CS166 Section 22 Alejandro Sherman

Lab 4:

1. List the year and title of each book
Relational Algebra:
$\pi_{Year, Title}$ (BOOKS)
SQL:

```
SELECT Title, Year
FROM BOOKS
```

2. List all information about students whose major is CS
Relational Algebra:
$\sigma_{Major='CS'}$(STUDENTS)
SQL:

```
SELECT *
FROM STUDENTS
WHERE STUDENTS.Major='CS'
```

3. List all students with books they can borrow (assuming all information)
Relational Algebra:
STUDENTS x BOOKS
SQL:

```
SELECT *
FROM STUDENTS, BOOKS
```

4. List all books published by McGraw-Hill before 1990 (assuming all information)
Relational Algebra:
$\sigma_{Publisher='McGraw-Hill'}(\sigma_{Year<1990}(BOOKS))$
SQL:

```
SELECT *
FROM BOOKS
WHERE BOOKS.Publisher='MCGraw-Hill' AND BOOKS.Year<1990
```

5. List the name of those authors who are living in Davis
Relational Algebra:
$\pi_{AName}(\sigma_{Address='Davis'}(AUTHORS))$
SQL:

```
SELECT AName
FROM AUTHORS
WHERE AUTHORS.Address='Davis'
```

6. List the name of students who are older than 30 and who are not studying CS
Relational Algebra:

$\pi_{StName}(\sigma_{Age>=30}(STUDENTS)) - \pi_{StName}(\sigma_{Major='CS''}(STUDENTS))$
SQL:

```
SELECT S1.StName
FROM STUDENTS S1
WHERE S1.Age>30
EXCEPT
SELECT S2.StName
FROM STUDENTS S2
WHERE S2.Major='CS'
```

7. Rename AName in the relation AUTHORS to Name
Relational Algebra:
$P_{AUTHORS(Name, Address)}(AUTHORS)$
SQL:

```
SELECT A.AName AS Name
FROM AUTHORS A
```

8. List the names of all students who have borrowed a book and who are CS majors
Relational Algebra:
$\pi_{StName}(\sigma_{STUDENTS.StId=borrow.StId}(\sigma_{Major='CS'}(STUDENTS \times borrows)))$
SQL:

```
SELECT S.StName
FROM STUDENTS S, borrows B
WHERE S.StId=B.StId AND S.Major='CS'
```

9. List the title of books written by the author “Jones”
Relational Algebra:
$\pi_{Title}(\sigma_{AName='Jones'}(\sigma_{BOOKS.DocID=has\text{-}written.DocId}(BOOKS \times has\text{-}written)))$
SQL:

```
SELECT B.Title
FROM BOOKS B, has-written H
WHERE B.DocId=H.DocId AND B.AName='Jones'
```

10. As previous, but not books that have the keyword “database”
Relational Algebra:
$\pi_{Title}(\sigma_{AName='Jones'}(\sigma_{BOOKS.DocID=has\text{-}written.DocId}(BOOKS \times has\text{-}written))) -$
$\pi_{Title}(\sigma_{Keyword='database'}(\sigma_{BOOKS.DocID=describes.DocId}(BOOKS \times describes)))$
SQL:

```
SELECT B.Title
FROM BOOKS B, has-written H
WHERE B.DocId=H.DocId AND B.AName='Jones'
EXCEPT
SELECT B2.Title
```

FROM BOOKS B2, describes D
WHERE B.DocId=D.DocId AND B.Keyword='database'

11. Find the name of the youngest student
Relational Algebra:
$\pi_{StName}(STUDENTS) - \pi_{A.StName}(\sigma_{A.Age>B.Age}(P_A(STUDENTS) \times P_B(STUDENTS)))$
SQL:
SELECT S.StName
FROM STUDENTS S
WHERE S.Age = (SELECT MIN(S2.Age) FROM STUDENTS S2)

12. Find the title of the oldest book
Relational Algebra:
$\pi_{Title}(BOOKS) - \pi_{B.Title}(\sigma_{A.Year<B.Year}(P_A(BOOKS) \times P_B(BOOKS)))$
SQL:
SELECT B.Title
FROM BOOKS B
WHERE B.Year = (SELECT MIN(B2.Year) FROM BOOKS B2)