Why You Might Want To Go Async

PyCon Colombia 2018 - Jonas Obrist - HDE Inc

Hi, I'm Jonas

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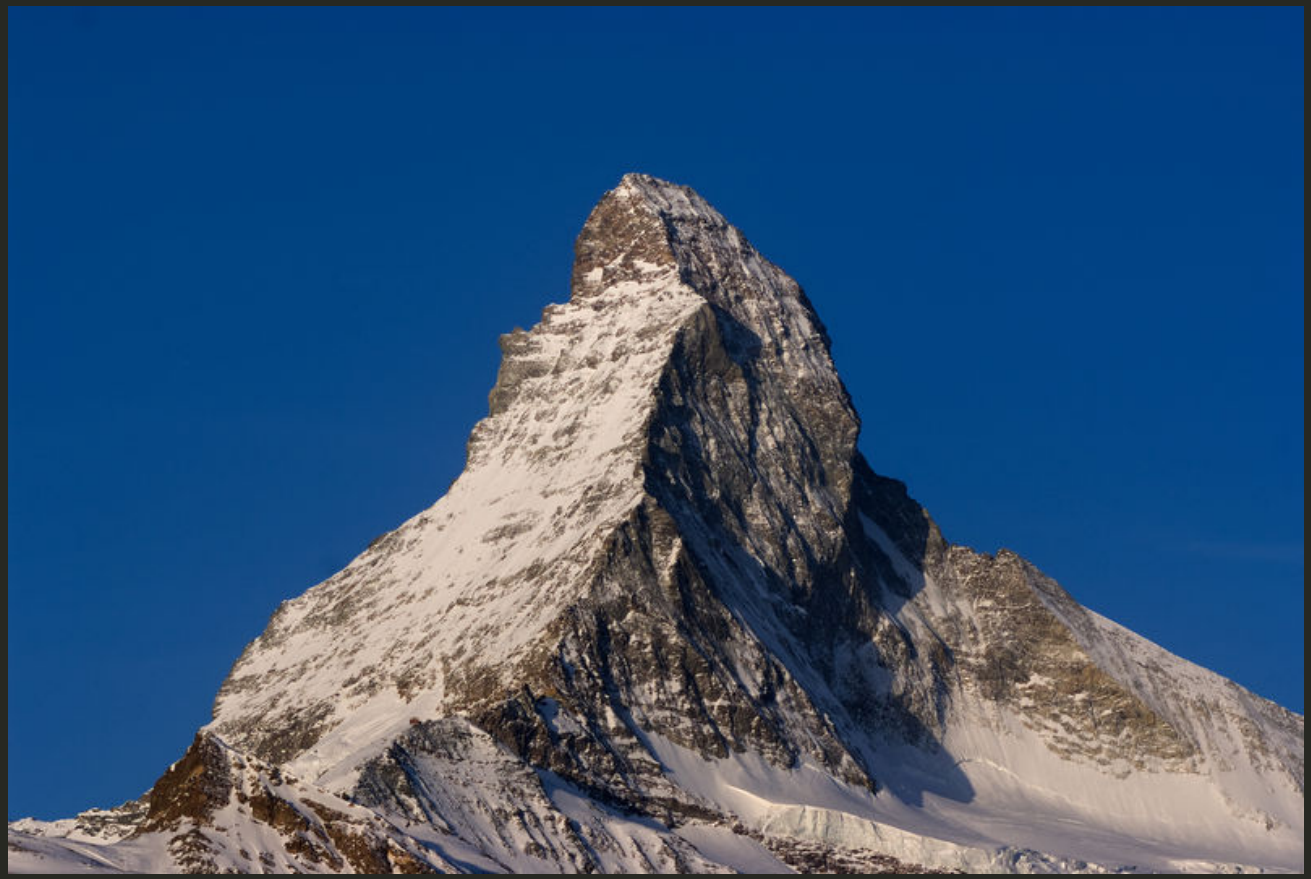

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Quick Links

@ojiidotch

github.com/ojii

hde.co.jp/en/

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What Do I Mean When I Say Async

Async

Asynchronous

Asynchronous IO

Asynchronous Networking

Asynchronous Networking

Opposite of Synchronous

Examples of Synchronous (Python) Frameworks/Libraries

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- `requests`

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- `Django`

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- `psycopg2` (PostgreSQL Library)
- `boto3` (AWS Library)
- `<most other libraries here>`

Examples of Asynchronous (Python) Frameworks/Libraries

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- `twisted`
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- `arsenic` & `aapns` (Libraries I wrote and am shamelessly plugging here)

Asynchronous IO Core Concepts

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- Event Loop

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- IO is non-blocking
- “Logic” might be blocking

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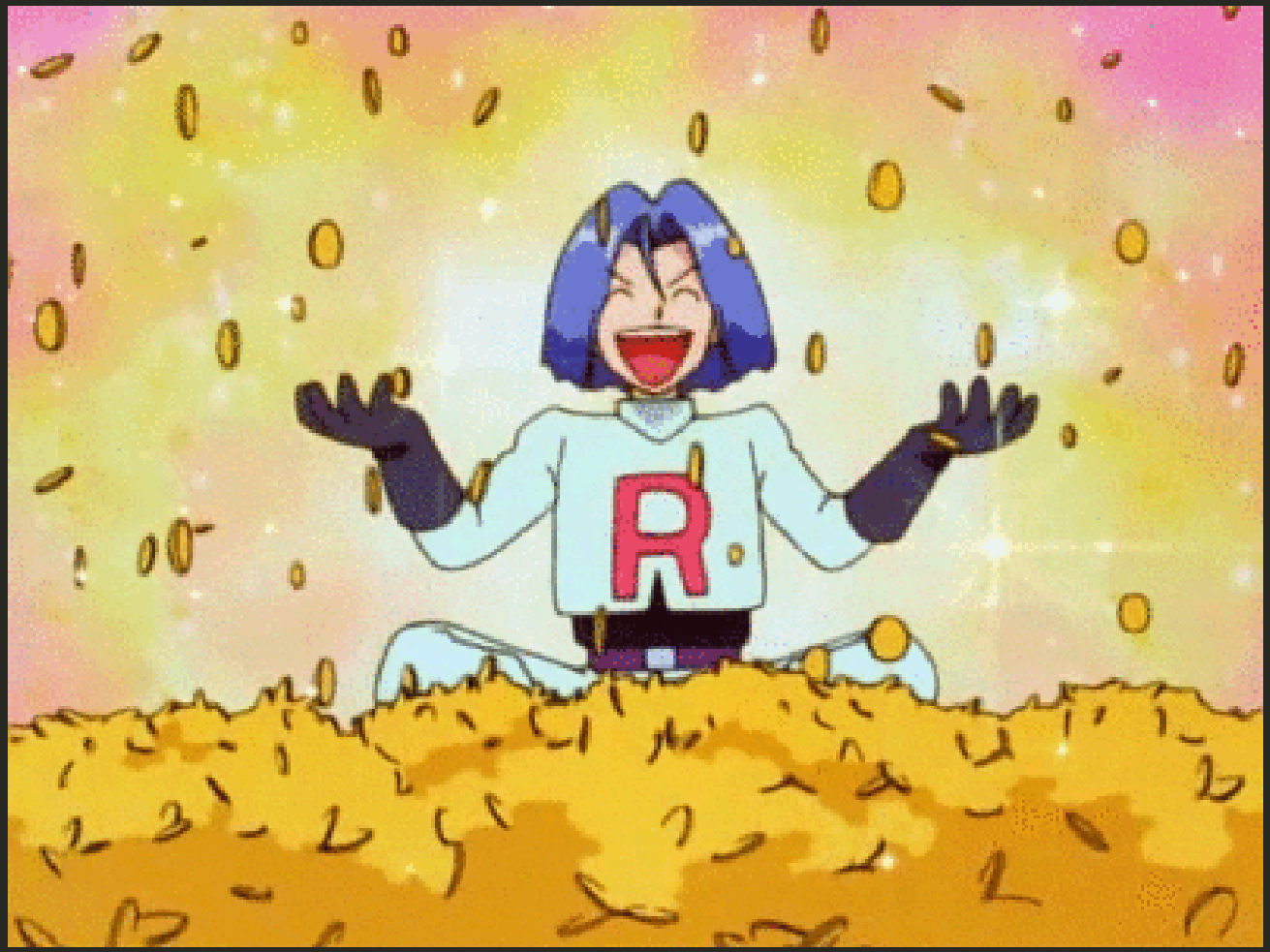
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Why Does Going Async Save Money

Python Is “Slow”

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Python Is “Slow”

- Synchronous web server can only handle **one** request per thread/process.
- Scaling is usually done with more threads/processes/servers
- Lots of resources (CPU) is wasted
    - Most of the time we're waiting for something to respond with data
    - Surprisingly little time is spent in our actual Python code

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Synchronous Python Is Inefficient

Asynchronous Python To The Rescue!

Example: A Web Server

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- Handle a `POST` request

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- Handle a `POST` request
- Store the `POST` data in a database

Example: A Web Server

- Handle a `POST` request
- Store the `POST` data in a database
- Return an identifier of the database object as json

Example: Webserver (Synchronous)

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```
def handler(request: Request) -> Response:
    data = request.post_data
    pk = database.save_item(data)
    return Response(
        status=200,
        body=json.dumps({'pk': pk}) ,
        content_type='application/json')
    )
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Example: Webserver (Synchronous)

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def handler(request: Request) -> Response: # First, Second
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    # First Done
    # Second Done
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    response.write(json.dumps({'pk': pk}))
    response.finish()
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    # Second Done
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Why Does That Work?

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- Still *one* process/thread

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- Still *one* process/thread
- While one request waits for data, handle other requests

An Analogy: A Restaurant

Story Time

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Story Time

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    - Heavy use of threads for legacy code
    - Tornado event loop
    - Still Python 2.7
- Reduced number of servers by **25%**
    - Server bill reduced by thousands of dollars per month
    - Business logic stayed the same
    - Only moved IO code to non-blocking or threads

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Why You Might Want To Go Async **Now**

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  - `async` iterators
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  - `await`
  - `async` iterators
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  - `async` context managers
- Async Revolution
  - `uvloop`
  - `aiopg`
  - `sanic`
  - `aio*`

Story Time (cont)

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- Upgraded App To Python 3.6

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- Result
  - **4x** speedup in request handling
  - CPU usage much lower, much more stable
  - Reduced number of servers by **another 30+%**

To Recap

To Recap

- Use Async To Save Money

To Recap

- Use Async To Save Money
- Use Async **Now** Because It's Ready

To Recap

- Use Async To Save Money
- Use Async **Now** Because It's Ready
- Use Python 3.6

Questions?

Thank You!

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