Murach Chapter 10 Part 2

How to Work with Tables

Week 6

Knowledge Points in this lecture

- Create table with Foreign Key constraints
- Create table with Check constraints
- Add/Drop/Modify column definitions using ALTER TABLE
- Change the constraints using ALTER TABLE
  - Add/Drop/Modify Check Constraints
  - Add/Drop/Modify constraints: foreign key, not null, unique
- Rename a table
- Truncate a table
- Drop a table
- Script to create tables in AP user
- View columns and constraints in a table in SQL Developer

The syntax of a column-level foreign key constraint

```
[CONSTRAINT constraint_name]
  REFERENCES table_name (column_name)
  [ON DELETE {CASCADE|SET NULL}]
```

The syntax of a table-level foreign key constraint

```
[CONSTRAINT constraint_name]
  FOREIGN KEY (column_name_1 [, column_name_2]...)
  REFERENCES table_name (column_name_1
                         [, column_name_2]...)
  [ON DELETE {CASCADE|SET NULL}]
```

[A]: A is optional
{A | B}: choice of A or B

A table with a column-level foreign key constraint

```
CREATE TABLE invoices
(
  invoice_id      NUMBER    PRIMARY KEY,
  vendor_id       NUMBER    REFERENCES vendors (vendor_id),
  invoice_number VARCHAR2(50) NOT NULL     UNIQUE
)
```

A table with a table-level foreign key constraint

```
CREATE TABLE invoices
(
  invoice_id        NUMBER           NOT NULL,
  vendor_id         NUMBER           NOT NULL,
  invoice_number    VARCHAR2(50)     NOT NULL    UNIQUE,
  CONSTRAINT invoices_pk
    PRIMARY KEY (invoice_id),
  CONSTRAINT invoices_fk_vendors
    FOREIGN KEY (vendor_id)
        REFERENCES vendors (vendor_id)
)
```

An INSERT statement that fails because a related row doesn't exist

```
INSERT INTO invoices
VALUES (1, 1, '1')
```

The response from the system

```
SQL Error: ORA-02291: integrity constraint
(EX.INVOICES_FK_VENDORS) violated - parent key not found
*Cause:    A foreign key value has no matching
           primary key value.
*Action:   Delete the foreign key or add a matching
           primary key.
```

A constraint that uses the ON DELETE clause

```
CONSTRAINT invoices_fk_vendors
  FOREIGN KEY (vendor_id) REFERENCES vendors (vendor_id)
  ON DELETE CASCADE
```

ON DELETE CASCADE:
Deleting a vendor automatically deletes all of its invoices.

The syntax of a check constraint

```
[CONSTRAINT constraint_name] CHECK (condition)
```

[A]: A is optional

A statement with check constraints

```
CREATE TABLE invoices
(
  invoice_id        NUMBER           PRIMARY KEY,
  invoice_total     NUMBER(9,2)      NOT NULL
                    CHECK (invoice_total >= 0),
  payment_total     NUMBER(9,2)      DEFAULT 0
                    CHECK (payment_total >= 0)
)
```

A statement with table-level check constraints

```
CREATE TABLE invoices
(
  invoice_id        NUMBER          PRIMARY KEY,
  invoice_total     NUMBER(9,2)     NOT NULL,
  payment_total     NUMBER(9,2)     DEFAULT 0,
  CONSTRAINT invoices_ck CHECK (invoice_total >= 0
                                AND payment_total >= 0)
)
```

An INSERT statement that fails due to a check constraint

```
INSERT INTO invoices
VALUES (1, 99.99, -10)
```

The response from the system

```
SQL Error: ORA-02290: check constraint (EX.INVOICES_CK)
violated 02290. 00000 -  "check constraint (%s.%s)
violated"
*Cause:    The values being inserted do not satisfy the
           named check
*Action:   do not insert values that violate the
           constraint.
```

The syntax for modifying the columns of a table

```
ALTER TABLE [schema_name.]table_name
{
ADD          column_name data_type [column_attributes] |
DROP COLUMN column_name |
MODIFY       column_name data_type [column_attributes]
}
```

[A]: A is optional
{A|B}: A or B

A statement that adds a new column

```
ALTER TABLE vendors
ADD last_transaction_date DATE;
```

A statement that drops a column

```
ALTER TABLE vendors
DROP COLUMN last_transaction_date;
```

Cannot drop certain columns.

- Example: primary key column(s)

A statement that changes the length of a column

```
ALTER TABLE vendors
MODIFY vendor_name VARCHAR2(100); --old: VARCHAR2(50)
```

A statement that changes the type of a column

```
ALTER TABLE vendors
MODIFY vendor_name CHAR(100);  --old: VARCHAR2
```

A statement that changes a default value

```
ALTER TABLE vendors
MODIFY vendor_name DEFAULT 'New Vendor';
```

A statement that fails because it would lose data

```
ALTER TABLE vendors
MODIFY vendor_name VARCHAR2(10); --old: VARCHAR2(50)
```

The response from the system

```
SQL Error: ORA-01441: cannot decrease column
length because some value is too big
```

Warning

- You should never alter a table or other database object in a **production database** without consulting the DBA.

The syntax for modifying the constraints of a table

```
ALTER TABLE table_name
{
ADD       CONSTRAINT  constraint_name
                      constraint_definition [DISABLE] |
DROP      CONSTRAINT  constraint_name |
ENABLE  [NOVALIDATE]  constraint_name |
DISABLE               constraint_name
}
```

Constraint status:

- Disabled - does not apply to (existing and new) data.
- Enabled no-validated – apply only to new data
- Enabled validated – apply to both new and existing data
  - Default status for a new constraint
  - If existing data violates the constraint, its status canNOT be changed to “Enabled validated”

A statement that adds a new check constraint

```
ALTER TABLE invoices
ADD CONSTRAINT invoice_total_ck
        CHECK (invoice_total >= 0);
```

A statement that drops a check constraint

```
ALTER TABLE invoices
DROP CONSTRAINT invoice_total_ck;
```

A statement that adds a disabled constraint

```
ALTER TABLE invoices
ADD CONSTRAINT invoice_total_ck
        CHECK (invoice_total >= 1) DISABLE;
```

A statement that enables a constraint for new values only

```
ALTER TABLE invoices
ENABLE NOVALIDATE CONSTRAINT invoice_total_ck;
```

A statement that disables a constraint

```
ALTER TABLE invoices
DISABLE CONSTRAINT invoice_total_ck;
```

A statement that adds a foreign key constraint

```
ALTER TABLE invoices
ADD CONSTRAINT invoices_fk_vendors
FOREIGN KEY (vendor_id) REFERENCES vendors (vendor_id);
```

A statement that adds a unique constraint

```
ALTER TABLE vendors
ADD CONSTRAINT vendors_vendor_name_uq
UNIQUE (vendor_name);
```

A statement that adds a not null constraint

```
ALTER TABLE vendors
MODIFY vendor_name
CONSTRAINT vendors_vendor_name_nn NOT NULL;
```

How Oracle handles new constraints

- By default, Oracle verifies that existing data satisfies a new constraint.
- If that's not what you want, you can add a disabled constraint or enabled but novalidated constraint.

A statement that renames a table

```
RENAME vendors TO vendor
```

A statement that deletes all data from a table

```
TRUNCATE TABLE vendor
```

A statement that deletes a table from the current schema

```
DROP TABLE vendor
```

A statement that qualifies the table to be deleted

```
DROP TABLE ex.vendor
```

DROP TABLE, TRUNCATE TABLE, DELETE

- DELETE FROM tablename
  - Remove only the data in the named table
- TRUCATE TABLE tablename
  - Remove all data in the named table
  - Shrink the storage space
- DROP TABLE tablename
  - Remove all data in the named table
  - Release all storage space allocated to the named table
  - Remove the definition of the named table

Notes for creating tables in a script

- You must create the tables that don't have foreign keys first.
  - First create tables that are parent tables on which other tables (child tables) depend through foreign key constraints.
  - Tables that are not related to any other table can be created in any order.
- When you drop tables, you start by dropping the last table that was created and then work back to the first table that was created.
  - Drop child tables before parent tables

The script that creates the AP schema

```
CREATE TABLE general_ledger_accounts
(
  account_number         NUMBER           NOT NULL,
  account_description    VARCHAR2(50)     NOT NULL,
  CONSTRAINT gl_accounts_pk
    PRIMARY KEY (account_number),
  CONSTRAINT gl_account_description_uq
    UNIQUE (account_description)
);
```

The script that creates the AP schema (continued)

```
CREATE TABLE terms
(
  terms_id                NUMBER          NOT NULL,
  terms_description       VARCHAR2(50)    NOT NULL,
  terms_due_days          NUMBER          NOT NULL,
  CONSTRAINT terms_pk
    PRIMARY KEY (terms_id)
);
```

The script that creates the AP schema (continued)

```
CREATE TABLE vendors
(
  vendor_id                 NUMBER          NOT NULL,
  vendor_name               VARCHAR2(50)    NOT NULL,
  vendor_address1           VARCHAR2(50),
  vendor_address2           VARCHAR2(50),
  vendor_city               VARCHAR2(50)    NOT NULL,
  vendor_state              CHAR(2)         NOT NULL,
  vendor_zip_code           VARCHAR2(20)    NOT NULL,
  vendor_phone              VARCHAR2(50),
  vendor_contact_last_name  VARCHAR2(50),
  vendor_contact_first_name VARCHAR2(50),
```

The script that creates the AP schema (continued)

```
    default_terms_id              NUMBER          NOT NULL,
    default_account_number        NUMBER          NOT NULL,
    CONSTRAINT vendors_pk
      PRIMARY KEY (vendor_id),
    CONSTRAINT vendors_vendor_name_uq
      UNIQUE (vendor_name),
    CONSTRAINT vendors_fk_terms
      FOREIGN KEY (default_terms_id)
      REFERENCES terms (terms_id),
    CONSTRAINT vendors_fk_accounts
      FOREIGN KEY (default_account_number)
      REFERENCES general_ledger_accounts (account_number)
);
```

Table vendors is a child table of table terms and table general_ledger_accounts

The script that creates the AP schema (continued)

```
CREATE TABLE invoices
(
  invoice_id          NUMBER          NOT NULL,
  vendor_id           NUMBER          NOT NULL,
  invoice_number      VARCHAR2(50)    NOT NULL,
  invoice_date        DATE            NOT NULL,
  invoice_total       NUMBER(9,2)     NOT NULL,
  payment_total       NUMBER(9,2)                 DEFAULT 0,
  credit_total        NUMBER(9,2)                 DEFAULT 0,
  terms_id            NUMBER          NOT NULL,
  invoice_due_date    DATE            NOT NULL,
  payment_date        DATE,
```

The script that creates the AP schema (continued)

```
    CONSTRAINT invoices_pk
      PRIMARY KEY (invoice_id),
    CONSTRAINT invoices_fk_vendors
      FOREIGN KEY (vendor_id)
      REFERENCES vendors (vendor_id),
    CONSTRAINT invoices_fk_terms
      FOREIGN KEY (terms_id)
      REFERENCES terms (terms_id)
);
```

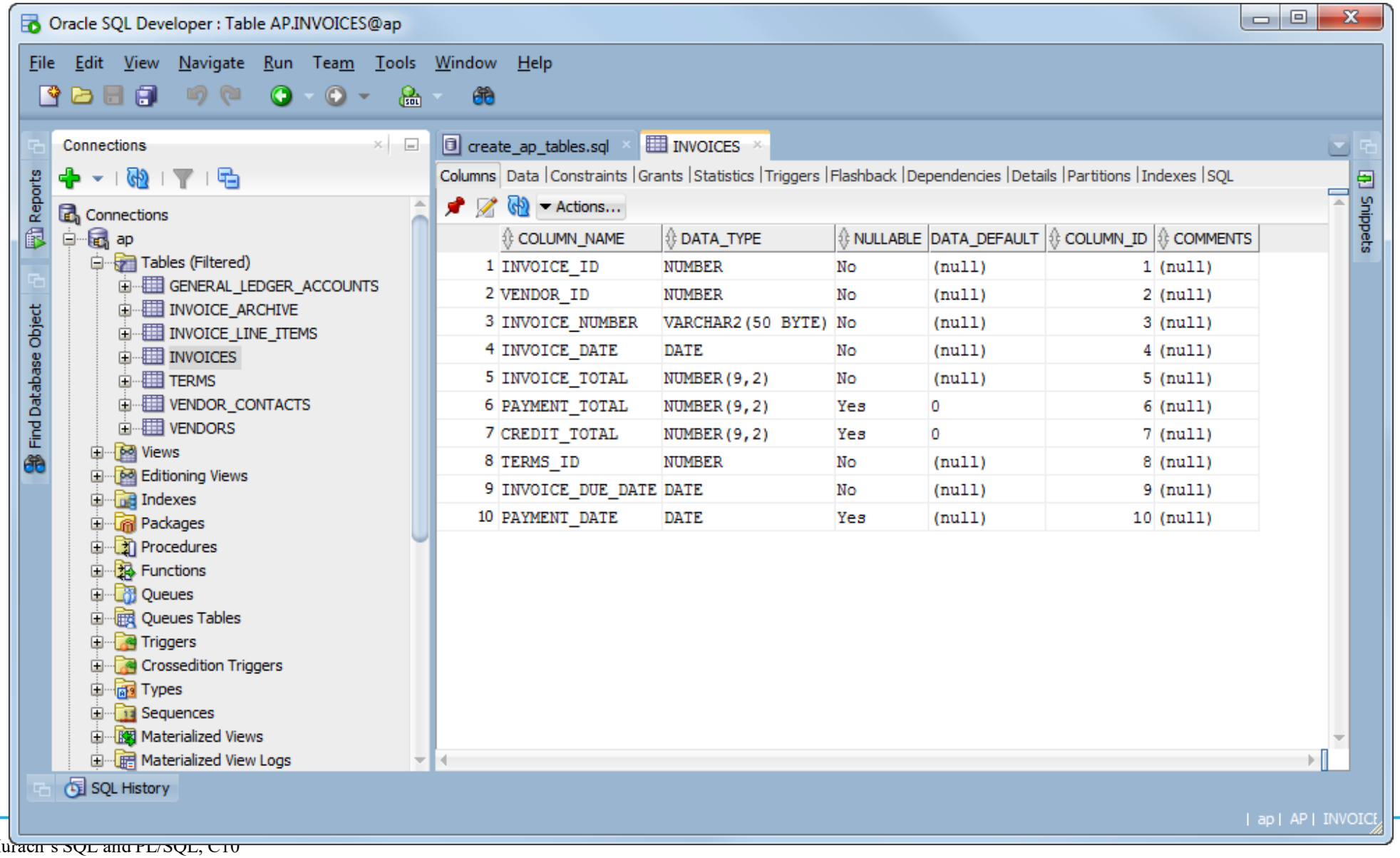
Table invoices is a child table of table vendors and table terms

The script that creates the AP schema (continued)

```
CREATE TABLE invoice_line_items
(
  invoice_id                NUMBER          NOT NULL,
  invoice_sequence          NUMBER          NOT NULL,
  account_number            NUMBER          NOT NULL,
  line_item_amt             NUMBER(9,2)     NOT NULL,
  line_item_description     VARCHAR2(100)   NOT NULL,
  CONSTRAINT line_items_pk
    PRIMARY KEY (invoice_id, invoice_sequence),
  CONSTRAINT line_items_fk_invoices
    FOREIGN KEY (invoice_id)
      REFERENCES invoices (invoice_id),
  CONSTRAINT line_items_fk_acounts
    FOREIGN KEY (account_number)
      REFERENCES general_ledger_accounts (account_number)
);
```

Table invoice_line_items is a child table of table invoices and table general_ledger_accounts

The column definitions for the Invoices table



	COLUMN_NAME	DATA_TYPE	NULLABLE	DATA_DEFAULT	COLUMN_ID	COMMENTS
1	INVOICE_ID	NUMBER	No	(null)	1	(null)
2	VENDOR_ID	NUMBER	No	(null)	2	(null)
3	INVOICE_NUMBER	VARCHAR2(50 BYTE)	No	(null)	3	(null)
4	INVOICE_DATE	DATE	No	(null)	4	(null)
5	INVOICE_TOTAL	NUMBER(9,2)	No	(null)	5	(null)
6	PAYMENT_TOTAL	NUMBER(9,2)	Yes	0	6	(null)
7	CREDIT_TOTAL	NUMBER(9,2)	Yes	0	7	(null)
8	TERMS_ID	NUMBER	No	(null)	8	(null)
9	INVOICE_DUE_DATE	DATE	No	(null)	9	(null)
10	PAYMENT_DATE	DATE	Yes	(null)	10	(null)

The constraints for the Invoices table