Tryton Technical Training

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September 18, 2015

Outline

Global overview

- A general purpose application platform
  - Web shop
  - Insurance software
  - GNU Health
  - Traditional ERP
- Covers lot of fields
  - Accounting
  - Sales Management
  - Stock Management
  - . . .
- Free Software
  - GPL-3
  - Tryton foundation
  - TU*

Technical Overview

- Written in Python
- Three tiers architecture
  - PyGTK client (*tryton*) and a JavaScript client (*sao*) in its infancy
  - Application Server (*trytond*)
  - DBMS, usually PostgreSQL but you can use SQLite or even MySQL
- Modularity of business functionalities

Python good practices (pip & virtualenv)

pip is THE tool for installing and managing Python packages.
virtualenv is THE tool used to create isolated Python environment.

- create isolated Python environments
  - Do not mix different version of your libraries / applications
  - Installation of packages in the user `$HOME`
- `pip install virtualenv` (or your distro package manager)
- `virtualenv --system-site-packages .venv/trytond`
- `source .venv/trytond/bin/activate`

hgnested is a mercurial extension. The tryton project use it to easily apply the same command on nested repositories.

Configuring mercurial

In order to activate both the hgnested and MQ extensions of Mercurial we will need to add those lines to your `.hgrc`

Example

```
[extensions]
hgext.mq =
hgnested =
```

Installing trytond

Example

```
$ hg nclone http://hg.tryton.org/3.4/trytond -b 3.4
$ cd trytond
$ pip install -e .
$ pip install vobject
```

Setting up a trytond config file

Here is a minimal example of a configuration file. You should save it in `$HOME/.trytond.conf`

Example

```
[database]
path = /home/training/databases
```

We will set the `TRYTOND_CONFIG` environment variable

Example

```
$ export TRYTOND_CONFIG=$HOME/.trytond.conf
```

Initializing a minimal trytond database

Example

```
$ touch ~/databases/test.sqlite
$ ./bin/trytond -d test -u ir res
```

trytond will ask you for the `admin` password at the end of the installation process.

Adding a new modules

In this tutorial we will use a MQ repository in order to progress step by step.

Example

```
$ cd trytond/modules
$ hg init training
$ cd training/.hg
$ hg clone http://hg.tryton.org/training -b 3.4 patches
```

Outline

A minimal trytond modules

A minimal trytond modules needs two files:

- `__init__.py` the usual file needed by all python modules
- `tryton.cfg` the file that helps tryton glue together model and view definitions

The content of `tryton.cfg`

Example

```
[tryton]
version=0.0.1
depends:
    ir
    res
```

Creating a model

A trytond model is a python class inheriting from Model. To enable the SQL persistence the model must inherit of ModelSQL.

Example

```
from trytond.model import ModelSQL

__all__ = ['Opportunity']

class Opportunity(ModelSQL):
    'Opportunity'
    __name__ = 'training.opportunity'
```

Register the model

In order for your object to be "known" by trytond they must be registered into the pool.

Example

```
from trytond.pool import Pool
from .opportunity import *

def register():
    Pool.register(
        Opportunity,
        module='training', type_='model')
```

Adding fields to a model

Example

```
class Opportunity(ModelSQL):
    'Opportunity'
    __name__ = 'training.opportunity'
    _rec_name = 'description'
    description = fields.Char('Description',
        required=True)
    start_date = fields.Date('Start Date',
        required=True)
    end_date = fields.Date('End Date')
    party = fields.Many2One('party.party',
        'Party', required=True)
    comment = fields.Text('Comment')
```

`fields` arguments

string	A string for label of the field.
required	A boolean if `True` the field is required.
readonly	A boolean if `True` the field is not editable in the user interface.
domain	A list that defines a domain constraint.
states	A dictionary. Possible keys are `required`, `readonly` and `invisible`. Values are PYSON expressions that will be evaluated with record values. This allows to change dynamically the attributes of the field.

The whole list in `trytond/model/fields/field.py`

fields.Char

In a tryton module:

Example

```
description = fields.Char('Description', required=True)
```

In the interface:

Example

In SQL:

Example

```
description VARCHAR NOT NULL
```

fields.Date

In a tryton module:

Example

```
start_date = fields.Date('Start Date', required=True)
```

In the interface:

Example

In SQL:

Example

```
start_date DATE NOT NULL
```

fields.Text

In a tryton module:

Example

```
comment = fields.Text('Comment')
```

In the interface:

Example

In SQL:

Example

```
comment TEXT
```

fields.Many2One

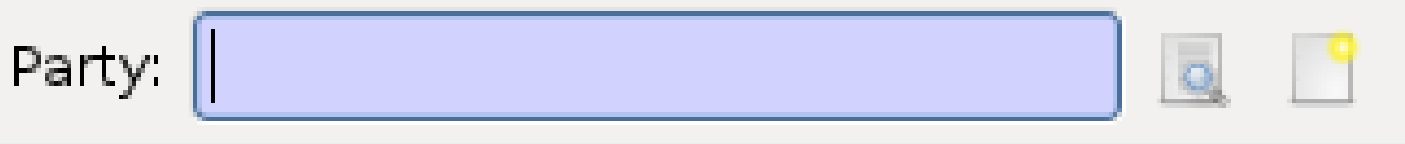
In a tryton module:

Example

```
party = fields.Many2One('party.party', 'Party', required=True)
```

In the interface:

Example



In SQL:

Example

```
party integer NOT NULL,
FOREIGN KEY(party) REFERENCES party_party(id)
```

Other relation fields

- `fields.One2Many`
- `fields.Many2Many`
- `fields.One2One`

Displaying data

To use the presentation layer your model must inherit from `ModelView`

Example

```
class Opportunity(ModelSQL, ModelView):
```

You must also add the xml presentation file in the `tryton.cfg` configuration file

Example

```
xml:
    opportunity.xml
```

Defining a view

- View objects are normal tryton objects (`trytond/ir/ui/view.py`)
- Two kind of view:

  Tree view a list of record

  Form view a view for editing/creating one record

A tree view

Example

```
<record model="ir.ui.view" id="opportunity_view_list">
    <field name="model">training.opportunity</field>
    <field name="type">tree</field>
    <field name="name">opportunity_list</field>
</record>
```

Example

```
<tree string="Opportunities">
    <field name="party"/>
    <field name="description"/>
    <field name="start_date"/>
    <field name="end_date"/>
</tree>
```

A form view

Example

```
<record model="ir.ui.view" id="opportunity_view_form">
    <field name="model">training.opportunity</field>
    <field name="type">form</field>
    <field name="name">opportunity_form</field>
</record>
```

Example

```
<form string="Opportunity">
    <label name="party"/>
    <field name="party"/>
    <label name="description"/>
    <field name="description"/>
    <label name="start_date"/>
    <field name="start_date"/>
    <label name="end_date"/>
    <field name="end_date"/>
    <separator name="comment" colspan="4"/>
    <field name="comment" colspan="4"/>
</form>
```

Gluing them together

Example

```
<record model="ir.action.act_window"
    id="act_opportunity_form">
    <field name="name">Opportunities</field>
    <field name="res_model">training.opportunity</field>
</record>
<record model="ir.action.act_window.view"
    id="act_opportunity_form_view1">
    <field name="sequence" eval="10"/>
    <field name="view" ref="opportunity_view_tree"/>
    <field name="act_window" ref="act_opportunity_form"/>
</record>
<record model="ir.action.act_window.view"
    id="act_opportunity_form_view2">
    <field name="sequence" eval="20"/>
    <field name="view" ref="opportunity_view_form"/>
    <field name="act_window" ref="act_opportunity_form"/>
</record>
```

Adding menu entries

Example

```
<menuitem name="Training" id="menu_training"/>
<menuitem parent="menu_training"
    action="act_opportunity_form"
    id="menu_opportunity_form"/>
```

Adding default values

Create a method in the object with the name `default_<field_name>`

Example

```
@staticmethod
def default_start_date():
    pool = Pool()
    Date = pool.get('ir.date')
    return Date.today()
```

Reacting to user input: on_change

Tryton provides a way to react on the user input by changing the value of other fields.
This mechanism is call the on_changes.
They come in two flavours:

on_change_<field name> When a field is changed a list of value is sent to the server. The server sends the new values of some fields

on_change_with_<field name> A field value is computed when any field in a list of fields is modified. The computation occurs on the server.

In both case the list of fields sent to the server is specified thanks to the decorator @fields.depends.

on_change

Example

```
@fields.depends('party')
def on_change_party(self):
    address = None
    if self.party:
        address = self.party.address_get(type='invoice')

    return {
        'address': address,
        }
```

on_change_with

Example

```
@fields.depends('start_date')
def on_change_with_end_date(self):
    if self.start_date:
        return self.start_date + datetime.timedelta(days=7)
    return None
```

Outline

Adding workflow to object

Your object should inherit from `Workflow`

Example

```
class Opportunity(Workflow, ModelSQL, ModelView):
```

It must have a state field:

Example

```
    state = fields.Selection([
            ('opportunity', 'Opportunity'),
            ('converted', 'Converted'),
            ('lost', 'Lost'),
            ], 'State', required=True,
        readonly=True, sort=False)
```

Defining a workflow

A workflow is composed of transitions:

Example

```
@classmethod
def __setup__(cls):
    super(Opportunity, cls).__setup__()
    cls._transitions |= set((
        ('opportunity', 'converted'),
        ('opportunity', 'lost'),
        ))
```

Defining transition method

Each transition must be linked a class method:

Example

```
@classmethod
@Workflow.transition('converted')
def convert(cls, opportunities):
    pool = Pool()
    Date = pool.get('ir.date')
    cls.write(opportunities, {
            'end_date': Date.today(),
            })
```

Adding buttons in view

Now we need to add buttons in the view

Example

```
<button name="convert" string="Convert" icon="tryton-go-next"/>
```

The method must be "button decorated" to be callable and defined.

Example

```
@classmethod
def __setup__(cls):
    ...
    cls._buttons.update({
            'convert': {},
            'lost': {},
            })

@classmethod
@ModelView.button
@Workflow.transition('converted')
def convert(cls, opportunities):
    ...
```

Making the view more beautiful

Let's add the state and the buttons to the opportunity view. There is also a way of grouping widgets

Example

```
<group col="2" colspan="2" id="state">
    <label name="state"/>
    <field name="state"/>
</group>
<group col="2" colspan="2" id="buttons">
    <button name="lost" string="Lost" icon="tryton-cancel"/>
    <button name="convert" string="Convert" icon="tryton-go-next"/>
</group>
```

Adding dynamicity in the form

Of course sometimes you want to make fields readonly/invisible/required under certain conditions. This behavior can be implemented using the `states` attribute of fields:

Example

```
start_date = fields.Date('Start Date', required=True,
    states={
        'readonly': Eval('state') != 'opportunity',
    }, depends=['state'])
end_date = fields.Date('End Date', readonly=True,
    states={
        'required': Eval('state').in_(['converted',
            'lost']),
    }, depends=['state'])
```

PYSON is used to encode statements that can be evaluated.
`http://doc.tryton.org/2.6/trytond/doc/topics/pyson.html`

Adding dynamicity to buttons

PYSON expression can also be used on buttons to hide them.

Example

```
@classmethod
def __setup__(cls):
    ...
    cls._buttons.update({
            'convert': {
                'invisible': ~Eval('state')\
                    .in_(['opportunity']),
                },
            'lost': {
                'invisible': ~Eval('state')\
                    .in_(['opportunity']),
                },
            })
```

Defining a simple function field

A function field is a field that is computed into python its data is not persistently store into the database.

Example

```
duration = fields.Function(fields.Integer('Duration'), 'get_duration')

def get_duration(self, name=None):
    if not self.start_date or not self.end_date:
        return None
    return (self.end_date - self.start_date).days
```

Any tryton type can be used. Note also that since this signature is the same as the one of an `on_change_with` then the same function can be used for both.
Of course a `setter` and a `searcher` can also be defined in order to modify or search corresponding data.

Defining a function field operating by batch

The previous example makes one call per record.
Tryton provides a way to compute the values by batch. In order to do so the getter must be a classmethod and it must return a dictionary mapping the `id` to the function value.

Example

```
description_length = fields.Function(fields.Integer('Description Length'),
    'get_description_length')

@classmethod
def get_description_length(cls, opportunities, name):
    cursor = Transaction.cursor()

    opportunity = cls.__table__()
    query = opportunity.select(
        opportunity.id, CharLength(opportunity.description))
    cursor.execute(*query)

    return dict(cursor.fetchall())
```

Adding actions to model

Sometime you want to add functionalities to a model that do not suite the use of a button. For this kind of use case the wizard is your solution.
A wizard is composed of two things:

- A set of views that represent the form to gather the user input
- A "state machine" that define what should be done

Wizard views

Those are standard `ModelView`, you can define `on_change`, `on_change_with` and default values on them.

Example

```
class ConvertOpportunitiesStart(ModelView):
    'Convert Opportunities'
    __name__ = 'training.opportunity.convert.start'
```

Wizard "state machine"

This is a class that inherits from `Wizard`. You'll be able to define different states on it.

Example

```
from trytond.wizard import Wizard, StateView, StateTransition, Button

class ConvertOpportunities(Wizard):
    'Convert Opportunities'
    __name__ = 'training.opportunity.convert'

    start = StateView('training.opportunity.convert.start',
        'training.opportunity_convert_start_view_form', [
            Button('Cancel', 'end', 'tryton-cancel'),
            Button('Convert', 'convert', 'tryton-ok', default=True),
            ])
    convert = StateTransition()

    def transition_convert(self):
        pool = Pool()
        Opportunity = pool.get('training.opportunity')
        opportunities = Opportunity.browse(
            Transaction().context['active_ids'])
        Opportunity.convert(opportunities)
        return 'end'
```

Activating the wizard

Example

```
<record model="ir.action.wizard" id="act_convert_opportunities">
    <field name="name">Convert Opportunities</field>
    <field name="wiz_name">training.opportunity.convert</field>
    <field name="model">training.opportunity</field>
</record>
<record model="ir.action.keyword" id="act_convert_opportunities_keyword">
    <field name="keyword">form_action</field>
    <field name="model">training.opportunity,-1</field>
    <field name="action" ref="act_convert_opportunities"/>
</record>
```

Extending models

Sometimes you want to extend existing objects to add miscellaneous information. Doing so is just a matter of (tryton) inheritance:

Example

```
from trytond.model import fields
from trytond.pool import PoolMeta

__all__ = ['Party']
__metaclass__ = PoolMeta


class Party:
    __name__ = 'party.party'
    opportunities = fields.One2Many(
            'training.opportunity', 'party',
            'Opportunities')
```

Extending existing views

Modifing existing view is done by adding record in the XML files that specify an XPATH and what to do with the resulting node.

Example

```
<record model="ir.ui.view" id="party_view_form">
    <field name="model">party.party</field>
    <field name="inherit" ref="party.party_view_form"/>
    <field name="name">party_form</field>
</record>
```

Example

```
<data>
    <xpath expr="/form/notebook/page[@id='accounting']"
        position="after">
        <page name="opportunities" col="1">
            <separator name="opportunities"/>
            <field name="opportunities"/>
        </page>
    </xpath>
</data>
```

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Adding a report

To add a report you must create an ODT template that is compatible with relatorio (`http://relatorio.openhex.org/`)
This report engine allows you to create OPENDOCUMENT files from templates.

Making trytond aware of the report

You must define a python class that will register a report object

Example

```
from trytond.report import Report

class OpportunityReport(Report):
    pass
```

You might want to overload the `parse` method to define a specific behavior.

Creating the report object

Example

```
<record model="ir.action.report" id="report_opportunity">
    <field name="name">Opportunity</field>
    <field name="model">training.opportunity</field>
    <field name="report_name">training.opportunity</field>
    <field name="report">training/opportunity.odt</field>
</record>
<record model="ir.action.keyword"
    id="report_opportunity_keyword">
    <field name="keyword">form_print</field>
    <field name="model">training.opportunity,-1</field>
    <field name="action" ref="report_opportunity" />
</record>
```

Using proteus to script tryton

You might want to script your tryton server. For this there is the proteus library. It will allow you to interact with it in a python way.
With models you will be able to use the find, edit, delete and create objects
You will also have the possiblity to use the wizards.

Setting up proteus

To set up proteus, you first need a connection to a Tryton server:

- either through XML-RPC using the `set_xmlrpc` method
- or on the same compute using the `set_trytond` method

The latter will use the possibility to import trytond to create and set up an internal trytond server.

An example of proteus

Example

```
import csv
import datetime
import sys
from proteus import config, Model

def main(args):
    Party = Model.get('party.party')
    Opportunity = Model.get('training.opportunity')
    csv_file = csv.DictReader(open(args[1], 'r'))
    for line in csv_file:
        parties = Party.find([('name', '=', line['Party'])])
        if not parties:
            party = Party(name=line['Party'])
            party.save()
        else:
            party = parties[0]
        line_date = datetime.datetime.strptime(line['Date'],
            '%d/%m/%y').date()
        new_opportunity = Opportunity(party=party,
            description=line['Description'], start_date=line_date)
        new_opportunity.save()

if __name__ == '__main__':
    config.set_trytond(password='admin', database_name='training')
    main(sys.argv)
```

Creating a 'view' object

`table_query` allows you to define a SQL-query to use as source of the records.

Example

```
class OpportunityByParty(ModelSQL, ModelView):
    'Opportunities by Party'
    __name__ = 'training.opportunity_by_party'

    party = fields.Many2One('party.party', 'Party', readonly=True)
    opportunity_count = fields.Integer('Opportunity count', readonly=True)

    @classmethod
    def table_query(cls):
        pool = Pool()
        opportunity_table = pool.get('training.opportunity').__table__()
        columns = [
            Min(opportunity_table.id).as_('id'),
            Max(opportunity_table.create_uid).as_('create_uid'),
            Max(opportunity_table.create_date).as_('create_date'),
            Max(opportunity_table.write_uid).as_('write_uid'),
            Max(opportunity_table.write_date).as_('write_date'),
            opportunity_table.party,
            Count(opportunity_table.id).as_('opportunity_count'),
            ]
        group_by = [opportunity_table.party]

        return opportunity_table.select(*columns, group_by=group_by)
```