Workshop Information SystEm (WISE) A Management Information System (MIS) project for Indian Railways Workshop

NEW DELHI

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4th Year, Semester VII
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ACKNOWLEDGEMENTS

The internship project work on "Workshop Information SystEm (WISE) A Management Information System (MIS) project for Indian Railways Workshop", has proved to be a collaborative process. Thus, for my involvement in this endeavor, I would thank all of the people who helped with the task.

This project has been completed under the able guidance of my faculty **Prof. Nidhi Chandra** (Faculty Guide) and **Mr. Pratik Pandey** (Industry Guide), who provided me with this wonderful opportunity. It has proven to be source of great insight in the field of Management Information System and Enterprise Resource Planning. My discussions with them on the matter, helped in decreasing the learning curve, curbing the problems encountered and devise contents for this report.

I would like to express my brief appreciation towards the engineering community at **Centre for Information System (CRIS)**, regarding their aid in clearing out any potential bottlenecks as well as showcasing commercial prospects of the project.

Last but not the least; I would like to thank my family members and all my friends for providing inspiration during this period of this study.

Signature

ABSTRACT

Decisions pertaining to the railways' rolling stock such as product planning, manufacturing or service delivery, marketing and sales, materials and inventory management, shipping and finance can be easily automated by generating a workshop report. This is based on raw data entered by an employee's login. WIS is being upgraded from ORACLE-DBMS to an Enterprise Resource Planning (ERP) model, in order to handle core business processes in real-time and, this essentially is the crux of the trainee's work during the period of internship. SAP EHP8 (software) and ABAP (Advanced Business Application Programming) have been used for setting up the ERP model and build the WIS platform. Hence, the following contents inform the reader about inter-dependent and aforesaid attributes of the WIS project. The work was successfully concluded with improvement in the product planning functional module's codebase". Finally, WIS is a live project under the aegis of Indian Railways and thus requires dealing with real-world corporate level software challenges, which will prove highly consequential in overall skill development of the trainee.

LIST OF FIGURES

LIST OF ABBREVIATIONS

CRIS	Centre for Railway Information System
WISE	Workshop Information SystEm
ERP	Enterprise Resource Planning
MIS	Management Information System
SAP	Systems, Applications & Products in Data Processing
ABAP	Advanced Business Application Programming

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INTRODUCTION

This report studies on the prospects of implementing a Management Information System (MIS). The discussions that follow henceforth are describing a proposed method using Workshop Information SystEm (WISE) model.

Research has been ongoing in the field of Enterprise Resource Model, database management in close combination for several decades and has led to several scientific breakthroughs. One such emerging work has gained importance which is Management Information System (MIS) due to increasing raw data and need to process it through computers to manage and support managerial decisions within an organization. Hence there is a need of Intelligent Record Keeping and Management Systems that maximize the benefit from investments in personnel, equipment, and business processes. This technology has been adopted to serve at the core of several infrastructure such as accounting, finance, management and marketing.

Rolling stock in rail transport industry referrers to any vehicles that move on a railway. As on the end of 2015-16, IR's rolling stock comprises over 251,256 Freight Wagons, 70,241 Passenger Coaches and 11,122 Locomotives (39 steam, 5,869 diesel and 5214 electric locomotives). Hence, Workshop Information SystEm (WISE) is smart IT solution for computerized management of such large scale vehicular presence. It handles a rolling stock's logistical lifecycle, right from its induction into workshop to maintenance and eventual retirement when necessary.

Center for Railway Information System (CRIS), has been identified for developing the integrated IT based system for all 3 modules of Accounting Reforms w.r.t above regard. This IT system would interface with the existing applications such as WISE and would provide smooth, secure and seamless integration for MIS reporting. Hence, its experience would be an added advantage while integrating data captured to produce cash- based accounts with that required for developing accrual accounting. This shall be covered later in the text when describing possible limitations

Organization of Report

This section is intended to serve as the groundwork for outline of rest of the project. A brief chapter-wise account is given for convenience of the reader.

Chapter 1 contains an introduction to rudimentary principles of the study, explain its purpose and scope. Finally, it ends with note on target readers of this report.

Chapter 2 gives information on various materials that were used in enacting the work. It talks about both software (language, libraries, framework etc.) and hardware counterparts of the same.

Chapter 3 gives the exhaustive particulars of the methodology adopted throughout this study, which are described briefly in this chapter.

Introduction to Workshop Information SystEm (WISE)

WISE is a Management Information System (MIS) project for railway workshops around the country. It generates a report for workshop management using the ORACLE DBMS, and is being upgraded to an ERP-based system. It is a state-of-the-art Technology like SAP, HP High end Servers, Juniper Routers, Industrial Kiosks, PDAs, E pen. This Project is sub-divided into two parts- ERP (SAP) which is implemented in WORKSHOPS and custom-built central application (J2EE) in all Divisions, Headquarters, Production Units, RDSO and Railway Board. WISE project will provide a seamless integration with FOIS, ICMS, LMS, FMM, MMIS and PRIME. A Soft launch of WISE application was held on 14 Aug 2012 at Raipur wagon repair shop. It is in operation in 14 workshops: Kharagpur, Jagadhri, Ajmer, Kota, Charbagh, Liluah, Kanchrapara, Matunga, Lower Parel, Parel, Bhusawal, Secunderabad, Lallaguda and Jamalpur.

Following are some of the benefits of WISE project:
1. Ease of Information
2. Online Leave/Pass/PTO
3. Lower Maintenance costs
4. Enhanced Efficiency
5. Lower Downtime
6. Reduced Inventory
7. Predictive Maintenance
8. History Tracking
9. Failure Analysis
10. Higher employee satisfaction
11. Paper less document flow

WISE-II is for the benefit of Indian Railways		
34 workshops	HR ESS	Reports & Docs
150 Types of Passenger Cars 50 Types of Wagons 30 Types of Locomotive	About 2 lakh Employees About 150000 M&P	About 250000 wagons About 70000 coaches About 10000 Locos

Figure 1: Illustration of process involved in WISE

Management Information System (MIS)

Management information system (MIS) refers to the processing of information through computers to manage and support managerial decisions within an organization. The concept may include systems termed transaction processing system, decision support system, expert system, or executive information system. The term is often used in the academic study of businesses and has connections with other areas, such as information systems, information technology, and informatics, e-commerce and computer science; as a result, the term is used interchangeably with some of these areas. MIS professionals help organizations to maximize the benefit from investments in personnel, equipment, and business processes.

The following are some of the benefits that can be attained using MIS:

- Companies are able to identify their strengths and weaknesses due to the presence of revenue reports, employees' performance record etc. Identifying these aspects can help a company improve its business processes and operations.
- Giving an overall picture of the company.
- Acting as a communication and planning tool.
- The availability of customer data and feedback can help the company to align its business processes according to the needs of its customers. The effective management of customer data can help the company to perform direct marketing and promotion activities.
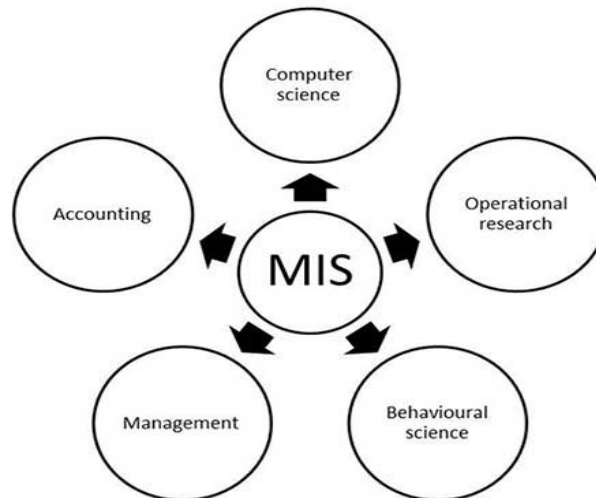
Figure 2: Illustration of disciplines employing WISE

Following are some of the Enterprise Applications of MIS:

☐ Enterprise systems—also known as enterprise resource planning (ERP) systems—provide integrated software modules and a unified database that personnel use to plan, manage, and control core business processes across multiple locations. Modules of ERP systems may include finance, accounting, marketing, human resources, production, inventory management, and distribution.

☐ Supply chain management (SCM) systems enable more efficient management of the supply chain by integrating the links in a supply chain. This may include suppliers, manufacturers, wholesalers, retailers, and final customers.

☐ Customer relationship management (CRM) systems help businesses manage relationships with potential and current customers and business partners across marketing, sales, and service.

☐ Knowledge management system (KMS) helps organizations facilitate the collection, recording, organization, retrieval, and dissemination of knowledge. This may include documents, accounting records, unrecorded procedures, practices, and skills. Knowledge management (KM) as a system covers the process of knowledge creation and acquisition from internal processes and the external world.

Enterprise Resource Planning

Enterprise resource planning (ERP) is the integrated management of core business processes, often in real-time and mediated by software and technology. These business activities can include:

- product planning, purchase
- production planning
- manufacturing or service delivery
- marketing and sales
- materials management
- inventory management
- shipping and payment
- finance

ERP is usually referred to as category of business-management software—typically a suite of integrated applications—that an organization can use to collect, store, manage and interpret data from these many business activities.
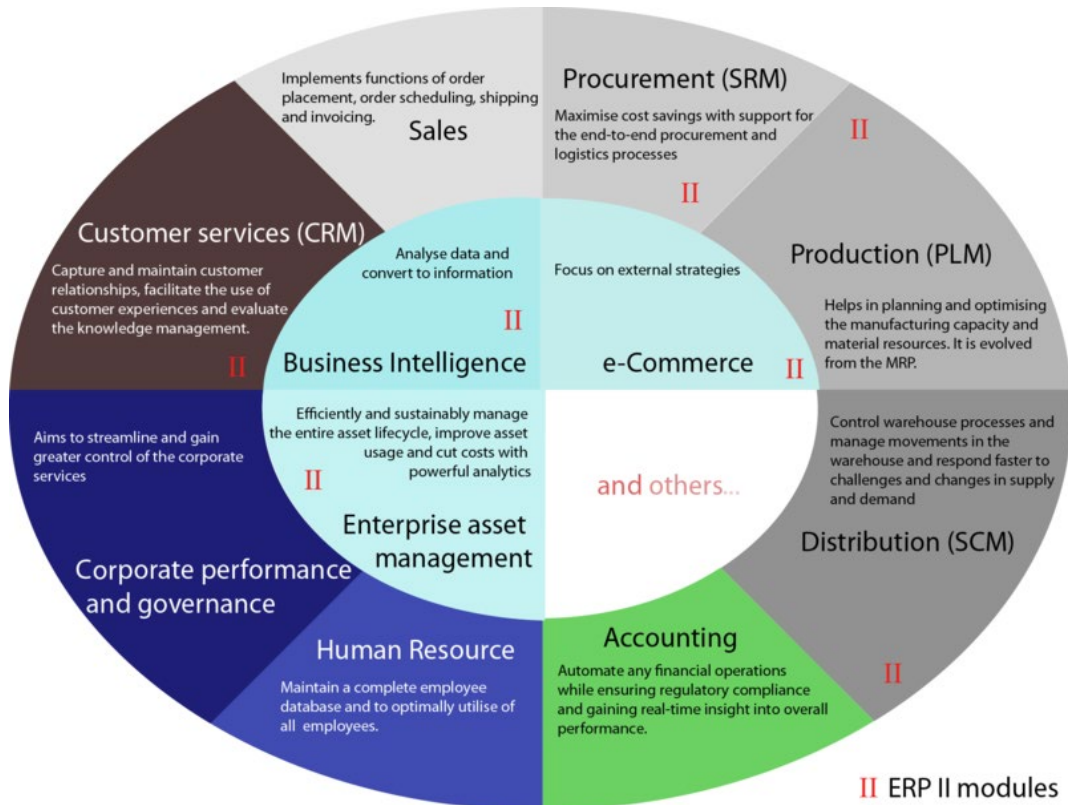

Figure 3: Diagram showing some typical ERP modules

ERP provides an integrated and continuously updated view of core business processes using common databases maintained by a database management system. ERP systems track business resources—cash, raw materials, production capacity—and the status of business commitments: orders, purchase orders, and payroll. The applications that make up the system share data across various departments (manufacturing, purchasing, sales, accounting, etc.) that provide the data. ERP facilitates information flow between all business functions and manages connections to outside stakeholders.

The ERP system integrates varied organizational systems and facilitates error-free transactions and production, thereby enhancing the organization's efficiency. However, developing an ERP system differs from traditional system development. ERP systems run on a variety of computer hardware and network configurations, typically using a database as an information repository.

SAP

SAP ERP is enterprise resource planning software developed by the German company SAP SE. Business Processes included in SAP ERP are Operations (Sales & Distribution, Materials Management, Production Planning, Logistics Execution, and Quality Management), Financials, Human Capital Management (Training, Payroll, e-Recruiting) and Corporate Services.

SAP ERP consists of several modules, including Financial Accounting (FI), Controlling (CO), Asset Accounting (AA), Sales & Distribution (SD), Material Management (MM), Product Planning (PP), Quality Management (QM), Project System (PS), Plant Maintenance (PM), Human Resources (HR). SAP ERP collects and combines data from the separate modules to provide the company or organization with enterprise resource planning.

Typical implementation phases:

- Phase 1 - Project Preparation
- Phase 2 - Business Blueprint
- Phase 3 - Realization
- Phase 4 - Final Preparation
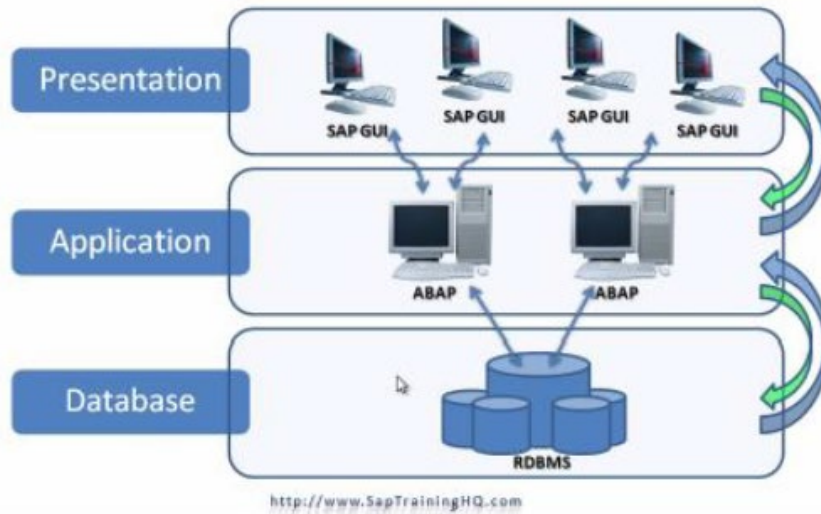- Phase 5 – Golive Support

Figure 4: SAP 3-Tier Client/Server Architecture

SAP ERP Architecture is explained as follows:

□ At the top is the Presentation server, which is any input device that can be used to control an SAP system (the diagram shows the SAP GUI, but this could equally be a web browser, a mobile device, and so on). The Presentation layer communicates with the Application server, and the Application server is the 'brains' of an SAP system, where all the central processing takes place.

□ The Application server is not just one system in itself, but can be made up of multiple instances of the processing system. The Application server, in turn, communicates with the Database layer.

□ The Database is kept on a separate server, mainly for performance reasons, but also for security, providing a separation between the different layers of the system.

Communication happens between each layer of the system, from the Presentation layer, to the Application server, to the Database, and then back up the chain, through the Application server again, for further processing, until finally reaching the Presentation layer.

Materials Required And Method

Software Used:

For program implementation following tools are used during the course of this research project:

- Advanced Business Application Programming, SAP R/2, SAP R/3
- Oracle Database 12c
- SAP SE

Hardware Used:

The implementation was tested on a well-equipped system with following specifications:

- Quad-Core i5-4200M 2.50 GHz Intel Mobile Processor
- 4 Gigabytes of RAM
- NVidia GeForce 860M
- 64-Bit Canonical Ubuntu 16.04 LTS on the machine
- Raw Project Data:

Method

The raw project data for generating rolling stock reports templates has been generated from various data-warehousing tools available in railways workshops. Employee of Indian Railways feed data about various attributes of a locomotive through an online portal for WISE. This repository of online data is the aggregate sum and processed to compute vehicle's report.

Entries were put through ABAP (high-level programming language created by the German software company SAP SE) in the database were taken from the client selection process.

Advanced Business Application Programming (ABAP):

It is a high-level programming language created by the German software company SAP SE. It is currently positioned, alongside Java, as the language for programming the SAP Application Server, which is part of the NetWeaver platform for building business applications.

All ABAP programs reside inside the SAP database. They are not stored in separate external files like Java or C++ programs. In the database all ABAP code exists in two forms: source code, which can be viewed and edited with the ABAP Workbench tools; and generated code, a binary representation somewhat comparable with Java bytecode. ABAP programs execute under the control of the runtime system, which is part of the SAP kernel. The runtime system is responsible for processing ABAP statements, controlling the flow logic of screens and responding to events (such as a user clicking on a screen button); in this respect it can be seen as a Virtual Machine comparable with the Java VM. A key component of the ABAP runtime system is the Database Interface, which turns database-independent ABAP statements ("Open SQL") into statements understood by the underlying DBMS ("Native SQL"). The database interface handles all the communication with the relational database on behalf of ABAP programs; It also contains extra features such as buffering of tables and frequently accessed data in the local memory of the application server.

ABAP software is deployed in software components. Examples for these are:

- SAP_BASIS is the required technical base layer which is required in every ABAP system.
- SAP_ABA contains functionalities which is required for all kinds of business applications, like business partner and address management.
- SAP_UI provides the functionality to create SAP UI5 applications.

- BBPCRM is an example for a business application, in this case the CRM application
- SAP ABAP is an ERP programming language.

Results And Discussions

The database entires were successfully updated on the server side and testing was done on client side (on the live system) to ensure the efficiency of the tasks that were performed and results were positive.