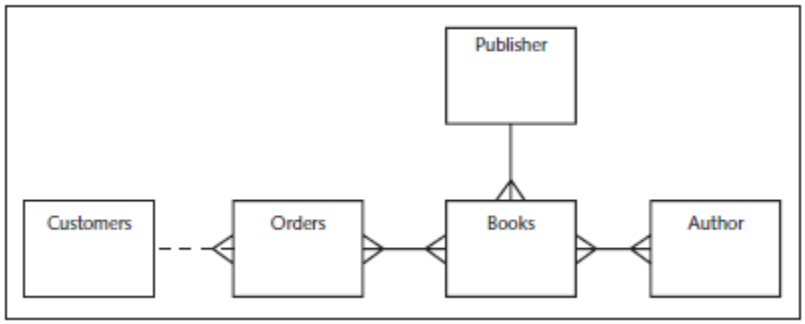
The database used throughout the CS623 class is based on the activities of a hypothetical business, an online bookseller named JustLee Books. The company sells books via the Internet to customers throughout the United States. When a new customer places an order, he or she provides data such as name, billing and shipping addresses, and items ordered. The company also uses a database for all books in inventory.

To access the data required for operating JustLee Books, management relies on a DBMS.

A database management system (DBMS) is used to create and maintain the structure of a database, and then to enter, manipulate, and retrieve the data it stores.

Creating an efficient database design is the key to using a database effectively to support an organization's business operations.

ER Model for JustLee



The following relationship are defined here

• Customers can place multiple orders, but each order can be placed by only one customer (one-to-many). The dashed line between Customers and Orders means a customer can exist in the database without having a current order stored in the ORDERS table. Therefore, this relationship is considered optional.

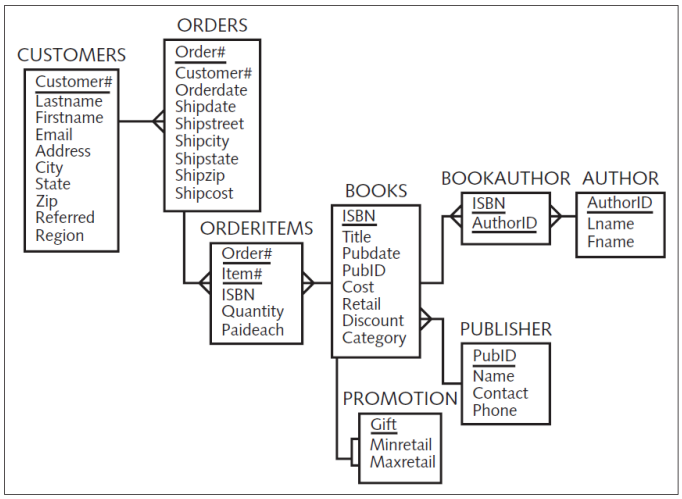
• An order can consist of more than one book, and a book can appear on more than one order (many-to-many).

• A book can have more than one author, and an author can write more than one book (many-to-many).

• A book can have only one publisher, but a publisher can publish more than

one book (one-to-many).

Tables in the JustLee Books Database after normalization



Tables in the JustLee Books Database

Next, take a closer look at each table in the JustLee Books database, referring to the table

structures in Figure above.

CUSTOMERS table: Notice that the CUSTOMERS table is the first table in below figure. It serves as a master table for storing basic data related to any customer who has placed an order with JustLee Books. It stores the customer's name, e-mail address, and mailing address, plus the Customer# of the person who referred that customer to the company. As a promotion to attract new customers, the bookstore sends a 10% discount coupon to any customer referring a friend who makes a purchase. The region data allows JustLee to track and analyze sales by geographic service areas. Why is a Customer# field included in the CUSTOMERS table? Because you might have two customers with the same name, and by assigning each customer a number, you can uniquely identify each person. Using account numbers or codes can also decrease the likelihood of data entry errors caused by incorrect spelling or abbreviations. Keep in mind the Customer# column serves as the primary key column for the CUSTOMERS table.

BOOKS table: The BOOKS table stores each book's ISBN, title, publication date, publisher ID, wholesale cost, and retail price. The table also stores a category name for each book (for example, Fitness, Children, Cooking) to track customers' purchasing patterns, as mentioned. Currently, the category's actual name is entered in the database. The Discount field indicates the current price reduction offered. Therefore, a book's current price is the retail amount less the discount amount, if applicable. AUTHOR and BOOKAUTHOR tables: As shown in below figure, the AUTHOR table maintains a list of authors' names. Because a many-to-many relationship originally existed between the book's entity and the authors entity, the BOOKAUTHOR table was created as a bridging table between these two entities. The

BOOKAUTHOR table stores each book's ISBN and author ID. If you need to know who wrote a particular book, you have the DBMS look up the book's ISBN in the BOOKS table, then look up each entry of the ISBN in the BOOKAUTHOR table, and finally trace the author's name back to the AUTHORS table through the AuthorID field.

ORDERS and ORDERITEMS tables: Data about a customer's order is divided into two tables: ORDERS and ORDERITEMS. The ORDERS table identifies which customer placed each order, the date the order was placed, the date it was shipped, and the shipping cost charged. Because the shipping address might be different from a customer's billing address, the shipping address is also stored in the ORDERS table. If a customer's order includes two or more books, the ORDERS table could contain a repeating group. Therefore, the items purchased for each order are stored separately in the ORDERITEMS table. The ORDERITEMS table records the order number, the ISBN of the book being purchased, and the quantity for each book. To uniquely identify each item in an order when multiple items are purchased, the table includes an Item# field that corresponds to the item's position in the sequence of products ordered. For example, if a customer places an order for three different books, the first book listed in the order is assigned Item# 1, the second book listed is Item# 2, and so on. A variation of this table could use the combination of the Order# and the book's ISBN to identify each product for an order. However, the concept of item# or line# is widely used in the industry to identify line items on an invoice or in a transaction, so it has been included in this table to familiarize you with the concept. The Paideach field in the ORDERITEMS table records the price the customer actually paid per copy for a specific book. This price is recorded because the Retail field in the BOOKS table is modified as book prices change, and the current database doesn't maintain a historical book price list. PUBLISHER table: The PUBLISHER table contains the publisher's ID code, name,contact person, and telephone number. The PUBLISHER table can be joined to the BOOKS table through the PubID field, which is the common field. This linked data from the PUBLISHER and BOOKS table enables you to determine which publisher to contact when you need to reorder books by identifying which books you obtained from each publisher. PROMOTION table:

The last table in below is the PROMOTION table.

JustLee Books has an annual promotion that includes a gift with each book purchased. The gift is based on the book's retail price. Customers ordering books that cost less than $12 receive a certain gift, and customers buying books costing between $12.01 and $25 receive a different gift. The PROMOTION table identifies the gift and the minimum and maximum retail values of the range. There's no exact value that matches the Retail field in the BOOKS table; therefore, to determine the correct gift, you need to determine whether a retail price falls within a particular range. An actual online bookseller's database would contain thousands of customers and books and, naturally, be more complex than the database shown in this textbook. For example, this database doesn't track data such as the quantity on hand for each book, discounted prices, and sales tax. Furthermore, to simplify the display of data on the screen and in reports, each table contains only a few records.

CUSTOMERS Table

Name	Null	Type
CUSTOMER#		NUMBER(4)
LASTNAME	NOT NULL	VARCHAR2(10)
FIRSTNAME	NOT NULL	VARCHAR2(10)
ADDRESS		VARCHAR2(20)
CITY		VARCHAR2(12)
STATE		VARCHAR2(2)
ZIP		VARCHAR2(5)
REFERRED		NUMBER(4)
REGION		CHAR(2)
EMAIL		VARCHAR2(30)

BOOKS Table

Name	Null	Type
ISBN	NOT NULL	VARCHAR2(10)
TITLE		VARCHAR2(30)
PUBDATE		DATE
PUBID		NUMBER(2)
COST		NUMBER(5,2)
RETAIL		NUMBER(5,2)
DISCOUNT		NUMBER(4,2)
CATEGORY		VARCHAR2(12)

ORDERS Table

Name	Null	Type
ORDER#	NOT NULL	NUMBER(4)
CUSTOMER#		NUMBER(4)
ORDERDATE	NOT NULL	DATE
SHIPDATE		DATE
SHIPSTREET		VARCHAR2(18)
SHIPCITY		VARCHAR2(15)
SHIPSTATE		VARCHAR2(2)
SHIPZIP		VARCHAR2(5)
SHIPCOST		NUMBER(4,2)

ORDERITEMS Table

Name	Null	Type
ORDER#		NUMBER(4)
ITEM#		NUMBER(2)
ISBN		VARCHAR2(10)
QUANTITY	NOT NULL	NUMBER(3)
PAIDEACH	NOT NULL	NUMBER(5,2)

AUTHOR Table

Name	Null	Type
AUTHORID	NOT NULL	VARCHAR2(4)
LNAME		VARCHAR2(10)
FNAME		VARCHAR2(10)

BOOKAUTHOR Table

Name	Null	Type
ISBN	NOT NULL	VARCHAR2(10)
AUTHORID	NOT NULL	VARCHAR2(4)

PUBLISHER Table

Name	Null	Type
PUBID	NOT NULL	NUMBER(2)
NAME		VARCHAR2(23)
CONTACT		VARCHAR2(15)
PHONE		VARCHAR2(12)

PROMOTION Table

Name	Null	Type
GIFT		VARCHAR2(15)
MINRETAIL		NUMBER(5,2)
MAXRETAIL		NUMBER(5,2)

Basic Assumptions

Three assumptions were made when designing the JustLee Books database:

• An order isn't shipped until all items for the order are available. (In other words, there are no back orders or partial order shipments.)

• All addresses are in the United States; otherwise, the structure of the Address/ Zip Code fields would need to be altered because many countries use different address information, such as province names.

• Only orders placed in the current month or orders placed in previous months that didn't ship are stored in the ORDERS table. At the end of each month, all completed orders are transferred to an annual SALES table. This transfer allows faster processing of data in the ORDERS table; when necessary, users can still access information pertaining to previous orders through the annual SALES table.

In addition to recording data, management wants to be able to track the type of books that customers purchase. Although databases were originally developed to record an organization's data transactions, many have realized the importance of having data to support other business functions. Data collected for a database can be used for other purposes. For example, organizations that deal with thousands or millions of sales transactions each month usually store copies of transactions in a separate database for various types of research. Analyzing historical sales data and other information stored in an organization's database is generally referred to as data mining. For this reason, the bookseller's database also includes data the Marketing Department can use to determine which categories of books customers purchase most often. By knowing buyers' purchasing habits, JustLee Books can promote new items in inventory to customers who purchase that type of book frequently. For example, if a customer has placed several orders for children's books, he or she might purchase similar books in the future. The Marketing Department can then target promotions for other children's books to that customer, knowing there's an increased likelihood of a purchase.