JOINS

CONSIDER THESE TABLES

TRADES

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

NAMES

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

REVENUE

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

TRADES

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

NAMES

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

REVENUE

TOTAL_REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

```
SELECT N.SYMBOL, N.NAME, T.HIGH , T.TIMESTAMP
FROM  NAMES N
OUTER JOIN TRADES T
ON N.SYMBOL = T.SYMBOL
```

```
SELECT N.SYMBOL, N.NAME, T.HIGH , T.TIMESTAMP
FROM  NAMES N
OUTER JOIN TRADES T
ON N.SYMBOL = T.SYMBOL
```

HIVE CONVERTS JOINS OVER MULTIPLE TABLES INTO A SINGLE MAP/REDUCE JOB IF THE SAME COLUMNS ARE USED IN THE JOIN CLAUSES

```
SELECT N.SYMBOL, N.NAME, T.HIGH , T.TIMESTAMP
FROM  NAMES N
OUTER JOIN TRADES T
ON N.SYMBOL = T.SYMBOL
```

HIVE CONVERTS JOINS OVER **MULTIPLE TABLES INTO A SINGLE MAP/REDUCE** JOB IF THE SAME COLUMNS ARE USED IN THE JOIN CLAUSES

```
SELECT N.SYMBOL, N.NAME, T.HIGH , T.TIMESTAMP
FROM  NAMES N
OUTER JOIN TRADES T
ON N.SYMBOL = T.SYMBOL
```

HIVE CONVERTS JOINS OVER MULTIPLE TABLES INTO A SINGLE MAP/REDUCE JOB IF THE **SAME COLUMNS ARE USED IN THE JOIN CLAUSES**

TRADES

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

NAMES

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

REVENUE

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

```
SELECT N.SYMBOL, N.NAME, T.HIGH , T.TIMESTAMP
FROM  NAMES N
OUTER JOIN TRADES T
ON N.SYMBOL = T.SYMBOL
```

If the symbol matches

<Rownum, <Row, Tablename> >

<Symbol, <Other Columns, Table>>

N.SYMBOL, N.NAME

RIL	Reliance

RIL	"Reliance", N

T.SYMBOL, T.HIGH , T.TIMESTAMP

RIL	100	02DEC2014

RIL	"100, 02DEC2014", T

<KEY, VALUE> PAIR IS DEPENDENT ON THE COLUMN ON WHICH WE JOIN

TRADES

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

NAMES

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

REVENUE

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

LET US CONSIDER ANOTHER QUERY ON THE SAME SET OF TABLES

```
SELECT NAMES.SYMBOL, TRADES.SERIES,
REVENUE.TOTAL_REVENUE,
FROM TRADES JOIN NAMES ON
(TRADES.SYMBOL = NAMES.SYMBOL)
JOIN REVENUE ON (REVENUE.SYMBOL = NAMES.SYMBOL)
```

HIVE CONVERTS JOINS OVER MULTIPLE TABLES INTO A SINGLE MAP/REDUCE JOB IF THE SAME COLUMNS ARE USED IN THE JOIN CLAUSES

TRADES

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

NAMES

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

REVENUE

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

LET US CONSIDER ANOTHER QUERY ON THE SAME SET OF TABLES

TRADES

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

NAMES

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

REVENUE

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

```
SELECT NAMES.SYMBOL, TRADES.SERIES,
REVENUE.TOTAL_REVENUE,
FROM TRADES JOIN NAMES ON
(TRADES.SYMBOL = NAMES.SYMBOL)
JOIN REVENUE ON (REVENUE.NAME = NAMES.NAME)
```

JOINS

```
SELECT NAMES.SYMBOL, TRADES.SERIES,
REVENUE.TOTAL_REVENUE,
FROM TRADES JOIN NAMES ON
(TRADES.SYMBOL = NAMES.SYMBOL)
JOIN REVENUE ON (REVENUE.NAME = NAMES.NAME)
```

THIS QUERY WILL BE CONVERTED TO TWO MAP/REDUCE JOBS BECAUSE IT USES DIFFERENT COLUMNS FROM THE SAME TABLE IN THE JOIN

JOINS

```
SELECT NAMES.SYMBOL, TRADES.SERIES,
REVENUE.TOTAL_REVENUE,
FROM TRADES JOIN NAMES ON
(TRADES.SYMBOL = NAMES.SYMBOL)
JOIN REVENUE ON (REVENUE.NAME = NAMES.NAME)
```

THIS QUERY WILL BE CONVERTED TO **TWO MAP/REDUCE JOBS** BECAUSE IT USES DIFFERENT COLUMNS FROM THE SAME TABLE IN THE JOIN

JOINS

```
SELECT NAMES.SYMBOL, TRADES.SERIES,
REVENUE.TOTAL_REVENUE,
FROM TRADES JOIN NAMES ON
(TRADES.SYMBOL = NAMES.SYMBOL)
JOIN REVENUE ON (REVENUE.NAME = NAMES.NAME)
```

THIS QUERY WILL BE CONVERTED TO TWO MAP/REDUCE JOBS BECAUSE IT USES DIFFERENT COLUMNS FROM THE SAME TABLE IN THE JOIN

```
SELECT NAMES.SYMBOL, TRADES.SERIES, REVENUE.TOTAL_REVENUE,
FROM  TRADES JOIN NAMES ON
(TRADES.SYMBOL = NAMES.SYMBOL)
JOIN REVENUE ON (REVENUE.NAME = NAMES.NAME)
```

THIS IS CONVERTED TO TWO MAP/REDUCE JOBS

<KEY, VALUE> PAIR MAP OUTPUT IS DEPENDENT ON THE COLUMN ON WHICH WE JOIN TABLES

JOINS

CONSIDER THESE TABLES AGAIN

TRADES

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

NAMES

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

REVENUE

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

JOINS

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

TRADES

500 GB

NAMES

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

50 MB

REVENUE

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

500 MB

HERE ARE THE SIZES OF THESE TABLES

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

TRADES 500 GB

NAMES 50 MB

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

REVENUE 500 MB

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

CONSIDER A QUERY ON THESE TABLES

```
SELECT NAMES.SYMBOL, TRADES.SERIES,
REVENUE.TOTAL REVENUE,
FROM  NAMES JOIN TRADES ON
(TRADES.SYMBOL = NAMES.SYMBOL)
JOIN REVENUE ON (REVENUE.SYMBOL = NAMES.SYMBOL)
```

THIS WILL BE ONE MAP REDUCE JOB UNDER THE HOOD - ONE COLUMN IN THE JOIN = ONE MAP REDUCE JOB

```
SELECT NAMES.SYMBOL, TRADES.SERIES,
REVENUE.TOTAL REVENUE,
FROM  NAMES JOIN TRADES ON
(TRADES.SYMBOL = NAMES.SYMBOL)
JOIN REVENUE ON (REVENUE.SYMBOL = NAMES.SYMBOL)
```

THIS WILL BE ONE MAP REDUCE JOB UNDER THE HOOD - ONE COLUMN IN THE JOIN = ONE MAP REDUCE JOB

```
SELECT NAMES.SYMBOL, TRADES.SERIES,
REVENUE.TOTAL REVENUE,
FROM  NAMES JOIN TRADES ON
(TRADES.SYMBOL = NAMES.SYMBOL)
JOIN REVENUE ON (REVENUE.SYMBOL = NAMES.SYMBOL)
```

TRADES 500 GB

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

NAMES 50 MB

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

REVENUE 500 MB

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

```
SELECT NAMES.SYMBOL, TRADES.SERIES,
REVENUE.TOTAL REVENUE,
FROM  NAMES JOIN TRADES ON
(TRADES.SYMBOL = NAMES.SYMBOL)
JOIN REVENUE ON (REVENUE.SYMBOL = NAMES.SYMBOL)
```

WE HAVE THREE TABLES HERE IN THE SEQUENCE

TRADES 500 GB

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

NAMES 50 MB

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

REVENUE 500 MB

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

```
SELECT NAMES.SYMBOL, TRADES.SERIES,
REVENUE.TOTAL REVENUE,
FROM   NAMES JOIN TRADES ON
(TRADES.SYMBOL = NAMES.SYMBOL)
JOIN REVENUE ON (REVENUE.SYMBOL = NAMES.SYMBOL)
```

NAMES

TRADES 500 GB

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

NAMES 50 MB

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

REVENUE 500 MB

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

```
SELECT NAMES.SYMBOL, TRADES.SERIES,
REVENUE.TOTAL REVENUE,
FROM  NAMES JOIN TRADES ON
(TRADES.SYMBOL = NAMES.SYMBOL)
JOIN REVENUE ON (REVENUE.SYMBOL = NAMES.SYMBOL)
```

NAMES

TRADES

TRADES 500 GB

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

NAMES 50 MB

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

REVENUE 500 MB

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

```
SELECT NAMES.SYMBOL, TRADES.SERIES,
REVENUE.TOTAL REVENUE,
FROM  NAMES JOIN TRADES ON
(TRADES.SYMBOL = NAMES.SYMBOL)
JOIN REVENUE ON (REVENUE.SYMBOL = NAMES.SYMBOL)
```

NAMES TRADES

REVENUE

TRADES 500 GB

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

NAMES 50 MB

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

REVENUE 500 MB

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

NAMES TRADES REVENUE

IN THE JOIN MAPREDUCE, THE LAST TABLE IS STREAMED TO THE REDUCE OPERATION.

THE REMAINING TABLES ARE BUFFERED

TRADES 500 GB

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

NAMES 50 MB

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

REVENUE 500 MB

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

NAMES TRADES REVENUE

IN THE JOIN MAPREDUCE, THE LAST TABLE IS STREAMED TO THE REDUCE OPERATION.

THE REMAINING TABLES ARE BUFFERED

TRADES 500 GB

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

NAMES 50 MB

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

REVENUE 500 MB

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

NAMES TRADES REVENUE

IN THE JOIN MAPREDUCE, THE LAST TABLE IS STREAMED TO THE REDUCE OPERATION.

THE REMAINING TABLES ARE **BUFFERED**

TRADES

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

NAMES 50 MB

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

REVENUE 500 MB

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

NAMES TRADES REVENUE

THIS MEANS THAT 500 GB WORTH OF DATA IS KEPT IN MEMORY

500 GB

TRADES

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

NAMES 50 MB

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

REVENUE 500 MB

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

NAMES TRADES REVENUE

IN ORDER TO OPTIMIZE JOINS WE SHOULD MINIMIZE THE DATA HELD IN MEMORY

500 GB

TRADES 500 GB

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

NAMES 50 MB

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

REVENUE 500 MB

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

NAMES TRADES REVENUE

WRITE THE QUERY IN SUCH A MANNER THAT THE LARGEST TABLE APPEARS LAST

TRADES 500 GB

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

NAMES 50 MB

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

REVENUE 500 MB

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

NAMES

TRADES

REVENUE

IN THE JOIN MAPREDUCE THE MOST TABLE IS STREAMED TO THE REDUCER OPERATION. THE REMAINING TABLES ARE BUFFERED

SINCE TRADES IS THE LARGEST TABLE WE SHOULD TRY TO MAKE IT THE LAST IN THE SEQUENCE

TRADES 500 GB

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

NAMES 50 MB

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

REVENUE 500 MB

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

SINCE TRADES IS THE LARGEST TABLE WE SHOULD TRY TO MAKE IT THE LAST IN THE SEQUENCE

```
SELECT NAMES.SYMBOL, TRADES.SERIES,
REVENUE.TOTAL REVENUE,
FROM  NAMES JOIN REVENUE
ON (REVENUE.SYMBOL = NAMES.SYMBOL)JOIN TRADES
ON (TRADES.SYMBOL = NAMES.SYMBOL)
```

TRADES 500 GB

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

NAMES 50 MB

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

REVENUE 500 MB

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

CONSIDER THE SEQUENCE

```
SELECT NAMES.SYMBOL, TRADES.SERIES, REVENUE.TOTAL REVENUE,
FROM   NAMES JOIN REVENUE
ON (REVENUE.SYMBOL = NAMES.SYMBOL)JOIN TRADES
ON (TRADES.SYMBOL = NAMES.SYMBOL)
```

NAMES

TRADES 500 GB

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

NAMES 50 MB

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

REVENUE 500 MB

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

CONSIDER THE SEQUENCE

```
SELECT NAMES.SYMBOL, TRADES.SERIES, REVENUE.TOTAL REVENUE,
FROM  NAMES JOIN REVENUE
ON (REVENUE.SYMBOL = NAMES.SYMBOL)JOIN TRADES
ON (TRADES.SYMBOL = NAMES.SYMBOL)
```

NAMES

REVENUE

TRADES 500 GB

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

NAMES 50 MB

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

REVENUE 500 MB

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

CONSIDER THE SEQUENCE

```
SELECT NAMES.SYMBOL, TRADES.SERIES, REVENUE.TOTAL REVENUE,
FROM  NAMES JOIN REVENUE
ON (REVENUE.SYMBOL = NAMES.SYMBOL)JOIN TRADES
ON (TRADES.SYMBOL = NAMES.SYMBOL)
```

NAMES

REVENUE

TRADES

TRADES 500 GB

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

NAMES 50 MB

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

REVENUE 500 MB

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

TRADES IS NOW LAST IN THE SEQUENCE

```
SELECT NAMES.SYMBOL, TRADES.SERIES, REVENUE.TOTAL REVENUE,
FROM  NAMES JOIN REVENUE
ON (REVENUE.SYMBOL = NAMES.SYMBOL)JOIN TRADES
ON (TRADES.SYMBOL = NAMES.SYMBOL)
```

NAMES REVENUE TRADES

TRADES 500 GB

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

NAMES 50 MB

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

REVENUE 500 MB

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

WHICH MEANS IT WILL NOT BE HELD IN MEMORY!

```
SELECT NAMES.SYMBOL, TRADES.SERIES, REVENUE.TOTAL REVENUE,
FROM  NAMES JOIN REVENUE
ON (REVENUE.SYMBOL = NAMES.SYMBOL)JOIN TRADES
ON (TRADES.SYMBOL = NAMES.SYMBOL)
```

NAMES REVENUE TRADES

TRADES 500 GB

SYMBOL	SERIES	OPEN	HIGH	LOW	CLOSE	LAST

NAMES 50 MB

SYMBOL	NAME
RIL	Reliance
NESTLEIND	Nestle

REVENUE 500 MB

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

THERE IS ONE MORE WAY TO SPECIFY WHICH TABLE TO STREAM

```
FROM  NAMES JOIN REVENUE
ON (REVENUE.SYMBOL = NAMES.SYMBOL)JOIN TRADES
ON (TRADES.SYMBOL = NAMES.SYMBOL)
```

NAMES REVENUE TRADES

THERE IS ONE MORE WAY TO SPECIFY WHICH TABLE TO STREAM

USING

```
/*+ STREAMTABLE(table_name) */
```

THERE IS ONE MORE WAY TO SPECIFY WHICH TABLE TO STREAM

```
/*+ STREAMTABLE(table_name) */
```

THIS WAS THE ORIGINAL QUERY

```
SELECT NAMES.SYMBOL, TRADES.SERIES,
REVENUE.TOTAL REVENUE,
FROM  NAMES JOIN TRADES ON
(TRADES.SYMBOL = NAMES.SYMBOL)
JOIN REVENUE ON (REVENUE.SYMBOL = NAMES.SYMBOL)
```

WE WANT TO STREAM THE TRADES TABLE

THERE IS ONE MORE WAY TO SPECIFY WHICH TABLE TO STREAM

```
/*+ STREAMTABLE(table_name) */
```

WE WANT TO STREAM THE TRADES TABLE

```
SELECT /*+ STREAMTABLE(TRADES) */
NAMES.SYMBOL, TRADES.SERIES, REVENUE.TOTAL
REVENUE,
FROM  NAMES JOIN TRADES ON
(TRADES.SYMBOL = NAMES.SYMBOL)
JOIN REVENUE ON (REVENUE.SYMBOL = NAMES.SYMBOL)
```

WE WANT TO STREAM THE TRADES TABLE

```
/*+ STREAMTABLE(table_name) */
```

```
SELECT /*+ STREAMTABLE(TRADES) */
NAMES.SYMBOL, TRADES.SERIES, REVENUE.TOTAL
REVENUE,
FROM  NAMES JOIN TRADES ON
(TRADES.SYMBOL = NAMES.SYMBOL)
JOIN REVENUE ON (REVENUE.SYMBOL = NAMES.SYMBOL)
```

JOINS

JOINS WITH WHERE CLAUSE

TWO THINGS TO KEEP IN MIND

1. JOINS OCCUR BEFORE THE WHERE CLAUSE IS EVALUATED

1. JOINS OCCUR BEFORE THE WHERE CLAUSE IS EVALUATED

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

CONSIDER THE QUERY

```
SELECT NAMES.SYMBOL,REVENUE.TOTAL_REVENUE,
FROM NAMES
LEFT JOIN REVENUE ON
(REVENUE.SYMBOL = NAMES.SYMBOL)
WHERE SECTOR = 'FMCG';
```

1. JOINS OCCUR BEFORE THE WHERE CLAUSE IS EVALUATED

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

THE JOIN WILL BE EXECUTED FIRST

```
SELECT NAMES.SYMBOL,REVENUE.TOTAL_REVENUE,
FROM NAMES
LEFT JOIN REVENUE ON
(REVENUE.SYMBOL = NAMES.SYMBOL)
WHERE SECTOR = 'FMCG';
```

1. JOINS OCCUR BEFORE THE WHERE CLAUSE IS EVALUATED

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

OUTPUT OF JOIN COMMAND

```
SELECT
NAMES.SYMBOL,REVENUE.TOTAL_REVENUE,
FROM NAMES
LEFT JOIN REVENUE ON
(REVENUE.SYMBOL = NAMES.SYMBOL)
WHERE SECTOR = 'FMCG';
```

SYMBOL	TOTAL REVENUE
RIL	$ 4 Billion
NESTLEIND	$ 0.5 Billion
TATA	-

JOIN OUTPUT

1. JOINS OCCUR BEFORE THE WHERE CLAUSE IS EVALUATED

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

THE 'WHERE' CLAUSE IS THEN USED TO FILTER RESULTS FROM THE JOIN OUTPUT

```
SELECT NAMES.SYMBOL,REVENUE.TOTAL
REVENUE,
FROM NAMES
LEFT JOIN REVENUE ON
(REVENUE.SYMBOL = NAMES.SYMBOL)
WHERE SECTOR = 'FMCG';
```

SYMBOL	TOTAL REVENUE
RIL	$ 4 Billion
NESTLEIND	$ 0.5 Billion
TATA	-

JOIN OUTPUT

1. JOINS OCCUR BEFORE THE WHERE CLAUSE IS EVALUATED

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

THE 'WHERE' CLAUSE IS THEN USED TO FILTER RESULTS FROM THE JOIN OUTPUT

```
SELECT NAMES.SYMBOL,REVENUE.TOTAL
REVENUE,
FROM NAMES
LEFT JOIN REVENUE ON
(REVENUE.SYMBOL = NAMES.SYMBOL)
WHERE SECTOR = 'FMCG';
```

SYMBOL	TOTAL REVENUE
NESTLEIND	$ 0.5 Billion

JOIN OUTPUT

JOINS WITH WHERE CLAUSE

TWO THINGS TO KEEP IN MIND

1. JOINS OCCUR BEFORE THE WHERE CLAUSE IS EVALUATED

2. THE WHERE CLAUSE CAN REFER TO THOSE COLUMNS THAT DON'T EXIST IN THE JOIN OUTPUT

2. THE WHERE CLAUSE CAN REFER TO THOSE COLUMNS THAT DON'T EXIST IN THE JOIN OUTPUT

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

EVEN THOUGH 'SECTOR' IS NOT IN THE JOIN OUTPUT, IT CAN BE USED TO FILTER THE OUTPUT

```
SELECT NAMES.SYMBOL,REVENUE.TOTAL
REVENUE,
FROM NAMES
LEFT JOIN REVENUE ON
(REVENUE.SYMBOL = NAMES.SYMBOL)
WHERE SECTOR = 'FMCG';
```

SYMBOL	TOTAL REVENUE
RIL	$ 4 Billion
NESTLEIND	$ 0.5 Billion
TATA	-

JOIN OUTPUT

EVEN THOUGH 'SECTOR' IS NOT IN THE JOIN OUTPUT, IT CAN BE USED TO FILTER THE OUTPUT

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

```
SELECT NAMES.SYMBOL,REVENUE.TOTAL
REVENUE,
FROM NAMES
LEFT JOIN REVENUE ON
(REVENUE.SYMBOL = NAMES.SYMBOL)
WHERE SECTOR = 'FMCG';
```

SYMBOL	TOTAL REVENUE
RIL	$ 4 Billion
NESTLEIND	$ 0.5 Billion
TATA	-

JOIN OUTPUT

SYMBOL	TOTAL REVENUE
NESTLEIND	$ 0.5 Billion

FINAL OUTPUT

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

THE WHERE CLAUSE CAN ALSO REFERENCE FIELDS FROM THE RIGHT TABLE

```
SELECT NAMES.SYMBOL,REVENUE.TOTAL
REVENUE,
FROM NAMES
LEFT JOIN REVENUE ON
(REVENUE.SYMBOL = NAMES.SYMBOL)
WHERE REVENUE.SYMBOL = 'RIL';
```

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

THE WHERE CLAUSE CAN ALSO REFERENCE FIELDS FROM THE RIGHT TABLE

```
SELECT NAMES.SYMBOL,REVENUE.TOTAL
REVENUE,
FROM NAMES
LEFT JOIN REVENUE ON
(REVENUE.SYMBOL = NAMES.SYMBOL)
WHERE REVENUE.SYMBOL = 'RIL';
```

SYMBOL	TOTAL REVENUE
RIL	$ 4 Billion
NESTLEIND	$ 0.5 Billion
TATA	-

JOIN OUTPUT

SYMBOL	TOTAL REVENUE
RIL	$ 4 Billion

FINAL OUTPUT

JOINS

LEFT SEMI JOIN

IMPLEMENTS THE IN/EXISTS SUBQUERY SEMANTICS IN AN EFFICIENT WAY

IN/EXISTS

IN/EXISTS SUBQUERIES ARE SUPPORTED IN THE WHERE CLAUSE

IN

EXISTS

IN

'WHERE IN' RETURNS ROWS THAT MATCHES VALUES IN A SUBQUERY

LET US SAY WE HAVE TWO TABLES

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

IN

'WHERE IN' RETURNS ROWS THAT MATCHES VALUES IN A SUBQUERY

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

```
SELECT NAMES.SYMBOL
FROM NAMES
WHERE  NAMES.SYMBOL IN
(SELECT SYMBOL FROM REVENUE);
```

IN

'WHERE IN' RETURNS ROWS THAT MATCHES VALUES IN A SUBQUERY

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

```
SELECT NAMES.SYMBOL
FROM NAMES
WHERE  NAMES.SYMBOL IN
 (SELECT SYMBOL FROM REVENUE);
```

IN

'WHERE IN' RETURNS ROWS THAT MATCHES VALUES IN A SUBQUERY

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

```
SELECT NAMES.SYMBOL
FROM NAMES
WHERE  NAMES.SYMBOL IN
 (SELECT SYMBOL FROM REVENUE);
```

SYMBOL
RIL
NESTLEIND

NOT IN

'WHERE NOT IN' RETURNS ROWS THAT DO NOT MATCH VALUES IN A SUBQUERY

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

```
SELECT NAMES.SYMBOL
FROM NAMES
WHERE  NAMES.SYMBOL NOT IN
(SELECT SYMBOL FROM REVENUE);
```

SYMBOL
TATA

NOT IN & IN

IN/NOT IN SUBQUERIES ONLY SELECT A SINGLE COLUMN

IN

IN/NOT IN SUBQUERIES ONLY SELECT A SINGLE COLUMN

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

```
SELECT NAMES.SYMBOL
FROM NAMES
WHERE  NAMES.SYMBOL IN
 (SELECT SYMBOL FROM REVENUE);
```

SYMBOL
RIL
NESTLEIND

NAMES

IN/EXISTS

IN/EXISTS SUBQUERIES ARE SUPPORTED IN THE WHERE CLAUSE

IN

EXISTS

EXISTS

THE SQL EXISTS CONDITION IS USED IN COMBINATION WITH A SUBQUERY

```
SELECT *
FROM TABLE_NAME
WHERE   EXISTS
SUBQUERY;
```

IF THE SUBQUERY RETURNS AT LEAST ONE ROW, THE CONDITION IS SAID TO BE MET

EXISTS

THE SQL EXISTS CONDITION IS USED IN COMBINATION WITH A SUBQUERY

IF THE SUBQUERY RETURNS AT LEAST ONE ROW, THE CONDITION IS SAID TO BE MET

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

EXISTS

IF THE SUBQUERY RETURNS AT LEAST ONE ROW, THE CONDITION IS SAID TO BE MET

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

```
SELECT NAMES.SYMBOL
FROM NAMES
WHERE  EXISTS
(SELECT TOTAL_REVENUE FROM REVENUE
NAMES.name = REVENUE.name);
```

EXISTS

IF THE SUBQUERY RETURNS AT LEAST ONE ROW, THE CONDITION IS SAID TO BE MET

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

```
SELECT NAMES.SYMBOL
FROM NAMES
WHERE  EXISTS
(SELECT TOTAL_REVENUE FROM REVENUE
NAMES.name = REVENUE.name);
```

EXISTS

IF THE SUBQUERY RETURNS AT LEAST ONE ROW, THE CONDITION IS SAID TO BE MET

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

```
SELECT NAMES.SYMBOL
FROM NAMES
WHERE  EXISTS
(SELECT TOTAL_REVENUE FROM REVENUE
NAMES.name = REVENUE.name);
```

EXISTS

THERE IS ONE MORE CONDITION

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

THE SUBQUERY NEEDS TO BE CORRELATED

(SELECT TOTAL_REVENUE FROM REVENUE

```
NAMES.name = REVENUE.name);
```

THE SUBQUERY NEEDS TO BE CORRELATED

OUTER QUERY

```
SELECT *
FROM TABLE_NAME
WHERE   EXISTS
SUBQUERY;
```

A SUBQUERY IS CORRELATED WHEN IT USES A VALUE FROM THE OUTER QUERY

EXISTS

THE REFERENCED COLUMNS .name SHOULD BE IN SMALL CAPS

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

THE SUBQUERY NEEDS TO BE CORRELATED

```
FROM NAMES
WHERE  EXISTS
(SELECT TOTAL_REVENUE FROM REVENUE
NAMES.name = REVENUE.name);
```

THE SUBQUERY NEEDS TO BE CORRELATED

THE REFERENCED COLUMNS .name SHOULD BE IN SMALL CAPS

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

IF YOU DON'T USE SMALL CAPS, YOU WILL SEE THIS ERROR

```
FAILED: SemanticException [Error 10250]: Line 1:84 Invalid SubQuery expression 'SYMBOL': For Exists/Not Exists operator
SubQuery must be Correlated.
```

EXISTS

IF THE SUBQUERY RETURNS AT LEAST ONE ROW, THE CONDITION IS SAID TO BE MET

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

```
SELECT NAMES.SYMBOL
FROM NAMES
WHERE  EXISTS
(SELECT TOTAL_REVENUE FROM REVENUE
NAMES.name = REVENUE.name);
```

SYMBOL
RIL
NESTLEIND

NOT EXISTS

IF THE SUBQUERY DOES NOT RETURN AT LEAST ONE ROW, THE CONDITION IS SAID TO BE MET

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

```
SELECT NAMES.SYMBOL
FROM NAMES
WHERE NOT EXISTS
(SELECT TOTAL_REVENUE FROM REVENUE
NAMES.name = REVENUE.name);
```

SYMBOL
TATA

LEFT SEMI JOIN

LEFT SEMI JOIN IMPLEMENTS THE UNCORRELATED IN SUBQUERY SEMANTICS IN AN EFFICIENT WAY

CONSIDER THE PREVIOUS EXAMPLE

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

LEFT SEMI JOIN IMPLEMENTS THE UNCORRELATED IN SUBQUERY SEMANTICS IN AN EFFICIENT WAY

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

```
SELECT NAMES.SYMBOL
FROM NAMES
WHERE  NAMES.SYMBOL IN
(SELECT SYMBOL FROM REVENUE);
```

LEFT SEMI JOIN IMPLEMENTS THE UNCORRELATED IN/ EXISTS SUBQUERY SEMANTICS IN AN EFFICIENT WAY

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

CORRESPONDING LEFT SEMI JOIN QUERY IS

```
SELECT
NAMES.SYMBOL
FROM NAMES
WHERE
NAMES.SYMBOL IN
(SELECT SYMBOL
FROM REVENUE);
```

```
SELECT NAMES.SYMBOL
FROM NAMES
LEFT SEMI JOIN REVENUE
ON
(NAMES.SYMBOL = REVENUE.SYMBOL);
```

LEFT SEMI JOIN

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

```
SELECT NAMES.SYMBOL
FROM NAMES
LEFT SEMI JOIN REVENUE
ON
(NAMES.SYMBOL = REVENUE.SYMBOL);
```

LEFT SEMI JOIN

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

```
SELECT NAMES.SYMBOL
FROM NAMES
LEFT SEMI JOIN REVENUE
ON
(NAMES.SYMBOL = REVENUE.SYMBOL);
```

THE QUERY RETURNS ROWS FROM THE LEFT TABLE WHICH MATCH THE CONDITIONS IN THE ON PREDICATE

LEFT SEMI JOIN

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

```
SELECT NAMES.SYMBOL
FROM NAMES
LEFT SEMI JOIN REVENUE
ON
(NAMES.SYMBOL = REVENUE.SYMBOL);
```

THE QUERY RETURNS ROWS FROM THE LEFT TABLE WHICH MATCH THE CONDITIONS IN THE ON PREDICATE

I.E. NAMES

LEFT SEMI JOIN

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

```
SELECT NAMES.SYMBOL
FROM NAMES
LEFT SEMI JOIN REVENUE
ON
(NAMES.SYMBOL = REVENUE.SYMBOL);
```

THE QUERY RETURNS ROWS FROM THE LEFT TABLE WHICH MATCH THE CONDITIONS IN THE ON PREDICATE

LEFT SEMI JOIN

SYMBOL	NAME	SECTOR
RIL	Reliance	ENERGY
NESTLEIND	Nestle	FMCG
TATA	TATA	AUTOMOBILE

NAMES

TOTAL REVENUE	NAME	SYMBOL
$ 4 Billion	Reliance	RIL
$ 0.5 Billion	Nestle	NESTLEIND

REVENUE

```
SELECT NAMES.SYMBOL
FROM NAMES
LEFT SEMI JOIN REVENUE
ON
(NAMES.SYMBOL = REVENUE.SYMBOL);
```

YOU CANNOT USE COLUMNS FROM THE RIGHT TABLE IN THE SELECT OR WHERE CLAUSE

LEFT SEMI JOIN

LEFT SEMI JOINS ARE MORE EFFICIENT BECAUSE THEY JUST NEED TO SCAN THE RIGHT TABLE UNTIL "A MATCH" FOR THE ROW IS FOUND

LEFT SEMI JOIN

IN/EXISTS QUERIES ON THE OTHER HAND NEED TO SCAN THE ENTIRE RIGHT TABLE TO FETCH THE RESULTS OF THE SUBQUERY

LEFT SEMI JOIN

IN/EXISTS QUERIES ONLY ALLOW THE SUBQUERY TO RETURN 1 COLUMN

```
SELECT NAMES.SYMBOL
FROM NAMES
WHERE  NAMES.SYMBOL,NAMES.NAME IN
(SELECT SYMBOL,NAME FROM REVENUE);
```

THIS QUERY WILL NOT WORK

LEFT SEMI JOIN

IN LEFT SEMI JOINS, YOU CAN APPLY THE ON PREDICATE ON ANY NUMBER OF COLUMNS

```
SELECT NAMES.SYMBOL
FROM NAMES
LEFT SEMI JOIN REVENUE
ON
(NAMES.SYMBOL = REVENUE.SYMBOL) AND
(NAMES.NAME = REVENUE.NAME);
```