1814ict/2814ict/7003ict/1011ICT: Data Management/ Database Design/ Applied Computing

Topic 4.1: Introduction to SQL

(Chapter 7)

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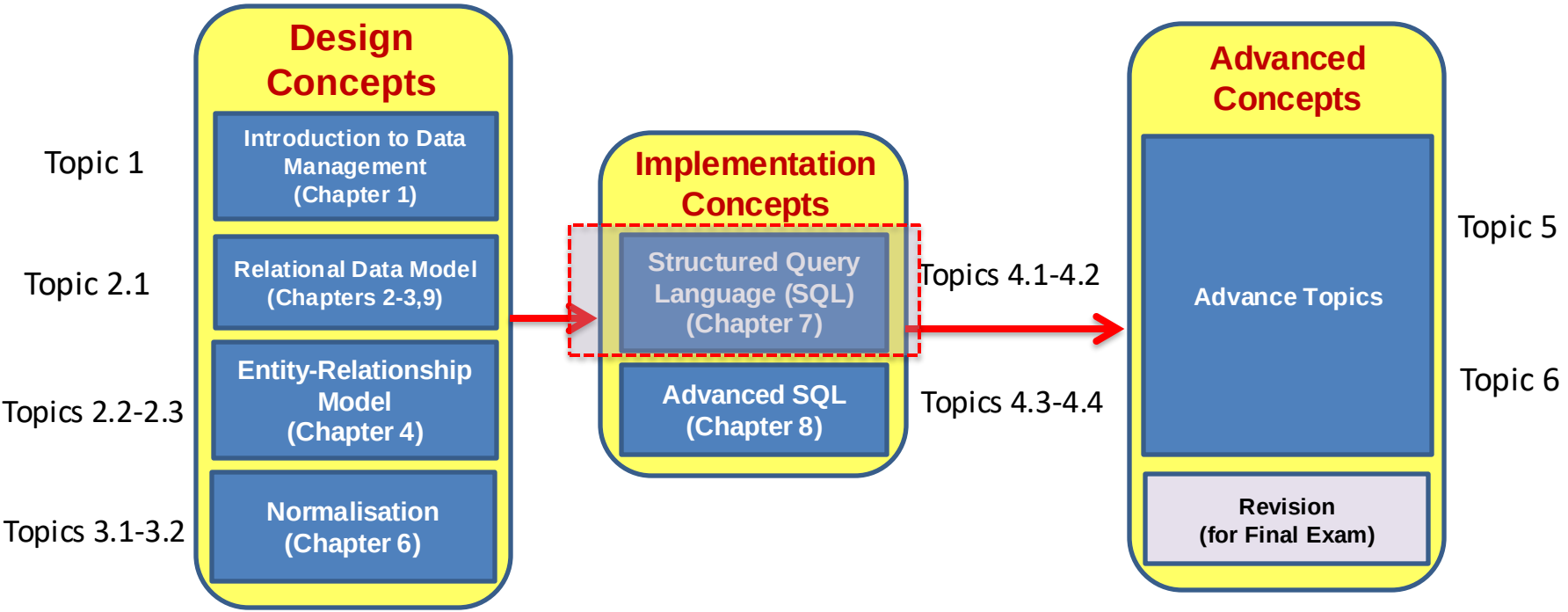
Course bigger picture

- Chapter references are to textbook *Database Systems: Design, Implementation, & Management - By Carlos Coronel and Steven Morris*



Learning Outcomes

At the end of this lecture students will be able to know:

- How to create a database and its tables
- How to insert data into a table
- How to update/modify/alter a table and its data
- What are some to the SQL constraints

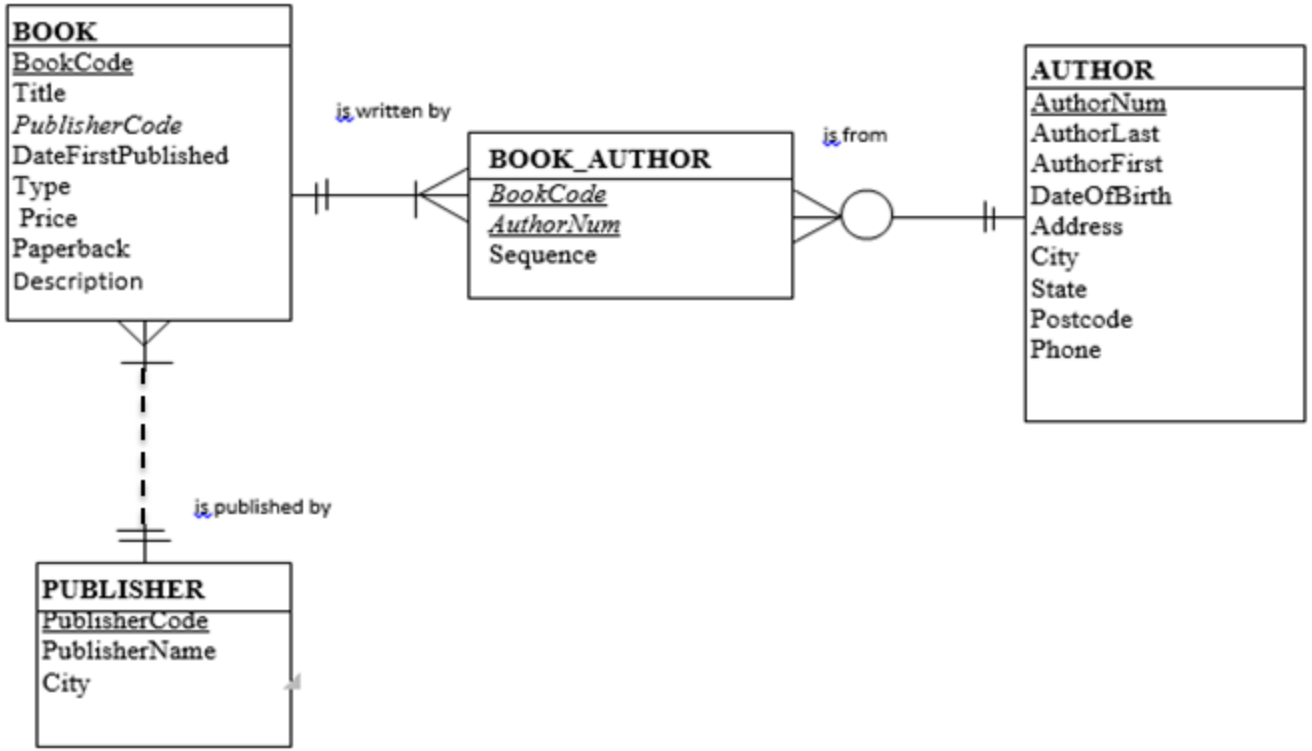
Content

- DDL, DML, DCL, TCL — **Outcome 1**
- Create statement
- Insert statement — **Outcome 2**
- Alter, modify, update, drop statements — **Outcome 3**
- Constraints — **Outcome 4**

Recap from Topic 3.2

Relational database schema

- We are given an ERD and it's relation schema
- Can you check if all tables are in 3NF?



Relational database schema

Table Name	Field	Type	Description
BOOK	BookCode	CHAR(6)	PRIMARY KEY
	Title	VARCHAR(40)	
	PublisherCode	CHAR(3)	FOREIGN KEY REFERENCES PUBLISHER(PublisherCode)
	DateFirstPublished	DATE	**Format:** DD-MM-YYYY
	Type	CHAR(3)	
	Price	DOUBLE	
	Paperback	CHAR(1)	
	Description	VARCHAR(30)	
AUTHOR	AuthorNum	INT (11)	PRIMARY KEY NOT NULL AUTO_INCREMENT
	AuthorLast	VARCHAR(12)	
	AuthorFirst	VARCHAR(10)	
	DateOfBirth	DATE	
	Address	VARCHAR(30)	
	City	VARCHAR(30)	
	State	CHAR(3)	
	Postcode	CHAR(4)	
	Phone	VARCHAR(15)	
BOOK-AUTHOR	BookCode	CHAR(6)	PRIMARY KEY FOREIGN KEY REFERENCES BOOK(BookCode)
	AuthorNum	INT(11)	PRIMARY KEY FOREIGN KEY REFERENCES AUTHOR(AuthorNum)
	Sequence	INT	
PUBLISHER	PublisherCode	CHAR(3)	PRIMARY KEY
	PublisherName	VARCHAR(25)	
	City	VARCHAR(30)	

- For columns with fixed length values (e.g., Postcode, BookCode) use CHAR(…) instead of VARCHAR(…).
- CHAR saves memory for fixed length values (e.g., s-number), VARCHAR saves memory of variable length values (e.g., name).

Introduction to SQL

SQL – Structured Query Language

- Used in relational DBMS to build and alter database and query tables.
- SQL is a Transform-Oriented language
  - designed to use relations to transform inputs into required outputs
- Currently Two standards organisations:
  - The American National Standards Institute (ANSI) and
  - The International Standards Organisation (ISO).
- Most components are case insensitive
  - SELECT vs select
- Data representation in SQL commands
  - Non-numeric is in single quotes: 'Smith'
  - Numeric is NOT in quotes: 12345

SQL – Structured Query Language

Griffith UNIVERSITY

Types of SQL statements:

- **D**ata **D**efinition **L**anguage (**DDL**) - Defines and modifies a schema e.g. CREATE / DROP / ALTER **table**; does not manipulate data
- **D**ata **M**anipulation **L**anguage (**DML**) - Language used to retrieve (SELECT), add (INSERT), modify (UPDATE) and DELETE **data**
- **D**ata **C**ontrol **L**anguage (**DCL**) statements. Used for providing (GRANT)/withdrawing (REVOKE) **access privileges**
- **T**ransaction **C**ontrol **L**anguage (**TCL**) statements are used to manage the changes made by DML statements. It allows statements to be grouped together into **logical transactions**. Example: COMMIT, ROLLBACK, etc.

SQL and Relational Algebra

- Relation Algebra (RA) is the basis for specifying and evaluating practical relational query languages such as SQL.

- Basic set of operators to retrieve the data from the database
  - Select, Project, Product, Natural Join, Union, Intersect, Minus, Divide

- Advantages
    - Relatively standard implementation-independent form to express a query

Results Table

- Each of the operations results in a **new temporary** table
- Temporary table exists only during the time the query is in use
- E.g. Display all products with a price < $2
  - SELECT * FROM PRODUCT;
  - SELECT * FROM PRODUCT WHERE Price < 2;

Original Table

P_CODE	P_DESCRIPT	PRICE
213345	9v battery	1.92
311452	Power drill	34.99
254467	100W bulb	1.47

SELECT all will yield

Results Table

P_CODE	P_DESCRIPT	PRICE
213345	9v battery	1.92
311452	Power drill	34.99
254467	100W bulb	1.47

SELECT only PRICE less than 2.00 will yield

Results Table

P_CODE	P_DESCRIPT	PRICE
213345	9v battery	1.92
254467	100W bulb	1.47

Thank you