

Technical Sheet

F3 Platform Architecture and Data Integration

F3 Platform is built for speed, flexibility, scalability, and extensibility. You can reduce time to market for advanced, high-performance enterprise valuation and risk analytics by leveraging F3 Platform in conjunction with off-the-shelf tools and backed by FINCAD Professional Service's extensive experience integrating with front, middle, and back office systems.

Scalability

Whether you have a large portfolio of vanilla instruments or a portfolio that includes advanced hybrid structures, the ability to scale the risk (VaR, Greeks, scenario analysis, xVA) and valuation calculations utilizing a combination of closed form and simulation engines can get fairly expensive and may need to be done in intra-day.

F3 Platform provides a solution which is quick to install and deploy on a variety of hardware/software platforms, and addresses scalability with a distributed calculation engine and memory manager.

Distributed Calculation

A key component of the F3 Platform architecture is the calculation service. This component uses a pool of worker processes which can perform independent calculations in parallel, so you can take full advantage of your hardware, or even send some processes to the cloud, to achieve required performance levels.

F3 models are designed to take advantage of this parallelism. For example, different iterations of a Monte Carlo simulation are automatically farmed out to the calculation service by the workflow engine. The calculation service can then perform these tasks in parallel and return results in a map-reduce fashion. The calculation service can be hosted on a local server farm or on a cloud.

Distributed Memory

The second pillar of the F3 Platform architecture is its distributed high-speed cache which facilitates faster calculations. The cache stores all calculation results such that it can provide results directly for requests whose results are already present in the cache and only recalibrates data or performs calculations where underlying data or trades have changed minimizing calculation time.

Consistent hashing is used for efficient retrieval of objects in a distributed environment. The distributed cache stores curve and model construction instructions, previous requests and results. If curves have not changed since the last request for a previously calculated result then the result is returned from cache rather than recalculating it.

The cache within each worker stores curves and calibrated models. These are not yet shared across workers. Each worker has to calibrate each model.

The cache has a persistent backing store to provide reliability and disaster recovery.

Cache can also be scaled across multiple servers as business needs grow.

Integration

F3 Platform provides avenues for integration with 3rd party components such as market data feed, trade feed, and reference data. It also includes an HTTP API based on industry standard RESTful architecture to facilitate application development.

Market Data Connectors

The F3 market data connector provides a convenient adapter layer for integrating multiple market data providers. It provides connectors for Bloomberg Server API, Bloomberg Open API, and Thompson Reuters RFA and can be configured to connect with any other market data provider.

Rest API

The REST API provides a way to easily access the F3 Analytics platform over HTTP. It also provides the flexibility to developers to use programming technology of their choice since REST is universally supported by all major programming technologies including: Python, C++, C# and Java.

REST endpoints allow creation of F3 objects (models, curves, market data, and trades) and to request valuation and risk calculation results. The REST API uses the workflow layer to direct requests to the calculation and storage services.

F3 Platform's distributed architecture easily integrates with industry standard database technology, market data feeds, and web servers.

F3 Platform API

The F3 Platform API is the core that supports the rapid implementation and extension of F3 Platform. It provides access to both the distributed computation and data management capabilities within F3 Platform through Representational State Transfer (REST) and Remote Procedure Call-over-HTTP (RoH) interfaces optimized for valuation and risk.

The main capabilities of the REST API are:

- Perform create, read, update and delete operations on all objects
- Provide filters for read operations on lists of objects
- Provide results sets in condensed or expanded form
- Perform valuation and risk analytics at the group and individual trade level

The (RoH) API is used when F3 Platform is deployed as an analytics engine where data management services are implemented in another system. It provides an interface for invoking F3 functions over an HTTP connection. These functions may be invoked synchronously or asynchronously to create, manipulate, and analyze the full universe of F3 objects. A session mechanism enables preservation of internal state between function invocations.

The F3 Platform architecture can integrate components written in any language through the manipulation of JSON representations of business objects through the APIs. F3 Platform services are readily compatible with J2EE and .NET environments and F3 Platform is available for deployment on LINUX and Windows® servers.

Integration Languages

F3 Platform clients such as F3 Excel™ Edition, F3 Toolbox for use with MATLAB™, or user-built applications integrate with the F3 Platform API to provide highly scalable, distributed calculation for F3 functions. The language-independent API is compatible with commonly used programming languages that support HTTP requests including:

- C#
- C++
- Java
- Python

The F3 Platform API enables the management, standardization and distribution of all aspects of valuation and risk in F3 Platform. Clients leverage the API to extend F3 Platform by manipulating trades, F3 models, valuation methodologies, and the data required for valuation and risk calculations.

Transparency and Auditability

The API provides transparency into the built-in FINCAD models and enables clients to load their own F3 pricing and risk models into F3 Platform. It also allows clients to calculate portfolio values using different data sources, including proprietary data and data sourced from third-party providers and counterparties.

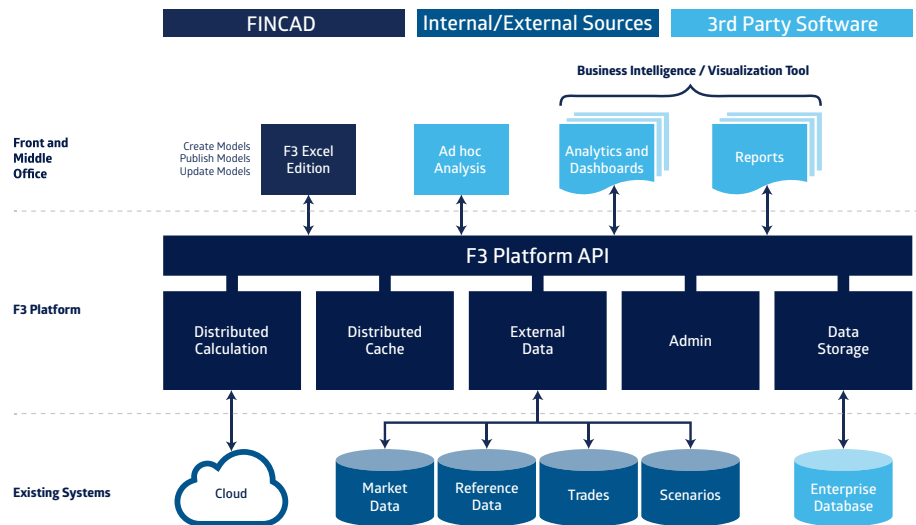
In order to simplify audit of valuation and risk measures, all data changes made in F3 Platform are recorded and are easily accessible through the F3 Platform API.

Flexible Tagging

A fully customizable tagging system enables all data to be grouped, categorized and associated with other data. The tagging system can be used to:

- Group trades into any portfolio, book, strategy, or netting set with no predefined hierarchy
- Identify the purpose of any trade (hedging, financing etc.)
- Associate hedging trades with a related exposure
- Link to other processes and systems (e.g. 3rd party identifiers)
- Attribute ownership to business units and individuals

F3 Platform is an enterprise ready, distributed architecture designed with a view of efficient parallelization of computation, and dynamic memory scaling. This architecture provides for ease of integration with industry standard database technology, market data feeds, and web servers. These features provide a solid base and support for valuation and risk analysis for a wide range of asset classes and instrument types.



Accelerated Implementation

To accelerate implementation, F3 Platform includes a set of pre-defined templates of validated models, and financial instrument definitions. To extend coverage across asset classes, trade templates defining the data structures and construction rules can be easily and independently created without needing any additional software development.

Pre-defined Templates

F3 Platform is pre-populated with a large set of fully-documented convention definitions for markets, settlement and payments. User-defined conventions can be added to F3 Platform as required.

Holiday data (sourced from Copp Clark™ and distributed under license) is provided with F3 Platform and is updated regularly.

Systems Integration

Based upon widely used open standards, the F3 Platform API is compatible with leading proprietary and open source Extract, Transform, and Load (ETL) tools. F3 Platform includes pre-validated symbol and data mappings to Bloomberg and Reuters APIs for market and reference data.

Financial instrument definitions stored in machine-readable trade templates enable data-driven integration with source systems.

Separation of Roles

Software developers can receive the financial modelling instructions developed by quants using F3 Excel or F3 toolkit for use with MATLAB described in F3ML, an XML like format, and upload them to the platform without the need to code each F3 function inside their source code.

Using F3 Platform, developers can focus on application design and integration, reducing time to deliver applications.

Reliability

F3 Platform is built with reliability in mind. It is designed to run on Windows Server and Linux operating systems with support for enterprise-grade relational databases (Oracle, MySQL, MS SQL, and Sybase) and web servers (Apache, IIS).

High-availability is built into the heart of F3 Platform. All F3 services can be distributed across multiple machines. In the event of a calculation server failure, the platform manager reroutes calculations to other available servers. Platform manager works with web servers that support load balancing and hot failover. The storage service is compatible with database clustering on all supported database products.

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