Test Your Database with pgTAP

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PostgreSQL Conference West 2008

Working on a New App

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CREATE TABLE users (
  nick  TEXT    PRIMARY KEY,
  pass  TEXT    NOT NULL,
);
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CREATE UNIQUE INDEX udx_users_nick
ON users(LOWER(nick));
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CREATE UNIQUE INDEX udx_users_nick
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- Bah! Two indexes!

Lookup a User

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SELECT *
  FROM users
 WHERE LOWER(nick) = LOWER(?);
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- I finally got sick of this
- What to do?

- Well, I've got these great tools…


CITEXT

Shave Me!

Inspiration Strikes!

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- Hey, I know!

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- I can implement CITEXT 2.0!

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- Now what?
- Write tests, of course

Writing Tests

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- Hard to know if values correct
- Perl tests: Output easy to interpret
- Why not output something simple?

First Stab at SQL Testing

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```
\set QUIET 1
\set ON_ERROR_STOP 1
\pset format unaligned
\pset tuples_only
\pset pager

SELECT 'a'::citext = 'a'::citext;
SELECT 'a'::citext = 'A'::citext;
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First Pass at Output

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- Cool!
- Inspired by Perl test output: easy to scan
- But…could it be better?


ExposedPlanet.com
TAP


ExposedPlanet.com
TAP
Shave Me!

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Inspiration Strikes Again!

- Hey, I know!
- I can port Test::More from Perl
- Test::More outputs TAP
- Test output will be easy to read

OMG TAP WTF?

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> Test Anything Protocol (TAP) is a general purpose format for transmitting the result of test programs to a thing which interprets and takes action on those results. Though it is language agnostic, it is primarily used by Perl modules.
>
> —Wikipedia

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% perl -Ilib t/try.t
1..5
ok 1 - use FSA::Rules;
ok 2 - Create FSA::Rules object
ok 3 - Start the machine
not ok 4 - Should have a state
#   Failed test 'Should have a state'
#   at t/try.t line 12.
ok 5 - Should be able to reset
# Looks like you failed 1 test of 5.
```

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- Think they passed?

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```
use Test::More tests => 5;
use_ok 'FSA::Rules';
ok my $r = FSA::Rules->new,
   'Create FSA::Rules object';
ok $r->start, 'Start the machine';
ok $r->curr_state, 'Should have a state';
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\echo 1..3
CREATE TEMP SEQUENCE __tc__;
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RETURNS TEXT AS $$
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              ) END;
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SELECT ok( 'a' = 'a', '"a" should eq "a"' );
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Introducing pgTAP

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  - finish() — Test finished, report!

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pgTAP Basics

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\set QUIET on
\set ON_ERROR_ROLLBACK true
\set ON_ERROR_STOP true
\pset tuples_only
\pset format unaligned
BEGIN;

-- Plan the tests.
SELECT plan(1);
--SELECT * FROM no_plan();

SELECT ok( true, 'Truth should be true' );

-- Clean up.
SELECT * FROM finish();
ROLLBACK;
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pgTAP Practices

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SELECT has_table( 'users' );
SELECT has_pk( 'users' );
SELECT has_column( 'users', 'surname' );
SELECT col_not_null( 'users', 'name' );
SELECT col_type_is( 'users', 'name', 'text' );

SELECT fk_ok(
    'contacts', 'user_id',
    'users',    'id'
);
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A pgTAP Loop

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```
SELECT plan(5);

CREATE TEMPORARY TABLE try (
    a CITEXT,
    b TEXT
);

INSERT INTO try
VALUES ('a', 'a'), ('b', 'b'),
       ('a', 'a'), ('à', 'à'),
       ('Bjørn', 'Bjørn');

SELECT is(
    UPPER( a ),
    UPPER( b ),
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) FROM try;
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A pgTAP Loop

```
SELECT plan(5);

CREATE TEMPORARY TABLE try (
    a CITEXT,
    b TEXT
);

INSERT INTO try
VALUES ('a', 'a'), ('b', 'b'),
       ('a', 'a'), ('à', 'à'),
       ('Bjørn', 'Bjørn');

SELECT is(
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pgTAP Loop Output

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ok 2 - UPPER("b")
ok 3 - UPPER("a")
ok 4 - UPPER("à")
ok 5 - UPPER("Bjørn")
```

Validate your Schema

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SELECT is( 'a', 'a', '"a" should eq "a"' );
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SELECT matches( 'foo', 'o$', '"foo" ~ "o$"');
SELECT like( 'foo', 'f%', '"foo" ~~ "f%"');
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Test Your Schema

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- Say you use triggers in your database

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```
CREATE FUNCTION hash_pass() RETURNS TRIGGER AS $$
BEGIN
    NEW.pass := MD5( NEW.pass );
    RETURN NEW;
END;
$$ LANGUAGE plpgsql;

CREATE TRIGGER set_users_pass
BEFORE INSERT OR UPDATE ON users
FOR EACH ROW EXECUTE PROCEDURE hash_pass();
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```

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```

```
SELECT is(
    pass,
    MD5('s0up3rs3c!7'),
    'Password should be hashed'
) FROM users WHERE nick = 'theory';
```

Validate Your Schema

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INSERT INTO users ( nick, pass )
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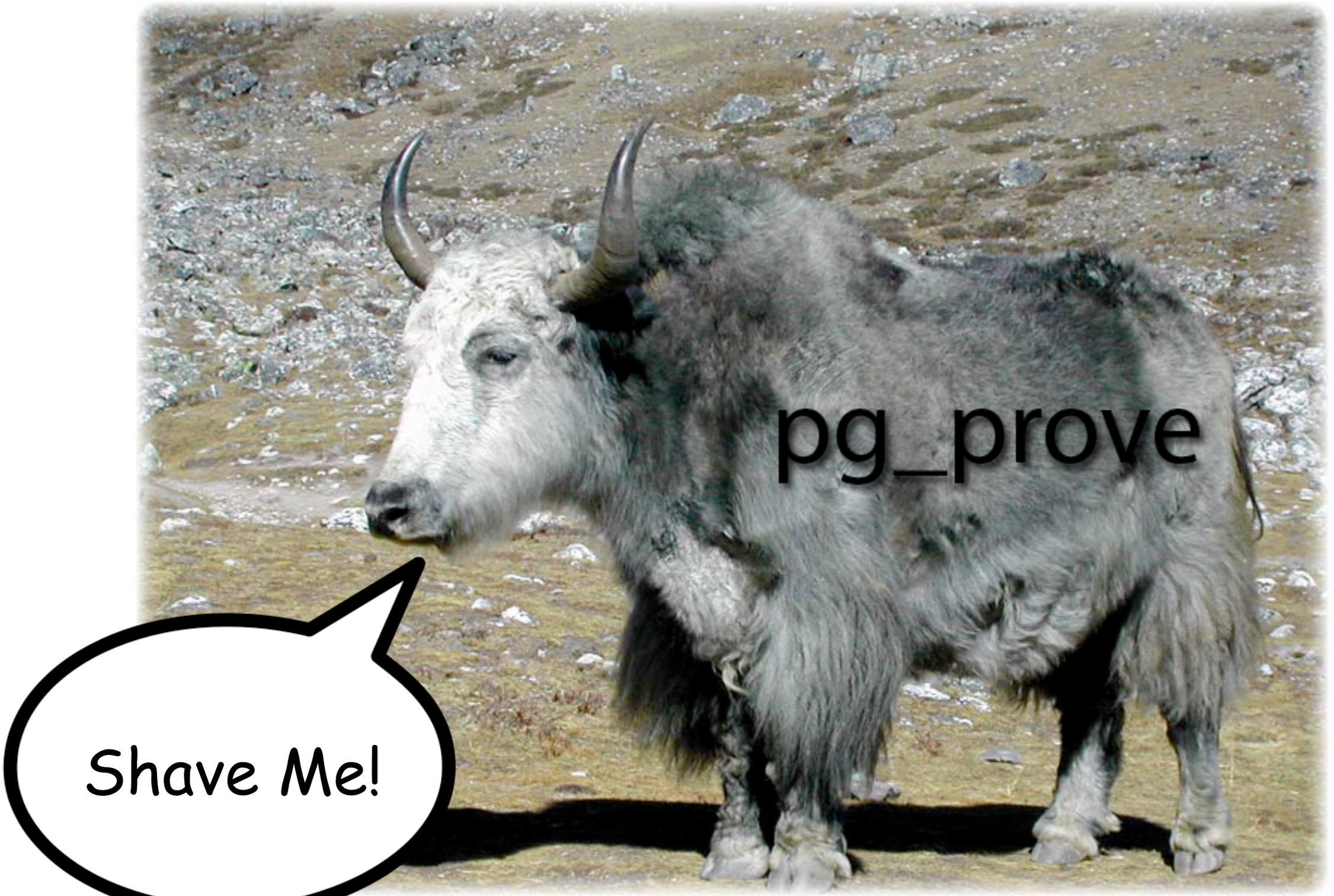
- This got me to thinking...


pg_prove


pg_prove
Shave Me!

TAP::Harness

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test_foo.....
1..5
ok 1 - UPPER("a")
ok 2 - UPPER("b")
ok 3 - UPPER("a")
ok 4 - UPPER("à")
ok 5 - UPPER("Bjørn")
ok
All tests successful.
Files=1, Tests=5,  1 wallclock secs
( 0.01 usr  0.00 sys +  0.01 cusr  0.00 csys =  0.02 CPU)
Result: PASS
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Using pg_prove

- pg_prove distributed with pgTAP
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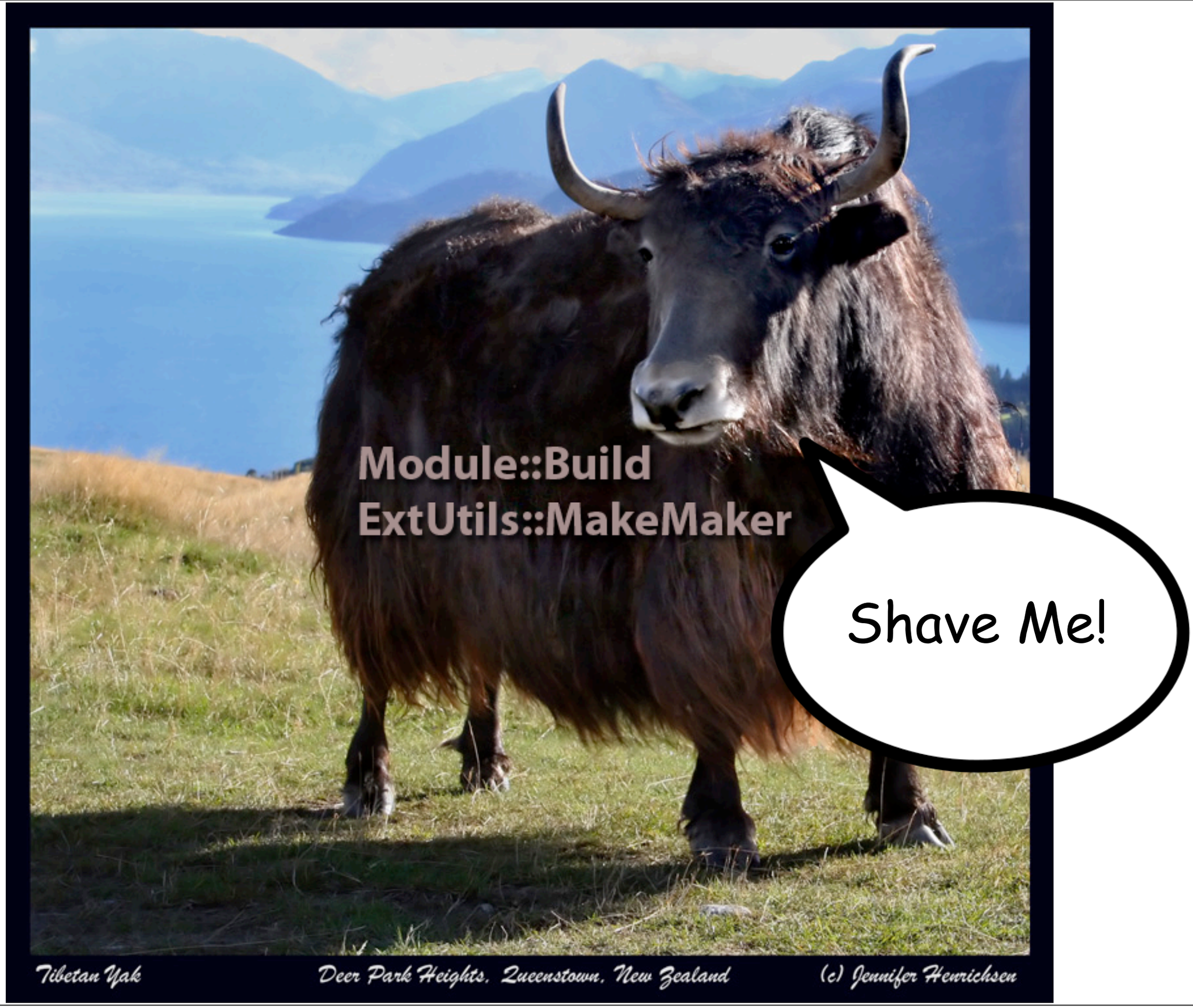
Module::Build
ExtUtils::MakeMaker
Tibetan Yak
Deer Park Heights, Queenstown, New Zealand
(c) Jennifer Henrichsen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Build Integration

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try%
```

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```
% psql -Xd try -f pg.sql
CREATE TEMP TABLE srt (
   name CITEXT
);
CREATE TABLE
INSERT INTO srt (name)
VALUES ('aardvark'),
       ('AAA'),
       ('aba'),
       ('ABC'),
       ('abd');
INSERT 0 5
SELECT LOWER(name) as aaa FROM
srt WHERE name = 'AAA'::text;
 aaa
-----
 aaa
(1 row)
```

```
SELECT LOWER(name) as aaa FROM
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- Separate files to maintain!

Or this?

Or this?

```
% ~/dev/Kineticode/pgtap/trunk/pg_prove -d try pgtap.sql --verbose
pgtap....
1..4
ok 1 - Should find "AAA"::text
ok 2 - Should find "AAA"::varchar
ok 3 - Should find "AAA"::bpchar
ok 4 - Should find "AAA"
ok
All tests successful.
Files=1, Tests=4,  0 wallclock secs ( 0.00 usr  0.00 sys +  0.01
cusr  0.00 csys =  0.01 CPU)
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```
MODULES = citext
DATA_built = citext.sql
DATA = uninstall_citext.sql
REGRESS = citext
REGRESS_OPTS = --load-language plpgsql

ifdef USE_PGXS
PG_CONFIG = pg_config
PGXS := $(shell $(PG_CONFIG) --pgxs)
include $(PGXS)
else
subdir = contrib/citext
top_builddir = ../..
include $(top_builddir)/src/Makefile.global
include $(top_srcdir)/contrib/contrib-global.mk
endif
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- Must have pg_regress load PL/pgSQL
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BEGIN;
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SELECT plan(1);
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\unset ECHO
1..1
ok 1 - W00t!
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- Table results must be contorted into scalars

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    ARRAY( SELECT name FROM srt ORDER BY name ),
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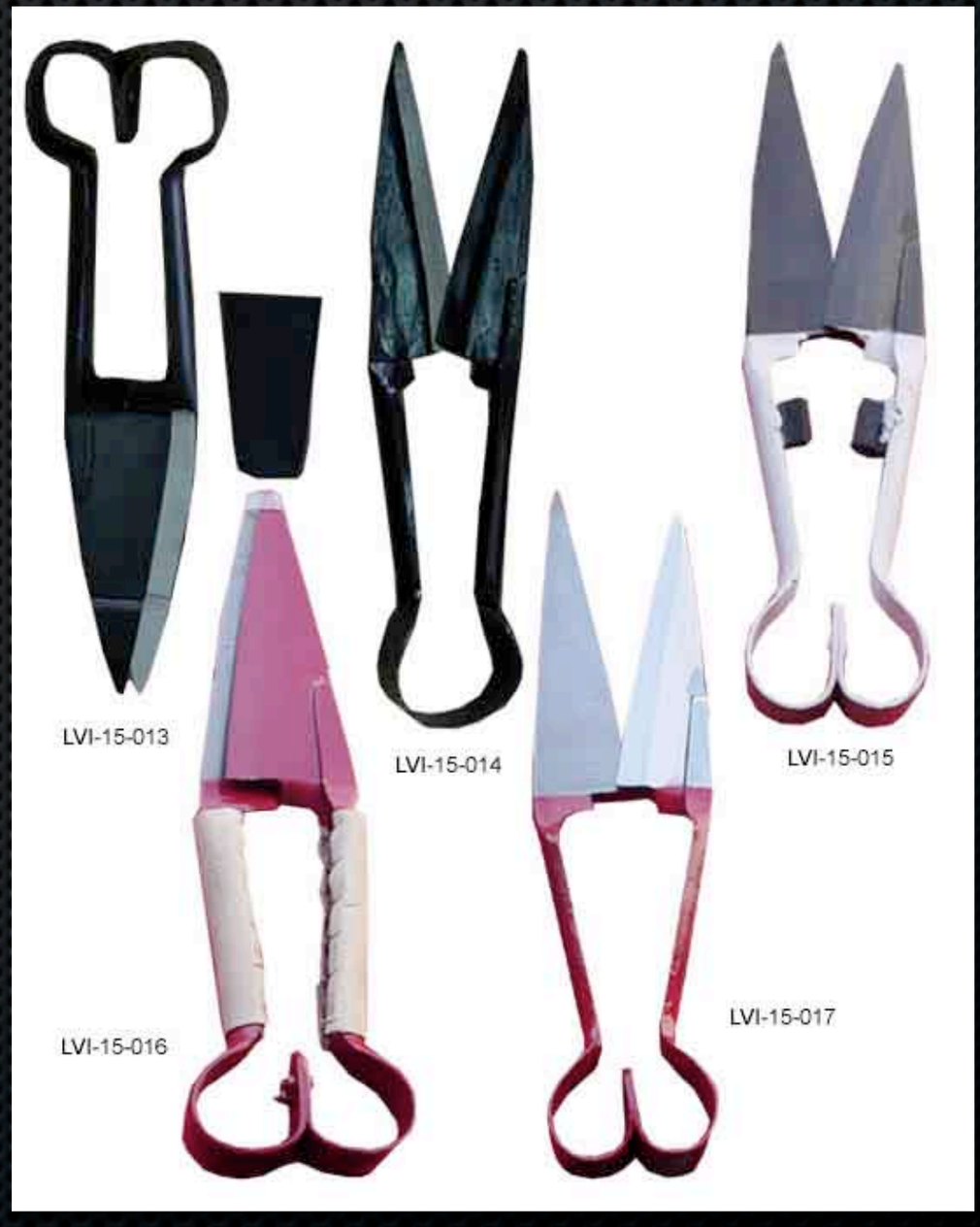
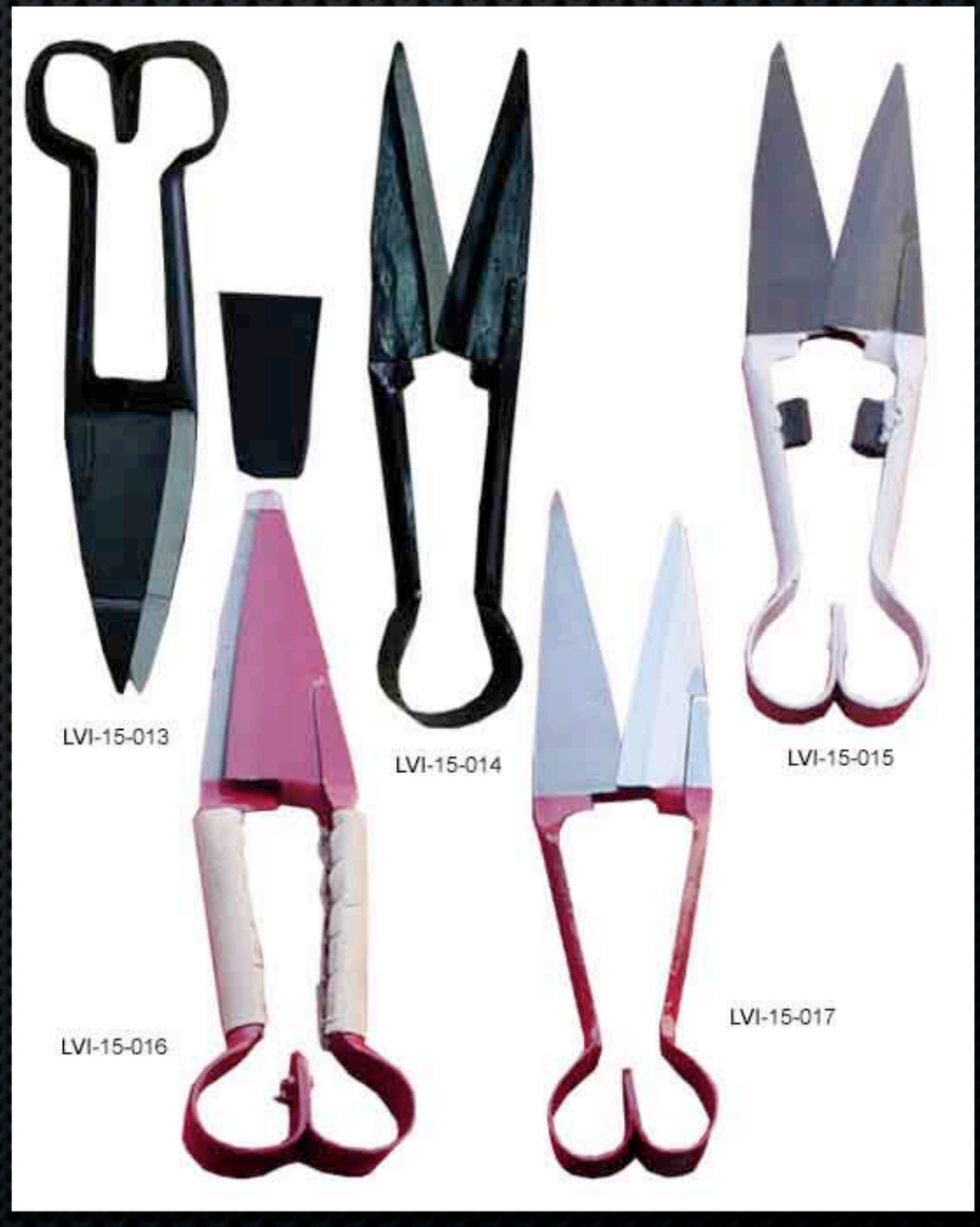
- Tom hates it
- (Doesn’t bother me)

The Future



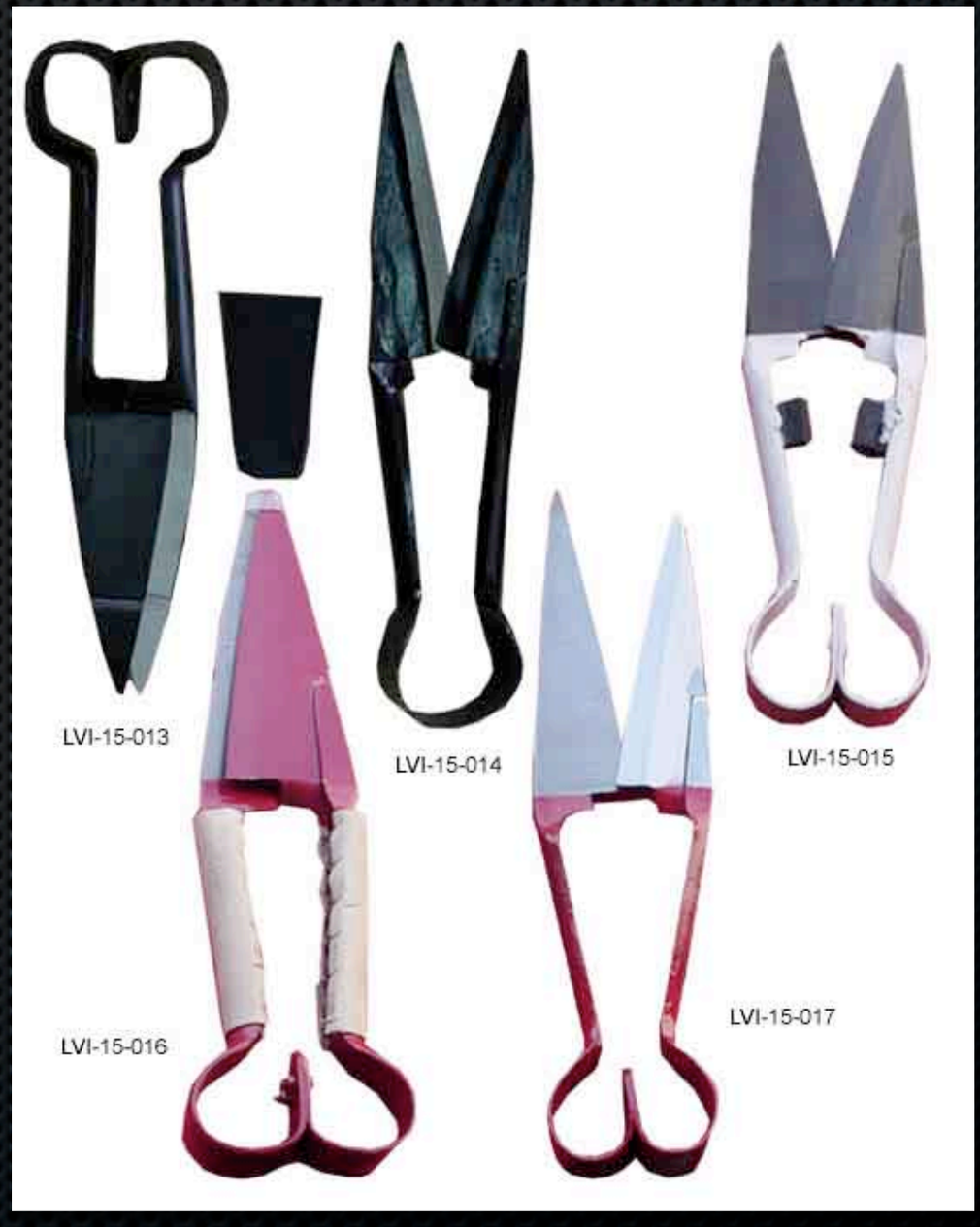
The Future

- Conditionals?



The Future

- Conditionals?
- Faster performance?



The Future

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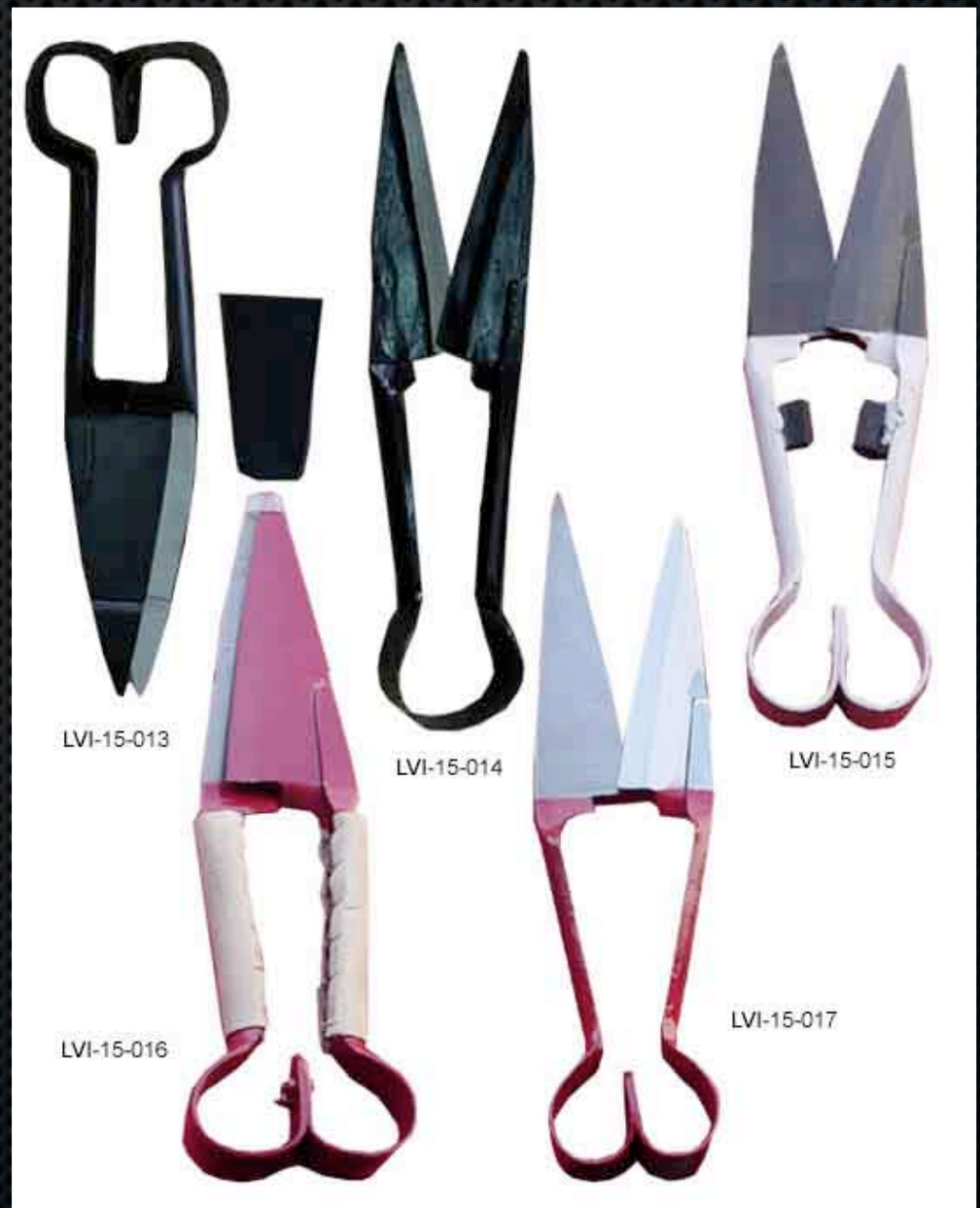
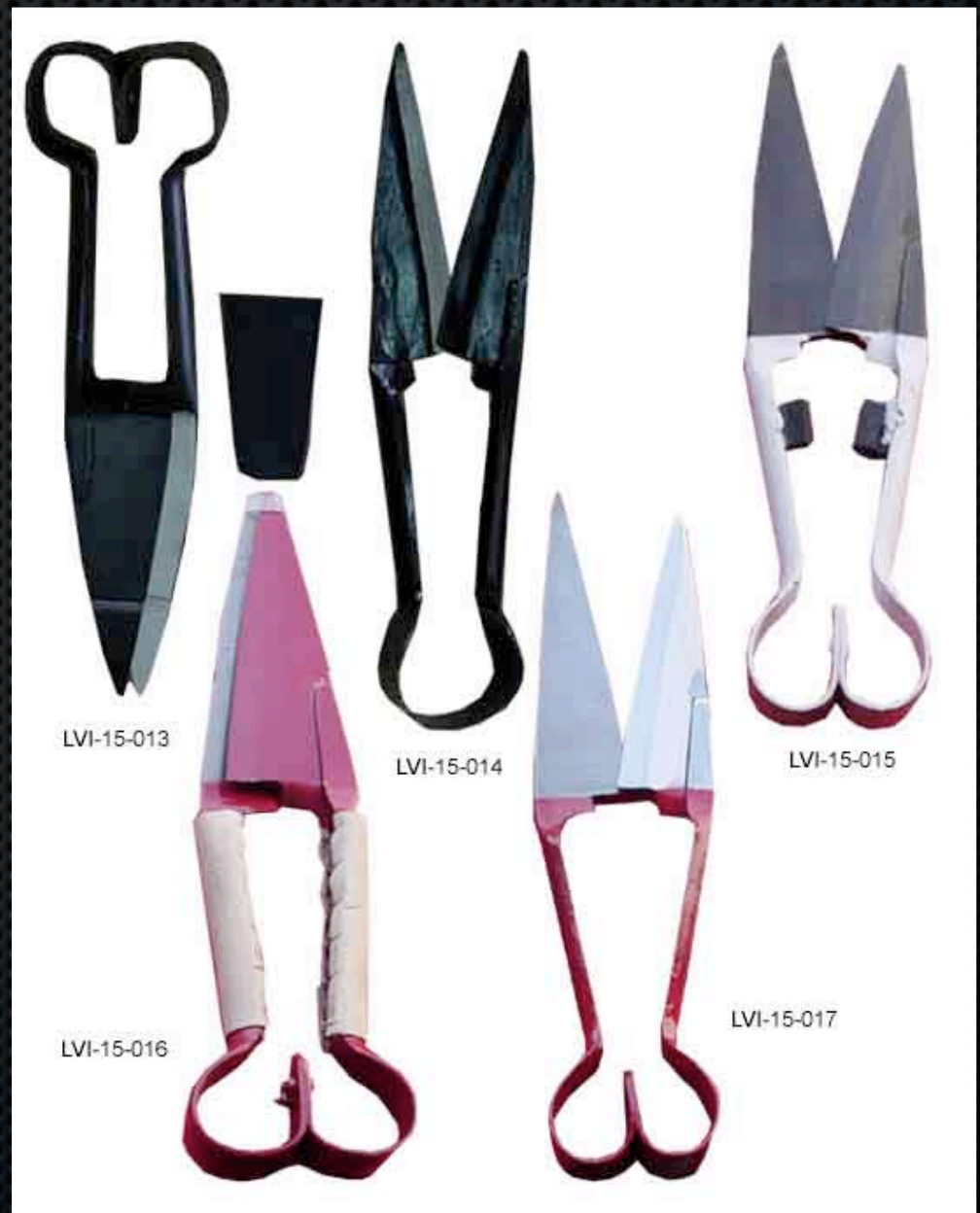


The Future

- Conditionals?
- Faster performance?
  - Port slow bits to C?
- Wanna help?



Help Out!

http://pgtap.projects.postgresql.org/

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Thank You!