Tradeflow Technical Systems Overview

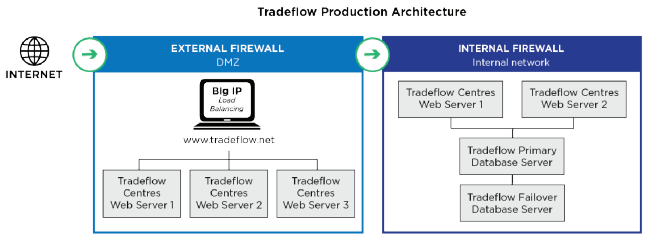
Tradeflow is a web-based software suite designed by Expeditors for use by our customers. Its solutions provide tools to help importers and exporters gain more control of the global logistics supply chain through data management and compliance processes. Divided into integrated modules, or Centers, Tradeflow facilitates activities such as global product classification, landed cost estimation, restricted party screening, electronic booking, and document creation.

Overview of System Architecture

Tradeflow is a multi-tiered, web-enabled, hosted business system implemented using the Java language in conjunction with relational database technology. The core Tradeflow system architecture is based on a suite of reusable, formal technical components, which form the basis of all Expeditors Java systems. In addition, a subset of the system functionality is implemented as "web services" that use a commercial application server product.

Deployment Diagram

The deployment diagram below depicts the physical components, which comprise the Tradeflow system, their relative physical placement, and the connectivity paths between them.



Hardware

As shown in the diagram above, there are three primary servers dedicated to the production deployment of Tradeflow:

- **Web Servers** – IBM X86 PC with 12 cores (24 CPUs), 48 GB of RAM
- **Worker Servers** – IBM X86 PC with 12 cores (24 CPUs), 48 GB of RAM
- **Database Servers** – IBM X86 PC with 12 cores (24 CPUs), 144 GB of RAM

Each of these servers is running the Solaris operating system.

Tradeflow uses a hardware device to handle SSL (Secure Socket Layer) encryption, decryption, and certificate handling. This device is sourced from Array Networks Corporation. Tradeflow takes advantage of other servers for authentication and messaging, such as EDI and email, which are shared with other Expeditors systems.

Expeditors provides firewalls between the internet and the application servers as well as between the application servers and database servers/shared servers.

Software

- **Tradeflow Centers** – Tradeflow is implemented as a standard 3-tier (Presentation/Application/Persistence) model, which carefully adheres to the Model-View-Controller (MVC) pattern. All Tradeflow code is written in Java.
- **Database** – Both Tradeflow Centers and TCA services use relational databases DB/2 for persistent storage.
- **DB2 Shared Security Server** – The Tradeflow Centers use a DB2 repository to retain authentication and authorization information associated with users and systems.
- **Web Server** – An Apache Tomcat web server is used to host the Tradeflow Center and TCA services.

Security

There are four categories of "security" technology at work within the Tradeflow system:

- **Authentication** – Authentication of users is accomplished via interaction with the Expeditors Security & Profiles component, which provides a secure wrapper on top of a repository of user profile information. Standard user-I.D. and password authentication takes place prior to granting access to the Tradeflow system. Passwords are stored in an encrypted form to preclude reverse engineering of actual password text values.
- **Authorization** – Authorization of users within Tradeflow is accomplished through testing of the presence or absence of "roles" and "permissions" on an authenticated user's profile. This is a runtime activity which leverages security enforcement from the Security & Profiles component as well as code within Tradeflow.

TRADE flow

- **Data Security** – Persistent data is stored in an RDBMS that resides behind a fire wall and uses standard (RDBMS product supplied) security. Transactional data (between client browsers and application) is protected through encryption and certificate exchange using Secure Sockets Layer (SSL) technology.
- **Network** – Network level security is provided via double firewall technology (between browser and application server and between application server and database server),which characterizes our "DMZ" (see deployment diagram for illustration).

Additionally, the database servers are only accessible to their corresponding application servers. Unauthorized connection requests from other machines outside of Expeditors WAN are categorically denied access to database servers.

Monitoring & Support
Expeditors monitors the health of our applications through multiple vectors. We monitor server availability, resources, and health, as well as application availability and response times. We have a 24x7 operations team which monitors the health of our systems through an internal deployed monitoring solution. The operations team responds to notifications and alerts when issues are reported and takes action to resolve the situation based on defined standard operating procedures. Monitoring and regular review provide trending details and allow us to proactively adjust our services to account for increases in utilization and resource consumption.

Backup & Recovery
As with all Expeditors systems, Tradeflow is routinely backed up on a daily basis. Backup systems and processes are fully automated and monitored by our data center personnel. Backup media are stored off-site and managed by our data storage provider. Data center personnel are fully trained on backup and recovery procedures for Tradeflow and provide 24/7 coverage.

Disaster Recovery
Utilizing the Disaster Recovery site (DR1) in Spokane, WA, the Tradeflow database is synchronized daily to ensure all customer data is automatically backed up and available in a secondary data center. The DR1 database backup is a third database, after the primary and live fail over databases. In the event of a catastrophic disaster to the primary two servers, DR1 provides an offsite location for a recovery database.

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