Examples of Transformations

Consider the following relation schemas:

Branch-schema = \{branch-name, branch-city, assets\}
Account-schema = \{branch-name, account-no, balance\}
Depositor-schema = \{customer-name, account-no\}

The relations branch, account, and depositor are instances of these schemas.

The query:

\[ \Pi_{customer-name}(\sigma_{branch-city=\text{"Brooklyn"}}(branch \bowtie (account \bowtie depositor))) \]

can be transformed (via rule 7a) into:

\[ \Pi_{customer-name}((\sigma_{branch-city=\text{"Brooklyn"}}(branch)) \bowtie (account \bowtie depositor)) \]

Consider the above query modified to restrict attention to customers who have a balance over $1000.

\[ \Pi_{customer-name}(\sigma_{branch-city=\text{"Brooklyn"}\land balance>1000}(branch \bowtie (account \bowtie depositor))) \]

Rule 7a can no longer be applied, however rule 6 can be applied:

\[ \Pi_{customer-name}(\sigma_{branch-city=\text{"Brooklyn"}\land balance>1000}((branch \bowtie account) \bowtie depositor)) \]

Now rule 7a can be applied:

\[ \Pi_{customer-name}((\sigma_{branch-city=\text{"Brooklyn"}\land balance>1000}(branch \bowtie account)) \bowtie depositor) \]

We can continue via rule 1 on the interior subexpression:

\[ \sigma_{branch-city=\text{"Brooklyn"}}(\sigma_{balance>1000}(branch \bowtie account)) \]

Which gives rise to:

\[ \sigma_{branch-city=\text{"Brooklyn"}}(branch) \bowtie \sigma_{balance>1000}(account) \]