The IN Operator Conditions can contain IN for "element of" SELECT pname FROM project WHERE pnumber IN (1,2,4,5); SELECT pname FROM project WHERE pnumber NOT IN (1,2); SELECT pname FROM project WHERE plocation IN ('Houston', 'Stafford');

The IN Operator

This will not work in many systems (e.g. Access). Can redo as OR of ANDS:

SELECT dependent_name
FROM dependent
WHERE ((sex = 'M' AND relationship = 'SPOUSE') OR
(sex = 'F' AND relationship = 'DAUGHTER));

Nesting Queries with IN

SELECT Iname, fname FROM employee WHERE ssn IN (SELECT essn FROM dependent)

Nesting Queries Examples List the Names of all supervisors. List the Names of all employees that have a dependent spouse. List the SSNs of employees that on some project work the same time as `John Smith' List departments located in 'Houston' List departments not located in 'Houston' List employees without dependents List projects nobody works on

EXCURSION: USING IN FOR SET OPERATIONS

Set Intersection

Example: Supervisors that have a dependent

SELECT fname, Iname
FROM employee
WHERE ssn IN (SELECT essn
FROM dependent)
AND ssn IN (SELECT superssn
FROM employee);

Mangers that are also supervisors

Set Complement Example: Employees without dependents SELECT fname, Iname FROM employee WHERE ssn NOT IN (SELECT essn FROM dependent); • Employees which are not managers

· Projects on which nobody works 20 hours or more

Set Difference

Example: Employees that have dependents, but no dependent children

SELECT fname, Iname FROM employee WHERE ssn IN (SELECT essn FROM dependent) AND ssn NOT IN (SELECT essn

FROM dependent
WHERE relationship IN ('son', 'daughter');

 Projects that Franklin Wong works on, but not John Smith

Set UNION

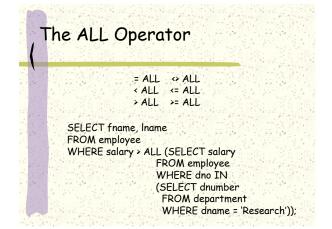
(SELECT S.ssn
FROM employee AS E, employee AS S
WHERE E.superssn = S.ssn)
UNION
(SELECT mgrssn
FROM department);

compare to

(SELECT Iname, fname, ssn FROM employee WHERE ssn IN (SELECT superssn FROM employee) AND ssn IN (SELECT mgrssn FROM department);

Set Operations Examples List the names of managers that have a dependent Departments not located in Houston? Employees without dependents? Henry Books List publishers of which Henry Books does not currently stock any books. List books that have exactly one author. List authors that have written both paperback and hardcover books.





Nesting Queries with ALL

- List the names of employees that make the maximum salary
- List the names of employees that make the minimum salary
- List the names of employees that make a salary that is different from everybody else's salary

Naming Scope for nested assignments

Correlated Nesting Queries

- · List the names of employees that have a child of the opposite sex
- · List the names of employees that make more money than their supervisors

Existence

Tests that a set is nonempty

SELECT fname, Iname
FROM employee
WHERE EXISTS (SELECT *
FROM dependent
WHERE ssn = essn);

SELECT fname, Iname
FROM employee
WHERE NOT EXISTS (SELECT *
FROM dependent
WHERE ssn = essn);

Tests that a set contains one element SELECT fname, Iname FROM employee WHERE UNIQUE (SELECT * FROM dependent WHERE ssn = essn); Not supported by Access or SQLServer

Existence Examples

- List the names of employees that work on all department 5 projects [connection to contains]
 List the names of employees that work on all department 4 projects
- $\boldsymbol{\cdot}$ List the names of people that work on projects in all departments

Joins in SQL

SELECT e.*, s.* FROM employee AS e, employee AS s WHERE e.superssn = s.ssn;

Explicit joins (with variations in Access, SQLServer)

SELECT e.*, s.* FROM (employee AS e JOIN employee AS s ON e.superssn = s.ssn);

SELECT e.*, s.*
FROM (employee e LEFT OUTER JOIN employee s
ON e.superssn = s.ssn);

Joins in Access SELECT employee.* FROM employee LEFT JOIN dependent ON employee.ssn = dependent.essn; Similarly right join No full outer join

Joins in SQLServer SELECT* FROM employee LEFT JOIN dependent ON ssn = essn WHERE relationship = 'daughter'; Similarly right join No full outer join

More Examples List employees that work on a research department project, and an administration project. List departments which supervise a project that nobody is assigned to work on. List all employees and, if they have a supervisor, their supervisor

Henry Book Examples

- List authors that have published books with both Putnam Publishing Group and Jove Publications
- List authors that have written fiction, but not mystery
- · List books that are available at only one of the branches
- · List authors that have coauthored books