

SQL = Structured Query Language

- ❖ SQL is specific to databases = 4GL
 - ◆ Data definition
 - ◆ Creates Database and Table Structures
 - ◆ Data manipulation
 - ◆ Data Select, Insert, Delete, and Update
 - ◆ Performs complex queries to transform data into useful information
- ❖ ANSI prescribes an SQL standard
 - ◆ Microsoft Access supports some but not all of the ANSI specification
 - ◆ Results in Syntax conflicts with book

Simple Database Example

- ❖ Each product is supplied by only a single vendor
- ❖ A vendor may supply many products
- ❖ Has *PRODUCT* and *VENDOR* tables
- ❖ Draw Entity Relationship Diagram



Data Dictionary

TABLE NAME	ATTRIBUTE NAME	CONTENTS	TYPE	FORMAT	RANGE	REQUIRED	PK OR FK	FK REFERENCED TABLE
PRODUCT	P_CODE	Product code	CHAR(10)	XXXXXXXXXX	NA	Y	PK	
	P_DESCRPT	Product description	VARCHAR(35)	XXXXXXXXXXXX	NA	Y		
	P_INDATE	Stocking date	DATE	DDMMYYYY	NA	Y		
	P_ONHAND	Units available	SMALLINT	#####	0-9999	Y		
	P_MIN	Minimum units	SMALLINT	#####	0-9999	Y		
	P_PRICE	Product price	NUMBER(8,2)	#####	000.9999.00	Y		
	P_DISCOLNT	Discount rate	NUMBER(4,2)	####	000.0.30	Y		
	V_CODE	Vendor code	INTEGER	###	100-999		FK	VENDOR
	V_CODE	Vendor code	INTEGER	#####	1000-9999	Y	PK	
	V_NAME	Vendor name	CHAR(35)	XXXXXXXXXXXXXX	NA	T		
V_CONTACT	Contact person	CHAR(25)	XXXXXXXXXXXXXX	NA	T			
V_AREACODE	Area code	CHAR(2)	##	NA	Y			
V_PHONE	Phone number	CHAR(8)	999-9999	NA	Y			
V_STATE	State	CHAR(2)	XX	NA	Y			
V_ORDER	Previous order	CHAR(1)	X	Y or N	Y			

FK = Foreign key
 PK = Primary key
 CHAR = Fixed character length data, 1 to 255 characters.
 VARCHAR = Variable character length data, 1 to 2,000 characters. May also be labeled VARCHAR2 in Oracle.
 NUMBER = Numeric data, NUMBER(9,2) is used to specify numbers with two decimal places and up to nine digits, including the decimal places. Some RDMSs permit the use of a MONEY or a CURRENCY data type.
 INT = Integer values only
 SMALLINT = Small integer values only

Enter Data Into Tables

VENDOR : Table									
V_CODE	V_NAME	V_CONTACT	V_AREACODE	V_PHONE	V_STATE	V_ORDER			
21225	Bryson, Inc.	Smithson	615	223-3234	TN	Y			
21226	SuperLoo, Inc.	Flushing	904	215-8995	FL	N			
21231	D&E Supply	Singh	615	228-3245	TN	Y			
21344	Gomez Bros.	Ortega	615	889-2546	KY	N			

PRODUCT : Table									
P_CODE	P_DESCRPT	P_INDATE	P_ONHAND	P_MIN	P_PRICE	P_DISCOUNT	V_CODE		
110ER31	Power painter, 15 psi., 3-nozzle	02-Dec-1996	8	5	\$109.99	0.00	25695		
13-02/P2	7.25-in. pwr. saw blade	12-Nov-1996	32	15	\$14.99	0.05	21344		
14-Q1A.3	9.00-in. pwr. saw blade	12-Nov-1996	18	12	\$17.49	0.00	21344		
1546-Q02	Hrd. cloth, 1/4-in., 2x50	14-Aug-1996	15	8	\$39.95	0.00	23119		
1558-QW1	Hrd. cloth, 1/2-in., 3x50	14-Aug-1996	23	5	\$43.99	0.00	23119		
2232/QTY	B&D jigsaw, 12-in. blade	29-Oct-1996	8	5	\$109.92	0.05	24288		
2232/QWE	B&D jigsaw, 8-in. blade	23-Sep-1996	6	5	\$99.87	0.05	24288		
2238/QPD	B&D cordless drill, 1/2-in.	19-Oct-1996	12	5	\$38.95	0.05	25595		
23109-HB	Claw hammer	19-Nov-1996	23	10	\$5.95	0.10	21225		
23114-AA	Sledge hammer, 12 lb.	01-Dec-1996	8	5	\$14.40	0.05	21225		
54778-2T	Rat-tail file, 1/8-in. fine	14-Jun-1996	43	20	\$4.99	0.00	21344		
89-WRE-Q	Hicut chain saw, 16 in.	06-Jul-1996	11	5	\$256.99	0.05	24288		
PVC23DR1	PVC pipe, 3.5-in., 8-ft	19-Dec-1996	188	75	\$5.87	0.00	21225		
SM-18277	1.25-in. metal screw, 25	28-Nov-1996	172	75	\$6.99	0.00	21225		
SW-23116	2.5-in. wd. screw, 50	23-Sep-1996	237	100	\$8.45	0.00	21231		
WR3/TT3	Steel matting, 4'x8'x1/8", .5" mesh	16-Nov-1996	18	5	\$119.95	0.10	25595		
			0	0	\$8.00	0.00			

Data Definition SQL Commands

- ❖ **Metadata**
 - ◆ Description of data properties and relationships described by data dictionary information
- ❖ **Data Definition SQL commands** describe the database structure or schema
 - ◆ DBMS creates tables using SQL commands
- ❖ **Database administrator** creates schema
 - ◆ Logical group of tables or logical database
 - ◆ Groups tables by owner
 - ◆ Enforces security

CREATE SCHEMA AUTHORIZATION <creator>
 Example:
 CREATE SCHEMA AUTHORIZATION JONES

MS Access Does Not Support

CREATE TABLE Statement (MS Access)

- ❖ **CREATE** a database **TABLE** (entity set)
- ❖ **PRIMARY KEY** is a **CONSTRAINT** and use an identifier
- ❖ For **Entity Integrity** to exist, table's **PRIMARY KEY** must have the integrity constraints **NOT NULL** and **UNIQUE**

```
CREATE TABLE VENDOR (
    V_CODE          INTEGER          NOT NULL    UNIQUE
    CONSTRAINT pkVENDOR PRIMARY KEY,
    V_NAME          TEXT(35)         NOT NULL,
    V_CONTACT       TEXT(15)        NOT NULL,
    V_AREACODE      TEXT(3)         NOT NULL,
    V_PHONE         TEXT(8)         NOT NULL,
    V_STATE         TEXT(2)         NOT NULL,
    V_ORDER         TEXT(1)         NOT NULL
);
```

MS Access Requires Here

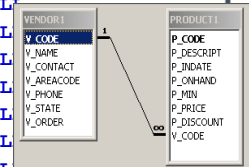
Access Supported Data Types and Syntax

Item	Synonyms	Description
TEXT (w)	CHAR (w) VARCHAR (w)	Stores alphanumeric text with field width (w). Limited to 255 character maximum. Each character requires 1 byte storage. No difference between CHAR and VARCHAR.
MEMO		Memo data type supports up to 65,535 characters. No field width is specified as allocated dynamically. No Synonyms.
INTEGER	INT	Stores 4-byte long integer (whole number) value with permissible range ±2 billion.
SMALLINT		Stores 2-byte integer (whole number) value with permissible range ±32,000.
BYTE		Stores 1-byte integer (whole number) value with permissible range +127 to -128.
SINGLE		Stores 4-byte floating point (real number) value with 6 significant digits accuracy.
DOUBLE	NUMBER	Stores 8-byte floating point (real number) value with 13 significant digits accuracy.
CURRENCY		Stores 8-byte currency value with 15 significant digits accuracy.
YESNO		Stores a Boolean true/false value.
DATETIME	DATE	Stores Date and Time in this field.

Connecting Tables with Foreign Keys

- ❖ Create only one table per query or MS Access "chokes"
- ❖ **FOREIGN KEY** is assigned as a **CONSTRAINT** which **REFERENCES** a field in the joined table.

```
CREATE TABLE PRODUCT (
    P_CODE          TEXT(10)        NOT NULL    UNIQUE
    CONSTRAINT pkProduct PRIMARY KEY,
    P_DESCRIPT     TEXT(35)        NOT NULL,
    P_INDATE       DATE            NOT NULL,
    P_ONHAND       SMALLINT        NOT NULL,
    P_MIN          SMALLINT        NOT NULL,
    P_PRICE        CURRENCY        NOT NULL,
    P_DISCOUNT   SINGLE          NOT NULL,
    V_CODE         INTEGER         NOT NULL
    CONSTRAINT fkVENDOR REFERENCES
    VENDOR1 (V_CODE)
);
```



SQL Data Management Commands

❖ Data Entry

INSERT INTO <table name> VALUES

❖ Deleting Table Rows

DELETE FROM PRODUCT WHERE

❖ Making a Changes to Data Items

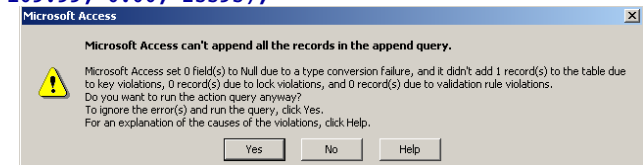
UPDATE PRODUCT

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Data Record (Tuple) - INSERT INTO

❖ Insert only one record per query or MS Access "chokes"

- ◆ **INSERT INTO VENDOR VALUES(21225, 'Bryson, Inc.', 'Smithson', '615','223-3234', 'TN', 'Y');**
- ◆ **INSERT INTO VENDOR VALUES(25595, 'Rubicon Sis.', 'Orton', '904','890-3529', 'TN', 'N');**
- ◆ **INSERT INTO PRODUCT VALUES('11 QER/31', 'Power painter, 15 psi., 3-nozzle', '07/02/1999', 8, 5, 109.99, 0.00, 25595);**



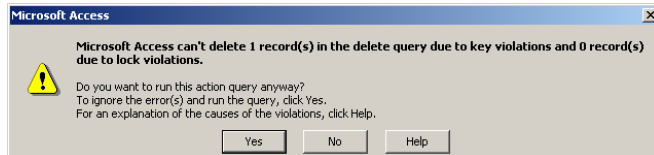
- ◆ **INSERT INTO VENDOR1 SELECT * FROM VENDOR;**
- ◆ **INSERT INTO PRODUCT SELECT * FROM PRODUCT;**

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Data Record (Tuple) - DELETE FROM

❖ DELETE record as specified in WHERE clause.

- ◆ **DELETE FROM VENDOR WHERE V_STATE='FL';**
- ◆ **DELETE FROM VENDOR WHERE V_STATE='KY' AND V_STATE='GA';**
- ◆ **DELETE FROM VENDOR WHERE V_STATE='KY' OR V_STATE='GA';**



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Data Record - UPDATE SET WHERE

❖ UPDATE items in WHERE clause to SET value.

- ◆ **UPDATE PRODUCT SET P_INDATE = '6/1/2001' WHERE P_CODE = '13-Q2/P2';**
- ◆ **UPDATE PRODUCT SET V_CODE = 23119 WHERE V_CODE = 24288;**

P_CODE	P_DESCRIPTION	P_INDATE	P_ONHAND	P_MIN	P_PRICE	P_DISCOUNT	V_CODE
11QER/31	Power painter, 15 psi., 3-nozzle	02-Dec-1996	8	5	\$109.99	0.00	25595
13-Q2/P2	7.25-in. pwr. saw blade	01-Jun-2001	32	15	\$14.99	0.05	21344
14-Q1/L3	9.00-in. pwr. saw blade	12-Nov-1996	18	12	\$17.49	0.00	21344
1546-Q02	Hrd. cloth, 1/4-in., 2x50	14-Aug-1996	15	8	\$39.95	0.00	23119
1558-QW1	Hrd. cloth, 1/2-in., 3x50	14-Aug-1996	23	5	\$43.99	0.00	23119
2232-QTY	B&D jigsaw, 12-in. blade	29-Oct-1996	8	5	\$109.92	0.05	23119
2232-QWE	B&D jigsaw, 8-in. blade	23-Sep-1996	6	5	\$99.87	0.05	23119
2238-QPD	B&D cordless drill, 1/2-in.	19-Oct-1996	12	5	\$38.95	0.05	25595
23109-HB	Claw hammer	19-Nov-1996	23	10	\$5.95	0.10	21225
23114-AA	Sledge hammer, 12 lb.	01-Dec-1996	8	5	\$14.40	0.05	
54778-2T	Rat-tail file, 1/8-in. fine	14-Jun-1996	43	20	\$4.99	0.00	21344
89-WRE-Q	Hicut chain saw, 16 in.	06-Jul-1996	11	5	\$256.99	0.05	23119
PVC23DRT	PVC pipe, 3.5-in., 8-ft	19-Dec-1996	188	75	\$5.87	0.00	
SM-18277	1.25-in. metal screw, 25	28-Nov-1996	172	75	\$6.99	0.00	21225
SW-23116	2.5-in. wd. screw, 50	23-Sep-1996	237	100	\$8.45	0.00	21231
WR3/TT3	Steel matting, 4'x8'x1/8", .5" mesh	16-Nov-1996	18	5	\$119.95	0.10	25595
*			0	0	\$0.00	0.00	

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