SCHEDULE Optimus

Empowering

your Service Functions

DSR Solutions - Schedule Optimus

Technology - Brief

DSR SOLUTIONS Limited

Creative Minds... Innovative Solutions...

Schedule Optimus - Technology Brief

Schedule Optimus - An end-2-end **Service Function Management** (SFM) Solution

- Development Methodology: Rational Unified Process
- Framework: J2EE for Web Solution;
  J2ME for Mobile Solution;
  GIS
- Platform: Distributed Common Platform
- Architecture: J2EE Architecture
- Building Blocks: Multiple n-tier

Adapting to the emerging trends of application development, Schedule Optimus is forging ahead in the technological domain with its:

1. Enterprise wide, Open architecture (Standard N Tier architecture)
2. Distributed, Object Oriented, Multi-Tiered, Modular and Web based
3. Web Services ready for easy integration
4. Mobile Solution (Palm, WAP) and Wireless connectivity
5. Messaging Solution

The big advantage for mobile solutions is that the N-tier architecture can be leveraged to support multiple user devices, from PCs to PDAs to Smart Phones, enable companies to deploy different devices for different field job functions, depending on the needs in the field.

Architecture

- Distributed
- N-tier
- Modular
- Web based System developed on J2EE platform.

Schedule Optimus with its J2EE platform provides many benefits including

- Platform Independent
- Scalability to meet demand variations
- Integration with existing information systems
- Choice of servers, Tools and Components
- Flexible Security Model

Enterprise Java Beans (EJB) – Server Components

- Functionality is provided by server components, running under any J2EE compatible application server like WebLogic, Oracle, Borland, JBOSS, etc.
- Server components are developed using Enterprise Java Beans (EJB) technology which offers many benefits including
  - Persistence Services
  - Declarative Transactions
  - Data Caching
  - Declarative Security
  - Error Handling
  - Component Framework for Business Logic
  - Scalability and Fail-over
  - Portability
  - Manageability.

Data Persistence – Database Support

Schedule Optimus

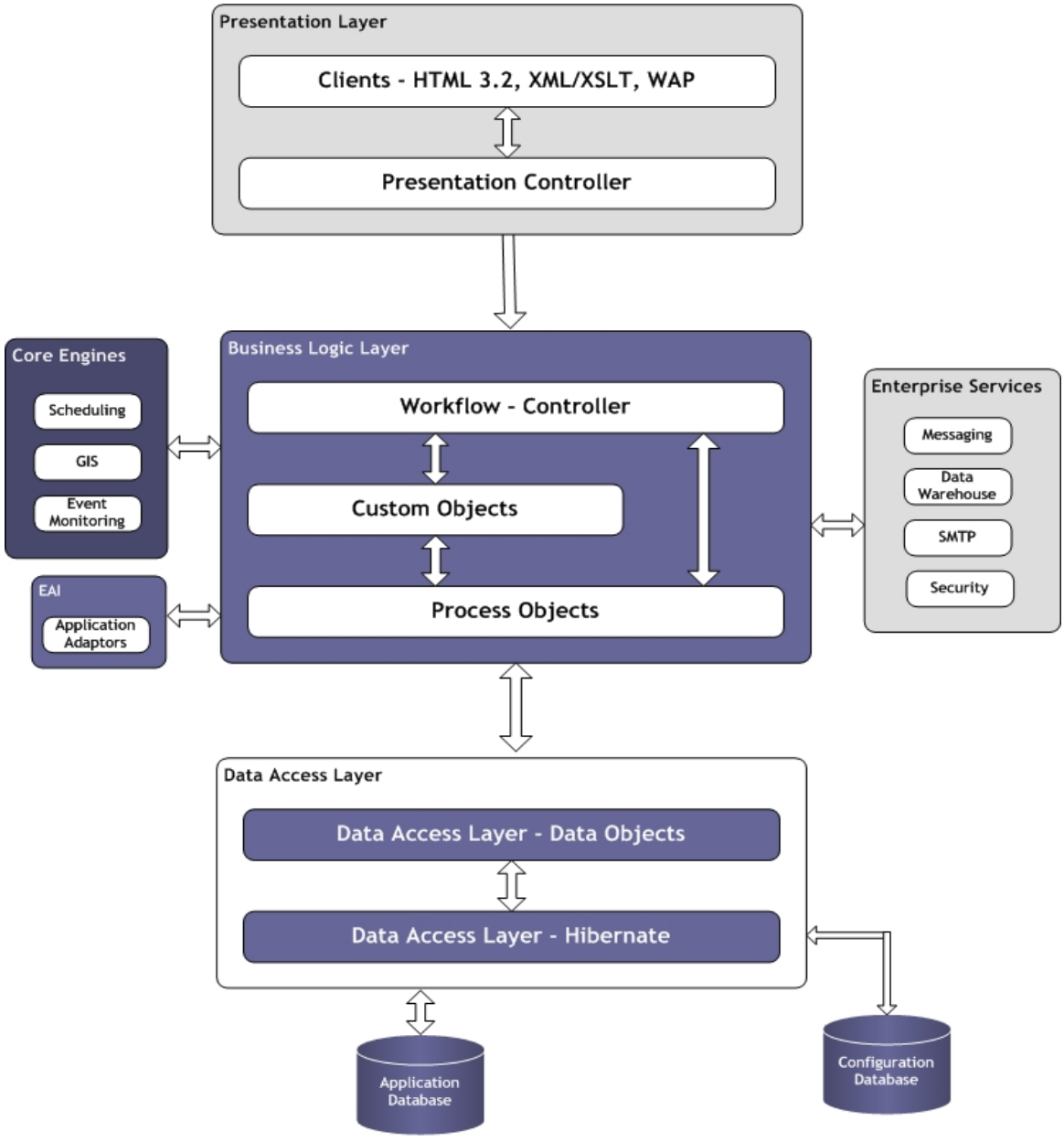
- Uses Object Relational Mapping Tool Hibernate for its persistence services (free open source).
- Supports all the major RDBMS available in the market including
  - SQL Server, MySQL
  - Oracle
  - Informix
  - DB2
  - Sybase

Integration Capabilities

Schedule Optimus

- Is web services ready for integration support with server components built using EJB.
- Exposes key functionality through well–defined, coarse-grained web interface adapters which aids for integration with external applications.

Application Architecture – A Snap Shot

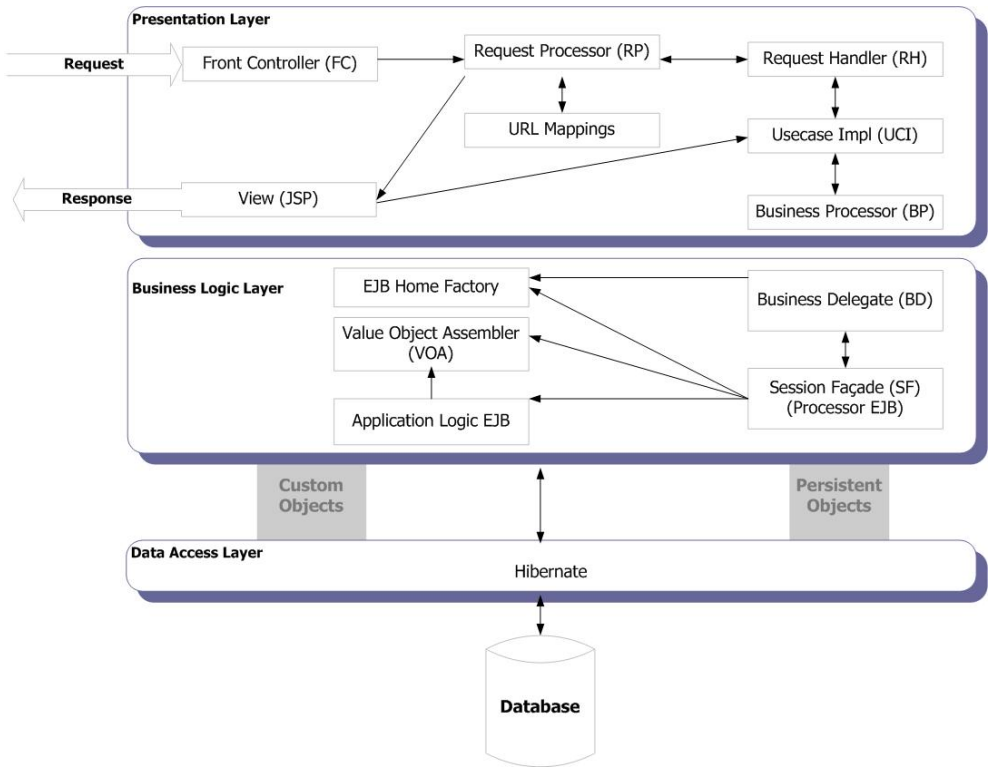


Schedule Optimus Architecture

Design Patterns

Schedule Optimus makes extensive use of design patterns for ease of development and maintenance. The following design patterns were incorporated in Schedule Optimus.

- Front Controller: Centralizes view management (Navigation, Template, and Security) for a web application in a single object to handle incoming client requests.
- Business Processor: Acts as a single point of exit from the presentation tier.
- Business Delegate: Decouples presentation tier and business services tier.
- EJB Home Factory: Hides the complexities of looking up resources like Home Objects for EJB Components and Data source through the use of JNDI on the server.
- Session Façade: Stateless Session Bean component used to execute business logic corresponding to the application functionality
- Data Access Object: Abstracts and encapsulates all access to data source and manages the connection with the data source to obtain and store data
- Value Object Assembler: Builds custom objects from various business objects and other objects that define the model or part of the model



Design Patterns Usage

Mobile Technologies (J2ME)

Schedule Optimus' mobile solution - "Mobile Service Engineer"

- **Technology**: Built on J2ME Technology
- **Data Access**: Provides real time access to data and information to the field service engineer.
- **Integration**: Integrates with the overall service process that includes Contract Management, Service Parts Inventory, Customer Service and Automated Dispatch.
- **Mobile Devices**: Supports multiple mobile devices including **PDA's** (Palm OS and Windows CE), **WAP** Phones with Wireless Markup Language (**WML**) based user interfaces and **Cell Phones & Pagers** compatible with J2ME technologies.

Schedule Optimus' Mobile Service Engineer, supports various Modes of Operation that include:

- **Real-time, Online Communication**: Supports Web browsers, WAP Devices and PDAs and facilitates real time data and information exchange with various stakeholders.
- **Offline Communication**: The novelty in this approach is the intent to simulate an on-line user experience whilst the mobile worker is actually disconnected (offline) from the network which has a resultant effect that enables the mobile worker to fully complete their tasks, before needing to establish a mobile connection to the corporate network.

XML Support

Schedule Optimus provides robust support for XML allowing existing enterprise or e-commerce applications to seamlessly integrate with Schedule Optimus thus facilitating EAI Solution.

Scalability

Schedule Optimus

- Leverages Application Server's dynamic load balancing and clustering features.
- Is built considering two possible scenarios, Scale-up & Scale-Out.
  - Scale-Up: Increasing the power of the system by enhancing the system resources
  - Scale-Out: Increasing the number of systems and distributing the load across the systems.

Security

Schedule Optimus

- Provides Application Level Security besides the System Level security, the Enterprise Opts for.
- Being web based, access to processes, features and functions is facilitated through a security engine built in, which provides the application level security.

Scheduling Process

Schedule Optimus' powerful scheduling engine combines both Predictive and Reactive Scheduling techniques and algorithms for scheduling tasks to service engineers.

- **Predictive scheduling:** Near optimal solution is found as quickly as possible using **heuristic search** and **Constraint Satisfaction Problem** (CSP). Once the near optimal schedule is found then these schedules are optimized using **Simulated Annealing Algorithm** which is the industry standard optimization algorithm.
- **Reactive Scheduling:** Makes use of different techniques for repairing the schedules in real time due to various unexpected events from different stake holders of the system.

GIS Interface

Schedule Optimus

- Provides GIS interface for showing the Driving directions and Shortest Route for the service engineer.
- Integrates with any java compatible GIS / Mapping Solution.
- Also supports GIS Solution using Travel Matrix.

Technologies Deployed

- Enterprise Java Beans (EJB)
- XML/XSLT
- Java Message Service (JMS)
- JCL (Java Constraint Library)
- Servlets & Java Server Pages (JSP)
- Hibernate (Object Relational Mapping Tool)
- Quartz (Enterprise Job Scheduler)
- HTML/DHTML

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