

Database Design

CISC437/637, Lecture #2
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Introduction to Database Design

- Why use a database?
 - You have data
 - You want to be able to ask questions of that data and get answers fast
- How do you design a database in general?
- How do you design a database specifically to support the questions you want to ask?

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Design Decisions

- Designing something is a process of making decisions and implementing them
 - Choices should be analyzed in terms of how well they support what you want to do and their cost
 - Not so much as “right” versus “wrong”
 - Yet each choice must be carefully analyzed
 - In some cases, higher-level decisions force certain lower-level decisions

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Database Design

- A database is designed within a particular data model
 - Recall: a **data model** is a collection of high-level data description constructs
- A data model imposes limitations on what decisions can be made
 - Limitations can be good... with no limitations, anything goes
 - Limitations can be bad... they restrict the real-world scenarios that can be accommodated

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Designing a Database

- Basic steps in designing a database:
 - Understand the data and what applications it needs to support
 - Use that understanding to model the data with **conceptual schema**
 - Implement the conceptual schema with **logical schema** in the DBMS
 - Refine—you won't get it right the first time!

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Understanding the Data

- **Requirements analysis** is the process of understanding the data and what it is used for
- Example requirements:

"I would like my customers to be able to browse my catalog of books and place orders over the Internet. Currently, I take orders over the phone. I have mostly corporate customers who call me and give me the ISBN number of a book and a quantity; they often pay by credit card. I then prepare a shipment that contains the books they ordered. If I don't have enough copies in stock, I order additional copies and delay the shipment until the new copies arrive; I want to ship a customer's entire order together. My catalog includes all the books I sell. For each book, the catalog contains its ISBN number, title, author, purchase price, sales price, and the year the book was published. Most of my customers are regulars, and I have records with their names and addresses. New customers have to call me first and establish an account before they can use my website.

On my new website, customers should first identify themselves by their unique customer identification number. Then they should be able to browse my catalog and to place orders online."

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