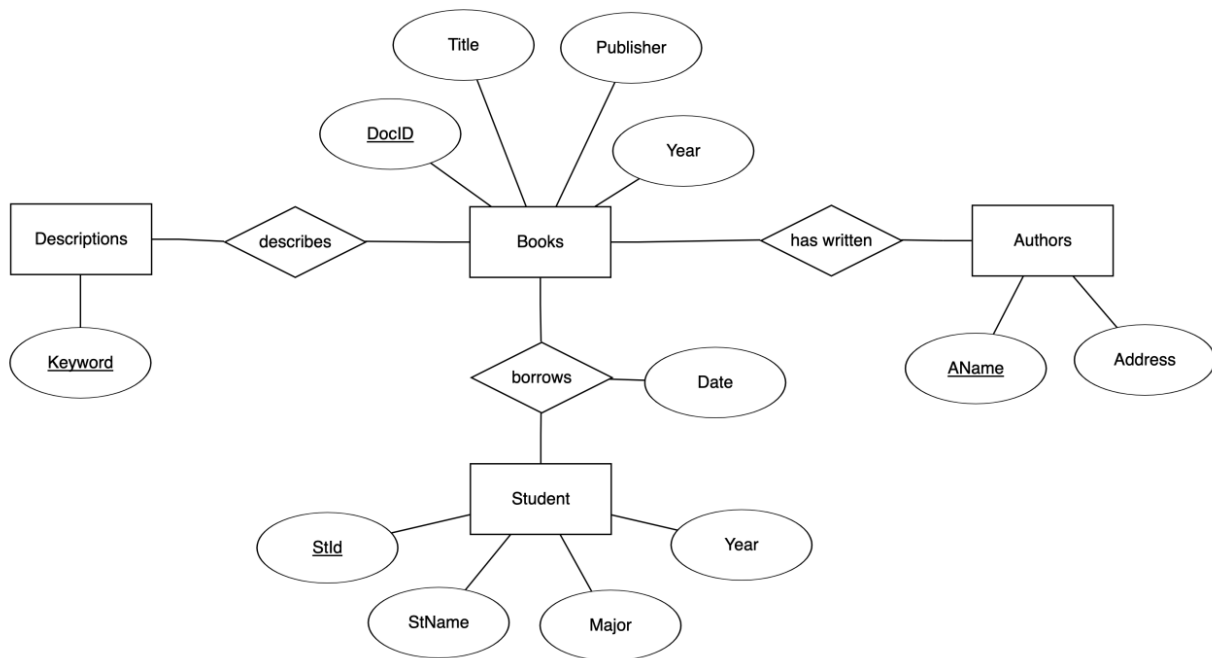CS 166: Lab 4 Assignment

The Relational Algebra & SQL

Table Definitions:

- BOOKS(DocId, Title, Publisher, Year)
- STUDENTS(StId, StName, Major, Age)
- AUTHORS(AName, Address)
- borrows(DocId, StId, Date)
- has-written(DocId, AName)
- describes(DocId, Keyword)

ER Diagram:

1. List the year and title of each book

- Relational algebra
  ○ $\pi_{Year,Title}(BOOKS)$
- SQL

2. List all information about students whose major is CS

- Relational algebra
  - $\sigma_{Major="CS"}(STUDENTS)$

3. List all students with books they can borrow

- Relational algebra
  - $\pi_{StName,Title}(STUDENTS \times BOOKS)$

4. List all books published by McGraw-Hill before 1990

- Relational algebra
  - $\pi_{Title}\left(\sigma_{Publisher="McGraw-Hill",\ Year<1990}(BOOKS)\right)$

5. List the name of those authors who are living in Davis

- Relational algebra
  - $\pi_{Name}\left(\sigma_{Address="Davis"}(AUTHORS)\right)$

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

- Relational algebra
  - $\pi_{StName}\left(\sigma_{Age>30,\ Major\ !="CS"}(STUDENTS)\right)$

7. Rename AName in the relation AUTHORS to Name

- Relational algebra
  - $\rho_{Name,Address}(AUTHORS)$

8. List the names of all students who have borrowed a book and who are CS majors.

- Relational algebra
  - $\pi_{StName}\left(\sigma_{Major\ !="CS"}(STUDENTS \bowtie borrows)\right)$

9. List the title of books written by the author "Jones."

- Relational algebra
  - $\pi_{Title}\left(\sigma_{AName="Jones"}(BOOKS \bowtie haswritten)\right)$

10. As previous, but not books that have the keyword "database"

- Relational algebra
  - $\pi_{Title}\left(\sigma_{AName="Jones",}\left(\sigma_{keyword!="database"}(BOOKS \bowtie describes) \bowtie haswritten\right)\right)$

11. Find the name of the youngest student

- Relational algebra
  - $\pi_{Name}\left(\sigma_{\min(age)}(Students)\right)$

12. Find the title of the oldest book

- Relational algebra
  - $\pi_{Title}\left(\sigma_{\min(year)}(Books)\right)$