QO - Week 09

January 23, 2021

Exercise 1
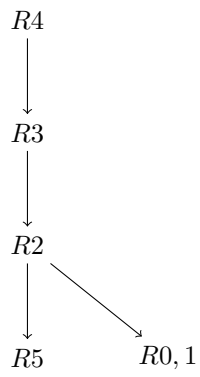
Precedence Graph

$R4(50)$
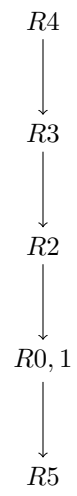
0.3

$R3(40)$

0.2

$R2(50)$

0.2 $\quad$ 0.2

$R5(55)$ $\qquad$ $R0(20)$

0.1

$R1(10)$
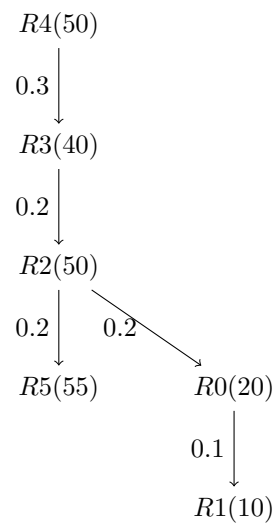
IKKBZ

Step 1 (normalize subtrees of R2):

Relation	C	T	rank
3	12	12	$\frac{11}{12}$
2	10	10	$\frac{9}{10}$
5	11	11	$\frac{10}{11}$
0	4	4	$\frac{3}{4}$
1	1	1	0
1,0	8	4	$\frac{3}{8}$

$R4$

$\downarrow$

$R3$

$\downarrow$

$R2$

$\downarrow$ $\searrow$

$R5$ $R0,1$

Step 2 (merge subtrees of R2):

Relation	C	T	rank
3	12	12	$\frac{11}{12}$
2	10	10	$\frac{9}{10}$
5	11	11	$\frac{10}{11}$
0	4	4	$\frac{3}{4}$
1	1	1	0
1,0	8	4	$\frac{3}{8}$

$$R4$$
$$\downarrow$$
$$R3$$
$$\downarrow$$
$$R2$$
$$\downarrow$$
$$R0,1$$
$$\downarrow$$
$$R5$$

Step 3 (denormalize):

$$R4$$
$$\downarrow$$
$$R3$$
$$\downarrow$$
$$R2$$
$$\downarrow$$
$$R0$$
$$\downarrow$$
$$R1$$
$$\downarrow$$
$$R5$$

DPSize:

set	plan	card	cost
R0	R0	20	0
R1	R1	10	0
R2	R2	50	0
R3	R3	40	0
R4	R4	50	0
R5	R5	55	0
R0, R1	R0⋈R1	20	20
R0, R2	R0⋈R2	200	200
R2, R3	R2⋈R3	400	400
R3, R4	R3⋈R4	600	600
R2, R5	R2⋈R5	550	550
R0, R1, R2	R0⋈R1⋈R2	200	220
R0, R2, R5	R0⋈R2⋈R5	2200	2400
R0, R2, R3	R0⋈R2⋈R3	1600	1800
R2, R3, R5	R2⋈R3⋈R5	4400	4800
R2, R3, R4	R2⋈R3⋈R4	6000	6400
R0, R1, R2, R5	R0⋈R1⋈R2⋈R5	2200	2420
R0, R1, R2, R3	R0⋈R1⋈R2⋈R3	1600	1820
R0, R2, R3, R5	R0⋈R2⋈R3⋈R5	17600	19400
R0, R2, R3, R4	R0⋈R2⋈(R3⋈R4)	24000	24800
R2, R3, R4, R5	R2⋈R5⋈(R3⋈R4)	66000	67150
R0, R1, R2, R3, R5	R0⋈R1⋈R2⋈R3⋈R5	17600	19420
R0, R1, R2, R3, R4	R0⋈R1⋈R2⋈(R3⋈R4)	24000	24820
R0, R2, R3, R4, R5	R0⋈R2⋈R5⋈(R3⋈R4)	264000	267000
Alle	R0⋈R1⋈R2⋈R5⋈(R3⋈R4)	264000	267020

DPLinear:

plan	card	cost
R4	50	0
R3	40	0
R2	50	0
R0	20	0
R1	10	0
R5	55	0
R4⋈R3	600	600
R3⋈R2	400	400
R2⋈R0	200	200
R0⋈R1	20	20
R4⋈(R3⋈R2)	6000	6400
R3⋈(R2⋈R0)	1600	1800
R2⋈(R0⋈R1)	200	220
R4⋈R3⋈(R2⋈R0)	24000	24800
R2⋈(R2⋈(R0⋈R1))	1600	1820
R2⋈(R0⋈R1)⋈R5	2200	2420
R4⋈R3⋈(R2⋈(R0⋈R1))	24000	24820
R3⋈(R2⋈(R0⋈R1))⋈R5	17600	19420
R4⋈R3⋈(R2⋈(R0⋈R1)⋈R5)	264000	267020

Compare:

Same result, but DPLinear much less work