

Database Design in HMDA

1. Introduction

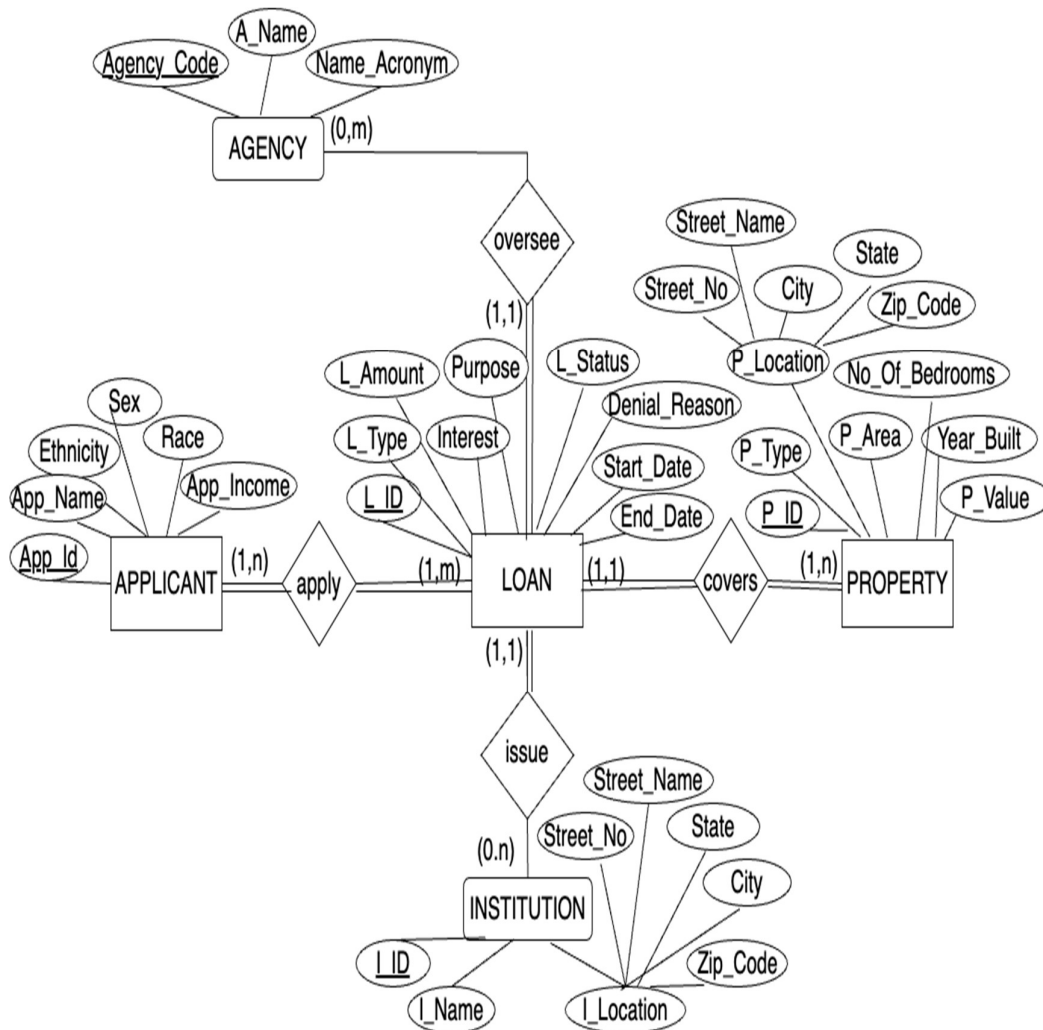
HMDA (Home Mortgage Disclosure Act) data is readily accessible on the Consumer Financial Protection Bureau's website. Adam reached out to Yana Rusovski, who serves as the Director of Compliance within the Department of Housing and Urban Development (HUD) in Chicago, specifically in the FHEO (Fair Housing and Equal Opportunities) division. Yana frequently incorporates HMDA data into her professional responsibilities.

2. Description of the Organization

The database stores data regarding loans granted by financial institutions in Illinois to make sure they comply with the Home Mortgage Disclosure Act and provide a way for federal agencies to confirm that institutions are engaging in non-discriminatory behavior as well as providing data to develop new public policies. It contains data about the applicant, the property belonging to the applicant, the loan applied to, the financial institution providing the loan, and the federal agency that oversaw the loan.

- Every applicant has at least one loan that they applied for and can have many of them. Every applicant will be identified by an applicant id. Each one has a name, ethnicity, race, sex, and income.
- Each property can be covered by multiple loans and must be covered by at least one. Every property will be identified by a property id. Each property has a type, location (street name, street number, city, state, zip), number of rooms, year built, total area, and total value of the house.
- Every loan has exactly one federal agency overseeing fair and compliant distribution of the loan, exactly one institution lending the loan, one property that it covers, and there can be multiple applicants per loan, but there must be at least one. Every loan will be identified by a loan id. Each of these loans has a type, purpose, amount, interest, status (of approval), denial reason, start date, and end date.
- The financial institution refers to the lender. Each institution can lend many loans. Every financial institution has a federally generated lender id. They will also have a name and location (street name, street number, city, state, zip).
- The agency pertains to entities responsible for regulating and overseeing mortgage-related activities. Every agency can oversee many loans. Every agency has a unique code to be identified by. They will also have a name and an acronym for that name.

3. ER Diagram

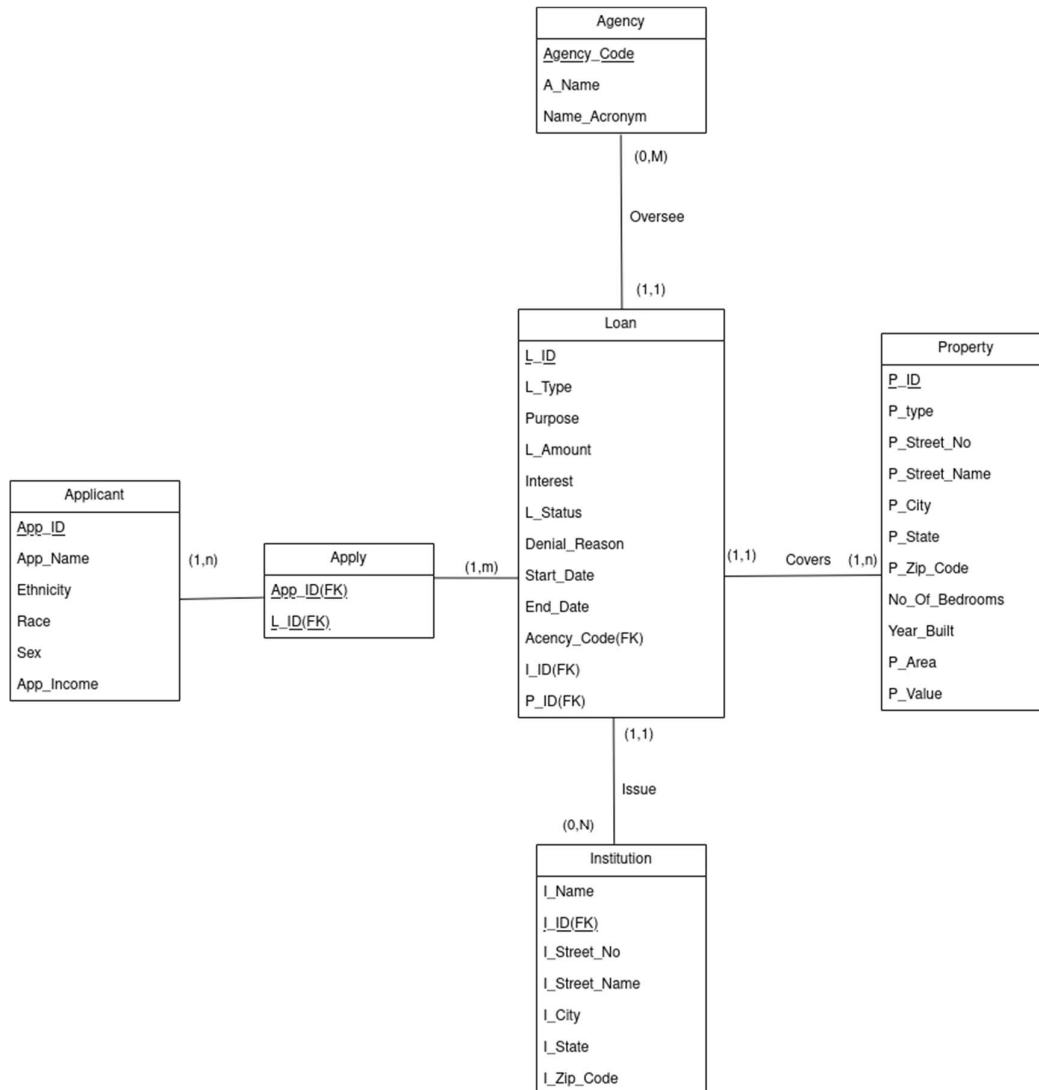


4. ER Diagram Uncaptured Constraints

- 1. Loan amount and applicants' income are positive and in U.S dollars.
- 2. Loan interest represents the percent increase per year.
- 3. Loan start_date and end_date is in the standard U.S format 'MM/DD/YYYY'
- 4. Sex, race, and ethnicity in applicant have a set of predefined values
- 5. Loan status, purpose, type, and denial_reason have a set of predefined values.
- 6. All the financial institutions and federal agencies are in the U.S.
- 7. Property Value is positive and in U.S dollars.

5. Relational Schema

- This section provides the relational schema with referential integrity and the relational table details.



6. Queries

The following table summarizes the queries in the HMDA Database.

Query Name	Description	Output	Relations Accessed
#1. Loan App Denied Per Month Year 2017	This query will show how many loan applications have been denied by which institution and agency and what was the percentage and reason of denial for each month of the year '2017'.	<ul style="list-style-type: none"> ● Institution Name ● Agency Name ● Year ● Month ● Total Applications ● Denial Count ● Denial Percentage ● Denial Reason 	<ul style="list-style-type: none"> ● Loan ● Institution ● Agency
#2. Average Loan Per Applicant Below Average Income	It finds the average income, total number of loans, average interest rate, and average loan amount per applicant with an income at or below the average. Order by applicant income descending.	<ul style="list-style-type: none"> ● app_id ● app_income ● Count_loans ● Average_interest ● Average_amount ● average_income 	<ul style="list-style-type: none"> ● applicant ● apply ● loan
#3. Average income and average number of loans per sex/race	<p>List the average income</p> <p>And average number of</p> <p>Loans per sex/race</p> <p>Combination</p> <p>Order by number of loans and income</p>	<ul style="list-style-type: none"> ● Applicant.Sex, ● Applicant.Race, ● Applicant.App_Income, ● Loan.L_ID ● Applicant.App_ID ● Apply.App_ID 	<ul style="list-style-type: none"> ● Applicant ● Apply ● Loan
#4. The number of loan and average property value	List the count of loans and the average property values supervised by each agency, considering only properties valued over 300,000 and agencies with more than one loan. Sort the results in ascending order based on the average property values.	<ul style="list-style-type: none"> ● A_Name ● num_loans ● Average_value 	<ul style="list-style-type: none"> ● Agency ● Loan ● Property