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Créateur d’applications mobiles

TECH TALKS

GRATUITS & OUVERTS AU PUBLIC

Tech talks sous forme de courtes formations
le **mercredi** de **17h** à **18h** !

N’hésitez pas à nous **contacter** afin de participer
aux **prochaines sessions** au sein de nos locaux !

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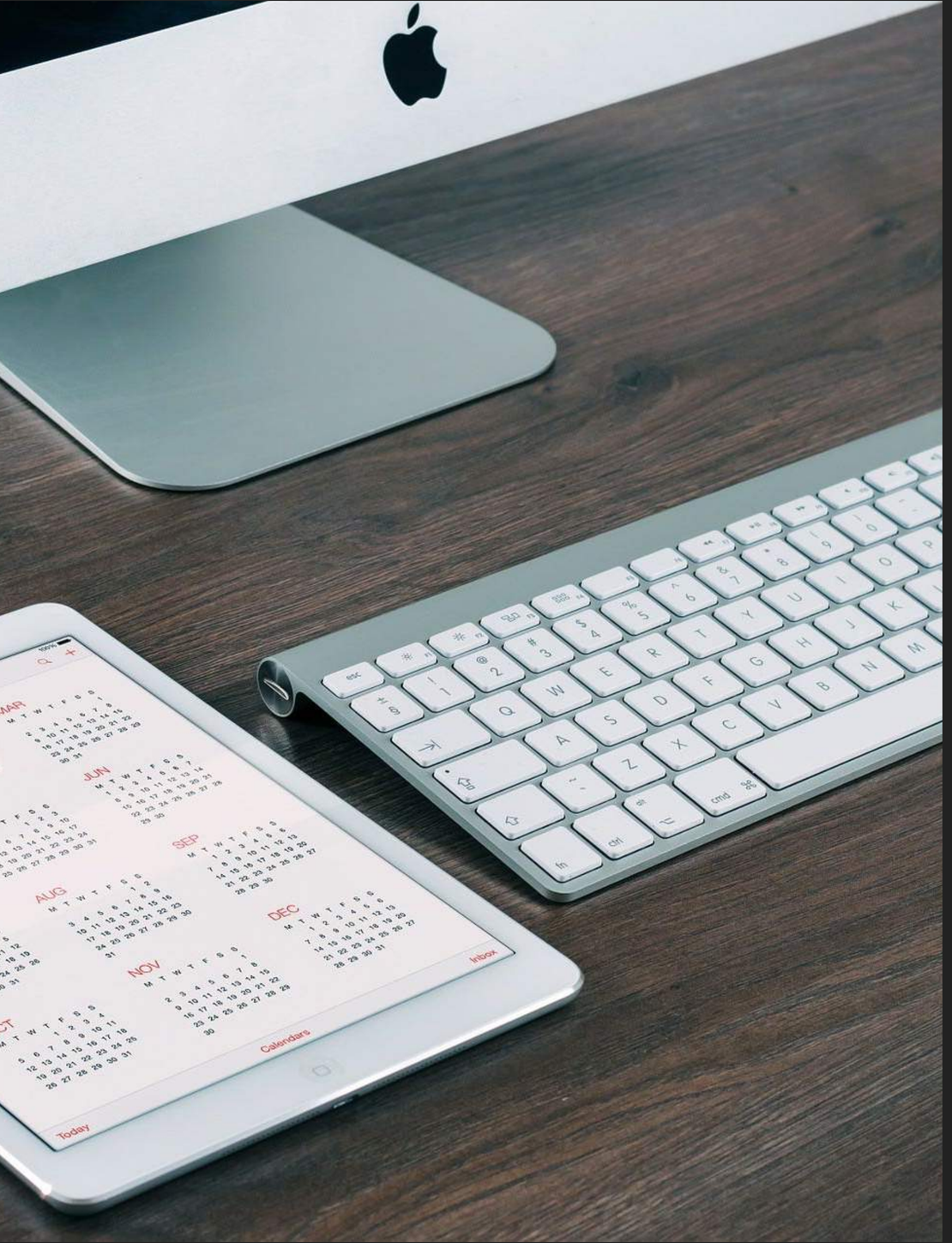

TECH TALK #14 – 01.03.2017

CELERY BASICS FOR DJANGO

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WHAT IS CELERY?

SINCE 2009

ASYNCHRONOUS

~~DJANGO ONLY~~

TASK QUEUE BASED ON

DISTRIBUTED

MESSAGE PASSING

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WHAT IS CELERY?

ASYNCHRONOUS

TASK QUEUE BASED ON

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WHAT IS CELERY?

ASYNCHRONOUS
TASK QUEUE BASED ON
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TASK QUEUE

- Used to distribute work across threads, processes or servers, in a non-blocking fashion
- Input is a unit of work called a task
- Worker processes monitor queues for work to do
- Celery supports scheduled and recurring tasks

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USE CASES

- Notifying users (email, APNs/GCM notifications…)
- Generating reports (PDFs...)
- Communicating with external services
- Triggering cleanup operations
- Making sure something is done (via *retries*)
- And much more…

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WHAT IS CELERY?

ASYNCHRONOUS
TASK QUEUE BASED ON
DISTRIBUTED
MESSAGE PASSING

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WHAT IS CELERY?

ASYNCHRONOUS
TASK QUEUE BASED ON
DISTRIBUTED
MESSAGE PASSING

(DISTRIBUTED) MESSAGE PASSING

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- Celery communicates via messages
- Messages transit through a *broker*
- System can consist of N workers and brokers
  ➡ Scaling and high availability

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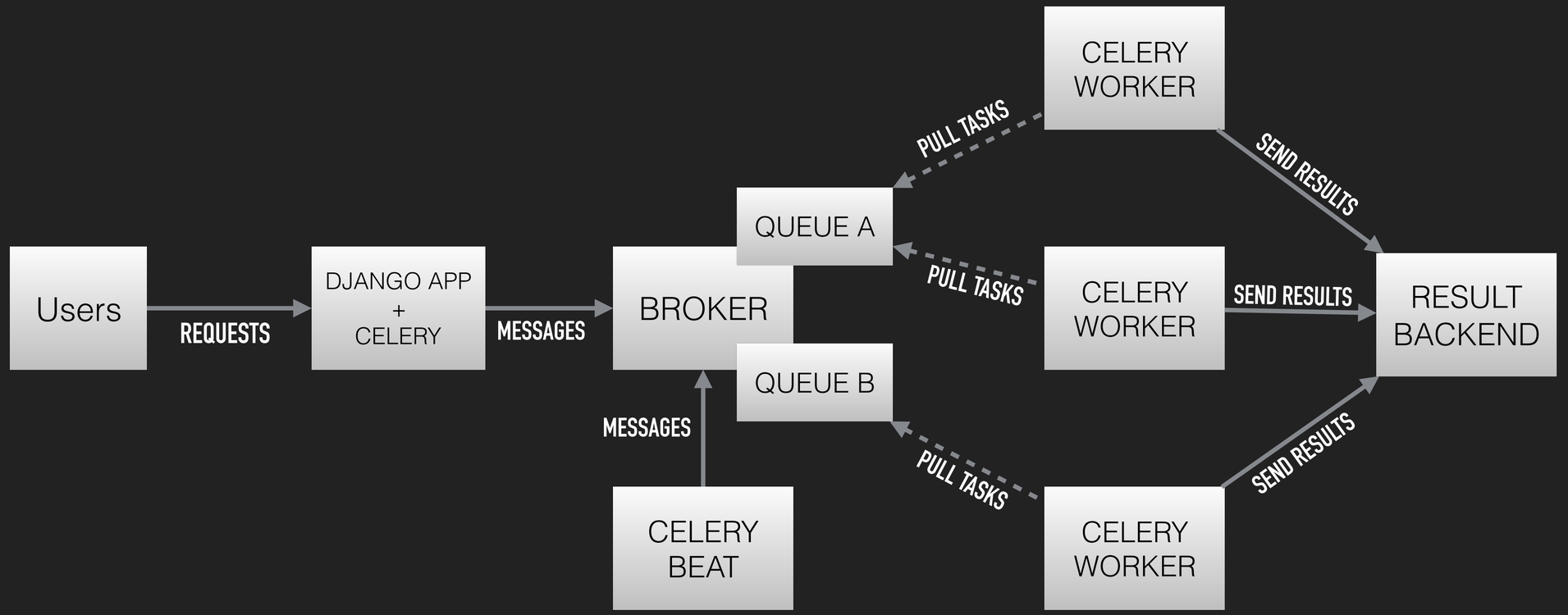
A TYPICAL SYSTEM

HOW IT ALL FITS TOGETHER



WHAT IS A BROKER?

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Broker *verb* — Pr. /ˈbrəʊkə(r)/

broker something to arrange the details of an agreement[…].

— *Oxford Advanced Learner's Dictionary*

- Intermediary role between the different parts of the system
- Answers the question “What remains to be done?”
- Stores queues and associated tasks

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BROKER SUPPORT

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- Celery supports lots of different brokers
- Only two are feature-complete and worth your time
  - RabbitMQ
  - Redis

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RABBITMQ

RabbitMQ™

- Highly customisable routing
- Persistent queues
- HA features
- Requires a bit of messaging knowledge to use advanced features

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REDIS

- You likely already use it
  - ➡ If not: `sudo (apt-get|port) install redis`
- Config is very easy (there is none)
- Can be susceptible to data loss
- Has some quirks(1)

(1) http://docs.celeryproject.org/en/stable/getting-started/brokers/redis.html#caveats

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WHICH IS RIGHT FOR YOU?

Simply need to send the occasional email?

➡ Choose redis

Need persistent queues or advanced task distribution?

➡ Choose rabbit face

RESULT BACKENDS

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- If you want to keep track of tasks' state or need the return values
- Use cache (redis is good for that)
- Sometimes, you won't need to keep the results
  - ✓ Globally: set `task_ignore_result` to `True` in settings
  - ✓ Per task: use `@app.task(ignore_result=True)`

More about result backends: http://docs.celeryproject.org/en/latest/userguide/tasks.html#result-backends

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CONCURRENCY

- Multiprocessing (prefork)
  - ✓ Safe default
  - ➡ Limited to a few proc
- Green threads (E
  - ➡ Bette me cases
  - ⚠ don't perform blocking calls

You c ix both types of workers and route tasks accordi compatibility and/or best performance.

EXPERIMENT

MODERN CELERY

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- You don't need *django-celery* anymore
  - ➡ New-style Django integration is very well documented
- Settings have been revamped(1) in Celery 4.0 (current stable)
  - ➡ All Celery-related settings should be prefixed with `CELERY_`
  - ➡ Upgrade with `celery upgrade settings proj/settings.py --django`
  - ➡ Use `app.config_from_object('django.conf:settings', namespace='CELERY')`

(1) full changes: http://docs.celeryproject.org/en/latest/userguide/configuration.html#conf-old-settings-map

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TESTING

- Avoid *eager mode* (`CELERY_ALWAYS_EAGER`)
  - ➡ you are only testing an emulation of a worker
- Prefer mocks(1) to test your *tasks* (retries etc.)
  - ➡ `@patch` + `assert_called_with` go a long way
- Test your logic separately

(1) See http://docs.celeryproject.org/en/latest/userguide/testing.html#tasks-and-unit-tests for a mocking example

DOS AND DONTS

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- DON'T assume you know *when* tasks will run
  - ✓ Make your scheduled tasks idempotent or use locking
- DON'T pass complex objects to tasks
  - ✓ DO prefer IDs to avoid race conditions
- DO make many small tasks with one purpose each
  - ✓ Single responsibility principle
  - ⚠️ Big tasks are harder to read, maintain and parallelise
- DO *chain* tasks (DON'T make tasks wait for others' results)

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KEEP IN MIND

- Use `@shared_task` in reusable apps
- Unlike `runserver`, Celery isn't automatically reloaded on code changes
  - ✓ Don't forget to restart your worker/beat processes
- It's probably a good idea to use exponential back-off for retries

```
def backoff(retries):
    return 2.0 ** retries


@app.task(max_retries=5)
def sync_miserable_pay_account(account_id):
    mp_account = Account.get(id=account_id)
    try:
        mp_account.sync()
    except MiserablePayException as e:
        # Do some cleanup here
        raise self.retry(e, countdown=backoff(self.request.retries))
```

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SOME TIPS

- `pip install setproctitle`
  - ✦ Nicer `top` and `ps` output for Celery processes
- `pip install librabbitmq`
  - ➡ If using RabbitMQ (optimised C client)
- `--max-tasks-per-child` to mitigate
  - memory leaks you have no control over
  - your own *bousettes®* 💩

TIPS (CONTINUED)

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- Take advantage of Celery's `purge` and `inspect` commands

```
$ celery -A proj purge
$ celery -A proj inspect scheduled
```

- Enable RabbitMQ's *management* plugin for a nice web UI
  - ➡ Useful to monitor RabbitMQ
  - ➡ Makes it easy to manage users, messages, queues etc.

- Flower is a web-based Celery monitoring solution

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WHAT WE DIDN'T COVER

BUT YOU SHOULD KNOW ABOUT

* AMQP (Advanced Message Queuing Protocol)
* Task routing, queue binding
* Broker HA
* Broker security

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REFERENCES

- Celery documentation
- RabbitMQ documentation
- Sample Django project with Celery integration
- Celery 4.0 release log

TECH TALK

ANIMÉ PAR

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