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<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
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<td>15</td>
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<td><strong>Chap. 6</strong></td>
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<td><strong>DB Design</strong></td>
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<td><strong>Chap. 7</strong></td>
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<td><strong>SQL/DB Construction</strong></td>
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I. GETTING STARTED

II. DATABASE DESIGN & IMPLEMENTATION

- Introduction (C-1)
  - Introduction to Structured Query Language (C-2)
  - Rel. Model and Normalization (C-3)
  - Database Design and Normalization (C-4)
  - Data Modeling with the ER Model (C-5)
  - Transforming Data Models into Database Designs (C-6)
  - SQL for Database Construction (C-7)

III. SELECTED TOPICS

- Managing Multiuser Databases (C-9)
- XML (C-13)
NOTES FOR CLASS SESSION ON PHYSICAL DATABASE DESIGN

STARTING POINTS

Questions to begin our deliberation

1. How are entity-relationship data models transformed into relational database designs?

Student Learning Outcomes (Desired Outcomes)

At the end of in-class and outside-class work on this topic, you should be able to:

1. Describe how to transform data models into database designs. [Comprehension]
2. Identify primary keys and describe when to use a surrogate key. [Comprehension]
3. Discuss the use of referential integrity constraints. [Comprehension]
4. Discuss the use of referential integrity actions. [Comprehension]
5. Represent ID-dependent, 1:1, 1:N, and N:M relationships in tables. [Application]
6. Represent weak entities in tables. [Application]
7. Represent supertype/subtypes as tables. [Application]
8. Represent recursive relationships as tables. [Application]
9. Represent ternary relationships in tables. [Application]
10. Implement referential integrity actions required by minimum cardinalities. [Synthesis]

QUESTIONS TO EXPLORE READINGS

Q 1. Why should database design be conducted before the database is implemented?
Q 2. How are primary keys and surrogate keys different?
Q 3. What is referential integrity and how is it enforced?
Q 4. What are referential integrity actions?

In-Class Exercise 6

Chapter: Transforming Data Models into Database Designs

Points to consider (Please take time review all the points before starting the exercise):
Exercise:

Use the data model that we created in the previous in-class assignment and create a database design by answering the following questions.

1. Specify the primary keys for each of the table.
2. Specify the properties for each column in each table (see Text Figure 6-6 for an example).

3. With the provided information, please create a database design for Georgia Pacific (see Text Figure 6-1 for guidance). You can draw in hand the ER-diagram for the database design. 

**Bonus Question:** The database design in (3) should include the specification of referential integrity actions for enforcing minimum cardinality (use Text Figure 6-27 for guidance and Figure 6-30 for an example).

Text Figure 6-27:

<table>
<thead>
<tr>
<th>Parent Required</th>
<th>Action on Parent</th>
<th>Action on Child</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insert</td>
<td>None</td>
<td>• Get a parent • Prohibit</td>
</tr>
<tr>
<td>Modify key or foreign key</td>
<td>• Change children’s foreign key values to match new value (cascade update) • Prohibit</td>
<td>• OK if new foreign key value matches existing parent</td>
</tr>
<tr>
<td>Delete</td>
<td>• Delete children (cascade delete) • Prohibit</td>
<td>None</td>
</tr>
</tbody>
</table>

(a) Actions When Parent Is Required
Take-Home Assignment 6

Chapter: Transforming Data Models into Database Designs

This assignment is a continuation of the previous take-home assignment. Please read the solution for the previous assignment before starting this one.

Use the data model that we created in the previous in-class assignment and create a database design by answering the following questions:

<table>
<thead>
<tr>
<th>Child Required</th>
<th>Action on Parent</th>
<th>Action on Child</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insert</td>
<td>• Get a child&lt;br&gt;• Prohibit</td>
<td>None</td>
</tr>
<tr>
<td>Modify key or foreign key</td>
<td>• Update the foreign key of (at least one) child&lt;br&gt;• Prohibit</td>
<td>• If not last child, OK&lt;br&gt;• If last child, prohibit or find a new replacement</td>
</tr>
<tr>
<td>Delete</td>
<td>None</td>
<td>• If not last child, OK&lt;br&gt;• If last child, prohibit or find a new replacement</td>
</tr>
</tbody>
</table>

(b) Actions When Child Is Required
4. Specify the primary keys for each of the table.
5. Specify the properties for each column in each table (see Text Figure 6-6 for an example).
6. With the provided information, please create a database design for the book store (see Text Figure 6-1 for guidance). You need to draw the E-R diagram for the database design using Visio 2007 or the ERWin tool. If you are using Visio please follow the instructions for using Visio (link provided on the course Schedule page) and note Step 14 of the instructions – When designing the physical model, instead of using “View” item in the left-hand panel, use “Entity”, which distinguishes the resulting diagram from the corresponding ER-diagram for the conceptual model.
**Bonus Question:** The database design in (3) should include the specification of referential integrity actions for enforcing minimum cardinality (use Text Figure 6-27 for guidance and Figure 6-30 for an example).

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**Study Guide Chapter 7 (SG-Ch7)**


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**Self-Test 7 (ST7)**

Available at the uLearn site for the course.