FAST, DOCUMENTED AND RELIABLE JSON WEBSERVICES WITH PYTHON

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Who am I

- CTO @ Axant.it mostly Python company (with some iOS and Android)
- TurboGears2 development team member
- MongoDB fan and Ming ODM contributor
- Skeptic developer always looking for a better solution

What's going to come

- Rapid prototyping of web services
- Tools to quickly document json services
- Using Ming and Mongo In Memory for mongodb based fully tested webservices
- Bunch of tools to deploy TurboGears based services

Why TurboGears

- Can start small, easy scale to a full featured environment when required
- RestController makes easy to write REST
- ObjectDispatch makes a lot of sense for non-rest services
- TurboGears validation copes great with API

Start Small

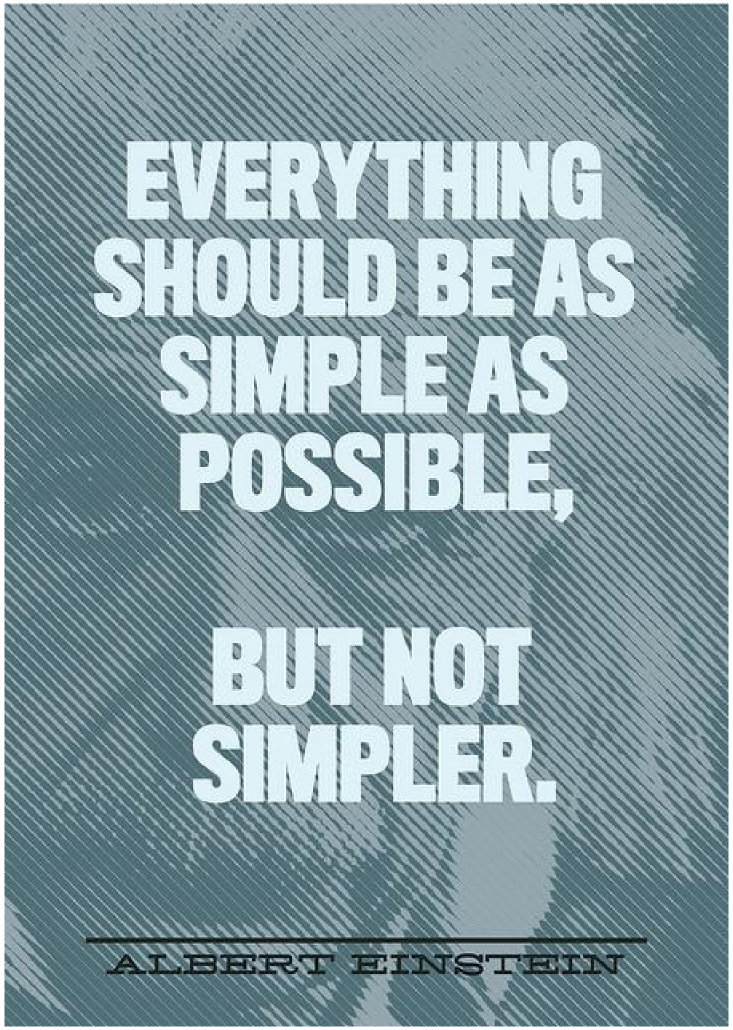
- TurboGears minimal mode provides a convenient way to write simple services

```
from wsgiref.simple_server import make_server
from tg import expose, TGController, AppConfig


class RootController(TGController):
    @expose('json:')                            # Render output as JSON
    def echo(self, what):                       # ?what=X is passed as a parameter
        return dict(text='Hello %s' % what)  # Will be encoded to JSON due to @expose


# Define a minimal mode application that dispatches to RootController
config = AppConfig(minimal=True, root_controller=RootController())

print("Serving on port 8080...")
httpd = make_server('', 8080, config.make_wsgi_app())
httpd.serve_forever()
```

Let's try it!

- Start python
  - python myapp.py
- Point browser
  - http://localhost:8080/echo?what=user
- Get your asnwer back
  - {**"text"**: "Hello user"}

As easy as it can be



Where to store? Try MongoDB

- Many APIs can be mapped to a single findAndModify call when proper Document design is in place
- Subdocuments make a lot of sense
- PyMongo works great with gevent
- GridFS for uploaded files

It scales! Really easy to shard

MongoDB on TurboGears

- Available out of the box
  - $ gearbox quickstart --ming myproj
  - http://turbogears.readthedocs.org/en/tg2.3.0b2/turbogears/mongodb.html
- Ming design similar to SQLAlchemy
  - http://merciless.sourceforge.net/orm.html
  - Unit of Work or go barenone bypassing ODM
- Production on big sites like sourceforge

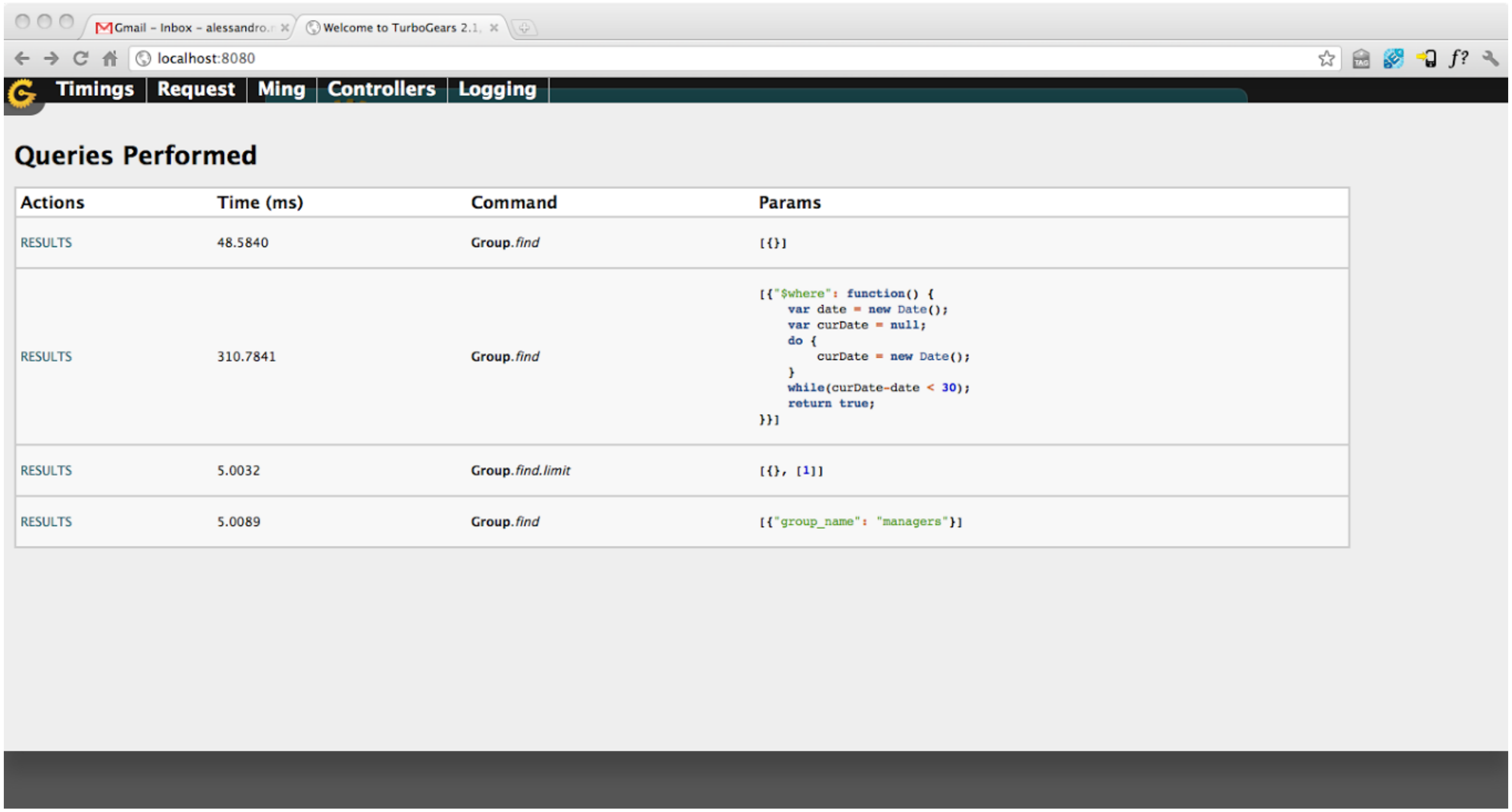
Testing MongoDB

- Ming provides MongoInMemory
    - much like sqlite://:memory:
- TurboGears quickstart provides a test suite that uses MIM for every new project with fixtures to setup models and controllers
- Implements 90% of mongodb, including javascript execution with spidermonkey

Debugging MongoDB

- TurboGears debugbar has builtin support for MongoDB
    - Executed queries logging and results
    - Queries timing
    - Syntax prettifier and highlight for Map-Reduce and $where javascript code
    - Queries tracking on logs for performance reporting of webservices

DebugBar in action



Queries Performed

Actions	Time (ms)	Command	Params
RESULTS	48.5840	Group.*find*	`[{}]`
RESULTS	310.7841	Group.*find*	see below
RESULTS	5.0032	Group.*find.limit*	`[{}, [1]]`
RESULTS	5.0089	Group.*find*	`[{"group_name": "managers"}]`

```
[{"$where": function() {
    var date = new Date();
    var curDate = null;
    do {
        curDate = new Date();
    }
    while(curDate-date < 30);
    return true;
}}]
```

Try tgext.crud

- Sadly most people use it only to prototype html crud controllers
- Works great to generate REST apis too
- Builtin validation and error reporting
- Can be customized like any RestController
    - Just name your methods like the verbs and implement them

No, for real!

- Supports both SQLA and MongoDB
- Can perform substring filtering on get_all
- Provides a lot of configurable features
  - Input as urlencoded/multipart params or JSON body
  - Supports conditional If-Unmodified-Since PUT
  - Can perform automatic relationships serialization
  - Pagination tuning

Great, now how do I use it?

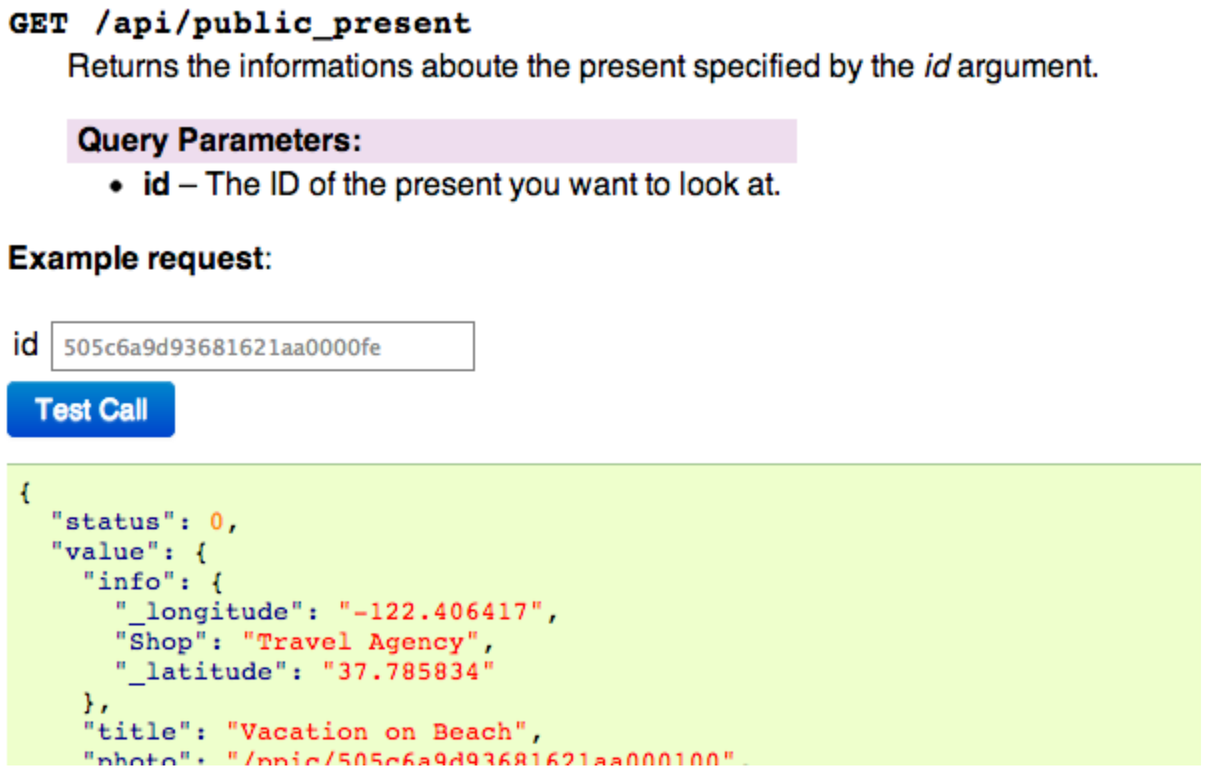
- If you are like me, as soon as you switch writing the client you totally forgot the api methods signature.
- Even if you know, other people won't
- Be your team hero: Write documentation!

D11nman, sphinx superpowers

sphinxcontrib.jsoncall

- Extends sphinxcontrib.httpdomain
- Makes easy to document JSON based urls
- Provides a form to play with api by submitting values and reading responses
- prettifies and highlights responses as JSON

Quickly write **references**



`GET /api/public_present`

Returns the informations aboute the present specified by the *id* argument.

Query Parameters:

- **id** – The ID of the present you want to look at.

Example request:

id 505c6a9d93681621aa0000fe

Test Call

```
{
  "status": 0,
  "value": {
    "info": {
      "_longitude": "-122.406417",
      "Shop": "Travel Agency",
      "_latitude": "37.785834"
    },
    "title": "Vacation on Beach",
    "photo": "/ppic/505c6a9d93681621aa000100",
```

Using tgjsonautodoc

- Generates documentation for methods with @expose('json')
- Uses docstring to document the API
- Autogenerates a playground form using the method definition
- If @validate is used, documents validators

Docstrings everywhere!

```
 @expose('json')
@validate({'player':OptionalPlayerValidator(),
           'count':Int(not_empty=True)},
           error_handler=fail_with(403))
def leaderboard(self, player, count):
    """
    Provides global or relative ranks for the currently active tournament.
    If a player is provided, instead of returning the first ``count`` best
    players it will return ``count/2`` people before and after
    the player. The player itself is also returned

    :query player: The ``facebook id`` of the user.
    :query count: The number of ranks to return (maximum 20, must be an even number)

    .. jsoncall:: /api/leaderboard

        {"player": "",
         "count": 3}

        {
          "error": null,
          "code": 0,
          "result": {
            "ranks": [
                ...
            ]
          }
        }
    """
```

Setup Sphinx

- sphinx-quickstart docs
    - BUILD_DIR = ../myapp/public/doc
- Enable sphinxcontrib.tgjsonautodoc to automatically generate doc
    - extensions = ['sphinxcontrib.httpdomain', 'sphinxcontrib.jsoncall', 'sphinxcontrib.tgjsonautodoc']
    - tgjsonautodoc_app = '../development.ini'

Let sphinx do the hard work

- Put reference for your APIs wherever you prefer and skip any unwanted url

```
Available API
-------------------

.. tgjsonautodoc::
    :skip-urls: /admin,/data
```

You **wrote** doc!

Typical team member when he reads your doc!

Deploy

- You don't want to use gearbox serve
- Circus with Chausette is a super-easy and flexible solution for deployments
  - http://turbogears.readthedocs.org/en/tg2.3.0b2/cookbook/deploy/circus.html
- Gearbox can automate most of the configuration steps for circus deployment

Going on Circus and Gevent

- Minimal circus.ini configuration

    -
      ```
      [circus]
      include = configs/*.ini
      ```
- Enable application virtualenv
- pip install gearbox-tools
- Autogenerate configuration
    - `gearbox deploy-circus -b gevent > ../myproj.ini`
- circusd circus.ini
    - `2013-01-01 01:01:01 [26589] [INFO] myproj started`

Circus Config

```
[env:myproj]
PATH=/home/amol/venv/tg23py26/bin:$PATH
VIRTUAL_ENV=/home/amol/venv/tg23py26

[watcher:myproj]
working_dir = /tmp/myproj
cmd = chaussette --backend gevent --fd $(circus.sockets.myproj) paste:production.ini
use_sockets = True
warmup_delay = 0
numprocesses = 1

stderr_stream.class = FileStream
stderr_stream.filename = myproj.log
stderr_stream.refresh_time = 0.3

stdout_stream.class = FileStream
stdout_stream.filename = myproj.log
stdout_stream.refresh_time = 0.3

[socket:myproj]
host = localhost
port = 8080
```

Orchestrating the whole stack

- Apart serving your own application with chaussette, circus can also start your dependencies like redis, celery and so on when starting the app.
- Make sure to have a look at documentation
  - http://circus.readthedocs.org/en/latest/

Questions?