## Multiple Choice:

1. A data model is a what?
2. The mathematical model of formulas and logic used in a system
3. The abstract creating of an ideal system transformation
4. The model that is produced by extreme programming
5. The expanded, thoroughly balanced and normalized use case for a system
6. A formal way of representing the data that are used and created by a business system

Ans: e

Response: Introduction

Difficulty: easy

1. A data model can do what?
2. Illustrate return-on-investment, break-even point, and economic feasibility
3. Represent actions or processes that occur in the to-be system
4. Be used as a logical data model in analysis and as a physical data model in design
5. Only be used in BPR situations
6. Only be used with JAD sessions

Ans: c

Response: Introduction

Difficulty: easy

1. An entity relationship diagram (ERD):
2. Is a use-case diagram enhanced graphically to show data and process modeling
3. Is a high-level CASE diagram of data modeling used in business systems
4. Is an illustration of external data flows to and from a business systems
5. Is a picture that shows the information that is created, stored, and used by a business system
6. Is a graphical display of the processes in a business system

Ans: d

Response: The Entity Relationship Diagram

Difficulty: easy

1. Lines on an ERD diagram indicate what?
2. Hierarchies between processes
3. Relationships among the data
4. Plurality of data items
5. Uniqueness of data items
6. Primary keys

Ans: b

Response: The Entity Relationship Diagram

Difficulty: medium

1. An entity is which of the following?
2. Is the association between two related processes
3. Has cardinality (1:1, 1:N, or M:N)
4. Shows if it can be null or no null
5. Is a person, place or thing
6. Is described with a verb phrase

Ans: d

Response: Elements of an Entity Relationship Diagram

Difficulty: easy

1. Which would NOT likely be an attribute of an entity called “Student”?
2. Age
3. Student identification number
4. Class room number
5. Home phone
6. Gender

Ans: c

Response: Elements of an Entity Relationship Diagram

Difficulty: medium

1. Which would NOT likely be an **entity** on a car insurance ERD?
2. Customer
3. Policy
4. Agent
5. Zip code
6. Car

Ans: d

Response: Elements of an Entity Relationship Diagram

Difficulty: medium

1. Which would likely be an **entity** on a car insurance ERD?
2. date
3. Gender
4. company
5. fire district
6. Car

Ans: e

Response: Elements of an Entity Relationship Diagram

Difficulty: medium

1. An ERD is a picture which shows the information that is \_\_\_\_\_\_\_\_ by a business system.
2. created
3. stored
4. used
5. all of these

Ans: d

Response: Elements of an Entity Relationship Diagram

Difficulty: medium

1. You have entities of ITEM, SOLD-ITEM, SALE and PAYMENT. Which most likely is NOT a relationship?
2. SALE is paid by PAYMENT
3. PAYMENT pays for ITEM
4. ITEM is included in SOLD-ITEM
5. SALE involves SOLD-ITEM
6. PAYMENT pays for SALE

Ans: b

Response: Elements of an Entity Relationship Diagram

Difficulty: easy

1. The lines that connect the entities are referred to as
2. Data flows
3. connectors
4. relationships
5. crow’s feet
6. foreign key

Ans: c

Response: Elements of an Entity Relationship Diagram

Difficulty: medium

1. Modality refers to which of the following?
2. Relationships of one-to-one; one-to-many; or many-to-many
3. Whether and entity can exist with or without a related instance in the related entity
4. The hierarchical structure that was developed in process models applied to data models
5. The number of attributes generated by an entity
6. Whether the entity has a unique identifier (aka ‘primary key’) or a concatenated identifier (aka ‘composite key’)

Ans: b

Response: Elements of an Entity Relationship Diagram

Difficulty: hard

1. Jack is developing an ERD for a small dental practice office patient record system. The dental practice has three dentists, six hygienists, and many patients. A patient is always assigned to the same dentist for all appointments. In particular, he is working on the relationship between dentists and patients. Should it be which of the following?
2. 1 to 1, with a modality of null
3. 1 to many with a modality of not null
4. Many to many with a modality of null
5. Many to many with a modality of not null
6. 1 to many with a modality of null

Ans: b

Response: Elements of an Entity Relationship Diagram

Difficulty: hard – especially due to the assumptions you have to make about dentists and patients

1. Information in the data dictionary is called what?
2. Metadata
3. Cached information
4. Compiled data
5. Data repository
6. File silo

Ans: a

Response: The Data Dictionary and Metadata

Difficulty: medium

1. Entity Relationship Diagrams show relationships between entities that are what?
2. Outputs from JAD sessions
3. Consistent with the ACM guidelines
4. In line with the business rules and processing
5. Defined by the project sponsor
6. Extensions of the process models

Ans: c

Response: Introduction

Difficulty: hard

1. The three major parts of an ERD diagram are what?
2. Process, data flow, data store
3. Attribute, modularity, cardinality
4. Relationship, data flow, entity
5. Relationship, attribute, entity
6. Process, entity and relationship

Ans: d

Response: Elements of Entity Relationship Diagrams

Difficulty: easy

1. What is true about creating an entity relationship diagram?
2. There will be at most seven entities
3. There will be at most seven relationships
4. If you identify more than seven entities, analyze and combine until you have seven or less
5. It is an iterative process
6. Entities will have at most seven attributes

Ans: d

Response: Creating an Entity Relationship Diagram

Difficulty: easy

1. In creating ERD’s, which would most likely NOT be a source for entities?
2. Use cases
3. Level 0 DFD diagrams
4. External entities
5. Data flows
6. Cost / benefit reports

Ans: e

Response: Creating an Entity Relationship Diagram

Difficulty: medium

1. In adding attributes to an ERD, which of the following might NOT be a good resource for attributes?
2. From the CASE tool
3. Data flows from DFDs
4. Requirements documents
5. The system proposal document
6. Through interviews (what users need for reports and processing)

Ans: d

Response: Creating an Entity Relationship Diagram

Difficulty: medium

1. The last step in creating basic ERD’s is to:
2. Identify relationships
3. Define attributes and assign identifiers
4. Recognize entities
5. Test them with users
6. Compile them with Java

Ans: a

Response: Creating an Entity Relationship Diagram

Difficulty: medium

1. What type of process is creating an ERD?
2. Well defined process
3. Sequential process
4. Process defined by five steps
5. Iterative process
6. User defined process

Ans: d

Response: Creating an Entity Relationship Diagram

Difficulty: medium

1. Anthony is working on the cardinality of doctors and patients in a large urban hospital. With the large number of doctors with varying specialties and patients that may have more than one aliment, he thinks the relationship might be noted as what?
2. 1 to 1
3. 1 to 2
4. 1 to many
5. Many to many
6. Many to 1

Ans: d

Response: Creating an Entity Relationship Diagram

Difficulty: medium

1. Omar has a model with 85 entities. He can do which of the following?
2. Compress these into at most seven entity grouping units
3. Group these into related subject areas
4. Stop – he has all entities defined
5. Sort the entities alphabetically
6. Co-validate the entities with the level 2 DFD diagrams

Ans: b

Response: Validating an Entity Relationship Diagram

Difficulty: medium

1. The first step to building an Entity Relationship Diagram is to do what?
2. Identify data flows from the level 0 DFD diagram
3. draw the relationships between the entities
4. identify the attributes for each entity
5. identify the entities
6. identify the processes, data flows and data stores

Ans: d

Response: Creating an Entity Relationship Diagram

Difficulty: easy

1. When normalizing data models, if you take attributes that have multiple values for a single instance of an entity and create separate entities for those attributes you are moving from:
2. O normal form to 1st normal form (1NF)
3. 1st normal form (1NF) to 2nd normal form (2NF)
4. 2nd normal form (2NF) to 3rd normal form (3NF)
5. Generalized normal form (GNF) to fully normalized form (FNF)
6. Dependent normal form (DNF) to Independent normal form (INF)

Ans: a

Response: Appendix 5A: Normalizing the Data Model

Difficulty: medium

1. Independent entities are what?
2. When a child requires attributes from the parent
3. When there is only one entity for a data process model
4. When an entity can exist without the help of another entity
5. Where the entity identifier is also the primary key
6. When an entity comes from an external source (aka ‘external entity’)

Ans: c

Response: Advanced Syntax

Difficulty: medium

1. A(n) \_\_\_\_\_ entity is an entity with an identifier that describes only the entity.
2. dependent
3. incomplete
4. independent
5. intersection
6. non-identifying

Ans: c

Response: Advanced Syntax

Difficulty: medium

1. A(n) \_\_\_\_\_ entity cannot exist without the presence of another entity or has an identifier that is based on another entity’s attribute.
   1. independent
   2. incomplete
   3. dependent
   4. variable
   5. non-complying

Ans: c

Response: Advanced Syntax

Difficulty: medium

1. The two methods to validate that an ERD is well formed are what?
2. Balancing with process models and following design guidelines created by Chen
3. Normalization and balancing with process models
4. Renaming theory
5. Balancing with process models and renaming theory
6. Normalization and following design guidelines created by Chen

Ans: b

Response: Validating an Entity Relationship Diagram

Difficulty: medium

1. Andrew, an analyst for PaxMedia Inc., has just learned that the business rules for a system he has been working on have changed. This means wjat
2. Nothing – once the ERD data models have been drawn, they are ‘frozen’ for the system
3. Andrew will be reassigned to a different project that is in its beginning stages
4. The ERD components will have to be changed
5. The ERD data model will have to be put on hold while new DFD diagrams are created
6. The project will have to be scrapped and restarted

Ans: c

Response: Validating an Entity Relationship Diagram

Difficulty: medium

1. A logical data model that does not lead to repeating fields and that the data models leads to tables containing fields that are dependent on the whole identifier is in \_\_\_\_\_ normal form.
2. balanced
3. first
4. primary
5. second
6. third

Ans: d

Response: Appendix 5A: Normalizing the Data Model

Difficulty: medium

1. When the analyst is evaluating a data model to ensure that all fields in a record depend fully on the entire primary key, which step of normalization is being performed?
2. base normal form
3. first normal form
4. second normal form
5. third normal form
6. cannot tell from this information

Ans: c

Response: Appendix 5A: Normalizing the Data Model

Difficulty: medium

1. If the logical data model does not contain attributes that have *repeating values* it is in \_\_\_\_\_.
2. base normal form
3. first normal form
4. non-normal form
5. second normal form
6. third normal form

Ans: b

Response: Appendix 5A: Normalizing the Data Model

Difficulty: medium

1. Balance occurs between DFDs and ERDs when the data stores \_\_\_\_\_
2. Are uniquely named
3. Have only one input and one output flow
4. Are named the same as the relationships on the ERD
5. Can be compared to ERD data flows and attributes on the ERD are included in data stores on the DFD
6. Can be equated to entities on the ERD and when entities are referred to by data stores on the DFD

Ans: e

Response: Balancing Entity Relationship Diagrams with Data Flow Diagrams

Difficulty: medium

## True / False Questions

1. Data models can be either logical or physical.

Ans: True

Response: Introduction

Difficulty: easy

1. During the analysis phase logical data models are created.

Ans: True

Response: Introduction

Difficulty: easy

1. During the analysis phase, analysts create programming models to represent how the business system will operate.

Ans: False

Response: Introduction

Difficulty: medium

1. A data model is a formal way of representing the data that are used and created by a business system.

Ans: True

Response: Introduction

Difficulty: easy

1. One of the most commonly used techniques for data modeling is ERDs.

Ans: True

Response: Introduction

Difficulty: medium

1. ERDs are drawn in several levels: Context ERD diagrams; Level 0 ERD diagrams; Level 1 ERD diagrams.

Ans: False

Response: The Entity Relationship Diagram

Difficulty: medium

1. On an ERD, processes are listed alphabetically with relationship connections drawn between processes.

Ans: False

Response: The Entity Relationship Diagram

Difficulty: hard

1. On an ERD, data elements are listed alphabetically with a cross listing to the processes that manipulate them.

Ans: False

Response: The Entity Relationship Diagram

Difficulty: hard

1. With an ERD, the diagrams are drawn in a sequential order – from top to bottom.

Ans: False

Response: The Entity Relationship Diagram

Difficulty: medium

1. With an ERD, special symbols are added to show high-level business rules.

Ans: True

Response: The Entity Relationship Diagram

Difficulty: medium

1. With an ERD, similar kinds of information are listed together in entities.

Ans: True

Response: The Entity Relationship Diagram

Difficulty: medium

1. ERD’s are data modeling techniques.

Ans: True

Response: The Entity Relationship Diagram

Difficulty: medium

1. With an ERD, lines are drawn to show relationships among the data.

Ans: True

Response: The Entity Relationship Diagram

Difficulty: medium

1. On an ERD, data elements are described as singular (1:1); plurals (1:N); or didactic (M:N).

Ans: False

Response: The Entity Relationship Diagram

Difficulty: hard

1. On an ERD, data elements are grouped in a hierarchical structure that is uniquely identified by number.

Ans: False

Response: The Entity Relationship Diagram

Difficulty: hard

1. On an ERD, data elements are listed together and place inside boxes called entities.

Ans: True

Response: The Entity Relationship Diagram

Difficulty: hard

1. ERDs and DFDs are two techniques for data modeling.

Ans: False

Response: The Entity Relationship Diagram

Difficulty: medium

1. ERDs and DFDs are two techniques for process modeling.

Ans: False

Response: The Entity Relationship Diagram

Difficulty: medium

1. A textbook-provided example of a ‘full-service CASE’ tool is Visible Analyst.

Ans: True

Response: Introduction

Difficulty: easy

1. An ERD is a picture that shows how data and information is processed and transformed by a business system.

Ans: False

Response: The Entity Relationship Diagram

Difficulty: hard

1. A graphical illustration that shows the information that is created, stored, and used by a business system would be an ERD.

Ans: True

Response: The Entity Relationship Diagram

Difficulty: easy

1. An illustration of the transformation of data into business value is an ERD.

Ans: False

Response: The Entity Relationship Diagram

Difficulty: medium

1. An analyst can read an ERD to discover the individual pieces of information in a system and how they are organized and related to each other.

Ans: True

Response: The Entity Relationship Diagram

Difficulty: easy

1. On an ERD, similar kinds of information are listed together and placed inside boxes called data containers.

Ans: False

Response: The Entity Relationship Diagram

Difficulty: medium

1. An entity is the basic building block for a data model.

Ans: True

Response: Elements of an Entity Relationship Diagram

Difficulty: easy

1. An entity is described by an action verb.

Ans: False

Response: Elements of an Entity Relationship Diagram

Difficulty: easy

1. Entities are further designed with attributes.

Ans: True

Response: Elements of an Entity Relationship Diagram

Difficulty: easy

1. Entities are a person, place, or thing.

Ans: True

Response: Elements of an Entity Relationship Diagram

Difficulty: easy

1. In an entity called STUDENT, you might find attributes of Student-ID, Last-Name, First-Name and cell-phone.

Ans: True

Response: Elements of an Entity Relationship Diagram

Difficulty: easy

1. In an entity called STUDENT, you might find attributes of PROFESSOR-ID, Last-Name, First-Name and CLASSROOM.

Ans: False

Response: Elements of an Entity Relationship Diagram

Difficulty: easy

1. Relationships are some type of information that is captured about entities.

Ans: False

Response: Elements of an Entity Relationship Diagram

Difficulty: easy

1. Relationships are associations between entities.

Ans: True

Response: Elements of an Entity Relationship Diagram

Difficulty: easy

1. Relationships are drawn with lines showing cardinality and plurality.

Ans: False

Response: Elements of an Entity Relationship Diagram

Difficulty: hard

1. ERDs can be quite complex and might have hundreds or thousands of entities.

Ans: True

Response: Creating an Entity Relationship Diagram

Difficulty: easy

1. The three steps in creating an ERD are: (1) identify the entities; (2) identify the processes; (3) identify the relationships

Ans: False

Response: Creating an Entity Relationship Diagram

Difficulty: medium

1. The three steps in creating an ERD are: (1) identify the entities; (2) identify the attributes; (3) identify the relationships

Ans: True

Response: Creating an Entity Relationship Diagram

Difficulty: medium

1. Metadata is data about data.

Ans: True

Response: The Data Dictionary and Metadata

Difficulty: easy

1. CASE tools have ‘data repositories’.

Ans: False

Response: The Data Dictionary and Metadata

Difficulty: easy

1. In defining the data characteristics of Universal Product Codes, we might describe them as twelve characters made up of digits – numeric only.

Ans: True

Response: The Data Dictionary and Metadata

Difficulty: medium

1. In defining LAST-NAME in the data dictionary, we might describe it as a character field having from 1 to 15 alphabetic characters.

Ans: False

Response: The Data Dictionary and Metadata

Note: You will also need special characters like D’Angelo or O’Brien

Difficulty: hard

1. One of the first places to start developing Entity Relationship Diagrams is by looking at the level 0 process models (DFD) and the use cases for data flows and data stores.

Ans: True

Response: Creating an Entity Relationship Diagram

Difficulty: medium

1. Data modeling is an iterative process.

Ans: True

Response: Creating an Entity Relationship Diagram

Difficulty: easy

1. When validating ERDs you should balance ERD entities with the data flows and data stores from the DFD process diagrams.

Ans: True

Response: Balancing Entity Relationship Diagrams with Data Flow Diagrams

Difficulty: easy

1. CRUD stands for create, read, update and delete and can be used to verify DFDs and ERDs.

Ans: True

Response: Balancing Entity Relationship Diagrams with Data Flow Diagrams

Difficulty: medium

## Essays

1. You have a student registration system (simplified) with three entities: Student, Professor, and Class. Assume standard attributes for the three entities. What might be the relationships, cardinality and modality between the three?

Answer

Answers will vary; but something like:

Professor teach classes (probably 1:M); a class is taught by 1 professor; students take classes (1:M); it might be possible to have a class with no students (so modality might be null) – such as an advanced nuclear physics class taught at 5:00 a.m. ; it might be possible that a professor isn’t teaching this semester (on sabbatical or doing research projects) – so modality of null; could a student not be taking any classes? If so that could also have a modality of null (might be doing an internship that is not registered with the campus; might be on a study-abroad trip that isn’t for credit and is not registered for; might have dropped out for the semester, etc.); professors have many students and student have many professors (M:N); and again if a professor is on sabbatical or doing research may not have students and if a student is not enrolled, he/she may not have any professors.

Response: Creating an Entity Relationship Diagram

Difficulty: hard – mainly due to the number of assumptions which must be made to make a “correct” diagram

1. In the sample data for the STUDENT entity, there are repeating values for class and semester attributes. For example, Adam Murphy took CIS 370 section 2 in fall 2008; Brenda Olson took CIS 370 section 2 in fall 2008; Jing Zhang took CIS 370 section 2 in fall 2008; etc. What is the process to modify this entity so that there are no attributes with multiple values?

Answer

This is to put the entity into First Normal Form (1NF). Generally, you will create a new entity Courses-Taken where each course each semester each section is placed and a relationship will be drawn between the entities. For this example, one entry in the Courses-Taken entity will be: CIS 370-Section2-fall2008 – and a relationship between the courses-Taken and the students will be drawn.

Response: Appendix 5A: Normalizing the Data Model

Difficulty: hard

1. How do you validate an ERD?

Answer

Creating and validating ERDs can be tough. It takes experience to draw ERDs well and there are not all that many guidelines and rules. You will want to verify that entities are complete (i.e. have all the needed attributes, have consistent names (not client at some point and customer at another point), that relationships are identified and drawn; that cardinality (1:1; 1:N or M:N) is drawn – and if possible M:N cardinalities are avoided by creating entities in between the M:N entities; that modality is identified (null or non-null); and that eventually the ERD is normalized to 3NF.

It takes time and patience to learn and do this!!!

Response: Validating an Entity Relationship Diagram and Appendix 6A: Normalizing the Data Model

Difficulty: hard

1. Discuss what should be done to ensure that the entity relationship diagrams balance with the data flow diagrams. What is the consequence of failing to balance these models?

Answer

The key to balancing these diagrams is to remember that both models must refer to exactly the same 'data foundation' of the system. Every entity on the data model should correspond to a data store on a DFD. Also, all the data elements that comprise the data flows in the DFDs should appear as attributes of entities in the data model. Similarly, the attributes of the data model entities should be found in the process models; otherwise, the data is probably not used by the business system and should not be stored. If the analysts do not balance the data and process models, then the system will either omit critical data or will contain unnecessary data.

Response: Balancing Entity Relationship Diagrams with Data Flow Diagrams

Difficulty: hard