



# Python programming for real-world constraints

dark arts to envision execution and make systems run faster

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# Real-world constraints

- Understand code better
- Identify bottlenecks
- Work around bottlenecks





5.5y at Facebook

Made over 10k cache servers

fast, stable, and available

Consultant

Co-founded Ajah.ca



Fellow of the PSF

Started Montréal-Python

Vice-chairman, PyCon 2012-13





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## Introspection

- Ipython / Jupyter notebook
- `?`, `??`
- `pprint()`
- `inspect`





## Debugging

- Avoid `print()`
- `pdb`, `ipdb`
- `set_trace()`
- `pysnooter`



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## Scarce resources

- CPU
- Memory
- I/O: disk & network





## **Access hierarchy**

- CPU cache
- RAM, local network
- Hard drive
- Internet





## Profiling

- `time`, `timeit`, `sys.getsizeof()`
- `cProfile`
- `kcachegrind`, `WinCacheGrind`
- `memory_profiler`
- `scalene`

## Resource monitoring

- `top`
- `iostat`, `iostat`
- `jnettop`





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## **Mitigation Strategies**

- I/O: Threading, asyncio
- CPU: Cython



A close-up photograph of a vibrant blue snake with red eyes, coiled around a thin, light-colored branch. The snake's scales are highly detailed and glossy. The background is a soft, out-of-focus green.

## Libraries and tools

lpython  
pprint  
inspect  
timeit  
pysnopper

cProfile  
kcachegrind  
memory\_profiler  
scalene  
asyncio

cython  
top  
iotop  
iostat  
jnettop

## Credits

Climbing pictures: Yen Kha

Blue snake: Edy Pamungkas <http://35awards.com/author/edypank369/>