Review

What are the different types of keys?

students (utorid, student_number, first_name, last_name, address)

marks (first_name, last_name, grade)

A super key is a set of attributes that can uniquely identify any row in the relation.

(email_address, first_name, last_name)

(utor_id, student_number)

(student_number, primary_address)

What can't be super keys?

(primary_address) - Multiple students could live at the same address.

(last_name, primary_address) - Multiple students could live at the same address and share the same last name.

A candidate key is a super key with no redundant attributes.

(email_address)

(utor_id)

(student_number)

A primary key is a candidate key that is chosen by the database designer. I might choose to identify students with their student number because it is more space efficient to store a 4-bit number. I might choose to identify students with their email address because it is more descriptive.

Question 1:

The first thing to do is to read and remember the question. Right off the bat, we can tell that branch names and customer IDs can uniquely identify any tuple inside the branches and customers relation.

branch (branch_name, branch_city, assets)

customer (ID, customer_name, customer_street, customer_city)

Now, if you remember from your B07 Software Design, a good way to design any sort of program is to consider the use cases.

We know that a customer can have multiple loans, so here, it makes sense for us to associate a unique loan_number attribute. Whenever someone wants to borrow some money, we will want to uniquely identify this transaction with a new loan number.

loan (loan_number, branch_name, amount)

borrower (ID, loan_number)

We know that customers might want to share accounts. We also know that customers might have multiple accounts. For example, if I was married to someone, then I might want to share an account with my wife. So in this case, I might want to say that account_number can uniquely identify every different account. However, depositors can only be uniquely identified with both the customer ID as well as the account number.

account (account_number, branch_name, balance)

depositor (ID, account_number)

Question 2:

A foreign key is an attribute in a table that reference the primary key in another table.

loan [branch_name] FOREIGN KEY branch [branch_name]

account [branch_name] FOREIGN KEY branch [branch_name]

borrower [loan_number] FOREIGN KEY loan [loan_number]

or

loan [loan_number] FOREIGN KEY borrower [loan_number] (but 1st one makes more sense, because the loan relation has higher precedence than the borrower relation)

depositor [ID] FOREIGN KEY customer [ID]

borrower [ID] FOREIGN KEY customer [ID]

depositor [account_number] FOREIGN KEY account [account_number]