

나. 소트를 발생시키는 오퍼레이션

1) Sort Aggregate

~~전체~~ 전체 로우를 대상으로 집계를 수행할 때 나타남.

~~실제~~ 실제 소트가 발생하지 않는다.

- SQL Server 실행계획엔 'Stream Aggregate' 라고 표시됨.

```
select sum(sal), max(sal), min(sal) from emp
```

Id	Operation	Name	Rows	Bytes	Cost (%CPU)	Time
0	SELECT STATEMENT		1	4	3 (0)	00:00:01
1	SORT AGGREGATE		1	4		
2	TABLE ACCESS FULL	EMP	14	56	3 (0)	00:00:01

2) Sort Order By

- 정렬된 결과집합을 얻고자 할 때 나타남.

```
select * from emp order by sal desc
```

Id	Operation	Name	Rows	Bytes	Cost (%CPU)	Time
0	SELECT STATEMENT		14	518	4 (25)	00:00:01
1	SORT ORDER BY		14	518	4 (25)	00:00:01
2	TABLE ACCESS FULL	EMP	14	518	3 (0)	00:00:01

← 'Sort Group By' 나 'Hash Group By' 연산에서 'aggregation'까지 수행됨

3) Sort Group By

(Sort Group By Aggregation)

- Sorting 알고리즘을 사용해 그룹별 집계를 수행할 때 나타남.

- 오라클은 Hashing 알고리즘으로 그룹별 집계를 수행하기도 함.

← hash group by (hash group by aggregation)

```
select deptno, job, sum(sal), max(sal), min(sal)
from emp
group by deptno, job
```

Id	Operation	Name	Rows	Bytes	Cost (%CPU)	Time
0	SELECT STATEMENT		11	165	4 (25)	00:00:01
1	HASH GROUP BY		11	165	4 (25)	00:00:01
2	TABLE ACCESS FULL	EMP	14	210	3 (0)	00:00:01

4) Sort Unique

선택된 결과집합에서 중복 레코드를 제거하고자 할 때 나타남.
Union 연산자나 Distinct 연산자를 사용할 때가 대표적임.

```
select distinct deptno from emp order by deptno
```

Id	Operation	Name	Rows	Bytes	Cost (%CPU)	Time
0	SELECT STATEMENT		3	9	5 (40)	00:00:01
1	SORT UNIQUE		3	9	4 (25)	00:00:01
2	TABLE ACCESS FULL	EMP	14	42	3 (0)	00:00:01

5) Sort Join

- Sort Merge Join을 수행할 때 나타남.

```
select /*+ ordered use_merge(e) */ *  
from emp e, dept d  
where d. deptno = e. deptno
```

Id	Operation	Name	Rows	Bytes	Cost (%CPU)	Time
0	SELECT STATEMENT		14	798	6 (17)	00:00:01
1	MERGE JOIN		14	798	6 (17)	00:00:01
2	TABLE ACCESS BY INDEX ROWID	EMP	14	518	2 (0)	00:00:01
3	INDEX FULL SCAN	EMP_IDX	14		1 (0)	00:00:01
* 4	SORT JOIN		4	80	4 (25)	00:00:01
5	TABLE ACCESS FULL	DEPT	4	80	3 (0)	00:00:01

6) Window Sort

- 윈도우 함수를 수행할 때 나타남.

```
select empno, ename, job, mgr, sal, row_number() over (order by hiredate)  
from emp
```

Id	Operation	Name	Rows	Bytes	Cost (%CPU)	Time
0	SELECT STATEMENT		14	476	4 (25)	00:00:01
1	WINDOW SORT		14	476	4 (25)	00:00:01
2	TABLE ACCESS FULL	EMP	14	476	3 (0)	00:00:01