



Assignment Project Exam Help

Entity-Relationship Model – Part 1

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Database Design Process

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IT Projects¹

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	2011	2012	2013	2014	2015
SUCCESSFUL	29%	27%	31%	28%	29%
CHALLENGED	49%	56%	50%	55%	52%
FAILED	22%	17%	19%	17%	19%

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¹ CHAOS report by Standish Group, 2015



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- There can be many reasons, including:

- Customers were not sure about what they wanted,
- Requirements were not properly documented,
- Improper development methodology was used,
- Resources were not sufficient,
- There were communication issues,
- ...

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The Tyre Swing Project

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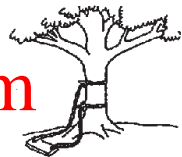
As proposed by
the project sponsor



As specified in the
project request

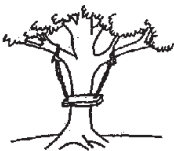


As designed by the
senior analyst



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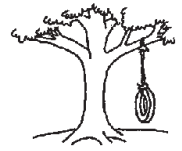
As produced by
the programmers



As installed at the
user's site



What the user
wanted



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Database Design – Four Phases

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- The database design process has **four phases**:

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1 Requirements Collection and Analysis

2 Conceptual Design

3 Logical Design

4 Physical Design

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Phase 1: Requirements Collection and Analysis

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- **Requirements collection and analysis** is the process of collecting and analyzing data requirements of the organization so as to provide database solutions that fulfill business needs of the organization.

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Compilation of data requirements includes:

- a description of data used or generated;
- details of how data is to be used generated
- any additional requirements for new database system;
- ...

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Phase 2: Conceptual Design

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- Conceptual design is the process of constructing a conceptual data model that is

- modeled at a high-level of abstraction;

- sufficiently simple and often graphical;

- used to communicate the requirements of a database with nontechnical users.

- A conceptual data model is built using the information in users' requirements specification.

Note: The conceptual design is based on **the entity-relationship model** in this course.



Phase 3: Logical Design

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- **Logical design** is the process of constructing a logical data model (e.g. relational or object-oriented).
- A conceptual data model is translated onto a logical data model, which can be further refined (e.g. normalisation) to meet the data requirements. For example,

- **From:** An ER model

- **To:** Relations with their primary and foreign keys, which facilitates SQL to deal with retrieving, updating and deletion.

Note: The logical design is based on **the relational data model** in this course.



Phase 4: Physical Design

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- **Physical Design** is the process of implementing the logical data model in a specific database management system (DBMS).
- Assume that the logical data model is the relational data model. Then the physical design is to create relations in a DBMS that involves:
 - Selecting the files in which to store the relations.
 - Deciding which indexes should be used to achieve efficient access.
 - Describing the integrity constraints and security measures.
 - ...
- The decisions made during the physical design phrase affect the performance and accessibility of the database.

Note: Details of this topic are out of the scope of our course.



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