The Indian Railways is one of the largest railway systems in the world under a single management. It runs 11,000 trains every day. Spread across 67 divisions, it covers 104,000 km of rail track, has over 7,000 railway stations and ferries around 17 million passengers daily.

Planning the movement of trains, deciding on precedence and crossings, forecasting train arrivals and providing this information to all the concerned within the system, is a critical element of day-to-day operations for the railways, in order to achieve efficiency, ensure safety, and provide customer satisfaction.

Centre for Railway Information System (CRIS) – an umbrella organisation in-charge of IT projects under the Indian Railways – selected Wipro for designing and deploying the Control Office Application (COA). The project is part of the Indian Railways overall endeavor to use IT applications for improving planning and resource utilisation for Indian Railways.

THE CHALLENGE

A large network combined with heavy traffic, both passenger and freight with wide variations in running patterns, makes the task of train controlling and operations a very difficult one. Section Controllers who are assigned to control a portion of the network within each divisional control office, used to manually record the movement of trains on a train chart, while constantly keeping track of various parameters needed for efficient planning. The control chart is a time-distance graph which is used to control and plan the movement of trains. It is used to ensure that scheduled passenger trains run on their paths, ensure efficient paths for unscheduled freight trains, forecast the movement of trains and provide information on arrivals and departures as per commercial requirements.

A good controller constantly optimises on resources and ensures trains run smoothly through the system, reducing detention of both scheduled and unscheduled trains. With increasing traffic levels, the Section Controllers were often constrained by the need to document every event (i.e., train arrival/departure, track failures, crew change, signal status, fuel status) and yet focus on their primary duty of planning and reporting the movement of trains. The existing system also involved a lot of paper work by support staff who were required to replicate the operational data given in the control chart to various registers.

As a result, the core activity of advance planning and timely reporting of train movements was getting diluted. Consequently, management also had to make special efforts to obtain the information required for good decision-making.

Indian Railways decided to automate the process of controlling train operations to ensure greater efficiency in train operations.

Wipro’s Solution

Wipro developed and deployed the COA application in Madurai and Trivandrum division control offices as a pilot implementation. The solution was later upgraded with components of the Microsoft .NET Framework 3.0, using Visual Studio 2005 with Oracle as Database. The solution is now being rolled out to all 73 control/area offices across India.

COA System Architecture

The COA application constitutes three distinct layers - the presentation layer, the business logic layer and the data access layer. The presentation layer and the business logic layers are authored in C# (C sharp) whereas the data access layer has been built using ADO.NET objects. The presentation layer components are hosted on windows XP/Vista and the data access layer components are hosted on Windows 2003 Server.

The COA integrates with other CRIS applications like FOIS (Freight Operation Information System) and NTES (National Train Enquiry System) through (Central Application) CAS server.

COA Design Considerations

- Three Tier Distributed Architecture
- High Availability and Scalable system
- User friendly interface
- High level of Data Security
- High Availability to ensure 24 x 7 operations by Controllers (users)
- Minimum downtime and minimum Response time
HOW IT WORKS

At each of the 73 control offices, a cluster of database and application servers provide an intuitive GUI-based system for train controllers to record the movement of each train on a virtual control chart. The application requires the controllers to enter only the data related to the train operations with ease.

The application then draws the charting of the sectional trains together with advance forecasting, taking into consideration all operational parameters like blocks, caution orders, crossing, precedence, priority, load details, etc. It also communicates with the adjacent divisions on handover/takeover details of trains.

Wipro has also integrated COA with existing systems like National Train Enquiry System (NTES) and adjacent divisions.

For the entire project, Wipro undertook end-to-end project management under the guidance of CRIS, including product sale, inventory mobilization, product delivery, site readiness followed by remaining phases of the project like design, development, testing, training, Wipro worked with CRIS to ensure a smooth transition from a 150 year old tradition of manual charting to an automated system involving massive change management. Currently, Wipro is also in charge of maintaining and supporting the COA application for Indian Railways.

KEY BENEFITS

- Updated train position is a feature developed by the train charting software in which the train position is updated on a near real-time basis. This would also help avoid manual enquiry at information counters in railway stations.
- The Control Office Application has unbundled an immense potential in improving forecasting of train arrivals and departures at various stations, improving punctuality of trains and implementing a number of innovative passenger information systems using latest information technology aids.
- Establishment of faster and better interfaces with the consumers by streamlining processes and enhancing availability of information.

FUTURE PLANS

- Integrating COA with Freight Operations Information System (FOIS) to facilitate data exchange for internal reporting
- Automating data entry using GPS.

SANDHYA SHAMA RAO
CONTENT MANAGER
WIPRO INFOTECH

Dweep Bhoomi
Hand-written ROR goes Offline

Land Record Computerisation at Ferrargunj Tehsil has been completed based on software devolved by NIC. The Data entry of land records of all the villages of the tehsil is completed and records are prepared in the Form “F” according to the provisions under rule 134 of the Andaman and Nicobar islands land revenue and land reforms rules 1968.

All changes in the Record of Right shall be carried out only through the “Dweep Bhoomi” software with effect from 15th January, 2010. These include various services like mutation, mortgage, sub-division, diversion and acquisition. Any mutation carried out other than online through “Dweep Bhoomi software on or after 15th January 2010 will not be recognised.