CS 348 - Homework 3

Relational Algebra and GCP

Spring 2022

Write your answers for questions 1 to 9 in this latex file. Use a latex editor, such as overleaf to edit and compile your latex to a PDF file. Submit your latex file to Brightspace. Submit your PDF file to Gradescope. Question 1 includes some relational algebra operators and symbols that you can use in your answers.

1. **Answer:**
   $\pi_{minimum\_nights}(place)$

2. **Answer:**
   $\pi_{place.id,place.name}((\sigma_{neighbourhood.name='Harlem'}(place \bowtie_{place.neighbourhood\_id=neighbourhood.neighbourhood\_id} neighbourhood))$

3. **Answer:**
   $\pi_{place.id,place.name}$
   $((\sigma_{neighbourhood.name='Harlem'}(\sigma_{place.neighbourhood\_id=neighbourhood.neighbourhood\_id}(place \times neighbourhood))))$

4. **Answer:**
$\pi_{area.area,neighbourhood.name,place.id,place.name,place.price}$
$(\sigma_{area.area='StatenIsland'}(area \bowtie_{area.area\_id=neighbourhood.area\_id} neighbourhood$
$\bowtie_{neighbourhood.neighbourhood\_id=place.neighbourhood\_id} place)$

5. **Answer:**
$\pi_{host.host\_name,area.area}(host \times area)$

6. **Answer:**
$R \leftarrow ((\pi_{neighbourhood.neighbourhood\_id} neighbourhood) - (\pi_{place.neighbourhood\_id} place))$
$R2 \leftarrow \pi_{neighbourhood.neighbourhood\_id,neighbourhood.name}$
$(neighbourhood \bowtie_{neighbourhood.neighbourhood\_id=R.neighbourhood\_id} R)$

7. **Answer:**
$\pi_{neighbourhood.neighbourhood\_id,neighbourhood.name}(\sigma_{host.host\_name='Luke' \text{ or } host.host\_name='Casey'}$
$((place \bowtie_{place.neighbourhood\_id=neighbourhood.neighbourhood\_id} neighbourhood) \bowtie_{place.host\_id=host.host\_id}$

$host$))

8. **Answer:**
   $a \leftarrow place \bowtie_{place.host\_id=host.host\_id} host$
   $b \leftarrow a \bowtie_{neighbourhood.neighbourhood\_id=place.neighbourhood\_id} neighbourhood$
   $c \leftarrow b \bowtie_{neighbourhood.area\_id=area.area\_id} area$
   $d \leftarrow \pi_{host.host\_id,area.area\_id} c$
   $e \leftarrow \pi_{area.area\_id} area$
   $result \leftarrow d \div e$

9. **Answer:**

   a
   - minimum: 1
   - maximum: n

   b
   - minimum: 1
   - maximum: n

   c
   - minimum: 0
   - maximum: n - 1

   d
   - minimum: 0
   - maximum: 0