Python for Quant Finance

From Advanced Analytics to
Deployment via the Browser

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Dr. Yves J. Hilpisch is the founder and managing partner of The Python Quants, a group focusing on the use of Open Source technologies for Quant Finance and Data Science.

He is the author of "Python for Finance" (O'Reilly, 2014) and "Derivatives Analytics with Python" (Wiley, 2015).

Yves lectures on computational finance at the CQF Program (http://cqf.com) and Saarland University.

He is organizer of Meetup groups and conferences about Python and Open Source for Quant Finance in Frankfurt, Berlin, London and New York.

Yves is a regular speaker at Python and other technology conferences as well as at Quant Finance conferences.

I. **Our Market and The Problem**

II. How We Solve The Problem

III. Concrete Use Cases

Mega Trends

Some mega trends that influence quant finance

Dynamic communities evolve
to professional networks.

Today's standard is "open source",
even for key technologies.

Complex analytics work flows are
coded in the browser.

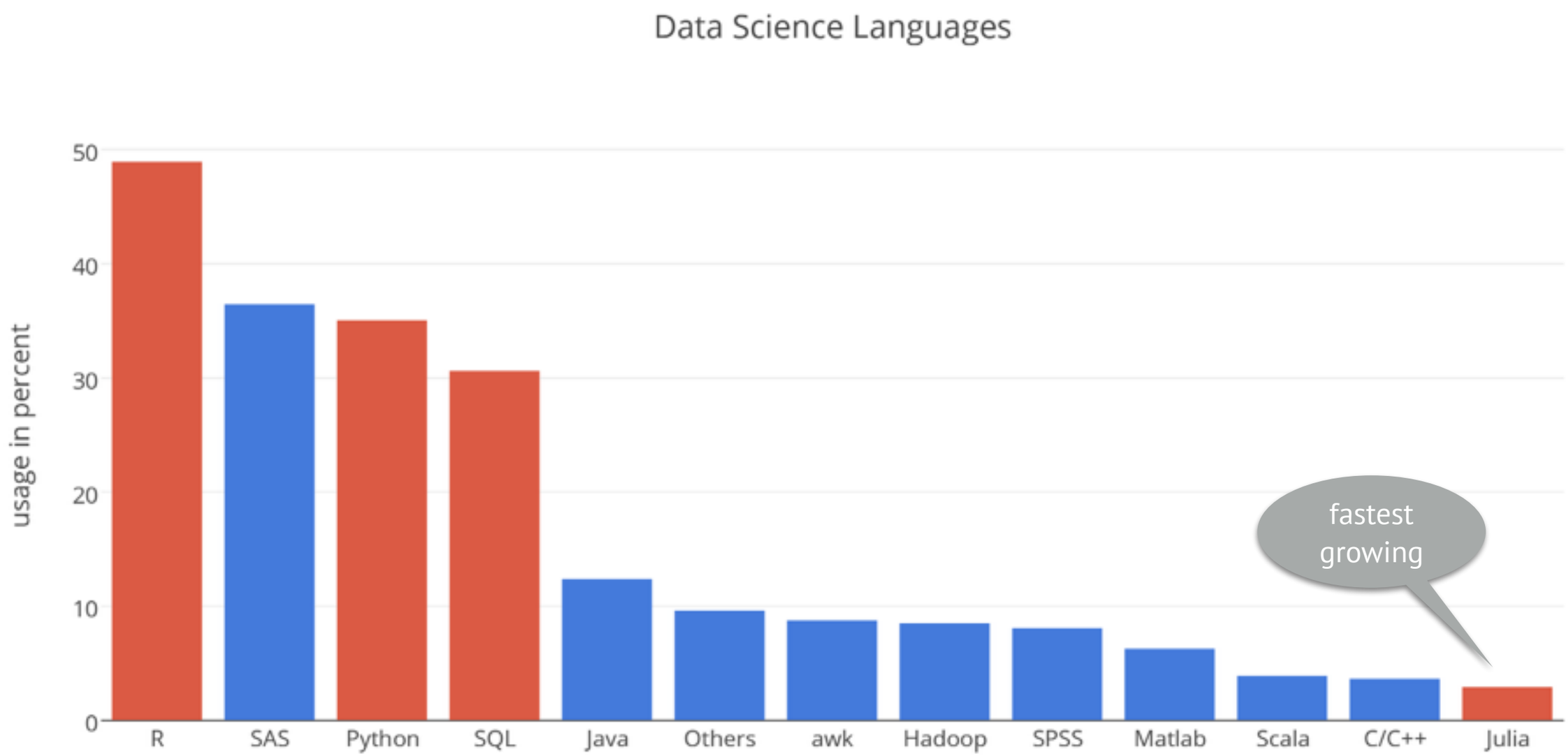
More and more data sets are
"open and free".

Infrastructure is a standardized
commodity, billed by the hour.

Even individuals can trade real-
time and with high leverage.

Open Source Data Science

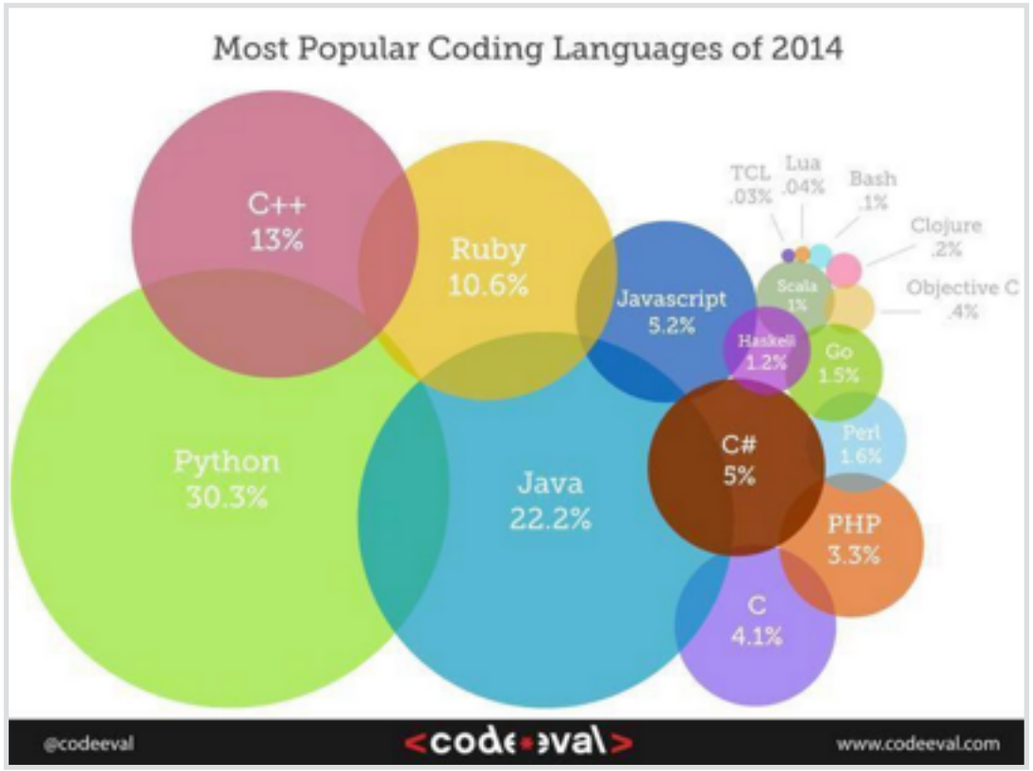
OS languages dominate data science these days

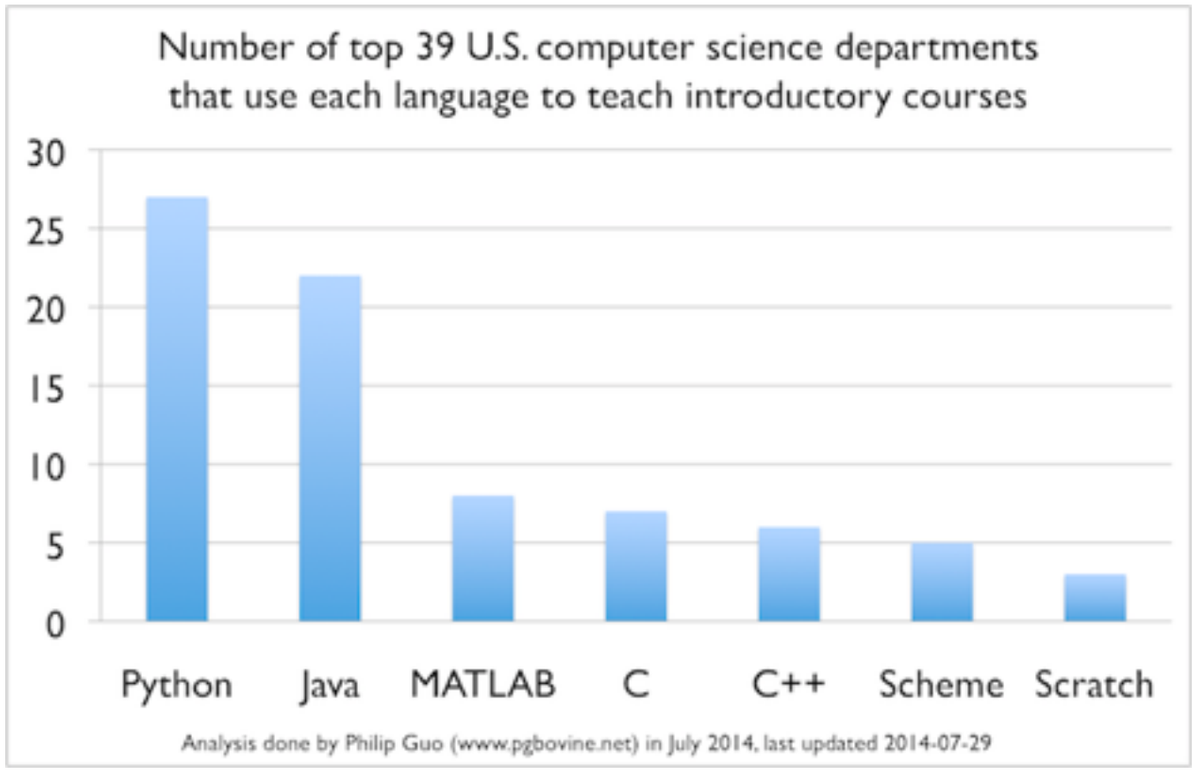


Poll data from August 2014. Source: http://www.kdnuggets.com

Python as Strategic Platform

Python plays an important role in the open source ecosystem





“Python's readable syntax, easy integration with C/C++, and the wide variety of numerical computing tools make it a natural choice for financial analytics.

It's rapidly becoming the de-facto replacement for a patchwork of languages and tools at leading financial institutions.”

Kirat Singh—Co-Founder, President and CTO
Washington Square Technologies

Adoption in Finance

The biggest financial players have already adopted Python

Bank of America Merrill Lynch

"Quartz is Bank of America Merrill Lynch's integrated trading, position management, pricing and risk management platform. … It's the fact that Quartz uses **Python**, a remarkably flexible programming language, that enables it to work so well for such a large development community."

J.P.Morgan

"Athena is J.P. Morgan's cross-market risk management and trading system. … Athena includes a globally replicated object-oriented database, a powerful dependency graph, and a fully integrated stack across pricing, risk and trading tools. The code is a combination of **Python**, C++, and Java: …"

AQR

"AQR Capital Management is looking for innovative and passionate developers to design and implement AQR's proprietary research and production systems. … The successful candidate is comfortable working in the quantitative space and has an aptitude for mathematics. … Code using primarily **Python** (and some C#)."

2σ TWO SIGMA

"We are seeking a data engineering software engineer to join our team. Our data engineers are the backbone of Two Sigma's information-gathering mission. … Experience using several different programming languages such as Java, Groovy, and **Python**."

Open Source Revolution

Both in the front and back end OSS revolutionizes finance

FRONT END

In the front end, open source software revolutionizes how quantitative analysts and developers work on a daily basis.

BACK END

In the back end, open source software revolutionizes how analytics workflows and financial applications are deployed and scaled.

Open Data Science Conference

IP[y]: IPython
Interactive Computing

openstack
CLOUD SOFTWARE

Spark

jupyter

PyData

CLOUD FOUNDRY

BEAKER
THE DATA SCIENTIST'S LABORATORY

"DigitalOcean is a simple and fast cloud hosting provider built for developers. Customers can create a cloud server in 55 seconds, and pricing plans start at only $5 per month for 512MB of RAM, 20GB SSD, 1 CPU, and 1TB Transfer."

The Problem

Obstacles to using Python & Open Source for Quant Finance

Open Source
fast changing
environment

Vendors & Partners
almost no Python for
Quant Finance experts

Libraries
for financial analytics
mainly missing

Tools & Processes
no real standards,
isolated applications only

Deployment
complex, costly,
lengthy, risky

Maintenance
how to update,
maintain infrastructure?

Diverse End Users
computer & data scientists
as well as domain experts

Training
how to train and
re-train people?

Start
where and how to
start, who to talk to?

I. Our Market and The Problem

II. How We Solve The Problem

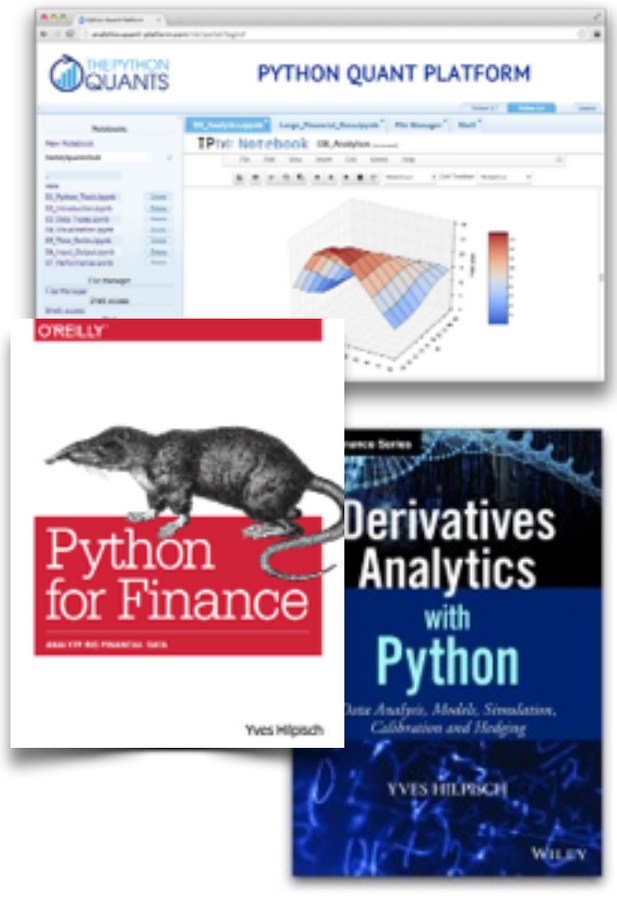
III. Concrete Use Cases

The Python Quants

We are uniquely positioned to solve the problem

Products

Technology
& Books



Services & Training

Consulting, Development
& Training

[Eurex Advanced Services]

[Quantshub Training]

Community

Conferences,
Meetups & Web

[For Python Quants]

[Python for Quant Finance]

The Python Quants

Our current focus and value proposition

Current Focus

Front end (tooling)
& financial libraries

IP[y]: IPython
Interactive Computing

Future Focus

Back end deployment
& scaling

Business Model

Similar to Red Hat:
strong partner for OSS

redhat.

"**The software is free. The subscription is invaluable.** Red Hat customers enjoy the latest security fixes, award-winning support, and committed product life cycles."

Python Quant Platform

Paradigms in data analytics (as we see it) and where we fit in

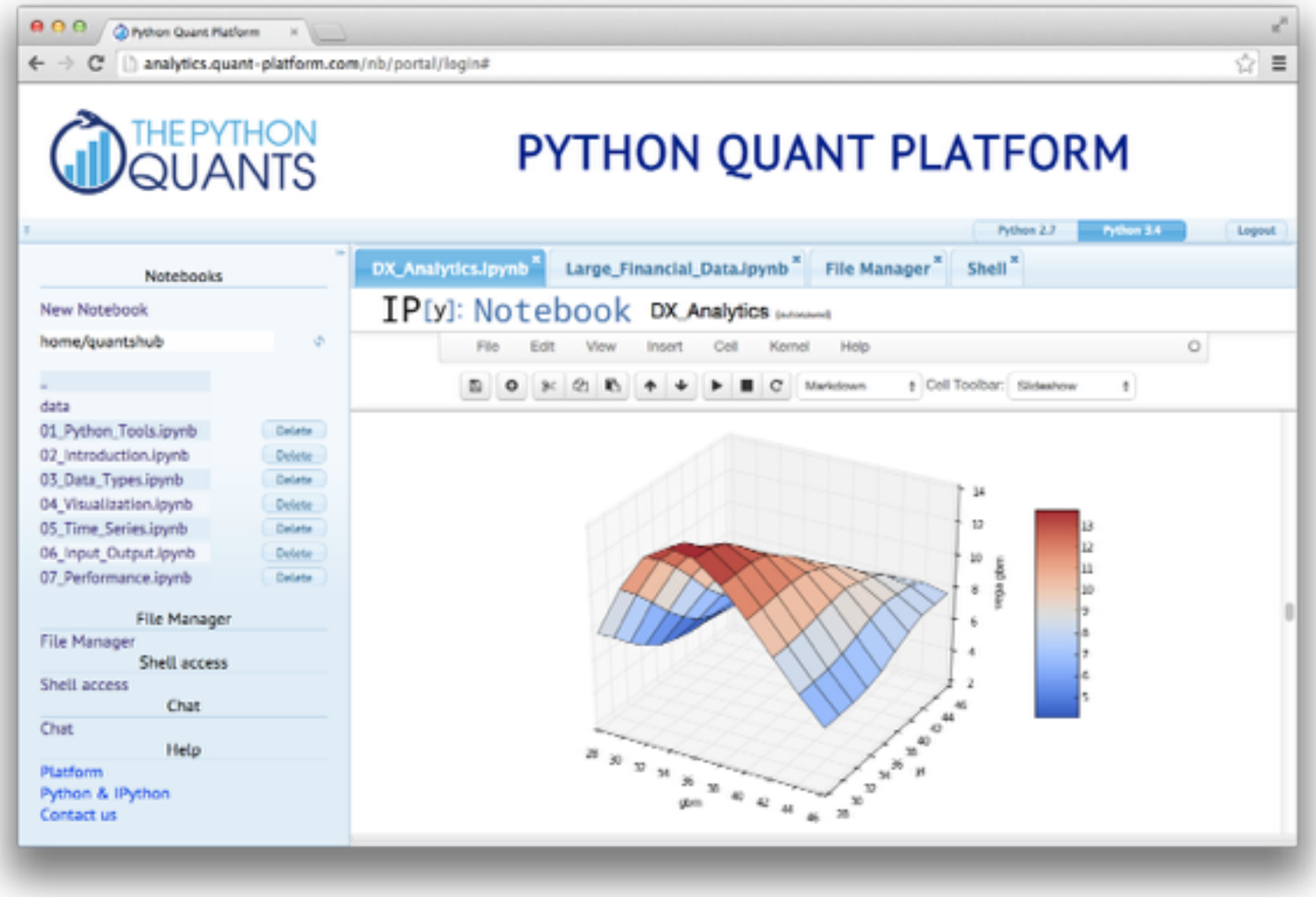
1. Generation: Move Data Around — data analytics started by moving data from one place to another, analyzing it locally and moving results back to the remote data source

2. Generation: Move Code Around — moving tons of data is costly and time consuming; moving small code sets is faster and less costly

3. Generation: Don't Move Anything — the Browser and Web technologies allow to work directly and in real-time on the infrastructure where data and code are stored (replacing remote ssh/ftp access and emulating desktop experience)

Python Quant Platform

Browser-based, collaborative financial and data analytics



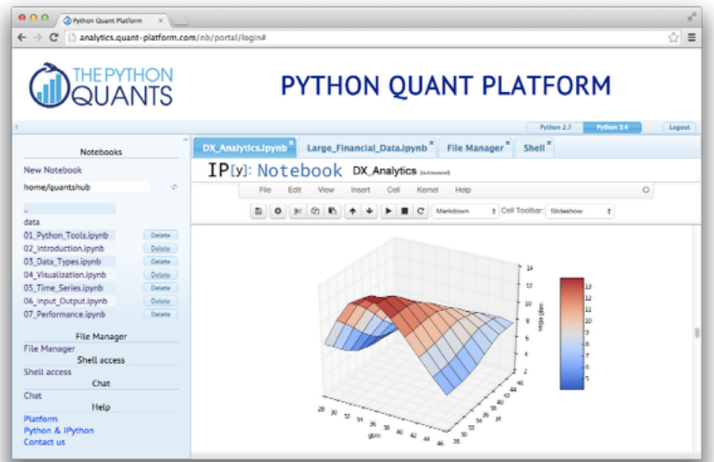
The Python Quant Platform offers Web-based, scalable, collaborative financial analytics as well as rapid financial engineering and application deployment for individuals, teams and companies. Easily deploy it anywhere via Docker containers & browser-based access.

http://trial.quant-platform.com

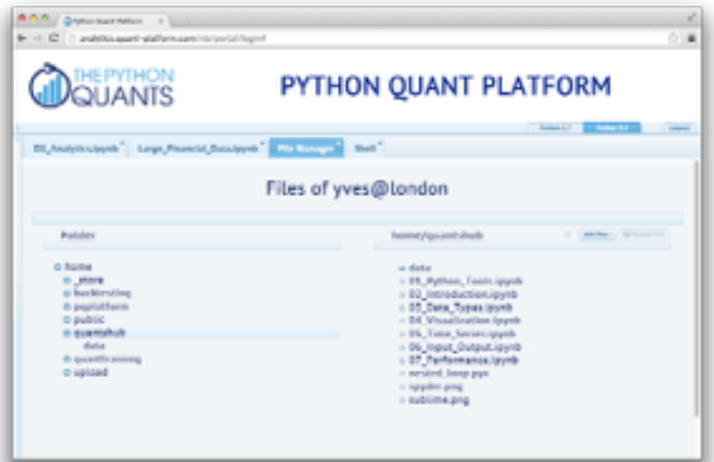
Python Quant Platform

It integrates all that is needed for modern data analytics

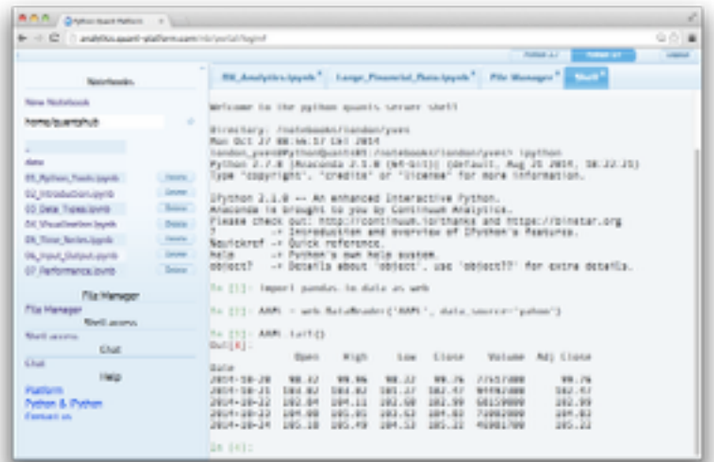
IPython Notebook



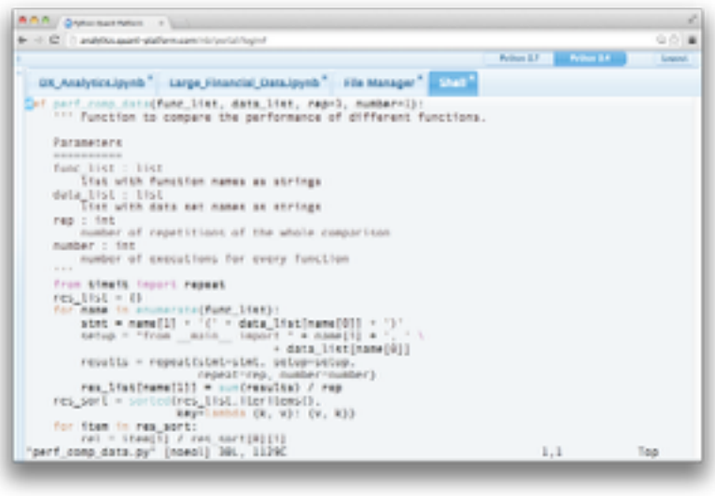
GUI-based File Management



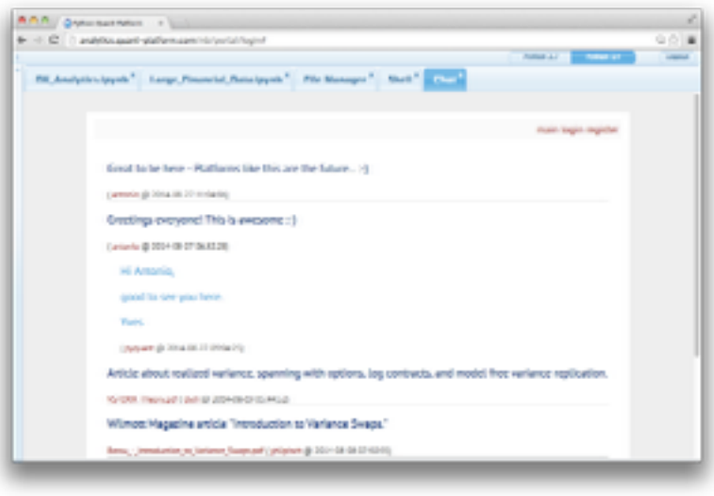
Linux & IPython Shell



"Absorb what is useful, discard what is not, and add what is uniquely your own."—Bruce Lee



Code Editing



Chat & Forum

Resource Control

Python Quant Platform

Multiple languages, flexible infrastructure and collaboration

Python & More

Full-Fledged
Python Stack

Anaconda

NumPy, SciPy, pandas, PyTables
h5py, matplotlib, IPython,
numexpr Cython LLVM, LLVMpy
Numba, Scikit-learn, many more

julia

Cloud & Dedicated

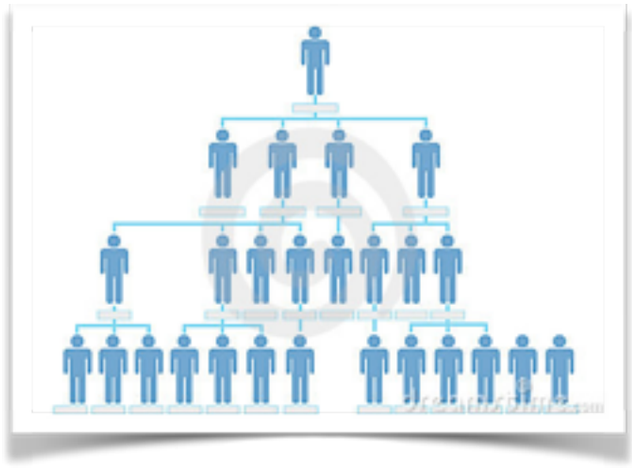
Linux-based
Infrastructure

PQP can be even deployed on the
smallest DigitalOcean droplet for
5 USD per month. User registration
in 30 seconds, client-specific deployment
in 30 minutes.

PQP can be deployed on dedicated
servers in a data center or
on client premise—directly or based
on Docker containers.

Users & Collaboration

Accounts, Rights, Sharing
and Security



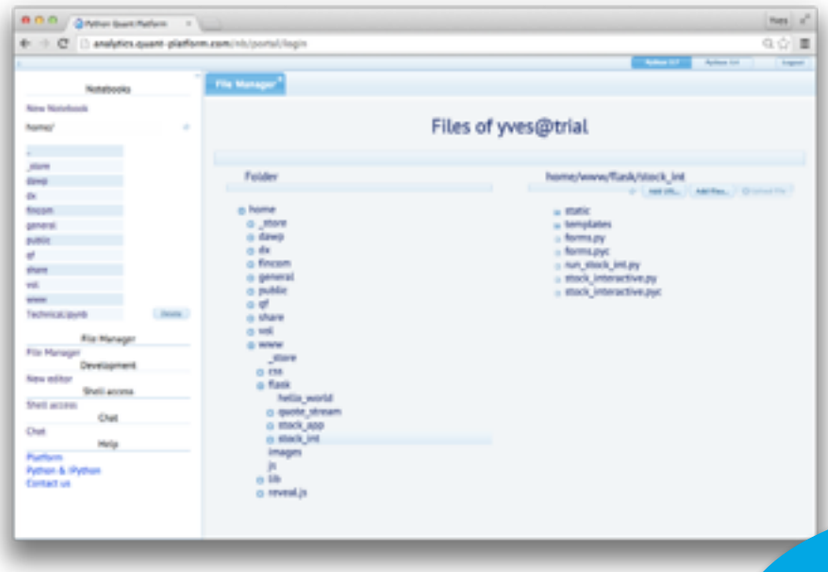
Using the unique, decade long
developed and matured user
and rights & role management
of Linux as the basis
(“bottom-up approach”)

Adding standardised features
for team sharing and public sharing.

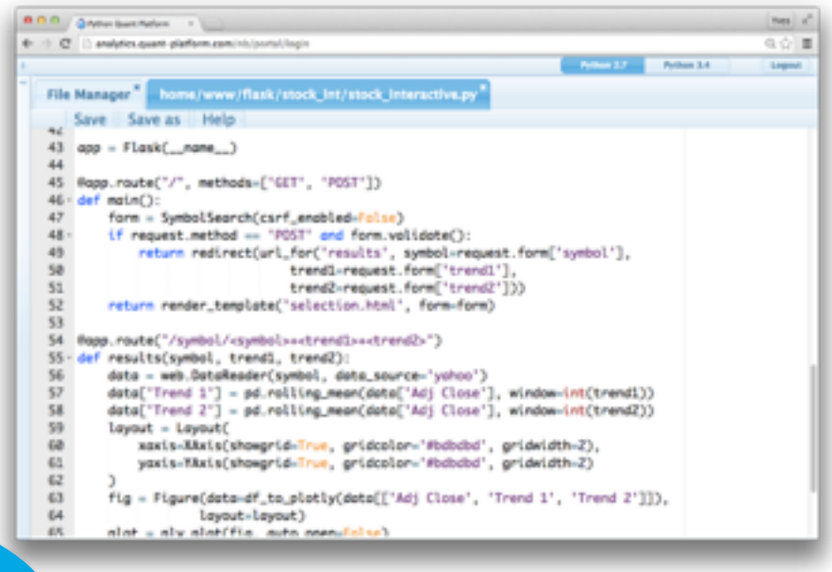
Application Development

You can manage projects and edit all typical file types

Project File Management

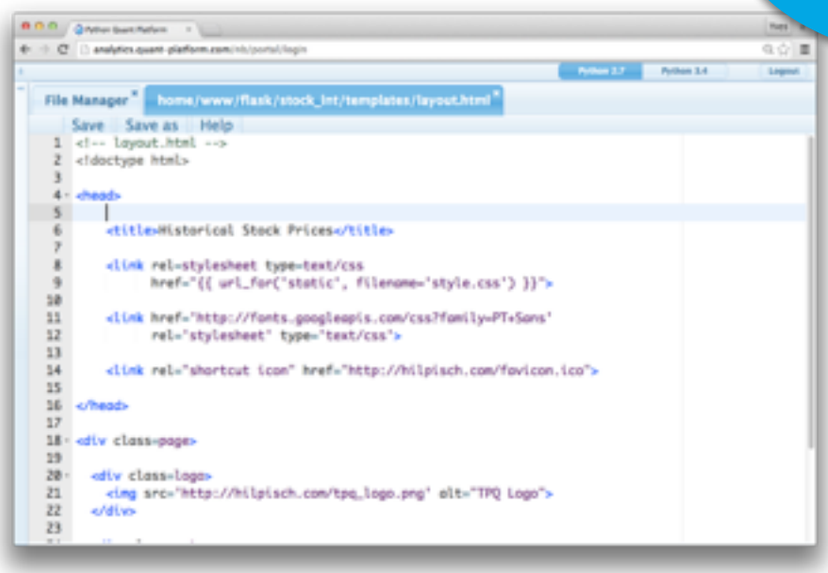


Python Application Logic

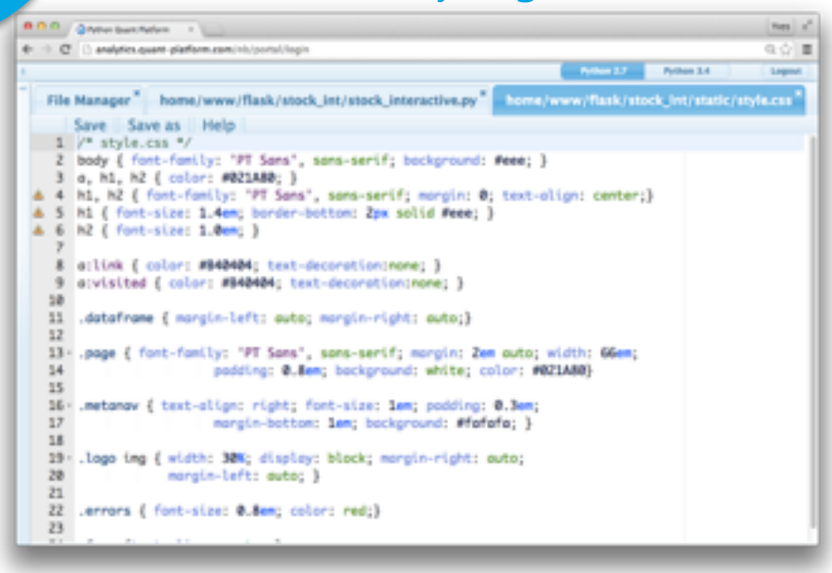


Example: Flask Web Application

HTML Content

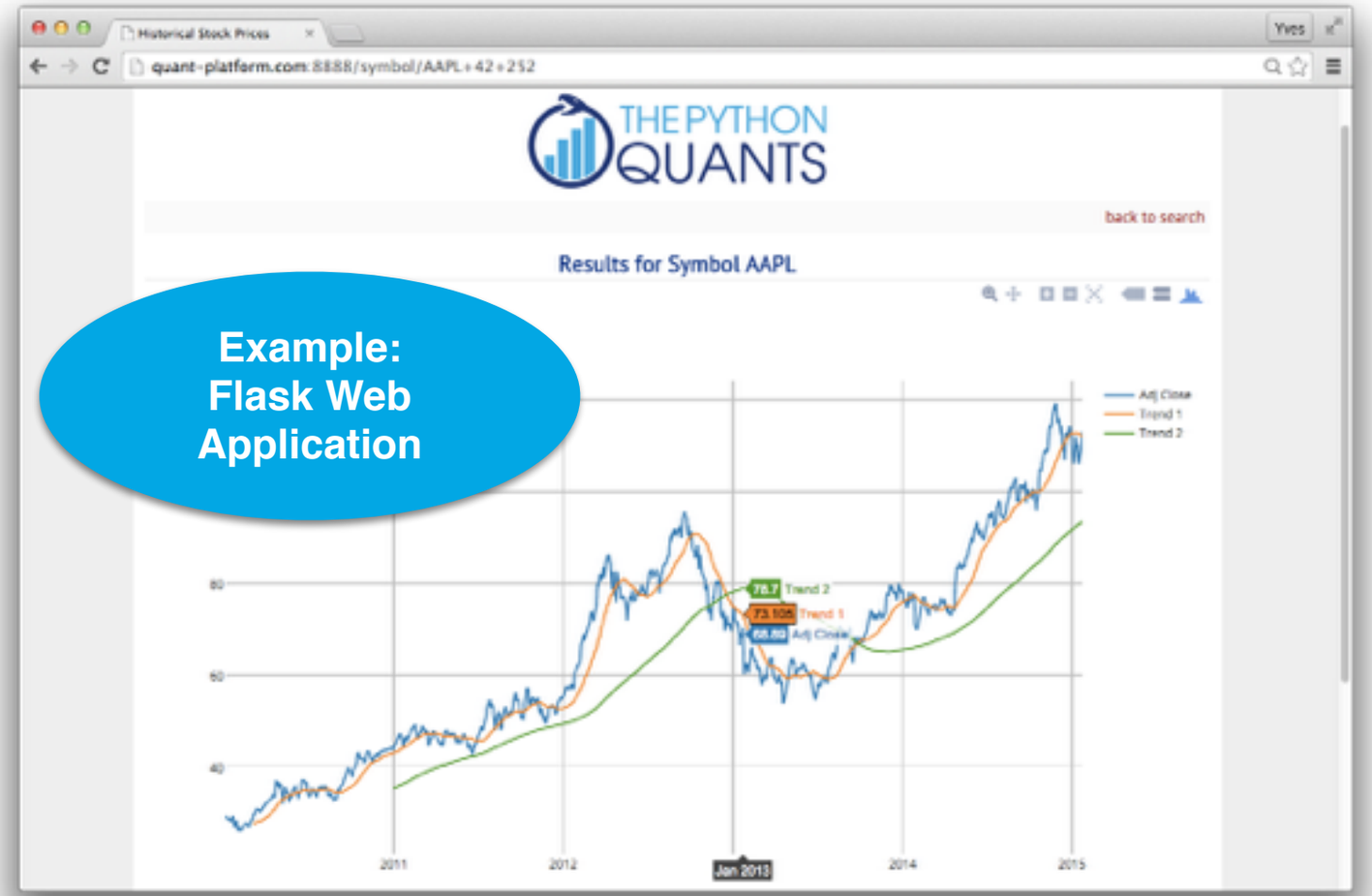


CSS Styling



Application Deployment

Your applications can then be directly deployed on the platform

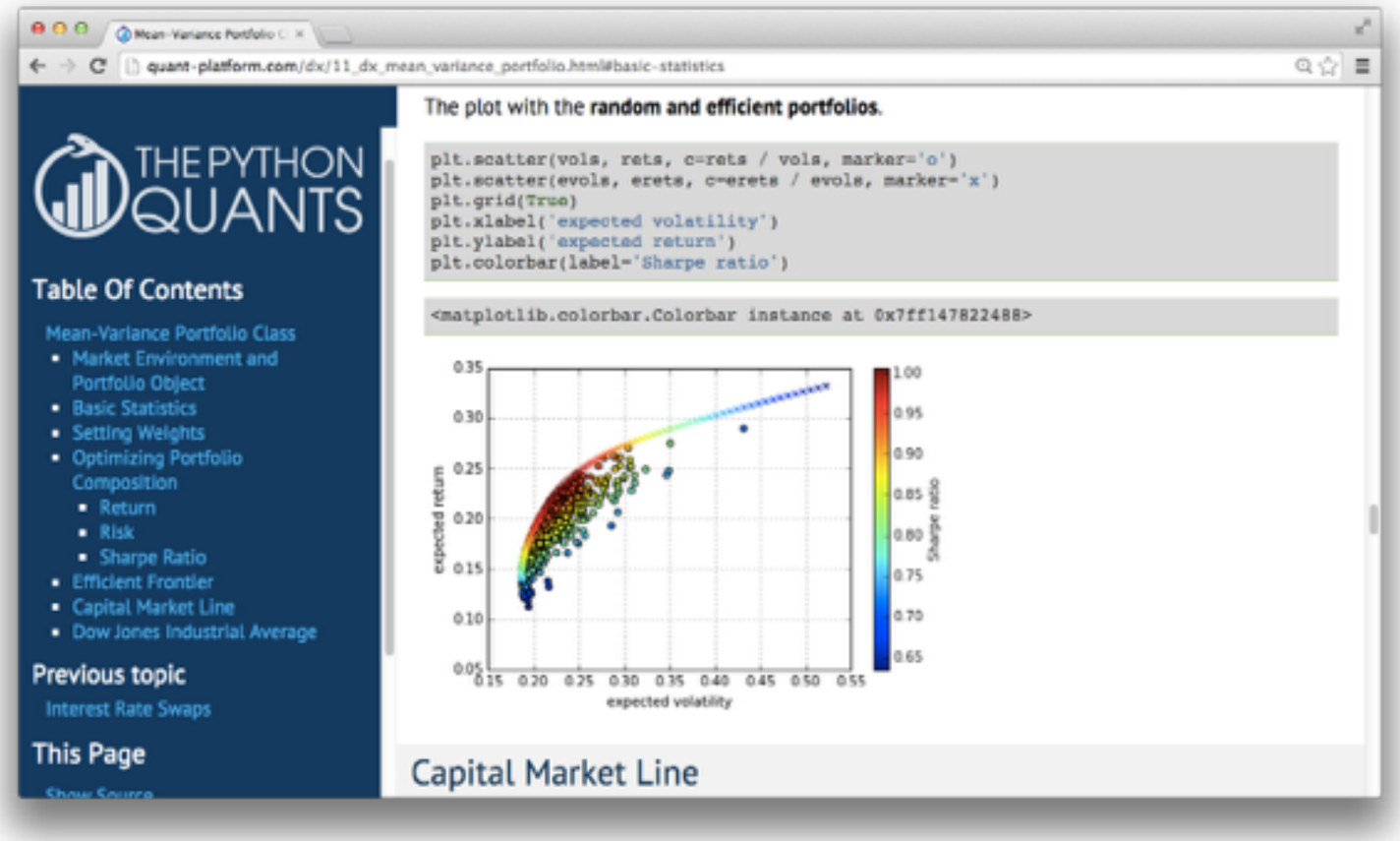


The Python Quant Platform is based on standard Linux servers. This allows you to easily deploy Web- and browser-based applications on any kind of infrastructure—both for internal and external users.

Link to Flask Application

DX Analytics

Python-based library for financial, derivatives & risk analytics

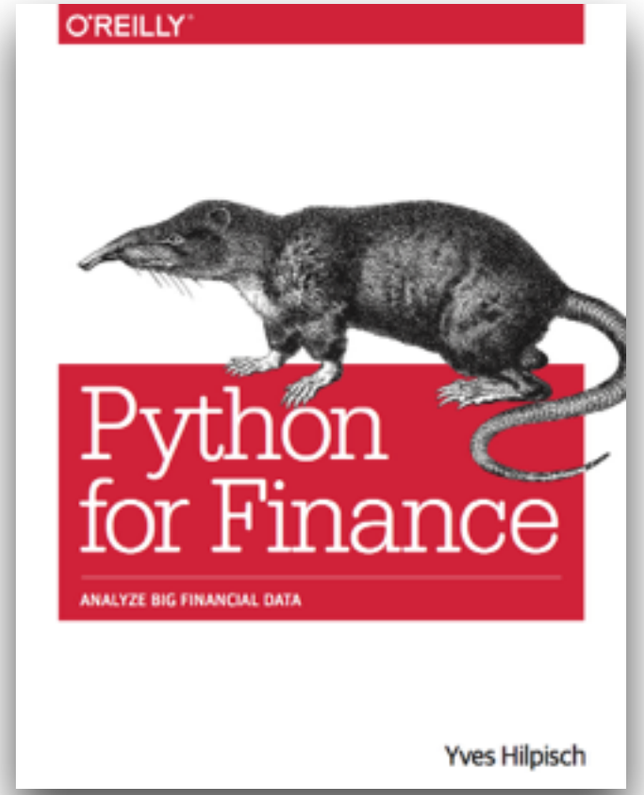


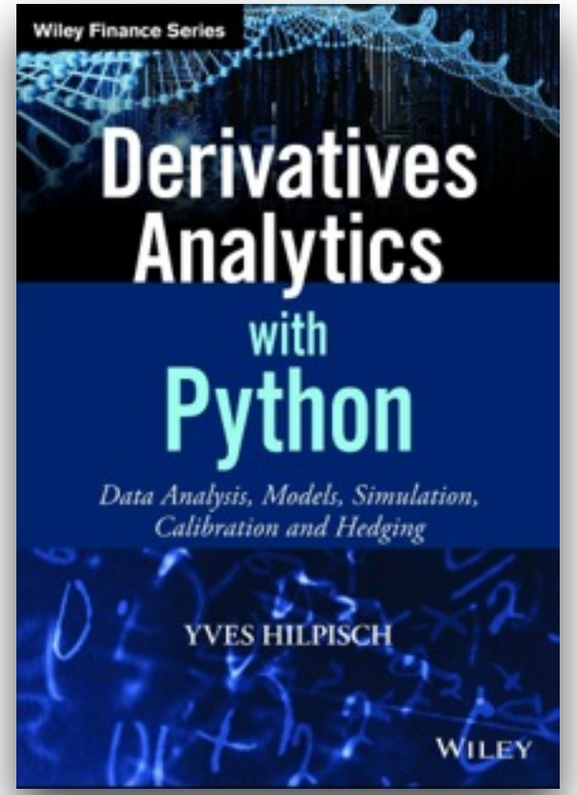
DX Analytics is the first Python-based financial analytics library implementing advanced derivatives and risk analytics approaches. It is open source, easily expandable and simple to integrate. Its strengths lie in simulation-based analytics.

http://dx-analytics.com

Python for Quant Finance Books

Providing know-how, guidance and use cases



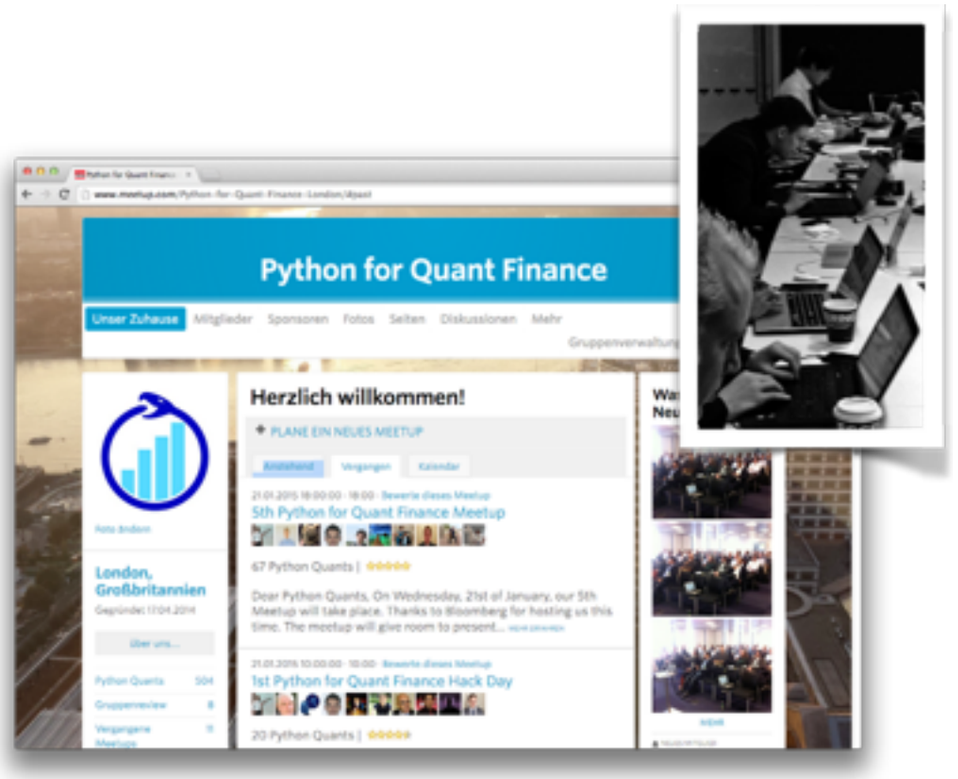


Python for Finance teaches the use of Python for financial analytics and financial applications (cf. O'Reilly).

Derivatives Analytics with Python teaches quant finance with self-contained implementations in Python (cf. Wiley).

Python for Quant Finance Communities

Organizing conferences and community events



Conferences
225 in New York in 2014
165 in London in 2014

Planned 2015
Frankfurt, New York,
London, Asia

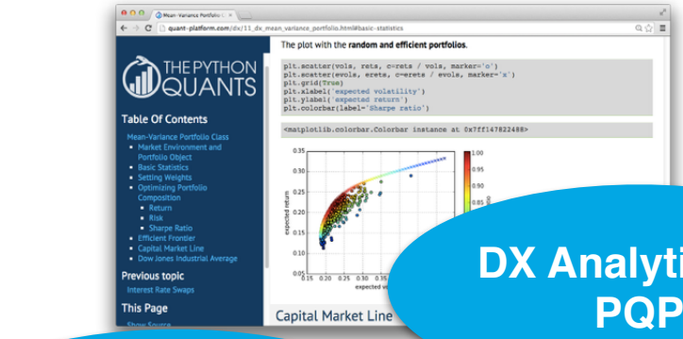
OUR PARTNERS
Thomson Reuters
Bloomberg
Fitch Learning
Pivotal
...

Meetup Groups
600+ members in London
(biggest group of its kind)
225+ in New York
210+ in Berlin

Planned 2015
Frankfurt

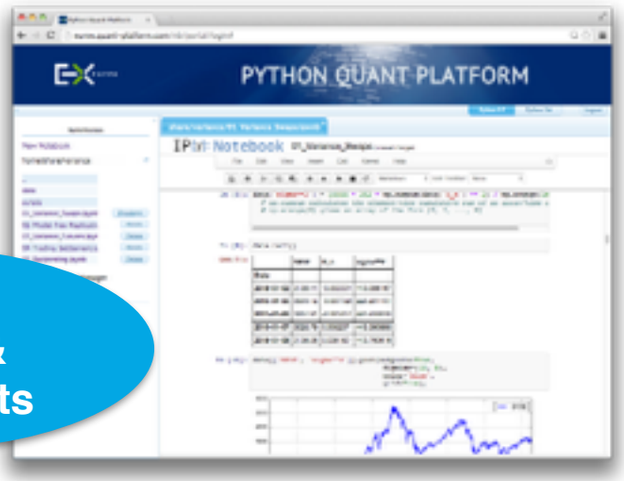
Our Product & Service Platform

All products & services together build an integrated offering



DX Analytics on PQP

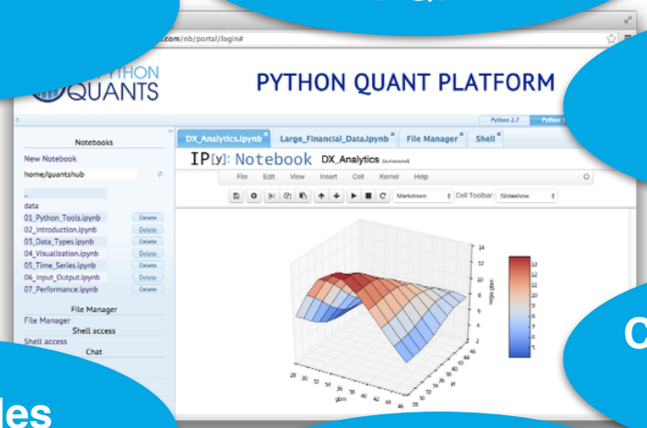
Use DEXISION from PQP



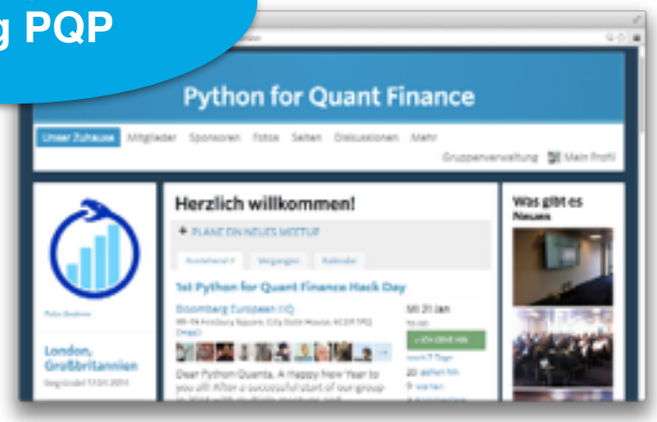
Client projects & deployments

Books explaining DX Analytics

Book Codes on PQP



Community events using PQP



Trainings using PQP

Trainings based on books

THE PYTHON QUANTS GROUP

I. Our Market and The Problem

II. How We Solve The Problem

III. Concrete Use Cases

Concrete Use Cases

From local advanced analytics to large scale deployments

Derivatives Analytics

Doing financial analytics with DX Analytics

Link to HTML version

Link to HTML5 slides version

Analytics in the Cloud

Jupyter Notebook server in Docker container

Link to server

Github repository

Quant Platform

Developing and deploying in the browser

The application uses Python, pandas, plotly and Flask to retrieve historical stock price data (from Yahoo! Finance) and to visualize the data as an interactive D3.js plot.

Link to application

Github repository

Quant Platform Takeaways

Being better and faster
in financial analytics and engineering.

Interactively prototype, collaborate on and share
Python, R, Julia, ... -based analytics workflows and
applications across your organization.

Benefit from books, consulting, support and training
from the Python for Quant Finance experts.

Be part of the global Python for Quant Finance
Community.

Upcoming Events

28. April – 01. May in New York
For Python Quants Bootcamps & Conference
http://forpythonquants.com

05. June in Frankfurt
“Open Source for Quant Finance”
http://osqf.tpq.io

[Contact me for discount codes.]

The Python Quants GmbH

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