THETICA SYSTEMS

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 firms
- 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.

Email Sales@Thetica.com or visit www.TheticaSystems.com for more information or to request a demo.