
Tutorial 2

CSC 343

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Overview

1. Keys and Referential Integrity

2. ER Diagram Construction
 - A. Task and Requirements Given
 - B. Sample Solution Explained



Keys and Referential Integrity

Consider the relations in a banking database given by the following schema:

- Branch (branchName, address, city, sales, manager)
- Customer (cID, firstName, lastName, address, city, birthDate, phoneNum, totalAssets)
- Loan (loanNum, branchName, amount, duration, interest)
- Borrower (cID, loanNum)
- Account (acctNum, branch, balance, type)
- Depositor (cID, acctNum)



Keys and Referential Integrity

BRANCH provides information on the branch name, it's street address, city, total sales thus far for the year, and the branch manager.

CUSTOMER records customer information such as a customer ID (cID), their name, street address, city, birth date, telephone number, and total assets recorded.

LOAN records information about loans, specifically, the loan number, the branch that opened the loan, the amount, duration period, and yearly interest rate.

BORROWER associates a customer to a loan.

ACCOUNT provides details about bank accounts such as the account number, the home branch, the current balance, and the type of account.

DEPOSITOR associates a customer to an account.

Branch (branchName, address, city, sales, manager)
Customer (cID, firstName, lastName, address, city, birthDate, phoneNum, totalAssets)
Loan (loanNum, branchName, amount, duration, interest)
Borrower (cID, loanNum)
Account (acctNum, branch, balance, type)
Depositor (cID, acctNum)



Keys and Referential Integrity

Your Task:

1. Identify the primary key for each relation. For each key, briefly state the assumptions or conditions under which each key would be valid.
2. Given your choice of primary keys in (1), define four referential integrity constraints. What are the appropriate primary to foreign key references.

Branch (branchName, address, city, sales, manager)

Customer (cID, firstName, lastName, address, city, birthDate, phoneNum, totalAssets)

Loan (loanNum, branchName, amount, duration, interest)

Borrower (cID, loanNum)

Account (acctNum, branch, balance, type)

Depositor (cID, acctNum)



Banking DB – Sample Solution

- Branch (branchName) **depending on your assumption, assumptions need always be stated*
 - *assumption:* branch names are unique; i.e. no two branches can have the same name
- Customer (cID)
- Loan (loanNum)
- Borrower (cID, loanNum) → both of which are Foreign Keys: Customer (cID) and Loan (loanNum)
- Account (acctNum) **depending on your assumption, assumptions need always be stated*
 - *assumption:* account numbers include the transit number and institution number, making them unique; i.e. no two accounts can have the same number
- Depositor (cID, acctNum) → both of which are Foreign Keys: Customer (cID) and Account (acctNum)



ER Diagram Construction Task

- You have been hired by UTM Travel Inc. as a Database Architect. The first task assigned to you is to create an ER diagram describing the schema of their tour operator business. Specifically, UTM Travel Inc. is looking for you to design a database that tracks its people.
- Draw the E-R diagram capturing the described requirements.



Requirements

- Each person should have their address recorded; exactly one address is designated as the mailing address. An address contains: a street number, street name, P.O. Box (where applicable), city, province (or state where applicable), and country. Corresponding (possibly empty) phone numbers can be associated to each person's address; both a phone number and a fax number. Each person, in addition, may have cell phone numbers and a list of email addresses (both could potentially be empty).
- Each person may be a past customer, a current customer, a tour guide, an employee, or any combination of these. A past customer is a person who has taken a tour with the company previously. A current customer is presently booked on a tour. An example of "any combination of these", can be an employee taking a tour; making the employee a customer. An alternative example would be an employee working as a tour guide for a particular tour.



Requirements

- For every person, we must record their name, age, and gender. The person's date-of-birth is optional. Furthermore, whenever a tour guide is on a tour, a guide contract must reference the tour, providing information of the amount a tour guide is compensated for their work.
- Our database records all tours that have ever occurred; past, present and future. Being in the 21st century, we are not concerned with storage issues. Each tour will have an associated: guide, ID, itinerary, status, and a list of all customers participating in the tour. Each tour may have one or more guides. Each tour's status must be one of three states: completed, in-progress, or in-the-future. Each tour's itinerary must list all the dates of the tour. For each date, there is a simple text description of the activities for the day, the locations of all accommodations, and locations for breakfast, lunch and dinner.



Requirements

- Accommodations and meals are arranged by Providers; uniquely identifiable. Accommodations can be either a hotel, rooms rented for the tour, or a combination of the two. A meal (defined as: breakfast, lunch or dinner) can be scheduled in a restaurant or a hotel. The types of services are: accommodations and meals. A contract exists between providers and itineraries to show clients the services provided. Contracts depict a service's start and end date(s), the type of service provided, pricing, and all (if any) financial penalties that one can accrue. A service date speaks of when an accommodation or meal is to be provided). All monetary sums and prices are assumed to be in Canadian dollars (i.e. CAD defined by the ISO 4217) and no currency conversion is required.

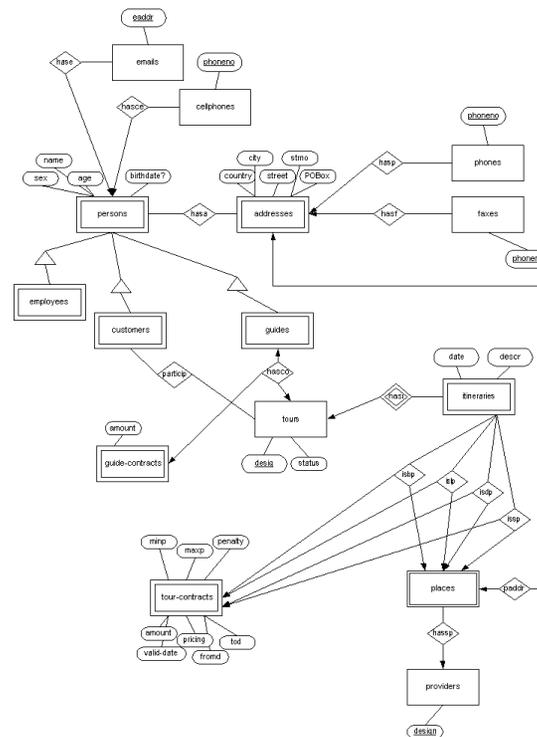
Requirements – Overview

Task: create the ER Diagram to model the requirements

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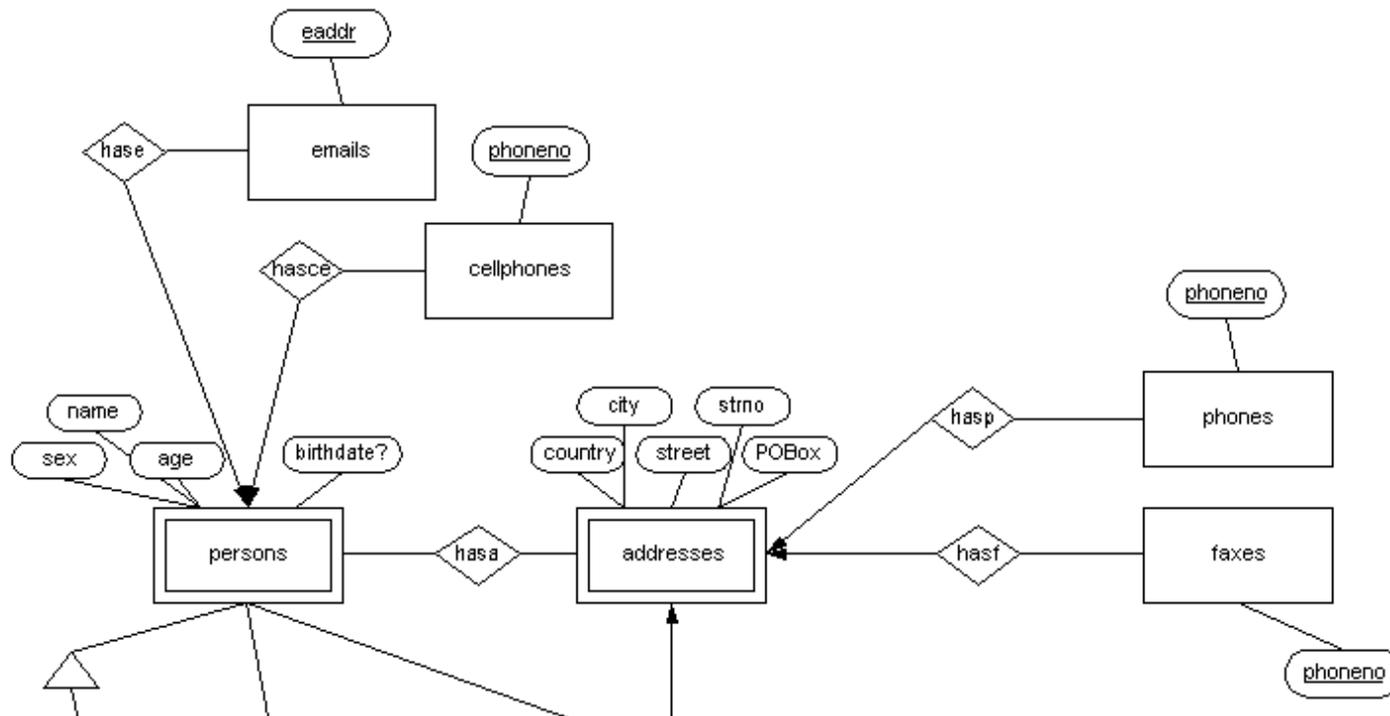


ER Diagram – Sample Solution



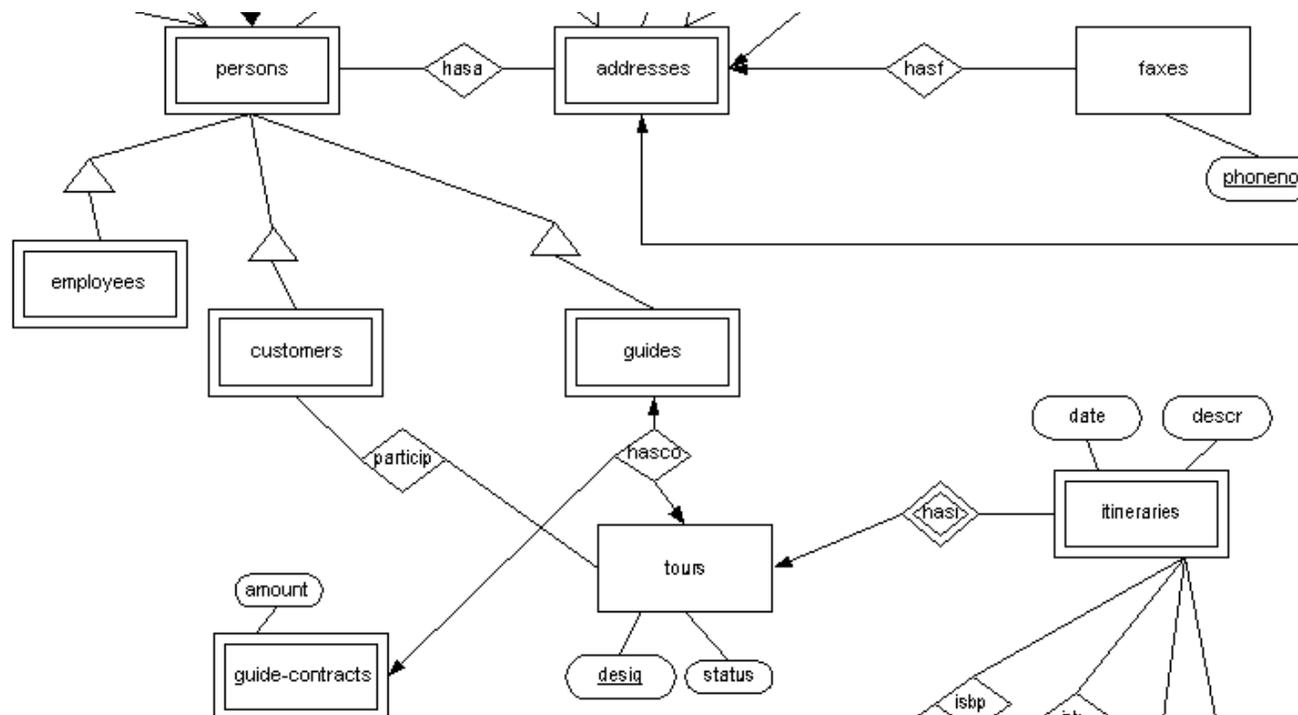


ER Diagram – Sample Solution



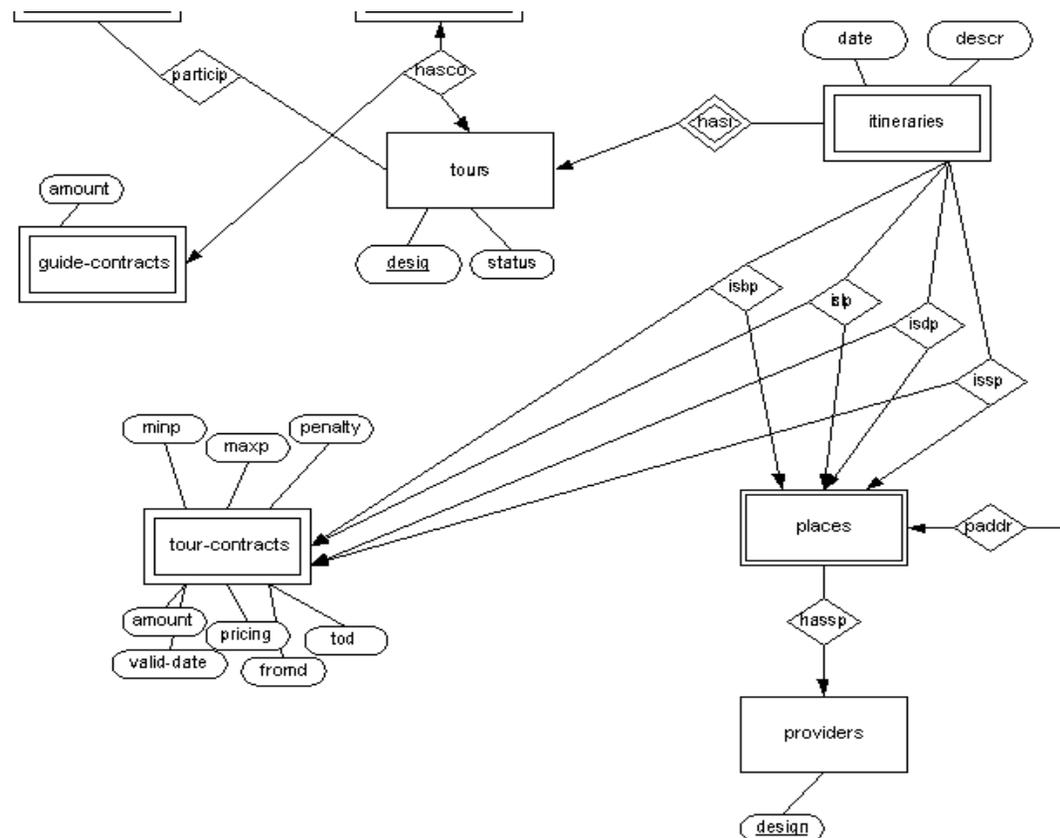


ER Diagram – Sample Solution





ER Diagram – Sample Solution





Any Questions?

- Do you have any questions?
- If you have any content that you would like to be added in a Tutorial, please let me know by Friday!
 - Email request to me: nafiz.hossain@utoronto.ca