Xiang Xu Week3 Quiz 2/10/2017

a) Write down the Attribute Usage Matrix.

	A1(name)	A2(university)	A3(state)	A4(gpa)
q1	1	0	0	1
q2	1	1	1	1
q3	0	1	1	0
q4	0	1	1	0

b) Calculate the Attribute Affinity Matrix.

site 1
acc (q1) = 10
acc (q2) = 2
acc (q3) = 10
acc (q4) = 5

site 2
acc (q1) = 5
acc (q2) = 3
acc (q3) = 0
acc (q4) = 10

Access Matrix

	S1	S2	Stotal
q1	10	5	15
q2	2	3	5
q3	10	0	10
q4	5	10	15

Attribute Affinity Matrix

	A1(name)	A2(university)	A3(state)	A4(gpa)
A1	20	5	5	20
A2	5	30	30	5
A3	5	30	30	5
A4	20	5	5	20

c)Write the Clustered Affinity Matrix. (You do not have to use the bond energy algorithm if you can make a good estimate and justify it.)

	A1(name)	A4(gpa)	A2(university)	A3(state)
A1	20	20	5	5
A4	20	20	5	5
A2	5	5	30	30
A3	5	5	30	30

We need reorder columns and rows and to see which ones cluster well together, by observation and examining this by eye, we can see above Clustered Affinity Matrix are well arranged.

d) Estimate (do not calculate) the line of partition and show the vertically fragmented table.

	A1(name)	A4(gpa)	A2(university)	A3(state)
A1	20	20	5	5
A4	20	20	5	5
A2	5	5	30	30
A3	5	5	30	30

Original Table

sid	Name	University	State	Gpa
1	Jones	JHU	MD	3.7
2	Harris	UMD	MD	2.5
3	Chu	NYU	NY	3.9
4	Kim	Cornell	NY	3.8
5	Sudarsen	RPI	NY	2.8
6	Katz	Columbia	NY	3.1
7	Miller	Goucher	MD	2.9
8	Penn	NYU	NY	3.6

Fragment 1

sid	Name	Gpa
1	Jones	3.7
2	Harris	2.5
3	Chu	3.9
4	Kim	3.8
5	Sudarsen	2.8
6	Katz	3.1
7	Miller	2.9
8	Penn	3.6

Fragment 2

sid	University	State
1	JHU	MD
2	UMD	MD
3	NYU	NY
4	Cornell	NY
5	RPI	NY
6	Columbia	NY
7	Goucher	MD

8	NYU	NY

2.Prove or bring a counter example to the following: Applying horizontal fragmentation to a table and then applying vertical fragmentation to the horizontal fragments is equivalent to applying vertical fragmentation to a table and then applying horizontal fragmentation to the vertical fragments.

Original Table

sid	Name	University	State	Gpa
1	Jones	JHU	MD	3.7
2	Harris	UMD	MD	2.5
3	Chu	NYU	NY	3.9
4	Kim	Cornell	NY	3.8
5	Sudarsen	RPI	NY	2.8
6	Katz	Columbia	NY	3.1
7	Miller	Goucher	MD	2.9
8	Penn	NYU	NY	3.6

q1:
```
SELECT   name, gpa
FROM     STUDENT
WHERE    gpa > 3.5
```

q2:
```
SELECT name, university, state
FROM STUDENT
WHERE gpa <= 3.5
```

q3:
```
SELECT  university
FROM STUDENT
WHERE state = 'NY'
```

q4:
```
SELECT university
FROM STUDENT
WHERE state = 'MD'
```

Applying vertical fragmentation to a table and then applying horizontal fragmentation to the vertical fragments

Continue with the result of 1 d)

Vertical Fragment

R1

sid	Name	Gpa
1	Jones	3.7
2	Harris	2.5
3	Chu	3.9
4	Kim	3.8
5	Sudarsen	2.8
6	Katz	3.1
7	Miller	2.9
8	Penn	3.6

R2

sid	University	State
1	JHU	MD
2	UMD	MD
3	NYU	NY
4	Cornell	NY
5	RPI	NY
6	Columbia	NY
7	Goucher	MD
8	NYU	NY

Then Horizontal Fragment

R11 = gpa <= 3.5

sid	Name	Gpa
2	Harris	2.5
5	Sudarsen	2.8
6	Katz	3.1
7	Miller	2.9

R12 = gpa > 3.5

sid	Name	Gpa
1	Jones	3.7
3	Chu	3.9
4	Kim	3.8
8	Penn	3.6

R21 = MD

sid	University	State
1	JHU	MD
2	UMD	MD
7	Goucher	MD

R22= NY

sid	University	State
3	NYU	NY
4	Cornell	NY
5	RPI	NY
6	Columbia	NY
8	NYU	NY

Applying horizontal fragmentation to a table and then applying vertical fragmentation to the horizontal fragments

Horizontal fragment

sid	Name	University	State	Gpa
1	Jones	JHU	MD	3.7
2	Harris	UMD	MD	2.5
3	Chu	NYU	NY	3.9
4	Kim	Cornell	NY	3.8
5	Sudarsen	RPI	NY	2.8
6	Katz	Columbia	NY	3.1
7	Miller	Goucher	MD	2.9
8	Penn	NYU	NY	3.6

R1 = MD and <=3.5

Sid	Name	University	State	Gpa
2	Harris	UMD	MD	2.5
7	Miller	Goucher	MD	2.9

R2= NY and <=3.5

sid	Name	University	State	Gpa
5	Sudarsen	RPI	NY	2.8
6	Katz	Columbia	NY	3.1

R3 = MD and >3.5

sid	Name	University	State	Gpa
1	Jones	JHU	MD	3.7

R4 = NY and >3.5

sid	Name	University	State	Gpa
3	Chu	NYU	NY	3.9
4	Kim	Cornell	NY	3.8
8	Penn	NYU	NY	3.6

vertical fragment

vertical fragment will divide our 4 relations to 8 relations

R1 -> R11 , R12

R2 -> R21, R22

R3 -> R31, R32

R4 -> R41, R42

so without going forward to calculate every detail out, if we do vertical first then horizontal we get total 4 fragments, if we do horizontal first then vertical, we get total 8 fragments.

we can already conclude Applying horizontal fragmentation to a table and then applying vertical fragmentation to the horizontal fragments is DIFFERENT to applying vertical fragmentation to a table and then applying horizontal fragmentation to the vertical fragments.