Exercise Sheet 2

Deadline: 09.12.2017

Exercise 1: Necessary Operations of Relational Algebra

Definition 1 (Necessary Operation) *An operation of the relational algebra is necessary if there exists a query using this operation that cannot be expressed using any combination of other operators.*

a) We have introduced set difference ($-$) and union ($\cup$) as basic operations of the relational algebra. Set intersection ($\cap$) is not a necessary operation; proof this.

Exercise 2: Car Manufacturer Database

A car manufacturer uses a database with the following relations to manage its suppliers:
$Supplier(\underline{Name}, Location)$ – the suppliers and their location
$Part(\underline{PartNr}, Description)$ – the parts used in the production
$Product(\underline{ProductNr}, Price)$ – the cars produced
$SupplierParts(\underline{Name}, \underline{PartNr})$ – the suppliers for the different parts
$PartProducts(\underline{PartNr}, \underline{ProductNr})$ – the parts needed for the respective cars

Translate the textual queries into terms of relational algebra and vice versa.

1. $\pi_{PartNr}(Part) - \pi_{PartNr}(PartProducts)$
2. The names of the suppliers that supply no parts.
3. The locations of the suppliers that supply no parts.
4. The description of the items that have a supplier and are used for a product.
5. The prices of products that are containing parts from suppliers located in Berlin.