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6.9. How can the key and foreign key constraints be enforced by the DBMS? Is the enforcement technique you suggest difficult to implement? Can the constraint checks be executed efficiently when updates are applied to the database?

When performing an update or delete in the database the affected rows in the database could be determined. Once we know what rows in the database will be affected by the update or deletion we can check the list of constraints and see if any apply to the rows we are updating or deleting. Once we determine if any constraints affect the update you can proceed with the update. If any of the constraints are violated during the updated we can throw an error and roll back the update or deletion.

This does not seem particularly difficult to implement since once the database is defined you could probably have a lookup table for the constraints. You could then recursively apply your update to the database checking if any update breaks a constraint. If an update or deletion breaks a constraint at any point we can backtrack restoring the database to its previous state.

This may not be very efficient if there are a lot of items being updated and/or a large number of constraints. For example, if we update one row that has a value used as a foreign key for a large number of rows in another table then we would need to update all of the items in the other table and check the corresponding constraints for every item that needs to be updated in that table.