Solutions for Exercise Sheet 12

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Our solutions for Exercise Sheet 12.

Exercise 1

- For the bushy tree $(R_4 \bowtie_{p_1} (R_3 \bowtie_{p_2} R_5)) \bowtie_{p_3} (R_1 \bowtie_{p_4} R_2)$
  - Give the ordered list encoding
  - Give the ordinal number encoding
- For the left-deep tree $(((R_4 \bowtie R_1) \bowtie R_3) \bowtie R_2))$
  - Give the ordered list encoding
  - Give the ordinal number encoding
- Give the bushy join tree for the ordinal number encoding "35 13 23 12"

Bushy: ordered list

$R_3 \bowtie_{p_2} R_5$	$[]$	$[p_1, p_2, p_3, p_4]$
$R_4 \bowtie (R_3 \bowtie_{p_2} R_5)$	$[2]$	$[p_1, p_3, p_4]$
$(R_4 \bowtie (R_3 \bowtie_{p_2} R_5)); (R1 \bowtie_{p_4} R_2)$	$[2, 1]$	$[p_3, p_4]$
$(R_4 \bowtie (R_3 \bowtie_{p_2} R_5)) \bowtie_{p_3} (R1 \bowtie_{p_4} R_2)$	$[2, 1, 2]$	$[p_3]$
	$[2, 1, 2, 1]$	$[]$

Bushy: ordinal number enconding

$[]$	$[R_1, R_2, R_3, R_4, R_5]$
$[35]$	$[(R_3 \bowtie R_5)][R_1, R_2, R_4]$
$[35\ \ 14]$	$[(R_3 \bowtie R_5)][R_1, R_2, R_4]$
$[35\ \ 14\ \ 23]$	$[(R_4 \bowtie (R_3 \bowtie R_5))][R_1, R_2]$
$[35\ \ 14\ \ 23\ \ 12]$	$[(R_4 \bowtie (R_3 \bowtie R_5)), (R_1 \bowtie R_2)][]$

Left Deep: Ordered List = 4, 1, 3, 2

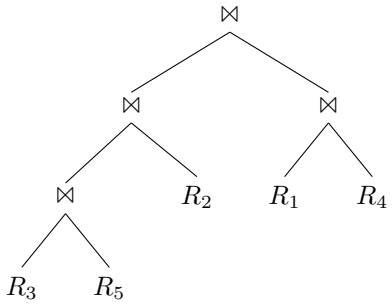
Left Deep: Ordinal Number Enconding

R_4	$[]$	$[R_1, R_2, R_3, R_4]$
$R_4 \bowtie R_1$	$[4]$	$[R_1, R_2, R_3]$
$(R_4 \bowtie R_1) \bowtie R_3$	$[4, 1]$	$[R_2, R_3]$
$((R_4 \bowtie R_1) \bowtie R_3) \bowtie R_2$	$[4, 1, 2]$	$[R_2]$
	$[4, 1, 2, 1]$	$[]$

Bushy join tree for the ordinal number encoding "35 13 23 12"

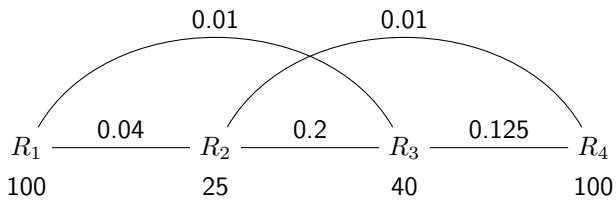
Bushy: ordinal number enconding

$[]$	$[R_1, R_2, R_3, R_4, R_5]$
$[35]$	$[(R_3 \bowtie R_5)][R_1, R_2, R_4]$
$[35\ \ 13]$	$[((R_3 \bowtie R_5) \bowtie R_2)][R_1, R_4]$
$[35\ \ 13\ \ 23]$	$[((R_3 \bowtie R_5) \bowtie R_2), (R_1 \bowtie R_4)][]$
$[35\ \ 13\ \ 23\ \ 12]$	$[(((R_3 \bowtie R_5) \bowtie R_2) \bowtie (R_1 \bowtie R_4))][]$


⋈
⋈
⋈
⋈
R_2
R_1
R_4
R_3
R_5

Exercise 2

Given the following query graph and the relation order R_1, R_2, R_3, R_4, compute the optimal join tree and its cost while preserving the given order of relations. Use C_{out} as your cost function. Use the algorithm provided in the lecture and show the final tables for split points, costs, statistics (cardinalitites).



Predicates

	1	2	3	4
1	$\emptyset$	$\{12\}$	$\{13\}$	$\emptyset$
2	-	$\emptyset$	$\{23\}$	$\{24\}$
3	-	-	$\emptyset$	$\{34\}$
4	-	-	-	$\emptyset$

Statistics (cardinalities)

	1	2	3	4
1	100	100	8	1
2	-	25	200	25
3	-	-	40	500
4	-	-	-	100

Costs

	1	2	3	4
1	0	100	108	109
2	-	0	200	225
3	-	-	0	500
4	-	-	-	0

Split points

	1	2	3	4
1	-	1	2	3
2	-	-	2	3
3	-	-	-	3
4	-	-	-	-