



Relational Database Concepts

Delete and Update Actions for Referenced Rows

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Objectives

- Learn how to perform DML operations on referenced rows.

Delete and Update Actions for Referenced Rows

- For each referential integrity constraint, you should carefully consider actions on referenced rows in parent tables of 1-M relationships.
- A parent row is referenced if there are rows in a child table with foreign key values identical to the primary key value of the parent table row.
- The first row of the Course table with CourseNo "IS320" is referenced by the first row of the Offering table.

OFFERNO	COURSE	OFFTER	OFFYEAR	OFFLOCATION	OFFTIME	FACNO	OFFD
1111	IS320	SUMMER	2013	BLM302	10:30:00		MW
1234	IS320	FALL	2012	BLM302	10:30:00	098-76-5432	MW
2222	IS460	SUMMER	2012	BLM412	13:30:00		TTH
3333	IS320	SPRING	2013	BLM214	08:30:00	098-76-5432	MW
4321	IS320	FALL	2012	BLM214	15:30:00	098-76-5432	TTH
4444	IS320	WINTER	2013	BLM302	15:30:00	543-21-0987	TTH
5555	FIN300	WINTER	2012	BLM207	08:30:00	765-43-2109	MW
5678	IS480	WINTER	2013	BLM302	10:30:00	987-65-4321	MW
5679	IS480	SPRING	2013	BLM412	15:30:00	876-54-3210	TTH
6666	FIN450	WINTER	2013	BLM212	10:30:00	987-65-4321	TTH
7777	FIN480	SPRING	2013	BLM305	13:30:00	765-43-2109	MW

Delete and Update Actions for Referenced Rows

- It is natural to consider what happens to related Offering rows when the referenced Course row is deleted or the CourseNo is updated.
- More generally, these concerns can be stated as Deleting a referenced row:
- What happens to related rows (that is, rows in the child table with the identical foreign key value) when the referenced row in the parent table is deleted?

The following are the conditions or actions permitted for updating and deleting referenced rows or the primary key of referenced rows on tables :

- Restrict: Does not allow the action on the referenced row. For example, do not permit a Student row to be deleted if there are any related Enrollment rows. Similarly, does not allow Student.StdNo to be updated if there are related Enrollment rows.
- Cascade: Perform the same action (cascade the action) to related rows. For example, if a Student is deleted, then delete the related Enrollment rows and if a Student.StdNO is changed in some row, update StdNo in the related Enrollment rows.

Delete and Update Actions for Referenced Rows

STDNO	STDFIRSTNAME	STDLASTNAME	STDCITY	ST	STDZIP	STDMAJ	ST	STDGPA
123-45-6789	HOMER	WELLS	SEATTLE	WA	98121-1111	IS	FR	3
124-56-7890	BOB	NORBERT	BOTHELL	WA	98011-2121	FIN	JR	2.7
234-56-7890	CANDY	KENDALL	TACOMA	WA	99042-3321	ACCT	JR	3.5
345-67-8901	WALLY	KENDALL	SEATTLE	WA	98123-1141	IS	SR	2.8
456-78-9012	JOE	ESTRADA	SEATTLE	WA	98121-2333	FIN	SR	3.2
567-89-0123	MARIAH	DODGE	SEATTLE	WA	98114-0021	IS	JR	3.6
678-90-1234	TESS	DODGE	REDMOND	WA	98116-2344	ACCT	SO	3.3
789-01-2345	ROBERTO	MORALES	SEATTLE	WA	98121-2212	FIN	JR	2.5
876-54-3210	CRISTOPHER	COLAN	SEATTLE	WA	98114-1332	IS	SR	4
890-12-3456	LUKE	BRAZZI	SEATTLE	WA	98116-0021	IS	SR	2.2
901-23-4567	WILLIAM	PILGRIM	BOTHELL	WA	98113-1885	IS	SO	3.8

OFFERNO	STDNO	ENRGRADE
1234	123-45-6789	3.3
1234	234-56-7890	3.5
1234	345-67-8901	3.2
1234	456-78-9012	3.1

Delete and Update Actions for Referenced Rows

- Nullify: Set the foreign key of related rows to null. For example, if a Faculty row is deleted, then set FacNo to NULL in related Offering rows and if a Faculty. FacNo is updated, then set FacNo to NULL in related Offering rows.
- The nullify action is not permitted if the foreign key does not allow null values. For example, the nullify option is not valid when deleting rows of the Student table because Enrollment. StdNo is part of the primary key.

OFFERNO	COURSE	OFFTER	OFFYEAR	OFFLOCATION	OFFTIME	FACNO	OFFD
1111	IS320	SUMMER	2013	BLM302	10:30:00		MW
1234	IS320	FALL	2012	BLM302	10:30:00	098-76-5432	MW
2222	IS460	SUMMER	2012	BLM412	13:30:00		TTH
3333	IS320	SPRING	2013	BLM214	08:30:00	098-76-5432	MW
4321	IS320	FALL	2012	BLM214	15:30:00	098-76-5432	TTH

FACNO	FACFIRSTNAME	FACLASTNAME	FACCITY	FA	FACZIPCODE	FACR	FACHIREDA	FACSALARY	FACSUPERVIS	FACDEP
543-21-0987	VICTORIA	EMMANUEL	BOTHELL	WA	98011-2242	PROF	15-APR-01	120000		MS
765-43-2109	NICKI	MACON	BELLEVUE	WA	98015-9945	PROF	11-APR-02	65000		FIN
654-32-1098	LEONARD	FIBON	SEATTLE	WA	98121-0094	ASSC	01-MAY-99	70000	543-21-0987	MS
098-76-5432	LEONARD	VINCE	SEATTLE	WA	98111-9921	ASST	10-APR-00	35000	654-32-1098	MS
876-54-3210	CRISTOPHER	COLAN	SEATTLE	WA	98114-1332	ASST	01-MAR-04	40000	654-32-1098	MS
987-65-4321	JULIA	MILLS	SEATTLE	WA	98114-9954	ASSC	15-MAR-05	75000	765-43-2109	FIN



Delete and Update Actions for Referenced Rows

- Default: Sets the foreign key of related rows to its default value. For example, if a Faculty row is deleted, then set FacNo to a default faculty in related Offering rows. The default faculty might have an interpretation such as “to be announced.” Likewise, if Faculty.FacNo is updated, then set FacNo to its default value in related Offering rows. The default action is an alternative to the nullify action as the default action avoids null values.
- The delete and update actions can be specified in SQL using the ON DELETE and ON UPDATE clauses. These clauses are part of foreign key constraints. For example, the revised CREATE TABLE statement for the Enrollment table shows ON DELETE and ON UPDATE clauses for the Enrollment table. The RESTRICT keyword means restrict (the first possible action).



Delete and Update Actions for Referenced Rows

The keywords CASCADE, SET NULL, and SET DEFAULT can be used to specify the second through fourth options, respectively.

```
CREATE TABLE Enrollment
( OfferNo INTEGER, StdNo CHAR(11),
  EnrGrade DECIMAL(3,2),
  CONSTRAINT PKENrollment PRIMARY KEY (OfferNo, StdNo),
  CONSTRAINT FKOfferNo FOREIGN KEY (OfferNo) REFERENCES Offering ON DELETE
  RESTRICTON UPDATE CASCADE,
  CONSTRAINT FKStdNo FOREIGN KEY (StdNo) REFERENCES Student ON DELETE
  RESTRICTON UPDATE CASCADE );
```


Delete and Update Actions for Referenced Rows

A referenced row must be inserted before its related rows. For example, before inserting a row in the Enrollment table, the referenced rows in the Student and Offering tables must exist. Referential integrity places an ordering on insertion of rows from different tables.

OFFERNO	STDNO	ENRGRADE
1234	123-45-6789	3.3
1234	234-56-7890	3.5
1234	345-67-8901	3.2
1234	456-78-9012	3.1
1234	567-89-0123	3.8
1234	678-90-1234	3.4
1234	789-01-2345	3.5



Delete and Update Actions for Referenced Rows

There is a related action designated by the keywords NO ACTION. The difference between RESTRICT and NO ACTION involves the concept of deferred integrity constraints.