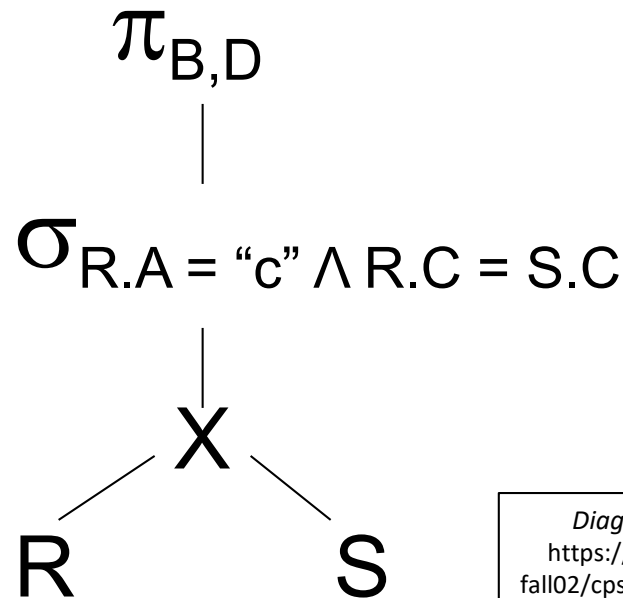


```
SELECT Bookings.booking, Flights.aircraft
FROM Bookings, Flights
WHERE date="2019-11-04"
      AND Bookings.flight=Flights.flight;
```



Heuristics:

- *Push selections down*
- *Replace cross if possible*

Diagram credit: Shvsnath Babu
<https://www2.cs.duke.edu/courses/fall02/cps196.3/lectures/23-qo-notes.pdf>

GOALS:

1. Convert the query above to the logical parse tree shown
2. Generate alternative parse trees to optimize
3. Estimate the cost of possible physical plans
4. Propose a physical plan

```
SELECT Flights.dest, MIN(Bookings.date)
FROM Flights, Bookings
WHERE Flights.flight = Bookings.flight
GROUP BY Bookings.name;
```

Heuristics:

- Remove duplicates before grouping
- Project attributes for grouping
- Replace cross if possible
- Push projections lower

GOALS:

1. Convert the query above to the logical parse tree shown
2. Generate alternative parse trees to optimize
3. Estimate the cost of possible physical plans
4. Propose a physical plan

