

## The lifeblood of an exchange

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The lifeblood of any marketplace is its technology make up. The trading engine is the heart. The IT architecture is the circulatory system that connects to the various internal organs, such as the surveillance and risk management platforms, and to the gateways to external vendors, traders, market data feeds and clearing platforms. Each organ provides basic functionality, but it's how they interact that ultimately determines speed, capacity and robustness.

The technical make up of any marketplace will depend on its business goals and regulatory requirements; however, there are common nonfunctional considerations for all. The technology guiding stars for any exchange are robustness, flexibility, cost and performance.

### Robustness

Robustness is essential to maintaining the trust and confidence of market stakeholders and generally incorporates factors such as uptime, test capacity, security, documentation and incident handling. Best practices require a minimum of 99.95% uptime in all business critical operations – 99.99% is better. To ensure glitch-free operation for its members, a market must provide good testing facilities for everyone connecting to it, including members, data vendors and ISVs. While people design documentation and incident handling, both are essential elements to market operations as is preventive maintenance. All need to be incorporated in

the planning process. The necessity of strong system security has always been and continues to be critical.

### Flexibility and scalability

The one constant element in today's hyper-competitive global markets is that change will occur. Exchanges cannot lock themselves into a technology model that does not easily let them adjust. The flexibility to introduce new products and asset classes, for example, is essential. System capacity is another major consideration. An exchange must be able to run several simultaneous major business development projects at any time. System reconfigurations and capacity increases must be supported. Support for standard interfaces and protocols, such as FIX or ISO 15022/SWIFT, can facilitate connectivity to third party products and simplify replacement of components.

### Cost

The cost of any marketplace technology must be weighed against the proposed business model. A broker-sponsored MTF will have dramatically different requirements than a start-up commodities market or a new national exchange, for example. While the traditional choice has been build vs. buy or a combination of the two, outsourcing has become an increasingly viable initial option for many start-ups. Consider the major costs of maintaining an in-house system:

- **Data center** Premises, power and cooling, physical security, data backup, disaster recovery
- **Hardware** Servers, computers and peripherals, operating system licenses, support agreements for replacement and repair
- **Data storage** Solutions fulfilling regulatory requirements
- **Network** Installation and recurring line costs, network equipment and management software
- **3rd party applications** Project, license and support costs for externally developed systems, layered software used in applications,
- **Staff** Data center, network, system management, application management, customer interface, development, IT management and project

Of course, external solutions providers must be trustworthy and reliable partners who offer proven solutions capable of meeting all functionality and performance requirements.

### Performance

From a trading system perspective, the key performance considerations are latency and capacity. A trading engine must be able to operate with the volumes and transaction speeds that are expected for the market. Low latency is relevant for many applications, but with the dramatic increase in high frequency trading expected worldwide, sub-millisecond latency has become vital for exchange trading systems. Exact capacity requirements, generally measured by transactions per second, will change over time, so a scalable system that allows for capacity improvements

with increased demand is essential.

From a functional perspective, the trading engine must provide a comprehensive market model, support market makers, facilitate various order types and provide the ability to support local market rules. As global competition continues, the capability to host and power multiple markets and asset classes on a single platform has become a significant advantage.

Just as runners will train differently when preparing for a marathon or a re-

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lay race, exchanges will architect their technology to their specific requirements, whether they trade equities in New York, gold in Japan or electricity in central Europe. For each, however, the core building blocks are the same.

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