CSE 111 – DATABASE SYSTEMS

Midterm Exam

October 28, 2020

Consider the following relational schema:

- Product(maker, model, type)

- PC(model, speed, ram, hd, price)

- Laptop(model, speed, ram, hd, screen, price)

- Printer(model, color, type, price)

which is provided as a SQLite database populated with sample data. Write the SQL statement and draw the relational algebra query tree for the following queries (**5 points/SQL + 5 points/query tree**):

1. What makers produce Printers?

2. What makers produce color Printers cheaper than $200?

3. What makers produce PCs, Laptops, and Printers?

4. What makers produce PCs and Printers but do not produce Laptops?

5. For every maker that sells both PCs and Laptops, find the combination of PC and Laptop that has minimum price. Print the maker, the PC model, Laptop model, and the combination price (PC price + Laptop price).

6. What is the average price of a Printer?

7. How many models of each different type of Printers are offered?

8. How many models of laser color Printers are available?

9. How many makers produce at least 2 different types (not models) of Printers?

10. For every Laptop screen size, find the minimum price of Laptops having that screen size.

11. What Laptop screen sizes are offered in at least 3 different models?

12. What Laptop screen sizes are offered with at least 2 different speeds?

13. What Laptops are more expensive than any PC? Print the model and the price.

14. What Printers produced by the maker of the most expensive PC that also produces Printers are the cheapest? Print the model and the price.

15. Find the average price for each product category (PC, Laptop, Printer) for every maker having products in all the categories.

16. What makers produce exactly a single Laptop model?

17. What makers do not produce any Laptop model?

18. What makers produce a single Laptop model and exactly 3 PC models?

19. What makers produce at least a PC or Laptop model and at most 3 Printer models?

20. List the Laptops with screen size 15 or larger and speed less than 2 made by a maker that also makes printers. Print the laptop model, the screen, the speed, and the maker.

You have to turn in two files. The first file `midterm.sql` contains the SQL statement for all the 20 queries in the given order 1, 2, ..., 20. You have to be able to run this file over the provided database and get the query results in the order 1, 2, ..., 20. The second file `midterm.pdf` contains the query execution trees for the 20 queries, in the given order. The two files have to be uploaded separately.