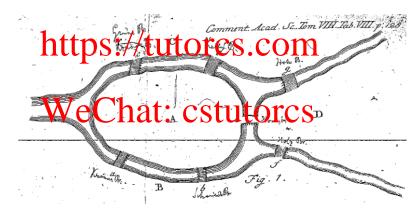


Week 4 ER Model Assignment Project Exam Help





Housekeeping information

SAssignment 1 (SQL) is available on Wattle, and he submission via Wittle it p

- Individual, no group work!
- Do not post any idea/partial solution/result on Wattle.
- Do not wait until/the last minute to check/submit your solution.

 Saint le SQL/quest ous solutions will be available on Wattle.
- The correctness of gueries does not depend on any database state.
- Partial marks may be awarded.



Housekeeping information

As Salignment 1 (SQL) is available on Wattle, and the submission via Wittle is possible 3159, 30 Aug (Tubsday, Week 4) \sim

- Individual, no group work!
- Do not post any idea/partial solution/result on Wattle.
- Do not wait until/the last minute to check/submit your solution.
- Sample SQL questions solutions will be available on Wattle.
- The correctness of queries does not depend on any database state.
- Partial marks may be awarded.
- Drop-in sessions for Assignment 1 (yia Zoom)
 - We that: cstutorcs
 - 23 Aug (Tue) 5-7 pm
 - 25 Aug (Thu) 5-7 pm
 - 30 Aug (Tue) 5-7 pm



Housekeeping information

- Individual, no group work!
- Do not post any idea/partial solution/result on Wattle.
- Do not wait until/the last minute to check/submit your solution.
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 CSTUTOTCS

 Thursday

 CSTUTOTCS
 - 23 Aug (Tue) 5-7 pm
 - 25 Aug (Thu) 5-7 pm
 - 30 Aug (Tue) 5-7 pm
- Welcome our class representatives: Alex Boxall, Daniel Herald, Devanshi Dhall, Naoibh McLoughlin, Wenxuan Zhang, Zhuxuan Yan.



Database Design – Four Phases

Assignment Project Exam Help

The database design process has four phases:

htelip Beins the time Gay as Om

Conceptual Design Entity-Relationship Model

From Entity-Relationship Model to Relation Schemas

Physical Design



Phase 2: Conceptual Design

Assignment Project Exam Help that is

- hmodeled at a Migh-level of abstraction; **UTOTCS**COM

 sufficiently simple and often graphical;
- used to communicate the requirements of a database with poptechnical users.
- A conceptual data model is built using the information in users' requirements specification.

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



Assignment Project Exam Help

https://tutorcs.com



Assignment Project Exam Help

a simplification of reality

often a graphical depiction of data hassociated with autobuling language COM



Assignment Project Exam Help

- a simplification of reality
- often a graphical depiction of data hassociates with almost ling larguage COM
- What does modeling do?



Assignment Project Exam Help A model is

- a simplification of reality
- often a graphical depiction of data.

 Lassociates with almost the larguage COM
- What does modeling do?

- creates an understanding 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

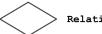
ER diagrams (Peter Chen in 1976):





inity as rectangles,

Relationship as diamonds.



Relationship



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

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

- 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 sententer hours, livel, and offering department. The value of course number is unique or each obuse.
- 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.
 https://tutorcs.com



Assignment Project Exam. Help

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https://tutorcs.com

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.

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WeChat: CStutorcs



Assignment Project Exam. Help

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 TUTOS: // tutorcs.com

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Assignment Project Exam. Help

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https://tutorcs.com

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Question that in the entities Sittle for Infantibutes?

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



Assignment Project Exam. Help

- Relationships: Associations between entities.



Assignment Project Exam. Help

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- Attributes: Properties that describe entities and relationships.
 TUDS://tutorcs.com

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



Assignment Project Exam. Help

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 TUTORS.COM

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Question: What are the entities, relationships and attributes?



Assignment Project Exam. Help

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

Question: What are the entities, relationships and attributes?

- VENITIES STUDENT LDEPARTMENT LOT CS
- 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. IUDS. / UUTOTCS. COIII



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



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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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Question wat are the constraints of leationship "has_minor_with"?



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Question Mat are the constrains of Lealonship "Bas_minor_with"?

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Assignation and the pecifies the national further turns of straining the period can participate in.

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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. TUDOTCS.COM

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



Assignment Project Exam Help

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Assignment Project Exam Help

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Entities: course



Assignment Project Exam Help

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 - Entities: course, department



Assignment Project Exam Help

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- Entities: course, department
- Relationships: offer (between department and course)



Assignment Project Exam Help

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



Assignation of the state of the

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



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Constraints on Relationships

A SSA GIAITAGE PECIFES TO A TO TUMBER X relationship the property can participate in.

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Question What are the constraints on relationship "offer"?

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).



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

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 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).

CSTUTOTCS

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A sectionships: Associations between entities. Help

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Question Weat are the entitles, relationships and attributes?

- Entities: section, course, student
- Relationships: section_taught (between section and course), grade_record (between student and section)



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- 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.

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

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Assignment Project Exam Help

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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://tutorcs.com



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

- Identify the relationships to the relationships to
 - has_major (between student and department)
 - coffer (between department and course)
 section taugh? (between Section and course)
 - grade_record (between student and section)



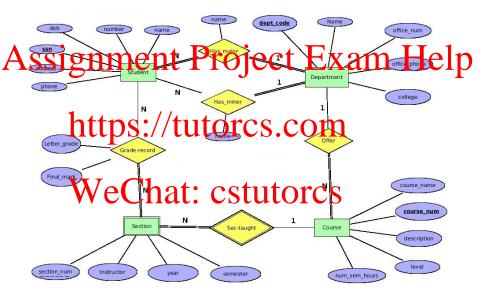
Assignment Project Exam Help student, course, department, section (weak entity)

- Identify the relationships

 Thas major (between studencare department)
 - has_major (between student and department)
 - offer (between department and course)

 rection taught (between Settle) and dourse
 - 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

- 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 emplifiles and export your ER diagrams as a UPER digure.
- You can download the jar file from the following website: https://github.com/rterrabh/TerraER/releases/download/TerraER3. 01/TerraER3.01beta.jar.
- You can double-chick that file to execute on 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.



managing information about its sale process. The company sells products in both local shops and webstores on the internet. Each local enop kazalramet certact details (e.g., ortons number and antail), and unique location. The database application also needs to store the URL(unique), name and last updated date of each webstore. Every product has a unique product b, a description, an 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 an pack order stroin et le la shop or a webstore. 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.

(Exercise 2) A retailer company wants to build a database application for



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products in both local shops and webstores of the Internet. Each local shop has, a hand, so htadt details (e.g., phone number and brhail) unique location. The database application also needs to store the URL(unique), name and last updated date of each webstore. Every product hastaronique/p/ddunttor a poscription, apritem 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 what least one product and each order is from either a shop or a webstore. 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.



Assignment Project Exam Help

Identify the entities (including weak entity types)

https://tutorcs.com



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

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

https://tutorcs.com



Assignment Project Exam Help

- Identify the entities (including weak entity types)
 shop, webstore, product, customer, order, delivery
- Identificass/syperclass and the cores for ding is jointness and completeness constraints



- Identify the entities (including weak entity types)
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- Identificass superclass and the cores for difficionness and completeness constraints
 - The company sells products in both local shops and webstores on the Internet.
 - Wachen der sassaciated with bither a shoppora webstore.



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 - Tack der sasseciated with higher a short or a webstore.
 - subclass shop, webstore
 - superclass store



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 - disjoint and complete



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 - disjoint and complete
- Identify the relationships



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Assignment Project Exam Help shop, webstore, product, customer, order, delivery

- Identify subclass/superclass and the corresponding disjointness and confidences superclass and the corresponding disjointness and confidences.
 - subclass shop, webstore
 - superclass store
- Identity the relationships Culstoner place trader CStutorcs
 - order consists of product
 - each order is from store(superclass) (either subclass shop or subclass webstore)
 - delivery is for order



Assignment Projects Exam Help shop, webstore, product, customer, order, delivery

- Identify subclass/superclass and the corresponding disjointness and cormidteness constraints utores.com

 - superclass store
- Identify the relationships
- Identifythe atribute a finities and relationships and identify a primary key for each entity type



Assignment Projects Exam Help shop, webstore, product, customer, order, delivery

- Identify subclass/superclass and the corresponding disjointness and corported persons training to the subclass shop, webstore

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 - Attributes for product: productID, description, item price, quantity



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 - Attributes for product: productID, description, item price, quantity
 - Primary key for product: productID



Soleginanies (Intluding Validation) Exam Help shop, webstore, product, customer, order, delivery

- Identify subclass/superclass and the corresponding disjointness and Completeness constraints

 Neurolas Shop/webstroncs.com

 - superclass store
- Identify the relationships
- Identity the attributes of entities and relationships and identify a primary key for each entity type 11.



shop, webstore, product, customer, order, delivery

- Identify subclass/superclass and the corresponding disjointness and Completeness constraints

 Neutrons Shop/webstron CS.COM

 - superclass store
- Identify the relationships
- Identify the attributes of entities and relationships and identify a primary key for each entity type 11.
 - The database application should also record customers' details such as their name, address and email. Every customer is assigned a unique ID.



Assignmentud by the state of the shop, webstore, product, customer, order, delivery

- Identify subclass/superclass and the corresponding disjointness and completeness constraints
 Tsutclass hop/vebttenics.com
 - superclass store
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- Identify the attributes of entities and relationships and identify a primary key for each entity type
 - The database application should also record customers' details such as their name, address and email. Every customer is assigned a unique ID.
 - Attributes for customer: name, address, email, CustomerID



Assignmentud of various Exam Help shop, webstore, product, customer, order, delivery

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- Identify the attributes of entities and relationships and identify a primary key for each entity type
 - The database application should also record customers' details such as their name, address and email. Every customer is assigned a unique ID.
 - Attributes for customer: name, address, email, CustomerID
 - Primary key for customer: CustomerID



SS dentify the entition (included week entity types) Exam Help

 Identify subclass/superclass and the corresponding disjointness and completeness constraints

- Identify the relationships
- Identify the attributes of entities and relationships and identify a primary key for when tity type at: cstutorcs



Assidentify the pritities (fintflud to weak entity tyrtes) Exam Help

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- Identify the relationships
- Identify the attributes of entities and relationships and identify a primary key for eachyentity type
 - Paccocal nature and contact Ottil Ces., phone number and email), and a unique location. The database application also needs to store the URL(unique), name and last updated date of each webstore.



Assidentify the prilities (in thud be weak entity tyrtes) Exam Help

 Identify subclass/superclass and the corresponding disjointness and completeness constraints

- Identify the relationships
- Identify the attributes of entities and relationships and identify a primary key for pachyentity type
 - Pactoral states a new total total Cas., phone number 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



Asside mily the entities (in that a weak entity tyres) Exam Help

 Identify subclass/superclass and the corresponding disjointness and completeness constraints

- Identify the relationships
- Identify the attributes of entities and relationships and identify a primary key for pachyentity type
 - Paccoal 12 as a none to batt Orbit Cas., phone number 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: <u>location/URL</u>



Assidentify the antition find flud by weak entity types) Exam Help

 Identify subclass/superclass and the corresponding disjointness and completeness constraints

- Identify the relationships
- Identify the attributes of entities and relationships and identify a primary key for pachyentity type
 - Eac Coal Sharts a new total total Cas., phone number 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
 - Attributes for subclass shop: phone number, email
 - Attributes for subclass webstore: last updated date



ssignmentud Projects Exam Help Identify subclass/superclass

Identify the relationships

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

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Assiegnmientud Projectes Exam Help

Identify the relationships

https://tutores.com

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

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Assignmentud Projectes Exam Help

Identify the relationships

https://tutores.com

- 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.



Assignmientud Projectes Exam Help

Identify the relationships

https://tutores.com

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

West mer nantiace a Stell torcs

- 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).



Assignment Project Exam Help

- Identify subclass/superclass
- Identify the relationships

https://tutorcs.com

- Identify the attributes of entities and relationships
- Identity rardinality ratios and participation constraints on relationships
 CSTUTOTCS



Assignmentul rajects Exam Help

- Identify subclass/superclass
- Identify the relationships

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

 A delivery may be requested for each order.



Assignmentu Projects Exam Help

- Identify subclass/superclass
- Identify the relationships

https://tutorcs.com

- Identify the attributes of entities and relationships
- Identify cardinality ratios and participation constraints on relationships
 - A delivery may be requested for each gracer.
 - Cardinality ratios: A delivery is for at most one order and an order has at most one delivery.



Assignmentur Projects Exam Help

- Identify subclass/superclass
- Identify the relationships

https://tutorcs.com

- Identify the attributes of entities and relationships
- Identify pardinality ratios and participation constraints on relationships
 - A delivery may be requested for each order.
 - 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).
 An order may or may not have a delivery (Partial).



Assignmentud projectes Exam Help

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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Assignmentud projectes Exam Help

Identify the relationships

https://turtures.com

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



Assignmentud projectes Exam Help

Identify the relationships

https://turtures.com

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

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Cardinality ratios: An order may contain many products and an product may be contained in many orders.



Assignmentud projectes Exam Help

Identify the relationships

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

MacColder Christitis of Cat Seas Une Opticis

- 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)
- Idehritstings sypertius torcs.com
- Identify the relationships
- Identify the attributes of entities and relationships
- Identity cardinality ratios and participation constraints on relationships
 CSUULOTCS



Assignment Project Exam Help

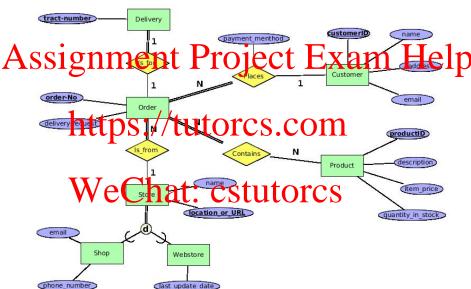
Constructing an ER or EER Model

- Identify the entities (including weak entity types)
- Ide hist things so support that orcs.com
- Identify the relationships
- Identify the attributes of entities and relationships
- Identity radicality ratios and participation constraints on relationships
- 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 kazalramet certact details (e.g., ortono number and antail), and 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 b, a description, an 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 an had forder stroin et le la shop or a webstore. 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 model is translated onto a logical data model, which can be unther primed (e.g., normalisation) to meet the data requirements. For example,

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 To: Relations with their primary and foreign 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

A Sest separation of the leading the model of the Material and roled posterior the EER model.

Step 1: Mapping of Regular Entity Types

h Step 2: Mapping of Weak Entity Types

Mapping billina y 1 Challation Ship Types

- Foreign key approach
- Merged relation approach

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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

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Step 1: Regular Entity types

Assignment in the lattiful type properties a relation schema with the lattiful telepolicy of the lattiful telepolicy where a with the lattiful telepolicy where a with the lattiful telepolicy of the lattiful tel

PK: the key attributes of E



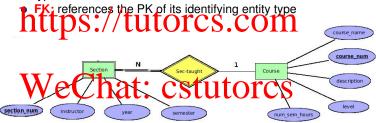
- COURSE(course_num, course_name, description, num_sem_hours, level)
 with PK: {course_num}
- Note: This is not necessarily the final relation schema of Course.



Step 2: Weak Entity Types

Assignment weak entity type D, or eate a relation schema with the attributed p

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

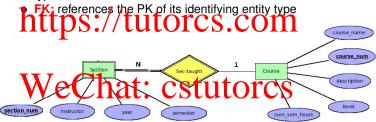




Step 2: Weak Entity Types

Assiproach weak entity type D, ereate 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]



SFpre tra relationship type Pointy one total participation extend the Leap the Points 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

PK references the PK of the partial-side entity type

PK of the partial-side entity type





A SSF program retationship type Byrith one total particle attorn externs the Let p 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

FK1 references the PK of the partial-side entity type

TCD S. C. O'THE



PK: {Name}

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



A SSF program retationship type P with one databartic participation a stem the Le 1 p the Relation 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

FK references the PK of the partial-side entity type

TUPS:



PK: {Name}

FK: [Mgr_SSN]⊆EMPLOYEE[SSN].

• How can we model the total participation?



A SS Force 111 retationship type Revitty one total participation externs the Let p the lettion 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

FK references the PK of the partial-side entity type

TUPS:



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 retationship type Remitty one total participation externs the Le 1p relation 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

FK references the PK of the partial-side entity type

TUPS:



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 retationship type Revitty one total participation externs the Let p the lettion 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

FK references the PK of the partial-side entity type

TUPS:



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.



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

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

Assignment the Power interest reasoning true? 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.
 EMPLOYEE-DEP(SSN, Name, Salary, Start_date, Dname, Address) with
- EMPLOYEE-DEP(SSN, Name, Salary, Start_date, Dname, Address) with PK: {SSN} or {Dname}



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.
 EMPLOYEE-DEP(SSN, Name, Salary, Start_date, Dname, Address) with
- EMPLOYEE-DEP(SSN, Name, Salary, Start_date, Dname, Address) with PK: {SSN} or {Dname}
- How can we model the total participations?



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.
 EMPLOYEE-DEP(SSN, Name, Salary, Start_date, Dname, Address) with
- 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.



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.
 EMPLOYEE-DEP(SSN, Name, Salary, Start_date, Dname, Address) with
- 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?



Assignment the Project reconstant 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.
- However, melging Hart is no always a good solution. Why?



Assignment the Project reconstant 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.
- However, merging traitis negatives agood solution. Why?
 - (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) .



Assignment to Project to Einstand Help



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Assignment to Project to Example 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.
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Assignment to Project to Einstein 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.
- MANNEGEN, Inputsiar Gast With torcs

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.
- MANNESS N, Introt Star Gas With TOTCS
 PK: {SSN} or {Dname}

FKs: [SSN] EMPLOYEE[SSN] and [Dname] 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.
- MANNESS IN TRANSPORTS THE CAST WILL TO I'CS

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

Spreach 1: Nelationship type Resident the relationschama of the electronschama of the el type, where

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





Step 4: Binary 1:N Relationship Types

A SS For each 1: Naclationship type R extend the relation schema of help 1 p type, where

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

https://tutorcs.com
name dept.code Name office_num
address Veesuenat: CStutoroarths
college

 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

A SS Foreart M:Ny None ation on poly type & create Frentien acromal with 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



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 moltivalued fittricular A greate and latter scheme with a Lelp attribute corresponding to A plus 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 . / the best type that has A

the property of the entity relationship type that has A





Step 6: Multi-valued Attributes

A SS Forearh moltingalured futtricularly greate and latter schemon with a Lelp attribute corresponding to A plus 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 . / the beautiful continuous and the pk of the entity/relationship type that has A



EMPLOYEE_ADDRESS(SSN, Address) with

PK: {SSN, Address}

FK: [SSN] EMPLOYEE[SSN]



ER-to-Relations Algorithm (Recall)

A SST QUAINTOINTOINT THE DISICE PRODE INTO PAINTS AND THE P

Step 1: Mapping of Regular Entity Types

h Step 2: Mapping of Weak Entity Types Mapping of Hinay II Challetton Ship Types

- Foreign key approach
- Merged relation approach

WeChars-reference and particulars

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



Revisit Subqueries – Use LEFT/RIGHT JOIN?

Assistall students: Depute newly as under Involved 14 purses in 1p

```
SELECT s.StudentID, s.Name
FROM (SELECT e.StudentID, COUNT(*) AS NoOfEnrols
                        OF THE TUIL OF CS. COM
                                  GROUP BY e.StudentID) ne RIGHT JOIN STUDENT s
ON (s.StudentID = ne.StudentID) AND (ne.NoOfEnrols < 4);</pre>
                           SCUMENTOIS AS (
SELECT A trude CIS, the TAC AS SELECT A trude CIS, the Tac AS SELECT A
                                 FROM ENROL e
                                 WHERE e.Semester = '2016 S2'
                                 GROUP BY e.StudentID)
SELECT s.StudentID, s.Name
FROM STUDENT & LEFT JOIN StudEnrols ne
ON (s.StudentID = ne.StudentID) AND (ne.NoOfEnrols < 4);</pre>
```



Subqueries – Using LEFT/RIGHT JOIN Is Still Incorrect!

September 1975 and names who are under involled (< 4 courses in 1975) September 1976 (< 4 courses in 1976) September 1976

	StudentID	CourseNo	Semester				
	111	BUSN2011	2016 S2				
4	111	COMP1100	2016 S2				
ı	144	COMF 2406-	-2016 S2 -	CC PA	Matill in	corroc	+2).
ı		FCO/12/102	20 [6 S2]	CS. BO	ı (şun m	COLLEC	<i>ι</i> : <i>)</i> .
	222	BUSN2011	2016 S2				
	222	COMP2400	2016 S2		StudentID	Name	
	333	BUSN2011	2016 S2				
	333	COMP2400	2016 S2		111	Tom	
L	323	ECON2102	2016 S2		222	Emily	
Λ	70	CO 1	2010 02	4774040	333	John	
	VV EI				444	Ana	

StudentID	Name	
111	Tom	
222	Emily	
333	John	
444	Ana	

STUDENT		
StudentID	Name	
111	Tom	
222	Emily	
333	John	
444	Ana	

The reason why "111, Tom" is incorrectly included in the final result is due to "Query Processing and Optimisation", which will be discussed in Week 8.



Subqueries – Use Set Operations

Assignment de la resuje ceter Encourte de la propertie de la ceter en la ceter

The set of all students EXCEPT the set of students enrolled in at least 4

ntips://tulentro.ts.com

FROM (SELECT StudentID FROM STUDENT

Westatidestutores

FROM ENROL e

WHERE e.Semester = '2016 S2'

GROUP BY e.StudentID

HAVING COUNT(*) > 3) e4 INNER JOIN Student s

ON (e4.StudentID = s.StudentID);



Subqueries – Using Set Operations Works.

Assisting the content of the content

		ENROL		
	StudentID	CourseNo	Semester	
1	1111	BUSN2011	2016 S2	
1	11	COMP1700	20 6 S2 20 6 S2	cs.com
		COMP2400	20+6 S2	
	111	ECON2102	2016 S2	Result:
	222	BUSN2011	2016 S2	11000111
	222	COMP2400	2016 S2	
	333	BUSN2011	2016 S2	StudentID Name
1	333	CD //P2400 /	_ 2016 S2 _	222 Emily
	V 331	EC/0N 21/02	2016 S2	stutores 333 John Ana
				444 Ana

STUDENT		
StudentID	Name	
111	Tom	
222	Emily	
333	John	
444	Ana	



(Credit Cookie) Graph Model and ER Diagram



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(Credit Cookie) Graph Model and ER Diagram

Assignment Reject Exam Help Carl Gottlieb Ehler (1685-1753) https://tutorcs.com

Seven Bridges of Königsberg

Euler (1707-1783)

With the Chility-Relationship Model Toward a

PETER PIN-SHAN CHEN

Massachusetts Institute of Technology

- 1st paper in ACM Transactions on Database Systems in 1976
- 1st international conference on very large data bases (VLDB) in 1975