

Key Points – Data Modification

- GUI tools like MySQL Workbench may provide interfaces for inserting, modifying, and deleting data but knowing the SQL is important for developing DB applications

Data Modification

- insert rows into a table
 - insert a single row

```
INSERT INTO R(A1, ..., An)
VALUES (v1, ..., vn)
```

 - uses specified values for attributes listed and default values for the others
 - insert multiple rows

```
INSERT INTO R(A1, ..., An)
<subquery>
```

 - subquery is fully evaluated before any rows are inserted, so no inserted rows can affect the subquery

Data Modification

- delete rows from a table

```
DELETE
FROM R
WHERE <condition>
```

 - all rows satisfying the condition are deleted
 - without WHERE, all rows are deleted (but not the table itself)
 - may propagate to other tables if there are foreign key constraints with ON DELETE CASCADE

Data Modification

- update values in existing rows

```
UPDATE R
SET <new value asgn>
WHERE <condition>
```

 - <new value asgn> has the form attr = expr
 - separate multiple assignments with commas
 - expr can be an expression involving the same attribute or another – the value used is the one from the current row
 - all rows satisfying the condition are affected
 - only actual changes to the value are counted as updated rows
 - may propagate to other tables if there are foreign key constraints with ON UPDATE CASCADE

Data Modification

- any modification will be rejected if it violates foreign key, NOT NULL, and other integrity constraints

Figure 5.6

One possible database state for the COMPANY relational database schema.

Empname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary	Super_ssn	Dno
John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000	333445555	5
Franklin	T	Wong	333445555	1956-12-08	638 Voss, Houston, TX	M	40000	888665555	5
Alicia	J	Zelaya	999887777	1968-01-19	3321 Castle, Spring, TX	F	25000	987654321	4
Jennifer	S	Wallace	987654321	1941-06-20	291 Berry, Bellaire, TX	F	43000	888665555	4
Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000	333445555	5
Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000	333445555	5
Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000	987654321	4
James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000	NULL	1

Dname	Dnumber	Mgr_ssn	Mgr_start_date
Research	5	333445555	1988-05-22
Administration	4	987654321	1995-01-01
Headquarters	1	888665555	1981-06-19

Dnumber	Dlocation
1	Houston
4	Stafford
5	Bellaire
5	Sugarland
5	Houston

Essn	Pno	Hours
123456789	1	32.5
123456789	2	7.5
666884444	3	40.0
453453453	1	20.0
453453453	2	20.0
333445555	2	10.0
333445555	3	10.0
333445555	10	10.0
333445555	20	10.0
999887777	30	30.0
999887777	10	10.0
987987987	10	35.0
987987987	30	5.0
987654321	30	20.0
987654321	20	15.0
888665555	20	NULL

Pname	Pnumber	Plocation	Dnum
ProductX	1	Bellaire	5
ProductY	2	Sugarland	5
ProductZ	3	Houston	5
Computerization	10	Stafford	4
Reorganization	20	Houston	1
Newbenefits	30	Stafford	4


Essn	Dependent_name	Sex	Bdate	Relationship
333445555	Alice	F	1986-04-05	Daughter
333445555	Theodore	M	1983-10-25	Son
333445555	Joy	F	1958-05-03	Spouse
987654321	Abner	M	1942-02-28	Spouse
123456789	Michael	M	1988-01-04	Son
123456789	Alice	F	1988-12-30	Daughter
123456789	Elizabeth	F	1967-05-05	Spouse


Quiz


Pname	Pnumber	Plocation	Dnum
ProductX	1	Bellaire	5
ProductY	2	Sugarland	5
ProductZ	3	Houston	5
Computerization	10	Stafford	4
Reorganization	20	Houston	1
Newbenefits	30	Stafford	4


Dname	Dnumber	Mgr_ssn	Mgr_start_date
Research	5	333445555	1988-05-22
Administration	4	987654321	1995-01-01
Headquarters	1	888665555	1981-06-19

Assuming that all default values are NULL, are these legal INSERT statements?

INSERT INTO PROJECT(Pname,Plocation,Dnum)
VALUES ("ProductA","Austin",1) 

INSERT INTO PROJECT(Pnumber,Pname,Plocation,Dnum)
VALUES (40,"ProductA","Austin",1) 

INSERT INTO PROJECT(Pnumber,Pname,Plocation,Dnum)
VALUES (40,"ProductA",NULL,1) 


INSERT INTO PROJECT(Pnumber,Pname,Plocation,Dnum)
VALUES (10,"ProductA","Austin",1) 


Quiz

Pname	Pnumber	Plocation	Dnum
ProductX	1	Bellaire	5
ProductY	2	Sugarland	5
ProductZ	3	Houston	5
Computerization	10	Stafford	4
Reorganization	20	Houston	1
Newbenefits	30	Stafford	4

Dname	Dnumber	Mgr_ssn	Mgr_start_date
Research	5	333445555	1988-05-22
Administration	4	987654321	1995-01-01
Headquarters	1	888665555	1981-06-19

Assuming that all default values are NULL, are these legal INSERT statements?

INSERT INTO PROJECT(Pnumber,Pname,Plocation,Dnum)
VALUES ("ProductA",40,"Austin",1) 

INSERT INTO PROJECT(Pnumber,Pname)
VALUES (40,"ProductA") 

Quiz

PROJECT				DEPARTMENT			
Pname	Pnumber	Plocation	Dnum	Dname	Dnumber	Mgr_ssn	Mgr_start_date
ProductX	1	Bellaire	5	Research	5	333445555	1988-05-22
ProductY	2	Sugarland	5	Administration	4	987654321	1995-01-01
ProductZ	3	Houston	5	Headquarters	1	888665555	1981-06-19
Computerization	10	Stafford	4				
Reorganization	20	Houston	1				
Newbenefits	30	Stafford	4				

DEPT_LOCATIONS	
Dnumber	Dlocation
1	Houston
4	Stafford
5	Bellaire
5	Sugarland
5	Houston

Assuming that all default values are NULL, are these legal INSERT statements?

```
INSERT INTO PROJECT(Pnumber,Plocation,Dnum)
SELECT * FROM DEPT_LOCATIONS
```



```
INSERT INTO PROJECT(Pnumber,Plocation,Dnum)
SELECT Dnumber+50,Dlocation,Dnumber FROM DEPT_LOCATIONS
```



Quiz

How many rows will be deleted?

```
DELETE FROM WORKS_ON
WHERE Hours < 10
```

```
DELETE FROM WORKS_ON W
WHERE NOT EXISTS ( SELECT *
FROM DEPENDENT D
WHERE D.Essn=W.Essn )
```

WORKS_ON		
Essn	Pno	Hours
123456789	1	32.5
123456789	2	7.5
666884444	3	40.0
453453453	1	20.0
453453453	2	20.0
333445555	2	10.0
333445555	3	10.0
333445555	10	10.0
333445555	20	10.0
999887777	30	30.0
999887777	10	10.0
987987987	10	35.0
987987987	30	5.0
987654321	30	20.0
987654321	20	15.0
888665555	20	NULL

DEPENDENT				
Essn	Dependent_name	Sex	Bdate	Relationship
333445555	Alice	F	1986-04-05	Daughter
333445555	Theodore	M	1983-10-25	Son
333445555	Joy	F	1958-05-03	Spouse
987654321	Abner	M	1942-02-28	Spouse
123456789	Michael	M	1988-01-04	Son
123456789	Alice	F	1988-12-30	Daughter
123456789	Elizabeth	F	1967-05-05	Spouse

Quiz

EMPLOYEE									
Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary	Super_ssn	Dno
John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000	333445555	5
Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000	888665555	5
Alicia	J	Zelaya	999887777	1968-01-19	3321 Castle, Spring, TX	F	25000	987654321	4
Jennifer	S	Wallace	987654321	1941-06-20	291 Berry, Bellaire, TX	F	43000	888665555	4
Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000	333445555	5
Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000	333445555	5
Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000	987654321	4
James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000	NULL	1

PROJECT			
Pname	Pnumber	Plocation	Dnum
ProductX	1	Bellaire	5
ProductY	2	Sugarland	5
ProductZ	3	Houston	5
Computerization	10	Stafford	4
Reorganization	20	Houston	1
Newbenefits	30	Stafford	4

How many rows will be updated?

```
UPDATE WORKS_ON W
SET Hours = NULL
WHERE NOT EXISTS ( SELECT *
FROM PROJECT P JOIN EMPLOYEE E
ON P.Dnum=E.Dno
WHERE W.Pno=P.Pnumber AND W.Essn=E.Ssn )
```

EXISTS is true if there are rows in the subquery result and false otherwise