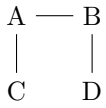
Query Optimization Homework 5

February 2, 2021

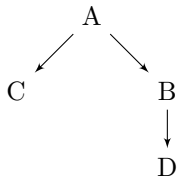
1 Exercise 1

1.1 Perform the IKKBZ algorithm

1. Call $IKKBZ(G, C_{out})$ with G:



2. Call $IKKBZ - Sub(G_A, C_{out})$ with G_A :



Relation	n	s	C	T	rank
B	10	0,9	9	9	$\frac{8}{9}$
C	100	0,1	10	10	$\frac{9}{10}$
D	100	0,1	10	10	$\frac{9}{10}$

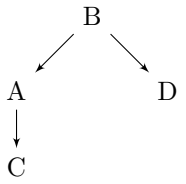
2.1 Normalize(A) doesn't change anything

2.2 Merge the chains under A:

2.3 Denormalize(G_A) doesn't change anything
2.4 Compute C_{out}:

$$C_{out}(A \bowtie B) = 10 \cdot 10 \cdot 0.9 = 90$$
$$C_{out}((A \bowtie B) \bowtie D) = 90 \cdot 100 \cdot 0.1 + 90 = 990$$
$$C_{out}(((A \bowtie B) \bowtie D) \bowtie C) = 900 \cdot 100 \cdot 0.1 + 990 = 9990$$

3. Call $IKKBZ - Sub(G_B, C_{out})$ with G_B :



Relation	n	s	C	T	rank
A	10	0,9	9	9	$\frac{8}{9}$
C	100	0,1	10	10	$\frac{9}{10}$
D	100	0,1	10	10	$\frac{9}{10}$

3.1 Normalize(B) doesn't change anything

3.2 Merge the chains under B:

3.3 Denormalize(G_B) doesn't change anything
3.4 Compute C_{out}:

$$C_{out}(B \bowtie A) = 10 \cdot 10 \cdot 0.9 = 90$$
$$C_{out}((B \bowtie A) \bowtie C) = 90 \cdot 100 \cdot 0.1 + 90 = 990$$
$$C_{out}(((B \bowtie A) \bowtie C) \bowtie D) = 900 \cdot 100 \cdot 0.1 + 990 = 9990$$

4. Call $IKKBZ - Sub(G_C, C_{out})$ with G_C :

Relation	n	s	C	T	rank
A	10	0,1	1	1	0
B	10	0,9	9	9	$\frac{8}{9}$
D	100	0,1	10	10	$\frac{9}{10}$

4.1 Denormalize(G_C) doesn't change anything
4.2 Compute C_{out}:

$$C_{out}(C \bowtie A) = 100 \cdot 10 \cdot 0.1 = 100$$
$$C_{out}((C \bowtie A) \bowtie B) = 100 \cdot 10 \cdot 0.9 + 100 = 1000$$
$$C_{out}(((C \bowtie A) \bowtie B) \bowtie D) = 900 \cdot 100 \cdot 0.1 + 1000 = 10000$$

5. Call $IKKBZ - Sub(G_D, C_{out})$ with G_D :

Relation	n	s	C	T	rank
A	10	0,9	9	9	$\frac{8}{9}$
B	10	0,1	1	1	0
C	100	0,1	10	10	$\frac{9}{10}$

5.1 Denormalize(G_D) doesn't change anything
5.2 Compute C_{out}:

$$C_{out}(D \bowtie B) = 100 \cdot 10 \cdot 0.1 = 100$$
$$C_{out}((D \bowtie B) \bowtie A) = 100 \cdot 10 \cdot 0.9 + 100 = 1000$$
$$C_{out}(((D \bowtie B) \bowtie A) \bowtie C) = 900 \cdot 100 \cdot 0.1 + 1000 = 10000$$

6. Choose the precedence graph with the minimal cost, both G_A and G_B are minimal, so we choose G_A and construct the following join tree: