

2004 Paper 13 Question 8

Databases

- (a) Define the operators of the core relational algebra. [5 marks]
- (b) Let R be a relation with schema $(A_1, \dots, A_n, B_1, \dots, B_m)$ and S be a relation with schema (B_1, \dots, B_m) . The quotient of R and S , written $R \div S$, is the set of tuples t over attributes (A_1, \dots, A_n) such that for every tuple s in S , the tuple ts (i.e. the concatenation of tuples t and s) is a member of R . Define the quotient operator using the operators of the core relational algebra. [8 marks]
- (c) The core relational algebra can be extended with a duplicate elimination operator, and a grouping operator.
- (i) Define carefully these two operators. [3 marks]
- (ii) Assuming the grouping operator, show how the duplicate elimination operator is, in fact, unnecessary. [2 marks]
- (iii) Can the grouping operator be used to define the projection operator? Justify your answer. [2 marks]