



INFORMATION

Location: Toronto, Ontario
 Web site: www.ieso.ca
 Industry: Energy

CHALLENGE

To create mission-critical applications to be used by Control Room personnel responsible for the dispatching of power throughout Ontario.

SOLUTION

A set of complex, highly interactive web based applications, with single sign-on security. A multi-tier client-server infrastructure with a front end created on Java Server Faces and Ajax connecting to a scalable back end, providing a high rate of screen refresh to the operators.

TECHNOLOGIES

- Linux
- Apache
- Java Server Faces
- Java EE
- Ajax
- Oracle
- Microsoft SQL Server

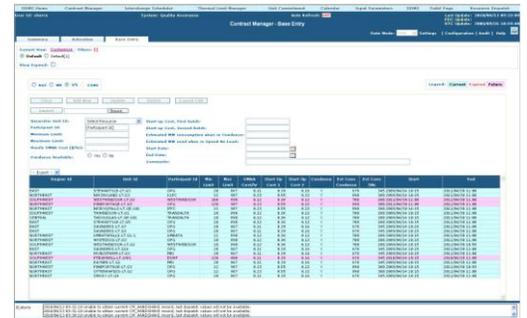
Affinity Helps Manage Electricity Grid

The Independent Electricity System Operator (IESO) works at the heart of Ontario's power system, connecting all participants - generators that produce electricity, transmitters that send it across the province, retailers that buy and sell it, industries and businesses that use it in large quantities and local distribution companies that deliver it to people's homes.

OUR SOLUTION

The IESO's Dispatch Data Management System (DDMS) is an integrated set of management tools that allow control room operators (CROs) to successfully ensure the security and stability of the provincial electrical grid.

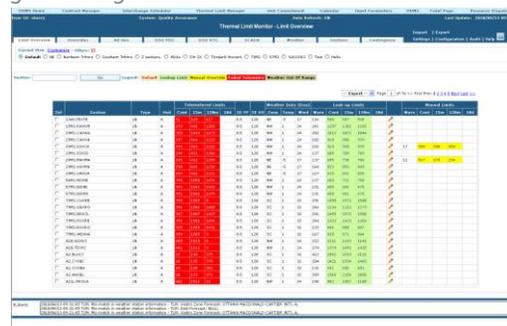
INPARAM manages constraint parameters that control the operation of the Multiple Interval dispatch Optimizer (MIO). MIO produces both real-time constrained operating schedules based on current weather conditions and pre-dispatch constrained operating schedules support the forecast load and weather conditions expected throughout the province.



The Thermal Limit Manager (TLM) allows control room operators to view, configure and provide overrides for telemetry and safe operating limit information calculated on regular intervals based on telemetry data, zone weather, lookup schedules and manual overrides.

Contract Manager (CM) maintains contract services for ancillary services and reliability, as well as for manually constraining dispatchable generators and loads.

Unit Commitment Manager (UCM) obtains the scheduled start and stop times (via MIO) and provides confirmed start and stop times for generating units. UCM also accesses real time data through OSI-PI to obtain the generating unit breaker and generating state.



The Interchange Scheduler (IS) allows control room operators to review and revise scheduled energy flows between Ontario and adjacent electricity grids, and coordinates these schedules with a central repository housing information for all such transactions within North America.

Resource Dispatch (RDISP) receives real-time constrained energy and operating reserve dispatch schedules (from MIO), allows the operator to review and make adjustments to the schedules, and then automatically dispatches new targets to the internal resources (those within the electrical grid) at the start of each five minute dispatch interval.



**Power to Ontario.
On Demand.**

BENEFITS

Affinity Systems created a completely custom solution that was unique to the business needs of IESO. As compared to the previous “out of the box” system they used, this new solution provides a much tighter fit to their specific needs.

- The DDMS is a collection of 6 separate modules which allows for easier managing and maintaining. If one module needs updating, the rest of the system’s availability will not be compromised and users remain unaffected.
- The DDMS is a browser-based solution making it very intuitive and user friendly.
- The system also has role-based permission, whereby security varies for each role and is controlled by a single sign on through a portal.
- Performance and throughput was improved and control room personnel have a software tool that supports the time sensitive, mission-critical nature of IESO.

Affinity Systems

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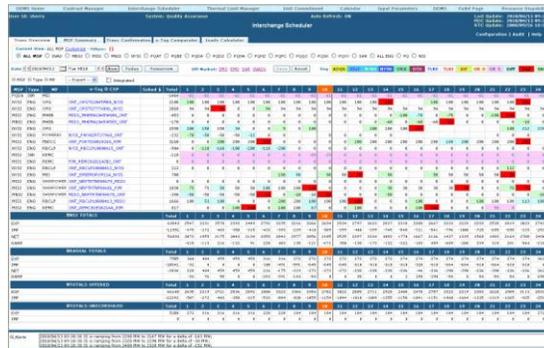
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The CRO also uses RDISP to perform a number of manual dispatching and scheduling operations including:

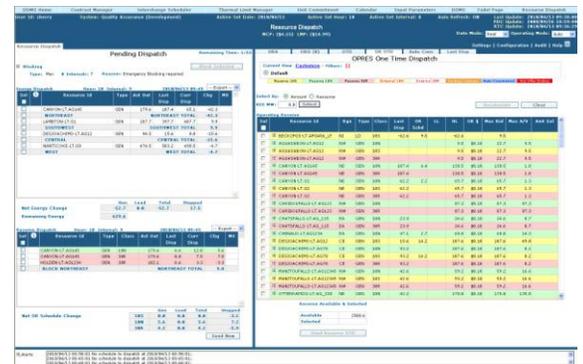
- Scheduling automatic constrained contracts that respect ramp rates for slower moving generators
- Performing optimized (emergency) one-time dispatches for a specific amount (both increases and decreases) of energy or operating reserve for cases of unexpected load demand, or security or reliability issues that were not foreseen
- Performing one-time dispatches to specific targets for specific resources
- Optimally activating and de-activating operating reserve while taking into consideration existing targets, the current market bids and offers, and resource operating limits and ramp rates



DDMS was designed to fit into existing archetypes and architecture employed by the customer. It uses a three-tiered approach separating data, business logic, and presentation to simplify the evolutionary growth of the system as its user base matures and its functionality becomes richer.

The Data Integration Layer uses Hibernate to interface data housed in a High-Availability Oracle Operational Database. Active Directory establishes credentials and makes available the roles and permissions under which users operate.

Java-based DDMS Servers combine the functionality of both web and application servers by responding to both types of requests. Web page requests from the portal are processed with a JSF framework and directly invoke business logic routines. A web services request layer allows the business logic to be exposed to other DDMS servers and IESO subsystems. Caching strategies at the servers ensure that performance requirements are met.



The User Interface of the applications runs on the operator’s screens under a standard web browser. In order to provide for a rich user experience, an Ajax framework is included in the client to support asynchronous operation of each page, and to guarantee synchronization among multiple instances of the application deployed at different stations. DHTML is employed to assist in ensuring that dialogs and tool tips appear on the proper display in a multi-monitor environment.