Example

- Which students have enrolled in two or more papers?

ENROLMENT

ID	paper
101	CO102
101	CO103
102	CO102
103	MA101

- we first rename paper to paper' and join the resulting relation with Enrolment, hence

$$X := \text{ENROLMENT} * \delta_{\text{paper} \rightarrow \text{paper}'}(\text{ENROLMENT})$$

ID	paper	paper'
101	CO102	CO102
101	CO102	CO103
101	CO103	CO102
101	CO103	CO103
102	CO102	CO102
103	MA101	MA101

Database Design Quality

- This gives us for each student every pair of papers he or she has enrolled in
- We are not interested in pairs which have same entries but the ones with different entries for the pair

$$Y := \sigma_{paper \neq paper'}(X)$$

IDk	paper	Paper'
101	CO102	CO103
101	CO103	CO102

Relational Algebra Example

- We get the student ID that have enrolled in two or more courses

$$\pi_{ID}(Y)$$

ID
101

- represented in one query

$$\pi_{ID}(\sigma_{paper \neq paper'}(ENROLMENT * \delta_{paper \rightarrow paper'}(ENROLMENT)))$$