REPORT PHASE-3
Team - Lonely

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Overview:

- Selects and joins are pushed downwards for optimisations
- Use selectivity factors to decide best site to perform operations
- selectivity factors for selections and joins.
- Uses semi-join for optimisations
- Support every type of queries
- Support for executing select-project-join queries where data is located in three sites.
- Doesn't crashes
- Support for aggregates, groupby and where

Algorithm/Heuristics:

It identifies all the attributes which are only needed and then contact only those sites from which data is needed. A common site is decided on the basis of selectivity factors and brings data to that site using semi-join conditions.

Query Examples:

1. **Horizontal**

```
SELECT sum(roomNo), reserveId from Room Group By reserveId
SELECT sum(roomNo), max(reserveId) from Room Group By city
SELECT min(roomNo) from Room Group By city Having city='Delhi'
```

Results:

```
[(Decimal('401'), 1), (Decimal('402'), 2), (Decimal('404'), 3), (Decimal('501'), 4), (Decimal('203'), 5),
(Decimal('201'), 6), (Decimal('601'), 7), (Decimal('999'), 8), (Decimal('205'), 9), (Decimal('206'), 10),
(Decimal('207'), 11), (Decimal('210'), 12)]

[(Decimal('1708'), 4), (Decimal('2004'), 8), (Decimal('828'), 12)]

[(401,)]
```

2. **Derived Horizontal**

```
SELECT min(checkIn), reserveId from Reserve Group By reserveId;
SELECT min(checkIn), reserveId from Reserve Group By reserveId having reserveId = 1;
```

Results:

```
[('12:00:01', 1), ('12:10:01', 2), ('12:10:01', 3), ('12:00:31', 4), ('12:00:11', 5), ('12:00:51', 6), ('14:00:01', 7),
('16:00:01', 8), ('18:00:01', 9), ('12:10:01', 10), ('12:03:01', 11), ('12:20:01', 12)]
```

[('12:00:01', 1)]

3. Vertical

SELECT guestId, name, address from Guest;
SELECT max(reserveId), name from Guest Group by name;
SELECT max(reserveId), name from Guest Group by name Having name = 'name5';
Results:
[(1, 'name1', 'address1'), (2, 'name2', 'address2'), (3, 'name3', 'address3'), (4, 'name4', 'address4'), (5, 'name5', 'address5'), (6, 'name6', 'address6'), (7, 'name7', 'address7'), (8, 'name8', 'address8'), (9, 'name9', 'address9'), (10, 'name10', 'address10'), (11, 'name11', 'address11'), (12, 'name12', 'address12')]

[(1, 'name1'), (2, 'name2'), (3, 'name3'), (4, 'name4'), (5, 'name5'), (6, 'name6'), (7, 'name7'), (8, 'name8'), (9, 'name9'), (10, 'name10'), (11, 'name11'), (12, 'name12')]

[(5, 'name5')]

4. Mix Hybrid Queries

SELECT Room.city, sum(Guest.reserveId), max(roomNo) from Room JOIN Guest on Room.reserveId = Guest.reserveId Group by Room.city
Result:
[('Delhi', Decimal('10'), 501), ('Mumbai', Decimal('26'), 999), ('Goa', Decimal('42'), 210)]

SELECT Room.city, max(Guest.reserveId), sum(roomNo) from Room JOIN Guest on Room.reserveId = Guest.reserveId Group by Room.city
Result:
[('Delhi', 4, Decimal('1708')), ('Mumbai', 8, Decimal('2004')), ('Goa', 12, Decimal('828'))]

SELECT Room.city, min(Guest.reserveId), sum(roomNo) from Room JOIN Guest on Room.reserveId = Guest.reserveId Group by Room.city
Result:
[('Delhi', 1, Decimal('1708')), ('Mumbai', 5, Decimal('2004')), ('Goa', 9, Decimal('828'))]

SELECT Room.city, max(Guest.reserveId), sum(roomNo) from Room JOIN Guest on Room.reserveId = Guest.reserveId Group by Room.city Having city='Mumbai'
Result:
[('Mumbai', 8, Decimal('2004'))]

SELECT Room.city, max(Guest.reserveId), sum(roomNo) from Room JOIN Guest on Room.reserveId = Guest.reserveId Group by Room.city Having Room.city='Mumbai' and Room.city='Goa'
Result:

[]

SELECT Room.city, max(Guest.reserveId), sum(roomNo) from Room JOIN Guest on Room.reserveId = Guest.reserveId Group by Room.city Having Room.city='Mumbai' and Room.city='Goa' and Room.city = 'Delhi'

Result:

[]

SELECT Room.city, max(Guest.reserveId), sum(roomNo) from Room JOIN Guest on Room.reserveId = Guest.reserveId Group by Room.city Having Room.city='Mumbai' and Room.city='Goa' or Room.city = 'Delhi'

Result:

[('Delhi', 4, Decimal('1708'))]

SELECT Room.city, max(Guest.reserveId), sum(roomNo) from Room JOIN Guest on Room.reserveId = Guest.reserveId Where Guest.reserveId > 2 Group by Room.city

Result:

[('Delhi', 4, Decimal('905')), ('Mumbai', 8, Decimal('2004')), ('Goa', 12, Decimal('828'))]

SELECT Room.city, max(Guest.reserveId), sum(roomNo) from Room JOIN Guest on Room.reserveId = Guest.reserveId Where Guest.reserveId > 2 and Guest.reserveId < 5 Group by Room.city

Result:

[('Delhi', 4, Decimal('905'))]

SELECT Room.city, min(Guest.reserveId), sum(roomNo) from Room JOIN Guest on Room.reserveId = Guest.reserveId Where Guest.reserveId > 2 Group by Room.city

Result:

[('Delhi', 3, Decimal('905')), ('Mumbai', 5, Decimal('2004')), ('Goa', 9, Decimal('828'))]

SELECT Room.city, min(Guest.reserveId), max(roomNo) from Room JOIN Guest on Room.reserveId = Guest.reserveId Where Guest.reserveId < 2 or Room.roomNo > 600 Group by Room.city

Result:

[('Delhi', 1, 401), ('Mumbai', 7, 999)]

SELECT Room.city, min(Guest.reserveId), max(roomNo) from Room JOIN Guest on Room.reserveId = Guest.reserveId Where Guest.reserveId > 2 and Guest.reserveId < 4 or Room.roomNo > 600 Group by Room.city

Result:

[('Delhi', 3, 404), ('Mumbai', 7, 999)]

SELECT Room.city, max(Guest.reserveId), sum(roomNo), sum(phone), max(payment) from Room JOIN Guest on Room.reserveId = Guest.reserveId Group by Room.city

Result:

[('Delhi', 4, Decimal('1708'), 0.0, 'yes'), ('Mumbai', 8, Decimal('2004'), 0.0, 'yes'), ('Goa', 12, Decimal('828'), 0.0, 'yes')]

SELECT Room.city, sum(Room.reserveId), sum(Reserve.reserveId), max(checkIn) from Room JOIN Reserve on Room.reserveId = Reserve.reserveId Group by Room.city

Result:

[('Delhi', Decimal('10'), Decimal('10'), '12:10:01'), ('Mumbai', Decimal('26'), Decimal('26'), '16:00:01'), ('Goa', Decimal('42'), Decimal('42'), '18:00:01')]