Query Optimization: Exercise

Session 8

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Generating Permutations
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- Keep current prefix and the rest of relations
- Extend the prefix only if exchanging the last two relations does not result in a cheaper sequence
Transformative Approaches
Explore the search space by directly applying equivalences to the initial join tree [1].
Random Trees with Cross Products
Generate a tree, then generate a permutation: $C(n - 1)$ trees, $n!$ permutations

Pick a random number $b \in [0, C(n - 1)]$, \textit{unrank} $b$

Pick a random number $p \in [0, n!]$, \textit{unrank} $p$

Attach the permutation to the leaves of the tree
Unrank($n, r$)

**Input:** the number $n$ of elements to be permuted and the rank $r$ of the permutation to be constructed

**Output:** a permutation $\pi$

for each $0 \leq i < n$

\[ \pi[i] = i \]

for each $n \geq i > 0$ descending {

\[ \text{swap}(\pi[i - 1], \pi[r \mod i]) \]

\[ r = \lfloor r/i \rfloor \]

}

return $\pi$;
• every tree is a word in \{ (,), \}
• map such words to the grid, every step up is (, down )
• the number of different paths \( q \) can be computed (see lectures)
• Procedure: start in (0,0), walk up as long as rank is smaller than \( q \). When it is bigger, step down, \( rank = rank - q \)
Next Homework

- unrank permutation/tree
- implement ExhaustiveTransformation2
▶ Slides and exercises: db.in.tum.de/teaching/ws1718/queryopt
▶ Send any questions, comments, solutions to exercises etc. to radke@in.tum.de
▶ Exercise due: 9 AM, December 18