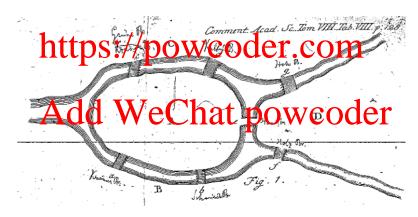


Week 4 Workshop Assignment Project Exam Help





Housekeeping information

Assistance submission via Wattle is edg 20:50 sep 5 (Friday, Week 6)

- Individual, no group work!
- Do not post any idea/partial solution/result on Wattle.
- Do not wait until the last minute to theck/submit your solution.
 Salogle SQL que tions solutions white evaluate an Watte.
- The correctness of queries does not depend on any database state.
- Partial marks may be awarded.



Housekeeping information

Assisted Assessment (Assignment) will be available on Wattle 23:59 and the submission via Wattle is add 26:56 Sep 5 (Friday, Week 6)

- Individual, no group work!
- Do not post any idea/partial solution/result on Wattle.
- Downot wait until the last minute to theck submit your solution.
- Salog le SQL/que tibbs/sMtitoswhbelavailable on Wattle.
- The correctness of queries does not depend on any database state.
- Partial marks may be awarded.
- Droppin sessions to Assignment 1 (Week 5 and Week 6) Aug 25 (Mon) 2-3 pm (NEW) at power of the power of the
 - Aug 24 (Tue) 2-3 pm
 - Aug 25 (Wed) 8-9 pm (NEW)
 - Aug 30 (Mon) 2-3 pm (NEW)
 - Aug 31 (Tue) 2-3 pm
 - Sep 1 (Wed) 8-9 pm (NEW)



Database Design – Four Phases

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The database design process has four phases:

https://powcoder.com

Conceptual Design Entity-Relationship Model

From Entity-Relationship Model to Relation Schemas

Physical Design



Phase 2: Conceptual Design

Assignment Project Exam Help that is Assignment Project Exam Help that is

https://powcoder.com • sufficiently simple and often graphical;

 used to communicate the requirements of a database with anontechnical users.

• Add WeChat powcoder requirements specification.

Note: The conceptual design is based on the **Entity-Relationship Model** in this course.



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Assignment Project Exam Help

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Assignment Project Exam Help

- a simplification of reality
 often a graphidal depiction
- hoften a graphical depiction of data der.com
- What does modeling do?



Assignment Project Exam Help

a simplification of reality

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What does modeling do?

Modaling day echat provided and relationships of components of a system

- helps in conceptualising and visualising the structure of a system that we may want to build.
- facilitates specifications of the behaviour of a system
- gives rise to a template that guides us in constructing a system

...



Entity-Relationship (ER) Model

Assignment Project Exam Help

ER diagrams (Peter Chen in 1976):



Key attribute with underlined;



Add we Chat powcoder

Relationship as diamonds.





(Exercise 1) Consider the following data requirements for a university student database that is used to keep track of students' transcripts.

Some property for a consider the following data requirements for a university students' transcripts.

Some property for a consider the following data requirements for a university students' transcripts.

Some property for a university student in the consideration of the consideration of

- Each department has name, department code, office number, office phone, and college. Both name and code have unique values for each department.
- Each course has a course name, description, course number, number of semester fours, level, and offering department. The value of course number is unique breach course.
- Each section of a course has an instructor, semester, year, and section number and the section number distinguishes different sections of the same course that are taught during the same semester/year; its values are 1, 2, 3, ..., up to the number of sections taught during each semester.
- A grade record refers to each student and a particular section, consisting of a final mark and a letter grade from (F, D, C, B, A).



Assignment Project Exam. Help

- Relationships: Associations between entities.
- Attributes: Properties that describe entities and relationships.
 POWCODE COM



Assignment Project Exam. Help

- Relationships: Associations between entities.

Each student has name, student number, social security number, address, phone and birthdate. Both social security number and student number have unique values for each student.



Assignment Project Exam. Help

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Question Wat are incentities lead it is incentifications in a start to the Color of the Color of



Assignment Project Exam. Help

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Question What are intentities leading in an Wife COT

- Entities: STUDENTRelationships:
- Attributes: name, student number, social security number, address, phone and birthdate for STUDENT



Assignment Project Exam. Help

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 POWCOGET.COM



Assignment Project Exam. Help

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 DOWCOGET.COM

Each student has exactly one major, and may have a minor (if any) with departments



Assignment Project Exam. Help

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 DOWCOGET.COM

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Assignment Project Exam. Help

- Relationships: Associations between entities.

Each student has exactly one major, and may have a minor (if any) with departments

- Question What are the entitles relationships and attributes? POWCOGET
 - Relationships: has_major_with between STUDENT and DEPARTMENT, has_minor_with between STUDENT and DEPARTMENT
 - Attributes: name for has_major_with, name for has_minor_with



Assignment Project Example the perity can participate in.

 Participation constraints (total, partial): Specifies whether the existence of any entity depends on its being related to another entity via the relationship type. Ittps://powcoder.com



Assignment Project Example the perity can participate in.

 Participation constraints (total, partial): Specifies whether the existence of any entity depends on its being related to all other entity via the relationship type TUPS. / DOWCOCET. COM

Each student has exactly one major, and may have a minor (if any) with departments



Assignment Project Example the perity can participate in.

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Assignment Project Example the perity can participate in.

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Each student has exactly one major, and may have a minor (if any) with departments.

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Cardinality ratios: Every student has at most one major and a department may offer many majors (to different students)



Assignment Project Example the perity can participate in.

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Question Wat a evh Constraint a trelation how his mo wit??

Cardinality ratios: Every student has at most one major and a department may offer many majors (to different students)

Participation constraints: Every student must have one major (total) and each department must (typically) offer one major (total).



Assignment Project Example the perity can participate in.

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Each student has exactly one major, and may have a minor (if any) with departments.

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Assignment Project Example the perity can participate in.

 Participation constraints (total, partial): Specifies whether the existence of any entity depends on its being related to all other entity via the relationship type TUDS.

Each student has exactly one major, and may have a minor (if any) with departments.

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Cardinality ratios: Every student has at most one minor and a department may offer many minor (to different students)



Assignment Project Example the perity can participate in.

 Participation constraints (total, partial): Specifies whether the existence of any entity depends on its being related to all other entity via the relationship type TUPS. / DOWCOCET. COM

Each student has exactly one major, and may have a minor (if any) with departments.

Question Viat are the constraint at relationship the mile with?

Cardinality ratios: Every student has at most one minor and a department may offer many minor (to different students)

Participation constraints: Every student **may or may not** have one minor (**partial**) and each department **must** (typically) offer one minor (**total**).



Assignment Project Exam Help Things" in the real world (with independent existence).

- Relationships: Associations between entities.
- Attributes: Properties that describe entities and relationships.
 POWCOGER.COM

Each course has a course name, description, course number, number of semester hours, level, and offering department.



Assignment Project Exam Help • Entities: "Things" in the real world with independent existence).

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Assignment Project Exam Help

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Assignment Project Exam Help

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Question What are the contities relations the and structures are the contities relations the contities are the contities relations the continue of the contities relations the contities relations the contities relations the contities relations the continue of the continu

- Entities: course, department
- Relationships: offer (between department and course)
- Attributes: course name, description, course number, number of semester hours and level (of the entity course)



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Participation constraints (total, partial): Specifies whether the existence of any entity depends on its being related to another entity via the relationship typhttps://powcoder.com



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Participation constraints (total, partial): Specifies whether the existence of any entity depends on its being related to another entity via the relationship typerity typerity typerity is a specified with the existence of any entity depends on its being related to another entity via the relationship typerity is a specified with the existence of any entity depends on its being related to another entity via the relationship typerity is a specified with the existence of any entity depends on its being related to another entity via the relationship typerity is a specified with the existence of any entity depends on its being related to another entity via the relationship typerity is a specified with the existence of any entity depends on its being related to another entity via the relationship typerity is a specified with the existence of any entity depends on its being related to another entity via the relationship typerity is a specified with the existence of any entity of the existence of the existe

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Each course has a course name, description, course number, number of semester hours, level, and offering department.

Question What are the constraints of relationship of the Cardinality ratios: Every course is offered by at most one department and a department may offer many courses



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Each course has a course name, description, course number, number of semester hours, level, and offering department.

Question What are the constraints of relationship "offer" der Cardinality ratios: Every course is offered by at most one department and a department may offer many courses

Participation constraints: Every course must be offered by some department (total) and each department may (or may not) offer any courses (partial).



ntities "Things" in the realworld (with independent existence). Help earliers in the realworld (with independent existence).

 Attributes: Properties that describe entities and relationships. Each section of a course has an instructor, semester, year, and section number and the section number distinguishes different sections of the same

..., up to the number of sections taught during each semester.

A grade record refers to each student and a particular section, consisting of a final mark and witter grade from (F,D, C, B, A).

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Things in the representative independent existence). Help erationsnips: Associations between entities.

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- Question Viat ave Incontities Teations in San Valtibue CET
 - Entities: section, course, student
 - Relationships: section_taught (between section and course), grade_record (between student and section)



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Question Wat average from the continuous particular section, consisting of a final mark and a latter grade from (F,D,C,B,A).

- Entities: section, course, student
- Relationships: section_taught (between section and course), grade_record (between student and section)
- Attributes: instructor, semester, year, and section number (of the weak entity section), final mark and letter grade (of the relationship grade_record)



(Exercise 1) Consider the following data requirements for a university student database that is used to keep track of students' transcripts.

STHOM VELSIVE STRUCK OF CACHES THAT IS NOT THAT THE STRUCK OF STRUCK OF CACHES THAT THE STRUCK OF CACHES THAT

- Each student has exactly one major, and may have a minor (if any) with detartments C //10 OTT C O OTT C O
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Assignment Project Exam Help student, course, department, section (weak entity)

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Assignment Project Exam Help student, course, department, section (weak entity)

• Identify the relationships nttps://powcoder.com



Assignment Project Exam Help student, course, department, section (weak entity)

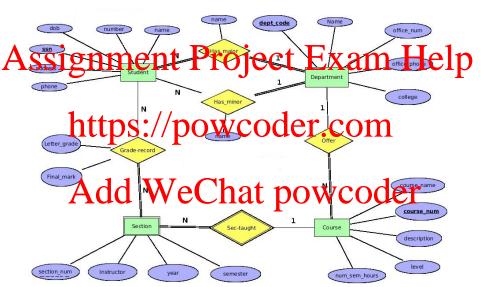
- oldentify the relationships that major (between student and department) Om
 - has_major (between student and department)
 - offer (between department and course)
 - scion taum de weel eath now COCET
 - grade_record (between student and section)



Assignment Project Exam Help student, course, department, section (weak entity)

- o Identify the relationships (between student and department) Om
 - has_major (between student and department)
 - offer (between department and course)
 scientaum be ween ection in course COCCT
 - grade_record (between student and section)
- Identify the attributes of entities and relationships and identify a primary key for each entity type
- Identify cardinality ratios and participation constraints on relationships







Software tool to draw ER diagram

Assignment Project Exam Help

- We require students to use an academic tool, TerraER, to draw the ER diagrams.
- Ter a ER allows you to save your ER diagrams into xral files and export your ER diagrams as a UPE digure!
- You can download the jar file from the following website: https://github.com/rterrabh/TerraER/releases/download/TerraER3.01/TerraER3.01/terraER3.01/
- You can double-click that file to execute or Windows/Mac/Linux (assume that the Java Runtime Environment JRE has been installed).
- More information on how to use TerraER will be provided next week.



(Exercise 2) A retailer company wants to build a database application for managing information about its sale process. The company sells products in both local shops and webstores on the Internet. Each local enop has alrame, certact details (e/g), other to number and entail, an unique location. The database application also needs to store the URL(unique), name and last updated date of each webstore. Every product hat a unique product Dag description and item price and a quantity in stock. The database application should also record customers' details such as their name, address and email. Every customer is assigned a unique ID. A customer may place an order that consists of at least one ar out and each order is then either a store of a melotice. Customers have three payment options (i.e., cash, paypal, and credit card) but for each order only one payment option can be chosen. A delivery may be requested for each order. After full-payment is received, a delivery would be sent out subject to products' availability. Every delivery has a unique tracking number.



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Assignment Project Exam Help

https://powcoder.com



Assignment Project Exam Help

Identify the entities (including weak entity types)
 shop, webstore, product, customer, order, delivery

https://powcoder.com



Assignment Project Exam Help Identify the entities (including weak entity types)

- shop, webstore, product, customer, order, delivery
- Ide not support the analytic ones and fig this interest and completeness constraints



Assignment Project Exam Help

- Identify the entities (including weak entity types) shop, webstore, product, customer, order, delivery
- Ide tit supers super the and the consequence of the constraints and completeness constraints
 - The company sells products in both local shops and webstores on





Assignment Project Exam Help

- Identify the entities (including weak entity types)
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- Identificass super D salvine or sanding lisibilities and completeness constraints
 - The company sells products in both local shops and webstores on the Internet.

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subclass shop, webstore



Assignment Project Exam Help

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- subclass shop, webstore
- superclass store



Assignment Project Exam Help

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- subclass shop, webstore
- superclass store
- disjoint and complete



Assignment Project Exam Help

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- Identificass super D sala recording lisinities and completeness constraints
 - The company sells products in both local shops and webstores on the Internet.

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- subclass shop, webstore
- superclass store
- disjoint and complete
- Identify the relationships



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full-payment is received, a **delivery** would be sent out subject to **products**' availability. Every **delivery** has a unique tracking number.



- Identify subclass/superclass and the corresponding disjointness and corrections so instrail to WCOGET. COM
 - subclass shop, webstore
 - superclass store
- Identify the relationships Chat powcoder
 - order consists of product
 - each order is from store(superclass) (either subclass shop or subclass webstore)
 - delivery is for order



- Identify subclass/superclass and the corresponding disjointness and completeness constraints OWCO der. Com

 - superclass store
- Identify the relationships
- at ributes of ties a detation (ips of dent) a milary key for each entity type



- Identify subclass/superclass and the corresponding disjointness and completeness constraints OWCOCET.COM
 subclass shop, vebstore
 - subclass snop, webstorsuperclass store
- Identify the relationships
- Identity he at ributes of entities and eating tips and denting minary key for each entity type
 - Every product has a unique productID, a description, an item price, and a quantity in stock.



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 - superclass store
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- Identity he at ribus of ties a Relation lips and defting minary key for each entity type
 - Every product has a unique productID, a description, an item price, and a quantity in stock.
 - Attributes for product: productID, description, item price, quantity



- Identify subclass/superclass and the corresponding disjointness and completeness constraints OWCODET. COM
 - superclass store
- Identify the relationships
- Identity the at ributes of ties at the atting tips and dentiting miniary key for each entity type
 - Every product has a unique productID, a description, an item price, and a quantity in stock.
 - Attributes for product: productID, description, item price, quantity
 - Primary key for product: productID



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- Identify the at ributes of entities and relationships and identify a primary key for each only type



- Identify subclass/superclass and the corresponding disjointness and completeness constraints
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 - superclass store
- Identify the relationships
- Identity the at ributes of entities and relationships and identity a primary key for each chitty type
 - The database application should also record customers' details such as their name, address and email. Every customer is assigned a unique ID.



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 Tutclasshop/verween WCOCer.Com
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 - Attributes for customer: name, address, email, CustomerID



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 - Primary key for customer: CustomerID



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 Identify subclass/superclass and the corresponding disjointness and completeness constraints

hsubclass short, webstore hsure the property of the property o

- Identify the relationships
- Identify the attributes of entities and relationships and identify a primary key for each entity type Chat powcoder



Assidentify the principal find the product, customer, order, delivery am Help

 Identify subclass/superclass and the corresponding disjointness and completeness constraints

hsubclass shop, webstore wooder.com

- Identify the relationships
- Identify the attributes of entities and relationships and identify a primary key for each entity type Change and tage of the control of the c



Asside military find the product, customy for the first delivery am Help

 Identify subclass/superclass and the corresponding disjointness and completeness constraints

hsubclass shop, webstore wooder.com

- Identify the relationships
- Identify the attributes of entities and relationships and identify a primary key for each entity type. In an attack that should be a primary key for each entity type. In an attack that the primary key for each entity type. In an attack that the primary key for each entity type. In an attack that the primary key for each entity type. It is a primary key for each en
 - Attributes for superclass store: name, location/URL



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 Identify subclass/superclass and the corresponding disjointness and completeness constraints

hsubclass shop, webstore wooder.com

- Identify the relationships
- Identify the attributes of entities and relationships and identify a primary key for each entity type. The characteristic part and trace to the control of the characteristic part and email), and a unique location. The database application also needs to store the URL(unique), name and last updated date of each webstore.
 - Attributes for superclass store: name, location/URL
 - Primary key for superclass store: location/URL



Assider if the principal find the prediction of the product of the principal find the product of the principal find the product of the principal find the principal f

 Identify subclass/superclass and the corresponding disjointness and completeness constraints

hsubclass shop, webstore wooder.com

- Identify the relationships
- Identify the attributes of entities and relationships and identify a primary key for each entity type. Change that the control of the contr
 - Attributes for superclass store: name, location/URL
 - Primary key for superclass store: location/URL
 - Attributes for subclass shop: phone number, email
 - Attributes for subclass webstore: last updated date



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Identify the relationships

- Identify the attributes of entities and relationships
- Identify cardinality ratios and participation constraints on relationships
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Identify the relationships

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- Identify the attributes of entities and relationships
- Identify cardinality ratios and participation constraints on relationships

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Cardinality ratios: A customer may place many orders and an order is placed by one customer.



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Identify the relationships

- Identify the attributes of entities and relationships
- Identify cardinality ratios and participation constraints on relationships
 - Cardinality ratios: A customer may place many orders and an order is placed by one customer.
 - Participation constraints: A customer may or may not place any orders (Partial). An order must be placed by one customer (Total).



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- Identify subclass/superclass
- Identify the relationships

- Identify the attributes of entities and relationships
- Identify cardinality nations and participation constraints on relationships

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- Identify subclass/superclass
- Identify the relationships

- Identify the attributes of entities and relationships
- Identify cardinality nations and participation constraints on relationships

 A definery may be requested to each order. COCCT



Assignment Project Exam Help

- Identify subclass/superclass
- Identify the relationships

- Identify the attributes of entities and relationships
- Identify cardinality nations and participation constraints on relationships and participation constraints on relationships coder.
 - Cardinality ratios: A delivery is for at most one order and an order has at most one delivery.



Assignmental rojects Exam Help

- Identify subclass/superclass
- Identify the relationships

- Identify the attributes of entities and relationships
- Identify cardinality nations and participation constraints on relationships are constraints on the constraint of the constraints of the
 - Cardinality ratios: A delivery is for at most one order and an order has at most one delivery.
 - Participation constraints: A delivery must be for an order (Total).
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Identify the relationships

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Identify the relationships

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ssignment Project Exam Help Identify subclass/superclass

Identify the relationships

- Identify the attributes of entities and relationships
- Identify cardinality ratios and participation constraints on relationships re vorsesor nearon 10 WCOCCT
 - Cardinality ratios: An order may contain many products and an



Assignmentud Projectes Exam Help

Identify the relationships

- Identify the attributes of entities and relationships
- Identify cardinality ratios and participation constraints on relationships
 Aget free vorses of the composition of the co
 - Cardinality ratios: An order may contain many products and an product may be contained in many orders.
 - Participation constraints: A order must contain some product (Total). A product may or may not be contained in an order (Partial).



Assignment Project Exam Help

Constructing an ER or EER Model

- Identify the entities (including weak entity types)
- Idelattanges sympowcoder.com
- Identify the relationships
- Identify the attributes of entities and relationships
- Identity cardinality in this and participation constraints on relationships

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Assignment Project Exam Help

Constructing an ER or EER Model

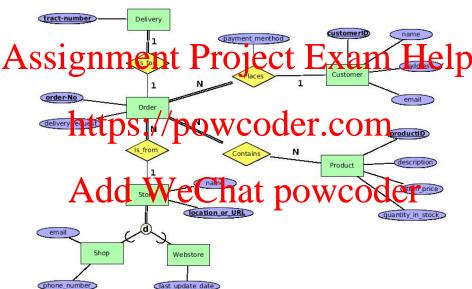
- Identify the entities (including weak entity types)
- Identify the relationships
- Identify the attributes of entities and relationships
- Identity cardinality in this and participation constraints on relationships

 Add Weenat powcoder
- Not all the constraints can be expressed in the ER model



(Exercise 2) A retailer company wants to build a database application for managing information about its sale process. The company sells products in both local shops and webstores on the Internet. Each local enop has alrame, certact details (e/g), other to number and entail, an unique location. The database application also needs to store the URL(unique), name and last updated date of each webstore. Every product hat a unique product Dag description and item price and a quantity in stock. The database application should also record customers' details such as their name, address and email. Every customer is assigned a unique ID. A customer may place an order that consists of at least one product and each order is from either a short of a websit Customers have three payment options (i.e., cash, paypal, and credit card) but for each order only one payment option can be chosen. A delivery may be requested for each order. After full-payment is received, a delivery would be sent out subject to products' availability. Every delivery has a tracking number.







Phase 3: Logical Design

Assignment Project Exam Help Logical design is the process of constructing a logical data model (e.g.

 Logical design is the process of constructing a logical data model (e.g. relational or object-oriented).

 A conceptual data inddel is translated onto a legical data model, which can be unther prince (e.g., polynalisation) to meet the data requirements. For example,

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• **To:** Relations with their primary and oreign keys, which facilitates SQL to deal with retrieving, updating and deletion.

Note: The logical design is based on the **relational data model** in this course.



ER-to-Relations Algorithm

Assisphanical terminates in the model of the Materian of the posterior the EER model.

Step 1: Mapping of Regular Entity Types

h Step 2: Mar/bing of Weak Entity Types

Mar/birg Delinary Creeks Stip Com

- Foreign key approach
- Merged relation approach

Add Wress reference approach woode1 Step 4: Mapping of Binary 1:N Relationship Types

Step 5: Mapping of Binary M:N Relationship Types

Step 6: Mapping of Multi-valued Attributes

Step 7: Mapping of N-ary Relationship Types

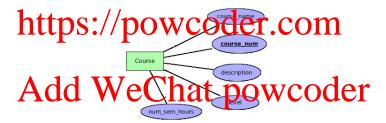
Step 8: Mapping of Superclass/Subclass



Step 1: Regular Entity types

Assignment in the late of the property of the late of

PK: the key attributes of E

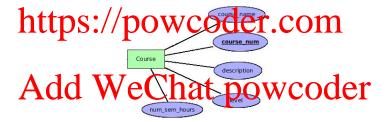




Step 1: Regular Entity types

Assignmentality typ Digrestic relation schema with the lattilibrates policy signment multi-valued attributes until step 6), where

PK: the key attributes of E



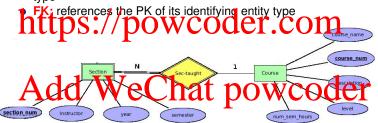
- COURSE(course_num, course_name, description, num_sem_hours, level)
 with PK: {course_num}
- Note: This is not necessarily the final relation schema of COURSE.



Step 2: Weak Entity Types

Assiproach weak entity type D, erests a relation schema with the Ittrouted p

 PK: the partial key attributes of E_w plus the PK of its identifying entity type

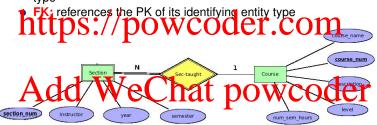




Step 2: Weak Entity Types

Assiproach weak entity type D, erests a relation schema with the attributed p

 PK: the partial key attributes of E_w plus the PK of its identifying entity type



SECTION(section_num, instructor, semester, year, course_num)
 with PK: {section_num, course_number}
 with FK: [course_num] COURSE[course_num]



A SS Force 111 retationship type By ith ane cotal participation a stem the Le 1p the PK of the partial-side entity type by the altributes of R and the PK of the partial-side entity type, where

PK: still the PK of the total-side entity type

FK1 references the PK of the partial ail to entity type

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TK1 references the PK of the total-side entity type





A SS Force 111 renationship type Pointy one distallor article attributes of R and the total-side entity type by the attributes of R and the PK of the partial-side entity type, where

PK: still the PK of the total-side entity type

FK references the PK of the partial ail to entity type

THE PK of the partial ail to entity type

THE PK of the partial ail to entity type

THE PK of the partial ail to entity type

THE PK of the partial ail to entity type

THE PK of the partial ail to entity type



PK: {Name}

FK: [Mgr_SSN]⊆EMPLOYEE[SSN].



SFpre translation tripe Pyrith one distributed participation externs the Lelp the PK of the partial-side entity type by the attributes of R and the PK of the partial-side entity type, where

PK: still the PK of the total-side entity type

FKtreferences / POW COULT COM



PK: {Name}

FK: $[Mgr_SSN] \subseteq EMPLOYEE[SSN]$.

• How can we model the total participation?



A SS Force tra retationship type Byrith one data particle attorn externs the Lead prediction schema of the total-side entity type by the attributes of R and the PK of the partial-side entity type, where

PK: still the PK of the total-side entity type

The PK of the partial-side entity type



PK: {Name}

FK: $[Mgr_SSN] \subseteq EMPLOYEE[SSN]$.

How can we model the total participation?
 Add NOT NULL constraint to Mgr_SSN for total participation.



A SS Force 111 renationship type Pointy one distallor article attributes of R and the total-side entity type by the attributes of R and the PK of the partial-side entity type, where

PK: still the PK of the total-side entity type

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PK: still the PK of the total-side entity type



PK: {Name}

FK: [Mgr_SSN] CEMPLOYEE[SSN].

Why don't we extend the relation schema of the partial-side entity type?



A SS Force 111 renationship type Pointy one distance article attributes of R and the total-side entity type by the attributes of R and the PK of the partial-side entity type, where

PK: still the PK of the total-side entity type

THE PK of the partial-side entity type



PK: {Name}

FK: [Mgr_SSN] CEMPLOYEE[SSN].

Why don't we extend the relation schema of the partial-side entity type?
 This may cause many NULL values.



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- If participation on both sides is total, we may merge the relation schemas of both entity types and the attributes of the relationship type into a single relation.
- EMPLOYEE-DEP(SSN, Name, Salary, Star Ldate, Dname, Address) with PK: {SSN} or {Dname}





- If participation on both sides is total, we may merge the relation schemas of both entity types and the attributes of the relationship type into a single relation.
- EMPLOYEE-DEP(SSN, Name, Salary, Startdate, Dname, Address) with PK: {SSN} or {Dname}
- How can we model the total participations?





- If participation on both sides is total, we may merge the relation schemas of both entity types and the attributes of the relationship type into a single relation.
- EMPLOYEE-DEP(SSN, Name, Salary, Start date, Dname, Address) with PK: {SSN} or {Dname}
- How can we model the total participations?
 Add NOT NULL constraint to both SSN and Dname for total participations.





- If participation on both sides is total, we may merge the relation schemas
 of both entity types and the attributes of the relationship type into a
 single relation.
- EMPLOYEE-DEP(SSN, Name, Salary, Start date, Dname, Address) with PK: {SSN} or {Dname}
- How can we model the total participations?
 Add NOT NULL constraint to both SSN and Dname for total participations.
- Is merging them always a good solution?



Step 3: Binary 1:1 Relationship Types - (Merged relation)

Assignment the Project ream Help



- If participation on both sides is total, we may merge the relation schemas
 of both entity types and the attributes of the relationship type into a
 single relation.
- Howele Chenging there is not a ways a pool switten. Whyle I



Step 3: Binary 1:1 Relationship Types - (Merged relation)

Assignment Project Exam? Help



- If participation on both sides is total, we may merge the relation schemas
 of both entity types and the attributes of the relationship type into a
 single relation.
- Howele Cherging them is not away a pool switten Only C1
 - (1) The two entity types represent different entities in the real world.
 - (2) The two entity types participate in different relationship types.
 - (3) Having separate relation schemas for two entity types often leads to more efficient updates than a single relation schema.

(4) .



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If both sides are partial, we may create a (new) relation schema which cross-references the PKs of the relation schemas of the two entity types.
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- If both sides are partial, we may create a (new) relation schema which cross-references the PKs of the relation schemas of the two entity types.
- MANAGES SN, DWAYNG Sart dae With POWCOCET PK: {SSN} or {Dname}

FKs: $[SSN]\subseteq EMPLOYEE[SSN]$ and $[Dname]\subseteq DEPARTMENT[Name]$



Assignment Project Exam Help



- If both sides are partial, we may create a (new) relation schema which cross-references the PKs of the relation schemas of the two entity types.
- Markar (SIGN, Draine) art dae Mth POWCOCET PK: {SSN} or {Dname}
 - $FKs: [SSN] \subseteq EMPLOYEE[SSN] \ and \ [Dname] \subseteq DEPARTMENT[Name]$
- Can we still merge them into a single relation using previous approaches?



Assignment Project Exam Help



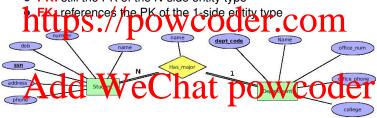
- If both sides are partial, we may create a (new) relation schema which cross-references the PKs of the relation schemas of the two entity types.
- Markages SN, Dyanes art dae With POWCOCET PK: {SSN} or {Dname}
 - FKs: $[SSN]\subseteq EMPLOYEE[SSN]$ and $[Dname]\subseteq DEPARTMENT[Name]$
- Can we still merge them into a single relation using previous approaches?
 We cannot; otherwise what would be the primary key for the merged relation schema?



Step 4: Binary 1:N Relationship Types

A SS Forceach 1: Negationship 1/20/17 extend that relations store and the PK of the 1 side entity type by the attributes of 7 and the PK of the 1 side entity type, where

PK: still the PK of the N-side entity type

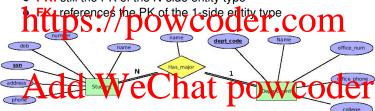




Step 4: Binary 1:N Relationship Types

Assignment to the latter of the attributes of anothe PK of the 1 side entity type by the attributes of anothe PK of the 1 side entity type.

PK: still the PK of the N-side entity type



 STUDENT(SSN, Name, Number, DoB, address, phone, major_dept, major_name) with

PK: {SSN}

FK: [major_dept] CDEPARTMENT[dept_code]



Step 5: Binary M:N (N:N) Relationship Types

SSFpreach Miniputs the PKs of the participating entity types, where

- PK: the combination of the PKs of the participating entity types
- FKs: references the PKs of the participating entity types

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GRADE_RECORD(ssn, section_num, course_num, letter_grade, final_grade)

PK: {ssn, section_num, course_num}

 $FK: [ssn] \subseteq STUDENT[ssn]$

FK: [section_num, course_num] \subseteq SECTION[section_num, course_num].



Step 6: Multi-valued Attributes

A SS Foreach molti valued fattrifule of oreas and latter schemowith and place of the entity/relationship type that has A as an attribute, where

PK: the combination of A and the PK of the entity/relationship type

that has A . / PROTING Critical Continuous Arrangements of the entity/relationship type

that has A . / PROTING Critical Continuous Arrangements Arrangements





Step 6: Multi-valued Attributes

A SS For each moltingalured fattrice was a relation schemowith and place of the PK of the entity/relationship type that has A as an attribute, where

PK: the combination of A and the PK of the entity/relationship type that has A provide Critical Carthy Calculationship type that has A



EMPLOYEE_ADDRESS(SSN, Address) with

PK: {SSN, Address}

FK: [SSN] EMPLOYEE[SSN]



ER-to-Relations Algorithm (Recall)

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Step 1: Mapping of Regular Entity Types

h Step 2: Mapping of Weak Entity Types

Swapping Orinary C Belationship Good

- Foreign key approach
- Merged relation approach

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Step 4: Mapping of Binary I:N Relationship Types
Step 5: Mapping of Binary M:N Relationship Types

Step 6: Mapping of Multi-valued Attributes

Step 7: Mapping of N-ary Relationship Types

Step 8: Mapping of Superclass/Subclass



(Credit Cookie) Graph Model and ER Diagram



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(Credit Cookie) Graph Model and ER Diagram



- 1st paper in ACM Transactions on Database Systems in 1976
- 1st ider rational conference on a state part asset CLOPIT CAP

The Entity-Relationship Model—Toward a Unified View of Data

PETER PIN-SHAN CHEN

Massachusetts Institute of Technology