

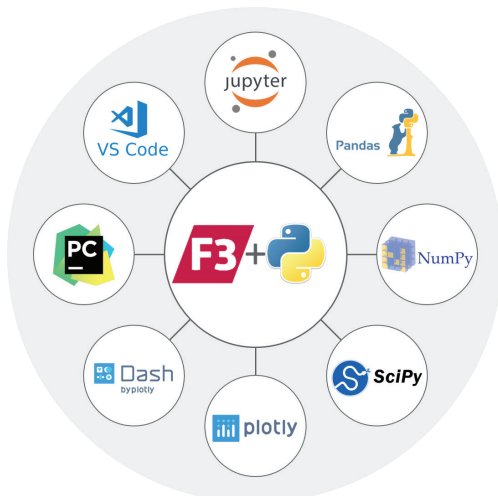
Python Toolkit

Unlimited flexibility to create custom analytics, applications and reports without the burden of infrastructure issues

Industry Challenges

Due to its versatility and ease of use, Python has achieved widespread adoption in finance, and is now the multi-purpose tool of choice for quantitative analysts and other financial technologists.

Although, it is easy to write code with Python, deploying it to production can be challenging, and teams often struggle with infrastructure issues such as data management, calculation scaling, version control, admin and security.



A rich ecosystem of Python tools and libraries work seamlessly with F3.

The Solution

Your firm is unique, and your portfolio and risk systems should have the flexibility to easily accommodate your specific requirements. With FiNCAD F3 and the Python Toolkit you have the flexibility for unlimited customization using Python and its rich ecosystem, plus FiNCAD's industry standard analytics.

The F3 Python Toolkit helps you deploy and centrally manage your Python code with the enterprise-class technology of F3 Platform. Portfolio managers, traders, and quants can maximize productivity by easily collaborating with each other. This also frees them to focus on creating value without the burden of infrastructure issues, such as data management, calculation scaling, admin and security.

The FiNCAD F3 Python toolkit includes an F3 Python SDK, F3 Python MicroServices and F3 Python Trade Scripting which enable:

- **Custom applications:** Rapidly build applications with standard Python libraries and tools, plus native F3 functionality for building rich, interactive UIs without having to be a developer. Create custom analytics, such as portfolio optimizers, which can be viewed in F3 WorkStation.
- **Custom reports:** Easily produce tailored reports in Python with a library of widgets for reporting, selecting books, trades and models, and for handling many types of financial inputs and outputs.
- **Trade scripting:** Model and script complex payoffs with Python's concise syntax and F3's analytics and data. Examples include structured products, hybrids, and derivatives with embedded optionality.

Common use cases:

- Strategy back-testing
- Structured product scripting
- Pre-trade limit checking
- Portfolio optimization
- Optimized hedging strategies
- LDI portfolio construction
- Cash flow matching
- Custom risk reports

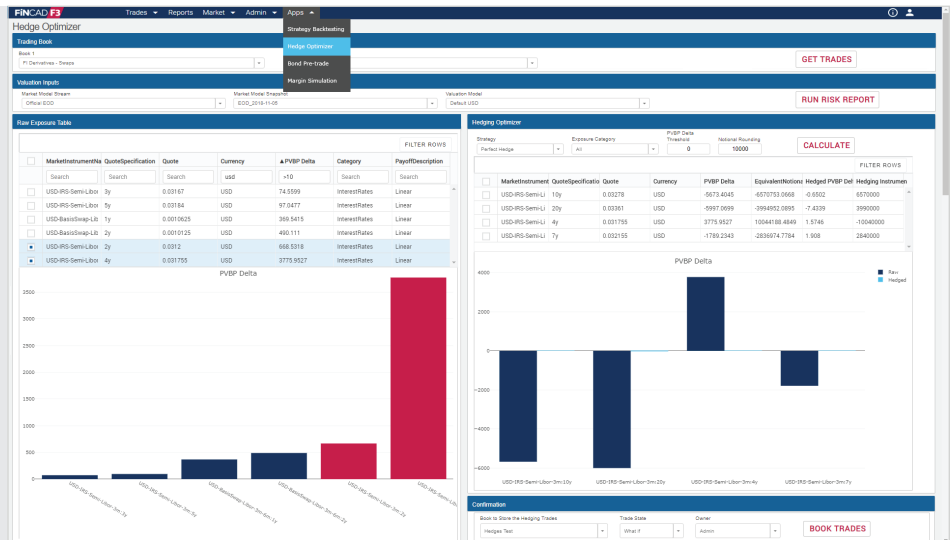
Custom Applications

Develop custom applications faster with familiar tools, and without needing to learn a new development environment. Includes a large collection of UI widgets for managing books, trades and models, and for handling many types of financial inputs and outputs.

Easily deploy your Python code as a MicroService and F3 Platform takes care of managing and securing it.

Use your favorite Python tool including, Jupyter Notebooks and Jupyter Lab, PyCharm, Visual Studio Code and Eclipse.

Direct support for asynchronous programming enables improved application performance and responsiveness while running computationally intensive calculations.



```

1 from f3sdk.services.service_decorators import f3service
2 from f3sdk.f3.payoff import Max, Min, If
3 import asyncio
4
5 @f3service()
6 async def fx_tarn(f3,
7                 base_fx_index: str,
8                 interest_rate_cap_index: str,
9                 base_fx_index_initial: float,
10                interest_rate_cap_index_initial: float,
11                cap_rate: float,
12                base_currency: str,
13                notional: str,
14                start_date: str,
15                maturity: str,
16                market_convention: str,
17                pay_rec: str) -> str:
18
19     flow = lambda payoff, roll : f3.CreateSingleCashflowProduct( RollDates = roll,
20                                                                Index = payoff,
21                                                                Notional = notional,
22                                                                Currency = base_currency,
23                                                                PayRec = pay_rec )
24
25     rolls = await f3.evaluate( f3.RollsSchedule( StartDate = start_date,
26                                                Maturity = maturity,
27                                                MarketConvention = market_convention ) )
28
29     total_payoff = 0
30     tarn_flows = []
31     redemption_flows = []
32     for roll in rolls:
33         # define payoff in loop over the schedule
34         # operators overLoaded and functions defined for indices
35         this_payoff = roll[1] * 0.01 * Max( [0.0, Min( [base_fx_index(roll) - base_fx_index_initial,
36                                                    interest_rate_cap_index(roll) - interest_rate_cap_index_initial] ) ] )
37
38         prev_cond = total_payoff < cap_rate
39         total_payoff += this_payoff
40         this_cond = total_payoff < cap_rate
41         tarn_flows.append( flow( (total_payoff < cap_rate) * this_payoff, roll ) )
42         redemption_flows.append( flow( If( this_cond, 0, prev_cond ) * ( 1 + this_payoff ), roll ) )
43
44     fx_tarn = await f3.evaluate( f3.CreatePortfolioProduct( tarn_flows + redemption_flows ) )
45     return fx_tarn

```

Trade Scripting

Support new products as rapidly as the business dictates. Complex payoffs are scripted with Python rather than a proprietary language and will apply equally to any valuation method you choose. Native integration with F3 means you benefit from:

- Standard trade operations, audit and reporting
- Full analytic risk from Universal Algorithmic Differentiation
- Scenarios, VaR, P&L, xVA
- Cash flow projections
- Generic calibration framework



Custom Reports

Design new reports and analyses that exactly match your business requirements using Python and F3 analytics. The F3 custom analysis toolset includes a suite of input and presentation widgets to make F3 WorkStation integration of the outputs seamless, and the F3 reporting infrastructure will automatically generate the correct visual presentation. It will appear in F3 WorkStation as a new report, as in the example to the left.

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