

Sqitch

Ronan
Dunklau

The problem

Sqitch:
overview

Practical
sqitch

Sqitch

VCS-enabled database change management

Ronan Dunklau

Kozea

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Outline

Sqitch

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- 1 The problem
 - Overview
 - Solutions
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 - Goals
 - Concepts
- 3 Practical sqitch
 - Getting started
 - Writing changes
 - Deploying changes
 - VCS-enabled, you said?
 - Templates

Database change

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Solutions

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Different kind of changes:

- Database Schema changes (DDL statements)

```
ALTER TABLE sometable ADD COLUMN somecolumn VARCHAR
```

- Static data changes (DML statements)

```
INSERT INTO vat_rates (vat_code, vat_country, timespan)
  values ('BTW', 'BE', '[2012-01-01,infinity)')::daterange)
```

- Procedures, Triggers, Extensions. . .

```
CREATE OR REPLACE FUNCTION increment(integer) RETURNS integer as $$
  select $1 + 1;
$$ LANGUAGE sql;
```

Common problems

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- **Current state of the db** What should I deploy to be up-to-date ?
- **Versioning** How can I store the different revisions ?
- **Concurrent work** How can I merge my work with my colleagues ?
- **Revert** Is there a way to revert to a previous state ?

Ordered scripts - bis

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- Hard to maintain
- Tend to evolve into a full home-grown (or not) solution:
sql migrations
- Merges are hell

Ordered scripts - bis

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Solutions

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- Hard to maintain
- Tend to evolve into a full home-grown (or not) solution: sql migrations
- Merges are hell

Example

```
-lctrh  
01-initial.sql 02-table1.sql 10-table2.sql  
15-table3.sql 20-add_function.sql  
21-add_another_function.sql
```

Domain-Specific-Languages (DSLs)

- Examples: Liquibase, Rails migrations, Django south, SQLAlchemy's alembic...
- Often tied to a language/framework
- "Opinionated" about what you can and should do

Sqitch goals

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Goals:

- Easy-to-use
- VCS integration
- No silly conventions
- Easy configuration
- No opinions

Sqitch concepts

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Concepts

- Change
- Status
- Tag
- Plan

Changes

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Changes

- Named transition from a state *A* to a state *B*, along with the reverse transition.
- Uniquely identified (think of git commit hash)
- Defines "dependencies" and "conflicts" with other changes (optional)
- Actually defines three scripts:
 - deploy
 - revert
 - verify

Status

- Current database status
- Defined by the set of applied change

Example

```
user@machine% sqitch status
# On database sqitchtest
# Project: sqitch-tuto
# Change: 0694e414dc474004803c150df5ffd61b672b47e6
# Name: change_pass
# Deployed: 2013-01-29 08:38:21 +0100
# By: Ronan Dunklau <ronan.dunklau@kozea.fr>
#
Nothing to deploy (up-to-date)
```

Tags

- Similar to a VCS tag ex: git tag
- Allows to "tag" a specific change to identify a particular state ex: V1.0.0

Plan

- Set of every defined change and tag
- Materialized by a simple "sqitch.plan" text file

Example

```
%syntax-version=1.0.0-b2
%project=sqitch-tuto
%uri=sqitch-tuto
appschema 2012-10-10T15:12:30Z Ronan Dunklau <ronan.dunklau@kozea.fr> # App schema for all sqitch tuto objects.
users [appschema] 2012-10-11T07:42:04Z Ronan Dunklau <ronan.dunklau@kozea.fr> # Creates table to track our users.
insert_user [users appschema] 2012-10-11T07:47:22Z Ronan Dunklau <ronan.dunklau@kozea.fr> # insert_user function
change_pass [users appschema] 2012-10-11T07:47:27Z Ronan Dunklau <ronan.dunklau@kozea.fr> # change_pass function
@v1.0.0-dev1 2012-10-11T07:51:41Z Ronan Dunklau <ronan.dunklau@kozea.fr> # Tag v1.0.0-dev1
```

plan

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- Preamble
- Plan
- Change name

```
%syntax-version=1.0.0-b
%project=sqitch-tuto
%uri=sqitch-tuto

appschema 2012-10-10T15:12:30Z Author <author@domain.com> # Comments.

users [appschema] 2012-10-11T07:42:04Z Author <author@domain.com> # Comments.

@v1.0.0-dev1 2012-10-11T07:51:41Z Author <author@domain.com> # Tag v1.0.0-dev1
```

- Changes
- Tags
- Comments

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```
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%project=sqitch-tuto
%uri=sqitch-tuto

appschema 2012-10-10T15:12:30Z Author <author@domain.com> # Comments.

users [appschema] 2012-10-11T07:42:04Z Author <author@domain.com> # Comments.

@v1.0.0-dev1 2012-10-11T07:51:41Z Author <author@domain.com> # Tag v1.0.0-dev1
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```
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appschema 2012-10-10T15:12:30Z Author <author@domain.com> # Comments.

users [appschema] 2012-10-11T07:42:04Z Author <author@domain.com> # Comments.

@v1.0.0-dev1 2012-10-11T07:51:41Z Author <author@domain.com> # Tag v1.0.0-dev1
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```
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%uri=sqitch-tuto

appschema 2012-10-10T15:12:30Z Author <author@domain.com> # Comments.

users [appschema] 2012-10-11T07:42:04Z Author <author@domain.com> # Comments.

@v1.0.0-dev1 2012-10-11T07:51:41Z Author <author@domain.com> # Tag v1.0.0-dev1
```

- Changes
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```
%syntax-version=1.0.0-b
%project=sqitch-tuto
%uri=sqitch-tuto

appschema 2012-10-10T15:12:30Z Author <author@domain.com> # Comments.

users [appschema] 2012-10-11T07:42:04Z Author <author@domain.com> # Comments.

@v1.0.0-dev1 2012-10-11T07:51:41Z Author <author@domain.com> # Tag v1.0.0-dev1
```

- Changes
- Tags
- Comments

Installation

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Getting started

Writing changes

Deploying changes

VCS-enabled, you
said?

Templates

- Install from CPAN (comprehensive perl archive network) `cpan -f App::Sqitch`

- Available from the Kozea gentoo overlay.

<https://github.com/Kozea/Overlay.git>

Configuration

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Templates

● Per-project

```
~/myproject/sqitch.conf
```

- Project specific configuration: dbengine, dbname...
- Edition via a text editor, or the sqitch config command

```
user@host:# sqitch config core.engine pg
```

● Per-user

```
~/sqitch/sqitch.conf
```

- User configuration: user name, user email...
- Edition via a text editor, or the sqitch config --user command

```
user@host:# sqitch config --user user.name "Ronan Dunklau"  
user@host:# sqitch config --user user.email "ronan.dunklau@kozea.fr"
```

Initializing a new project

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Templates

```
user@host % mkdir myproject
user@host % cd myproject
user@host % sqitch --engine pg init myproject --uri http://myproject/
Created sqitch.conf
Created sqitch.plan
Created deploy/
Created revert/
Created verify/
```

Default sqitch.conf

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Templates

```
[core]
  engine = pg
  # plan_file = sqitch.plan
  # top_dir = .
  # deploy_dir = deploy
  # revert_dir = revert
  # verify_dir = verify
  # extension = sql
# [core "pg"]
# db_name =
# client = psql
# sqitch_schema = sqitch
# password =
# port =
# host =
# username =
```

Anatomy of a change

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Templates

- Entry in the sqitch.plan file
- 3 scripts, all named by "change_name.sql"
 - deploy
 - revert
 - verify

Adding a change

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Templates

```
● sqitch add mynewtable -n "Add my newtable"  
Created deploy/mynewtable.sql  
Created revert/mynewtable.sql  
Created verify/mynewtable.sql  
Added "mynewtable" to sqitch.plan
```

Adding a change

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said?

Templates

- `sqitch add mynewtable -n "Add my newtable"`
Created `deploy/mynewtable.sql`
Created `revert/mynewtable.sql`
Created `verify/mynewtable.sql`
Added "mynewtable" to `sqitch.plan`

- **Creates everything**

Adding a change

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said?

Templates

- `sqitch add mynewtable -n "Add my newtable"`
Created `deploy/mynewtable.sql`
Created `revert/mynewtable.sql`
Created `verify/mynewtable.sql`
Added "mynewtable" to `sqitch.plan`

- **Creates everything**
- **Just need to fill in the blanks !**

Sqitch.plan

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said?

Templates

```
%syntax-version=1.0.0-b2
%project=myproject
%uri=http://myproject/
```

```
mynewtable 2013-01-31T09:57:11Z Ronan Dunklau <ronan.dunklau@kozea.fr> # Add mynewtab
```

Deploy Script

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Templates

```
-- Deploy mynewtable
```

```
BEGIN;
```

```
-- XXX Add DDLs here.
```

```
COMMIT;
```

Deploy Script

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said?

Templates

```
-- Deploy mynewtable
```

```
BEGIN;
```

```
    CREATE TABLE mynewtable (  
        id serial primary key,  
        label varchar
```

```
    );
```

```
COMMIT;
```

Revert Script

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said?

Templates

```
-- Revert mynewtable
```

```
BEGIN;
```

```
-- XXX Add DDLs here.
```

```
COMMIT;
```

Revert Script

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Templates

```
-- Revert mynewtable
```

```
BEGIN;
```

```
    DROP TABLE mynewtable;
```

```
COMMIT;
```


Verify Script

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Templates

```
-- Test mynewtable
```

```
BEGIN;
```

```
-- XXX Add tests here.
```

```
COMMIT;
```

Verify Script

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Templates

```
-- Test mynewtable
```

```
BEGIN;
```

```
    SELECT 1 from mynewtable;
```

```
COMMIT;
```

Deploy changes

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Templates

3 commands:

- `sqitch deploy [target]`
- `sqitch revert [target]`
- `sqitch rebase [revert-target] [deploy-target]`

Examples

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Templates

```
user@host % sqitch status
# On database sqitchtest
No changes deployed

user@host % sqitch deploy
Deploying changes to sqitchtest
+ mynewchange .. ok

user@host % sqitch revert
Revert all changes from sqitchtest? [Yes]
- mynewchange .. ok
```

More changes

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Templates

```
user@host % sqitch add mysecondtable --requires mynewtable -n "Add second tables"
Created deploy/mysecondtable.sql
Created revert/mysecondtable.sql
Created verify/mysecondtable.sql
Added "mysecondtable [mynewtable]" to sqitch.plan
```

```
%syntax-version=1.0.0-b2
%project=myproject
%uri=http://myproject/
```

```
mynewtable 2013-01-31T09:57:11Z Ronan Dunklau <ronan.dunklau@kozea.fr> # Add mynewtab
mysecondtable [mynewtable] 2013-01-31T10:04:25Z Ronan Dunklau <ronan.dunklau@kozea.fr>
```

Ready to release

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Templates

```
user@host % sqitch tag v0.0.1 -n First release
Tagged "mysecondtable" with @v0.0.1
user@host % sqitch bundle
Bundling into bundle
Writing config
Writing plan
Writing scripts
    + mynewtable
    + mysecondtable @v0.0.1
```

Easy to merge

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Templates

- Each change lives in its own set of files
- Only sqitch.plan may produce merge conflict

Easy to merge

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Templates

- Each change lives in its own set of files
- Only sqitch.plan may produce merge conflict
 - Easy to resolve: merge=union

Easy to merge

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Templates

- Each change lives in its own set of files
- Only sqitch.plan may produce merge conflict
 - Easy to resolve: merge=union
 - Simple sequence + dependencies

Rework

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Templates

Rework = modify an existing script Ex: rewrite a function, or change a column data type.

- ```
sqitch rework mynewtable -m "Add a column"
Added "mynewtable [mynewtable@v0.0.1]" to sqitch.plan.
Modify these files as appropriate:
 * deploy/mynewtable.sql
 * revert/mynewtable.sql
 * verify/mynewtable.sql
```

- Copy mynewtable.sql to mynwtble@v0.0.1.sql

# Rework

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Templates

Rework = modify an existing script Ex: rewrite a function, or change a column data type.

- ```
sqitch rework mynewtable -m "Add a column"
Added "mynewtable [mynewtable@v0.0.1]" to sqitch.plan.
Modify these files as appropriate:
  * deploy/mynewtable.sql
  * revert/mynewtable.sql
  * verify/mynewtable.sql
```

- Copy mynewtable.sql to mynwtble@v0.0.1.sql

Warning

Make sure everything is consistent! Deploy:
mynewtable@v0.0.1 -¿ mysecondtable -¿ v0.0.1 -¿
mynewtable Revert: mynewtable -¿ v0.0.1 -¿
mysecondtable -¿ mynewtable@v0.0.1

Templates

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Templates

- Custom templates creation for deploy / revert / verify scripts
- Deploy.templates configuration

Templates

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Templates

- Custom templates creation for deploy / revert / verify scripts
- Deploy.templates configuration
- Available as a command-line options:

```
--template-directory  
--deploy-template  
--revert-template
```

Why use templates ?

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Templates

- Enhance productivity
- Enforce conventions

Example: template

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Templates

```
-- Deploy [% change %]
[% FOREACH item IN requires -%]
-- requires: [% item %]
[% END -%]
[% FOREACH item IN conflicts -%]
-- conflicts: [% item %]
[% END -%]

BEGIN;

CREATE FUNCTION [% change %] () RETURNS VOID AS $$
-- XXX function body
$$ language sql;

COMMENT ON FUNCTION [% change %] IS ' [% comment %] ';

COMMIT;
```

Example: Add change

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Templates

```
user@host % sqitch add randomstring \  
                --template-dir=./functiontemplates/ \  
                --set comment="Returns a random string"  
Created deploy/randomstring.sql  
Created revert/randomstring.sql  
Created verify/randomstring.sql  
Added "randomstring" to sqitch.plan  
  
-- Deploy randomstring  
  
BEGIN;  
  
CREATE FUNCTION randomstring () RETURNS VOID AS $$  
    -- XXX function body  
$$ language sql;  
  
COMMENT ON FUNCTION randomstring IS 'Returns a random string';  
  
COMMIT;
```


Questions

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Templates

Thank you for your attention! Questions ?