EPPS 6354: Information Management

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Assignment 2

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Questions

- Q1: What are the differences between relation schema, relation and instance? Give an example using the university database to illustrate.
- Q2: Draw a schema diagram for the following bank database:

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branch(*branch_name*, *branch_city*, *assets*)
customer (*ID*, *customer_name*, *customer_street*, *customer_city*)
loan (*loan_number*, *branch_name*, *amount*)
borrower (*ID*, *loan_number*)
account (*account_number*, *branch_name*, *balance*)
depositor (*ID*, *account_number*)

- Q3: . Consider the above bank database. Assume that branch names (branch_name)and customer names (customer_name)uniquely identify branches and customers, but loans and accounts can be associated with more than one customer.

  i. What are the appropriate primary keys? (Underline each in diagram)

  ii. Given your choice of primary keys, identify appropriate foreign keys.

Q1: Relation Schema, Relation and Instance Comparisons

- **Relation Schema:** A relation schema defines the structure of a table in a relational database. It specifies the names and types of attributes (columns) that will be present in the table. A relation schema consists of attributes and domains.

- **Relation:** A relation, often referred to as a table, is the actual implementation of a relation schema. It is a set of rows, where each row represents a record or tuple, and each column represents an attribute. The department relation contains data about the departments in rows as records.

Department
Dept_name
Building
Budget

Figure 1: Sample of the "Department" relation schema

dept_name	*building*	*budget*
Biology	Watson	90000
Comp. Sci.	Taylor	100000
Elec. Eng.	Taylor	85000
Finance	Painter	120000
History	Painter	50000
Music	Packard	80000
Physics	Watson	70000

Figure 2: Sample of the "Department" relation

Source: Silberschatz, A., Korth, H. F., & Sudarshan, S. (2011). Database system concepts. McGraw-Hill.

Q1: Relation Schema, Relation and Instance Comparisons

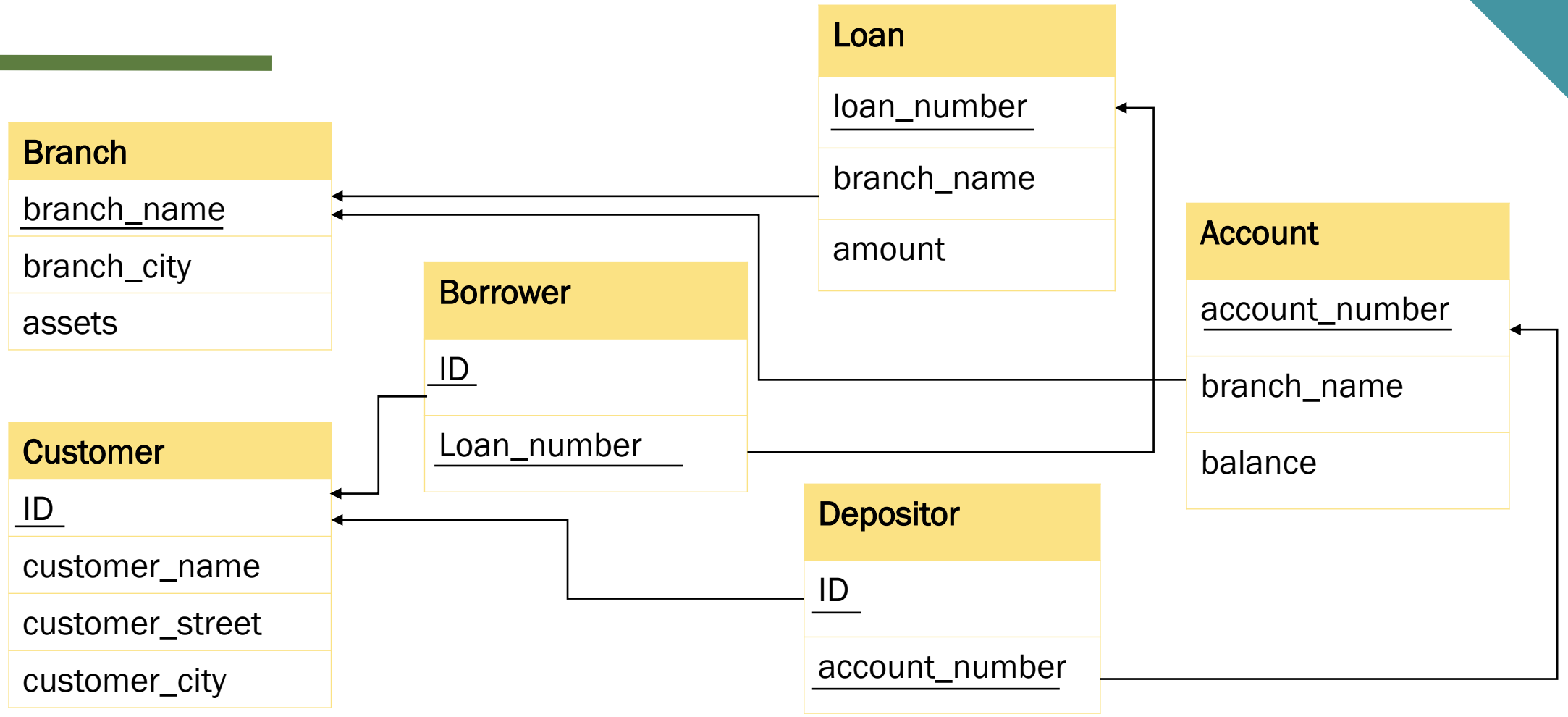
- **Instance:** An instance of a relation refers to the specific set of data contained in the relation at a given point in time. It represents the actual rows and values present in the table.
- For example, the current data in the “Teaches" relation, including all existing course records, forms an instance of that relation.

ID	*course_id*	*sec_id*	*semester*	*year*
10101	CS-101	1	Fall	2017
10101	CS-315	1	Spring	2018
10101	CS-347	1	Fall	2017
12121	FIN-201	1	Spring	2018
15151	MU-199	1	Spring	2018
22222	PHY-101	1	Fall	2017
32343	HIS-351	1	Spring	2018
45565	CS-101	1	Spring	2018
45565	CS-319	1	Spring	2018
76766	BIO-101	1	Summer	2017
76766	BIO-301	1	Summer	2018
83821	CS-190	1	Spring	2017
83821	CS-190	2	Spring	2017
83821	CS-319	2	Spring	2018
98345	EE-181	1	Spring	2017

Figure 3: Sample instance of the “Teaches” relation

Source: Silberschatz, A., Korth, H. F., & Sudarshan, S. (2011). Database system concepts. McGraw-Hill.

Q2: Schema diagram for a bank database:



Q2: Schema diagram for a bank database:

Schema description:

- Arrows connect the foreign keys to their reference tables or relations.
- Primary keys are underlined, some relations have two primary keys.

Q3: Primary keys in bank database

branch(*branch_name*, *branch_city*, *assets*)
customer (*ID*, *customer_name*, *customer_street*, *customer_city*)
loan (*loan_number*, *branch_name*, *amount*)
borrower (*ID*, *loan_number*)
account (*account_number*, *branch_name*, *balance*)
depositor (*ID*, *account_number*)

A primary key is a special attribute or combination of attributes within a database table that uniquely identifies each record in that table.

- It is common to list the primary key attributes first when defining a relation schema.

Q3: Foreign keys in bank database

branch(*branch_name*, *branch_city*, *assets*)
customer (*ID*, *customer_name*, *customer_street*, *customer_city*)
loan (*loan_number*, *branch_name*, *amount*)
borrower (*ID*, *loan_number*)
account (*account_number*, *branch_name*, *balance*)
depositor (*ID*, *account_number*)

Foreign keys establish relationships between the tables.

- For example, the foreign key in the Loan table relates to the primary key in the Branch table, indicating which branch the loan is associated with.
- Similarly, foreign keys in Borrower and Depositor tables establish relationships with Customer, Loan, and Account tables.

Thank you