

Welcome to Lesson 4 of Module 3 on the relational data model and the CREATE TABLE statement

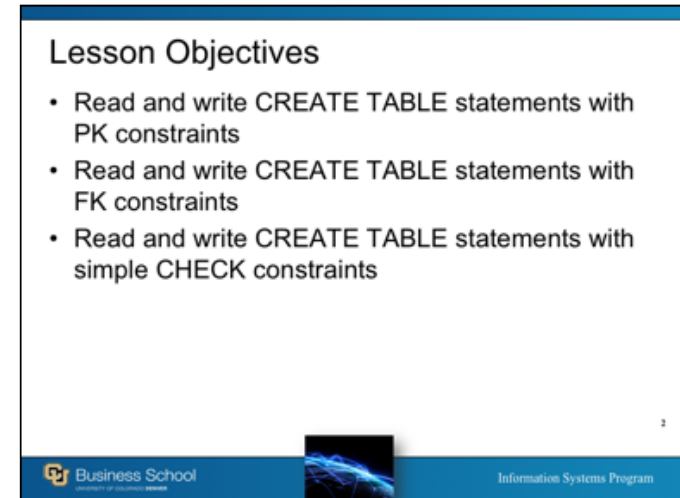
- Careful study of the relational data model
- This lesson covers some syntax extensions of the CREATE TABLE statement for integrity constraints.

Opening question:

- Why are constraint names important?
- Imagine that you are on call as a database administrator. An error occurs but the error name is meaningless.

Relational databases are the dominant commercial standard

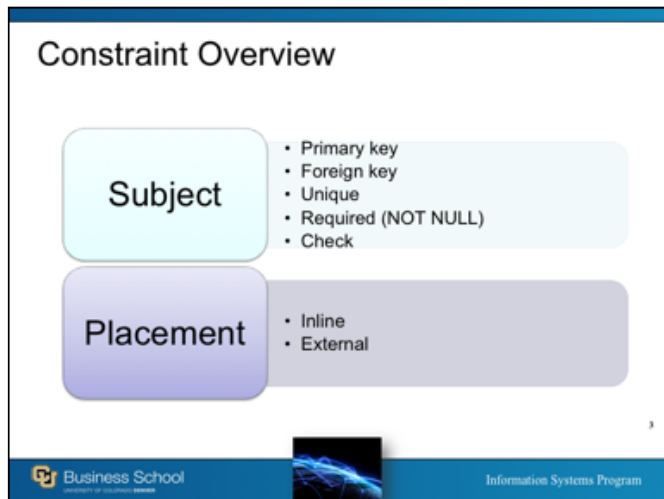
- Simplicity and familiarity with table manipulation
- Strong mathematical framework
- Lots of research and development



Extend details in CREATE TABLE statement

Write syntactically acceptable statements

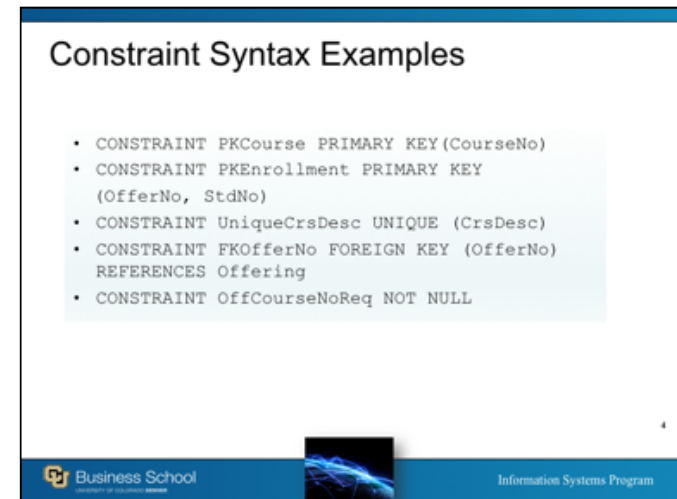
Specify details correctly



Constraint subject

Placement

- External: after column definitions
- Inline: same line as a column definition



CONSTRAINT keyword

Optional constraint name

Oracle syntax: MySQL has some limitations

All of these constraints can be external or inline in Oracle and standard SQL. Typically required (NOT NULL) constraints are inline and others are external.

Keyword(s) about constraint type

## External PK Constraint Placement

```
CREATE TABLE Course
( CourseNo CHAR(6),
  CrsDesc VARCHAR(250),
  CrsUnits SMALLINT,
  CONSTRAINT PKCourse PRIMARY KEY(CourseNo),
  CONSTRAINT UniqueCrsDesc UNIQUE (CrsDesc) )
```

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Extended CREATE TABLE statement

External primary key constraint: CourseNo

Candidate key: CrsDesc (course description)

Named constraints: easier to reference; PKCourse, UniqueCrsDesc

## External FK Constraint Placement

```
CREATE TABLE Enrollment
( OfferNo INTEGER,
  StdNo CHAR(11),
  EnrGrade DECIMAL(3,2),
  CONSTRAINT PKErollment PRIMARY KEY
  (OfferNo, StdNo),
  CONSTRAINT FKOfferNo FOREIGN KEY (OfferNo)
  REFERENCES Offering,
  CONSTRAINT FKStdNo FOREIGN KEY (StdNo)
  REFERENCES Student );
```

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Primary key:

- combination of OfferNo and StdNo
- combined PK (or composite PK)
- Use as external constraint

Foreign key constraints:

- OfferNo references Offering
- StdNo references Student

## Inline Constraint Placement

```
CREATE TABLE Offering
( OfferNo      INTEGER,
  CourseNo     CHAR(6) CONSTRAINT OffCourseNoReq NOT NULL,
  OffLocation  VARCHAR(50),
  OffDays      CHAR(6),
  OffTerm      CHAR(6) CONSTRAINT OffTermReq NOT NULL,
  OffYear      INTEGER CONSTRAINT OffYearReq NOT NULL,
  FacNo        CHAR(11),
  OffTime      DATE,
  CONSTRAINT PKOffering PRIMARY KEY (OfferNo),
  CONSTRAINT FKCourseNo FOREIGN KEY (CourseNo)
    REFERENCES Course,
  CONSTRAINT FKFacNo FOREIGN KEY (FacNo)
    REFERENCES Faculty );
```

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NOT NULL keywords

- Should use constraint names even for inline constraints
- Inline constraints associated with a specific column
- Easy to trace error when a constraint violation occurs

Two foreign keys:

- CourseNo: nulls not allowed
- FacNo: nulls allowed; prepare catalog before instructors are assigned; permits flexibility

## Check Constraint Examples

- Syntax: CHECK ( <row-condition> )
- Row conditions with columns from the same table

```
CONSTRAINT ValidGPA CHECK ( StdGPA BETWEEN 0 AND 4 )

CONSTRAINT ValidStdClass
  CHECK ( StdClass IN ('FR', 'SO', 'JR', 'SR' )

CONSTRAINT OffYearValid CHECK ( OffYear > 1970 )

CONSTRAINT EnrollDropValid
  CHECK ( EnrollDate < DropDate )
```

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CHECK constraints are typically external.

First four examples show single column conditions.

Last example shows a constraint among two columns. Both columns must come from the same table. Enrollment date before drop date.

## Summary

- Importance of PK and FK constraints
- Use constraint names
- CHECK constraint limitations
- MySQL syntax limitations



Information Systems Program

PK constraints ensure traceability of business entities such as customers.

FK constraints ensure connections among business entities are valid.

Constraint names help identify nature of data integrity violation. Helps specialist resolve problem more timely.

CHECK constraint limitations

- Ensure efficient execution
- Columns of the same table
- Constraints involving multiple tables cannot be done in CREATE TABLE statement (triggers instead)

CREATE TABLE statement important because of relative portability.