



## **Unit 2: Unit 2: Conceptual Design: Data Modeling and the Entity Relationship Model - Discussion 1**

Scroll down and click "Respond" to post your reply to the Discussion questions. Please review the Discussion Board Participation grading rubric on your course syllabus.

The Discussion Board Participation grading rubric contains important information that will ensure that you earn maximum points. Your postings should be qualitative and provide substantive depth that advances the discussion.

Title for Discussion Thread: Exploring ERDs

### **Website Search**

Identify a web site used for ordering a product or service and then identify and describe a set of entities that expand functionality beyond the ordering process. As an example when you go to Amazon.com and review products what are the various entities involved in this process.

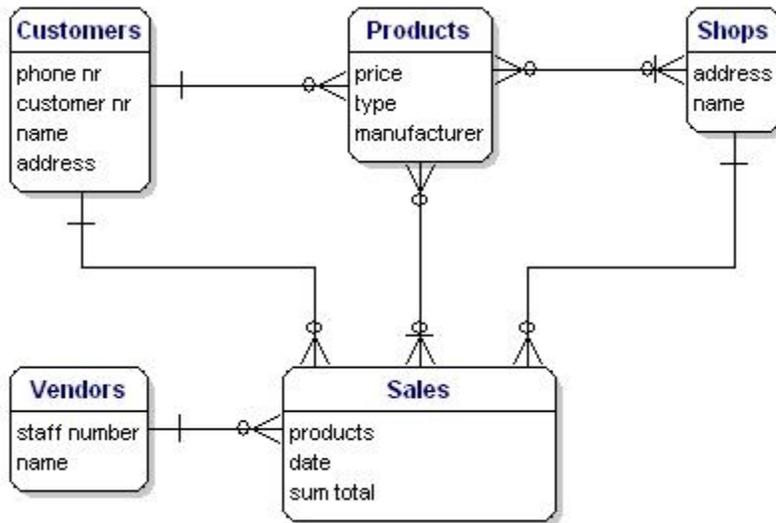
Newegg      Edward Jackson 

5/17/2014 3:08:55 PM

The website that I have selected for discussion is Newegg, as in newegg.com. Newegg is like many other online marketplaces because it sells a myriad of products. Where Newegg excels is in customer service and user experience. The company really goes the extra mile for their customers. In review of the discussion board question, there are numerous entities at Newegg. First, the products are broken down into categories. These categories include computer hardware, PCs& laptops, electronics, cameras, software, gaming, cell phones, home & outdoors, automotive, outlet, and marketplace; each of these entities are a one to many association—a person can click a category, which then the category leads to a list of other related sales products (Newegg, 2014). Additional entities can be found in the form of site features, these would include the customer themselves (once registered), the shopping cart, and shopping tools. Once the product has been selected, let's say a laptop, there are attributes which can be selected for filtering or upgrading the product such as price, screen size, HDD capacity, resolution, memory, and CPU speed.

A good example of entities and relationships can be seen below.

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<http://www.datanamic.com/supimg/dez005-examplefirstrelationships.jpg>

The crow's foot notation is explained by this:

Symbol	Meaning
	One—Mandatory
	Many—Mandatory
	One—Optional
	Many—Optional



<http://web.presby.edu/~wasmith/newcourses/333/notes/images/Fig5-8.JPG>

#### Reference

Coronel, C., Rob, P., & Morris, S. (2012). Database systems: design, implementation, and management (10e. ed.). Boston, MA: Cengage Learning

Newegg. (2014). Newegg. Retrieved from <http://www.newegg.com>

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## **Unit 2: Unit 2: Conceptual Design: Data Modeling and the Entity Relationship Model - Discussion 2**

### **“Real World” ERDs**

Option 1. Entity-relationship and Data models are said to model the "real world." Respond to this statement and provide examples in support or opposition of this statement.

Option 2. Please identify and describe a system that you use regularly. Please describe how the system is used and your use of the system. Then describe the data available within the system, list and define entities you are familiar with and then provide example data within the system.

LANDesk Edward Jackson 

5/17/2014 4:07:14 PM

My real world system I have selected to elaborate on is LANDesk. I mentioned this last unit, but now have the opportunity to explain why LANDesk models the real world. If you missed my last discussion post, LANDesk is basically an enterprise management information system. The LANDesk management suite of software allows you to manage inventory and deploy application fixes, updates, and patches. Additionally, it can deploy custom-built automated application packages. And when it comes to modeling the real world, the management suite is a perfect example of data modeling done right. But first, let's discuss reality, and how daily operations would work "without" LANDesk.

In the technical days of old, and end-user would require an application updated in their department...or perhaps the whole company needed an application updated. Usually a few meetings would be help (sometimes many meetings), where an update strategy would have to formulated. Field technicians, armed with the install files on the network, or CDs, would be sent to each user's computer, they would follow some setup documentation, and complete the installation—this would be one machine at a time. During the setup, or afterwards, a spreadsheet would be updated to chart the progress of the installs. Well, well...then desktop management

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software came along.

LANDesk would take the place on manual installations, by first having an engineer use the application setup documentation to build a package. That package would then be added to LANDesk. Now, when an application needs to be updated, LANDesk can be accessed, the list of machines can be selected, and then a deployment schedule set (100,000+ machines with ease). Now, let's look at the direct correlation of reality with data modeling.

<b>Reality</b>	<b>Data Modeling</b>
The application to be installed by tech	Becomes a "Package" in LANDesk
Each computer to receive the package	"Computer" located in inventory in LANDesk
Spreadsheet to chart progress	Database with "Status Updates"
Meetings for strategy and scheduling	Sets "Scheduling" in LANDesk

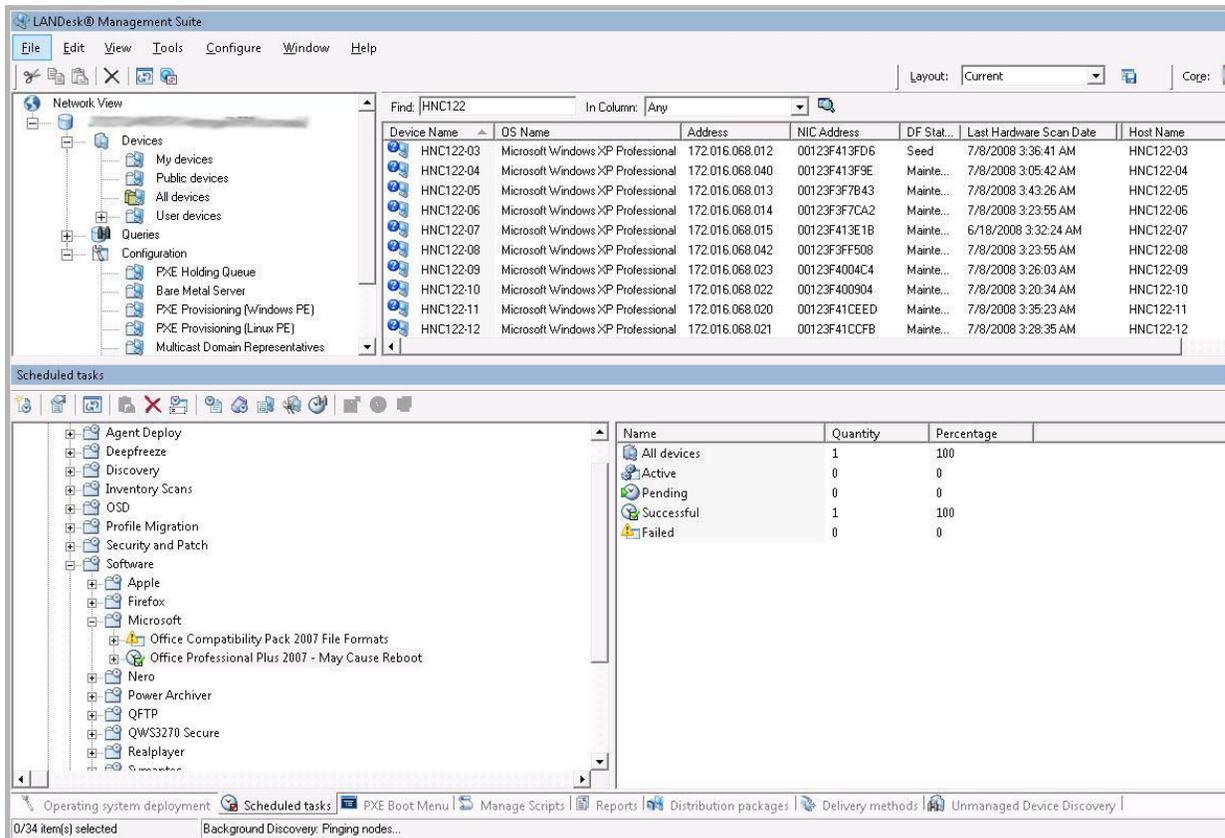
As you can see, reality and the data modeling used in LANDesk match up perfectly. Of course, this is only a simple example. LANDesk actually houses much more information, and its features and functions far surpass manual processes. For example, at any given moment, a real-time report can be ran to output (from a database) specific information concerning hardware, software, settings, and machine statuses. Because a SQL database lies at the core of LANDesk, filters and queries can be created to return information that would nearly be impossible to retrieve otherwise.

#### References

LANDesk. (2014). LANDesk Management Software. Retrieved from <http://www.landesk.com/>

LANDesk Interface

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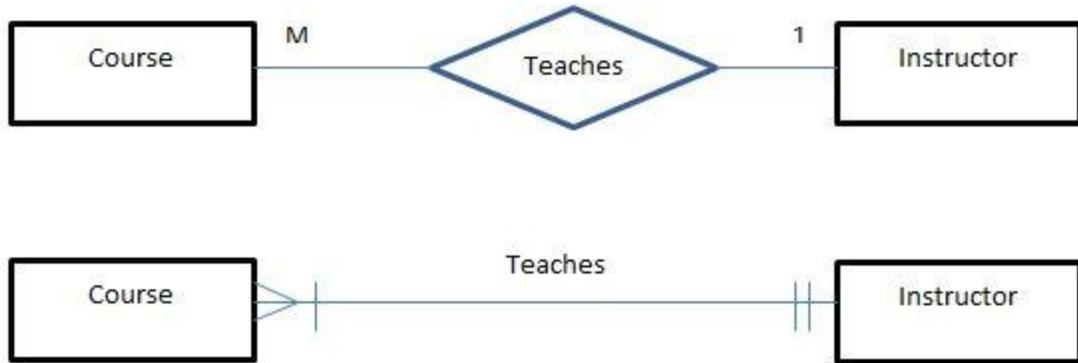


<https://danpixley.files.wordpress.com/2008/07/landesk2.jpg>

## ERD

In ER diagrams when the relationship is denoted the arrows are not used. Some instructors use this arrow when they want to decide the cardinalities but that is just to get the cardinality (1:1, 1:M and N:M)

I have attached the ER diagram for this in Chen notation and also using Crow Notation you can use either of them.

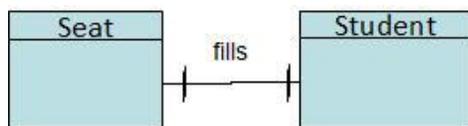
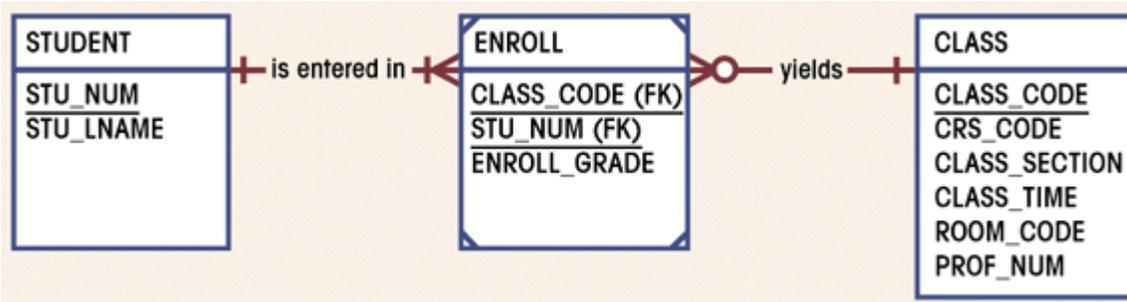


Deciding the cardinality for a relationship is a practical scenario there is no hard and pass rule to obtain it. What you need to do is start from one side of the relationship and take one tuple (instance) and see how many tuples from the other entity participate for the relationship. Then do the vice versa. Then you know the participation number of tuples) from each entity to the relationship. Think about set theory and functions in mathematics when you decide the cardinality (i.e. Set of instructors, Set of Courses and set of Teaches relationship type) then this is so easy but if you are not from a mathematic background just think of practical scenario.

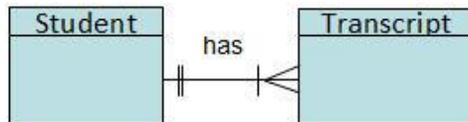
**For Examples**

- a) For 1 instructor he or she can teach Many (M) courses
- b) For 1 Course there is only 1 instructor

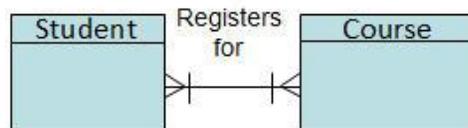
so in instructor side there is always 1 in a) and b) but in Courses there is M and 1 in a) and b) there for Instructor: Course cardinality is 1:M



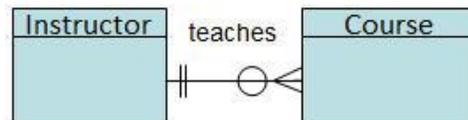
Left to right: a seat is filled by exactly one student  
Right to left: a student fills exactly one seat



Left to right: a student has one or more transcripts  
Right to left: a transcript has one student



Left to right: a student registers for one or more courses  
Right to left: a course is registered by one or more students



Left to right: an instructor teaches zero to many courses  
Right to left: a course is taught by exactly one instructor

## Conceptual Design: Data Modeling and the Entity Relationship Model

Unit 2 reviews the data modeling and the conceptual design of a database covering the basic terminology used for the development of Entity Relationship Diagrams (ERDs). Top down database design, bottom up database design, and view integration techniques to ER Modeling will be reviewed.

### Outcomes

After completing this unit, you should be able to:



- Define relational database basics.
- Define the terms entity and relationship.
- Identify business rules for a database as part of conceptual design.
- Identify connectivity and participation as part of conceptual design.
- Review Entity Relationship Diagrams (ERD) and ER notations.
- Develop an Entity Relationship Diagram.
- Compare and contrast Bottom up Database Design and Top down Database Design.

### **Course outcome(s) practiced in this unit:**

**IT525-2:** Use data modeling concepts.

**IT525-3:** Use entity-relation diagrams in the design of a database.

### **What do you have to do in this unit?**

- Complete the assigned Reading.
- Participate in the Seminar or complete the Alternative Assignment.
- Participate in the Discussion Board.
- Complete the unit Assignment.

### **Additional Resources**

Two approaches for designing databases: the top-down database method and the bottom-up database method. The top-down method starts with defining the entity types and then determines the business rules and ends with identifying all the attributes and keys while the bottom up approach starts with the attributes and ends with an ERD.

#### **Top down Database Design**

1. **Find the entity types.**
2. **List directly-related entity type pairs.**
3. **Write the business rules to determine connectivity.**
4. **Draw the ERD.**
5. **Designate primary keys (PKs) and foreign keys (FKs).**
6. **Identify other needed attributes.**



## 7. Review ERD participation and constraints and update the ERD.

### Bottom up Database Design

To design a database that will support a “form,” “user view,” or “report.”

1. Find all the attributes on the form.
2. Establish the dependencies (determinants).
3. Group attributes that have a common determinant into an entity type; name it.
4. Find directly-related entity type pairs.
5. Determine connectivity for each pair.
6. Draw the ERD.
7. Review ERD participation and constraints and update the ERD.

[IT525 SeminarSlides-Class2.pptx](#)

## Reading

Chapter 2 introduces the basic concepts and definitions of data modeling techniques used to design databases. Chapter 3 reviews the conceptual design components as database design. Chapter 4 reviews Entity Relationship (ER) modeling. Topics covered include entities, attributes, business rules, top down database design, bottom up database design, relationships, entity relationship diagrams, and the notations used as part of the conceptual design process.

## Web Reading

Using your favorite search engine, please research the following topics:

- Entity Relationship Diagrams
  - Chen Notation
  - Crow’s Feet Notation
  - Data Modeling Concepts
  - ERD with Mike Chapple
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- **Entity Relationship Diagram:** A logical representation of the data for an organization or for a business area.



- **Chen Notation:** A data model created by P. Chen by 1975. A data model that describes (1:1, 1:M, and M:N) between entities at the conceptual model.
- **Crow's Foot Notation:** A representation of the entity relationship diagram that uses a three-pronged symbol to represent the "many" sides of the relationship.
- **Business Rule:** A description of a policy, procedure, or principle within an organization.
- **Entity:** A person, place, object, event, or concept in the user environment about which the organization wishes to maintain data.
- **Entity Set (Entity Type):** A collection of entities that share common properties or characteristics.
- **Attribute:** A property or characteristic of an entity type that is of interest to the organization.
- **Relationship:** A meaningful association between (or among) entity types.
- **Connectivity:** The classification of the relationship between entities. Classifications include 1:1, 1:M, and M:N.
- **Cardinality Constraint:** Specifies the number of instances of one entity that can (or must) be associated with each instance of another entity.
- **Participation Constraint:** Specifies either required or optional.
- **Associative Entity:** An entity designed to transform an M:N relationship into two 1:M relationships. The composite entity's primary key comprises at least the primary keys of the entities that it connects.
- **Weak Entity:** An entity that displays existence dependence and inherits the primary key from its parent entity.
- **Many-to-Many:** Associations among two or more entities in which one occurrence of an entity is associated with many occurrences of a related entity and one occurrence of the related entity is associated with many occurrences of the first entity.
- **One-to-One:** Associations among two or more entities that are used by data models. In a 1:1 relationship, one entity instance is associated with only one instance of the related entity.
- **One-to-Many:** Associations among two or more entities that are used by data models. In a 1:M relationship, one entity instance is associated with many instances of the related entity.

Attending live Seminars is important to your academic success, and attendance is highly recommended. The Seminar allows you to review the important concepts presented in



each unit, discuss work issues in your lives that pertain to these concepts, ask your instructor questions, and allow you to come together in real time with your fellow classmates. There will be a graded Seminar in Units 1 through 5 in this course. You must either attend the live Seminar or you must complete the Seminar alternative assignment in order to earn points for this part of the class.

### ***Option 1***

#### **Topics reviewed in the Seminar will include:**

1. Define relational database basics.
2. Define the terms entity and relationship.
3. Identify business rules for a database as part of conceptual design.
4. Identify connectivity and participation as part of conceptual design.
5. Review Entity Relationship Diagrams (ERD) and ER notations.
6. Develop an Entity Relationship Diagram.
7. Review the top down and bottom up database design methodologies.

### ***Option 2- Alternative Assignment:***

You will benefit most from attending the graded Seminar as an active participant. However, if you are unable to attend you have the opportunity to make up the points by completing the alternative assignment.

Please review the Seminar. Provide a 200 word summary of the Seminar. Follow APA format. Include at least two references and two citations.

#### **Format:**

- One inch margins (top, bottom, sides), Times New Roman or Arial 12 point font.
- Double spaced.
- Running header with title, name, and page numbers.
- References and citations follow APA Format. Do not use more than 5 words directly from a source without quotation marks to avoid plagiarism.

#### **Rubric:**

1. Two hundred words. 5 points.
2. Compliance with APA format. At least two reference and citations. 5 points



3. Writing ability (Grammar, Spelling, Flow). 5 points
4. Mastery of database design concepts. 10 points

Your paper should be in APA format and cite all references used. Submit to the Seminar Dropbox.

## Project 2

### Outcomes addressed in this activity:

#### Course Outcomes:

**IT525-2:** Use data modeling concepts.

**IT525-3:** Use entity-relation diagrams in the design of a database.

#### Project Instructions:

#### Question 1. Definitions

Define each of the following terms (1 pt. each). In addition, ***provide an example*** of each term (2 pts. each).

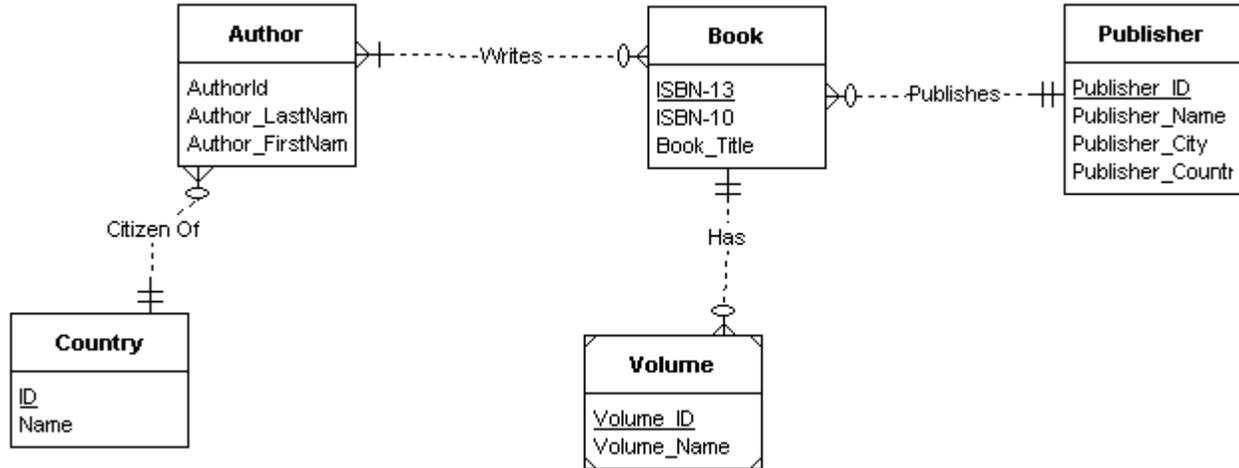
- a. Business Rule
- b. Entity
- c. Entity Set (Entity Type)
- d. Entity Instance
- e. Attribute
- f. Relationship
- g. Connectivity
- h. Cardinality Constraint
- i. Participation Constraint.
- j. Associative Entity

#### Question 2 Business Rules

Please use this four-row format when writing your connectivity-determining business rules.



**Figure 1. Publisher Database**



**Explanation of each row in the 4-row format:**

- (1) Write the entity pair. Underline and/or bold.
- (2) Give one business rule. Indicate the multiplicity of that rule in parentheses.
- (3) Give the other business rule. Indicate the multiplicity of that rule in parentheses.
- (4) Give the connectivity. (If the connectivity is M:N, give the associative entity name.)

Following is an example of the required four-row format for business rules for a binary relationship for this Assignment.

**Publisher – Book**

ONE Publisher may publish MANY Books [M]

ONE Book has ONE Publisher [1]

Publisher 1:M Book.

Complete the same 4-row format for the remaining relationships in the ERD illustrated in Figure 1.

The Unit 2 Enrichment Seminar will have more information about writing these rules and for determining, in a one-to-many relationship, which is the "1" entity type and which is the "M" entity type.



Be sure the connectivity row for each 1:M relationship has the correct direction. The rule with the multiplicity "many" will determine the direction. For example, if the rule is: "ONE Publisher may publish MANY Books", then Publisher is the "1" table and Book is the "M" table, so you would write the connectivity as: Publisher 1:M Books.

Use the four-row format to write the business rules and connectivity for the three binary relationships other than Publisher – Book.

### Question 3 Primary Key / Foreign Key Placement

The primary key of a table is often named after the table. Example: **ISBN-13** would be chosen as the name of the primary key for the Book table.

For each entity set in the table below, give the primary key attribute(s) and the foreign key attribute(s) (if any).

Entity Set	Primary Key Attribute(s)	Foreign Key Attribute(s)
Publisher		
Volume		
Book		
Book-Author		
Author		
Country		

(Hint 1 – There may not be a foreign key attribute if the entity is not on the “M” side of a relationship)

**(Hint 2 – Some foreign key attributes and the associative entity set in the table are not shown in Figure 1.)**

### Question 4 Entity Relationship Diagram

Part A. Update the ERD from Question 2 to account for the M:N relationship between Book and Author.

Part B. The report below shows the fields to identify the review of books by customers. Follow either the Top Down Database Design or the Bottom Up Database Design approach to extend the ERD from Question 2. Provide the new ERD. Include a 4–6 sentence paragraph describing how you chose the approach you used to extend the ERD and the process followed.



**Customer ID:**  
**Customer Name:**

Review Date	Book ISBN	Book Title	Rating of Book	Customer Review
1/12/2013	...	...	...	...
1/15/2013	...	...	...	...

**Review the grading rubric below before beginning this activity.**

**100 point project grading rubric**

<b>Project Requirements/criterion</b>	<b>Points Possible</b>	<b>Points earned by student</b>
1. Document demonstrates that the student was able to provide the proper definitions with examples.	0-30	
2. Document demonstrates that the student was able to provide the proper Business Rules.	0-20	
3. Document demonstrates that the student was able to indicate the proper Primary Key/Foreign Key.	0-10	
4. Part A. ERD updated to account for the M:N relationship between Book and Author.	0-15	
4, Part b. Document demonstrates that the student was able to create an ERD using a database design approach and explain the approach followed.	0-25	
<b>Total (Sum of all points)</b>		
<b>Points deducted for spelling, grammar, and/or APA errors.</b>		
<b>Adjusted total points</b>		