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# **GNU Taler Developer Onboarding Manual**

*Release 0.6.0pre1*

**GNU Taler team**

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## TALER INSTALLATION

This section describes the GNU Taler deployment on `gv.taler.net`.

### 1.1 User Accounts

On `gv.taler.net`, there are four users that are set up to serve Taler on the internet:

- `taler-test`: serves `*.test.taler.net` and gets automatically built by Buildbot.
- `taler-internal`: serves `*.int.taler.net`, and does *NOT* get automatically built.

The following two users are *never* automatically built, and they both serve `*.demo.taler.net`. At any given time, only one is active and serves the HTTP requests from the outside; the other one can so be compiled without any downtime. If the compilation succeeds, the inactive user can be switched to become active (see next section), and vice versa.

- `demo-blue`
- `demo-green`

### 1.2 Compile and switch color.

If the setup is already bootstrapped, then it should only be needed to login as 'demo-X' (with X being the inactive color); and then:

```
$ source activate
$ taler-deployment-build
```

and then switch the color by logging in as the *demo* user, and switch the color with the following command:

```
$ taler-deployment-switch-demo-X
```

### 1.3 Full bootstrap.

In order to bootstrap a Taler installation under a empty home directory, do:

```
$ cd $HOME
$ git clone git://git.taler.net/deployment
```

Then run the prepare script that will (1) download all the repositories (2) build the codebases, (3) configure the system, and (4) generate the needed data.

```
:: $ ./deployment/bin/taler-deployment-prepare [test | int | demo]
```

### Note

If the DB schema of merchant/exchange/auditor changed, at this point it MIGHT be necessary to reset all the tables. To this regard, consider running one of the following commands:

```
# To reset the merchant DB.
$ taler-merchant-dbinit -r

# To reset the exchange DB.
$ taler-exchange-dbinit -r

# To reset the exchange DB.
$ taler-auditor-dbinit -r
```

If all the steps succeeded, then it should be possible to launch all the services. Give:

```
$ taler-deployment-start

# or restart, if you want to kill old processes and
# start new ones.
$ taler-deployment-restart
```

Verify that all services are up and running:

```
$ taler-deployment-arm -I
$ tail logs/<component>-<date>.log
```

## 1.4 How to upgrade the code.

Some repositories, especially the ones from the released components, have a *stable* branch, that keeps older and more stable code. Therefore, upon each release we must rebase those stable branches on the master.

The following commands do that:

```
$ cd $REPO

$ git pull origin master stable
$ git checkout stable

# option a: resolve conflicts resulting from hotfixes
$ git rebase master
$ ...

# option b: force stable to master
$ git update-ref refs/heads/stable master

$ git push # possibly with --force

# continue development
$ git checkout master
```



## BUILDING THE DOCUMENTATION

All the Taler documentation is built by the user *docbuilder* that runs a Buildbot worker. The following commands set the *docbuilder* up, starting with a empty home directory.

:: # Log-in as the 'docbuilder' user.

```
$ cd $HOME $ git clone git://git.taler.net/deployment $ ./deployment/bootstrap-docbuilder
```

```
# If the previous step worked, the setup is # complete and the Buildbot worker can be started.
```

```
$ buildbot-worker start worker/
```



## BUILDING THE WEBSITES.

Taler Websites, *www.taler.net* and *stage.taler.net*, are built by the user *taler-websites* by the means of a Buildbot worker. The following commands set the *taler-websites* up, starting with a empty home directory.

:: # Log-in as the 'taler-websites' user.

```
$ cd $HOME $ git clone git://git.taler.net/deployment $ ./deployment/bootstrap-sitesbuilder
```

```
# If the previous step worked, the setup is # complete and the Buildbot worker can be started.
```

```
$ buildbot-worker start worker/
```



## CODE COVERAGE.

Code coverage tests are run by the *lcovworker* user, and are also driven by Buildbot.

```
# Log-in as the 'lcovworker' user.

$ cd $HOME
$ git clone git://git.taler.net/deployment
$ ./deployment/bootstrap-taler lcov

# If the previous step worked, the setup is
# complete and the Buildbot worker can be started.

$ buildbot-worker start worker/
```

The results are then published at <https://lcov.taler.net/>.



## ONLINE SERVICES CHECKER.

The user *demo-checker* runs periodic checks to see if all the *\*.demo.taler.net* services are up and running. It is driven by Buildbot, and can be bootstrapped as follows.

```
# Log-in as the 'demo-checker' user

$ cd $HOME
$ git clone git://git.taler.net/deployment
$ ./deployment/bootstrap-demochecker

# If the previous step worked, the setup is
# complete and the Buildbot worker can be started.

$ buildbot-worker start worker/
```





## TOPPING THE TIP RESERVE UP

Both 'test' and 'demo' setups get their tip reserve topped up by a Buildbot worker. The following steps get the reserve topper prepared.

```
:: # Log-in as <env>-topper, with <env> being either 'test' or 'demo'  
    $ git clone git://git.taler.net/deployment $ ./deployment/prepare-reservetopper <env>  
    # If the previous steps worked, then it should suffice to start # the worker, with:  
    $ buildbot-worker start worker/
```



## PRODUCING AUDITOR REPORTS

Both 'test' and 'demo' setups get their auditor reports compiled by a Buildbot worker. The following steps get the reports compiler prepared.

```
:: # Log-in as <env>-auditor, with <env> being either 'test' or 'demo'  
    $ git clone git://git.taler.net/deployment $ ./deployment/prepare-auditorreporter <env>  
    # If the previous steps worked, then it should suffice to start # the worker, with:  
    $ buildbot-worker start worker/
```



## 8.1 Release Process and Checklists

This document describes the process for releasing a new version of the various Taler components to the official GNU mirrors.

The following components are published on the GNU mirrors

- taler-exchange (exchange.git)
- taler-merchant (merchant.git)
- talerdonations (donations.git)
- talerblog (blog.git)
- taler-bank (bank.git)
- taler-wallet-webex (wallet-webex.git)

## 8.2 Tagging

Tag releases with an **annotated** commit, like

```
git tag -a v0.1.0 -m "Official release v0.1.0"  
git push origin v0.1.0
```

## 8.3 Database for tests

For tests in the exchange and merchant to run, make sure that a database *talercheck* is accessible by *\$USER*. Otherwise tests involving the database logic are skipped.

## 8.4 Exchange, merchant

Set the version in `configure.ac`. The commit being tagged should be the change of the version.

For the exchange test cases to pass, `make install` must be run first. Without it, test cases will fail because plugins can't be located.

```
./bootstrap
./configure # add required options for your system
make dist
tar -xf taler-$COMPONENT-$VERSION.tar.gz
cd taler-$COMPONENT-$VERSION
make install check
```

## 8.5 Wallet WebExtension

The version of the wallet is in *manifest.json*. The *version\_name* should be adjusted, and *version* should be increased independently on every upload to the WebStore.

```
./configure
make dist
```

## 8.6 Upload to GNU mirrors

See <https://www.gnu.org/prep/maintain/maintain.html#Automated-FTP-Uploads>

Directive file:

```
version: 1.2
directory: taler
filename: taler-exchange-0.1.0.tar.gz
```

Upload the files in **binary mode** to the ftp servers.

**CODE**

Taler code is versioned via Git. For those users without write access, all the codebases are found at the following URL:

```
git://git.taler.net/<repository>
```

A complete list of all the existing repositories is currently found at <https://git.taler.net/>. Note: <repository> must NOT have the .git extension.





## BUGTRACKING

Bug tracking is done with Mantis (<https://www.mantisbt.org/>). All the bugs are then showed and managed at <https://bugs.gnunet.org/>, under the “Taler” project. A registration on the Web site is needed in order to use the bug tracker.



## CONTINUOUS INTEGRATION

CI is done with Buildbot (<https://buildbot.net/>), and builds are triggered by the means of Git hooks. The results are published at <https://buildbot.wild.gv.taler.net/>.

In order to avoid downtimes, CI uses a “blue/green” deployment technique. In detail, there are two users building code on the system, the “green” and the “blue” user; and at any given time, one is running Taler services and the other one is either building the code or waiting for that.

There is also the possibility to trigger builds manually, but this is only reserved to “admin” users.



## CODE COVERAGE

Code coverage is done with the Gcov / Lcov (<http://ltp.sourceforge.net/coverage/lcov.php>) combo, and it is run *\*nightly\** (once a day) by a Buildbot worker. The coverage results are then published at <https://lcov.taler.net/>.



## CODING STYLE

These are the general coding style rules for Taler.

- Baseline rules are to follow GNU guidelines, modified or extended by the GNUnet style: <https://gnunet.org/style>

### 13.1 Naming conventions

- include files (very similar to GNUnet):
  - if installed, must start with “`taler_`” (exception: `platform.h`), and MUST live in `src/include/`
  - if NOT installed, must NOT start with “`taler_`” and MUST NOT live in `src/include/` and SHOULD NOT be included from outside of their own directory
  - end in “`_lib`” for “simple” libraries
  - end in “`_plugin`” for plugins
  - end in “`_service`” for libraries accessing a service, i.e. the exchange
- binaries:
  - `taler-exchange-xxx`: exchange programs
  - `taler-merchant-xxx`: merchant programs (demos)
  - `taler-wallet-xxx`: wallet programs
  - plugins should be `libtaler_plugin_xxx_yyy.so`: plugin `yyy` for API `xxx`
  - `libtalerxxx`: library for API `xxx`
- logging
  - tools use their full name in `GNUNET_log_setup` (i.e. ‘`taler-exchange-keyup`’) and log using plain ‘`GNUNET_log`’.
  - pure libraries (without associated service) use ‘`GNUNET_log_from`’ with the component set to their library name (without `lib` or ‘`.so`’), which should also be their directory name (i.e. ‘`util`’)
  - plugin libraries (without associated service) use ‘`GNUNET_log_from`’ with the component set to their type and plugin name (without `lib` or ‘`.so`’), which should also be their directory name (i.e. ‘`exchangedb-postgres`’)
  - libraries with associated service) use ‘`GNUNET_log_from`’ with the name of the service, which should also be their directory name (i.e. ‘`exchange`’)
- configuration
  - same rules as for GNUnet

- exported symbols
  - must start with `TALER_[SUBSYSTEMNAME]_` where `SUBSYSTEMNAME` MUST match the subdirectory of `src/` in which the symbol is defined
  - from `libtalerutil` start just with `TALER_`, without `subsystemname`
  - if scope is ONE binary and symbols are not in a shared library, use binary-specific prefix (such as `TMH = taler-exchange-httpd`) for globals, possibly followed by the subsystem (`TMH_DB_xxx`).
- structs:
  - structs that are ‘packed’ and do not contain pointers and are thus suitable for hashing or similar operations are distinguished by adding a “P” at the end of the name. (NEW) Note that this convention does not hold for the `GNUnet`-structs (yet).
  - structs that are used with a purpose for signatures, additionally get an “S” at the end of the name.
- private (library-internal) symbols (including structs and macros)
  - must not start with `TALER_` or any other prefix
- testcases
  - must be called “`test_module-under-test_case-description.c`”
- performance tests
  - must be called “`perf_module-under-test_case-description.c`”



## TESTING LIBRARY

This chapter is a VERY ABSTRACT description of how testing is implemented in Taler, and in NO WAY wants to substitute the reading of the actual source code by the user.

In Taler, a test case is a array of `struct TALER_TESTING_Command`, informally referred to as `CMD`, that is iteratively executed by the testing interpreter. This latter is transparently initiated by the testing library.

However, the developer does not have to defined `CMDs` manually, but rather call the proper constructor provided by the library. For example, if a `CMD` is supposed to test feature `x`, then the library would provide the `TALER_TESTING_cmd_x ()` constructor for it. Obviously, each constructor has its own particular arguments that make sense to test `x`, and all constructor are thoroughly commented within the source code.

Internally, each `CMD` has two methods: `run ()` and `cleanup ()`. The former contains the main logic to test feature `x`, whereas the latter cleans the memory up after execution.

In a test life, each `CMD` needs some internal state, made by values it keeps in memory. Often, the test has to *share* those values with other `CMDs`: for example, `CMD1` may create some key material and `CMD2` needs this key material to encrypt data.

The offering of internal values from `CMD1` to `CMD2` is made by *traits*. A trait is a `struct TALER_TESTING_Trait`, and each `CMD` contains a array of traits, that it offers via the public trait interface to other commands. The definition and filling of such array happens transparently to the test developer.

For example, the following example shows how `CMD2` takes an amount object offered by `CMD1` via the trait interface.

Note: the main interpreter and the most part of `CMDs` and traits are hosted inside the exchange codebase, but nothing prevents the developer from implementing new `CMDs` and traits within other codebases.

```
/* Without loss of generality, let's consider the
 * following logic to exist inside the run() method of CMD1 */
..

struct TALER_Amount *a;
/**
 * the second argument (0) points to the first amount object offered,
 * in case multiple are available.
 */
if (GNUNET_OK != TALER_TESTING_get_trait_amount_obj (cmd2, 0, &a))
    return GNUNET_SYSERR;
...

use(a); /* 'a' points straight into the internal state of CMD2 */
```

In the Taler realm, there is also the possibility to alter the behaviour of supposedly well-behaved components. This is needed when, for example, we want the exchange to return some corrupted signature in order to check if the merchant backend detects it.

This alteration is accomplished by another service called *twister*. The twister acts as a proxy between service A and B, and can be programmed to tamper with the data exchanged by A and B.

Please refer to the Twister codebase (under the `test` directory) in order to see how to configure it.

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