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I am setting up a department table named departmentwith that contains a primary key on the dept field.

```
SQL> create table departmentwith
2 (dept char(2) constraint dept_pk primary key,
3 deptname varchar2(15),
4 manager varchar2(15));
```

Table created.

```
SQL> desc departmentwith;
-----
Name                                         Null?    Type
-----
DEPT                                         NOT NULL CHAR(2)
DEPTNAME                                     VARCHAR2(15)
MANAGER                                     VARCHAR2(15)
```

I am setting up a inventory table called invenwith that contains a primary key on the itemno field and a foreign key on dept that references to the departmentwith table.

```
SQL> create table invenwith
2 (itemno varchar2(4) constraint itemno_pk primary key,
3 itemname varchar2(15),
4 onhand number(5),
5 onorder number(5),
6 reordpt number(5),
7 cost number(6,2),
8 price number(6,2),
9 dept char(2) constraint dept_fk references departmentwith(dept),
10 itemclass char(2),
11 location varchar2(4));
```

Table created.

```
SQL> desc invenwith;
-----
Name                                         Null?    Type
-----
ITEMNO                                       NOT NULL VARCHAR2(4)
ITEMNAME                                     VARCHAR2(15)
ONHAND                                       NUMBER(5)
ONORDER                                     NUMBER(5)
REORDPT                                     NUMBER(5)
COST                                         NUMBER(6,2)
PRICE                                       NUMBER(6,2)
DEPT                                         CHAR(2)
ITEMCLASS                                   CHAR(2)
LOCATION                                       VARCHAR2(4)
```

Handwritten notes:

- PK (next to itemno in the SQL code)
- dept fk (with an arrow pointing from dept in the invenwith table to dept in the departmentwith table)
- Itemno PK (with an arrow pointing to itemno in the invenwith table)
- Department (with an arrow pointing to dept in the departmentwith table)
- dept PK (with an arrow pointing to dept in the departmentwith table)

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link successfully. To fix this problem, I need to go to departmentwith and insert a record with a dept of BK that the BK in invenwith can link to.

```
SQL> insert into invenwith
  2 values
  3 ('1111','Ramona the
Pest',10,10,15,10.00,12.99,'BK','CH','Z200');
insert into invenwith
*
ERROR at line 1:
ORA-02291: integrity constraint (FGROCEER.DEPT_FK) violated - parent
key not
found

SQL> insert into departmentwith
  2 values ('BK','Books','Smith');

SQL> select * from departmentwith;

DE DEPTNAME      MANAGER
-----
BK Books        Smith

1 row created.

SQL> insert into invenwith
  2 values
  3 ('1111','Ramona the
Pest',10,10,15,10.00,12.99,'BK','CH','Z200');

1 row created.
SQL> set linesize 120
SQL> select * from invenwith;

ITEM ITEMNAME      ONHAND  ONORDER  REORDPT  COST
PRICE DE IT LOCA
-----
1111 Ramona the Pest      10      10      15      10
```

Because there is no BK entry in departmentwith the foreign key of dept from invenwith does not work. I had to go to departmentwith and insert the record with the primary key of BK.

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```
SQL> insert into invenwith
  2 values
  3 ('1111','Ramona the
Pest',10,10,15,10.00,12.99,'BK','CH','Z200');

1 row created.
SQL> set linesize 120
SQL> select * from invenwith;

ITEM ITEMNAME          ONHAND  ONORDER  REORDPT  COST
PRICE DE IT LOCA
-----
1111 Ramona the Pest      10       10       15       10
12.99 BK CH Z200

Now I am trying to insert a record with a duplicate primary key (and
also a duplicate dept) but it catches the primary key problem and
rejects.

SQL> insert into invenwith
  2 values
  3 ('1111', 'fudga-a-mania',8,5,15,9,11.95,'AA','CH','Z200');
```

```
insert into invenwith
*
ERROR at line 1:
ORA-00001: unique constraint (PGROCER.ITEMNO_PK) violated

Now I am inserting with a valid itemno but an invalid dept so it is
rejected.

SQL> insert into invenwith
  2 values
  3 ('1212', 'fudga-a-mania',8,5,15,9,11.95,'TY','CH','Z200');
insert into invenwith
*
ERROR at line 1:
ORA-02291: integrity constraint (PGROCER.DEPT_FK) violated - parent
key not found
```

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```
rejected.

SQL> insert into invenwith
  2 values
  3 ('1212', 'fudga-a-mania',8,5,15,9,11.95,'TY','CH','Z200');
insert into invenwith
*
ERROR at line 1:
ORA-02291: integrity constraint (PGROCER.DEPT_FK) violated - parent
key not found

SQL> insert into invenwith
  2 values
  3 ('1212', 'fudga-a-mania',8,5,15,9,11.95,'BK','CH','Z200');

1 row created.

SQL> select * from invenwith;

ITEM ITEMNAME          ONHAND  ONORDER  REORDPT    COST
PRICE DE IT LOCA
-----
1111 Ramona the Pest      10        10        15         10
12.99 BK CH Z200
1212 fudga-a-mania       8          5         15          9
11.95 BK CH Z200

Next I am showing that the constraints do exist. Notice the table
name has to be in capitals.

SQL> select constraint_name, column_name from user_cons_columns where
table_name = 'DEPARTMENTWITH';

CONSTRAINT_NAME
-----
COLUMN_NAME
-----
DEPT_PK
DEPT
```

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```
SQL> select constraint_name, column_name from user_cons_columns where table_name =
'INVENWITH';

CONSTRAINT_NAME
-----
COLUMN_NAME
-----

ITEMNO_PK
ITEMNO

DEPT_FK
DEPT

SQL> create table departmentwithbk as select * from departmentwith;

Table created.

SQL> create table invenwithbk as select * from invenwith;

Table created.

I can disable constraints that I have put on the table. Then I can
enable them.

SQL> desc invenwith;
Name Null? Type
-----
ITEMNO NOT NULL VARCHAR2(4)
ITEMNAME VARCHAR2(15)
ONHAND NUMBER(5)
ONORDER NUMBER(5)
REORDPT NUMBER(5)
COST NUMBER(6,2)
PRICE NUMBER(6,2)
DEPT CHAR(2)
ITEMCLASS CHAR(2)
LOCATION VARCHAR2(4)

SQL> alter table invenwith
  2 disable constraint itemno_pk;

Table altered.

SQL> desc invenwith;
Name Null? Type
-----
ITEMNO VARCHAR2(4)
ITEMNAME VARCHAR2(15)
ONHAND NUMBER(5)
ONORDER NUMBER(5)
REORDPT NUMBER(5)
COST NUMBER(6,2)
```

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COST	NUMBER (6, 2)
PRICE	NUMBER (6, 2)
DEPT	CHAR (2)
ITEMCLASS	CHAR (2)

LOCATION	VARCHAR2 (4)
----------	--------------

```
SQL> alter table departmentwith
2 disable constraint dept_pk cascade;

Table altered.

SQL> alter table departmentwith
2 enable constraint dept_pk;

Table altered.

SQL> alter table invenwith
2 enable constraint itemno_pk;

Table altered.

SQL> alter table invenwith
2 enable constraint dept_fk;

Table altered.

Now I am dropping the keys.

SQL> alter table departmentwith
2 drop primary key cascade;

Table altered.

SQL> select constraint_name, column_name from user_cons_columns where
table_name = 'DEPARTMENTWITH';

no rows selected

SQL> select constraint_name, column_name from user_cons_columns where
table_name = 'INVENWITH';
```

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```
Table altered.

SQL> alter table invenwith
  2  enable constraint dept_fk;

Table altered.

Now I am dropping the keys.

SQL> alter table departmentwith
  2  drop primary key cascade;

Table altered.

SQL> select constraint_name, column_name from user_cons_columns where
table_name = 'DEPARTMENTWITH';

no rows selected

SQL> select constraint_name, column_name from user_cons_columns where
table_name = 'INVENWITH';

CONSTRAINT_NAME
-----
COLUMN_NAME
-----
ITEMNO_PK
ITEMNO

SQL> alter table invenwith
  2  drop primary key;

Table altered.

SQL> select constraint_name, column_name from user_cons_columns where
table_name = 'INVENWITH';

no rows selected
```

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Now that I have dropped the keys I have two existing tables with no keys. I want to alter the tables to have my primary and foreign keys.

```
SQL> alter table departmentwith
  2 add constraint dept_pk primary key(dept);
```

Table altered.

```
SQL> alter table invenwith
  2 add constraint itemno_pk primary key (itemno);
```

Table altered.

```
SQL> alter table invenwith
  2 add constraint dept_fk foreign key(dept) references departmentwith;
```

Table altered.

```
SQL> select constraint_name, column_name from user_cons_columns where table_name =
'DEPARTMENTWITH';
```

CONSTRAINT_NAME	COLUMN_NAME
DEPT_PK	DEPT

```
SQL> select constraint_name, column_name from user_cons_columns where table_name =
'INVENWITH';
```

CONSTRAINT_NAME	COLUMN_NAME
ITEMNO_PK	ITEMNO
DEPT_FK	DEPT

Now I am going to add a check constraint that will not accept a price out of the range of > 5 and < 500. I try to insert a record. The first error was not planned,

Handwritten notes:

- ①
- ②
- Handwritten diagram: Invenwith / Itemno PK → dept PK. Above dept is written "with department".

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DEPT

Now I am going to add a check constraint that will not accept a price out of the range of > 5 and < 500. I try to insert a record. The first error was not planned,

my itemname was too long. The second error was planned. It had a price of 4 which is out of range. Finally I entered a price within range and the record got added.

```
SQL> alter table invenwith
  2 add constraint valid_price_ck CHECK (price > 5 and price < 500);

Table altered.

SQL> insert into invenwith
  2 values
  3 ('2222','Trials of Apollo',4,4,10,10,4,'BK','TN','Z300');
('2222','Trials of Apollo',4,4,10,10,4,'BK','TN','Z300')
*
```

price

```
ERROR at line 3:
ORA-12899: value too large for column "PGROCER"."INVENWITH"."ITEMNAME" (actual: 16,
maximum: 15)

SQL> insert into invenwith
  2 values
  3 ('2222','Trials Apollo',4,4,10,10,4,'BK','TN','Z300');
insert into invenwith
*
```

```
ERROR at line 1:
ORA-02290: check constraint (PGROCER.VALID_PRICE_CK) violated

SQL> insert into invenwith
  2 values
  3 ('2222','Trials Apollo',4,4,10,10,14.99,'BK','TN','Z300');

1 row created.

SQL> select * from invenwith;
```

ITEM	ITEMNAME	ONHAND	ONORDER	REORDPT	COST	PRICE	DE	IT
1111	Ramona the Pest	10	10	15	10	12.99	BK	CH
1212	fudga-a-mania	8	5	15	9	11.95	BK	CH

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```
Now I am going to experiment with the unique constraint and the not null constraints.

SQL> alter table departmentwith
  2 add constraint dept_uk unique(deptname);

Table altered.

SQL> select * from departmentwith;

DE DEPTNAME      MANAGER
-----
BK Books         Smith

SQL> insert into departmentwith
  2 values ('TN','Books','Warren');
insert into departmentwith
*
ERROR at line 1:
ORA-00001: unique constraint (PGROCER.DEPT_UK) violated

SQL> insert into departmentwith
  2 values ('TN','Teen Books','Warren');

1 row created.

SQL> select * from departmentwith;

DE DEPTNAME      MANAGER
-----
BK Books         Smith
TN Teen Books    Warren

SQL> alter table departmentwith
  2 modify (constraint mang_n1 manager not null);

Table altered.

SQL> insert into departmentwith
  2 values ('BY','Baby',null);
values ('BY','Baby',null)
*
ERROR at line 2:
ORA-01400: cannot insert NULL into ("PGROCER"."DEPARTMENTWITH"."MANAGER")
```

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```
ORA-00001: unique constraint (PGROCER.DEPT_UK) violated

SQL> insert into departmentwith
  2 values ('TN','Teen Books','Warren');

1 row created.

SQL> select * from departmentwith;

DE DEPTNAME      MANAGER
-----
BK Books         Smith
TN Teen Books    Warren

SQL> alter table departmentwith
  2 modify (constraint mang_n1 manager not null);

Table altered.

SQL> insert into departmentwith
  2 values ('BY','Baby',null);
values ('BY','Baby',null)
                *
ERROR at line 2:
ORA-01400: cannot insert NULL into ("PGROCER"."DEPARTMENTWITH"."MANAGER")

SQL> insert into departmentwith
  2 values ('BY','Baby','Costa');

1 row created.
```

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Introduction to Indexes

www.pgrocer.net/Cis50/oraindex.html

Indexes in Oracle - An Introduction

If an index has been established and the SQL statement is setup to take advantage of the index, the index will be searched first and the access time will probably be noticeably lower if you are dealing with a large database. Without an index Oracle does a full table search examining every row. Oracle is actively involved in using indexes to satisfy queries and examines the query to determine what indexes it will use.

In Oracle, indexes are grouped with the concept of constraints. There are two major categories of constraints: integrity constraints that refer to the key fields and value constraints that deal with data entered into a column. A constraint is used to protect the validity of data in one or multiple tables and prevent invalid entries. Specifically, constraints enforce certain rules dealing with a table or a column of that table and can be used to prevent the deletion of a table that has children or dependencies. Indexes as constraints are making sure that the primary key field is unique and that the connection through a foreign key is valid.

The constraints that we will look at are shown in the table below.

Constraint	Processing
CHECK	Allows the specification of a condition on the data
FOREIGN KEY	Key used in the relationship of two tables
PRIMARY KEY	Unique key to each row in the table - uniquely identifies row
NOT NULL	Column must not be null
UNIQUE	Column(s) that must be unique for each row in the table

Smith →

Jones	X
North	X

Very primitive discussion of index.

When the programmer is using constraints, they have the option of naming them (then the name can be meaningful) or having the system generate a name with the SYS-Cn format. Constraints can be part of the process to create a table or they can be done as maintenance of the table. Since constraints can be on a column or on a table they can be defined at either level. If you want to see the constraints that have been assigned to a particular table do a SELECT from the USER_CONSTRAINTS data dictionary table.

To see all tables use:

```
SELECT * FROM USER_CONSTRAINTS;
```

To see a specific table, use:

```
SELECT * FROM USER_CONSTRAINTS WHERE TABLE_NAME = 'DONOR';
```

In the example below, I have defined one field as a primary key and put a check constraint on another.

SQL CODE:

```
1 CREATE TABLE TRYKEY1
2 (idno NUMBER(3) CONSTRAINT idno_pk PRIMARY KEY,
3 name VARCHAR2(20),
4* deptno NUMBER(2) CONSTRAINT valid_dept_ch CHECK (deptno > 0 AND deptno < 20))
SQL> /
```

Table created.

I am now inserting data into the table and making some errors to correspond to the constraints that I put in the table. The first row was inserted with no problems. In the second example, I tried to put in a row with a duplicate of the idno in the first row. An error occurred because of idno_pk. In the next example, I violated the deptno check and got an error on that constraint entitled valid_dept_ch. Notice that when I do a DESC on the table, the idno is described as NOT NULL. This is because a primary key can not contain a null value.

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taoie.

To see all tables use:

```
SELECT * FROM USER_CONSTRAINTS;
```

To see a specific table, use:

```
SELECT * FROM USER_CONSTRAINTS WHERE TABLE_NAME = 'DONOR';
```

In the example below, I have defined one field as a primary key and put a check constraint on another.

SQL CODE:

```
1 CREATE TABLE TRYKEY1
2 (idno NUMBER(3) CONSTRAINT idno_pk PRIMARY KEY,
3 name VARCHAR2(20),
4* deptno NUMBER(2) CONSTRAINT valid_dept_ch CHECK (deptno > 0 AND deptno < 20))
SQL> /
```

Table created.

I am now inserting data into the table and making some errors to correspond to the constraints that I put in the table. The first row was inserted with no problems. In the second example, I tried to put in a row with a duplicate of the idno in the first row. An error occurred because of idno_pk. In the next example, I violated the deptno check and got an error on that constraint entitled valid_dept_ch. Notice that when I do a DESC on the table, the idno is described as NOT NULL. This is because a primary key can not contain a null value.

SQL CODE:

```
SQL> INSERT INTO TRYKEY1
2 VALUES(111, 'Susan Smith', 12);
```

1 row created.

```
SQL> INSERT INTO TRYKEY1
2 VALUES (111, 'David Johnson', 10);
VALUES (111, 'David Johnson', 10)
*
```

ERROR at line 2:
ORA-00001: unique constraint (SCOTT.IDNO_PK) violated

```
SQL> INSERT INTO TRYKEY1
2 VALUES (222, 'Josh Anderson', 24);
VALUES (222, 'Josh Anderson', 24)
*
```

ERROR at line 2:
ORA-02290: check constraint (SCOTT.VALID_DEPT_CH) violated

```
SQL> SELECT * FROM trykey1;
```

IDNO	NAME	DEPTNO
111	Susan Smith	12

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ERROR at line 1:
ORA-01400: mandatory (NOT NULL) column is missing or NULL during insert

I have created a table named nameadr1 that has no indexes. Now I want to index the table so I am creating three indexes. One on idno_na, one on last_na and first_na and another on salary_na descending. This is done with CREATE INDEX. If you decide you do not want an index, you can drop it with DROP INDEX.

SQL CODE:

```
SQL> CREATE TABLE nameadr1
2 (idno_na NUMBER(3),
3 last_na VARCHAR2(12),
4 first_na VARCHAR2(10),
5 salary_na NUMBER(8,2),
6 npaycode NUMBER(2));

Table created.

SQL> DESC nameadr1;
-----
Name                               Null?    Type
-----
IDNO_NA                             NUMBER(3)
LAST_NA                              VARCHAR2(12)
FIRST_NA                             VARCHAR2(10)
SALARY_NA                            NUMBER(8,2)
NPAYCODE                             NUMBER(2)

SQL> CREATE INDEX idno_index ON nameadr1(idno_na);

Index created.

1* CREATE INDEX name_index ON nameadr1(last_na,first_na)
SQL> /

Index created.

SQL> CREATE INDEX sal_index ON nameadr1(salary_na desc);

Index created.

SQL> DROP INDEX idno_index;

Index dropped.
```

Now that I dropped the ordinary index on idno, I am going to make it the primary key. This is done with the ALTER and the command ADD PRIMARY KEY with the key in parenthesis. If you want to add a foreign key, it is also done with the ALTER. First, I tried to create the foreign key without creating the table that I needed to relate into. Because I must reference the secondary table in the creation of the foreign key, Oracle was aware that the secondary table did not exist and denied the request. I then created the secondary table without giving it a primary key, used the ALTER to make the primary key and then went back to the main table and created the FOREIGN KEY.

SQL CODE:

```
SQL> ALTER TABLE nameadr1
```

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SMART Ink

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```
SQL> CREATE INDEX sal_index ON nameadr1(salary_na desc);
Index created.
SQL> DROP INDEX idno_index;
Index dropped.
```

Now that I dropped the ordinary index on idno, I am going to make it the primary key. This is done with the ALTER and the command ADD PRIMARY KEY with the key in parenthesis. If you want to add a foreign key, it is also done with the ALTER. First, I tried to create the foreign key without creating the table that I needed to relate into. Because I must reference the secondary table in the creation of the foreign key, Oracle was aware that the secondary table did not exist and denied the request. I then created the secondary table without giving it a primary key, used the ALTER to make the primary key and then went back to the main table and created the FOREIGN KEY.

SQL CODE:

```
SQL> ALTER TABLE nameadr1
  2 ADD PRIMARY KEY(idno_na);
Table altered.
SQL> DESC nameadr1;
Name                               Null?    Type
-----
IDNO_NA                             NOT NULL NUMBER(3)
LAST_NA                              VARCHAR2(12)
FIRST_NA                              VARCHAR2(10)
SALARY_NA                             NUMBER(8,2)
NPAYCODE                              NUMBER(2)
```

```
SQL> ALTER TABLE nameadr1
  2 ADD FOREIGN KEY (npaycode) REFERENCES pay1;
ADD FOREIGN KEY (npaycode) REFERENCES pay1
*
ERROR at line 2:
ORA-00942: table or view does not exist
```

```
SQL> CREATE TABLE pay1
  2 (paycode NUMBER(2), jobname VARCHAR2(15));
Table created.
SQL> DESC pay1;
Name                               Null?    Type
-----
PAYCODE                              NUMBER(2)
JOBNAME                              VARCHAR2(15)
```

```
SQL> ALTER TABLE pay1
  2 ADD PRIMARY KEY (paycode);
Table altered.
SQL> ALTER TABLE nameadr1
  2 ADD FOREIGN KEY (npaycode) REFERENCES pay1;
Table altered.
```

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```
SQL> desc donationz;
Name                               Null?    Type
-----
IDNO                                VARCHAR2(5)
DRIVENO                             VARCHAR2(3)
CONTDATE                             DATE
CONTAMT                              NUMBER(6,2)

SQL> alter table donationz
  2 add constraint idnodrivenocontdate_pk primary key (idno, driveno, contdate);
Table altered.

SQL> desc donationz;
Name                               Null?    Type
-----
IDNO                                NOT NULL VARCHAR2(5)
DRIVENO                             NOT NULL VARCHAR2(3)
CONTDATE                             NOT NULL DATE
CONTAMT                              NUMBER(6,2)
```

```
SQL> desc drivez;
Name                               Null?    Type
-----
DRIVENO                             VARCHAR2(3)
DRIVENAME                           VARCHAR2(15)
DRIVECHAIR                           VARCHAR2(12)
LASTYEAR                             NUMBER(8,2)
THISYEAR                             NUMBER(8,2)

SQL> alter table drivez
  2 add constraint drivenoz_pk primary key (driveno);
Table altered.

SQL> desc drivez;
Name                               Null?    Type
-----
DRIVENO                             NOT NULL VARCHAR2(3)
DRIVENAME                           VARCHAR2(15)
DRIVECHAIR                           VARCHAR2(12)
LASTYEAR                             NUMBER(8,2)
THISYEAR                             NUMBER(8,2)

SQL> alter table donationz
  2 add constraint drivenoz_fk foreign key(driveno) references drivez;
Table altered.
```

donor
idno PK

drive
driveno PK

donation
idno
driveno
contdate) PK

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Using subqueries and alternatives:

These accomplish the same thing:

```
SQL> select driveno, drivename
2 from driveF19
3 where drivename = ANY
4 (select drivename
5 from driveF19);
```

```
DRI DRIVENAME
-----
100 Kids Shelter
200 Animal Home
300 Health Aid
400 Half Way
```

```
SQL> select driveno, drivename
2 from driveF19
3 where drivename = ANY
4 ('Kids Shelter', 'Animal Home', 'Health Aid', 'Half
Way');
```

```
DRI DRIVENAME
-----
100 Kids Shelter
200 Animal Home
300 Health Aid
400 Half Way
```

These also accomplish the same thing:

```
SQL> select driveno, contant, idno
```

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```
DRI SUM(CONTAMT)
---
200 260

something else
SQL> select driveno, sum(contamt)
2 from donationF19
3 where contamt > 20
4 group by driveno
5 having driveno =
6 (select driveno
7 from driveF19
8 where drivename = 'Kids Shelter');

DRI SUM(CONTAMT)
---
100 25
```

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```
SQL> edit
Wrote file afiedt.buf

1 select driveno, sum(contamt)
2 from donation
3 group by driveno
4 having driveno =
5     (select driveno
6      from drive
7*   where drivename = 'Animal Home')
SQL>
SQL>
SQL> /

DRI SUM(CONTAMT)
-----
200 260

SQL> select donationF19.driveno, sum(contamt)
2 from donationF19, driveF19
3 where donationF19.driveno = driveF19.driveno and drivename =
'Animal Home'
4 group by donationF19.driveno;

DRI SUM(CONTAMT)
-----
200 260
```

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A Subquery example that I cannot think of a reasonable alternative to:

```
SQL> edit
Wrote file afiedt.buf

 1 select idno, name, state, yrgoal
 2 from donor
 3 where yrgoal >
 4 (select yrgoal
 5   from donor
 6   where name = 'Susan Ash')
 7* and state = 'MA'
SQL> /
```

IDNO	NAME	ST	YRGOAL
11111	Stephen Daniels	MA	500


```
33333 Nancy Taylor MA 150

SQL> select name, yrgoal from donor;
```

NAME	YRGOAL
Stephen Daniels	500
Jennifer Ames	400
Carl Hersey	
Susan Ash	100
Nancy Taylor	150
Robert Brooks	50

```
SQL> edit
```

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100 KIDS SHELTER
200 Animal Home
300 Health Aid
400 Half Way

These also accomplish the same thing:

```
SQL> select driveno, contamt, idno
  2  from donationF19
  3  where driveno IN
  4  (select driveno
  5  from driveF19
  6  where drivename = 'Animal Home');
```

DRI	CONTAMT	IDNO
200	120	12121
200	100	11111
200	40	12121

```
SQL> select donationF19.driveno, contamt, idno
  2  from donationF19, driveF19
  3  where donationF19.driveno = driveF19.driveno and
  drivename = 'Animal Home';
```

DRI	CONTAMT	IDNO
200	40	12121
200	100	11111
200	120	12121

A Subquery example that I cannot think of a reasonable alternative to:

```
SQL> edit
```

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```
2 sal between losal and hisal) as grade from emp;
```

EMPNO	ENAME	SAL	GRADE
7369	SMITH	800	1
7499	ALLEN	1600	3
7521	WARD	1250	2
7566	JONES	2975	4
7654	MARTIN	1250	2
7698	BLAKE	2850	4
7782	CLARK	2450	4
7788	SCOTT	3000	4
7839	KING	5000	5
7844	TURNER	1500	3
7876	ADAMS	1100	1

EMPNO	ENAME	SAL	GRADE
7900	JAMES	950	1
7902	FORD	3000	4
7934	MILLER	1300	2

14 rows selected.

```
SQL> select deptno, avg(sal) from emp
2 group by deptno having avg(sal) >
3 (select max(sal) - 1000 from emp where deptno = 20);
```

DEPTNO	AVG(SAL)
20	2175
10	2916.66667

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