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**From page 264, Problems and Exercises, in your textbook, please answer the following:**

*1. According to author Fred Brooks, what is the single most difficult thing to do in systems development? How does use-case modeling help in this area?*

Frederick P. Brooks Jr. cited requirements, “deciding precisely what to build,” as the most difficult thing to accomplish in systems development. Use-Case Modeling identifies the use cases, actors, and relationships in a system and organizes them into subsystems, which modularize them into more manageable objects.

*4. During what part of the development life cycle are use cases first defined? When are they used during the development life cycle, and for what purpose?*

Before identifying use cases, the actors must first be identified in order to define how the system will be used. This way, the use cases may be mapped to specific actors and users of the system.

*8. In use-case modeling, once you identify the business actors, what perspective and language should you use in defining them? Use that perspective and language to construct an actor glossary using Figure 7-8 as an example.*

An actor should be identified with a name that defines their perspective of the system and use cases should be identified with the terminology the actor uses to describe their personal interactions with the system.

<b>Actor Glossary for Peer Reviewed Scientific Publishing</b>		
<b>Term</b>	<b>Synonym</b>	<b>Description</b>
1. Author	Scientist, Researcher	An individual who submits a paper to the journal for publication.
2. Journal Editor	Editor	An individual who gives a cursory evaluation of the paper, and determines its merit, what peer reviewers are qualified to evaluate it, and forwards it on to those individuals for further evaluation.
3. Peer Reviewer	Expert	An individual with established credentials in a specific academic field who reviews authors papers that are forwarded to them by editors.
4. Subscriber	Institution	Library that subscribes to the Journal, gathers data on popularity of the journal from reader usage to determine whether to continue subscription.
5. Reader	Audience	Individual who reads or references the

**From page 311, Review Questions, please answer the following:**

1. *What is the difference between logical and physical models?*

A physical model is geared more toward the Systems Design half of the development process. For example, modeling data in such a way that it can be converted into a database schema. The physical model describes what a system does, and how it will do it with some degree of specificity.

A logical model informs the physical model. It describes what the system does, but it does so independent of any solution.

**Note:** While logical and physical models are mentioned in Chapter 8, they are not actually defined until Chapter 9 on page 316 (same issue for questions 2 and 3).

2. *Why is it important to create an implementation-independent model of a system?*

Implementation-independent models think outside of the box. They are important because they are not constrained by any preconceptions of what the system can and cannot do. They expand the realm of possible technical solutions to a problem. They also communicate requirements in ways the System Owners and Users can understand, and allow defining what the system must do without burying the business requirements in technical details.

3. *Why is it necessary to create an implementation-dependent model of a system?*

An implementation-dependent model is required because at some point the system needs to actually be built according to the technical constraints available. At some point we must know exactly the data going into the system and the processes the system must emulate in explicit technical detail.

4. *What is an entity? What are entity instances?*

An entity is something about which the business needs to store data. These are general, such as books, CDs, software, users, etc. An instance of an entity is a single occurrence of an entity type, such as "To Kill a Mocking Bird," "Mozart's Greatest Hits," or MS Office.

5. *A relationship is a natural business association between entities. What is the relationship between student and teacher? Does it depend on how many classes a student can take, or how many classes a teacher can teach?*

Teacher entities teach, grade, and give assignments to student entities, who take classes, turn in assignments, and perform evaluations of teachers. If students can only take one class, then they will only have one teacher; however, students taking many classes will have many teachers. If a teacher is able to teach many classes, they and a particular student could have multiple teacher/student relationships between them, this could cause problems with normalization, and require creating a teacher-class entity to distinguish the relationships.

6. *What is cardinality? Give an example.*

Cardinality is the minimum and maximum number of occurrences one entity may have to another entity. For example, the entity "Legislative Branch" has 535 instances of "Representative," the entity "Senate" has 100 instances of "Senator," and the entity "Executive Branch" has only one instance of "President." Legislative Branch and Senate can both temporarily have less than their maximum instances if representatives or senators resign or die. Similarly, all three of these entities can have between 0 and their maximum instances of Democrats or Republicans.