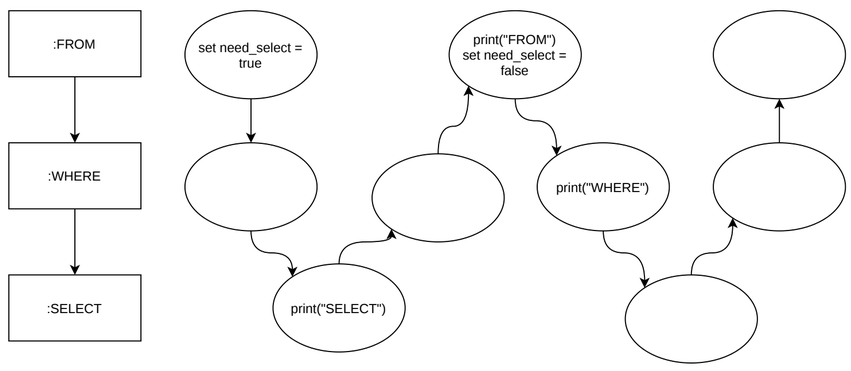
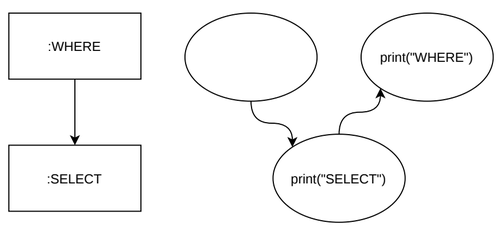
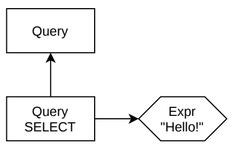

:FROM
:WHERE
:SELECT
set need_select = true
print("SELECT")
print("FROM")
set need_select = false
print("WHERE")


:WHERE
:SELECT
print("SELECT")
print("WHERE")

```
SELECT "Hello World!"
```

```
sql_select("Hello World!")
sql_query() |> sql_select("Hello World!")
```

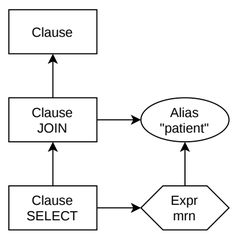



```
SELECT p.mrn FROM patient p
```

```
p = sql_alias("patient")
sql_join(p) |> sql_select(p.mrn)
```

```
p = sql_alias("patient")
p |> sql_select(p.mrn)
```

```
(p = sql_from("patient")) |> sql_select(p.mrn)
```



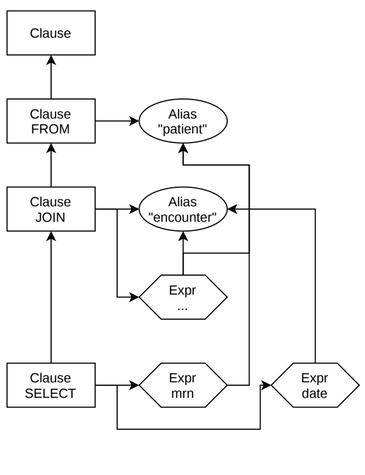

```
SELECT p.mrn, e.date
FROM patient p
JOIN encounter e ON (p.id = e.patient_id)
```

```
p = sql_alias("patient")
e = sql_alias("encounter")
sql_from(p) |> sql_join(e, p.id .== e.patient_id) |> sql_select(p.mrn, e.date)
```

```
p = sql_alias(catalog["public"]["patient"])
e = sql_alias(catalog["public"]["encounter"])
sql_from(p) |> sql_join(e, autojoin=p) |> sql_select(p.mrn, e.date)
```

```
p = sql_alias("patient")
e = sql_alias("encounter")
p |> sql_join(e, p.id .== e.patient_id) |> sql_select(p.mrn, e.date)
```

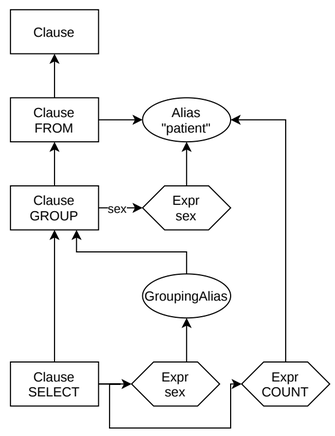
```
p = sql_alias("patient")
e = sql_alias("encounter")
sql_from(p) |> sql_join(e, p.id .== e.patient_id) |> sql_select(p.mrn) |> sql_select(e.date)
```




```
SELECT p.sex, COUNT(p)
FROM patient p
GROUP BY p.sex
```

```
p = sql_alias("patient")
g = sql_from(p) |> sql_group(sex = p.sex)
g |> sql_select(g.sex, sql_count(p))
```

```
p = From("patient")
g = Group(p, sex = p.sex)
Select(g, g.sex, Count(p))
```




```
SELECT p.mrn, COALESCE(g.n_e, 0)
FROM patient p
LEFT JOIN (
   SELECT e.patient_id, COUNT(e) AS n_e
   FROM encounter e
   GROUP BY e.patient_id) g ON (p.id = g.patient_id)
```

```
p = From("patient")
e = From("encounter")
g = Group(e, patient_id = e.patient_id)
j = LeftJoin(p, g, p.id .== g.patient_id, omit_if_unused=true)
Select(j, p.mrn, Coalesce(Count(e), 0))
```

```
SELECT p.mrn
FROM patient p
WHERE p.sex = 'male'
```

```
p = From("patient")
w = Where(p, p.sex .== "male")
Select(w, p.mrn)
```

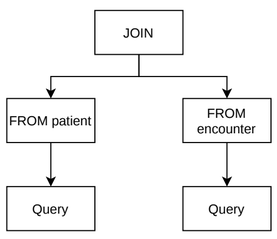
```
p = From("patient", columns=["mrn", "sex"])
w = Where(p, Ref(1, 2) .== "male", select=[Ref(1,1)])
Select(w, select=[Ref(1,1)])
```

```
SELECT p.mrn, e.date
FROM patient p
JOIN encounter e ON (p.id = e.patient_id)
```

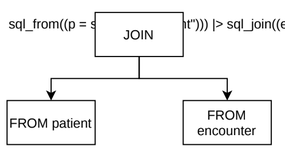
```
p = From("patient")
e = From("encounter")
g = Group(e, patient_id = e.patient_id)
gs = Select(g, patient_id = g.patient_id, n = Count(e))
j = LeftJoin(p, gs, p.id .== gs.patient_id)
Select(j, p.mrn, Coalesce(gs.n, 0))
```

```
patient_tbl = Table("patient", [("id", Int), ("sex", String), ("mrn", String)])
encounter_tbl = Table("encounter", [("id", Int), ("patient_id", Int), ("date", Date)])

auto_connect!(patient_tbl, encounter_tbl, [("id", "patient_id")])

p = From(patient_tbl)
e = From(encounter_tbl)
j = LeftJoin(p, e)
Select(j, p.mrn, e.date)
```

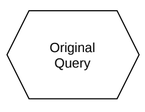
```
p = From("patient")
e = From("encounter")
j = Join(p, e, p.id .== e.patient_id)
Select(j, p.mrn, e.date)
```




```
sql_from((p = s                    t"))) |> sql_join((e = sql_alias("encounter")), p.id .== e.patient_id) |> sql_select(p.mrn, e.date)
```



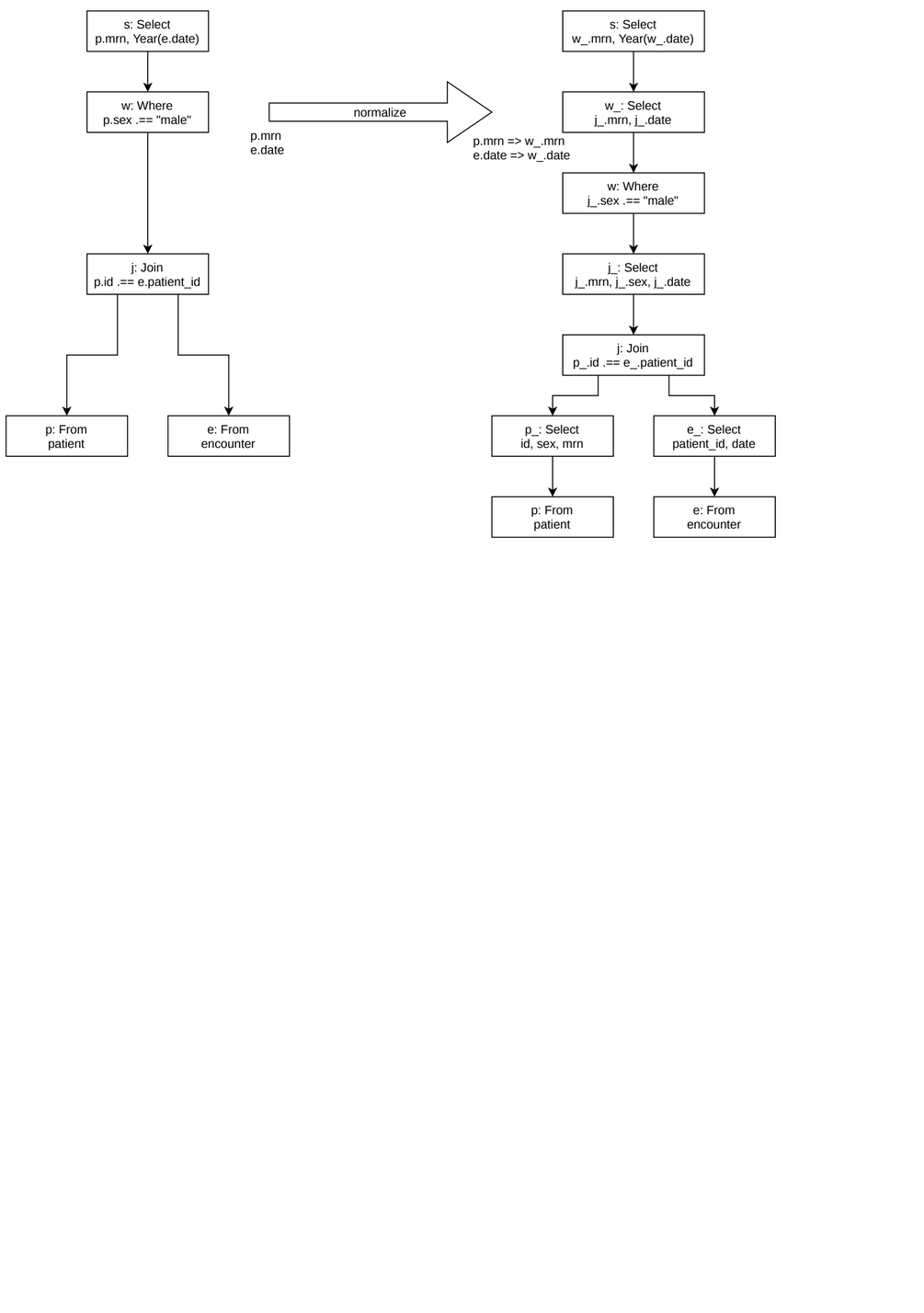

```
p = From("patient")
e = From("encounter")
g = Group(e, patient_id = e.patient_id, summarize=(; n = Count(e)))
j = LeftJoin(p, g, p.id .== g.patient_id)
Select(j, p.mrn, Coalesce(g.n, 0))
```



```
SELECT p.mrn, EXTRACT(YEAR FROM e.date)
FROM patient p
JOIN encounter e
ON (p.id = e.patient_id)
WHERE p.sex = 'male'
```

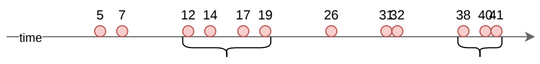
```
p = From(patient)
e = From(encounter)
j = Join(p, e, p.id .== e.patient_id)
w = Where(j, p.sex .== "male")
s = Select(w, mrn = p.mrn, year = Year(e.date))
```

```
p = From(patient)
p_ = Select(p, _id = Const(:id), _sex = Const(:sex), _mrn = Const(:mrn))
e = From(encounter)
e_ = Select(e, _patient_id = Const(:patient_id), _date = Const(:date))
j = Join(p_, e_, p_._id .== e_._patient_id)
j_ = Select(j, _mrn = p_._mrn, _sex = p_._sex, _date = e_._date)
w = Where(j_, j_._sex .== "male")
w_ = Select(w, _mrn = j_._mrn, _date = j_._date)
s = Select(w_, mrn = w_._mrn, year = Year(w_._date))
```



```
SELECT c.person_id, c.peer_id, c.timestamp, c.distance
FROM contact c
```

For each pair of persons, find the contact interval when there were detected at least once in a minute in a distance of less than 5 meters.

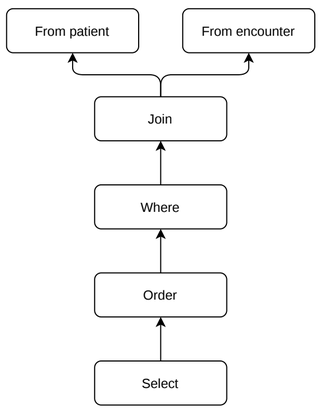


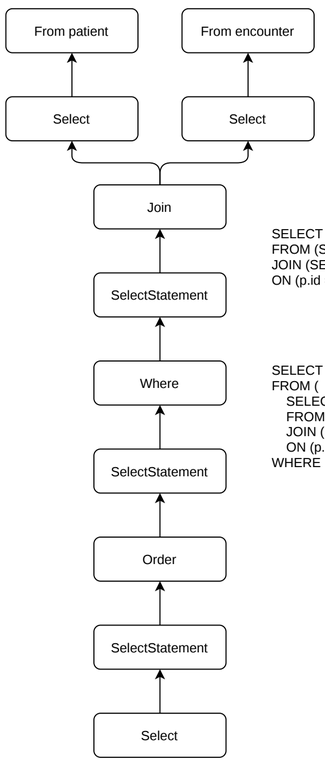
5	5		12	12		12	12		26		31	31		38	38	38							
0	2		0	2		5	7		0		0	1		0	2	3							

	5			12			12		26			31				38							
	2			2			7		0			1				3							

							12									38							
							7									3							

```
SELECT p.mrn, e.date
FROM patient p
JOIN encounter e ON (p.id = e.patient_id)
WHERE p.sex = 'male'
ORDER BY e.date
```

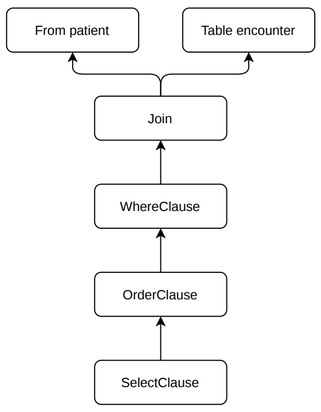


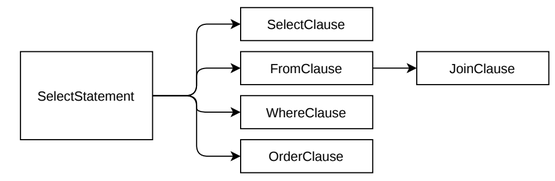


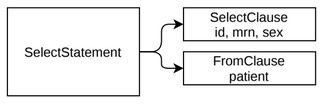

```
SELECT p.id, p.mrn, p.sex FROM patient p
SELECT p.id, p.mrn FROM patient p
SELECT e.patient_id, e.date FROM encounter e
```

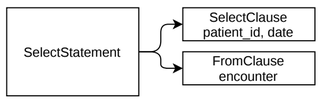
```
SELECT p.mrn, p.sex, e.date
FROM (SELECT p.id, p.mrn, p.sex FROM patient p) p
JOIN (SELECT e.patient_id, e.date FROM encounter e) e
ON (p.id = e.patient_id)
```

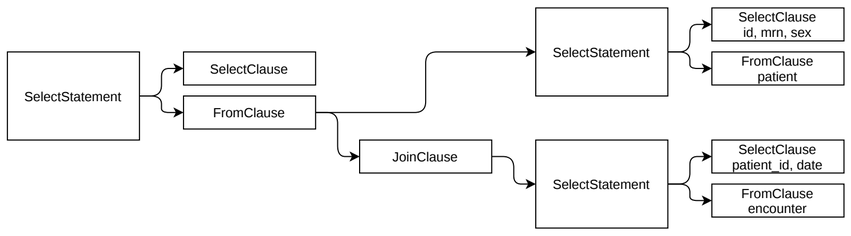
```
SELECT p.mrn, e.date
FROM (
   SELECT p.mrn, p.sex, e.date
   FROM (SELECT p.id, p.mrn, p.sex FROM patient p) p
   JOIN (SELECT e.patient_id, e.date FROM encounter e) e
   ON (p.id = e.patient_id)) p
WHERE p.sex = 'male'
```

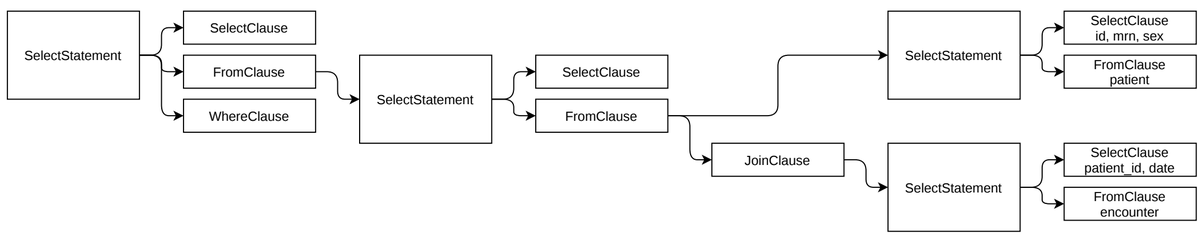


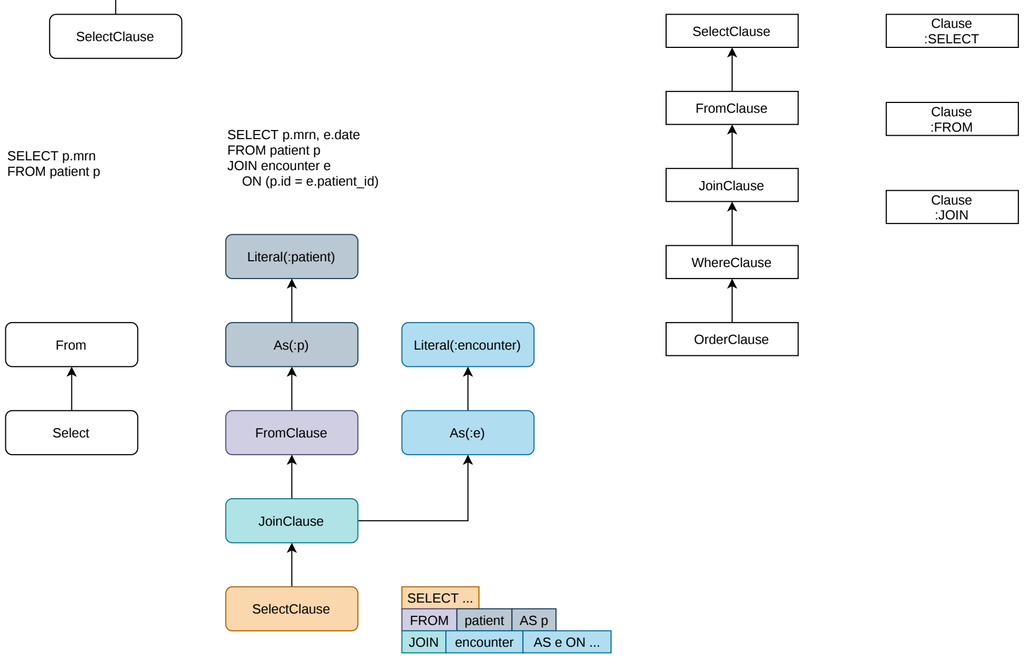


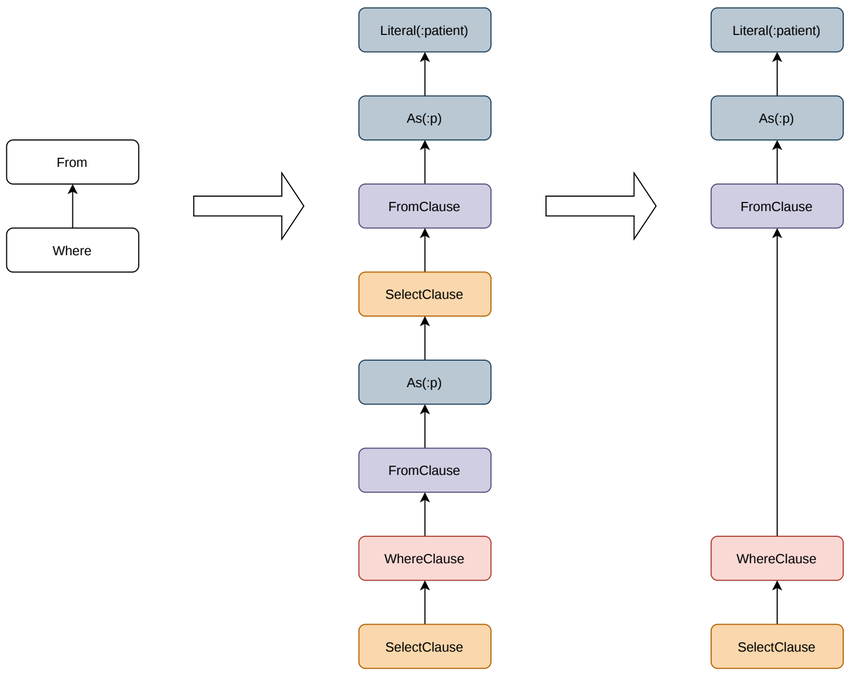


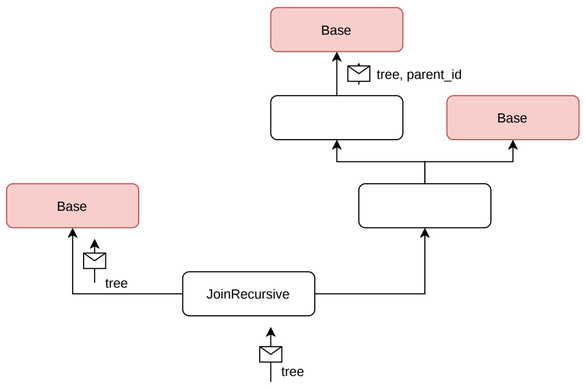




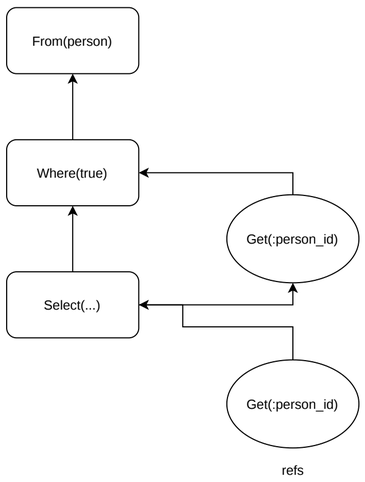


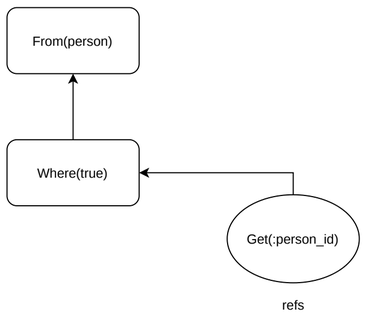


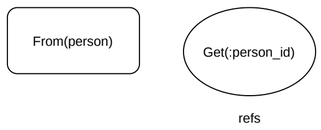


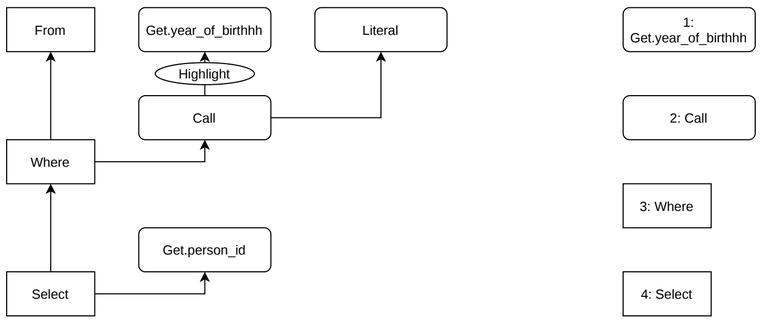



```
WITH RECURSIVE X AS (
      SELECT 1 AS N
   UNION ALL
      SELECT ...
      ...
         FROM X
      ...
         FROM X)
```


From(person)
Where(true)
Get(:person_id)
Select(...)
Get(:person_id)
refs


From(person)
Where(true)
Get(:person_id)
refs


From(person)
Get(:person_id)
refs

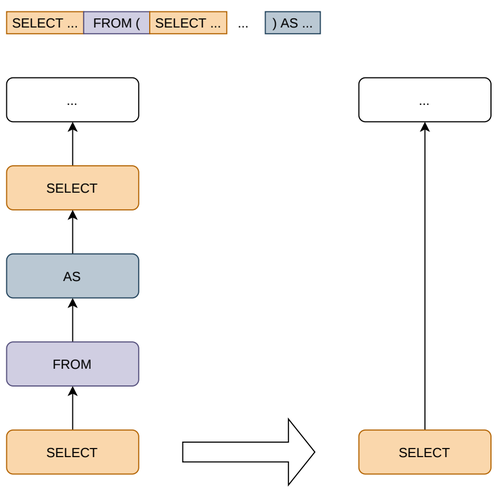


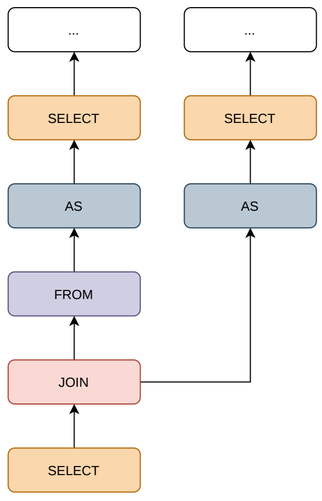
1: Get.year_of_birthhh

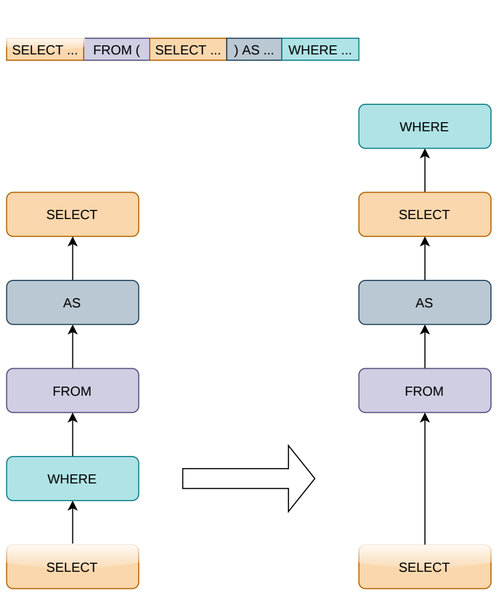
2: Call

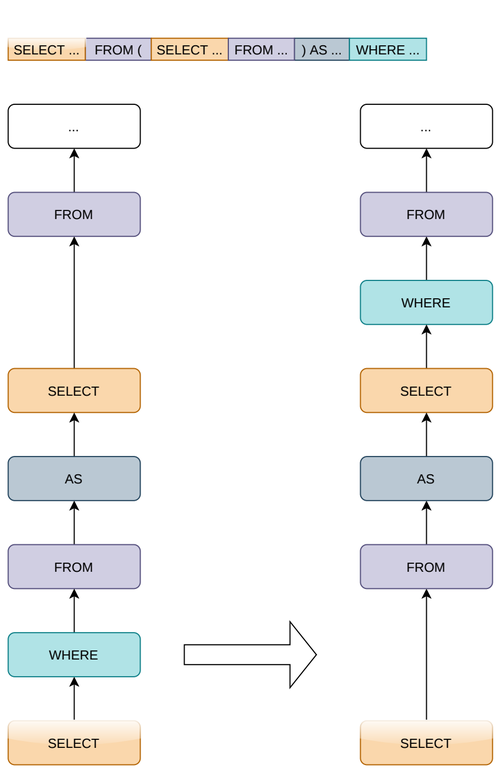
3: Where

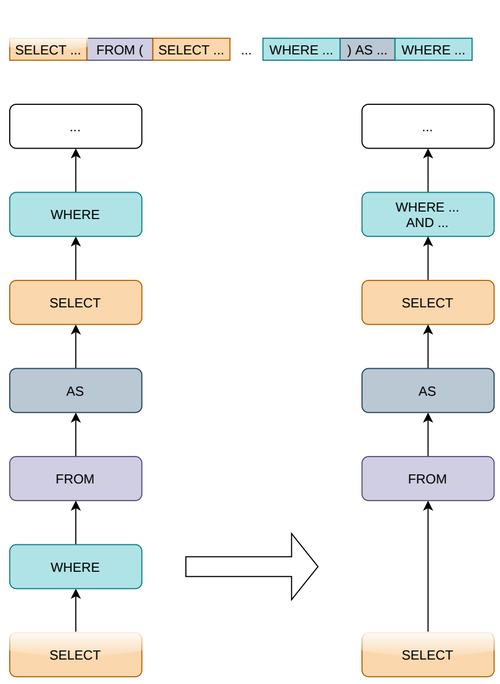
4: Select

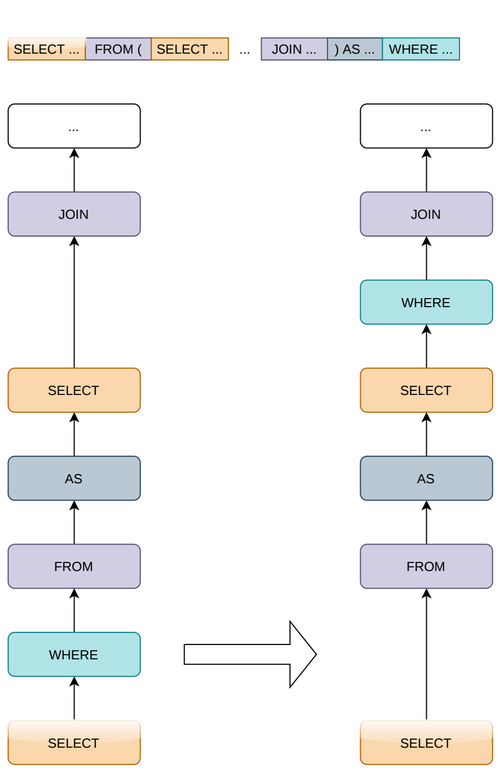

SELECT ... FROM (SELECT ...) AS ...
...
SELECT
AS
FROM
WHERE
SELECT
...
SELECT
SELECT

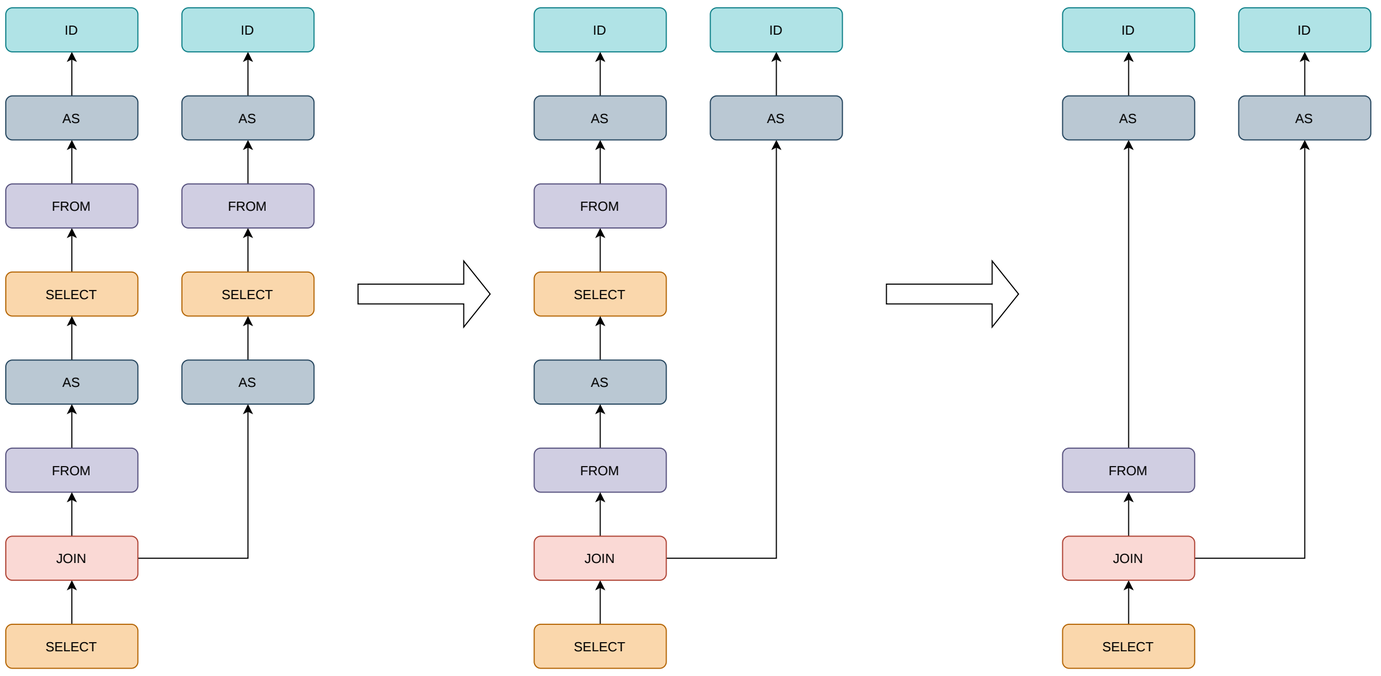

...
...
SELECT
SELECT
AS
AS
FROM
JOIN
SELECT

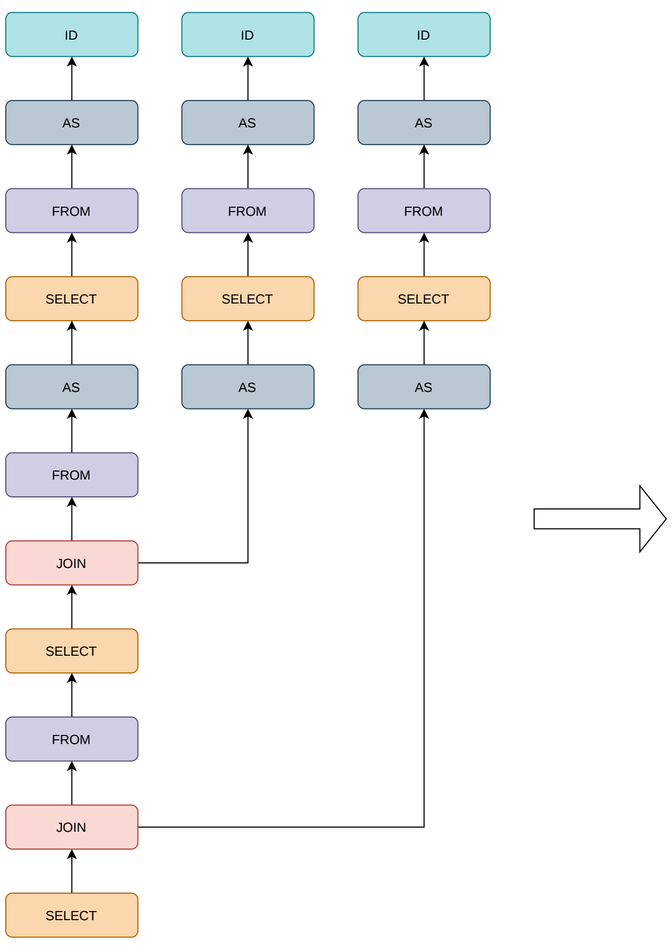

SELECT ... FROM (SELECT ...) AS ... WHERE ...
SELECT
AS
FROM
WHERE
SELECT
WHERE
SELECT
AS
FROM
SELECT

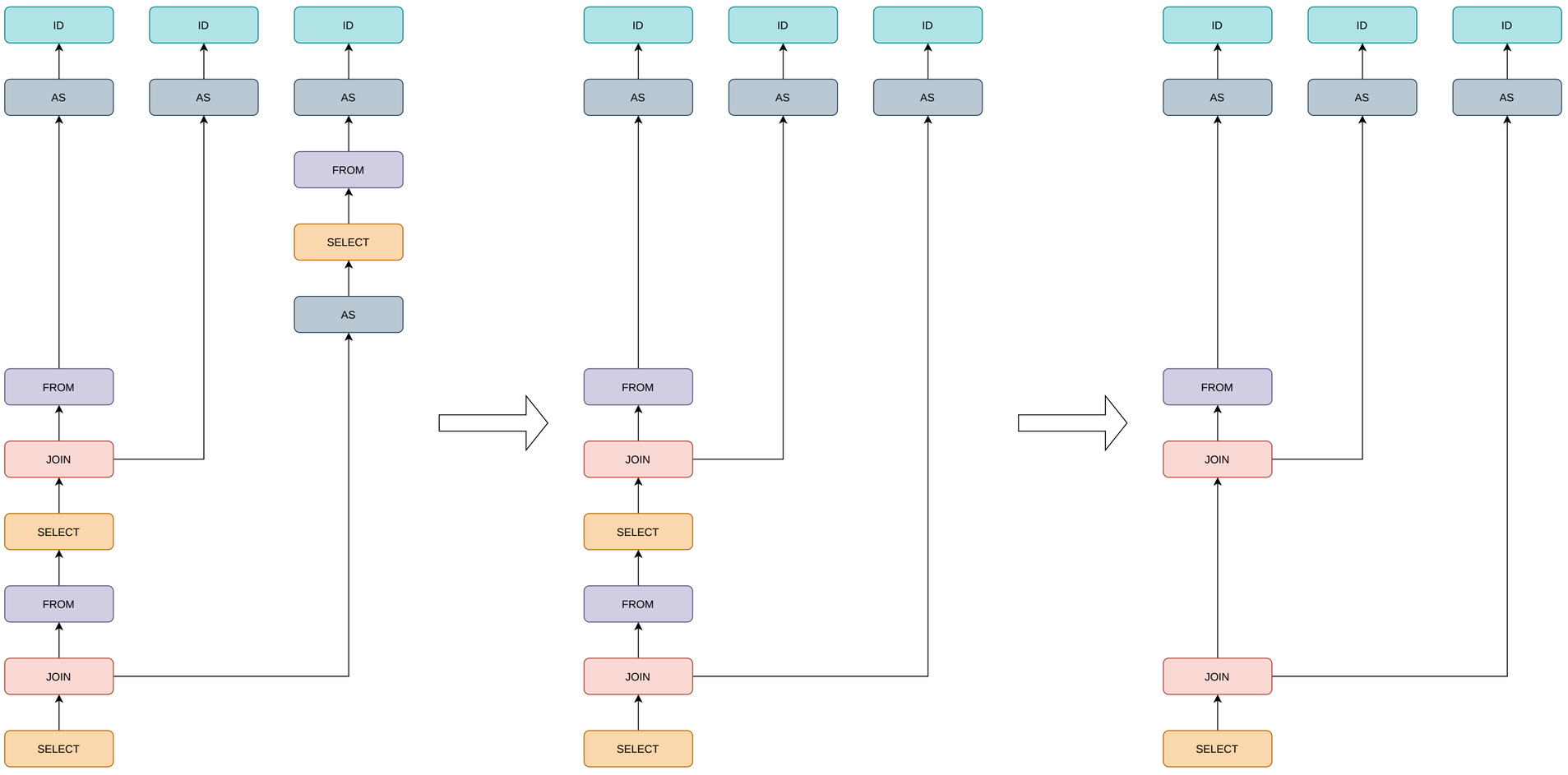

SELECT ... FROM (SELECT ... FROM ...) AS ... WHERE ...
...
FROM
SELECT
AS
FROM
WHERE
SELECT
...
FROM
WHERE
SELECT
AS
FROM
SELECT

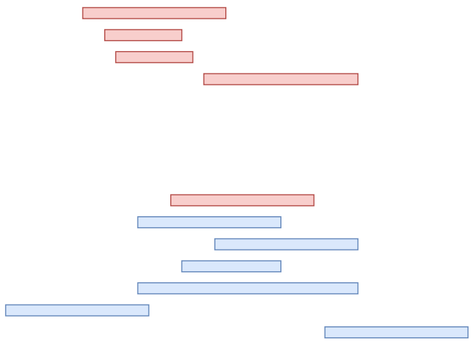

SELECT ... FROM (SELECT ... ... WHERE ...) AS ... WHERE ...
...
WHERE
SELECT
AS
FROM
WHERE
SELECT
...
WHERE ... AND ...
SELECT
AS
FROM
SELECT


SELECT ... FROM (SELECT ... ... JOIN ...) AS ... WHERE ...
...
JOIN
SELECT
AS
FROM
WHERE
SELECT
...
JOIN
WHERE
SELECT
AS
FROM
SELECT

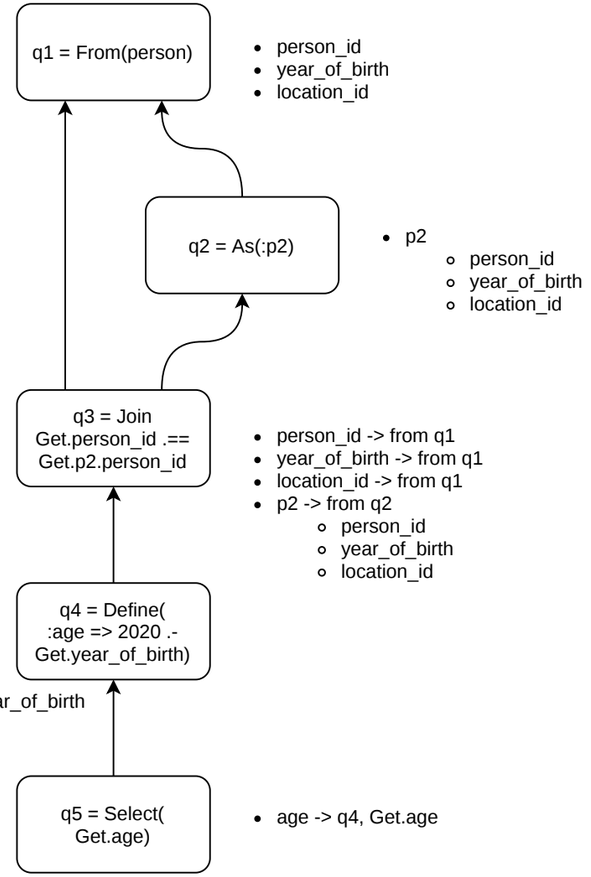

ID
ID
AS
AS
FROM
FROM
SELECT
SELECT
AS
AS
FROM
JOIN
SELECT
ID
ID
AS
AS
FROM
SELECT
AS
FROM
JOIN
SELECT
ID
ID
AS
AS
FROM
JOIN
SELECT


ID
ID
ID
AS
AS
AS
FROM
FROM
FROM
SELECT
SELECT
SELECT
AS
AS
AS
FROM
JOIN
SELECT
FROM
JOIN
SELECT


ID
ID
ID
AS
AS
AS
FROM
SELECT
AS
FROM
JOIN
SELECT
FROM
JOIN
SELECT
FROM
JOIN
SELECT
ID
ID
ID
AS
AS
AS
FROM
JOIN
SELECT
ID
ID
ID
AS
AS
AS
FROM
JOIN
SELECT



Generate a namespace for each node



- person_id
- year_of_birth
- location_id

- p2
  - person_id
  - year_of_birth
  - location_id

- person_id -> from q1
- year_of_birth -> from q1
- location_id -> from q1
- p2 -> from q2
  - person_id
  - year_of_birth
  - location_id

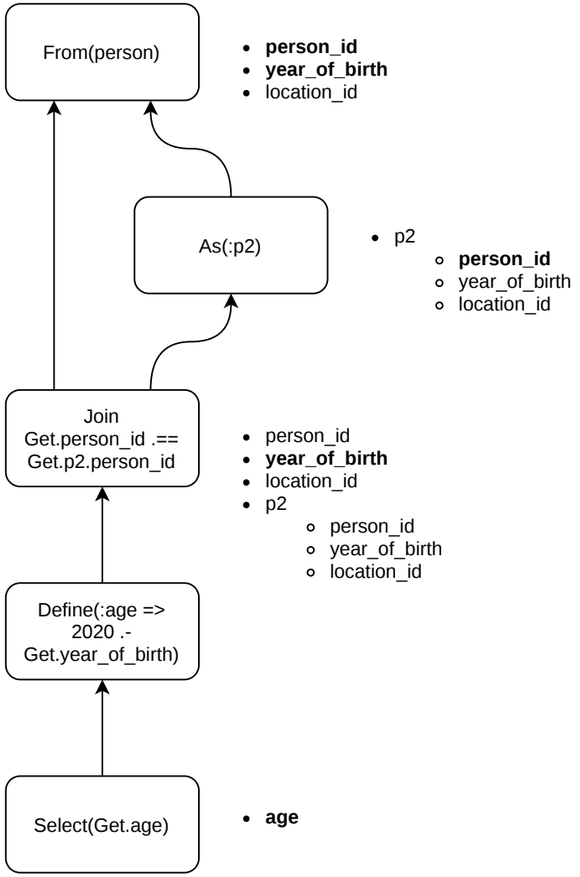
- person_id
- year_of_birth
- location_id
- age -> 2020 .- Get.year_of_birth
- p2
  - person_id
  - year_of_birth
  - location_id

- age -> q4, Get.age

A namespace must support:

- regular columns
- hierarchical aliases
- ambiguous columns
- groups
- nodes
- preserves order of columns

Generate an order for each node



- **person_id**
- **year_of_birth**
- location_id

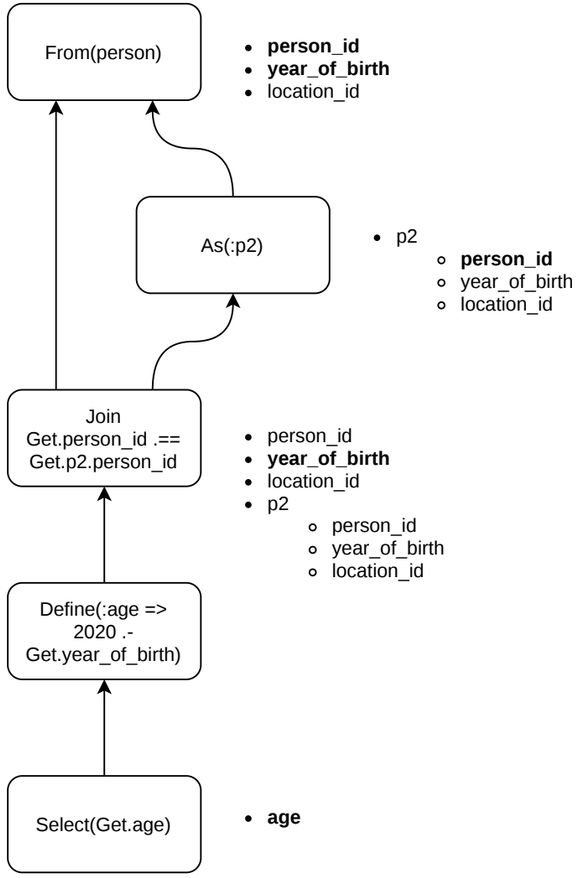
- p2
  - **person_id**
  - year_of_birth
  - location_id

- person_id
- **year_of_birth**
- location_id
- p2
  - person_id
  - year_of_birth
  - location_id

- person_id
- year_of_birth
- location_id
- **age**
- p2
  - person_id
  - year_of_birth
  - location_id

- **age**

Generate an order for each node



- **person_id**
- **year_of_birth**
- location_id

- p2
  - **person_id**
  - year_of_birth
  - location_id

- person_id
- **year_of_birth**
- location_id
- p2
  - person_id
  - year_of_birth
  - location_id

- person_id
- year_of_birth
- location_id
- **age**
- p2
  - person_id
  - year_of_birth
  - location_id

- **age**