Database Design in 3NF

events (id, date, organization_id, active)

organizations (id, name, street_1, street_2, city, state, zip, short_name, active)

quizzes (id, event_id, division, room, round)

students (id, first_name, last_name, grade, organization_id, active)

student_quizzes (id, student_id, quiz_id, num_attempted, num_correct, score)

student_teams (id, student_id, team_id, start_date, end_date, position, active)

teams (id, name, organization_id, division, active)

team_quizzes (id, team_id, quiz_id, raw_score, team_points, position)

users (id, first_name, last_name, status, organization_id, active, email, phone, password_digest, username)

Underlines:
Solid underlined fields are primary keys;
Dotted underlined fields are foreign keys;
Double underlined fields are composite keys that are both primary and foreign keys.

Database Design Notes:

1. Strictly speaking, having zip code in the organizations table creates a transitive dependency, but given the limited size of the system there is no need to normalize and move zip code and primary city & state into its own table.

2. A quiz is uniquely identified and determined by the combination of event_id, division, room, and round – the four fields that make a record. Nonetheless, to conform to Rails conventions, we will still create an 'id' field as the primary key for this table.

3. A student's current team assignment is determined by finding the student's record in the student_teams table that has a NULL value in end_date. When a student transitions to a new team, a callback method sets the end_date to today's date.

4. Likewise, if we were to have a composite key in the student_teams table, it must include student_id, team_id, and start_date – all three would be required. It is not unusual for a student to be on a team one month, switch the next month to another team (variety of reasons), and then later return to his/her original team. However, since we are following Rails conventions and using 'id' as the primary key, this is not an issue.

5. Zip codes are saved as strings to preserve leading zeros. We are only concerned with the first five digits and not tracking the +4 digits that sometimes follow.

6. In student_quizzes, we are saving scores as a calculated field in order to speed up some routine queries. This field cannot be accessed by the user directly and will be handled in this app by a callback method in the system.