Guy Golpur: 308353523
Bar Azouri: 205785124

1. SELECT * FROM book LIMIT 5 OFFSET ?

$$\boldsymbol{\pi}(\boldsymbol{book})$$

2.SELECT * FROM purchase LIMIT 5 OFFSET ?

$$\boldsymbol{\pi}(\text{purchase})$$

3.SELECT * FROM costumer LIMIT 5 OFFSET ?

$$\boldsymbol{\pi}(\text{costumer})$$

4.SELECT * FROM supplier LIMIT 5 OFFSET ?

$$\boldsymbol{\pi}(\text{supplier})$$

5.SELECT * FROM purchase_record WHERE record_date between ? and ? LIMIT 5 OFFSET ?

$$\sigma\ record_{date} \geq x\ \wedge record_{date} \leq y\ (\text{purchase\_record})$$

6.SELECT * FROM sales_and_discount LIMIT 5 OFFSET ?

$$\boldsymbol{\pi}(\text{supplier})$$

7.
/* by book name*/
SELECT * FROM book WHERE book_name = ? AND book_stock = ?

$$\sigma\ \text{book}_{\text{name}} = x\ \wedge \text{book}_{\text{stock}} = \text{"1"}\ (\text{book})$$

/* by book author and name */
SELECT * FROM book WHERE book_name = ? AND book_stock = ? AND book_author = ?

$$\sigma\ \text{book}_{\text{name}} = x\ \wedge \text{book}_{\text{stock}} = 1 \wedge\ \text{book}_{\text{author}} = \text{y}(\text{book})$$

8.
/* book name */
select book.supplier_id, supplier.supplier_id, supplier.supplier_name, supplier.supplier_phone, supplier.supplier_email from book inner JOIN supplier on book.supplier_id = supplier.supplier_id where book_name= ? ;

$$\pi\ book.supplier_{id}, supplier.supplier_{id}, supplier.supplier_{name}, supplier.supplier_{phone}, supplier.supplier_{email}$$
$$(\sigma\ \text{book.supplier}_{\text{id}} =\ \text{supplier.supplier}_{\text{id}}\ \wedge book_{name} = x(book\ \times\ supplier))$$

/*author name*/

select book.supplier_id, supplier.supplier_id, supplier.supplier_name, supplier.supplier_phone, supplier.supplier_email from book inner JOIN supplier on book.supplier_id = supplier.supplier_id where book_author= ? ;

$$\pi\ book.supplier_{id}, supplier.supplier_{id}, supplier.supplier_{name}, supplier.supplier_{phone}, supplier.supplier_{email} (\sigma\ \text{book.supplier}_{\text{id}} = \text{supplier.supplier}_{\text{id}} \wedge book_{author} = x\ (book\ \times\ supplier))$$

/* book name and author */

select book.supplier_id, supplier.supplier_id, supplier.supplier_name, supplier.supplier_phone, supplier.supplier_email from book inner JOIN supplier on book.supplier_id = supplier.supplier_id where book_name= ? and book_author = ? ;

$$\pi\ book.supplier_{id}, supplier.supplier_{id}, supplier.supplier_{name}, supplier.supplier_{phone}, supplier.supplier_{email} (\sigma\ \text{book.supplier}_{\text{id}} = \text{supplier.supplier}_{\text{id}} \wedge book_{author} = x \wedge book_{name} = y\ (book\ \times\ supplier))$$

9.

/* book name */

select book.id, purchase_record.record_date from book inner JOIN purchase_record on id = book_id where book_name= ? and purchase_record.record_date >= ? "

$$\pi\ book.id, purchas_{record}.record_{date} (\sigma\ \text{id}\ =\ \text{book}_{\text{id}} \wedge \text{book}_{\text{name}} = x \wedge \text{purchase}_{\text{record}}.\text{record}_{\text{date}} \geq y\ (book\ \times\ supplier))$$

/*author name */

select book.id, purchase_record.record_date from book inner JOIN purchase_record on id = book_id where book_author= ? and purchase_record.record_date >= ?

$$\pi\ book.id, purchas_{record}.record_{date} (\sigma\ \text{id}\ =\ \text{book}_{\text{id}} \wedge \text{book}_{\text{author}} = x \wedge \text{purchase}_{\text{record}}.\text{record}_{\text{date}} \geq y\ (book\ \times\ supplier))$$

/* book name and author name */

select book.id, purchase_record.record_date from book inner JOIN purchase_record on id = book_id where book_name= ? and purchase_record.record_date >= ? and book_author = ?

$$\pi\ book.id, purchas_{record}.record_{date} (\sigma\ \text{id}\ =\ \text{book}_{\text{id}} \wedge \text{book}_{\text{author}} = x \wedge \text{purchase}_{\text{record}}.\text{record}_{\text{date}} \geq y \wedge \text{book}_{\text{name}} = z\ (book\ \times\ supplier))$$

10.

select costumer.user_id, purchase_record.record_date from costumer inner join purchase_record on costumer.user_id=purchase_record.user_id where user_name=? and purchase_record.record_date >= ?

$$\pi\ \text{costumer.user}_{\text{id}}, \text{purchase\_record.record}_{\text{date}} \left(\sigma\ \text{costumer.user\_id} = \text{purchase\_record.user\_id} \wedge \text{user\_name} = x \wedge \text{purchase\_record.record\_date} \geq y\ \ (\text{costumer} \times \text{purchase\_record})\right)$$

11.

select * from costumer inner join (select user_id ,count(user_id) c from purchase_record where purchase_record.record_date >= ? group by user_id order by c desc limit 1) multi_purchase on costumer.user_id=multi_purchase.user_id limit 1;

$$(\sigma\ \text{costumer.user}_{\text{id}} = \text{multi}_{\text{purchase}}.\text{user}_{\text{id}} (\text{costumer} \times (\pi\ \text{user\_id}, \text{count(user\_id)}\ (\sigma\ \text{purchase}_{\text{record}}.\text{record}_{\text{date}} \geq\ \text{x (purchase\_record)}))))$$

12.

select * from supplier inner join (select supplier_id , count(supplier_id) c from book inner join (select book_id from purchase where purchase_date >= ?) pur on book.id=pur.book_id group by supplier_id order by c desc limit 1) sup on supplier.supplier_id=sup.supplier_id;

$$\sigma\ \text{supplier.supplier\_id} = \text{sup.supplier\_id}(\text{supplier} \times \left(\sigma\ \text{book.id} = \text{pur.book}_{\text{id}}\left(book \times \pi\ book_{id}\ (\sigma\ \text{purchase}_{\text{date}} \geq \text{x}\ \ (\text{purchase}))\right)\right))$$

13.

SELECT * FROM purchase WHERE purchase_date between ? and ?

$$\sigma(purchase_{date} \geq x\ \wedge\ purchase_{date} \leq y)$$

14.

SELECT * FROM purchase_record WHERE record_date between ? and ? and purchase_from = 'ordered'

$$\sigma\ purchase_{date} \geq x\ \wedge\ purchase_{date} \leq y\ (\text{purchase\_record})$$

15.

SELECT x.user_id, x.user_name,sum(price - amount_to_pay) as total from (select purchase_record.user_id, purchase_record.amount_to_pay,purchase_record.price,purchase_record.record_date, cos.user_name from purchase_record inner join (select * from costumer WHERE user_name = ?) cos on purchase_record.user_id = cos.user_id) x where x.record_date >= ? and x.user_name = ? group by user_id;

$\pi\ \text{user}_{\text{id}}, \text{amount}_{\text{to}_{\text{pay}}}, \text{price}, \text{record}_{\text{date}}, \text{user}_{\text{name}}\ \sigma\ \text{purchase}_{\text{record}}.\text{user}_{\text{id}} = \text{user}_{\text{id}} \wedge \text{record}_{\text{date}} \geq \text{x} \wedge (\text{purchase}_{\text{record}} \times \sigma\ \text{user\_name} = \text{y}\ (\text{costumer}))$

16.

select sum(amount_to_pay) _sum, quarter(record_date) as _quarter from purchase_record where year(record_date) = ? group by _quarter;

$$\pi\ sum\left(amount_{to_{pay}}\right), quarter(record_{date})$$
$$\sigma\ \text{year}(\text{record}_{\text{date}}) = \text{x}\ (\text{purchase}_{\text{record}})$$

17.

SELECT * FROM costumer WHERE join_date >= ? LIMIT 5 OFFSET ?

$\sigma\ join_{date} \geq x\ (costumer)$

18.

SELECT x.supplier_id, x.amount_to_pay , sum(amount_to_pay) as total from (SELECT amount_to_pay, book_id, record_date, book.supplier_id from purchase_record INNER JOIN book on purchase_record.book_id = book.id) x where x.supplier_id = ? and x.record_date between ? and ?;

$\pi\ amount_{to_{pay}}, book_{id}, record_{date}, book.supplier_{id}\ (\sigma\ \text{purchase\_record.book\_id} = \text{book.id} \wedge \text{supplier\_id} = \text{x} \wedge record_{date} \geq y \wedge record_{date} \leq z\ (purchase_{record} \times \text{book}))$

19.

SELECT * FROM purchase_record WHERE saller_name = ? and record_date between ? and ? LIMIT 5 OFFSET ?

$\sigma\ seller_{name} = x \wedge recoed_{date} \geq x \wedge record_{date} \leq y(purchase\_record)$

20.

select * from book inner join (select book_id , count(book_id) c from purchase_record where purchase_record.record_date >= ? and purchase_record.record_date < ? group by book_id order by c desc limit 10) multi_purchase on book.id=multi_purchase.book_id limit 5 OFFSET ?;

$$\sigma\ \text{book.id} = \text{multi\_purchase.book\_id}\ (book \times \pi\ book_{id}, count(book_{id})\ (\sigma\ \text{purchase}_{\text{record}}.\text{record}_{\text{date}} \geq \text{x} \wedge \text{purchase\_record.record\_date} < \text{y}\ (\text{purchase\_record})))$$