



Making Life Simpler for  
Structured Finance Professionals

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## Company Overview

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Thetica Systems began its unique problem-solving in the depths of the financial crisis, building custom systems to evaluate RMBS portfolios. A decade later, a broad range of clients use our proven solutions to price, analyze, compare, and report on CLO, RMBS, CMBS, and ABS bonds.

Our success has come from providing a viable solution to the buy-or-build dilemma. Purchasing a static off-the-shelf product offers a fast start but the more idea-driven trading desks can easily end up frustrated by lack of flexibility. An in-house system could seem ideal but time and expense can escalate, creating resource conflicts with other needed IT projects. And both of those approaches can become costly, not only for their budget line items but also in terms of missed opportunities.



Enter Thetica Systems. We understand the needs of structured finance and have the technology expertise required to create the unique system you deserve – one that gives you the exact information you need from your licensed market data. You can focus on your work while we take care of the rest, from data integration and maintenance to customized views, reports, and individual enhancements.

The word “Thetica” was created from the Greek letter “theta,” representing thought or reason, and “etica,” representing ethics. Thought, reason and ethics are essential elements of any successful business and our commitment to this concept is embedded in the company’s name.

Clients include investment banks, hedge funds, insurance companies, professional services providers, capital management, brokers, dealers, and others that invest in or monitor structured finance securities, with users from traders and trading desks, project managers, research and product controllers to risk managers, regulatory reporting, and IT.

## Thetica Trader Tools

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**Thetica Trader Tools™** combines technology infrastructure with powerful tools for structured finance pros that license Intex Solutions data. Integration with their workflows and business rules results in a unique system for each client. Our proven components can jump-start your project, saving the time and personnel required to build from scratch. We update continually as the Intex API changes and we guarantee our calculation results will match the IntexCalc platform.

Thetica Trader Tools consists of:

**Thetica Analytics Cloud Engine:** A bond analytics platform that brings real power to your analysis. We can automate almost any imaginable calculation or cashflows scenario so that it runs at blazing speed. Saved lists, portfolios, or universe jobs are automated to run on a set schedule according to client specifications. Full universe jobs are integrated into the web interface and run nightly so that results are available at the start of the business day. Clients can have direct integration with their internal systems or Excel workbooks. The Cloud Engine has its own easy to use API, enabling clients to leverage its capabilities.



**Thetica Structured Products Database (SPD)** brings your market data feeds into one space, where they can be easily queried, aggregated, analyzed, cross-joined and utilized. Our web-based system taps into a rich source of data which leverages our extensive data vendor partners. This database quickly becomes a key infrastructure component, allowing users to maximize their investment in market data.

Each data module includes its own database, data loaders, automated jobs, and in some cases also data aggregates. We have a close working relationship with many data vendors and are equipped to onboard new data sets easily. The following database modules can be licensed for access within Thetica SPD:

**Intex database.** We load all your licensed Intex data into the database on a daily basis, allowing you to query across many deals and cross-apply the data with other data sources. We load everything, not only deal, tranche, and asset data, but also credit enhancements, hedges, collateral performance statistics, etc. Access to historical data (such as historical CPR/CDR and CDO asset transaction data) is also available with additional licensing per Intex requirements. As an experienced Intex partner, we substantially enhance your investment in the data and tools they provide.

**Loan-level databases.** Data such as provided by Intex, CoStar, etc., based on the sources that client selects and licenses.

**Enhanced Loan Level / Pricing Data.** May include additional data sets such as provided by CoreLogic Loan Performance, or asset pricing such as from SCI (PriceABS), Markit or Reuters, or updated borrower credit profile information, such as provided by Equifax, TransUnion, etc., or historical and updated home values (HPI), such as provided by CoreLogic CaseShiller, CoreLogic HPI or DataQuick, etc., as well as additional data feeds such as Bloomberg data, again all based on the sources that client selects and licenses. Each such data module is priced separately.

**Output from Credit Models (Cashflow Scenario Vectors).** We can load the output of a client's own models into the database to be used by Analytics, or by directly integrating the model into Analytics if the client makes the model available as a DLL. We can also integrate third-party models and have integrated with partners such as Five Bridges and CoreLogic, which feed their vectors on a monthly basis to our cloud environment, where they are available to clients that are licensed with those partners.

**Color Database.** Data can be gathered via our color parser tool or sent by a client for inclusion in their database, where it supplements other datasets available to that client. We also are partnered with SCI for their PriceABS module which is integrated into our system.

**Client Position Data.** We can interface with client's own information sources, retrieving position data and storing it securely to use in automating analytics calculations or to drive custom reporting.

**Delivery.** Thetica Trader Tools can be delivered via the web either in a shared environment or with a dedicated database server for those clients that need to write their own queries, access the data directly, etc. No one other than your users can access your data, reports, or information in either environment.

**Shared Environment.** The shared server environment is suitable for clients that interact with Thetica only via the web application. It's a good choice for those who need a straightforward and economical solution without significant data-intensive integration or direct access to the database. Potential use cases could be an RMBS portfolio using only a third-party model or any portfolio that will use only simple queries, where the client does not intend to leverage our infrastructure to build their own reports and tools. For data security reasons, we cannot allow direct database connectivity in a Shared Environment.

**Dedicated Environment.** A dedicated set of servers enables clients with more complex needs to securely save and access proprietary data such as position information, bid lists, color information, custom proprietary calculations, etc. We can use this data in your customized web pages, which also are accessible only to your users. This dedicated server allows you to fully leverage our flexible infrastructure with your own data and workflows without expending resources to deal with the intricacies of the Intex API.

## Benefits by Bond Type

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We serve clients with a variety of needs relating to structured finance, from pricing and analysis for trading desks to deep dives for risk management and customized reporting for your clients and internal users.



Our proven components serve as the foundation for all bond types including ABS, CLO, CDO, CMBS, and non-Agency RMBS. Then we customize to your exact specifications. You gain access to high-speed analytics using whatever custom cashflows scenarios you wish, with full transparency on your bonds. You have fewer headaches and delays thanks to our integration with your licensed data providers and ongoing maintenance of those connections. We deal with changes – you don't have to.

### A Partial List of Benefits

- ReREMIC support: automatic selection of scenarios, ability to run child deal at both deal and group level; ability to run CLO (including setting Reinvestment Profile rules) and CMBS at asset level
- CLO support: ability to enter assumptions for each asset class; accurate handling of re-investment criteria
- CMBS support: easy search for assets by criteria and full integration between vector functions and bond analytics
- Portfolio support: yields for multiple scenarios and stress analysis; enhanced price-yield grids
- Screener functionality: access to the entire US RMBS universe to screen by analytical values, aggregate metrics, and other characteristics
- Run the full universe of CLOs in a few minutes using complex asset level scenarios, including automatic rules for asset reinvestment
- Run the full universe of CMBS at asset level forecasts
- Use the results of universe runs to feed tear-sheets, viewers, screeners, etc.
- Easily search the universe of securities based on various criteria including results from bond analytics calculations (e.g., WAL, First-Pay, Second-Pay, Back Pay, Never Pay, etc.)
- Create a customized reverse look-up to find all re-leverage points for an existing bond
- Quickly utilize complex Price/Yield matrices and custom pricing algorithms

## Case Studies

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We build custom systems on top of our proven infrastructure, so clients don't have to worry about outgrowing their tools or paying for irrelevant functions. And we maintain the data feeds and connections and deal with vendor changes, which can help to keep IT budgets in line. Scalability makes it easy to flex to changes in business focus and market conditions. Here are a few examples of how we've made life simpler for our clients.



**A major diversified financial services firm** needed to customize individual multi-page reports on a tremendous volume of RMBS deals. Multiple complex data sources required expert treatment to ensure accurate and timely results that could immediately be shared within the organization and with clients.

Our success in fulfilling this requirement led to demands for specialized CLO tools, additional custom analytics functionality across the spectrum of structured finance bonds, provision of a secure web portal offering, and other enhancements as part of an ongoing client relationship.



**One of the world's leading investment firms** needed a CMBS data/asset management tool to pull in market data from all sources, with the capacity to simultaneously run complex calculations on a set of hundreds of bonds.

Development of this project required business knowledge and market understanding as well as the purely technical ability to execute the envisioned solution. The resulting solution was graded as Excellent by its users post-implementation and remains in place today as part of an active client relationship.



Driven by the desire to improve return on investment in an outside system, a **global asset manager** sought a more flexible alternative. Their timeline for development and validation was exceptionally tight. The envisioned system required a range of functionalities, including generating custom reports on the fly, making ad hoc corrections to European mappings, and parsing/filtering BWICs, offering sheets, and color..



## Pricing and Licensing Overview

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We build individual systems on top of our stable infrastructure components, for rapid delivery of proven tools that have been tailored to client needs. Of course the first question is, “How much does all this cost?” The cost depends on a variety of factors including the components required, the number of users, the appropriate delivery environment, and the extent of customization requested. We will provide an in-depth proposal after discussing your individual wishlist and requirements.

Pricing is structured for visibility into the elements that comprise costs, to enable a fair evaluation of their value to your business processes. Each Thetica data component (such as bond type or historical data) is priced separately and clients pay a la carte for the data they need. User access is packaged in blocks of 5 Client Access Licenses, e.g., 1-5, 6-10, etc., with 5 as the minimum quantity. Users can easily be added or changed if usage levels change.



**Important Note: Thetica Systems does not supply or recommend market data, vectors, or credit models. All clients must separately license their desired Intex data and products; as an Intex partner we help you to get the most from your Intex license. Additional sources are integrated according to each client’s individual business needs and what they have licensed.**

## How It Works

- Client licenses their desired data feed(s) from Intex and any other data vendors
- Client provides any internally-generated data, models, workbooks, etc.
- Thetica integrates the client’s licensed data, models, and internal data into the requested modules and customizes the system according to an agreed implementation project
- Upon completion of implementation, client may request additional customization at package rates
- Client retains budget control and prediction of future development

## Our Data Sources

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Thetica Systems has deep experience with data vendors in the structured finance field, beginning with Intex Solutions and the Intex API. We do not provide an alternative to licensing Intex data; instead **we enable you to maximize the value you obtain** from data licenses and minimize your effort to maintain data feeds and adapt to changes in data vendor files.

Available Intex data includes not only deal, tranche, and asset data, but also credit enhancements, hedges, collateral performance statistics, etc. Access to historical data such as historical CPR/CDR and CDO assets transaction data is available if covered by individual client license with Intex Solutions.



Other sources can be integrated according to individual business needs. Each data source includes its own database, data loaders, automated jobs, and in some cases also data aggregates. We are data-agnostic so our clients can choose whatever data they need for their business.

Our integrated data sources cover loan level data, enhanced loan level/pricing data, outputs from in-house or third-party credit models, color database, and client position data.

We integrate a wide range of client-licensed or internally-generated data, including:

- Deal level data from Intex, Lewtan/ABS.Net, and Bloomberg via the Backoffice data feed
- Loan level data from CoreLogic Loan Performance, BlackBoxLogic, Lewtan/ABS.Net, CoStar, and Trepp
- Pricing for CLO NAV from Markit, Reuters, and Lewtan/ABS.Net
- Credit ratings from Equifax and Transunion
- HPI from CoreLogic, FHFA, Standard & Poor's/Case-Shiller, and DataQuick
- Color from SCI PriceABS and Bloomberg messages
- Industry standard pricing from Interactive Data Corporation
- Vectors and credit models from client's choice of third party vendors
- Data from internal models, workbooks, and databases



## Cloud Hosting Environment

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Thetica Systems has always used innovative approaches to manage the challenges of dealing with the large volumes of data and intricate connections required for ABS, CLO, CMBS and non-Agency RMBS bonds. As new delivery methods become available, we enhance our offerings to make use of technology that adds value for our clients. One such initiative has been development of our **Cloud Hosting Environment**.



Thetica Systems maintains an impressive footprint of high-end servers on a secure Amazon AWS private-cloud infrastructure. We have successfully completed multiple risk assessments and reviews by security officers of various company types before onboarding as clients in our cloud infrastructure:

- Banks
- Broker/Dealers
- Hedge Funds / Investment Funds
- Collat / Asset Managers
- Accounting and Insurance Companies
- Software Companies using us for their back-end building blocks

Our cloud environments have routinely passed all security inspections due to the stringent policies in place – for example, no access to servers from the Internet to servers, secure VPN tunnels to clients, client logins provisioned only for specific IP addresses, etc. Documentation can be provided upon request.

Below are some highlights that may be of interest to IT or Project Managers tasked with evaluating our offerings:

- **Reliability** - Amazon EC2 (“Elastic Computing Cloud”) offers a highly reliable environment where replacement instances can be rapidly and predictably commissioned. The service runs within Amazon’s secure VPC (Virtual Private Cloud). The Amazon EC2 Service Level Agreement commitment is 99.95% availability for each Amazon EC2 Region. Our servers are located in the East Coast region.
- **Flexibility** – Adding more computing power or disk space can be done in a matter of minutes. Needed changes are rapidly accomplished, such as reconfiguring a server or moving an instance to new hardware if the underlying hardware is faulty. The Analytics Grid capabilities have been thoroughly tested on a single server configuration and with up to 10 dedicated calculation servers where hundreds of deals ran in parallel through hundreds of cashflow scenarios.
- **Multiple Locations** – Amazon EC2 provides the ability to place instances in multiple locations. Amazon EC2 locations are composed of **Regions** and **Availability Zones**. Availability Zones are distinct locations that are

engineered to be insulated from failures in other Availability Zones and provide inexpensive, low latency network connectivity to other Availability Zones in the same Region. By launching instances in separate Availability Zones, applications are protected from failure of a single location. Regions consist of one or more Availability Zones, are geographically dispersed, and will be in separate geographic areas or countries. Amazon EC2 is currently available in eight regions: US East (Northern Virginia), US West (Oregon), US West (Northern California), EU (Ireland), Asia Pacific (Singapore), Asia Pacific (Tokyo), and South America (Sao Paulo).

- **Elastic IP Addresses** – Elastic IP addresses are static IP addresses designed for dynamic cloud computing. An Elastic IP address is associated with an account and not a particular instance. Unlike traditional static IP addresses, however, Elastic IP addresses allow Thetica to mask instance or Availability Zone failures by programmatically remapping the public IP addresses to an available instance. Rather than waiting on a data technician to reconfigure or replace your host, or waiting for DNS to propagate to all users, Amazon EC2 enables us to engineer around problems with quickly remapping Elastic IP addresses to a replacement instance.
- **Amazon EBS Storage (Elastic Block Store)** – Amazon’s instance storage technology is called “Elastic Block Store” (EBS). Each storage volume is automatically replicated within the same Availability Zone. This prevents data loss due to failure of any single hardware component. We snapshot each volume on a daily basis and can recover any data volume if EBS fails (note that Thetica has not experienced an EBS failure and has successfully tested data volume recovery). Amazon EBS volumes provide off-instance storage that persists independently from the life of an instance. *So if hardware malfunctions, it takes us less than 15 minutes to be up and running on alternative hardware of the same kind.*

Amazon EBS volumes are highly available, highly reliable volumes that can be leveraged as an Amazon EC2 instance’s boot partition or attached to a running Amazon EC2 instance as a standard block device. When used as a boot partition, Amazon EC2 instances can be stopped and subsequently restarted, enabling you to pay only for the storage resources used while maintaining your instance’s state. Amazon EBS volumes are designed to be highly available and reliable. Amazon EBS volume data is replicated across multiple servers in an Availability Zone to prevent the loss of data from the failure of any single component. The durability of your volume depends both on the size of your volume and the percentage of the data that has changed since your last snapshot. As an example, volumes that operate with 20 GB or less of modified data since their most recent Amazon EBS snapshot can expect an annual failure rate (AFR) of between 0.1% – 0.5%, where failure refers to a complete loss of the volume. *This compares with commodity hard disks that will typically fail with an AFR of around 4%, making EBS volumes 10 times more reliable than typical commodity disk drives.*

Because Amazon EBS servers are replicated within a single Availability Zone, mirroring data across multiple Amazon EBS volumes in the same Availability Zone will not significantly improve volume durability. However, for those interested in even more durability, Amazon EBS provides the ability to create point-in-time consistent snapshots of your volumes that are then stored in Amazon S3, and automatically replicated across multiple Availability Zones. So, taking frequent snapshots of your volume is a convenient

and cost-effective way to increase the long term durability of your data. In the unlikely event that your Amazon EBS volume does fail, all snapshots of that volume will remain intact, allowing you to recreate your volume from the last snapshot point.

- **Secure** - For more information on AWS Security please refer to <http://aws.amazon.com/security> for extensive documentation and whitepapers to satisfy most Information Security Officers' questions.

In summary, Amazon VPC (Virtual Private Cloud) lets us provision servers and segregate them behind separate firewalls, reserving access to data for only that client's users. We can define a virtual network topology that closely resembles a traditional network that might operate in your own datacenters. We have complete control over our virtual networking environment, firewalls, including selection of our own IP address range, creation of subnets, and configuration of route tables and network gateways. In addition to being able to create firewall rules, we can also create a Hardware Virtual Network connection between your corporate datacenter and Amazon and leverage the AWS cloud as an extension of your corporate datacenter.