these are empty '*', this policy matches each requested realm.

user If the user is empty or '*', this policy matches each user. You can exclude users from matching this policy, by prepending a '-' or a '!'. `*, -admin` will match for all users except the admin.

client The client is identified by its IP address. A policy can contain a list of IP addresses or subnets. You can exclude clients from subnets by prepending the client with a '-' or a '!'. `172.16.0.0/24, -172.16.0.17` will match each client in the subnet except the 172.16.0.17.

class `privacyidea.lib.policy.`**ACTION**

This is the list of usual actions.

ADDUSER = 'adduser'

APIKEY = 'api_key_required'

ASSIGN = 'assign'

AUDIT = 'auditlog'

AUTHITEMS = 'fetch_authentication_items'

AUTHMAXFAIL = 'auth_max_fail'

AUTHMAXSUCCESS = 'auth_max_success'

AUTOASSIGN = 'autoassignment'

CACONNECTORDELETE = 'caconnectordelete'

CACONNECTORREAD = 'caconnectorread'

CACONNECTORWRITE = 'caconnectorwrite'

CHALLENGERESPONSE = 'challenge_response'

CONFIGDOCUMENTATION = 'system_documentation'

COPYTOKENPIN = 'copytokenpin'

COPYTOKENUSER = 'copytokenuser'

DEFAULT_TOKENTYPE = 'default_tokentype'

DELETE = 'delete'

DELETEUSER = 'deleteuser'

DISABLE = 'disable'

EMAILCONFIG = 'smtpconfig'

ENABLE = 'enable'

ENCRYPTPIN = 'encrypt_pin'

GETCHALLENGES = 'getchallenges'

GETRANDOM = 'getrandom'

GETSERIAL = 'getserial'

IMPORT = 'importtokens'

LASTAUTH = 'last_auth'

LOGINMODE = 'login_mode'

LOGOUTTIME = 'logout_time'

LOSTTOKEN = 'losttoken'

LOSTTOKENPWCONTENTS = 'losttoken_PW_contents'

LOSTTOKENPWLEN = 'losttoken_PW_length'

LOSTTOKENVALID = 'losttoken_valid'

MACHINELIST = 'machinelist'

MACHINERESOLVERDELETE = 'mresolverdelete'

MACHINERESOLVERWRITE = 'mresolverwrite'

MACHINETOKENS = 'manage_machine_tokens'

MANGLE = 'mangle'

MAXTOKENREALM = 'max_token_per_realm'

MAXTOKENUSER = 'max_token_per_user'

NODETAILFAIL = 'no_detail_on_fail'

NODETAILSUCCESS = 'no_detail_on_success'

OTPPIN = 'otppin'

OTPPINCONTENTS = 'otp_pin_contents'

OTPPINMAXLEN = 'otp_pin_maxlength'

OTPPINMINLEN = 'otp_pin_minlength'

OTPPINRANDOM = 'otp_pin_random'

PASSNOTOKEN = 'passOnNoToken'

PASSNOUSER = 'passOnNoUser'

PASSTHRU = 'passthru'

PASSWORDRESET = 'password_reset'

PINHANDLING = 'pinhandling'

POLICYDELETE = 'policydelete'

POLICYTEMPLATEURL = 'policy_template_url'

POLICYWRITE = 'policywrite'

RADIUSSERVERWRITE = 'radiusserver_write'

REALM = 'realm'

REMOTE_USER = 'remote_user'

REQUIREDEMAIL = 'requiredemail'

RESET = 'reset'

RESOLVER = 'resolver'

RESOLVERDELETE = 'resolverdelete'

RESOLVERWRITE = 'resolverwrite'

RESYNC = 'resync'

REVOKE = 'revoke'

SERIAL = 'serial'

SET = 'set'

SETHSM = 'set_hsm_password'

SETPIN = 'setpin'

SETREALM = 'setrealm'

SMTPSERVERWRITE = 'smtpserver_write'

SYSTEMDELETE = 'configdelete'

SYSTEMWRITE = 'configwrite'

TOKENISSUER = 'tokenissuer'

TOKENLABEL = 'tokenlabel'

TOKENPAGESIZE = 'token_page_size'

TOKENREALMS = 'tokenrealms'

TOKENTYPE = 'tokentype'

TOKENWIZARD = 'tokenwizard'

UNASSIGN = 'unassign'

UPDATEUSER = 'updateuser'

USERDETAILS = 'user_details'

USERLIST = 'userlist'

USERPAGESIZE = 'user_page_size'

class privacyidea.lib.policy.**ACTIONVALUE**
This is a list of usual action values for e.g. policy action-values like otppin.

DISABLE = 'disable'

NONE = 'none'

TOKENPIN = 'tokenpin'

USERSTORE = 'userstore'

class privacyidea.lib.policy.**AUTOASSIGNVALUE**
This is the possible values for autoassign

NONE = 'any_pin'

USERSTORE = 'userstore'

class privacyidea.lib.policy.**LOGINMODE**
This is the list of possible values for the login mode.

DISABLE = 'disable'

PRIVACYIDEA = 'privacyIDEA'

USERSTORE = 'userstore'

class privacyidea.lib.policy.**PolicyClass**
The Policy_Object will contain all database policy entries for easy filtering and mangling. It will be created at the beginning of the request and is supposed to stay alive unchanged during the request.

get_action_values(*action*, *scope='authorization'*, *realm=None*, *resolver=None*, *user=None*, *client=None*, *unique=False*, *allow_white_space_in_action=False*)

Get the defined action values for a certain action like scope: authorization action: tokentype

would return a list of the tokentypes

scope: authorization action: serial

would return a list of allowed serials

Parameters

- **unique** – if set, the function will raise an exception if more

  than one value is returned

- **allow_white_space_in_action** (*bool*) – Some policies like emailtext would allow entering text with whitespaces. These whitespaces must not be used to separate action values!

Returns A list of the allowed tokentypes

Return type list

get_policies(*name=None*, *scope=None*, *realm=None*, *active=None*, *resolver=None*, *user=None*, *client=None*, *action=None*, *adminrealm=None*)
Return the policies of the given filter values

Parameters

- **name** –
- **scope** –
- **realm** –

- **active** –
- **resolver** –
- **user** –
- **client** –
- **action** –
- **adminrealm** – This is the realm of the admin. This is only evaluated in the scope admin.

Returns list of policies

Return type list of dicts

ui_get_enroll_tokentypes(*client*, *logged_in_user*)

Return a dictioary of the allowed tokentypes for the logged in user. This used for the token enrollment UI.

It looks like this:

{"hotp": "HOTP: event based One Time Passwords", "totp": "TOTP: time based One Time Passwords", "spass": "SPass: Simple Pass token. Static passwords", "motp": "mOTP: classical mobile One Time Passwords", "sshkey": "SSH Public Key: The public SSH key", "yubikey": "Yubikey AES mode: One Time Passwords with Yubikey", "remote": "Remote Token: Forward authentication request to another server", "yubico": "Yubikey Cloud mode: Forward authentication request to YubiCloud", "radius": "RADIUS: Forward authentication request to a RADIUS server", "email": "EMail: Send a One Time Passwort to the users email address", "sms": "SMS: Send a One Time Password to the users mobile phone", "certificate": "Certificate: Enroll an x509 Certificate Token."}

Parameters

- **client** (*basestring*) – Client IP address
- **logged_in_user** (*dict*) – The Dict of the logged in user

Returns list of token types, the user may enroll

ui_get_rights(*scope*, *realm*, *username*, *client=None*)

Get the rights derived from the policies for the given realm and user. Works for admins and normal users. It fetches all policies for this user and compiles a maximum list of allowed rights, that can be used to hide certain UI elements.

Parameters

- **scope** – Can be SCOPE.ADMIN or SCOPE.USER
- **realm** – Is either user users realm or the adminrealm
- **username** – The loginname of the user
- **client** – The HTTP client IP

Returns A list of actions

class privacyidea.lib.policy.**REMOTE_USER**

The list of possible values for the remote_user policy.

ACTIVE = 'allowed'

DISABLE = 'disable'

class privacyidea.lib.policy.**SCOPE**

This is the list of the allowed scopes that can be used in policy definitions.

ADMIN = 'admin'

AUDIT = 'audit'

AUTH = 'authentication'

AUTHZ = 'authorization'

ENROLL = 'enrollment'

GETTOKEN = 'gettoken'

REGISTER = 'register'

USER = 'user'

WEBUI = 'webui'

privacyidea.lib.policy.**delete_policy**(**args*, ***kwds*)
Function to delete one named policy

Parameters **name** – the name of the policy to be deleted

Returns the count of the deleted policies.

Return type int

privacyidea.lib.policy.**enable_policy**(**args*, ***kwds*)
Enable or disable the policy with the given name :param name: :return: ID of the policy

privacyidea.lib.policy.**export_policies**(**args*, ***kwds*)
This function takes a policy list and creates an export file from it

Parameters **policies** (*list of policy dictionaries*) – a policy definition

Returns the contents of the file

Return type string

privacyidea.lib.policy.**get_static_policy_definitions**(**args*, ***kwds*)
These are the static hard coded policy definitions. They can be enhanced by token based policy definitions, that can be found in lib.token.get_dynamic_policy_definitions.

Parameters **scope** (*basestring*) – Optional the scope of the policies

Returns allowed scopes with allowed actions, the type of action and a

description. :rtype: dict

privacyidea.lib.policy.**import_policies**(**args*, ***kwds*)
This function imports policies from a file. The file has a config_object format, i.e. the text file has a header

[<policy_name>] key = value

and key value pairs.

Parameters **file_contents** (*basestring*) – The contents of the file

Returns number of imported policies

Return type int

privacyidea.lib.policy.**set_policy**(**args*, ***kwds*)
Function to set a policy. If the policy with this name already exists, it updates the policy. It expects a dict of with the following keys: :param name: The name of the policy :param scope: The scope of the policy. Something like "admin", "system", "authentication" :param action: A scope specific action or a comma separated list of actions :type active: basestring :param realm: A realm, for which this policy is valid :param resolver: A resolver, for which this policy is valid :param user: A username or a list of usernames :param time: N/A if type() :param

client: A client IP with optionally a subnet like 172.16.0.0/16 :param active: If the policy is active or not :type active: bool :return: The database ID od the the policy :rtype: int

API Policies

Pre Policies These are the policy decorators as PRE conditions for the API calls. I.e. these conditions are executed before the wrapped API call. This module uses the policy base functions from privacyidea.lib.policy but also components from flask like g.

Wrapping the functions in a decorator class enables easy modular testing.

The functions of this module are tested in tests/test_api_lib_policy.py

privacyidea.api.lib.prepolicy.**api_key_required**(*request=None*, *action=None*)
This is a decorator for check_user_pass and check_serial_pass. It checks, if a policy scope=auth, action=apikeyrequired is set. If so, the validate request will only performed, if a JWT token is passed with role=validate.

privacyidea.api.lib.prepolicy.**check_anonymous_user**(*request=None*, *action=None*)
This decorator function takes the request and verifies the given action for the SCOPE USER without an authenticated user but the user from the parameters.

This is used with password_reset

Parameters

- **request** –
- **action** –

Returns True otherwise raises an Exception

privacyidea.api.lib.prepolicy.**check_base_action**(*request=None*, *action=None*, *anonymous=False*)
This decorator function takes the request and verifies the given action for the SCOPE ADMIN or USER. :param request: :param action: :param anonymous: If set to True, the user data is taken from the request

parameters.

Returns True otherwise raises an Exception

privacyidea.api.lib.prepolicy.**check_external**(*request=None*, *action='init'*)
This decorator is a hook to an external check function, that is called before the token/init or token/assign API.

Parameters

- **request** (*flask Request object*) – The REST request
- **action** (*basestring*) – This is either "init" or "assign"

Returns either True or an Exception is raised

privacyidea.api.lib.prepolicy.**check_max_token_realm**(*request=None*, *action=None*)
Pre Policy This checks the maximum token per realm. Check ACTION.MAXTOKENREALM

This decorator can wrap: /token/init (with a realm and user) /token/assign /token/tokenrealms

Parameters

- **req** (*Request Object*) – The request that is intercepted during the API call
- **action** (*basestring*) – An optional Action

Returns True otherwise raises an Exception

privacyidea.api.lib.prepolicy.**check_max_token_user**(*request=None*, *action=None*)
Pre Policy This checks the maximum token per user policy. Check ACTION.MAXTOKENUSER

This decorator can wrap: /token/init (with a realm and user) /token/assign

Parameters

- **req** –
- **action** –

Returns True otherwise raises an Exception

privacyidea.api.lib.prepolicy.**check_otp_pin**(*request=None*, *action=None*)
This policy function checks if the OTP PIN that is about to be set follows the OTP PIN policies ACTION.OTPPINMAXLEN, ACTION.OTPPINMINLEN and ACTION.OTPPINCONTENTS in the SCOPE.USER. It is used to decorate the API functions.

The pin is investigated in the params as pin = params.get("pin")

In case the given OTP PIN does not match the requirements an exception is raised.

privacyidea.api.lib.prepolicy.**check_token_init**(*request=None*, *action=None*)
This decorator function takes the request and verifies if the requested tokentype is allowed to be enrolled in the SCOPE ADMIN or the SCOPE USER. :param request: :param action: :return: True or an Exception is raised

privacyidea.api.lib.prepolicy.**check_token_upload**(*request=None*, *action=None*)
This decorator function takes the request and verifies the given action for scope ADMIN :param req: :param filename: :return:

privacyidea.api.lib.prepolicy.**encrypt_pin**(*request=None*, *action=None*)
This policy function is to be used as a decorator for several API functions. E.g. token/assign, token/setpin, token/init If the policy is set to define the PIN to be encrypted, the request.all_data is modified like this: encryptpin = True

It uses the policy SCOPE.ENROLL, ACTION.ENCRYPTPIN

privacyidea.api.lib.prepolicy.**init_random_pin**(*request=None*, *action=None*)
This policy function is to be used as a decorator in the API init function. If the policy is set accordingly it adds a random PIN to the request.all_data like.

It uses the policy SCOPE.ENROLL, ACTION.OTPPINRANDOM to set a random OTP PIN during Token enrollment

privacyidea.api.lib.prepolicy.**init_tokenlabel**(*request=None*, *action=None*)
This policy function is to be used as a decorator in the API init function. It adds the tokenlabel definition to the params like this: params : { "tokenlabel": "<u>@<r>" }

In addtion it adds the tokenissuer to the params like this: params : { "tokenissuer": "privacyIDEA instance" }

It uses the policy SCOPE.ENROLL, ACTION.TOKENLABEL and ACTION.TOKENISSUER to set the tokenlabel and tokenissuer of Smartphone tokens during enrollment and this fill the details of the response.

privacyidea.api.lib.prepolicy.**is_remote_user_allowed**(*req*)
Checks if the REMOTE_USER server variable is allowed to be used.

Note: This is not used as a decorator!

Parameters **req** – The flask request, containing the remote user and the client IP

Returns

privacyidea.api.lib.prepolicy.**mangle**(*request=None*, *action=None*)

This pre condition checks if either of the parameters pass, user or realm in a validate/check request should be rewritten based on an authentication policy with action "mangle". See *mangle* for an example.

Check ACTION.MANGLE

This decorator should wrap /validate/check

Parameters

- **request** (*Request Object*) – The request that is intercepted during the API call
- **action** (*basestring*) – An optional Action

Returns Always true. Modified the parameter request

privacyidea.api.lib.prepolicy.**mock_fail**(*req*, *action*)

This is a mock function as an example for check_external. This function creates a problem situation and the token/init or token/assign will show this exception accordingly.

privacyidea.api.lib.prepolicy.**mock_success**(*req*, *action*)

This is a mock function as an example for check_external. This function returns success and the API call will go on unmodified.

class privacyidea.api.lib.prepolicy.**prepolicy**(*function*, *request*, *action=None*)

This is the decorator wrapper to call a specific function before an API call. The prepolicy decorator is to be used in the API calls. A prepolicy decorator then will modify the request data or raise an exception

privacyidea.api.lib.prepolicy.**required_email**(*request=None*, *action=None*)

This precondition checks if the "email" parameter matches the regular expression in the policy scope=register, action=requiredemail. See *requiredemail*.

Check ACTION.REQUIREDEMAIL

This decorator should wrap POST /register

Parameters

- **request** – The Request Object
- **action** – An optional Action

Returns Modifies the request paramters or raises an Exception

privacyidea.api.lib.prepolicy.**set_realm**(*request=None*, *action=None*)

Pre Policy This pre condition gets the current realm and verifies if the realm should be rewritten due to the policy definition. I takes the realm from the request and - if a policy matches - replaces this realm with the realm defined in the policy

Check ACTION.SETREALM

This decorator should wrap /validate/check

Parameters

- **request** (*Request Object*) – The request that is intercepted during the API call
- **action** (*basestring*) – An optional Action

Returns Always true. Modified the parameter request

Post Policies These are the policy decorators as POST conditions for the API calls. I.e. these conditions are executed after the wrapped API call. This module uses the policy base functions from privacyidea.lib.policy but also components from flask like g.

Wrapping the functions in a decorator class enables easy modular testing.

The functions of this module are tested in tests/test_api_lib_policy.py

privacyidea.api.lib.postpolicy.**autoassign**(*request*, *response*)
This decorator decorates the function /validate/check. Depending on ACTION.AUTOASSIGN it checks if the user has no token and if the given OTP-value matches a token in the users realm, that is not yet assigned to any user.

If a token can be found, it assigns the token to the user also taking into account ACTION.MAXTOKENUSER and ACTION.MAXTOKENREALM. :return:

privacyidea.api.lib.postpolicy.**check_serial**(*request*, *response*)
This policy function is to be used in a decorator of an API function. It checks, if the token, that was used in the API call has a serial number that is allowed to be used.

If not, a PolicyException is raised.

Parameters **response** (*Response object*) – The response of the decorated function

Returns A new (maybe modified) response

privacyidea.api.lib.postpolicy.**check_tokentype**(*request*, *response*)
This policy function is to be used in a decorator of an API function. It checks, if the token, that was used in the API call is of a type that is allowed to be used.

If not, a PolicyException is raised.

Parameters **response** (*Response object*) – The response of the decorated function

Returns A new (maybe modified) response

privacyidea.api.lib.postpolicy.**get_webui_settings**(*request*, *response*)
This decorator is used in the /auth API to add configuration information like the logout_time or the policy_template_url to the response. :param request: flask request object :param response: flask response object :return: the response

privacyidea.api.lib.postpolicy.**no_detail_on_fail**(*request*, *response*)
This policy function is used with the AUTHZ scope. If the boolean value no_detail_on_fail is set, the details will be stripped if the authentication request failed.

Parameters

- **request** –
- **response** –

Returns

privacyidea.api.lib.postpolicy.**no_detail_on_success**(*request*, *response*)
This policy function is used with the AUTHZ scope. If the boolean value no_detail_on_success is set, the details will be stripped if the authentication request was successful.

Parameters

- **request** –
- **response** –

Returns

privacyidea.api.lib.postpolicy.**offline_info**(*request*, *response*)
This decorator is used with the function /validate/check. It is not triggered by an ordinary policy but by a MachineToken definition. If for the given Client and Token an offline application is defined, the response is enhanced with the offline information - the hashes of the OTP.

class privacyidea.api.lib.postpolicy.**postpolicy**(*function*, *request=None*)
Decorator that allows one to call a specific function after the decorated function. The postpolicy decorator is to be used in the API calls.

class privacyidea.api.lib.postpolicy.**postrequest**(*function*, *request=None*)
Decorator that is supposed to be used with after_request.

privacyidea.api.lib.postpolicy.**sign_response**(*request*, *response*)
This decorator is used to sign the response. It adds the nonce from the request, if it exist and adds the nonce and the signature to the response.

Note: This only works for JSON responses. So if we fail to decode the JSON, we just pass on.

The usual way to use it is, to wrap the after_request, so that we can also sign errors.

@postrequest(sign_response, request=request) def after_request(response):

Parameters

- **request** – The Request object
- **response** – The Response object

Policy Decorators

These are the policy decorator functions for internal (lib) policy decorators. policy decorators for the API (pre/post) are defined in api/lib/policy

The functions of this module are tested in tests/test_lib_policy_decorator.py

privacyidea.lib.policydecorators.**auth_lastauth**(*wrapped_function*, *user_or_serial*, *passw*, *options=None*)
This decorator checks the policy settings of ACTION.LASTAUTH If the last authentication stored in tokeninfo last_auth_success of a token is exceeded, the authentication is denied.

The wrapped function is usually token.check_user_pass, which takes the arguments (user, passw, options={}) OR token.check_serial_pass with the arguments (user, passw, options={})

Parameters

- **wrapped_function** – either check_user_pass or check_serial_pass
- **user_or_serial** – either the User user_or_serial or a serial
- **passw** –
- **options** – Dict containing values for "g" and "clientip"

Returns Tuple of True/False and reply-dictionary

privacyidea.lib.policydecorators.**auth_otppin**(*wrapped_function*, **args*, ***kwds*)
Decorator to decorate the tokenclass.check_pin function. Depending on the ACTION.OTPPIN it * either simply accepts an empty pin * checks the pin against the userstore * or passes the request to the wrapped_function

Parameters **wrapped_function** – In this case the wrapped function should be

tokenclass.check_ping :param *args: args[1] is the pin :param **kwds: kwds["options"] contains the flask g :return: True or False

privacyidea.lib.policydecorators.**auth_user_does_not_exist**(*wrapped_function*, *user_object*, *passw*, *options=None*)

This decorator checks, if the user does exist at all. If the user does exist, the wrapped function is called.

The wrapped function is usually token.check_user_pass, which takes the arguments (user, passw, options={})

Parameters

- **wrapped_function** –
- **user_object** –
- **passw** –
- **options** – Dict containing values for "g" and "clientip"

Returns Tuple of True/False and reply-dictionary

privacyidea.lib.policydecorators.**auth_user_has_no_token**(*wrapped_function*, *user_object*, *passw*, *options=None*)

This decorator checks if the user has a token at all. If the user has a token, the wrapped function is called.

The wrapped function is usually token.check_user_pass, which takes the arguments (user, passw, options={})

Parameters

- **wrapped_function** –
- **user_object** –
- **passw** –
- **options** – Dict containing values for "g" and "clientip"

Returns Tuple of True/False and reply-dictionary

privacyidea.lib.policydecorators.**auth_user_passthru**(*wrapped_function*, *user_object*, *passw*, *options=None*)

This decorator checks the policy settings of ACTION.PASSTHRU. If the authentication against the userstore is not successful, the wrapped function is called.

The wrapped function is usually token.check_user_pass, which takes the arguments (user, passw, options={})

Parameters

- **wrapped_function** –
- **user_object** –
- **passw** –
- **options** – Dict containing values for "g" and "clientip"

Returns Tuple of True/False and reply-dictionary

privacyidea.lib.policydecorators.**auth_user_timelimit**(*wrapped_function*, *user_object*, *passw*, *options=None*)

This decorator checks the policy settings of ACTION.AUTHMAXSUCCESS, ACTION.AUTHMAXFAIL If the authentication was successful, it checks, if the number of allowed successful authentications is exceeded (AUTHMAXSUCCESS).

If the AUTHMAXFAIL is exceed it denies even a successful authentication.

The wrapped function is usually token.check_user_pass, which takes the arguments (user, passw, options={})

Parameters

- **wrapped_function** –
- **user_object** –
- **passw** –
- **options** – Dict containing values for "g" and "clientip"

Returns Tuple of True/False and reply-dictionary

privacyidea.lib.policydecorators.**challenge_response_allowed**(*func*)

This decorator is used to wrap tokenclass.is_challenge_request. It checks, if a challenge response authentication is allowed for this token type. To allow this, the policy

scope:authentication, action:challenge_response must be set.

If the tokentype is not allowed for challenge_response, this decorator returns false.

See *challenge_response*.

Parameters **func** – wrapped function

privacyidea.lib.policydecorators.**config_lost_token**(*wrapped_function*, **args*, ***kwds*)

Decorator to decorate the lib.token.lost_token function. Depending on ACTION.LOSTTOKENVALID, ACTION.LOSTTOKENPWCONTENTS, ACTION.LOSTTOKENPWLEN it sets the check_otp parameter, to signal how the lostToken should be generated.

Parameters

- **wrapped_function** – Usually the function lost_token()
- **args** – argument "serial" as the old serial number
- **kwds** – keyword arguments like "validity", "contents", "pw_len"

kwds["options"] contains the flask g

Returns calls the original function with the modified "validity",

"contents" and "pw_len" argument

class privacyidea.lib.policydecorators.**libpolicy**(*decorator_function*)

This is the decorator wrapper to call a specific function before a library call in contrast to prepolicy and postpolicy, which are to be called in API Calls.

The decorator expects a named parameter "options". In this options dict it will look for the flask global "g".

privacyidea.lib.policydecorators.**login_mode**(*wrapped_function*, **args*, ***kwds*)

Decorator to decorate the lib.auth.check_webui_user function. Depending on ACTION.LOGINMODE it sets the check_otp parameter, to signal that the authentication should be performed against privacyIDEA.

Parameters

- **wrapped_function** – Usually the function check_webui_user
- **args** – arguments user_obj and password
- **kwds** – keyword arguments like options and !check_otp!

kwds["options"] contains the flask g :return: calls the original function with the modified "check_otp" argument

UserIdResolvers

The useridresolver is responsible for getting userids for loginnames and vice versa.

This base module contains the base class UserIdResolver.UserIdResolver and also the community class PasswdIdResolver.IdResolver, that is inherited from the base class.

Base class

class `privacyidea.lib.resolvers.UserIdResolver.`**`UserIdResolver`**

`add_user`(*attributes=None*)
Add a new user in the useridresolver. This is only possible, if the UserIdResolver supports this and if we have write access to the user store.

Parameters

- **`username`** (*basestring*) – The login name of the user
- **`attributes`** – Attributes according to the attribute mapping

Returns The new UID of the user. The UserIdResolver needs to

determine the way how to create the UID.

`checkPass`(*uid*, *password*)
This function checks the password for a given uid. returns true in case of success false if password does not match

Parameters

- **`uid`** (*string or int*) – The uid in the resolver
- **`password`** (*string*) – the password to check. Usually in cleartext

Returns True or False

Return type bool

`close`()
Hook to close down the resolver after one request

`delete_user`(*uid*)
Delete a user from the useridresolver. The user is referenced by the user id. :param uid: The uid of the user object, that should be deleted. :type uid: basestring :return: Returns True in case of success :rtype: bool

classmethod `getResolverClassDescriptor`()
return the descriptor of the resolver, which is - the class name and - the config description

Returns resolver description dict

Return type dict

static `getResolverClassType`()
provide the resolver type for registration

static `getResolverDescriptor`()
return the descriptor of the resolver, which is - the class name and - the config description

Returns resolver description dict

Return type dict

getResolverId()
get resolver specific information :return: the resolver identifier string - empty string if not exist

static getResolverType()
getResolverType - return the type of the resolver

Returns returns the string 'ldapresolver'

Return type string

getUserId(*loginName*)
The loginname is resolved to a user_id. Depending on the resolver type the user_id can be an ID (like in /etc/passwd) or a string (like the DN in LDAP)

It needs to return an emptry string, if the user does not exist.

Parameters **loginName** (*sting*) – The login name of the user

Returns The ID of the user

Return type string or int

getUserInfo(*userid*)
This function returns all user information for a given user object identified by UserID. :param userid: ID of the user in the resolver :type userid: int or string :return: dictionary, if no object is found, the dictionary is empty :rtype: dict

getUserList(*searchDict=None*)
This function finds the user objects, that have the term 'value' in the user object field 'key'

Parameters **searchDict** (*dict*) – dict with key values of user attributes - the key may be something like 'loginname' or 'email' the value is a regular expression.

Returns list of dictionaries (each dictionary contains a user object) or an empty string if no object is found.

Return type list of dicts

getUsername(*userid*)
Returns the username/loginname for a given userid :param userid: The userid in this resolver :type userid: string :return: username :rtype: string

loadConfig(*config*)
Load the configuration from the dict into the Resolver object. If attributes are missing, need to set default values. If required attributes are missing, this should raise an Exception.

Parameters **config** (*dict*) – The configuration values of the resolver

static testconnection(*param*)
This function lets you test if the parameters can be used to create a working resolver. The implementation should try to connect to the user store and verify if users can be retrieved. In case of success it should return a text like "Resolver config seems OK. 123 Users found."

param param: The parameters that should be saved as the resolver type param: dict return: returns True in case of success and a descriptive text rtype: tuple

update_user(*uid*, *attributes=None*)
Update an existing user. This function is also used to update the password. Since the attribute mapping know, which field contains the password, this function can also take care for password changing.

Attributes that are not contained in the dict attributes are not modified.

Parameters

- **uid** (*basestring*) – The uid of the user object in the resolver.

- **attributes** (*dict*) – Attributes to be updated.

Returns True in case of success

PasswdResolver

class privacyidea.lib.resolvers.PasswdIdResolver.**IdResolver**

checkPass(*uid*, *password*)
This function checks the password for a given uid. returns true in case of success false if password does not match

We do not support shadow passwords. so the seconds column of the passwd file needs to contain the crypted password

Parameters

- **uid** (*int*) – The uid of the user
- **password** (*sting*) – The password in cleartext

Returns True or False

Return type bool

checkUserId(*line*, *pattern*)
Check if a userid matches a pattern. A pattern can be "=1000", ">=1000", "<2000" or "between 1000,2000".

Parameters

- **line** (*dict*) – the dictionary of a user
- **pattern** (*string*) – match pattern with <, <=...

Returns True or False

Return type bool

checkUserName(*line*, *pattern*)
check for user name

classmethod getResolverClassDescriptor()
return the descriptor of the resolver, which is - the class name and - the config description

Returns resolver description dict

Return type dict

getResolverId()
return the resolver identifier string, which in fact is filename, where it points to.

getSearchFields(*searchDict=None*)
show, which search fields this userIdResolver supports

TODO: implementation is not completed

Parameters **searchDict** (*dict*) – fields, which can be queried

Returns dict of all searchFields

Return type dict

getUserId(*LoginName*)
search the user id from the login name

Parameters **LoginName** – the login of the user

Returns the userId

getUserInfo(*userId*, *no_passwd=False*)
get some info about the user as we only have the loginId, we have to traverse the dict for the value

Parameters

- **userId** – the to be searched user
- **no_passwd** – retrun no password

Returns dict of user info

getUserList(*searchDict*)
get a list of all users matching the search criteria of the searchdict

Parameters **searchDict** – dict of search expressions

getUsername(*userId*)
Returns the username/loginname for a given userid :param userid: The userid in this resolver :type userid: string :return: username :rtype: string

loadConfig(*configDict*)
The UserIdResolver could be configured from the pylons app config - here this could be the passwd file , whether it is /etc/passwd or /etc/shadow

loadFile()
Loads the data of the file initially. if the self.fileName is empty, it loads /etc/passwd. Empty lines are ignored.

static setup(*config=None*, *cache_dir=None*)
this setup hook is triggered, when the server starts to serve the first request

Parameters **config** (*the privacyidea config dict*) – the privacyidea config

LDAPResolver

class privacyidea.lib.resolvers.LDAPIdResolver.**IdResolver**

checkPass(*uid*, *password*)
This function checks the password for a given uid. - returns true in case of success - false if password does not match

classmethod getResolverClassDescriptor()
return the descriptor of the resolver, which is - the class name and - the config description

Returns resolver description dict

Return type dict

getResolverId()
Returns the resolver Id This should be an Identifier of the resolver, preferable the type and the name of the resolver.

getUserId(*LoginName*)
resolve the loginname to the userid.

Parameters **LoginName** (*string*) – The login name from the credentials

Returns UserId as found for the LoginName

getUserInfo(*userId*)
This function returns all user info for a given userid/object.

Parameters **userId** (*string*) – The userid of the object

Returns A dictionary with the keys defined in self.userinfo

Return type dict

getUserList(*searchDict*)

Parameters **searchDict** (*dict*) – A dictionary with search parameters

Returns list of users, where each user is a dictionary

getUsername(*user_id*)
Returns the username/loginname for a given user_id :param user_id: The user_id in this resolver :type user_id: string :return: username :rtype: string

classmethod get_serverpool(*urilist*, *timeout*)
This create the serverpool for the ldap3 connection. The URI from the LDAP resolver can contain a comma separated list of LDAP servers. These are split and then added to the pool.

See https://github.com/cannatag/ldap3/blob/master/docs/manual/source/servers.rst#server-pool

Parameters

- **urilist** (*basestring*) – The list of LDAP URIs, comma separated
- **timeout** (*float*) – The connection timeout

Returns Server Pool

Return type LDAP3 Server Pool Instance

loadConfig(*config*)
Load the config from conf.

Parameters **config** (*dict*) – The configuration from the Config Table

'#ldap_uri': 'LDAPURI', '#ldap_basedn': 'LDAPBASE', '#ldap_binddn': 'BINDDN', '#ldap_password': 'BINDPW', '#ldap_timeout': 'TIMEOUT', '#ldap_sizelimit': 'SIZELIMIT', '#ldap_loginattr': 'LOGINNAMEATTRIBUTE', '#ldap_searchfilter': 'LDAPSEARCHFILTER', '#ldap_userfilter': 'LDAPFILTER', '#ldap_mapping': 'USERINFO', '#ldap_uidtype': 'UIDTYPE', '#ldap_noreferrals' : 'NOREFERRALS', '#ldap_certificate': 'CACERTIFICATE',

static split_uri(*uri*)
Splits LDAP URIs like: * ldap://server * ldaps://server * ldap[s]://server:1234 * server :param uri: The LDAP URI :return: Returns a tuple of Servername, Port and SSL(bool)

classmethod testconnection(*param*)
This function lets you test the to be saved LDAP connection.

This is taken from controllers/admin.py

Parameters **param** (*dict*) – A dictionary with all necessary parameter to test the connection.

Returns Tuple of success and a description

Return type (bool, string)

Parameters are: BINDDN, BINDPW, LDAPURI, TIMEOUT, LDAPBASE, LOGINNAMEATTRIBUTE, LDAPSEARCHFILTER, LDAPFILTER, USERINFO, SIZELIMIT, NOREFERRALS, CACERTIFICATE, AUTHTYPE

Audit log

Base class

class `privacyidea.lib.auditmodules.base.`**`Audit`**(*config=None*)

`add_to_log`(*param*)
Add to existing log entry :param param: :return:

`audit_entry_to_dict`(*audit_entry*)
If the search_query returns an iterator with elements that are not a dictionary, the audit module needs to provide this function, to convert the audit entry to a dictionary.

`csv_generator`(*param*)
A generator that can be used to stream the audit log

Parameters **`param`** –

Returns

`finalize_log`()
This method is called to finalize the audit_data. I.e. sign the data and write it to the database. It should hash the data and do a hash chain and sign the data

`get_audit_id`()

`get_count`(*search_dict*, *timedelta=None*, *success=None*)
Returns the number of found log entries. E.g. used for checking the timelimit.

Parameters **`param`** – List of filter parameters

Returns number of found entries

`get_dataframe`(*start_time=datetime.datetime(2016, 3, 22, 21, 22, 36, 31132)*, *end_time=datetime.datetime(2016, 3, 29, 21, 22, 36, 31170)*)
The Audit module can handle its data the best. This function is used to return a pandas.dataframe with all audit data in the given time frame.

This dataframe then can be used for extracting statistics.

Parameters

- **`start_time`** (*datetime*) – The start time of the data
- **`end_time`** (*datetime*) – The end time of the data

Returns Audit data

Return type dataframe

`get_total`(*param*, *AND=True*, *display_error=True*)
This method returns the total number of audit entries in the audit store

`initialize`(**args*, ***kwds*)

`initialize_log`(*param*)
This method initialized the log state. The fact, that the log state was initialized, also needs to be logged. Therefor the same params are passed as i the log method.

log(**args*, ***kwds*)
This method is used to log the data. During a request this method can be called several times to fill the internal audit_data dictionary.

log_token_num(*count*)
Log the number of the tokens. Can be passed like log_token_num(get_tokens(count=True))

Parameters **count** (*int*) – Number of tokens

Returns

read_keys(**args*, ***kwds*)
Set the private and public key for the audit class. This is achieved by passing the entries.

#priv = config.get("privacyideaAudit.key.private") #pub = config.get("privacyideaAudit.key.public")

Parameters

- **pub** (*string with filename*) – Public key, used for verifying the signature
- **priv** (*string with filename*) – Private key, used to sign the audit entry

Returns None

search(*param*, *display_error=True*, *rp_dict=None*)
This function is used to search audit events.

param: Search parameters can be passed.

return: A pagination object

This function is deprecated.

search_query(*search_dict*, *rp_dict*)
This function returns the audit log as an iterator on the result

SQL Audit module

class privacyidea.lib.auditmodules.sqlaudit.**Audit**(*config=None*)
This is the SQLAudit module, which writes the audit entries to an SQL database table. It requires the configuration parameters. PI_AUDIT_SQL_URI

add_to_log(*param*)
Add new text to an existing log entry :param param: :return:

clear()
Deletes all entries in the database table. This is only used for test cases! :return:

csv_generator(*param=None*, *user=None*)
Returns the audit log as csv file. :param config: The current flask app configuration :type config: dict :param param: The request parameters :type param: dict :param user: The user, who issued the request :return: None. It yields results as a generator

finalize_log()
This method is used to log the data. It should hash the data and do a hash chain and sign the data

get_dataframe(*start_time=datetime.datetime(2016, 3, 22, 21, 22, 36, 115634)*, *end_time=datetime.datetime(2016, 3, 29, 21, 22, 36, 115667)*)
The Audit module can handle its data the best. This function is used to return a pandas.dataframe with all audit data in the given time frame.

This dataframe then can be used for extracting statistics.

Parameters

- **start_time** (*datetime*) – The start time of the data
- **end_time** (*datetime*) – The end time of the data

Returns Audit data

Return type dataframe

get_total(*param*, *AND=True*, *display_error=True*)
Returns the total number of audit entries in the audit store

log(*param*)
Add new log details in param to the internal log data self.audit_data.

Parameters **param** (*dict*) – Log data that is to be added

Returns None

read_keys(*pub*, *priv*)
Set the private and public key for the audit class. This is achieved by passing the entries.

#priv = config.get("privacyideaAudit.key.private") #pub = config.get("privacyideaAudit.key.public")

Parameters

- **pub** (*string with filename*) – Public key, used for verifying the signature
- **priv** (*string with filename*) – Private key, used to sign the audit entry

Returns None

search(*search_dict*, *page_size=15*, *page=1*, *sortorder='asc'*)
This function returns the audit log as a Pagination object.

search_query(*search_dict*, *page_size=15*, *page=1*, *sortorder='asc'*, *sortname='number'*)
This function returns the audit log as an iterator on the result

Machine Resolvers

Machine Resolvers are used to find machines in directories like LDAP, Active Directory, puppet, salt, or the /etc/hosts file.

Machines can then be used to assign applications and tokens to those machines.

Base class

class privacyidea.lib.machines.base.**BaseMachineResolver**(*name*, *config=None*)

static get_config_description()
Returns a description what config values are expected and allowed.

Returns dict

get_machine_id(*hostname=None*, *ip=None*)
Returns the machine id for a given hostname or IP address.

If hostname and ip is given, the resolver should also check that the hostname matches the IP. If it can check this and hostname and IP do not match, then an Exception must be raised.

Parameters

- **hostname** (*basestring*) – The hostname of the machine

- **ip** (*netaddr*) – IP address of the machine

Returns The machine ID, which depends on the resolver

Return type basestring

get_machines(*machine_id=None*, *hostname=None*, *ip=None*, *any=None*, *substring=False*)
Return a list of all machine objects in this resolver

Parameters **substring** – If set to true, it will also match search_hostnames,

that only are a subnet of the machines hostname. :type substring: bool :param any: a substring that matches EITHER hostname, machineid or ip :type any: basestring :return: list of machine objects

load_config(*config*)
This loads the configuration dictionary, which contains the necessary information for the machine resolver to find and connect to the machine store.

Parameters **config** (*dict*) – The configuration dictionary to run the machine resolver

Returns None

static testconnection(*params*)
This method can test if the passed parameters would create a working machine resolver.

Parameters **params** –

Returns tupple of success and description

Return type (bool, string)

Hosts Machine Resolver

class privacyidea.lib.machines.hosts.**HostsMachineResolver**(*name*, *config=None*)

get_machine_id(*hostname=None*, *ip=None*)
Returns the machine id for a given hostname or IP address.

If hostname and ip is given, the resolver should also check that the hostname matches the IP. If it can check this and hostname and IP do not match, then an Exception must be raised.

Parameters

- **hostname** (*basestring*) – The hostname of the machine
- **ip** (*netaddr*) – IP address of the machine

Returns The machine ID, which depends on the resolver

Return type basestring

get_machines(*machine_id=None*, *hostname=None*, *ip=None*, *any=None*, *substring=False*)
Return matching machines.

Parameters

- **machine_id** – can be matched as substring
- **hostname** – can be matched as substring
- **ip** – can not be matched as substring
- **substring** (*bool*) – Whether the filtering should be a substring matching
- **any** (*basestring*) – a substring that matches EITHER hostname, machineid or ip

Returns list of Machine Objects

load_config(*config*)
This loads the configuration dictionary, which contains the necessary information for the machine resolver to find and connect to the machine store.

Parameters **config** (*dict*) – The configuration dictionary to run the machine resolver

Returns None

static testconnection(*params*)
Test if the given filename exists.

Parameters **params** –

Returns

PinHandler

This module provides the PIN Handling base class. In case of enrolling a token, a PIN Handling class can be used to send the PIN via Email, call an external program or print a letter.

This module is not tested explicitly. It is tested in conjunction with the policy decorator init_random_pin in tests/test_api_lib_policy.py

Base class

class privacyidea.lib.pinhandling.base.**PinHandler**(*options=None*)
A PinHandler Class is responsible for handling the OTP PIN during enrollment.

It receives the necessary data like

- the PIN
- the serial number of the token
- the username
- all other user data:
  - given name, surname
  - email address
  - telephone
  - mobile (if the module would deliver via SMS)
- the administrator name (who enrolled the token)

send(*pin*, *serial*, *user*, *tokentype=None*, *logged_in_user=None*, *userdata=None*, *options=None*)

Parameters

- **pin** – The PIN in cleartext
- **user** (*user object*) – the owner of the token
- **tokentype** (*basestring*) – the type of the token
- **logged_in_user** (*dict*) – The logged in user, who enrolled the token
- **userdata** (*dict*) – Handler-specific user data like email, mobile...
- **options** (*dict*) – Handler-specific additional options

Returns True in case of success

Return type bool

1.13.3 DB level

On the DB level you can simply modify all objects.

The database model

class privacyidea.models.**Admin**(***kwargs*)
The administrators for managing the system. To manage the administrators use the command pi-manage.

In addition certain realms can be defined to be administrative realms.

Parameters

- **username** (*basestring*) – The username of the admin
- **password** (*basestring*) – The password of the admin (stored using PBKDF2, salt and pepper)
- **email** (*basestring*) – The email address of the admin (not used at the moment)

class privacyidea.models.**CAConnector**(*name*, *catype*)
The table "caconnector" contains the names and types of the defined CA connectors. Each connector has a different configuration, that is stored in the table "caconnectorconfig".

class privacyidea.models.**CAConnectorConfig**(*caconnector_id=None*, *Key=None*, *Value=None*, *caconnector=None*, *Type=''*, *Description=''*)
Each CAConnector can have multiple configuration entries. Each CA Connector type can have different required config values. Therefor the configuration is stored in simple key/value pairs. If the type of a config entry is set to "password" the value of this config entry is stored encrypted.

The config entries are referenced by the id of the resolver.

class privacyidea.models.**Challenge**(**args*, ***kwds*)
Table for handling of the generic challenges.

get(*timestamp=False*)
return a dictionary of all vars in the challenge class

Parameters **timestamp** (*bool*) – if true, the timestamp will given in a readable format 2014-11-29 21:56:43.057293

Returns dict of vars

get_otp_status()
This returns how many OTPs were already received for this challenge. and if a valid OTP was received.

Returns tuple of count and True/False

Return type tuple

is_valid()
Returns true, if the expiration time has not passed, yet. :return: True if valid :rtype: bool

set_data(*data*)
set the internal data of the challenge :param data: unicode data :type data: string, length 512

class privacyidea.models.**Config**(**args*, ***kwds*)
The config table holds all the system configuration in key value pairs.

Additional configuration for realms, resolvers and machine resolvers is stored in specific tables.

class privacyidea.models.**MachineResolver**(*name*, *rtype*)
This model holds the definition to the machinestore. Machines could be located in flat files, LDAP directory or in puppet services or other...

The usual MachineResolver just holds a name and a type and a reference to its config

class privacyidea.models.**MachineResolverConfig**(*resolver_id=None*, *Key=None*, *Value=None*, *resolver=None*, *Type=''*, *Description=''*)
Each Machine Resolver can have multiple configuration entries. The config entries are referenced by the id of the machine resolver

class privacyidea.models.**MachineToken**(**args*, ***kwds*)
The MachineToken assigns a Token and an application type to a machine. The Machine is represented as the tuple of machineresolver.id and the machine_id. The machine_id is defined by the machineresolver.

This can be an n:m mapping.

class privacyidea.models.**MachineTokenOptions**(*machinetoken_id*, *key*, *value*)
This class holds an Option for the token assigned to a certain client machine. Each Token-Clientmachine-Combination can have several options.

class privacyidea.models.**MethodsMixin**
This class mixes in some common Class table functions like delete and save

class privacyidea.models.**PasswordReset**(**args*, ***kwds*)
Table for handling password resets. This table stores the recoverycodes sent to a given user

The application should save the HASH of the recovery code. Just like the password for the Admins the appli-action shall salt and pepper the hash of the recoverycode. A database admin will not be able to inject a rogue recovery code.

A user can get several recoverycodes. A recovery code has a validity period

Optional: The email to which the recoverycode was sent, can be stored.

class privacyidea.models.**Policy**(*name*, *active=True*, *scope=''*, *action=''*, *realm=''*, *adminrealm=''*, *resolver=''*, *user=''*, *client=''*, *time=''*, *condition=0*)
The policy table contains policy definitions which control the behaviour during

- enrollment
- authentication
- authorization
- administration
- user actions

get(*key=None*)
Either returns the complete policy entry or a single value :param key: return the value for this key :type key: string :return: complete dict or single value :rytpe: dict or value

class privacyidea.models.**RADIUSServer**(***kwargs*)
This table can store configurations of RADIUS servers. https://github.com/privacyidea/privacyidea/issues/321

It saves * a unique name * a description * an IP address a * a Port * a secret

These RADIUS server definition can be used in RADIUS tokens or in a radius passthru policy.

save()
If a RADIUS server with a given name is save, then the existing RADIUS server is updated.

class privacyidea.models.**Realm**(**args*, ***kwds*)
The realm table contains the defined realms. User Resolvers can be grouped to realms. This very table contains just contains the names of the realms. The linking to resolvers is stored in the table "resolverrealm".

class privacyidea.models.**Resolver**(*name*, *rtype*)
The table "resolver" contains the names and types of the defined User Resolvers. As each Resolver can have different required config values the configuration of the resolvers is stored in the table "resolverconfig".

class privacyidea.models.**ResolverConfig**(*resolver_id=None*, *Key=None*, *Value=None*, *resolver=None*, *Type=''*, *Description=''*)
Each Resolver can have multiple configuration entries. Each Resolver type can have different required config values. Therefor the configuration is stored in simple key/value pairs. If the type of a config entry is set to "password" the value of this config entry is stored encrypted.

The config entries are referenced by the id of the resolver.

class privacyidea.models.**ResolverRealm**(*resolver_id=None*, *realm_id=None*, *resolver_name=None*, *realm_name=None*, *priority=None*)
This table stores which Resolver is located in which realm This is a N:M relation

class privacyidea.models.**SMTPServer**(***kwargs*)
This table can store configurations for SMTP servers. Each entry represents an SMTP server. EMail Token, SMS SMTP Gateways or Notifications like PIN handlers are supposed to use a reference to to a server definition. Each Machine Resolver can have multiple configuration entries. The config entries are referenced by the id of the machine resolver

class privacyidea.models.**Token**(*serial*, *tokentype=u''*, *isactive=True*, *otplen=6*, *otpkey=u''*, *userid=None*, *resolver=None*, *realm=None*, ***kwargs*)
The table "token" contains the basic token data like

- serial number
- assigned user
- secret key...

while the table "tokeninfo" contains additional information that is specific to the tokentype.

del_info(*key=None*)
Deletes tokeninfo for a given token. If the key is omitted, all Tokeninfo is deleted.

Parameters **key** – searches for the given key to delete the entry

Returns

get(**args*, ***kwds*)
simulate the dict behaviour to make challenge processing easier, as this will have to deal as well with 'dict only challenges'

Parameters

- **key** – the attribute name - in case of key is not provided, a dict of all class attributes are returned
- **fallback** – if the attribute is not found, the fallback is returned
- **save** – in case of all attributes and save==True, the timestamp is converted to a string representation

get_hashed_pin(*pin*)
calculate a hash from a pin Fix for working with MS SQL servers MS SQL servers sometimes return a '<space>' when the column is empty: ''

get_info()

Returns The token info as dictionary

get_realms()
return a list of the assigned realms :return: realms :rtype: list

get_user_pin(**args*, ***kwds*)
return the userPin :rtype : the PIN as a secretObject

set_info(*info*)
Set the additional token info for this token

Entries that end with ".type" are used as type for the keys. I.e. two entries sshkey="XYZ" and sshkey.type="password" will store the key sshkey as type "password".

Parameters **info** (*dict*) – The key-values to set for this token

set_pin(*pin*, *hashed=True*)
set the OTP pin in a hashed way

set_realms(*realms*)
Set the list of the realms. This is done by filling the tokenrealm table. :param realms: realms :type realms: list

set_so_pin(*soPin*)
For smartcards this sets the security officer pin of the token

:rtype : None

split_pin_pass(*passwd*, *prepend=True*)
The password is split into the PIN and the OTP component. THe token knows its length, so it can split accordingly.

Parameters

- **passwd** – The password that is to be split
- **prepend** – The PIN is put in front of the OTP value

Returns tuple of (res, pin, otpval)

update_otpkey(*otpkey*)
in case of a new hOtpKey we have to do some more things

update_type(*typ*)
in case the previous has been different type we must reset the counters But be aware, ray, this could also be upper and lower case mixing...

class privacyidea.models.**TokenInfo**(*token_id*, *Key*, *Value*, *Type=None*, *Description=None*)
The table "tokeninfo" is used to store additional, long information that is specific to the tokentype. E.g. the tokentype "TOTP" has additional entries in the tokeninfo table for "timeStep" and "timeWindow", which are stored in the column "Key" and "Value".

The tokeninfo is reference by the foreign key to the "token" table.

class privacyidea.models.**TokenRealm**(*realm_id=0*, *token_id=0*, *realmname=None*)
This table stored to wich realms a token is assigned. A token is in the realm of the user it is assigned to. But a token can also be put into many additional realms.

save()
We only save this, if it does not exist, yet.

privacyidea.models.**cleanup_challenges**()
Delete all challenges, that have expired.

Returns None

privacyidea.models.**get_machineresolver_id**(*resolvername*)
Return the database ID of the machine resolver :param resolvername: :return:

privacyidea.models.**get_machinetoken_id**(*machine_id*, *resolver_name*, *serial*, *application*)
Returns the ID in the machinetoken table

Parameters

- **machine_id** (*basestring*) – The resolverdependent machine_id
- **resolver_name** (*basestring*) – The name of the resolver
- **serial** (*basestring*) – the serial number of the token
- **application** (*basestring*) – The application type

Returns The ID of the machinetoken entry

Return type int

privacyidea.models.**get_token_id**(*serial*)
Return the database token ID for a given serial number :param serial: :return: token ID :rtpye: int

1.14 Frequently Asked Questions

1.14.1 How can I create users in the privacyIDEA Web UI?

So you installed privacyIDEA and want to enroll tokens to the users and are wondering how to create users.

privacyIDEA can read users from different existing sources like LDAP, SQL, flat files and SCIM.

You very much likely already have an application (like your VPN or a Web Application...) for which you want to increase the logon security. Then this application already knows users. Either in an LDAP or in an SQL database. Most web applications keep their users in a (My)SQL database. And you also need to create users in this very user database for the user to be able to use this application.

Please read the sections *UserIdResolvers* and *Userview* for more details.

But you also can define and editable SQL resolver. I.e. you can edit and create new users in an SQL user store.

If you do not have an existing SQL database with users, you can simple create a new database with one table for the users and according rows.

1.14.2 So what's the thing with all the admins?

privacyIDEA comes with its own admins, who are stored in a database table `Admin` in its own database (*The database model*). You can use the tool `pi-manage` to manage those admins from the command line as the system's root user. (see *Installation*)

These admin users can logon to the WebUI using the admin's user name and the specified password. These admins are used to get a simple quick start.

Then you can define realms (see *Realms*), that should be administrative realms. I.e. each user in this realm will have administrative rights in the WebUI.

Note: Use this carefully. Imagine you defined a resolver to a specific group in your Active Directory to be the privacyIDEA admins. Then the Active Directory domain admins can simply add users to be administrator in privacyIDEA.

You define the administrative realms in the config file `pi.cfg`, which is usually located at `/etc/privacyidea/pi.cfg`:

```
SUPERUSER_REALM = ["adminrealm1", "super", "boss"]
```

In this case all the users in the realms "adminrealm1", "super" and "boss" will have administrative rights in the WebUI, when they login with this realm.

As for all other users, you can use the *login_mode* to define, if these administrators should login to the WebUI with their userstore password or with an OTP token.

1.14.3 What are possible rollout strategies?

There are different ways to enroll tokens to a big number of users. Here are some selected high level ideas, you can do with privacyIDEA.

Autoenrollment

Using the *autoassignment* policy you can distribute physical tokens to the users. The users just start using the tokens.

Registration Code

If your users are physically not available and spread around the world, you can send a registration code to the users by postal mail. The registration code is a special token type which can be used by the user to authenticate with 2FA. If used once, the registration token get deleted and can not be used anymore. While logged in, the user can enroll a token on his own.

How can I translate to my language?

The web UI can be translated into different languages. The system determines the preferred language of you browser and displays the web UI accordingly.

At the moment "en" and "de" are available.

1.14.4 What are possible migration strategies?

You are already running an OTP system like RSA SecurID, SafeNet or Vasco (alphabetical order) but you would like to migrate to privacyIDEA.

There are different migration strategies using the *RADIUS* token or the RADIUS passthru policy.

RADIUS token migration strategy

Configure your application like your VPN to authenticate against the privacyIDEA RADIUS server and not against the old deprecated RADIUS server.

Now, you can enroll a *RADIUS* token for each user, who is supposed to login to this application. Configure the RADIUS token for each user so that the RADIUS request is forwarded to the old RADIUS server.

Now you can start to enroll tokens for the users within privacyIDEA. After enrolling a new token in privacyIDEA you can delete the RADIUS token for this user.

When all RADIUS tokens are deleted, you can switch off the old RADIUS server.

For strategies on enrolling token see *What are possible rollout strategies?*.

RADIUS PASSTHRU policy migration strategy

Configure your application like your VPN to authenticate against the privacyIDEA RADIUS server and not against the old deprecated RADIUS server.

Starting with privacyIDEA 2.11 the passthru policy was enhanced. You can define a system wide RADIUS server. Then you can create a *authentication* policy with the passthru action pointing to this RADIUS server. This means that - as long as a user trying to authenticate - has not token assigned, all authentication request with this very username and the password are forwarded to this RADIUS server.

As soon as you enroll a new token for this user in privacyIDEA the user will authenticate with this very token within privacyIDEA an his authentication request will not be forwarded anymore.

As soon as all users have a new token within privacyIDEA, you can switch of the old RADIUS server.

For strategies on enrolling token see *What are possible rollout strategies?*.

1.14.5 Setup translation

The translation is performed using grunt. To setup the translation environment do:

```
npm update -g npm
# install grunt cli in system
sudo npm install -g grunt-cli

# install grunt in project directory
npm install grunt --save-dev
# Install grunt gettext plugin
npm install grunt-angular-gettext --save-dev
```

This will create a subdirectory *node_modules*.

To simply run the German translation do:

```
make translate
```

If you want to add a new language like Spanish do:

```
cd po
msginit -l es
cd ..
grunt nggettext_extract
msgmerge po/es.po po/template.pot > po/tmp.po; mv po/tmp.po po/es.po
```

Now you can start translating with your preferred tool:

```
poedit po/es.po
```

Finally you can add the translation to the javascript translation file `privacyidea/static/components/translation/trans`

```
grunt nggettext_compile
```

Note: Please ask to add this translation to the Make directive *translation* or issue a pull request.

1.14.6 How can I setup HA (High Availability) with privacyIDEA?

privacyIDEA does not track any state internally. All information is kept in the database. Thus you can configure several privacyIDEA instances against one DBMS [21] and have the DBMS do the high availability.

Note: The passwords and OTP key material in the database is encrypted using the *encKey*. Thus it is possible to put the database onto a DBMS that is controlled by another database administrator in another department.

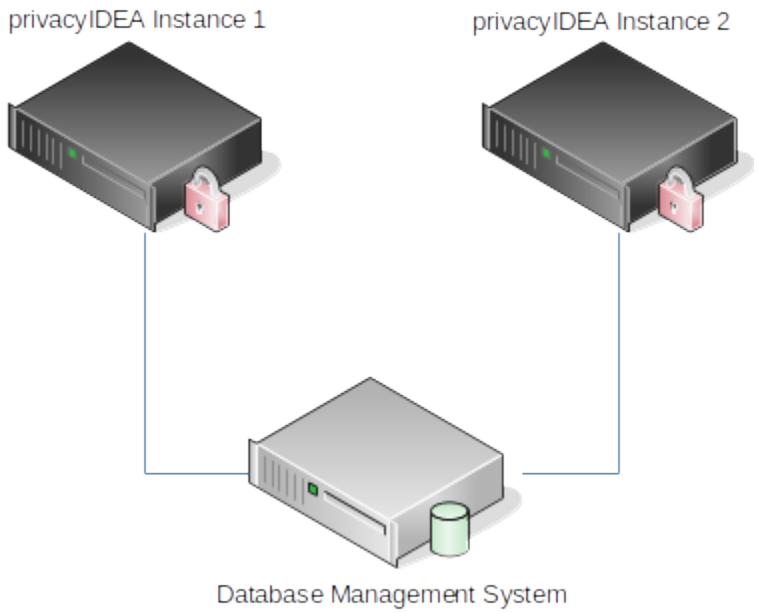
HA setups

When running HA you need to assure to configure the *pi.cfg* file on all privacyIDEA instances accordingly. You might need to adapt the `SQLALCHEMY_DATABASE_URI` accordingly.

Be sure to set the same `SECRET_KEY` and `PI_PEPPER` on all instances.

Then you need to provide the same encryption key (file *encKey*) and the same audit signing keys on all instances.

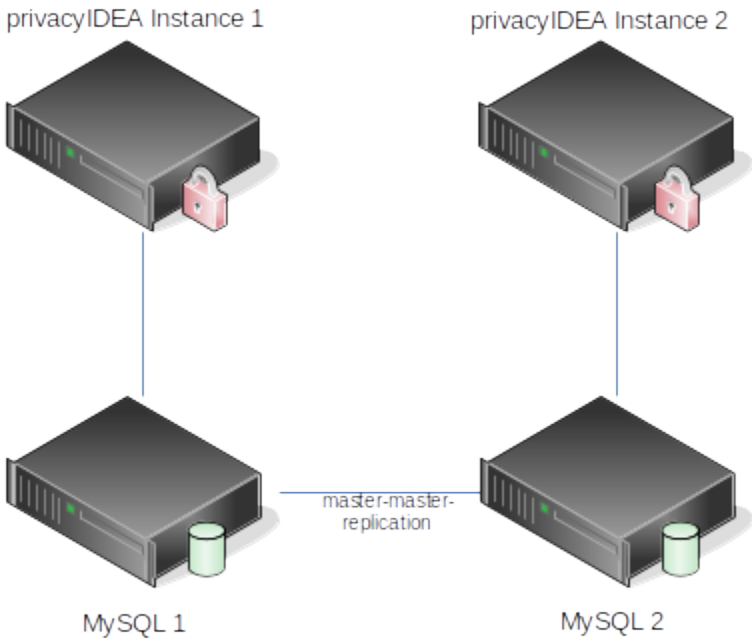
Using one central DBMS



[21] Database management system

If you already have a high available, redundant DBMS - like MariaDB Galera Cluster - which might even be addressable via one cluster IP address the configuration is fairly simple. In such a case you can configure the same `SQLALCHEMY_DATABASE_URI` on all instances.

Using MySQL master-master-replication



If you have no DBMS or might want to use a dedicated database server for privacyIDEA, you can setup one MySQL server per privacyIDEA instance and configure the MySQL servers to run in a master-master-replication.

Note: The master-master-replication only works with two MySQL servers.

There are some good howtos out there like [22].

1.14.7 MySQL database connect string

You can use the python package `MySQL-python` or `PyMySQL`.

`PyMySQL` is a pure python implementation. `MySQL-python` is a wrapper for a C implementation. I.e. when installing `MySQL-python` your python virtualenv, you also need to install packages like *python-dev* and *libmysqlclient-dev*.

Depending on whether you are using `MySQL-python` or `PyMySQL` you need to specify different connect strings in `SQLALCHEMY_DATABASE_URI`.

MySQL-python

connect string: `mysql://u:p@host/db`

[22] https://www.digitalocean.com/community/tutorials/how-to-set-up-mysql-master-master-replication.

Installation

Install a package *libmysqlclient-dev* from your distribution. The name may vary depending on which distritubtion you are running:

```
pip install MySQL-python
```

PyMySQL

connect string: `pymysql://u:p@host/db`

Installation

Install in your virtualenv:

```
pip install pymysql-sa
pip install PyMySQL
```

1.14.8 Are there shortcuts to use the Web UI?

I do not like using the mouse. Are there hotkeys or shortcuts to use the Web UI?

With version 2.6 we started to add hotkeys to certain functions. You can use '?' to get a list of the available hotkeys in the current window.

E.g. you can use `alt-e` to go to the *Enroll Token* Dialog and `alt-r` to actually enroll the token.

For any further ideas about shortcuts/hotkeys please drop us a note at github or the google group.

1.14.9 How to copy a resolver definition?

Creating a user resolver can be a time consuming task. Especially an LDAP resolver needs many parameters to be entered. Sometimes you need to create a second resolver, that looks rather the same like the first resolver. So copying or duplicating this resolver would be great.

You can create a similar second resolver by editing the exiting resolver and entering a new resolver name. This will save this modified resolver definition under this new name. Thus you have a resolver with the old name and another one with the new name.

1.14.10 Cryptographic considerations of privacyIDEA

Encryption keys

The encryption key is a set of 3 256bit AES keys. Usually this key is located in a 96 byte long file "enckey" specified by *PI_ENCFILE* in *The Config File*. The encryption key can be encrypted with a password.

The three encryption keys are used to encrypt

- data like the OTP seeds and secret keys stored in the *Token* table,
- password of resolvers to connect to LDAP/AD or SQL (stored in the *ResolverConfig* table)
- and optional additional values.

OTP seeds and passwords are needed in clear text to calculate OTP values or to connect to user stores. So these values need to be stored in a decryptable way.

Token Hash Algorithms

OTP values according to HOTP and TOTP can be calculated using SHA1, SHA2-256 and SHA2-512.

PIN Hashing

Token PINs are managed by privacyIDEA as the first of the two factors. Each token has its own token PIN. The token PIN is hashed with a seed with SHA2-256 and stored in the *Token* database table.

This PIN hashing is performed in *lib.crypto:hash*.

Administrator Passwords

privacyIDEA can manage internal administrators using *The pi-manage Script*. Internal administrators are stored in the database table *Admin*.

The password is stored using a PBKDF with SHA512 with 10023 rounds. The hash is salted and peppered. While the salt is stored in the *Admin* table created randomly for each admin password the pepper is unique for one privacyIDEA installation and stored in the pi.cfg file.

This way a database administrator is not able to inject rogue password hashes.

The admin password hashing is performed in *lib.crypto:hash_with_pepper*.

Audit Signing

The audit log is digitally signed. (see *Audit* and *The Config File*).

The audit log can be handled by different modules. privacyIDEA comes with an SQL Audit Module.

For signing the audit log the SQL Audit Module uses the RSA keys specified with the values *PI_AUDIT_KEY_PUBLIC* and *PI_AUDIT_KEY_PRIVATE* in *The Config File*.

By default the installer generates 2048bit RSA keys.

The audit signing is performed in *lib.crypto:Sign.sign* using SHA2-256 as hash function.

Note: Some parts are marked as "**(TODO)** Not yet implemented". These are components that have not been migrated from 1.5 to 2.0. If you are missing an important, not-yet-migrated part, drop us a note!

If you are missing any information or descriptions file an issue at github (which would be the preferred way), drop a note to info(@)privacyidea.org or go to the Google group.

This will help us a lot to improve documentation to your needs.

Thanks a lot!

CHAPTER 2

Indices and tables

- genindex
- modindex
- search

/application

/audit

/auth

/defaultrealm

/machine

/machineresolver

/policy

/realm

/resolver

/smtpserver

/system

/token

/token/(serial)

/token/assign

/token/challenges

/token/copypin

/token/copyuser

/token/disable

/token/enable

/token/getserial

/token/init

/token/load

/token/lost

/token/realm

/token/reset

/token/resync

/token/revoke

/token/set

/token/setpin

/token/unassign

/ttype

/user

/validate

p

Symbols

A

B

C

D

E

F

G

H

I

J

L

M

N

O

P

Q

R

S

T

U

V

W

Y