Stage IV – Elaboration: Design
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TOWN table

- This table is in BCNF because the attribute, Tcode, is the superkey for this relational schema. Each functional dependency from Tcode is trivial, meaning the resulting tuples from each Tcode are unique and are within the set of Tcode's values.

Tcode	Tname	County	Sustain_Rating
07430	Ringwood	Passaic	Average
08638	Ewing	Mercer	Average
07307	Jersey City	Hudson	Below Average

RESTAURANT table

- This table is in BCNF because it also contains the superkey for this relational schema, Tcode. However, the functional dependency is not trivial because there could be multiple restaurants that are vegan-friendly within the same Tcode.

Rname	TCode	Vegan_Friendly	Rest_Sustain_Rating	Address
Artemio's Prime & Proper	07430	Yes	High	1131 Greenwood Lake TPKE Ringwood, NJ 07456
The Hutton Restaurant & Bar	07307	Yes	High	225 Hutton St Jersey City, NJ 07307

VEGAN_OPTIONS table

- Although this table does not contain the superkey for this relational schema, it is still in BCNF. That is, because each restaurant in the table will have its own unique set of options, which makes the functional dependency trivial.

Rname	Options
Artemio's Prime & Proper	Salads, Substitute Tofu for most entrees, Cauliflower steak
The Hutton Restaurant & Bar	Small Cheese Plates, Chickpea pasta and vegetables, veggie burgers

SUSTAINABILITY table

- This table is in BCNF because it contains the superkey for this relational schema, Tcode, and each town in the table produces its own unique sustainability statistics. This shows that the functional dependency of Tcode is trivial.

Tcode	CO2_Emissions	Energy_Per_Acre_ Per_Year	Sustain_Rating	Perc_Renew_Energy
07430	20k - 40k	357 MWh	Average	25%
07307	70k - 5M	300 MWh	Below Average	16%

- Define the different views required. For each view list the data and transaction requirements. Give a few examples of queries, in English, to illustrate.

  town_sustain_view:

```
----
SELECT sustain_rating,
Tcode,
Tname,
County,
        ...
FROM Town
---------------------------------------------------------------------------------------
```

  restaurant_sustain_view:

```
----
SELECT Rname,
Tcode,
rest_sustain_rating,
Address,
        ...
FROM Restaurant
```

---

restaurant_sustain_vegan_view:

```
SELECT Rname,
Tcode,
rest_sustain_rating,
Address,
Options,
            ...
FROM Restaurant
  JOIN Vegan_Options
```

---

vegan_options_view:

```
SELECT Rname,
Tcode,
vegan_friendly,
Options,
            ...
FROM Restaurant
  JOIN Vegan_Options
```

---

sustainability_view:

```
SELECT Tcode,
CO2_Emissions,
Sustain_rating,
Options,
            ...
FROM Sustainability
```

---

town_sustainability_view:

```
SELECT Tcode,
CO2_Emissions,
Energy_Per_Acre_Per_Year,
Sustain_Rating,
Perc_Renew_Energy,
Tname,
County,
Sustain_Rating
            ...
FROM Town
  JOIN Sustainability
```

- Design a complete set of queries to satisfy the transaction requirements identified in the previous stages.
    - **TOWN Queries**
        - Retrieve all towns from TOWN and display info (Tcode, Tname, County, and/or Sustain_Rating).
        - Retrieve info (Tcode, Tname, County, and/or Sustain_Rating) on a town named ‘Specific Town’ from TOWN.
        - Retrieve info (Tcode, Tname, County, and/or Sustain_Rating) on a town in ‘Specific County’ from TOWN.
        - Retrieve info (Tcode, Tname, County, and/or Sustain_Rating) on a town with Tcode ‘Specific Tcode’ from TOWN.
        - Retrieve towns which have a (high, average, low) sustain ratings from TOWN and display info (Tcode, Tname, County, and/or Sustain_Rating).
    - **RESTAURANT Queries**
        - Retrieve all restaurants from RESTAURANT and display info (Rname, Tcode, Vegan_Friendly, Rest_Sustain_Rating, and/or Address).
        - Retrieve restaurants which have a (high, average, low) sustain ratings from RESTAURANT and display info (Rname, Tcode, Vegan_Friendly, Rest_Sustain_Rating, and/or Address).
        - Retrieve a restaurant named ‘Specific Restaurant from RESTAURANT and display info (Rname, Tcode, Vegan_Friendly, Rest_Sustain_Rating, and/or Address).
        - Retrieve restaurants located in Tcode ‘Specific Tcode’ from RESTAURANT and display info (Rname, Tcode, Vegan_Friendly, Rest_Sustain_Rating, and/or Address).
        - Retrieve restaurants which are vegan friendly from RESTAURANT and display info (Rname, Tcode, Vegan_Friendly, Rest_Sustain_Rating, and/or Address).
        - Retrieve restaurants located at address ‘Specific Address’ from RESTAURANT and display info (Rname, Tcode, Vegan_Friendly, Rest_Sustain_Rating, and/or Address).
    - **VEGAN_OPTIONS Queries**
        - Retrieve all vegan options from VEGAN_OPTIONS and display info (Rname and/or Options).
        - Retrieve list of vegan options from restaurant named ‘Specific Restaurant’ from VEGAN_OPTIONS and display info (Rname and/or Options).
        - Retrieve restaurants which have vegan option ‘Specific Vegan Option’ from VEGAN_OPTIONS and display info (Rname and/or Options).
    - **SUSTAINABILITY Queries**
        - Retrieve all sustainability stats from SUSTAINABILITY and display info (Tcode, CO2_Emissions, Energy_Per_Acre_Per_Year, Sustain_Rating, and/or Perc_Renew_Energy).
        - Retrieve sustainability stats from town with Tcode ‘Specific Tcode’ from SUSTAINABILITY and display info (Tcode, CO2_Emissions, Energy_Per_Acre_Per_Year, Sustain_Rating, and/or Perc_Renew_Energy).
        - Retrieve sustainability stats on town with CO2 Emissions </>/= ‘Specific Number’ from SUSTAINABILITY and display info (Tcode, CO2_Emissions, Energy_Per_Acre_Per_Year, Sustain_Rating, and/or Perc_Renew_Energy).

        - Retrieve sustainability stats on town with Energy_Per_Acre_Per_Year </>/= ‘Specific Number’ from SUSTAINABILITY and display info (Tcode, CO2_Emissions, Energy_Per_Acre_Per_Year, Sustain_Rating, and/or Perc_Renew_Energy).
        - Retrieve towns which have a (high, average, low) sustain ratings from SUSTAINABILITY and display info (Tcode, CO2_Emissions, Energy_Per_Acre_Per_Year, Sustain_Rating, and/or Perc_Renew_Energy).
        - Retrieve sustainability stats on town with Perc_Renew_Energy </>/= ‘Specific Number’ from SUSTAINABILITY and display info (Tcode, CO2_Emissions, Energy_Per_Acre_Per_Year, Sustain_Rating, and/or Perc_Renew_Energy).
    - **Examples of Queries Using Multiple Tables**
        - Retrieve towns which have a (high, average, or low) sustain ratings from SUSTAINABILITY and TOWN and display info (Tcode, CO2_Emissions, Energy_Per_Acre_Per_Year, Sustain_Rating, Perc_Renew_Energy, Tname, County, and/or Sustain_Rating).
        - Retrieve towns which have a restaurant with a (high, average, or low) from TOWN and RESTAURANT and display info (Rname, Tcode, Vegan_Friendly, Rest_Sustain_Rating, Address, Tname, County, and/or Sustain_Rating).
        - Retrieve all restaurants in the town named ‘Specific Town Name’ from TOWN and RESTAURANT and display info (Rname, Tcode, Vegan_Friendly, Rest_Sustain_Rating, Address, Tname, County, and/or Sustain_Rating).
        - Retrieve all restaurants in the county ‘Specific County’’ from TOWN and RESTAURANT and display info (Rname, Tcode, Vegan_Friendly, Rest_Sustain_Rating, Address, Tname, County, and/or Sustain_Rating).
        - Retrieve all restaurants with (high, average, or low) sustain ratings and vegan options from RESTAURANT and TOWN and display info (Rname, Tcode, Vegan_Friendly, Rest_Sustain_Rating, Address, and/or Vegan_Options).
        - Retrieve town named ‘Specific Town’ from TOWN and SUSTAINABILITY and display info (Tcode, CO2_Emissions, Energy_Per_Acre_Per_Year, Sustain_Rating, Perc_Renew_Energy, Tname, County, and/or Sustain_Rating).