MAX
Realtime messaging and activity stream engine

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Víctor

- Senior Python Developer and IT architect
- Plone Foundation member
- Plone core developer since 2010
- Author of Plone 3 intranets book (2010, PacktPub)
Carles

● Python and JavaScript lover
● Working with python for the last 8 years
● Occasional Erlang coder (when on drugs)
● Regex freak

@sunbit
Python @UPCnet and @BarcelonaTech
DEMO!
**History**

- First commit on August, **2011**

- Initially designed as the **key feature** for the Universitat Politècnica de Catalunya (BarcelonaTech) university concept of **social intranet**

- Today, MAX is used by more than 30,000 students and 8,000 university staff integrated in the online campus and the institutional collaboration tools
What is MAX?

- RESTful API
- 88 (and growing) endpoints
- Multi-source user and application activity stream
- Asynchronous messaging and conversations
- GPL Licensed
Old styled forums
What is a context?

Context (unique URI)

Forum  Topic  Post  Post  Post

Posts

Subscriptions
Contexts

● Identified by unique URIs

● Permissions per context
  ○ read
  ○ write
  ○ subscribe
  ○ unsubscribe
  ○ invite
  ○ kick
  ○ delete
  ○ flag

● Multiple context types based on permissions variations

● Granular permissions per user
  ○ Overriding the default ones defined by the context
  ○ Grant / Revoke
Real life examples

Communities site
- Institutional events
- Institutional news
- Alumni
- Sell your stuff

Online campus
- Applied maths III
- Signal theory
- Compilers
- Faculty news
Real life examples (II)
Community types

Open
Everyone can join and leave at will

Closed
The owner should invite me to join and I can leave at will

Institutional
The site admin subscribes people, no one can leave
Features

Activity Stream

- Stores **activity** from users and **applications**
- Usual **social** actions
  - Comments
  - Likes
  - Favorites
- **Images** and **files** support
Features

Conversations

- Realtime conversations and private messaging
- One to one
- Groups
- Images and files support
Features

JS Javascript UI widget
Features

Notifications

- Platform specific **push** notifications

- **Internal** notifications
  - Double check
  - others
Features

External sources aggregation
Features

Fully deployable on premises

- Addresses any **security** concerns
- Absolute customer data **privacy** and **ownership**
- “Corporate whatsapp”
Features Summary

JS
Components overview

- iOs App
- android App
- max.ui.js
- Plone
- Moodle
- REST Api “MAX”
- OAuth Server “Osiris”
- Messaging “Maxbunny”
- Sync services “Hub”
- Twitter listener “MaxTweety”
- RabbitMQ
- MongoDB
- NGINX
- LDAP
Osiris

- Minimal OAuth2 server implementation
- Build on top of pyramid
- Resource Owner Credentials Flow
- Tokens stored on MongoDB
- `/token` endpoint to generate token for a user
- `/checktoken` endpoint to verify a token
- Base LDAP user storage implementation
- Pluggable repoze.who based alternative user storage implementations
MAX

- REST(ful) api
- Also build on top of pyramid
- Hybrid URL-dispatch + traversal routing
- ACL policy with fine-grained permissions per endpoint
- Customized venusian decorator to configure endpoints
- Tweens used for several tasks
- Per-exception catching to provide detailed JSON error messages
- Per-request caching of variables
MAX (Routing)

● Route definition

```python
RESOURCES['avatar'] = dict(route='/people/{username}/avatar', filesystem=True, category='User', name='User avatar', traverse='/people/{username}')
```

● Endpoint definition

```python
@endpoint(route_name='avatar', request_method='POST', permission=modify_avatar)
def postUserAvatar(user, request):
    ""
    Upload user avatar
    ""
```
MAX (Tweens)

- exception catcher
- post tunneling
- compatibility check

```python
def compatibility_checker_factory(handler, registry):
    def compatibility_checker_tween(request):
        requested_compat_id = request.headers.get('X-Max-Compat-ID', None)
        if requested_compat_id is None:
            response = handler(request)
            return response
        expected_compat_id = str(request.registry.settings.get('max.compat_id'))
        if expected_compat_id == requested_compat_id:
            response = handler(request)
            return response
        else:
            return JSONHTTPPreconditionFailed(
                error=dict(
                    objectType='error',
                    error='CompatibilityIDMismatch',
                    error_description='X-Max-Compat-ID header value mismatch, {} was expected'.format(expected_compat_id)))
    return compatibility_checker_tween
```
MAX (Exception handling)

- Known error use cases are raised as custom exceptions:
  
  ```python
  raise ObjectNotFound("User {} doesn't have role {}".format(user, role))
  ```

- And rendered as a JSON message

  ```python
  @view_config(context=ObjectNotFound)
  def object_not_found(exc, request):
      return JSONHTTPNotFound(error=dict(objectType='error', error=ObjectNotFound.__name__, error_description=exc.message))
  ```

- Non-handled exceptions are logged with request information
Exception hash: df97a345acbc35f85337f1679e2c264e882a6b08

Raised on: 2015/07/21 11:27:46

POST /tokens HTTP/1.0
Accept-Encoding: gzip
Connection: close
Content-Length: 0
Content-Type: application/json
Host: max.upc.edu
User-Agent: Dalvik/2.1.0 (Linux; U; Android 5.1.1; Nexus 4 Build/LMY47V)
X-Forwarded-For: 147.83.182.8
X-Max-Compat-Id: 2
X-Oauth-Scope: widgetcli
X-Oauth-Username: marc.calvet
X-Virtual-Host-Uri: https://max.upc.edu

Traceback (most recent call last):
  File "/var/max.upc.edu/upc/eggs/max-5.3.2-py2.7.egg/max/tweens.py", line 91, in excview_tween
    response = handler(request)
  File "/var/max.upc.edu/upc/eggs/max-5.3.2-py2.7.egg/max/tweens.py", line 125, in compatibility_checker_tween
    response = handler(request)
  File "/var/max.upc.edu/upc/eggs/max-5.3.2-py2.7.egg/max/tweens.py", line 155, in post_tunneling_tween
    response = handler(request)
  File "/var/max.upc.edu/upc/eggs/max-5.3.2-py2.7.egg/max/tweens.py", line 175, in deprecation_wrapper_tween
    return response_wrapper(response)
  File "/var/max.upc.edu/upc/eggs/max-5.3.2-py2.7.egg/max/deprecations.py", line 256, in wrapper
    response.body = json.dumps(request.actor.getInfo())
  File "/var/python/python2.7/lib/python2.7/json/__init__.py", line 243, in dumps
    return _default_encoder.encode(obj)
  File "/var/python/python2.7/lib/python2.7/json/encoder.py", line 207, in encode
    chunks = self.iterencode(obj, _one_shot=True)
  File "/var/python/python2.7/lib/python2.7/json/encoder.py", line 278, in iterencode
    chunks = self.iterencode(o, _one_shot=True)
  File "/var/python/python2.7/lib/python2.7/json/encoder.py", line 184, in default
    raise TypeError(repr(o) + " is not JSON serializable")
TypeError: datetime.datetime(2014, 7, 17, 6, 56, 38, 901000) is not JSON serializable
RabbitMQ & messaging

- Exchange-to-exchange routing
- STOMP over WS using rabbitmq plugins
- “Public” end-user stomp endpoints
- Message delivery and security through routing key bindings
- Oauth authentication via erlang plugin
- Easy plug-in of temp queues for debugging
Messaging Design

dynamic queue

userid.subscribe
type=fanout

userid.publish
type=direct

activity
type=topic

dynamic queue

conversations
type=topic

Mobile Apps

Other clients

MAX

id

id.*

internal

id.*

messages

*notifications

push

messages
MaxCarrot

{"uuid": "005fab55bee84",
"user": {
  "username": "johndoe",
  "displayname": "John Doe"
},
"action": "add",
"object": "message",
"data": {
  "text": "Hello world!"
},
"source": "ios",
"domain": "demo",
"version": "4.0.1",
"published": "2015-07-21"}
MaxCarrot

- JSON based message format
- Used on messages routed through RabbitMQ
- Packed and unpacked versions
- Metadata/debugging fields
- Purpose related fields
- Encapsulates messaging logic
MaxCarrot
(Rules)

- Map field combinations to actions
- Pack messages following spec
- Ignore any message not matching any mapping

```
"source": {
  "id": "s",
  "type": "char",
  "values": {
    "ios": { "id": "c" },
    (...)
    "max": { "id": "m" }
  }
}
```

```
"version": {
  "id": "v",
  "type": "string",
}
```
MaxCarrot
(human-readable)

{"uuid": "005fab55bee84",
 "user": {
   "username": "johndoe",
   "displayname": "John Doe"
 },
 "action": "add",
 "object": "message",
 "data": {
   "text": "Hello world!"
 },
 "source": "ios",
 "domain": "demo",
 "version": "4.0.1",
 "published": "2015-07-21"}
MaxCarrot
(nerd-readable)

```javascript
{
  'a': 'a',
  'd': {
    'text': 'Helloworld!
  },
  'g': '005fab55be84',
  'i': 'demo',
  'o': 'm',
  'p': '2015-07-21',
  's': 'i',
  'u': {
    'u': 'johndoe',
    'd': 'JohnDoe'
  },
  'v': '4.01'
}
```
MaxBunny

- Pluggable multiprocess domain-aware queue consumer
- A multiprocess runner runs N process for each consumer defined.
- Each consumer binds to a queue and consumes messages
- Runner provides a shared pool of WSGI MaxClient instances, one for each domain.
MaxClient

- Opinionated Wrapper for REST api’s
- Wraps endpoint resources based on endpoint list definition.

    RESOURCES['activity'] = dict(route='/people/{username}/activities')

- Accesses endpoints in a pythonic way

    >>> client.people['username'].activities.get(qs={'limit':2})

- Creates json bodies from “nested” kwargs (with optional sensible defaults)

    >>> client.activities.post(object_content='Hello')
    {
        "object": {
            "objectType": "note",
            "content": "Hello"
        }
    }
MaxClient

- Raises a custom RequestError exception on 5xx and 4xx responses
- Returns None on 404 responses
- Returns parsed JSON body on success responses
WSGI MaxClient

- WSGI version
- Subclassed MaxClient that makes calls to a “fake” wsgi server
- Actual MAX Codebase is run by the client
- Requests don’t stress main api servers, only database

Limitations:
- User must have privileges on “real” max server
- Computer from where client is run must have access to storage backed
Twitter external aggregation

- Backend process listens twitter streaming service
- Selected tweets are queued and processed
- Valid tweets are injected into max activity stream
- Max users linked with twitter usernames
- Aggregation of content as a context
Current integrations

UPCnet uLearn Communities

UPCnet uLearn Campus

iOS & Android apps
Comunitats

EuroPython demo
7 entrades

EuroPython demo

Comunitats

Desenvolupadors Ge...

EuroPython demo

Veure més comunitats

Persons

Cerca

Administrar portlets

EuroPython demo

Otero Hernandez Javier javier.oterò
Hello guys, just say a big hello to all the EuroPython attendees!

Publicat a EuroPython demo
1 comentaris ⭐ favorit ➡ m'agrada ➡ Ñ' destacada

Riba Santos Corina corina.riba
I'm in! Count on me!

Publicat a EuroPython demo
0 comentaris ⭐ favorit ➡ m'agrada ➡ Ñ' destacada

Diaz Bertolez Roberto roberto.diaz
Yeah! Maybe we can celebrate it by going to drink some beers after work!

Publicat a EuroPython demo
0 comentaris ⭐ favorit ➡ m'agrada ➡ Ñ' destacada

Pilar Marinas pilar.marinas
Just joined to this community and I've already think it's so cool!!

Publicat a EuroPython demo
0 comentaris ⭐ favorit ➡ m'agrada ➡ Ñ' destacada

Carles Bruguera A carles.bruguera
A punt per la primera xerrada de la eupython

Administrar portlets
My courses

- **English 2.0**
  Teacher: Albert Cabot

- **Bones pràctiques TIC**
  Bones Pràctiques
  Aquest campus vol ser un espai per compartir tot el que es refereix al bon ús dels recursos TIC, siguin corporatius o personals.
  Teacher: Joaquín Albert Julve | Teacher: Guillermo Gonzalez | Teacher: Alfonso Gonzalez Fernandez | Teacher: David Levy Bunau | Teacher: Jose Luis Montero Saez
Stream

Otero Hernandez Javier
10 minutes ago
Location: EuroPython demo
Hello guys, just say a big hello to...

Riba Santos Corina
12 minutes ago
Location: EuroPython demo
I'm in! Count on me!

Diaz Bertolez Roberto
17 minutes ago
Location: EuroPython demo
Yeah! Maybe we can celebrate it...

Pilar Marinas
18 minutes ago
Location: EuroPython demo
Just joined to this community and...

Chats

Otero Hernandez Javier
less than a minute ago
See you tomorrow!

Janet Durà Pipó
2 minutes ago
I'm so tired...

Carles Bruguera A
4 minutes ago
Just a test for the demo!

T7 Check-in
4 hours ago

Marcos Monterro Torres
March 6, 2015
Donde estáis?

Ribas Roca Ana
January 22, 2015
Eoooo
Víctor Fernández de Alba

Taller comunitats Nexus 24. Abigail on fire! Gogogo

Laura Requena | laura.requena

Hi ha quorum!!!

Oriol Bosch

em reps o no?

11/06/14

Oriol Bosch

que estic parllant al de grup del utalk i la gent no em fot ni cas.. no sé si arriba

11/06/14

ara si

11/06/14

havia sortit i m'ha petat al carrer xats

11/06/14

Oriol B.

eo, canvia't la foto! que amb la nova versió ja no surt pixelada

17/07/14
Potential integrations
<place your web|app|whatever thingy name here>

<place the screenshots here>
Whishlist

- Social interactions (Follow/share)
- Finish & polish documentation
- Microservices / Dockerization
- Redis backed cache
- RabbitMQ SSL without NGINX
- Python3 / asyncio
- Explore JSON-LD (HATEOAS)
- Encryption
Community building?

Absolutely! Let’s do it!

Contact us, PR are welcome!
Resources

https://upcnet.github.io/max

https://github.com/UPCnet/max

https://github.com/UPCnet/maxserver
Thanks / Gràcies

@sunbit
@sneridagh