**管理员视图的ER模型如下：**

**0..1** 

**1..\*** 

**Has→**

**In→**

**1..\***

**←Write**

**Author**

**Author\_id**

**1..\*** 

**1..1** 

**←Has**

**Belongto→**

**←Ship**

**1..1**

**0..\***

**Customer**

**Customer\_id**

**Contain→**

**Order**

**Order\_number**

**Publish→**

**Publisher**

**Publish\_id**

**1..\***

**1..\***

**1..\***

**1..\***

**0..1**

**1..\***

**0..\***

# LineItem

**Book**

**ISBN**

**Shipment**

**Tracking\_number**

**Promotion**

**Promotion\_id**

**Category**

**Category\_id**

**1..\***

**1..1**

**←Promote**

**0..\***

**1..1**

**（1）标识实体及有关的属性、属性域和主键如下**：

**Book Entity (Strong)**

**- Title (single valued, simple string)**

**- ISBN (single valued, simple alphanumeric string), pk**

**- Edition (single valued, simple numeric)**

**- Date of Publication (single valued, composite concatenation of**

**characters and numbers)**

**- Price (single valued, simple floating point number)**

**- Book Description (single valued, simple string)**

**Author Entity (Strong)**

**- Author Name**

**- Author\_id, pk**

**Publisher Entity (Strong)**

**- Publisher id (single value, simple numeric), pk**

**- Publisher Name (single valued, simple string)**

**- Address (single valued, simple string)**

**- together the publisher name and address could make an alternate key because no to publishers can have the same name and address**

**Customer Entity (strong)**

**- Customer\_id (single valued, simple string), pk**

**- Name (multivalued, one value for first, middle and last name,**

**simple string)**

**- Mailing Address (single valued, simple string)**

**- Credit Card Number and Expiration Date (single value, simple**

**numeric sequence), alternate key**

**- Phone Number (single value, simple alphanumeric string)**

**- Email Address (single valued, simple alphanumeric string)**

**Shipment (strong)**

**- Date of Shipment ( single valued, composite of strings and**

**numbers)**

**- Tracking Number (single valued, simple alphanumeric string), pk**

**- Date of Expected Delivery ( single valued, compoite of strings**

**and numbers)**

**Order (Strong)**

**- Order Number (single valued, simple number), pk**

**- Mailing Address (single value, simple string)**

**- Method of Shipment (single value, simple string)**

**- Date and Time of Order (when the order was placed)**

**- Total Price of the Order (multivalue, composite)**

**Promotion (strong entity type )**

**- Promotion id number, pk**

**- Percentage Discount Points (single value, simple float)**

**- Duration of Promotion (start date and end date) (multivalued,**

**composite attributes like the dates above)**

**Line Item (weak entity type)**

**- Total price for each book that is ordered (single value, two place precision float)**

**- Quantity of each item ordered**

**Category (strong entity)**

**- Category ID (single value, simple numeric), pk**

**- Category Name (single value, simple string)**

**（2）标识关系及其参与实体的作用、基数和多样性如下：**

**- Book\_Author(Author *Write* Book)**

**Roles: Book fulfills book role and author fulfills author role**

**Cardinality: M:N, many books have many authors**

**Participation: Book and Author are both total**

**- Book\_category(Book *BelongTo* Category)**

**Roles: book fulfills the book role and category fulfills the category role**

**Cardinality: M:N, one book can belong to many categories,one category can contain many books**

**Participation: book is total, it must belong to some category,**

**category is partial, a category can exist without**

**any books in it.**

**- Publisher\_Book (Publisher *Publish* Book)**

**Roles: Book fulfills book or product role, Publisher fulfills**

**publisher or producer role**

**Cardinality: 1:N, 1 publisher publishes many books**

**Participation: Publisher and book are total**

**- Customer\_Order (Customer *Has* Order)**

**Roles: Customer fulfills buyer role and order fulfills**

**bought product role**

**Cardinality: 1:N, 1 customer can have many orders**

**Participation: Customer is partial and order is total**

**- Book\_Promotion (Promotion *Promote* Book)**

**Roles: Book fulfills book or product role, Promotion**

**fulfills sale role**

**Cardinality: M:N, many books can have many promotions, that is**

**books can be part of more than 1 sale and each**

**sale can have many books**

**Participation: Book is partial and promotion is total**

**- LineItem\_Order (Order *Contain* LineItem)**

**- Roles : line item fulfills the line item (one item per line in an order)**

**and the order fulfills the order role.**

**- Cardinality: 1:N, one order contains many line items**

**- Participation: Both line item and order are total**

**- LineItem\_Book (Book *In* LineItem)**

**- Roles: Book fulfills the book role, line item fulfills the line item role**

**- Cardinality: 1:N, one book can be in many line items**

**- Participation: line item is total and book is partial**

**- Shipment\_LineItem**

**- Roles: Partial order fulfills the partial order role and**

**line item fulfills the line item role.**

**- Cardinality: 1:N, one partial order can have many line items**

**- Participation: partial order is total and line item is partial**

**- Isa\_Category (Category *Has* Category)**

**Roles: Category fulfills the subclass role and Supercategory**

**fulfills the superclass role.**

**Cardinality: n:1, a super category can have many subcategories**

**Participation: Supercategory is total, there must be a supercatory for**

**each subcategory, but supcategory is partial, not every supercategory must have a subcategory to exist.**

## 

## the database application lifecycle

## ----------------------------------------------------------------------ER模型

**从附录中的电子商务**[**项目描述**](javascript:ContentByName('pg-ecommerce');)中为您的电子商务数据库创建完整的 ER 架构**。请注意，该规范是从用户的角度出发的，因此不会告诉您所有键（主键和备用键），所有关系以及关系的 arity 等。您应该识别它们。**

**做出合理的假设以完成规范。明确陈述您的所有假设。ER 架构中的每个构造都应通过上述规范或显式假设进行证实。**

**Make sure you identify all of the following:**

* **The entity types (identify weak entities).**
* **The attributes in each entity type (identify it as single-valued/multi-valued, derived, simple/composite, etc). Leave the attributes out of the diagram. Instead, list each entity in a textual form, and beneath each one, list its attributes.**
* **The relationship types (identify the roles, the cardinality constraints, and participation constraints).**

**Use the ER diagramming notations to draw your schema. Turn in your ER schema in a file named *ER.gif*, and the attribute list in a text file named *ER.txt***

## Appendix C. E-Commerce Project Description

* [**Data**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/#data)
  + [**Book Title**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/#booktitle)
  + [**Publisher**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/#publisher)
  + [**Customer**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/#customer)
  + [**Order**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/#order)
  + [**Fulfilled Order**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/#fulfilledorder)
  + [**Promotion**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/#promotion)
* [**Tasks**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/#tasks)
  + [**Accessing Books**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/#access)
  + [**Querying**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/#query)
  + [**Browsing**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/#browse)
  + [**Purchasing**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/#purchase)
  + [**Checking Order Status**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/#checkorder)

**In this course, you will design and implement the following project. Exercises in this course will ask you to build various components of the project. Towards the end of the course, all the pieces have to be combined to complete the project.**

### Data

**The system should capture information about books and customers and customer orders.**

#### Book Title

**The system will contain the following information about each book title:**

* **Author**
* **Title**
* **ISBN**
* **Publisher**
* **Edition**
* **Date of Publication**
* **Price**
* **Book Description**
* **Categories (the various categories to which the book belongs)**

**The book category is essentially a hierarchy: a category can have subcategories, each of which can have further subcategories. A category can have a number of books listed under it.**

#### Publisher

**The following information about the publisher should also be captured:**

* **Publisher Name**
* **Address**

#### Customer

**For each customer, the system should record the following information:**

* **Name (first name, middle initial, and last name)**
* **Mailing Address**
* **Credit Card Number and Expiration Date**
* **Phone Number (optional)**
* **Email Address**

#### Order

**For each order, the system should capture the following information:**

* **Order Number**
* **Customer**
* **Mailing Address**
* **Credit Card (to pay for the order)**
* **Method of Shipment (next day delivery, regular post)**
* **Shipping Date (date the order will be shipped)**
* **Date and Time of Order (when the order was placed)**
* **Price of the Order—which includes:** 
  + **ISBN and Price of each Book Title (list price and purchase price after discount)**
  + **Quantity Purchased (for each book title bought)**
  + **Shipping Cost**
  + **Tax**

#### Fulfilled Order

**When a title is not in stock, an order can be shipped in multiple shipments. Assume that a title is shipped for an order only when there are enough book copies of that title in stock. Assume that a shipment cannot combine books from different orders. For each shipment, the system should keep track of the following information.**

* **Order Number**
* **Date of Shipment**
* **Tracking Number (this could be the number assigned by the delivery agency)**
* **Date of Expected Delivery**
* **Titles Shipped and their Quantity**

#### Promotion

**Periodically, the e-store will run promotions on a list of books. The promotions will consist of the following data:**

* **Books being Promoted**
* **Percentage Discount Points**
* **Duration of Promotion (start date and end date)**

### Tasks

**In the description of tasks below, there are hyperlinks to screen snapshots of a sample implementation of the E-Commerce system.**

#### Accessing Books

**Books can be accessed by doing one of the following:**

* **Querying for the attributes of a book (For example, a user may want to find the books written by the author "John Doe" where the title contains the substring "database fundamentals". The system you build should support this functionality.)**
* **Browsing through the book categories**
* **Looking at the list of the top 10 books sold for the last month**

**To browse or query the books, users do not have to enter any user information. User information is only collected when the user is ready to buy.**

**Whenever a book is displayed, a checkbox or some such item will also be displayed next to the book to add the book to the customer's shopping cart.**

#### Querying

**The typical querying process is as follows:**

1. [**The user queries the system**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/01-query.gif) **(for the author's name or the book's title, or some other book attribute).**
2. [**The system displays the results**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/02-query-result.gif) **10 (books) to a page. Only the title, author, publisher, and price are shown.**
3. **For results exceeding 10 books, links at the bottom of the page should display a "Next" and "Previous" button to go to the next or previous 10 books, respectively.**
4. **When the user clicks on a particular book name,** [**all information about the book**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/03-book-details.gif) **is displayed.**

#### Browsing

**The typical process for browsing is as follows:**

* **At the beginning, there is a drop-down list box of top-level categories. The user chooses one of these categories.**
* **The system displays the first 10 books in this category (with a next/previous button to display more books), and all the subcategories within this category. For each book that is displayed, only the title, author, publisher, and price are shown.**
* **The user can traverse through the books or the categories.**
* **When the user clicks on a particular book name, all information about the book is displayed.**

#### Purchasing

**The typical process for purchasing is as follows:**

* **The user can click on a checkbox next to a book to add that book to a shopping cart.**
* **The user continues his or her selection of books by adding more books to the** [**shopping cart**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/04-view-cart.gif)**.**
* **Finally, the user orders books from his or her shopping cart (user can also delete books from the shopping cart) by** [**logging-in**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/05-checkout-login.gif) **(if** [**not already registered**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/06-checkout-login-failed.gif)**, then** [**registering**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/07-new-member-registration-details.gif)**). The system should provide a** [**registration-success message**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/08-registration-success.gif) **on successfully registering the user.**
* **The user should** [**provide all the shipping information**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/09-enter-shipping-info.gif) **(such as name, mailing address, etc).**
* **The user should also** [**provide credit-card information**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/10-credit-card-info.gif)**.**
* **The final step in the ordering process is** [**confirmation of order details**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/11-confirm-order.gif) **by the user.**
* **The system should respond with the** [**order-success message**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/12-ordered-success.gif) **at the end.**

#### Checking Order Status

**The typical process for checking one's order status is as follows:**

* **The user can type in his or her login ID and password.**
* **After the user logs in, the system will** [**provide an option to view the orders placed so far**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/13-member-accounts.gif)**.**
* **When the user chooses the option to view past orders,** [**all the details of all past orders should be listed.**](http://www.icarnegie.com/content/SSD/SSD7/1.5.1/normal/pg-ecommerce/14-past-orders.gif)