CENTRAL DATABASE DESIGN

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Abstract—
A Central Database Design refers to the structured planning and creation of a single, unified database that serves as the core data repository for an organization. It enables all users and systems to access and manage data from one central location, ensuring consistency, accuracy, and security.
The design process begins with requirement analysis, followed by logical design (such as entity-relationship modelling), physical design (involving indexing and storage planning), and security planning (managing user access and data protection). Backup and recovery strategies are also critical components. Common applications of central database systems include ERP platforms, banking systems, healthcare databases, and government records. Best practices include proper normalization, use of modeling tools, role-based access control, and regular schema updates.

Keywords:
SAP ECC, ABAP, SAP GUI, SAP ABAP Editor

I. INTRODUCTION

Introducing Central Database Design, A central database is a single, unified repository that stores data for multiple applications, departments, or organizational units. The design of a central database is foundational to ensuring data consistency, integrity, security, and accessibility across the entire organization. The central database design process involves careful planning, modeling, and structuring of data to meet the diverse needs of an organization while ensuring optimal performance and scalability.
One of the key goals of central database design is data integration—ensuring that data from various functional areas such as finance, sales, human resources, and inventory management is consistently and accurately represented. This integration enables real-time data sharing and reporting across departments. For example, when a new customer order is entered into the system, relevant information is immediately accessible to the inventory, shipping, and finance departments without the need for redundant data entry.

II. LITERATURE REVIEW

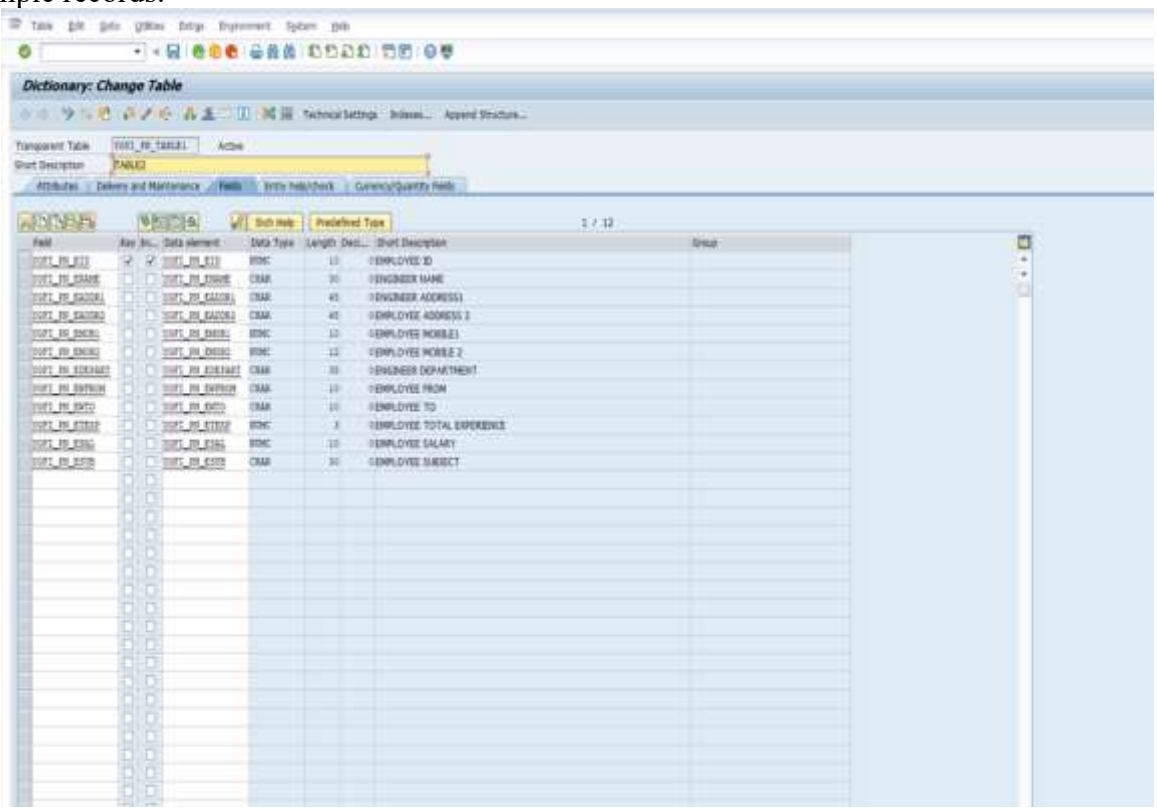
THE LITERATURE REVIEW FOR A CENTRAL DATABASE DESIGN (CDBD) HAS BEEN WIDELY STUDIED AS A FOUNDATIONAL CONCEPT IN DATA ARCHITECTURE, PARTICULARLY IN THE CONTEXT OF LARGE-SCALE ENTERPRISE SYSTEMS.
RECENT RESEARCH ALSO EXPLORES THE ROLE OF IN-MEMORY COMPUTING AND CLOUD-BASED CENTRAL DATABASES, ESPECIALLY WITH PLATFORMS LIKE SAP HANA, WHICH PROVIDE ENHANCED PROCESSING SPEED WHILE MAINTAINING CENTRALIZED DATA CONTROL.
RESEARCHERS HIGHLIGHT THE USE OF ROLE-BASED ACCESS CONTROLS, ENCRYPTION TECHNIQUES, AND AUDIT TRAILS TO SECURE CENTRAL DATABASES.
OVERALL, THE LITERATURE AFFIRMS THAT CENTRAL DATABASE DESIGN, WHEN PROPERLY IMPLEMENTED, SIGNIFICANTLY ENHANCES SYSTEM EFFICIENCY, INTEGRITY, AND SCALABILITY, MAKING IT A PREFERRED CHOICE FOR MODERN ENTERPRISE DATA SYSTEMS.

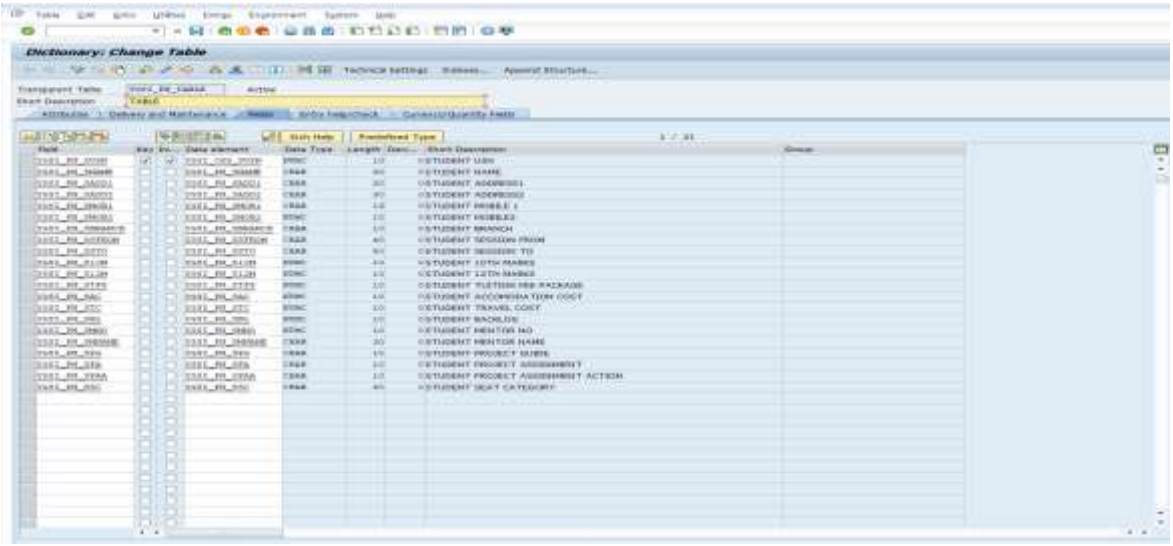
III. SYSTEM DESIGN

THE SYSTEM DESIGN FOR A CENTRAL DATABASE DESIGN INCLUDES TWO PRIMARY TRANSPARENT TABLES: ONE FOR EMPLOYEE RECORDS (YGS_T_PM_TABLE1) AND ANOTHER FOR STUDENT DATA (YGS_T_PM_TABLE). THE EMPLOYEE TABLE CAPTURES ESSENTIAL INFORMATION SUCH AS EMPLOYEE ID, NAME, ADDRESSES, CONTACT NUMBERS, DEPARTMENT, SALARY, EXPERIENCE, AND SUBJECTS HANDLED. MEANWHILE, THE STUDENT TABLE STORES KEY ACADEMIC AND PERSONAL DETAILS INCLUDING STUDENT USN, NAME, ADDRESSES, CONTACT NUMBERS, ACADEMIC SESSION DETAILS, MARKS, MENTOR INFORMATION, BACKLOG RECORDS, ACCOMMODATION AND TRAVEL COST, AND PROJECT ASSIGNMENT STATUS. BOTH TABLES ARE DESIGNED USING WELL-DEFINED DATA ELEMENTS AND APPROPRIATE DATA TYPES, ENSURING THAT THE SYSTEM IS SCALABLE, CONSISTENT, AND LOGICALLY NORMALIZED FOR EFFICIENT DATA HANDLING.

IV. IMPLEMENTATION

The implementation of the central database system was carried out within the SAP environment using the ABAP Data Dictionary (SE11). Transparent tables were created with carefully structured fields using predefined data types like CHAR and NUMC, and field lengths suited for the nature of the data. Primary keys were assigned appropriately to ensure the uniqueness of records—employee ID for employees and USN for students. Logical groupings were maintained for address, contact, academic, and project-related fields to reflect real-world organizational data structures. After defining the fields and relationships, the tables were activated and tested for data consistency and correctness using sample records.





V. RESULTS

THE RESULTS OF THE CENTRAL DATABASE DESIGN, UPON SUCCESSFUL CREATION AND DEPLOYMENT, THE SYSTEM DEMONSTRATED ROBUST PERFORMANCE IN MANAGING AND RETRIEVING CENTRALIZED DATA FOR BOTH EMPLOYEES AND STUDENTS. DATA ENTRY OPERATIONS BECAME MORE STREAMLINED DUE TO PREDEFINED STRUCTURES AND VALIDATION, AND THE ORGANIZATION BENEFITED FROM HAVING A SINGLE POINT OF ACCESS FOR ALL ESSENTIAL RECORDS. THE EMPLOYEE TABLE FACILITATED BETTER TRACKING OF SUBJECT ALLOCATION, DEPARTMENT ASSIGNMENTS, AND PROFESSIONAL HISTORY, WHILE THE STUDENT TABLE SUPPORTED DETAILED ACADEMIC TRACKING, MENTOR GUIDANCE, AND PROJECT STATUS REPORTING. THE SYSTEM PROVIDED A FOUNDATION FOR INTEGRATION WITH SAP MODULES SUCH AS HR AND TRAINING AND COULD BE EXTENDED FURTHER FOR ANALYTICAL AND REPORTING PURPOSES.

Vi.CONCLUSION

IN CONCLUSION, THE SAP ABAP DEVELOPMENT PROJECT SUCCESSFULLY DEMONSTRATED THE CAPABILITIES OF ABAP IN BUILDING ROBUST, DATA-DRIVEN ENTERPRISE APPLICATIONS.

THE PROJECT'S MAIN GOAL WAS TO STREAMLINE DATABASE OPERATIONS SUCH AS CREATING, RETRIEVING, UPDATING, AND DELETING RECORDS IN A USER-FRIENDLY AND RELIABLE ENVIRONMENT. THIS GOAL WAS MET USING CUSTOM ABAP CODE, SAP DATA DICTIONARY OBJECTS (Z-TABLES), AND INTERACTIVE SCREENS. ALL ESSENTIAL CRUD OPERATIONS WERE IMPLEMENTED SECURELY AND ABAP PROGRAMS, ENSURING DATA CONSISTENCY AND TRANSACTIONAL RELIABILITY.

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REFERENCES

- **SAP Help Portal –** https://help.sap.com
- **SAP Community Network (SCN)** – https://community.sap.com
- **ABAP Tutorials on Tutorials Point**– https://www.tutorialspoint.com/abap/
- **GeeksforGeeks – SAP ABAP Section** https://www.geeksforgeeks.org/sap-abap/