Welcome to Week 7 Workshop

Assignment Project Exam Help

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Housekeeping

Assignment Project Exam Help

- The mark and feedback on Assignment 1 (SQL) is available on Wattle.
- https://eduassistpro.github.i

Add WeChat edu_assist_pr

Housekeeping

Assignment Project Exam Help

- The mark and feedback on Assignment 1 (SQL) is available on Wattle.
  - https://eduassistpro.github.i
- The specification of Assignment 2 (Database Th
  Sep 23. The submission via Wattle is due 23:59 Oct 1
  - **Individual, no group work!**
  - **Do not post any idea/partial solution/result on Wattle.**

Add WeChat edu_assist_pr

SQL $\Rightarrow$ Relational Algebra

Assignment Project Exam Help

Database users

https://eduassistpro.github.i

```
SELECT ...
FROM ...
WHERE ...
...
```

Add WeChat edu_assist_pr

SQL $\Rightarrow$ Relational Algebra

Assignment Project Exam Help

Database users

Database systems

https://eduassistpro.github.i

```
SELECT ...
FROM ...
WHERE ...
...
```

Add WeChat edu_assist_pr

Why Relational Algebra?

- Make SQL queries easy-to-use ...

Assignment Project Exam Help

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Why Relational Algebra?

Assignment Project Exam Help

- Make SQL queries easy-to-use ...

Declarative	vs	Procedural
		log. Preheat oven to 350° and bake 30-minutes.

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Why Relational Algebra?

Assignment Project Exam Help

- Make SQL queries easy-to-use ...

Declarative	vs	Procedural
		log. Preheat oven to 350° and bake 30-minutes.

https://eduassistpro.github.i

Add WeChat edu_assist_pr

RA bridges the gap between the declarative natur procedure nature of a computer system.

Why Relational Algebra?

Assignment Project Exam Help

- Make SQL queries easy-to-use ...

Declarative	vs	Procedural
		log. Preheat oven to 350° and bake 30-minutes.

https://eduassistpro.github.i

Add WeChat edu_assist_pr

RA bridges the gap between the declarative natur
procedure nature of a computer system.

- **Expressive:** Each SQL query can be represented by a RA query.
- **Procedural:** Each RA query consists of step-by-step operations.

Why Relational Algebra?

- Make SQL queries run fast ...

Assignment Project Exam Help

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Why Relational Algebra?

- Make SQL queries run fast ...

Assignment Project Exam Help

https://eduassistpro.github.i

RA enables many different ways to implement a S

Add WeChat edu_assist_pr

Why Relational Algebra?

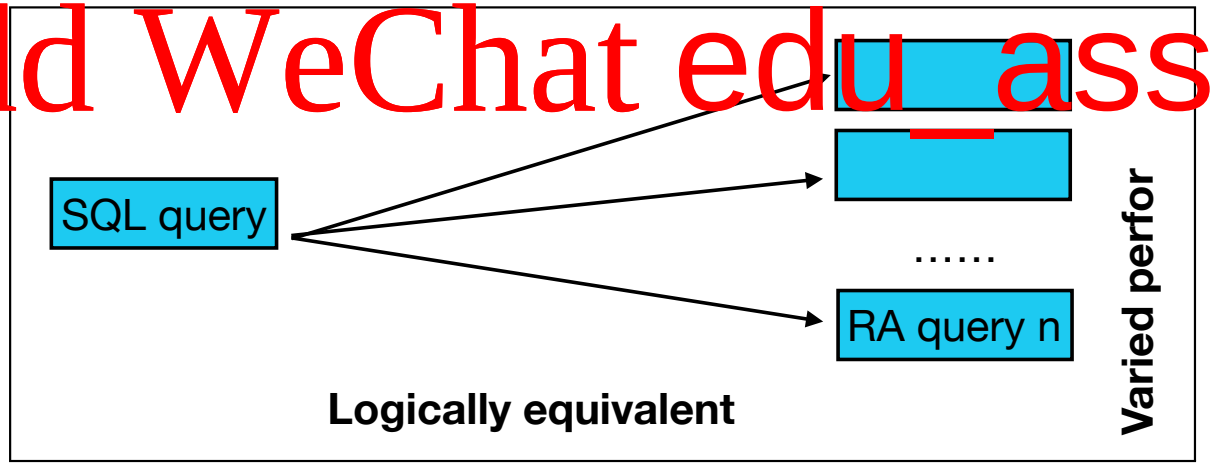
- Make SQL queries run fast ...

Assignment Project Exam Help

https://eduassistpro.github.i

RA enables many different ways to implement a S

Add WeChat edu_assist_pr



Arithmetic v.s. Algebra

What is the difference between “2+8=8+2” and “a+b=b+a”?

Assignment Project Exam Help

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Arithmetic v.s. Algebra

What is the difference between “2+8=8+2” and “a+b=b+a”?

- Arithmetic: “2+8=8+2” is a specific fact.
- Algebra: “a+b=b+a” is a general pattern.

Assignment Project Exam Help

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Arithmetic v.s. Algebra

What is the difference between “2+8=8+2” and “a+b=b+a”?

- Arithmetic: “2+8=8+2” is a specific fact.
- Algebra: “a+b=b+a” is a general pattern.

Assignment Project Exam Help

https://eduassistpro.github.i

Add WeChat edu_assist_pr

What is an "Algebra"?

Assignment Project Exam Help

- Mathematical system consisting of:
  -
  -

https://eduassistpro.github.i
es

Add WeChat edu_assist_pr

What is an "Algebra"?

Assignment Project Exam Help

- Mathematical system consisting of:
  -
  -
  - es
- Elementary algebra consisting of:
  - **Operands** — variables x, y, z, etc.
  - **Operators** — $+$, $-$, $\times$, $/$

https://eduassistpro.github.i

Add WeChat edu_assist_pr

What is an "Algebra"?

Assignment Project Exam Help

- Mathematical system consisting of:
  -
  -
- Elementary algebra consisting of:
  - **Operands** — variables X, Y, Z, etc.
  - **Operators** — $+$, $-$, $\times$, $/$
- Relational algebra consisting of:
  - **Operands** — relations R_1, R_2, R_3, etc.
  - **Operators** — $\{\sigma, \pi, \cup, \cap, \bowtie, \ldots\}$

https://eduassistpro.github.io
es
Add WeChat edu_assist_pr

Relational Operators [1]

Assignment Project Exam Help

https://eduassistpro.github.i

Add WeChat edu_assist_pr

. . . . . .
. . . . . .
. . . . . .

[1] http://merrigrove.blogspot.com.au/2011/12/another-introduction-to-algebraic-data.html (with some changes)

Summary of Relational Operators

Operator	Notation	Meaning
Selection	$\sigma_{\varphi}(R)$	choose rows
Proje		
Unio Inter Difference	$R_1 - R_2$	
Cartesian product Join Natural-join	$R_1 \times R_2$ $R_1 \bowtie_{\varphi} R_2$ $R_1 \bowtie R_2$	c
Renaming	$\rho_{R'(A_1,\ldots,A_n)}(R)$ $\rho_{R'}(R)$ $\rho_{(A_1,\ldots,A_n)}(R)$	rename relation and attributes

Assignment Project Exam Help
https://eduassistpro.github.i
Add WeChat edu_assist_pr

Selection Example

Assignment Project Exam Help

- Consider the relation SELLS:

Shop	Item	Price

https://eduassistpro.github.i

- What if we only want to know all the items with price les

Add WeChat edu_assist_pr

Selection Example

Assignment Project Exam Help

- Consider the relation SELL:

Shop	Item	Price

https://eduassistpro.github.i

- What if we only want to know all the items with price les

$\sigma_\varphi(R)$, φ = *Price* $<$ 9, R=SELL $\Rightarrow$ $\sigma_{Price<}$

Add WeChat edu_assist_pr

Selection Example

Assignment Project Exam Help

- Consider the relation SELL:

Shop	Item	Price

https://eduassistpro.github.i

- What if we only want to know all the items with price les

$\sigma_\varphi(R)$, φ = *Price* $<$ 9, R=SELL $\Rightarrow$ $\sigma_{Price<}$

Add WeChat edu_assist_pr

Shop	Item	Price
Coop	Ham	8
Migros	Cheese	8

Projection Example

Assignment Project Exam Help

- Consider the relation SELL:

Shop	Item	Price

https://eduassistpro.github.i

- What if we only want to know all the available shops a

Add WeChat edu_assist_pr

Projection Example

Assignment Project Exam Help

- Consider the relation SELL:

Shop	Item	Price

https://eduassistpro.github.i

- What if we only want to know all the available shops a

$\pi_{A_1,\ldots,A_n}(R)$, $\{A_1,\ldots,A_n\} = \{Shop, Item\}$

Add WeChat edu_assist_pr

Projection Example

Assignment Project Exam Help

- Consider the relation SELL:

Shop	Item	Price

https://eduassistpro.github.i

- What if we only want to know all the available shops a

$\pi_{A_1,\ldots,A_n}(R)$, $\{A_1,\ldots,A_n\} = \{Shop, Item\}$

Add WeChat edu_assist_pr

Shop	I
Coop	Cheese
Migros	Cabbage
Coop	Ham
Migros	Cheese

Selection + Projection Example

Assignment Project Exam Help

- Consider the relation SELL:

Shop	Item	Price

https://eduassistpro.github.i

- What if we only want to know all the available shops a less than 9 CHF?

Add WeChat edu_assist_pr

Selection + Projection Example

Assignment Project Exam Help

- Consider the relation SELL:

Shop	Item	Price

https://eduassistpro.github.i

- What if we only want to know all the available shops a less than 9 CHF?

Add WeChat edu_assist_pr

$\pi_{Shop,Item}(\sigma_{Price<9}(\textbf{SELL}))$

Selection + Projection Example

Assignment Project Exam Help

- Consider the relation SELL:

Shop	Item	Price

https://eduassistpro.github.i

- What if we only want to know all the available shops a less than 9 CHF?

Add WeChat edu_assist_pr

$\pi_{Shop,Item}(\sigma_{Price<9}(\textbf{SELL}))$

Shop	Item	Price
Coop	Ham	8
Migros	Cheese	8

Shop	Item
Coop	Ham
Migros	Cheese

Selection + Projection Example

Assignment Project Exam Help

- Consider the relation SELL:

Shop	Item	Price

https://eduassistpro.github.i

- What if we only want to know all the available shops a less than 9 CHF?

Add WeChat edu_assist_pr

Selection + Projection Example

Assignment Project Exam Help

- Consider the relation SELL:

Shop	Item	Price

https://eduassistpro.github.i

- What if we only want to know all the available shops a less than 9 CHF?

  What about $\sigma_{Price<9}(\pi_{Shop,Item}(\mathbf{SELL}))$?

Add WeChat edu_assist_pr

Selection + Projection Example

Assignment Project Exam Help

- Consider the relation SELL:

Shop	Item	Price

https://eduassistpro.github.i

- What if we only want to know all the available shops a less than 9 CHF?

Add WeChat edu_assist_pr

What about $\sigma_{Price<9}(\pi_{Shop,Item}(SELL))$?

Shop	Item
Coop	Cheese
Migros	Cabbage
Coop	Ham
Migros	Cheese

Selection + Projection Example

Assignment Project Exam Help

- Consider the relation SELL:

Shop	Item	Price

https://eduassistpro.github.i

- What if we only want to know all the available shops a less than 9 CHF?

Add WeChat edu_assist_pr

What about $\sigma_{Price<9}(\pi_{Shop,Item}(SELL))$?

Shop	Item
Coop	Cheese
Migros	Cabbage
Coop	Ham
Migros	Cheese

Error!
No price attribute available.

Selection and Projection – Properties

Assignment Project Exam Help

- Selections are **commutative**

$$\sigma_{\varphi_1}(\sigma_{\varphi_2}(R)) = \sigma_{\varphi_2}(\sigma_{\varphi_1}(R))$$

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Selection and Projection – Properties

Assignment Project Exam Help

- Selections are **commutative**

$$\sigma_{\varphi_1}(\sigma_{\varphi_2}(R)) = \sigma_{\varphi_2}(\sigma_{\varphi_1}(R)) = \sigma_{\varphi_1 \wedge \varphi_2}(R).$$

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Selection and Projection – Properties

Assignment Project Exam Help

- Selections are **commutative**

$$\sigma_{\varphi_1}(\sigma_{\varphi_2}(R)) = \sigma_{\varphi_2}(\sigma_{\varphi_1}(R)) = \sigma_{\varphi_1 \wedge \varphi_2}(R).$$

- Pr

π_B enera

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Selection and Projection – Properties

Assignment Project Exam Help

- Selections are **commutative**

$$\sigma_{\varphi_1}(\sigma_{\varphi_2}(R)) = \sigma_{\varphi_2}(\sigma_{\varphi_1}(R)) = \sigma_{\varphi_1 \wedge \varphi_2}(R).$$

- Pr

π_B enera

https://eduassistpro.github.i

- Pairs of selection and projection are **not c**

$\pi_{A_1,\ldots,A_n}(\sigma_\varphi(R)) = \sigma_\varphi(\pi_{A_1,\ldots,A_n}(R))$ **does**

Add WeChat edu_assist_pr

Selection and Projection – Properties

Assignment Project Exam Help

- Selections are **commutative**

$$\sigma_{\varphi_1}(\sigma_{\varphi_2}(R)) = \sigma_{\varphi_2}(\sigma_{\varphi_1}(R)) = \sigma_{\varphi_1 \wedge \varphi_2}(R).$$

- Pr

π_B enera

https://eduassistpro.github.i

- Pairs of selection and projection are **not c**

$\pi_{A_1,\ldots,A_n}(\sigma_\varphi(R)) \equiv \sigma_\varphi(\pi_{A_1,\ldots,A_n}(R))$ **does**

Add WeChat edu_assist_pr

- Selections will always keep the same number of co

Selection and Projection – Properties

Assignment Project Exam Help

- Selections are **commutative**

$$\sigma_{\varphi_1}(\sigma_{\varphi_2}(R)) = \sigma_{\varphi_2}(\sigma_{\varphi_1}(R)) = \sigma_{\varphi_1 \wedge \varphi_2}(R).$$

- Pr

π_B enera

https://eduassistpro.github.i

- Pairs of selection and projection are **not c**

$\pi_{A_1,\ldots,A_n}(\sigma_\varphi(R)) \equiv \sigma_\varphi(\pi_{A_1,\ldots,A_n}(R))$ **does**

Add WeChat edu_assist_pr

- Selections will always keep the same number of co

Selection and Projection – Properties

Assignment Project Exam Help

- Selections are **commutative**

$$\sigma_{\varphi_1}(\sigma_{\varphi_2}(R)) = \sigma_{\varphi_2}(\sigma_{\varphi_1}(R)) = \sigma_{\varphi_1 \wedge \varphi_2}(R).$$

- Pr

π_B

https://eduassistpro.github.i

enera

- Pairs of selection and projection are **not c**

$\pi_{A_1,\ldots,A_n}(\sigma_\varphi(R)) = \sigma_\varphi(\pi_{A_1,\ldots,A_n}(R))$ **does**

Add WeChat edu_assist_pr

- Selections will always keep the same number of co
- Projections will always keep the same number of rows?

Selection and Projection – Properties

Assignment Project Exam Help

- Selections are **commutative**

  $\sigma_{\varphi_1}(\sigma_{\varphi_2}(R)) = \sigma_{\varphi_2}(\sigma_{\varphi_1}(R)) = \sigma_{\varphi_1 \wedge \varphi_2}(R)$.

- Pr

  π_B enera

https://eduassistpro.github.i

- Pairs of selection and projection are **not c**

  $\pi_{A_1,\ldots,A_n}(\sigma_\varphi(R)) = \sigma_\varphi(\pi_{A_1,\ldots,A_n}(R))$ does

Add WeChat edu_assist_pr

- Selections will always keep the same number of co
- Projections will always keep the same number of rows? **No** (may introduce duplicates and have to be eliminated).

Selection and Projection – Properties

Assignment Project Exam Help

- Selections are **commutative**

  $\sigma_{\varphi_1}(\sigma_{\varphi_2}(R)) = \sigma_{\varphi_2}(\sigma_{\varphi_1}(R)) = \sigma_{\varphi_1 \wedge \varphi_2}(R)$.

- Pr

  π_B enera

https://eduassistpro.github.i

- Pairs of selection and projection are **not c**

  $\pi_{A_1,\ldots,A_n}(\sigma_\varphi(R)) = \sigma_\varphi(\pi_{A_1,\ldots,A_n}(R))$ does

Add WeChat edu_assist_pr

- Selections will always keep the same number of co
- Projections will always keep the same number of rows? **No** (may introduce duplicates and have to be eliminated).

Set Operations

Assignment Project Exam Help

- Relations are sets (of tuples/rows), we have standard operations on sets.
  - s
  - s all
- **Difference**, denoted as $R_1 - R_2$, res
  tuples that are in R_1 but not in R_2.

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Set Operations

Assignment Project Exam Help

- Relations are sets (of tuples/rows), we have standard operations on sets.
  - s
  - s all
  - **Difference**, denoted as $R_1 - R_2$, res
    tuples that are in R_1 but not in R_2.

https://eduassistpro.github.i

Add WeChat edu_assist_pr

- **Type compatibility**: R_1 and R_2 must have
  - the same number of attributes, and
  - the same domains for the attributes (the order is important).

Set Operations

Assignment Project Exam Help

STUDY

StudentID	CourseNo	Hours
111	COMP2400	120

https://eduassistpro.github.i

- What is the result for
  $\pi_{StudentID}(\sigma_{CourseNo='COMP2400'}(\text{STUDY})) \cap \pi$ TUDY))?

Add WeChat edu_assist_pr

$R_1 = \pi_{StudentID}(\sigma_{CourseNo='COMP2400'}(\text{STUDY}$

$R_2 = \pi_{StudentID}(\sigma_{CourseNo='ECON2102'}(\text{STUDY}))$

Set Operations

Assignment Project Exam Help
https://eduassistpro.github.i

STUDY

StudentID	CourseNo	Hours
111	COMP2400	120

- What is the result for

$\pi_{StudentID}(\sigma_{CourseNo='COMP2400'}(\text{STUDY})) \cap \pi$ TUDY))?

Add WeChat edu_assist_pr

$R_1 = \pi_{StudentID}(\sigma_{CourseNo='COMP2400'}(\text{STUDY}$

222

INTERSECT

$R_2 = \pi_{StudentID}(\sigma_{CourseNo='ECON2102'}(\text{STUDY}))$

StudentID
111

Set Operations

Assignment Project Exam Help
https://eduassistpro.github.i

STUDY

StudentID	CourseNo	Hours
111	COMP2400	120

- What is the result for
  $\pi_{StudentID}(\sigma_{CourseNo='COMP2400'}(\text{STUDY})) \cap \pi_{StudentID}(\sigma_{CourseNo='ECON2102'}(\text{STUDY}))$?

Add WeChat edu_assist_pr

$R_1 = \pi_{StudentID}(\sigma_{CourseNo='COMP2400'}(\text{STUDY}))$

$R_1 \cap R_2$

$R_2 = \pi_{StudentID}(\sigma_{CourseNo='ECON2102'}(\text{STUDY}))$

StudentID
111

Set Operations

Assignment Project Exam Help

https://eduassistpro.github.i

STUDY

StudentID	CourseNo	Hours
111	COMP2400	120

- What is the result for

$\pi_{StudentID}(\sigma_{CourseNo='COMP2400'}(STUDY)) \cap \pi$

Add WeChat edu_assist_pr

Set Operations

Assignment Project Exam Help
https://eduassistpro.github.i

STUDY

StudentID	CourseNo	Hours
111	COMP2400	120

- What is the result for

Add WeChat edu_assist_pr

$\pi_{StudentID}(\sigma_{CourseNo='COMP2400'}(\text{STUDY}) \cap \sigma$

$R_1 = \sigma_{CourseNo='COMP2400'}(\text{STUDY})$

$\pi_{StudentID}(R_1 \cap R_2)$

$R_2 = \sigma_{CourseNo='ECON2102'}(\text{STUDY})$

Set Operations

Assignment Project Exam Help
https://eduassistpro.github.i

STUDY

StudentID	CourseNo	Hours
111	COMP2400	120

- What is the result for

Add WeChat edu_assist_pr

$\pi_{StudentID}(\sigma_{CourseNo='COMP2400'}(\text{STUDY}) \cap \sigma$

$R_1 = \sigma_{CourseNo='COMP2400'}(\text{STUDY})$

$\pi_{StudentID}(R_1 \cap R_2)$

EMPTY!

$R_2 = \sigma_{CourseNo='ECON2102'}(\text{STUDY})$

Cartesian Product, Join and Natural Join

Assignment Project Exam Help

- **Cartesian product** $R_1 \times R_2$ combines tuples from two relations in a combinatorial fashion.

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Cartesian Product, Join and Natural Join

Assignment Project Exam Help

- **Cartesian product** $R_1 \times R_2$ combines tuples from two relations in a combinatorial fashion.

- **Join** $R_1 \bowtie_\varphi R_2 = \sigma_\varphi($

https://eduassistpro.github.io/

Add WeChat edu_assist_pr

Cartesian Product, Join and Natural Join

Assignment Project Exam Help

- **Cartesian product** $R_1 \times R_2$ combines tuples from two relations in a combinatorial fashion.

https://eduassistpro.github.i

- **Jo** ... **uct** **an** ...

$$R_1 \bowtie_{\varphi} R_2 = \sigma_{\varphi}($$

- **Natural Join** $R_1 \bowtie R_2$

Add WeChat edu_assist_pr

  1. Implicitly apply the join condition on **attributes that have the same name**
  2. Project out one copy of the attributes that have the same name in both relations.

Cartesian Product – Example

Assignment Project Exam Help

COURSE

No	Cname	Unit

https://eduassistpro.github.i

NROL

StudentID	CourseNo	Semester	Status
111	BUSN2011		
222	COMP2400		
111	COMP2400		

Add WeChat edu_assist_pr

- What is the result for COURSE × ENROL?

Cartesian Product – Example

Assignment Project Exam Help

COURSE		
No	Cname	Unit

https://eduassistpro.github.i

NROL			
StudentID	CourseNo	Semester	Status
111	BUSN2011		
222	COMP2400		
111	COMP2400		

Add WeChat edu_assist_pr

- What is the result for COURSE × ENROL?

  COURSE × ENROL will have 9 (=3×3) tuples and 7 (=3+4) attributes.

Join – Example

Assignment Project Exam Help
https://eduassistpro.github.i
Add WeChat edu_assist_pr

COURSE

No	Cname	Unit
COMP2400	Relational Databases	6
BUSN2011	Management Accounting	6

222	COMP2400	2016 S1	active
111	COMP2400		

- What is the result for COURSE $\triangleright\!\!\!\bowtie_{No=Course}$

Join – Example

Assignment Project Exam Help
https://eduassistpro.github.i
Add WeChat edu_assist_pr

COURSE

No	Cname	Unit
COMP2400	Relational Databases	6
BUSN2011	Management Accounting	6

222	COMP2400	2016 S1	active
111	COMP2400		

- What is the result for COURSE $\triangleright\!\!\!\rightarrow_{No=Course}$

No	Cname	Unit	StudentID	CourseNo	Semester	Status
COMP2400	Relational Databases	6	222	**COMP2400**	2016 S1	active
COMP2400	Relational Databases	6	111	**COMP2400**	2016 S2	active
BUSN2011	Management Accounting	6	111	**BUSN2011**	2016 S1	active

Join – Example

Assignment Project Exam Help
https://eduassistpro.github.i
Add WeChat edu_assist_pr

COURSE

No	Cname	Unit
COMP2400	Relational Databases	6

111	BUSN2011	2016 S1	active
222	COMP2400		
111	COMP2400		

- What is the result for $\pi_{No,Cname}(\text{COURSE} \triangleright$

Join – Example

Assignment Project Exam Help
https://eduassistpro.github.i
Add WeChat edu_assist_pr

COURSE

No	Cname	Unit
COMP2400	Relational Databases	6

111	BUSN2011	2016 S1	active
222	COMP2400		
111	COMP2400		

- What is the result for $\pi_{No,Cname}$(COURSE ▷

No	Cname
COMP2400	Relational Databases
BUSN2011	Management Accounting

Natural Join – Example

Assignment Project Exam Help
https://eduassistpro.github.i
Add WeChat edu_assist_pr

COURSE

No	Cname	Unit
COMP2400	Relational Databases	6

111	BUSN2011	2016 S1	active
222	COMP2400		
111	COMP2400		

- What is the result for COURSE ▷1 ENROL?

Natural Join – Example

Assignment Project Exam Help
https://eduassistpro.github.i
Add WeChat edu_assist_pr

COURSE

No	Cname	Unit
COMP2400	Relational Databases	6

111	BUSN2011	2016 S1	active
222	COMP2400		
111	COMP2400		

- What is the result for COURSE ⋈ ENROL?

  If there are no matching attributes in two tables for NATURAL JOIN, COURSE ⋈ ENROL will become COURSE × ENROL which outputs 9 (=3×3) tuples and 7 (=3+4) attributes.

Natural Join – Example

Assignment Project Exam Help
https://eduassistpro.github.i
Add WeChat edu_assist_pr

COURSE

CourseNo	Cname	Unit
COMP2400	Relational Databases	6

ENROL

111	BUSN2011	2016 S1	active
222	COMP2400		
111	COMP2400		

- What is the result for COURSE ⋈ ENROL?

Natural Join – Example

Assignment Project Exam Help
https://eduassistpro.github.i
Add WeChat edu_assist_pr

COURSE

CourseNo	Cname	Unit
COMP2400	Relational Databases	6

111	BUSN2011	2016 S1	active
222	COMP2400		
111	COMP2400		

- What is the result for COURSE ⋈ ENROL?

CourseNo	Cname	Unit	StudentID	Semester	Status
COMP2400	Relational Databases	6	222	2016 S1	active
COMP2400	Relational Databases	6	111	2016 S2	active
BUSN2011	Management Accounting	6	111	2016 S1	active

Natural Join – Example

Assignment Project Exam Help
https://eduassistpro.github.i
Add WeChat edu_assist_pr

COURSE

CourseNo	Cname	Unit
COMP2400	Relational Databases	6
BUSN2011	Management Accounting	6

222	COMP2400	2016 S1	active
111	COMP2400		

- What is the result for $\sigma_{StudentID=111}(\text{ENROLLS})$?

Natural Join – Example

Assignment Project Exam Help
https://eduassistpro.github.i
Add WeChat edu_assist_pr

COURSE

CourseNo	Cname	Unit
COMP2400	Relational Databases	6
BUSN2011	Management Accounting	6

222	COMP2400	2016 S1	active
111	COMP2400		

- What is the result for $\sigma_{StudentID=111}$(COURSE)?

CourseNo	Cname	Unit	StudentID	Semester	Status
COMP2400	Relational Databases	6	111	2016 S2	active
BUSN2011	Management Accounting	6	111	2016 S1	active

Natural Join – Example

Assignment Project Exam Help

COURSE

CourseNo	Cname	Unit
COMP2400	Relational Databases	6
BUSN2011	Management Accounting	6

https://eduassistpro.github.i

222	COMP2400	2016 S1	active
111	COMP2400		

Add WeChat edu_assist_pr

- What is the result for COURSE ⋈ COURSE?

Natural Join – Example

Assignment Project Exam Help
https://eduassistpro.github.i
Add WeChat edu_assist_pr

COURSE		
CourseNo	Cname	Unit
COMP2400	Relational Databases	6
BUSN2011	Management Accounting	6

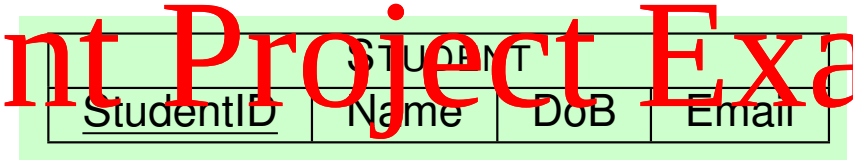
222	COMP2400	2016 S1	active
111	COMP2400		

- What is the result for COURSE ⋈ COURSE?

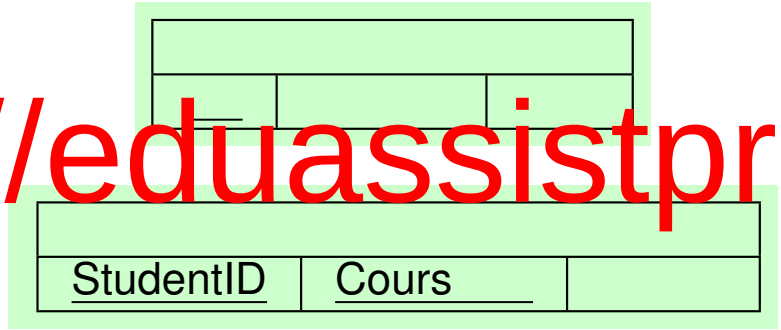
COURSE		
CourseNo	Cname	Unit
COMP2400	Relational Databases	6
BUSN2011	Management Accounting	6
ECON2102	Macroeconomics	6

Join – More Examples

Assignment Project Exam Help



https://eduassistpro.github.i

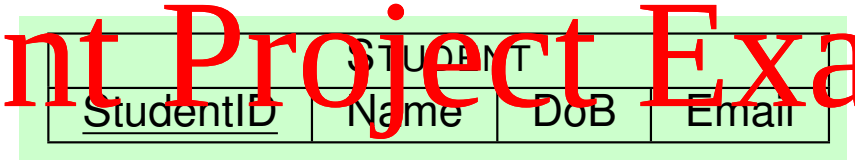


Add WeChat edu_assist_pr

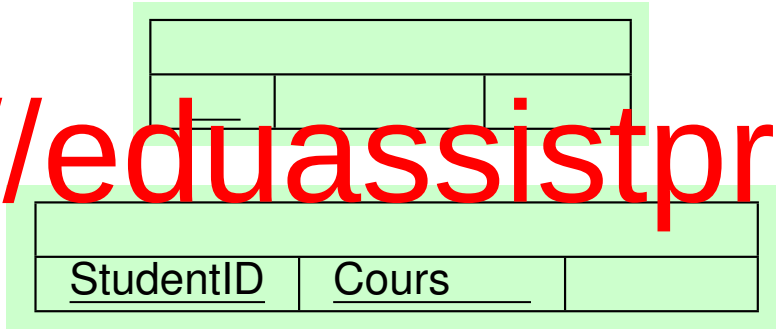
- List the email of students who have enrolled in cours of these courses.

Join – More Examples

Assignment Project Exam Help



https://eduassistpro.github.i

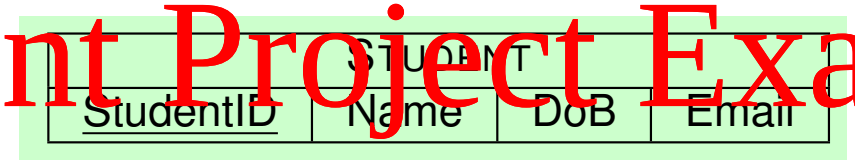


Add WeChat edu_assist_pr

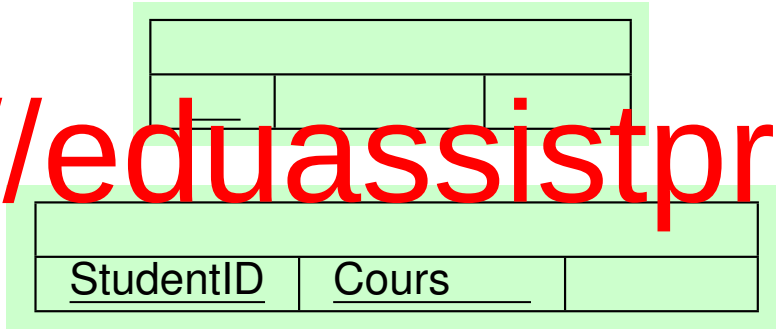
- List the email of students who have enrolled in cours of these courses.
  1. $\pi_{Email, CourseNo}(\sigma_{Student.StudentID=Enrol.StudentID}(\text{STUDENT} \times \text{ENROL}))$

Join – More Examples

Assignment Project Exam Help



https://eduassistpro.github.i

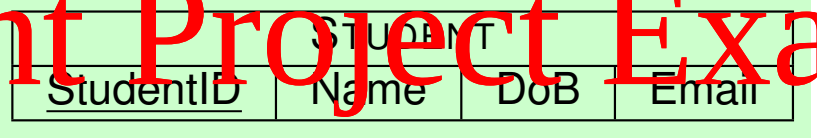


Add WeChat edu_assist_pr

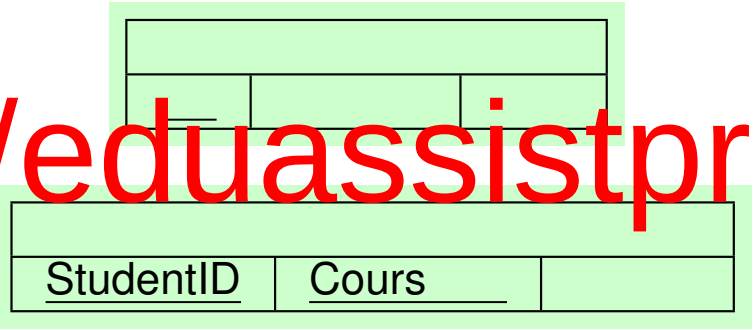
- List the email of students who have enrolled in cours of these courses.
  1. $\pi_{Email, CourseNo}(\sigma_{Student.StudentID=Enrol.StudentID}(\text{STUDENT} \times \text{ENROL}))$
  2. $\pi_{Email, CourseNo}(\text{STUDENT} \bowtie_{Student.StudentID=Enrol.StudentID} \text{ENROL})$

Join – More Examples

Assignment Project Exam Help



https://eduassistpro.github.i



Add WeChat edu_assist_pr

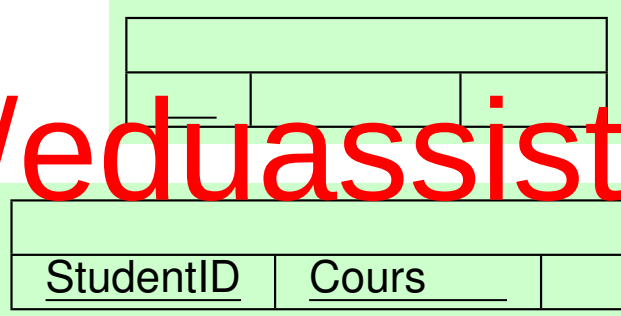
- List the email of students who have enrolled in cours of these courses.
  1. $\pi_{Email,CourseNo}(\sigma_{Student.StudentID=Enrol.StudentID}(\text{STUDENT} \times \text{ENROL}))$
  2. $\pi_{Email,CourseNo}(\text{STUDENT} \bowtie_{Student.StudentID=Enrol.StudentID} \text{ENROL})$
  3. $\pi_{Email,CourseNo}(\text{STUDENT} \bowtie \text{ENROL})$

Join – More Examples

Assignment Project Exam Help

STUDENT

StudentID	Name	DoB	Email



StudentID	Cours

https://eduassistpro.github.i

Add WeChat edu_assist_pr

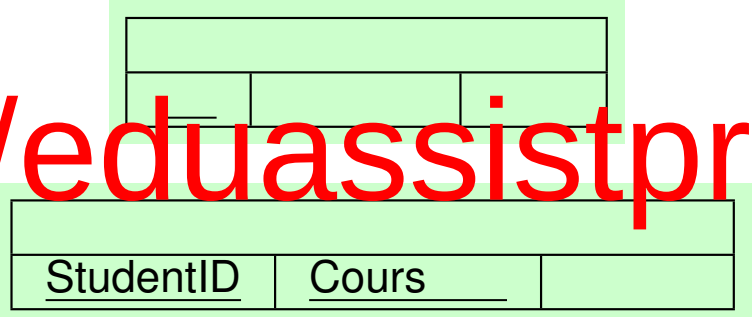
- List the email of students who have enrolled in cours of these courses.
  1. $\pi_{Email, CourseNo}(\sigma_{Student.StudentID=Enrol.StudentID}(\text{STUDENT} \times \text{ENROL}))$
  2. $\pi_{Email, CourseNo}(\text{STUDENT} \bowtie_{Student.StudentID=Enrol.StudentID} \text{ENROL})$
  3. $\pi_{Email, CourseNo}(\text{STUDENT} \bowtie \text{ENROL})$
  4. $(\pi_{Email, CourseNo}(\text{STUDENT})) \bowtie \text{ENROL}$

Join – More Examples

Assignment Project Exam Help

STUDENT

StudentID	Name	DoB	Email



StudentID	Cours

https://eduassistpro.github.i

Add WeChat edu_assist_pr

- List the email of students who have enrolled in cours of these courses.
  1. $\pi_{Email, CourseNo}(\sigma_{Student.StudentID=Enrol.StudentID}(\text{STUDENT} \times \text{ENROL}))$
  2. $\pi_{Email, CourseNo}(\text{STUDENT} \bowtie_{Student.StudentID=Enrol.StudentID} \text{ENROL})$
  3. $\pi_{Email, CourseNo}(\text{STUDENT} \bowtie \text{ENROL})$
  4. $(\pi_{Email, CourseNo}(\text{STUDENT})) \bowtie \text{ENROL}$ **Incorrect!**
  5. $\pi_{Email}(\text{STUDENT}) \bowtie \pi_{CourseNo}(\text{ENROL})$

Join – More Examples

Assignment Project Exam Help

STUDENT

StudentID	Name	DoB	Email

https://eduassistpro.github.i

StudentID	Cours

Add WeChat edu_assist_pr

- List the email of students who have enrolled in cours of these courses.
  1. $\pi_{Email, CourseNo}(\sigma_{Student.StudentID=Enrol.StudentID}(\text{STUDENT} \times \text{ENROL}))$
  2. $\pi_{Email, CourseNo}(\text{STUDENT} \bowtie_{Student.StudentID=Enrol.StudentID} \text{ENROL})$
  3. $\pi_{Email, CourseNo}(\text{STUDENT} \bowtie \text{ENROL})$
  4. $(\pi_{Email, CourseNo}(\text{STUDENT})) \bowtie \text{ENROL}$ **Incorrect!**
  5. $\pi_{Email}(\text{STUDENT}) \bowtie \pi_{CourseNo}(\text{ENROL})$ **Incorrect!**

Renaming

Assignment Project Exam Help

- **Renaming** is used to rename either the relation name or the attribute names, or both.

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Renaming

Assignment Project Exam Help

- **Renaming** is used to rename either the relation name or the attribute names, or both.
- R
  - https://eduassistpro.github.i
  - bute

$1, \ldots, n$

Add WeChat edu_assist_pr

Renaming

Assignment Project Exam Help

- **Renaming** is used to rename either the relation name or the attribute names, or both.
- R
  - bute
  - $_1, \ldots, \ _n$
  - $\rho_{R'}(R)$: renaming the relation name to
    names unchanged, o

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Renaming

Assignment Project Exam Help

- **Renaming** is used to rename either the relation name or the attribute names, or both.

- R

https://eduassistpro.github.i

  - ute

    1, . . . , n

  - $\rho_{R'}(R)$: renaming the relation name to
    names unchanged, o

Add WeChat edu_assist_pr

  - $\rho_{(A_1,\ldots,A_n)}(R)$: renaming the attribute nam ping the relation name unchanged.

Renaming

Assignment Project Exam Help

- **Renaming** is used to rename either the relation name or the attribute names, or both.
- R
https://eduassistpro.github.i
  - bute
  - 1, . . . , n
  - $\rho_{R'}(R)$: renaming the relation name to
Add WeChat edu_assist_pr
names unchanged, o
  - $\rho_{(A_1,\ldots,A_n)}(R)$: renaming the attribute nam ping the relation name unchanged.
- Renaming is useful for giving names to the relations that hold the intermediate results.

Rename – Example

Assignment Project Exam Help

- Given the following relation schema:

  STUDENT= StudentID, Name, DoB

- Fi

https://eduassistpro.github.i

457	Lisa	
458	Mike	
459	Peter	

Add WeChat edu_assist_pr

- What about the following choices?

Rename – Example

Assignment Project Exam Help

- Given the following relation schema:

  STUDENT= StudentID, Name, DoB

- Fi

https://eduassistpro.github.i

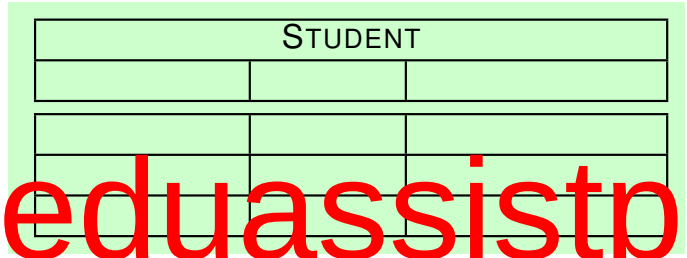
457	Lisa	
458	Mike	
459	Peter	

Add WeChat edu_assist_pr

- What about the following choices?
  1. $\pi_{Name,Name}(\sigma_{DoB=DoB}(\text{STUDENT} \times \text{STUDENT}))$
  2. $\pi_{Name,Name}(\text{STUDENT} \bowtie_{DoB=DoB} \text{STUDENT})$
  3. $\pi_{Name,Name}(\text{STUDENT} \bowtie \text{STUDENT})$

Rename – Example

- (1) $\rho_{Name,Name}(\pi_{Name}(\sigma_{Dob=DoB}(\text{STUDENT} \times \text{STUDENT})))$.



Assignment Project Exam Help
https://eduassistpro.github.i
Add WeChat edu_assist_pr

Rename – Example

- (1) $\rho_{\text{Name},\text{Name}'}(\pi_{\text{Name}}(\text{STUDENT} \bowtie_{\text{DoB}=\text{DoB}'} \rho_{\text{Name}'}(\text{STUDENT})))$.

Assignment Project Exam Help
https://eduassistpro.github.i
Add WeChat edu_assist_pr

STUDENT

STUDENT × STUDENT

StudentID	Name	DoB	Student		
457	Lisa	18-Oct-1993	457		
457	Lisa	18-Oct-1993	458		
457	Lisa	18-Oct-1993	458		
458	Mike	16-May-1990	457		
458	Mike	16-May-1990	458		
458	Mike	16-May-1990	458	Peter	18-Oct-1993
458	Peter	18-Oct-1993	457	Lisa	18-Oct-1993
458	Peter	18-Oct-1993	458	Mike	16-May-1990
458	Peter	18-Oct-1993	458	Peter	18-Oct-1993

Rename – Example

Assignment Project Exam Help
https://eduassistpro.github.i
Add WeChat edu_assist_pr

- (1) $\rho_{T(Name,Name)}(\pi_{T.Name,Name}(\sigma_{T.DoB=DoB}(\text{STUDENT} \times \text{STUDENT})))$.

STUDENT

STUDENT × STUDENT

StudentID	Name	DoB	Student		
457	Lisa	18-Oct-1993	457		
457	Lisa	18-Oct-1993	458		
457	Lisa	18-Oct-1993	458		
458	Mike	16-May-1990	457		
458	Mike	16-May-1990	458		
458	Mike	16-May-1990	458	Peter	18-Oct-1993
458	Peter	18-Oct-1993	457	Lisa	18-Oct-1993
458	Peter	18-Oct-1993	458	Mike	16-May-1990
458	Peter	18-Oct-1993	458	Peter	18-Oct-1993

- **Incorrect!**

Rename – Example

- **(2):** $\pi_{Name, Name}(\text{STUDENT} \rhd\!\lhd_{DoB=DoB} \text{STUDENT})$

STUDENT		
StudentID	Name	DoB

Assignment Project Exam Help

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Rename – Example

- **(2):** $\pi_{Name, Name}(\text{STUDENT} \rhd\!\lhd_{DoB=DoB} \text{STUDENT})$

STUDENT		
StudentID	Name	DoB

Assignment Project Exam Help
https://eduassistpro.github.i
Add WeChat edu_assist_pr

Rename – Example

- **(2):** $\pi_{Name, Name}(\text{STUDENT} \rhd\lhd_{DoB=DoB} \text{STUDENT})$

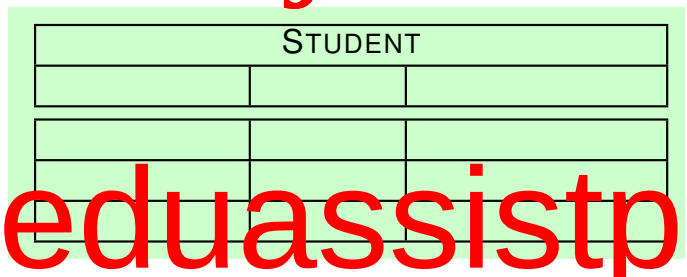
Assignment Project Exam Help
https://eduassistpro.github.i
Add WeChat edu_assist_pr

STUDENT		
StudentID	Name	DoB

- **Incorrect!**

Rename – Example

- (3) $\rho_{Name,Name}(\text{STUDENT} \bowtie \text{STUDENT})$



Assignment Project Exam Help
https://eduassistpro.github.i
Add WeChat edu_assist_pr

Rename – Example

- (3) $\rho_{\mathit{Name},\mathit{Name}}(\text{STUDENT} \bowtie \text{STUDENT})$

Assignment Project Exam Help
https://eduassistpro.github.i
Add WeChat edu_assist_pr

STUDENT		

(STUDENT ⋈ STUDENT)		
StudentID	Name	
457	Lisa	
458	Mike	
459	Peter	

Rename – Example

Assignment Project Exam Help

- (3) $\rho_{\mathit{Name},\mathit{Name}}(\text{STUDENT} \bowtie \text{STUDENT})$

https://eduassistpro.github.i

STUDENT		

Add WeChat edu_assist_pr

(STUDENT ⋈ STUDENT)		
StudentID	Name	
457	Lisa	
458	Mike	
459	Peter	

- **Incorrect!**

Rename – Example

Assignment Project Exam Help

- Given the following relation schema:

STUDENT={StudentID, Name, DoB}

- Fi

https://eduassistpro.github.i

457	Lisa	
458	Mike	
459	Peter	

Add WeChat edu_assist_pr

- What about the following choices?

Rename – Example

Assignment Project Exam Help

- Given the following relation schema:

  STUDENT={StudentID, Name, DoB}

- Fi

https://eduassistpro.github.i

457	Lisa	
458	Mike	
459	Peter	

Add WeChat edu_assist_pr

- What about the following choices?
  - $\pi_{R_1.Name, R_2.Name}(\sigma_{R_1.DoB=R_2.DoB}(\rho_{R_1}(\text{STUDENT}) \times \rho_{R_2}(\text{STUDENT})))$

Rename – Example

Assignment Project Exam Help

- Given the following relation schema:

  STUDENT={StudentID, Name, DoB}

- Fi

https://eduassistpro.github.i

457	Lisa	
458	Mike	
459	Peter	

Add WeChat edu_assist_pr

- What about the following choices?
  - $\pi_{R_1.Name, R_2.Name}(\sigma_{R_1.DoB=R_2.DoB}(\rho_{R_1}(\text{STUDENT}) \times \rho_{R_2}(\text{STUDENT})))$
    Almost correct!

Rename – Example

Assignment Project Exam Help

- Given the following relation schema:

  STUDENT={StudentID, Name, DoB}

- Fi

https://eduassistpro.github.i

457	Lisa	
458	Mike	
459	Peter	

Add WeChat edu_assist_pr

- What about the following choices?
  - $\pi_{R_1.Name,R_2.Name}(\sigma_{R_1.DoB=R_2.DoB}(\rho_{R_1}(\text{STUDENT}) \times \rho_{R_2}(\text{STUDENT})))$
    Almost correct!
  - $\pi_{Name,Name'}(\text{STUDENT} \bowtie \rho_{S(StudentID',Name',DoB)}(\text{STUDENT}))$

Rename – Example

Assignment Project Exam Help

- Given the following relation schema:

  STUDENT={StudentID, Name, DoB}

- Fi

https://eduassistpro.github.i

457	Lisa	
458	Mike	
459	Peter	

Add WeChat edu_assist_pr

- What about the following choices?
  - $\pi_{R_1.Name, R_2.Name}(\sigma_{R_1.DoB=R_2.DoB}(\rho_{R_1}(\text{STUDENT}) \times \rho_{R_2}(\text{STUDENT})))$
    Almost correct!
  - $\pi_{Name, Name'}(\text{STUDENT} \bowtie \rho_{S(StudentID', Name', DoB)}(\text{STUDENT}))$
    Almost correct!

Rename – Example

Assignment Project Exam Help

- Find pairs of students who have the same birthday. Show their names.

https://eduassistpro.github.i

$$\bowtie \rho_{S(StudentID', Name', DoB)}(\quad))$$

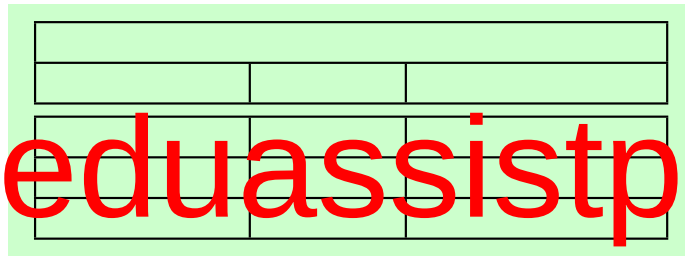
- If evaluating our queries over the following relatio

Add WeChat edu_assist_pr

STUDENT		
StudentID	Name	
457	Lisa	18-Oct-1993
458	Mike	16-May-1990
459	Peter	18-Oct-1993

Rename – Example

- (1): $\pi_{R_1.Name, R_2.Name}(\sigma_{R_1.StudentID < R_2.StudentID}(\sigma_{R_1.DoB = R_2.DoB}(\rho_{R_1}(\text{STUDENT}) \times \rho_{R_2}(\text{STUDENT}))))$.



Assignment Project Exam Help
https://eduassistpro.github.i
Add WeChat edu_assist_pr

Rename – Example

- (i): $\pi_{R_1.Name, R_2.Name}(\sigma_{R_1.StudentID < R_2.StudentID}(\sigma_{R_1.DoB = R_2.DoB}($
  $\rho_{R_1}(\text{STUDENT}) \times \rho_{R_2}(\text{STUDENT}))$.

$\rho_{R_1}(\text{STUDENT}) \times \rho_{R_2}(\text{STUDENT})$

R_1.StudentID	R_1.Name	R_1.DoB	R_2.Stud		
457	Lisa	18-Oct-1993	45		
457	Lisa	18-Oct-1993	45		
457	Lisa	18-Oct-1993	45		
458	Mike	16-May-1990	45		
458	Mike	16-May-1990	458	Mike	16-May-1990
458	Mike	16-May-1990	458	Peter	18-Oct-1993
458	Peter	18-Oct-1993	457	Lisa	18-Oct-1993
458	Peter	18-Oct-1993	458	Mike	16-May-1990
458	Peter	18-Oct-1993	458	Peter	18-Oct-1993

Assignment Project Exam Help
https://eduassistpro.github.i
Add WeChat edu_assist_pr

Rename – Example

Assignment Project Exam Help

- (i): $\pi_{R_1.Name, R_2.Name}(\sigma_{R_1.StudentID < R_2.StudentID}(\sigma_{R_1.DoB = R_2.DoB}($
  $\rho_{R_1}(\text{STUDENT}) \times \rho_{R_2}(\text{STUDENT}))$.

https://eduassistpro.github.i

Add WeChat edu_assist_pr

$R' = \sigma_{R_1.DoB = R_2.DoB}(\rho_{R_1}(\text{STUDENT})$

R_1.StudentID	R_1.Name	R_1.DoB	R_2.Stud		
457	Lisa	18-Oct-1993	45		
457	Lisa	18-Oct-1993	45		
458	Mike	16-May-1990	45		
459	Peter	18-Oct-1993	45		
459	Peter	18-Oct-1993	459	Peter	18-Oct-1993

Rename – Example

Assignment Project Exam Help

- (i): $\pi_{R_1.Name, R_2.Name}(\sigma_{R_1.StudentID < R_2.StudentID}(\sigma_{R_1.DoB = R_2.DoB}($
  $\rho_{R_1}(\text{STUDENT}) \times \rho_{R_2}(\text{STUDENT}))$.

https://eduassistpro.github.i

Add WeChat edu_assist_pr

$R' = \sigma_{R_1.DoB = R_2.DoB}(\rho_{R_1}(\text{STUDENT})$

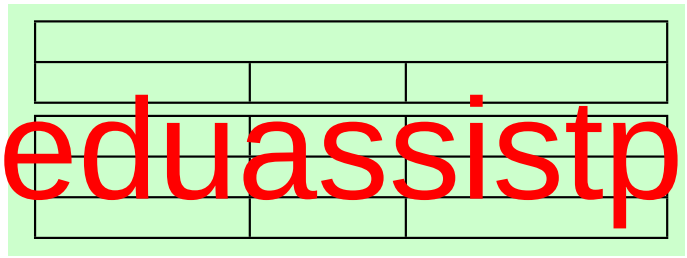
R_1.StudentID	R_1.Name	R_1.DoB	R_2.Stud		
457	Lisa	18-Oct-1993	45		
457	Lisa	18-Oct-1993	45		
458	Mike	16-May-1990	45		
459	Peter	18-Oct-1993	45		
459	Peter	18-Oct-1993	459	Peter	18-Oct-1993

$\pi_{R_1.Name, R_2.Name}(\sigma_{R_1.StudentID < R_2.StudentID}(R'))$

R_1.Name	R_2.Name
Lisa	Peter

Rename – Example

- (2) $\pi_{Name, Name'}(\sigma_{StudentID < StudentID'}($ STUDENT $\bowtie \rho_{S(StudentID', Name', DoB)}($STUDENT$))$.



Assignment Project Exam Help
https://eduassistpro.github.i
Add WeChat edu_assist_pr

Rename – Example

- (2) $\pi_{Name, Name'}(\sigma_{StudentID < StudentID'}($ STUDENT $\bowtie \rho_{S(StudentID', Name', DoB)}($STUDENT$))$.

Assignment Project Exam Help
https://eduassistpro.github.i
Add WeChat edu_assist_pr

$R' =$ STUDENT $\bowtie \rho_{S(StudentID'}$

StudentID	Name	DoB		
457	Lisa	18-Oct-199		
459	Peter	18-Oct-199		
459	Peter	18-Oct-199		
457	Lisa	18-Oct-1993	457	Lisa
458	Mike	16-May-1990	458	Mike

Rename – Example

Assignment Project Exam Help

- (2) $\pi_{Name, Name'}(\sigma_{StudentID < StudentID'}($ STUDENT $\bowtie \rho_{S(StudentID', Name', DoB)}($STUDENT$))$.

https://eduassistpro.github.i

Add WeChat edu_assist_pr

$R' =$ STUDENT $\bowtie \rho_{S(StudentID'}$

StudentID	Name	DoB		
457	Lisa	18-Oct-199		
459	Peter	18-Oct-199		
459	Peter	18-Oct-199		
457	Lisa	18-Oct-1993	457	Lisa
458	Mike	16-May-1990	458	Mike

$\pi_{Name, Name'}(\sigma_{StudentID < StudentID'}(R'))$

Name	Name'
Lisa	Peter

Relational Algebra (RA) – example

Assignment Project Exam Help

Which

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

Which

https://eduassistpro.github.i

Which relation schema(s) will be used?

- AWARD(*award_name*, *institution*, *country*)
  primary key : {*award_name*}

Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

Which

https://eduassistpro.github.i

Which relation schema(s) will be used?

- AWARD(*award_name*, *institution*, *country*)
  primary key : {*award_name*}

Add WeChat edu_assist_pr

$\pi_{\text{award\_name}}(\sigma_{country='USA'}(\text{AWARD}))$

Relational Algebra (RA) – example

Assignment Project Exam Help

Find the titles of the comedy movies (i.e. the major genre of the movie is comedy) which were produced in 1994.

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

Find the titles of the comedy movies (i.e. the major genre of the movie is comedy) which were produced in 1994.

Which r

- M
  p

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

Find the titles of the comedy movies (i.e. the major genre of the movie is comedy) which were produced in 1994.

Which r

- M

https://eduassistpro.github.i

$\pi_{\text{title}}(\sigma_{(production\_year=1994)\wedge(major\_genre='c}$

Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

Find the titles of the comedy movies (i.e. the major genre of the movie is comedy) which were produced in 1994.

Which r

- M

https://eduassistpro.github.i

$\pi_{\text{title}}(\sigma_{(production\_year=1994)\wedge(major\_genre='c}$

Add WeChat edu_assist_pr

Is the following RA also correct?

$\pi_{\text{title}}(\sigma_{production\_year=1994}(\text{MOVIE})) \cap \pi_{\text{title}}(\sigma_{major\_genre='comedy'}(\text{MOVIE}))$

Relational Algebra (RA) – example

Assignment Project Exam Help

Find the titles of the comedy movies (i.e. the major genre of the movie is comedy) which were produced in 1994.

Which r

- M

https://eduassistpro.github.i

$\pi_{\text{title}}(\sigma_{(production\_year=1994)\wedge(major\_genre='c}$

Add WeChat edu_assist_pr

Is the following RA also correct?

$\pi_{\text{title}}(\sigma_{production\_year=1994}(\text{MOVIE})) \cap \pi_{\text{title}}(\sigma_{major\_genre='comedy'}(\text{MOVIE}))$

It is not correct. Consider two movies, Robot (1994, action), Robot (2001, comedy).

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids, first names, and last names of the persons who played at least o

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids, first names, and last names of the persons who played at least o

Which r

https://eduassistpro.github.i

- M
  p
- PERSON(*id*, *first_name*, *last_name*, *year_*
  primary key : {*id*}
- ROLE(*id*, *title*, *production_year*, *descriptio*
  primary key : {*title*, *production_year*, *de* }
  foreign keys : [*title*, *production_year*] ⊆ MOVIE[*title*, *production_year*]
  [*id*] ⊆ PERSON[*id*]

Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids, first names, and last names of the persons who played at least one role in the movies produced in 1995.

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids, first names, and last names of the persons who played at least one role in the movies produced in 1995.

Which

- π_{R} ROLE $\bowtie$ PE
- $\pi_{\text{ROLE.id, first\_name, last\_name}}(\sigma_{\textit{production\_year}}$ PERSON))
- $\pi_{\text{id, first\_name, last\_name}}(\sigma_{\textit{production\_year}=1995}$
- $\pi_{\text{id, first\_name, last\_name}}(\sigma_{\textit{production\_year}=1995}$ $\bowtie$ $\bowtie$

  All the above RAs are correct. The last RA is also correct although the natural join of MOVIE is not needed.

https://eduassistpro.github.i
Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids, first names, and last names of the persons who played at least one role in the movies produced in 1995.

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids, first names, and last names of the persons who played at least one role in the movies produced in 1995.

Which

- π_{i} $_{PE}$ -

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids, first names, and last names of the persons who played at least one role in the movies produced in 1995.

Which

- π_{i} $_{\text{PE}}$ https://eduassistpro.github.i

  We need to specify id (from ROLE or PERS

Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids, first names, and last names of the persons who played at least one role in the movies produced in 1995.

Which

- $\pi_{\text{id, first\_name, last\_name}}(\text{PERSON} \bowtie \text{ROLE} \bowtie (\sigma_{\text{production\_year}=1995}\text{MOVIE}))$

  We need to specify id (from ROLE or PERS

- $\pi_{\text{id, first\_name, last\_name}}(\sigma_{\text{production\_year}=1995}\text{MOVIE}))$

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids, first names, and last names of the persons who played at least one role in the movies produced in 1995.

Which

- $\pi_{\text{id, first\_name, last\_name}}(\text{PERS} \bowtie \text{ROLE} \bowtie (\sigma_{\text{production\_year}=1995}\text{MOVIE}))$

  We need to specify id (from ROLE or PERS

- $\pi_{\text{id, first\_name, last\_name}}(\sigma_{\text{production\_year}=1995}\text{MOVIE} \bowtie \text{ROLE} \bowtie \text{PERS})$

  We need to specify id (from ROLE or PERS

https://eduassistpro.github.i
Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids, first names, and last names of the persons who played at least one role in the movies produced in 1995.

Which

- $\pi_{\text{id, first\_name, last\_name}}(\sigma_{\textit{production\_year}=1995}(\text{ROLE} \bowtie \text{PERSON}))$

https://eduassistpro.github.i

We need to specify id (from ROLE or PERS

- $\pi_{\text{id, first\_name, last\_name}}(\sigma_{\textit{production\_year}=1995}(\text{ROLE} \bowtie \text{PERSON}))$

Add WeChat edu_assist_pr

We need to specify id (from ROLE or PERS

- $\pi_{\text{id, first\_name, last\_name}}(\sigma_{\textit{production\_year}=1995}(\text{ROLE} \bowtie \text{PERSON}))$

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids, first names, and last names of the persons who played at least one role in the movies produced in 1995.

Which

- $\pi_{\text{id, first\_name, last\_name}}(\sigma_{\textit{production\_year}=1995}(\text{PERSON} \bowtie \text{ROLE}))$

  We need to specify id (from ROLE or PERS

- $\pi_{\text{id, first\_name, last\_name}}(\sigma_{\textit{production\_year}=1995}(\text{ROLE} \bowtie \text{PERSON}))$

  We need to specify id (from ROLE or PERS

- $\pi_{\text{id, first\_name, last\_name}}(\sigma_{\textit{production\_year}=1995}(\text{ROLE} \bowtie \text{PERSON}))$

  There is no need to specify id under π

https://eduassistpro.github.i
Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids, first names, and last names of the persons who played at least one role in the movies produced in 1995.

Which

- $\pi_{\text{id, first\_name, last\_name}}(\sigma_{\textit{production\_year}=1995}(\text{PERSON} \bowtie \text{ROLE}))$

  We need to specify id (from ROLE or PERS

- $\pi_{\text{id, first\_name, last\_name}}(\sigma_{\textit{production\_year}=1995}(\text{ROLE} \bowtie \text{PERSON}))$

  We need to specify id (from ROLE or PERS

- $\pi_{\text{id, first\_name, last\_name}}(\sigma_{\textit{production\_year}=1995}(\text{ROLE} \bowtie \text{PERSON}))$

  There is no need to specify id under π

- Note the difference between Cartesian Product, Inner Join and Natural Join.

https://eduassistpro.github.i
Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids of the directors who have directed at least one movie written by themselves.

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids of the directors who have directed at least one movie written by themselves.

Which r

- M
  p
- DIRECTOR(*id*, *title*, *production_year*)
  `primary key` : {*title*, *production_year*}
  `foreign keys` : [*title*, *production_year*] ⊆ MOVIE[*title*, *production_year*]
  [*id*] ⊆ PERSON[*id*]
- WRITER(*id*, *title*, *production_year*, *credits*)
  `primary key` : {*id*, *title*, *production_year*}
  `foreign keys` : [*title*, *production_year*] ⊆ MOVIE[*title*, *production_year*]
  [*id*] ⊆ PERSON[*id*]

https://eduassistpro.github.i
Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids of the directors who have directed at least one movie written

Which https://eduassistpro.github.i

- π_{DIRECTOR} (DIRECTOR. =WRITER.)∧(DIRECTOR. =WRITER.)∧ (DIRECTOR.*production_year*=WRITER.*production_year*)(DIR
- $\pi_{\text{DIRECTOR.id}}$(DIRECTOR ⋈(DIRECTOR.*id*=WRITER (DIRECTOR.*production_year*=WRITER.*production_year*)WRIT
- $\pi_{\text{id}}(\text{DIRECTOR} \bowtie \text{WRITER})$

Add WeChat edu_assist_pr

All the above RAs are correct.

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids of the directors who have directed at least one movie written by themselves.

Which

- π_{D} (D

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids of the directors who have directed at least one movie written by themselves.

Which

- π_{D} (DI
  W

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids of the directors who have directed at least one movie written by themselves.

Which

- π_{D} (DI
  W
- $\pi_{\text{DIRECTOR.id}}(\sigma_{\text{DIRECTOR}.id=\text{WRITER}.id}$(DIRECTO

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids of the directors who have directed at least one movie written by themselves.

Which

- π_{D} (DI
  W
- $\pi_{\text{DIRECTOR.id}}(\sigma_{\text{DIRECTOR}.id=\text{WRITER}.id}$(DIRECTO
  This query lists ids of the directors who have written a

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids of the directors who have directed at least one movie written by themselves.

Which

- π_{D} (DI
  W
- $\pi_{\text{DIRECTOR.id}}(\sigma_{\text{DIRECTOR}.id=\text{WRITER}.id}(\text{DIRECTO}$
  This query lists ids of the directors who have written a
- $\pi_{\text{id}}(\text{DIRECTOR}) \cap \pi_{\text{id}}(\text{WRITER})$

https://eduassistpro.github.i
Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids of the directors who have directed at least one movie written by themselves.

Which

- π_{D} (DI
  W
- $\pi_{\text{DIRECTOR.id}}(\sigma_{\text{DIRECTOR}.id=\text{WRITER}.id}(\text{DIRECTO}$
  This query lists ids of the directors who have written a
- $\pi_{\text{id}}(\text{DIRECTOR}) \cap \pi_{\text{id}}(\text{WRITER})$
  This query lists ids of the directors who have written at least one movie.

https://eduassistpro.github.i
Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids of the directors who have directed at least one movie written by themselves.

Which

- π_{D} (DI
  W
- $\pi_{\text{DIRECTOR.id}}(\sigma_{\text{DIRECTOR}.id=\text{WRITER}.id}(\text{DIRECTO}$
  This query lists ids of the directors who have written a
- $\pi_{\text{id}}(\text{DIRECTOR}) \cap \pi_{\text{id}}(\text{WRITER})$
  This query lists ids of the directors who have written at least one movie.
- $\pi_{\text{id}}(\pi_{\text{id,title,production\_year}}(\text{DIRECTOR}) \cap \pi_{\text{id,title,production\_year}}(\text{WRITER}))$

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids of the directors who have directed at least one movie written by themselves.

Which

- π_{D} (DI
  W
- $\pi_{\text{DIRECTOR.id}}(\sigma_{\text{DIRECTOR}.id=\text{WRITER}.id}(\text{DIRECTO}$
  This query lists ids of the directors who have written a
- $\pi_{\text{id}}(\text{DIRECTOR}) \cap \pi_{\text{id}}(\text{WRITER})$
  This query lists ids of the directors who have written at least one movie.
- $\pi_{\text{id}}(\pi_{\text{id,title,production\_year}}(\text{DIRECTOR}) \cap \pi_{\text{id,title,production\_year}}(\text{WRITER}))$
  Correct.

https://eduassistpro.github.i
Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids of the directors who have directed at least one movie written by themselves.

Which

- π_{D} (DI
  W
- $\pi_{\text{DIRECTOR.id}}(\sigma_{\text{DIRECTOR}.id=\text{WRITER}.id}(\text{DIRECTO}$
  This query lists ids of the directors who have written a
- $\pi_{\text{id}}(\text{DIRECTOR}) \cap \pi_{\text{id}}(\text{WRITER})$
  This query lists ids of the directors who have written at least one movie.
- $\pi_{\text{id}}(\pi_{\text{id,title,production\_year}}(\text{DIRECTOR}) \cap \pi_{\text{id,title,production\_year}}(\text{WRITER}))$
  Correct.

https://eduassistpro.github.i
Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids of the directors who have never played any roles in the movies directed by themselves.

- Li

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids of the directors who have never played any roles in the movies directed by themselves.

- Li
  D_1

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids of the directors who have never played any roles in the movies directed by themselves.

- Li
  D_1

https://eduassistpro.github.i

- List ids of director who have played at least one role in t
  by themselves.

Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids of the directors who have never played any roles in the movies directed by themselves.

- Li
  D_1
https://eduassistpro.github.i
- List ids of director who have played at least one role in t
  by themselves.
  $D_2 = \pi_{id}$(DIRECTOR $\bowtie$ ROLE)

Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids of the directors who have never played any roles in the movies directed by themselves.

- Li
  D_1
- List ids of director who have played at least one role in t
  by themselves.
  $D_2 = \pi_{id}$(DIRECTOR ⋈ ROLE)
- List the ids of the directors who have never played any roles in the movies directed by themselves.

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Relational Algebra (RA) – example

Assignment Project Exam Help

List the ids of the directors who have never played any roles in the movies directed by themselves.

- Li
  D_1
- List ids of director who have played at least one role in t
  by themselves.
  $D_2 = \pi_{id}(\text{DIRECTOR} \bowtie \text{ROLE})$
- List the ids of the directors who have never played any roles in the movies directed by themselves.
  $Result = D_1 - D_2$.

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Relational Algebra (RA)

Assignment Project Exam Help

- Relational algebra is a query language with **RA operators**:

https://eduassistpro.github.i

Add WeChat edu_assist_pr

Relational Algebra (RA)

Assignment Project Exam Help

- Relational algebra is a query language with **RA operators**:

https://eduassistpro.github.i

σ
π
ρ renaming

$\Uparrow$

Unary operator

Add WeChat edu_assist_pr

Relational Algebra (RA)

Assignment Project Exam Help

- Relational algebra is a query language with **RA operators**:

https://eduassistpro.github.i

σ
π
ρ renaming

⇑
Unary operator

$-$ difference

⇑
Binary operator
(Type compatible)

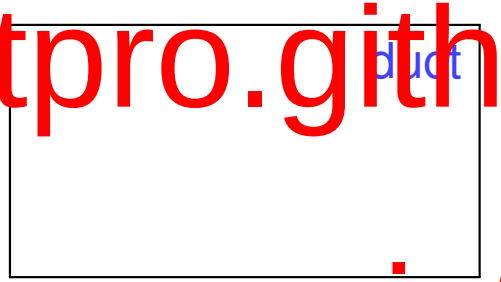
Add WeChat edu_assist_pr

Relational Algebra (RA)

Assignment Project Exam Help

- Relational algebra is a query language with **RA operators**:

https://eduassistpro.github.i



Add WeChat edu_assist_pr

Unary operator

Binary operator
(Type compatible)

(credit cookie) History of Algebra

Assignment Project Exam Help

https://eduassistpro.github.i

Add WeChat edu_assist_pr

http://historyofpythagoreantheorem.weebly.com/algebra.html

(credit cookie) History of Algebra

Assignment Project Exam Help

https://eduassistpro.github.i

Add WeChat edu_assist_pr

http://historyofpythagoreantheorem.weebly.com/algebra.html

(credit cookie) Diophantus of Alexandria

Assignment Project Exam Help

‘Hanellies Diophantus, the wonder behold.
Through art algebraic, the stone tells how old:
‘God ga
One tw
And the
In five years there came a bouncing new son.
Alas, the dear child of master and sage
After attaining half the measure of his father’s lif
After consoling his fate by the science of numbe
he ended his life’.

https://eduassistpro.github.i

Add WeChat edu_assist_pr

(credit cookie) Diophantus of Alexandria

Assignment Project Exam Help

‘Here lies Diophantus, the wonder behold.
Through art algebraic, the stone tells how old:
‘God ga
One tw
And the
In five years there came a bouncing new son.
Alas, the dear child of master and sage
After attaining half the measure of his father’s lif
After consoling his fate by the science of numbe
he ended his life’.

https://eduassistpro.github.i

Add WeChat edu_assist_pr

$x = x/6 + x/12 + x/7 + 5 + x/2 + 4$

(credit cookie) Diophantus of Alexandria

Assignment Project Exam Help

‘Here lies Diophantus, the wonder behold.
Through art algebraic, the stone tells how old:
‘God ga
One tw
And the
In five years there came a bouncing new son.
Alas, the dear child of master and sage
After attaining half the measure of his father’s lif
After consoling his fate by the science of numbe
he ended his life’.

https://eduassistpro.github.i

Add WeChat edu_assist_pr

$x = x/6 + x/12 + x/7 + 5 + x/2 + 4 \Rightarrow x = 84$

(credit cookie) Arithmetica and Margin-writing by Fermat

Assignment Project Exam Help

https://eduassistpro.github.i

Add WeChat edu_assist_pr

(credit cookie) Arithmetica and Margin-writing by Fermat

Assignment Project Exam Help

"If an integer n is greater than 2,

ns

c. I

https://eduassistpro.github.i

narrow to co

—Pierre de F

Add WeChat edu_assist_pr

(credit cookie) Arithmetica and Margin-writing by Fermat

Assignment Project Exam Help

"If an integer n is greater than 2,

ns

c. I

https://eduassistpro.github.i

narrow to co

—Pierre de F

Add WeChat edu_assist_pr

Fermat's Last Theorem was proved by Andrew Wiles in 1994.