Final Exam Review

14.03.2023

Consolidation of Action Taken

Questions submitted by students: 1,2,3,4,5,6,7,8,9,14,16,18,20

Compensation: Question 6,7,8, and 9.

Re-grading: Question 2.

Folgefehler: Please write us individually for question 1 with subject: “[DBT] Folgefehler Question 1 DBT WS-2022/23”.

Question 3

Tables	Join Plan	Cross Product	Join Size	Join Cost
{R, S, U}	(U x R) x S			
	(U x S) x R			
	(S x R) x U			

Given are four tables $R(a, e)$, $S(b, d)$, $T(c, e)$, and $U(a, d)$. Each relation has 1000 tuples. The relations have the following attribute domain cardinalities:

R(a, e)	S(b, d)	T(c, e)	U(a, d)
$V(R, a) = 20$			$V(U, a) = 400$
	$V(S, b) = 10$		
		$V(T, c) = 400$	
	$V(S, d) = 20$		$V(U, d) = 500$
$V(R, e) = 50$		$V(T, e) = 1000$	

Compute the cost of the best left-deep join plan using dynamic programming and fill out the tables below.

Note: Read the notes below each table before filling out the answers.

Two tables (already provided):

Tables	$\{R, T\}$	$\{R, S\}$	$\{S, T\}$	$\{R, U\}$	$\{S, U\}$	$\{T, U\}$
Join Size	1000	1000000	1000000	2500	2000	1000000

1. **(U x R) x S**
   a. Join Size = T(U x R) * T(S) / max(V((U x R), d), V(S, d)) = 2500 * 1000 / (max(20, 500)) = 5000
   b. Cost = Size of (U x R) = 2500
2. **(U x S) x R**
   a. Cost = Size of (U x S) = 2000
3. **(S x R) x U**
   a. Cost = Size of (S x R) = 1000000

Question 3

Tables	Join Plan	Cross Product	Join Size	Join Cost
{R, S, U}	(U x R) x S	No	5000	2500
	(U x S) x R	No		2000
	(S x R) x U	Yes		1000000

Given are four tables $R(a, e)$, $S(b, d)$, $T(c, e)$, and $U(a, d)$. Each relation has 1000 tuples. The relations have the following attribute domain cardinalities:

R(a, e)	S(b, d)	T(c, e)	U(a, d)
$V(R, a) = 20$			$V(U, a) = 400$
	$V(S, b) = 10$		
		$V(T, c) = 400$	
	$V(S, d) = 20$		$V(U, d) = 500$
$V(R, e) = 50$		$V(T, e) = 1000$	

Compute the cost of the best left-deep join plan using dynamic programming and fill out the tables below.

Note: Read the notes below each table before filling out the answers.

Two tables (already provided):

Tables	$\{R, T\}$	$\{R, S\}$	$\{S, T\}$	$\{R, U\}$	$\{S, U\}$	$\{T, U\}$
Join Size	1000	1000000	1000000	2500	2000	1000000

1. **(U x R) x S**
   a. Join Size = T(U x R) * T(S) / max(V((U x R), d), V(S, d)) = 2500 * 1000 / (max(20, 500)) = 5000
   b. Cost = Size of (U x R) = 2500
2. **(U x S) x R**
   a. Cost = Size of (U x S) = 2000
3. **(S x R) x U**
   a. Cost = Size of (S x R) = 1000000

Question 3

Tables	Join Plan	Cross Product	Join Size	Join Cost
{R, T, U}	(T x U) x R	Yes	2500	1000000
	(R x U) x T	No		2500
	(R x T) x U	No		1000

Given are four tables $R(a, e)$, $S(b, d)$, $T(c, e)$, and $U(a, d)$. Each relation has 1000 tuples. The relations have the following attribute domain cardinalities:

R(a, e)	S(b, d)	T(c, e)	U(a, d)
$V(R, a) = 20$			$V(U, a) = 400$
	$V(S, b) = 10$		
		$V(T, c) = 400$	
	$V(S, d) = 20$		$V(U, d) = 500$
$V(R, e) = 50$		$V(T, e) = 1000$	

Compute the cost of the best left-deep join plan using dynamic programming and fill out the tables below.

Note: Read the notes below each table before filling out the answers.

Two tables (already provided):

Tables	$\{R, T\}$	$\{R, S\}$	$\{S, T\}$	$\{R, U\}$	$\{S, U\}$	$\{T, U\}$
Join Size	1000	1000000	1000000	2500	2000	1000000

1. **(T x U) x R**
   a. Join Size = T(T x U) * T(R) / max(V((T x U), e), V(R, e)) * max(V(R, a), (T x U), a))

      = 1000000 * 1000 / (max(50, 1000) * max(20, 400)) = 2500

   b. Cost = Size of (T x U) = 1000000
2. **(R x U) x T**
   a. Cost = Size of (R x U) = 2500
3. **(R x T) x U**
   a. Cost = Size of (R x T) = 1000

Question 3

Given are four tables $R(a, e)$, $S(b, d)$, $T(c, e)$, and $U(a, d)$. Each relation has 1000 tuples. The relations have the following attribute domain cardinalities:

R(a, e)	S(b, d)	T(c, e)	U(a, d)
$V(R, a) = 20$			$V(U, a) = 400$
	$V(S, b) = 10$		
		$V(T, c) = 400$	
	$V(S, d) = 20$		$V(U, d) = 500$
$V(R, e) = 50$		$V(T, e) = 1000$	

Compute the cost of the best left-deep join plan using dynamic programming and fill out the tables below.

Note: Read the notes below each table before filling out the answers.

Two tables (already provided):

Tables	$\{R, T\}$	$\{R, S\}$	$\{S, T\}$	$\{R, U\}$	$\{S, U\}$	$\{T, U\}$
Join Size	1000	1000000	1000000	2500	2000	1000000

Three tables:

Tables	Join Plan	Cross Product	Join Size	Join Cost
$\{R, S, T\}$	$(R \bowtie T) \bowtie S$	Yes	1000000	0
	$(S \bowtie R) \bowtie T$	Yes		0
	$(S \bowtie T) \bowtie R$	Yes		0
$\{R, S, U\}$	$(U \bowtie R) \bowtie S$	No	5000	2500
	$(U \bowtie S) \bowtie R$	No		2000
	$(S \bowtie R) \bowtie U$	Yes		0
$\{R, T, U\}$	$(T \bowtie U) \bowtie R$	Yes	2500	0
	$(R \bowtie U) \bowtie T$	No		2500
	$(R \bowtie T) \bowtie U$	No		1000
$\{S, T, U\}$	$(S \bowtie U) \bowtie T$	Yes	2000000	0
	$(T \bowtie U) \bowtie S$	Yes		0
	$(S \bowtie T) \bowtie U$	Yes		0

Question 3

Three tables:

Tables	Join Plan	Cross Product	Join Size	Join Cost
$\{R,S,T\}$	$(R \bowtie T) \bowtie S$	Yes	1000000	0
	$(S \bowtie R) \bowtie T$	Yes		0
	$(S \bowtie T) \bowtie R$	Yes		0
$\{R,S,U\}$	$(U \bowtie R) \bowtie S$	No	5000	2500
	$(U \bowtie S) \bowtie R$	No		2000
	$(S \bowtie R) \bowtie U$	Yes		0
$\{R,T,U\}$	$(T \bowtie U) \bowtie R$	Yes	2500	0
	$(R \bowtie U) \bowtie T$	No		2500
	$(R \bowtie T) \bowtie U$	No		1000
$\{S,T,U\}$	$(S \bowtie U) \bowtie T$	Yes	2000000	0
	$(T \bowtie U) \bowtie S$	Yes		0
	$(S \bowtie T) \bowtie U$	Yes		0

Given are four tables $R(a,e)$, $S(b,d)$, $T(c,e)$, and $U(a,d)$. Each relation has 1000 tuples. The relations have the following attribute domain cardinalities:

R(a, e)	S(b, d)	T(c, e)	U(a, d)
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	$V(S,d) = 20$		$V(U,d) = 500$
$V(R,e) = 50$		$V(T,e) = 1000$	

Compute the cost of the best left-deep join plan using dynamic programming and fill out the tables below.

Note: Read the notes below each table before filling out the answers.

Two tables (already provided):

Tables	$\{R,T\}$	$\{R,S\}$	$\{S,T\}$	$\{R,U\}$	$\{S,U\}$	$\{T,U\}$
Join Size	1000	1000000	1000000	2500	2000	1000000

Join Cost = Cost for (R x T) x U + Size of (R x T) x U

= 1000 + 2500 = 3500