SAt 3210 Assignment 1
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1.7, 1.15, 2.5, 2.6, 2.7, 2.12, 2.13, 2.15, 2.18

1.7) List four significant differences between file processing systems and a DBMS

1. File processing does not offer data recovery.
2. Storing/retrieving data is much more difficult in file processing than in a DBMS.
3. File systems have much less redundancies
4. File processing provides details about the data, but DBMS only provides an abstract view

1.15) Describe at least three tables that might be used to store information in a social-network system

1. People/user table which stores info about the people using the network - age, name, ect.
2. Friends table which stores info about accounts that are connected
3. Permissions table which stores which users can view/interact with what content.

2.5) What is the result of $\sigma_{S.id=ID}(student \times Advisor)$

The table will contain all attributes of the students and advisors. Each row will contain a student ID and that student's advisor's ID. If a student has more than one advisor, they will show up multiple times, and vice versa for a student who an advisor, they will not show up.

2.6) Give an expression in relational Algebra to express:

A. Find the name of employes who live in Miami

$\Pi_{name}(\sigma_{city="Miami"}(employee))$

B. Names of employees whose salary is greater than $100,000

$\Pi_{name}(\sigma_{salary>100,000}(employee))$

C. Names of Employees who live in Miami + salary >100,000

$\Pi_{name}(\sigma_{city="Miami" \wedge salary>100,000}(employee))$

2.7) Give an expression in relational Algebra to express:

A. Find the name of each branch located in Chicago

$\Pi_{branch\_name}(\sigma_{branch\_city='Chicago'}(branch))$

B. Find the ID of each borrower who has a loan in branch Downtown

$\Pi_{customer\_name}(\sigma_{branch\_name='Downtown'}(borrower \bowtie loan))$

2.12) Assume Branch names and customer names uniquely identify branches/customers, but loans and accounts don't.

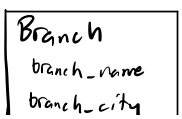
A) What are the appropriate primary keys.

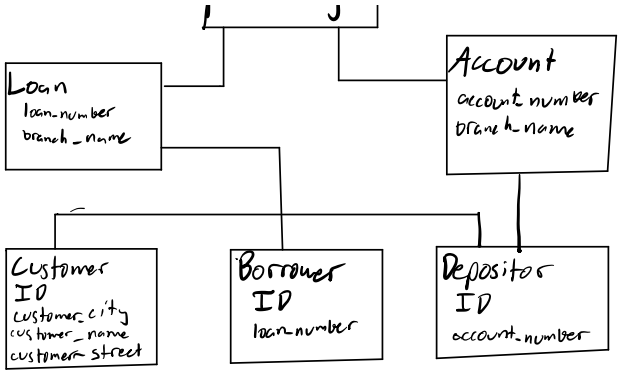
Branch - branch_name
Customer - ID
Loan - loan_number
Borrower - ID + loan_number
Account - account_number
Depositor - ID + account_number

B) Identify foreign keys

Branch - none
Customer - none
Loan - branch_name
Borrower - ID + loan_number
Account - branch_name
Depositor - ID + account_number

2.13) Construct a schema diagram of Fig. 2.18





2.15) Give an expression in relational algebra for the following

A. Find each loan number with a loan greater than $10,000

$\Pi_{loan\_number}(\sigma_{amount>10000}(loans))$

B. Find the ID of each depositor who has more than $6000

$\Pi_{ID}(depositors \bowtie_{depositors.account\_number = account.account\_number}(\sigma_{balance>6,000}(account)))$

C. Find the ID ------ at the "Uptown" branch

$\Pi_{ID}(depositors \bowtie_{depositors.account\_number = account.account\_number}(\sigma_{balance>6,000 \text{ and } branch\_name='uptown'}(account)))$

2.18) Write the following queries in relational Algebra

A. Find the ID and name of physics instructors

$\Pi_{ID, name}(\sigma_{department='physics'}(instructor))$

B. ID and name of instructors in Watson

$\Pi_{ID, name}(\sigma_{department\_building='Watson}(instructor \bowtie department))$

C. ID and name of students who have taken a Comp. Sci. class

$\Pi_{ID, name}(\sigma_{course.dept\_name="Comp\ Sci."}(Student \bowtie takes \bowtie section \bowtie course))$

D. ID and name of students who took atleast one course in 2018

$\Pi_{ID, name}(\sigma_{year=2018}(students \bowtie takes \bowtie section))$

E. ID and name of students who did not take classes in 2018

$\Pi_{ID, name}(\sigma_{year < > 2018}(students \bowtie takes \bowtie section))$