BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI HYDERABAD CAMPUS
FIRST SEMESTER
2021-22
CS F366 STUDY PROJECT

PROJECT OUTLINE & PLAN OF WORK

Date: 19/01/2024

Title of the project: Reverse Engineering Database to ER Model

Need for the study:

Reverse engineering a database to an Entity-Relationship (ER) model is a critical process that involves extracting the underlying structure and relationships within a database and representing them in a conceptual model. This endeavor is essential for several reasons, each contributing to the overall understanding, optimization, and maintenance of a database system.

Firstly, the need for reverse engineering a database to an ER model arises from the inherent complexity of large and legacy databases. Over time, databases can become convoluted with redundant tables, complex relationships, and inefficient structures. Understanding the underlying ER model allows database administrators and developers to gain insights into the system's design, facilitating the identification of potential areas for improvement, normalization, and optimization. Additionally, reverse engineering to an ER model is instrumental when dealing with undocumented databases. In many cases, databases lack proper documentation or have outdated documentation that does not accurately reflect the current state of the system. By reverse engineering the database into an ER model, stakeholders

can create up-to-date and comprehensive documentation, providing a clear blueprint of the data structure and relationships for future reference.

Moreover, reverse engineering is crucial during the process of system migration or integration. When organizations transition from one database system to another or when they need to integrate multiple databases, understanding the existing data structure becomes imperative. Creating an ER model from the existing databases aids in the smooth migration of data and ensures that the new or integrated system maintains the required relationships and constraints. Furthermore, the reverse engineering process assists in maintaining and evolving legacy systems. As technologies advance, organizations often need to update or modernize their database systems. The ER model derived from reverse engineering serves as a foundation for redesigning the database structure, making it compatible with contemporary technologies and business requirements without compromising data integrity.

In conclusion, the need for studying and implementing reverse engineering of databases to ER models is multi-faceted. It provides insights into complex data structures, aids in documentation, supports migration efforts, and facilitates the evolution of database systems. This process is an invaluable tool for database administrators, developers, and analysts seeking to enhance the efficiency, accuracy, and adaptability of their database systems.

Objectives:

- To create an accurate and comprehensive ER model by developing a deep understanding of the existing database structure, including tables/entities, attributes, and relationships.

- Enhance and update the database documentation by generating a detailed and up-to-date ER model, providing a clear and accessible representation of the data structure.

- Facilitate seamless system migration and integration by using the ER model to ensure a smooth transition of data and to maintain consistent relationships between entities in the database.

- Facilitate the maintenance and evolution of legacy systems by creating an ER model that serves as a basis for redesigning the database to meet contemporary technological and business requirements.

By addressing these objectives, the project aims to not only create an accurate representation of the database in the form of an ER model but also to leverage this understanding for database optimization, documentation enhancement, and overall improvement in data management practices.

Literature Review:

- M. H. Alalfi, J. R. Cordy and T. R. Dean, "SQL2XMI: Reverse Engineering of UML-ER Diagrams from Relational Database Schemas," 2008 15th Working Conference on Reverse Engineering, Antwerp, Belgium, 2008, pp. 187-191, doi: 10.1109/WCRE.2008.30.

- Roger H.L. Chiang, Terence M. Barron, Veda C. Storey, Reverse engineering of relational databases: Extraction of an EER model from a relational database, Data & Knowledge Engineering, Volume 12, Issue 2, 1994, ISSN 0169-023X

- Christian Soutou, Relational database reverse engineering: Algorithms to extract cardinality constraints, Data & Knowledge Engineering, Volume 28, Issue 2, 1998, ISSN 0169-023X

Work Plan

- January 15th – 31st, 2024

- The first Project Meet with Project IC - Gururaj Sir was held.

- We learned what the project is about and, and overview of the project.

- Discussed the timeline of this project and its evaluation components.

- presenting the project outline to sir.

- getting feedback on it and finalizing the overall project timeline.

- presentation regarding what we have understood about the project and what we have inferred from an initial reading of the research materials about it.

- February 1st – 15th 2024

  - Submitting the final project outline.

  - Literature survey of all the most recent and credible research papers.

- February 16th – 29th 2024

  - Thorough understanding and analysis of all the research papers.

  - Finishing the research phase of the project and planning the implementation phase.

- March 16th – 31st ,2024

- Developing the blueprint for how we are going to implement the project.

- Deciding which tools we are going to use for implementation.

- Setting up checkpoints and deadlines for implementing each part/feature of the project.

- April 1st – 15th ,2024

   - Implementing parts of the project within their stipulated deadline.

   - Using checkpoints to see if each part/feature works properly.

- April 16th – 30th ,2024

   - Finishing the implementation and testing of the project.

   - Final presentation of the project.

   - Final report submission.

References

- Fundamentals of Database Systems - Elmasri Navathe - 7th-Edition (To learn about ER Diagram and relational database).

- https://www.youtube.com/watch?v=o0DgKSA0YeE (To learn the basic understanding of reverse engineering from relational database to ER model)

- https://github.com/griseldacl/Extracting_ER_From_Relational_Schema

Expected Knowledge to be gained after completion of the project:

- Acquire a detailed understanding of the existing database structure, including tables, relationships, constraints, and other elements contributing to the data architecture.

- Develop proficiency in Entity-Relationship (ER) modeling techniques, enabling the creation of accurate and comprehensive conceptual models that represent the relationships and dependencies within the database.

- Acquire knowledge and skills related to system migration and integration, using the ER model as a foundation for a smooth transition or integration process.

- Improve communication skills by using the ER model as a visual representation to convey complex database structures and relationships to diverse stakeholders.

Name: Ishan Harsh

ID No: 2021A7PS2854H

Name: Meet Patel

ID No: 2021A7PS2692H