

Aggregate Functions

```
SELECT avg(salary), max(salary), min(salary)
FROM employee;
```

Functions:

avg	min
sum	max
stdev	
var	count

Aggregate Functions Examples

```
SELECT max(salary), min(salary)
FROM employee, department
WHERE dno = dnumber AND dname='Research';
```

```
SELECT count(*) AS employees
FROM employee;
```

```
SELECT count(distinct superssn)
FROM employee;
```

Nested Aggregate Functions

```
SELECT lname, fname
FROM employee
WHERE (SELECT count(*)
FROM dependent
WHERE ssn = essn) >= 2;
```

```
SELECT lname, fname,
(SELECT count(*)
FROM dependent
WHERE ssn = essn) AS depnr
FROM employee;
```

Nested Aggregate Functions Examples

- List names of supervisors that supervise more than one person.
- List employees making less than the average salary.
- List names of employees that work on at least 3 projects.
- Which employees have more male than female dependents?

Nested Aggregate Functions Examples

Henry Books

- List books that have at least two authors. At least three?
- How many copies of East of Eden do we have in stock (at any location)?
- What's the average price of a hardback mystery novel?

Grouping

```
SELECT dno, count(*), avg(salary)
FROM employee
GROUP BY dno;
```

```
SELECT pnumber, pname, count(*)
FROM project, works_on
WHERE pnumber = pno
GROUP BY pnumber, pname;
```

Grouping Examples

- List department names with number of locations.
- Display a list of employee names with the number of dependents.
- Same, with all employees, even if they do not have any dependents.
- List names of employees that work less than 38 hours on projects.
- List names of employees that work the longest total time (according to works_on)

Having

Conditions involving groupwise properties, are specified in the HAVING clause.

```
SELECT dno, count(*), avg(salary)
FROM employee
GROUP BY dno
HAVING count(*) > 2;
```

```
SELECT dno, count(*), avg(salary)
FROM employee
GROUP BY dno
HAVING avg(salary) > 33500;
```

Having Examples

- Retrieve the names of projects on which more than two employees work
- List projects with a total project time less than 40 hours per week.
- List departments in which the average salary is more than 30000 (smallest, largest salary?).
- Trickier: For each department compute the number of employees that make more than 40000, but only include departments with more than 5 employees.
- List employees that have at least two female dependents.

SELECT Syntax

SELECT attributes and functions (define aliases)
FROM list of tables (define aliases)
WHERE condition
GROUP BY grouping attributes
HAVING group condition
ORDER BY attribute list
