

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.

The screenshot displays the SAP SE11 Dictionary: Change Table interface for the transparent table YGS_T_PM_TABLE1. The table is active and its short description is 'TABLE1'. The 'Fields' tab is selected, showing a list of 12 fields. The fields are organized into columns: Field, Key, Data element, Data Type, Length, and Short Description. The fields are as follows:

Field	Key	Data element	Data Type	Length	Short Description
YGS_T_PM_ID	✓	YGS_T_PM_ID	NUMC	10	EMPLOYEE ID
YGS_T_PM_NAME		YGS_T_PM_NAME	CHAR	30	EMPLOYEE NAME
YGS_T_PM_ADDR1		YGS_T_PM_ADDR1	CHAR	40	EMPLOYEE ADDRESS1
YGS_T_PM_ADDR2		YGS_T_PM_ADDR2	CHAR	40	EMPLOYEE ADDRESS 2
YGS_T_PM_MOB1		YGS_T_PM_MOB1	NUMC	12	EMPLOYEE MOBILE1
YGS_T_PM_MOB2		YGS_T_PM_MOB2	NUMC	12	EMPLOYEE MOBILE 2
YGS_T_PM_DEPT		YGS_T_PM_DEPT	CHAR	30	EMPLOYEE DEPARTMENT
YGS_T_PM_PROB		YGS_T_PM_PROB	CHAR	10	EMPLOYEE PROB
YGS_T_PM_EXP		YGS_T_PM_EXP	CHAR	10	EMPLOYEE TO
YGS_T_PM_EXP1		YGS_T_PM_EXP1	NUMC	8	EMPLOYEE TOTAL EXPERIENCE
YGS_T_PM_SAL		YGS_T_PM_SAL	NUMC	10	EMPLOYEE SALARY
YGS_T_PM_SUB		YGS_T_PM_SUB	CHAR	30	EMPLOYEE SUBJECT

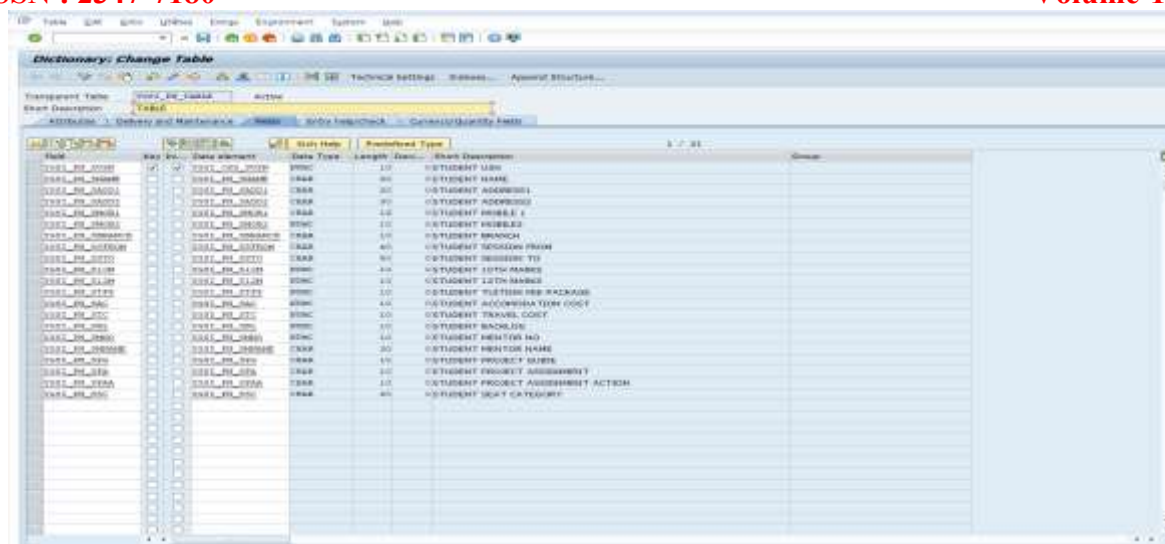


Table	Data Element	Data Type	Length	Decimals	Short Description
STUDENT_ID	STUDENT_ID	CHAR	10		STUDENT ID
STUDENT_NAME	STUDENT_NAME	CHAR	40		STUDENT NAME
STUDENT_ADDRESS	STUDENT_ADDRESS	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS2	STUDENT_ADDRESS2	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS3	STUDENT_ADDRESS3	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS4	STUDENT_ADDRESS4	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS5	STUDENT_ADDRESS5	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS6	STUDENT_ADDRESS6	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS7	STUDENT_ADDRESS7	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS8	STUDENT_ADDRESS8	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS9	STUDENT_ADDRESS9	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS10	STUDENT_ADDRESS10	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS11	STUDENT_ADDRESS11	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS12	STUDENT_ADDRESS12	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS13	STUDENT_ADDRESS13	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS14	STUDENT_ADDRESS14	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS15	STUDENT_ADDRESS15	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS16	STUDENT_ADDRESS16	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS17	STUDENT_ADDRESS17	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS18	STUDENT_ADDRESS18	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS19	STUDENT_ADDRESS19	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS20	STUDENT_ADDRESS20	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS21	STUDENT_ADDRESS21	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS22	STUDENT_ADDRESS22	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS23	STUDENT_ADDRESS23	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS24	STUDENT_ADDRESS24	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS25	STUDENT_ADDRESS25	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS26	STUDENT_ADDRESS26	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS27	STUDENT_ADDRESS27	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS28	STUDENT_ADDRESS28	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS29	STUDENT_ADDRESS29	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS30	STUDENT_ADDRESS30	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS31	STUDENT_ADDRESS31	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS32	STUDENT_ADDRESS32	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS33	STUDENT_ADDRESS33	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS34	STUDENT_ADDRESS34	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS35	STUDENT_ADDRESS35	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS36	STUDENT_ADDRESS36	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS37	STUDENT_ADDRESS37	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS38	STUDENT_ADDRESS38	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS39	STUDENT_ADDRESS39	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS40	STUDENT_ADDRESS40	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS41	STUDENT_ADDRESS41	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS42	STUDENT_ADDRESS42	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS43	STUDENT_ADDRESS43	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS44	STUDENT_ADDRESS44	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS45	STUDENT_ADDRESS45	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS46	STUDENT_ADDRESS46	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS47	STUDENT_ADDRESS47	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS48	STUDENT_ADDRESS48	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS49	STUDENT_ADDRESS49	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS50	STUDENT_ADDRESS50	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS51	STUDENT_ADDRESS51	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS52	STUDENT_ADDRESS52	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS53	STUDENT_ADDRESS53	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS54	STUDENT_ADDRESS54	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS55	STUDENT_ADDRESS55	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS56	STUDENT_ADDRESS56	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS57	STUDENT_ADDRESS57	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS58	STUDENT_ADDRESS58	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS59	STUDENT_ADDRESS59	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS60	STUDENT_ADDRESS60	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS61	STUDENT_ADDRESS61	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS62	STUDENT_ADDRESS62	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS63	STUDENT_ADDRESS63	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS64	STUDENT_ADDRESS64	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS65	STUDENT_ADDRESS65	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS66	STUDENT_ADDRESS66	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS67	STUDENT_ADDRESS67	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS68	STUDENT_ADDRESS68	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS69	STUDENT_ADDRESS69	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS70	STUDENT_ADDRESS70	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS71	STUDENT_ADDRESS71	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS72	STUDENT_ADDRESS72	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS73	STUDENT_ADDRESS73	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS74	STUDENT_ADDRESS74	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS75	STUDENT_ADDRESS75	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS76	STUDENT_ADDRESS76	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS77	STUDENT_ADDRESS77	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS78	STUDENT_ADDRESS78	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS79	STUDENT_ADDRESS79	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS80	STUDENT_ADDRESS80	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS81	STUDENT_ADDRESS81	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS82	STUDENT_ADDRESS82	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS83	STUDENT_ADDRESS83	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS84	STUDENT_ADDRESS84	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS85	STUDENT_ADDRESS85	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS86	STUDENT_ADDRESS86	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS87	STUDENT_ADDRESS87	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS88	STUDENT_ADDRESS88	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS89	STUDENT_ADDRESS89	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS90	STUDENT_ADDRESS90	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS91	STUDENT_ADDRESS91	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS92	STUDENT_ADDRESS92	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS93	STUDENT_ADDRESS93	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS94	STUDENT_ADDRESS94	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS95	STUDENT_ADDRESS95	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS96	STUDENT_ADDRESS96	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS97	STUDENT_ADDRESS97	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS98	STUDENT_ADDRESS98	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS99	STUDENT_ADDRESS99	CHAR	40		STUDENT ADDRESS
STUDENT_ADDRESS100	STUDENT_ADDRESS100	CHAR	40		STUDENT ADDRESS

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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