

# Big Data Engineering: Assignment 2

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Translation into Relational Algebra

## Subproblem 1

Translate the following colloquial queries into relational algebra expressions

1.

$\pi_{name, genre}((books) \bowtie_{author=aid} ((persons) \bowtie_{pid=aid} (\sigma_{salary > 2000}(authors))))$

2.

$\pi_{name}(\sigma_{birth\_year < 2000}((persons) \bowtie_{pid=mid} (\pi_{mid}(members) - \pi_{member}(borrow))))$

3.

$R_1 := \pi_{rb, rl}((borrow) \bowtie_{member=rm, library=rl, book=rb} (\rho_{rm \leftarrow member, rl \leftarrow library, rb \leftarrow book}(reserve)))$

$R_2 := \sigma_{genre='fantasy'}((books) \bowtie_{bid=rb} (\sigma_{borrow\_date=reservation\_date}(R)))$

$\pi_{city}((libraries) \bowtie_{lid=rl} (R_2))$

4.

$M := ((member) \bowtie_{favorite\_author=name} (\sigma_{name='StephenKing'}(persons) \bowtie_{pid=aid} (authors)))$

$L := \sigma_{city, pid}((libraries) \bowtie_{lid=library} ((membership) \bowtie_{member=mid} (M)))$

$\gamma_{city, avg(*)}(L)$

## Subproblem 2

Translate the following relational algebra queries into natural language

1.

This query gives back all birth years where someone has have/has borrowed at least 6 books in a library in Saarbrücken.

2.

It gives back the birth year of the youngest person that have/has borrowed or reserved a book by an author whose salary is above 2500.