Matt Pineau   November 17, 2014

Database Management   Professor Labouseur

Lab 9: Normalization Three

1)   Functional Dependencies:

        People Table
        pid → first_name
        pid → last_name
        pid → address
        pid → dob

        Players Table
        pl_id → ag_id
        pl_id → tid

        Coaches Table
        cid → num_years_coaching

        Age_Groups Table
        ag_id → age_range_start
        ag_id → age_range_end

        Teams Table
        tid → ag_id
        tid → ac_roster_id
        tid → hc_id

        The following tables only have primary key fields, and therefore have no
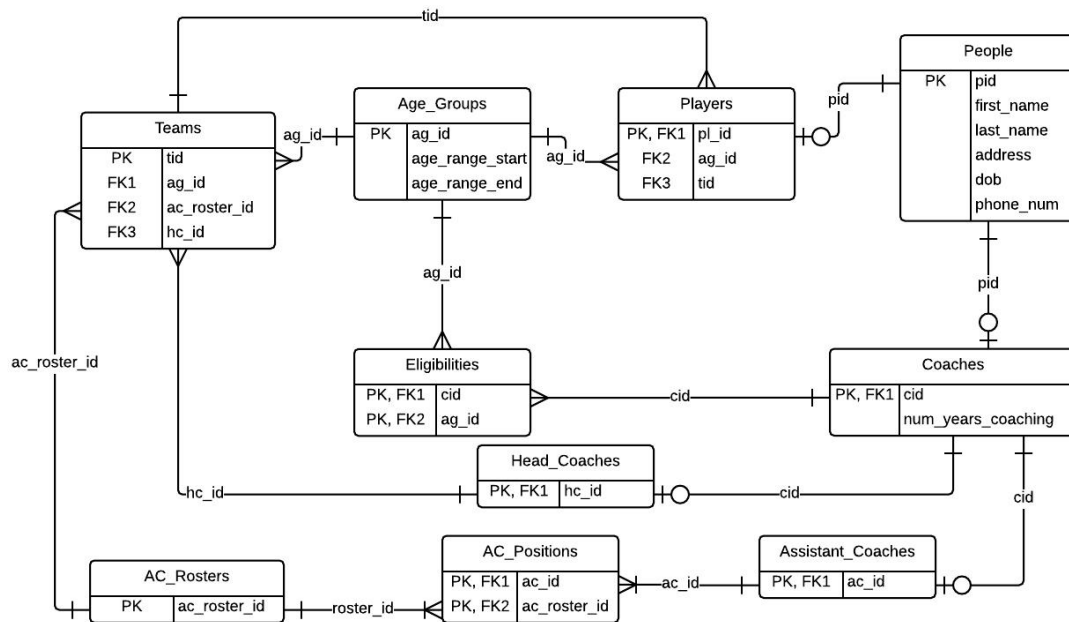   functional dependencies:

        Head_Coaches
        Assistant_Coaches
        Eligibilities
        AC_Positions
        AC_Rosters

2)

Teams
PK	tid
FK1	ag_id
FK2	ac_roster_id
FK3	hc_id

Age_Groups
PK	ag_id
	age_range_start
	age_range_end

Players
PK, FK1	pl_id
FK2	ag_id
FK3	tid

People
PK	pid
	first_name
	last_name
	address
	dob
	phone_num

Eligibilities
| PK, FK1 | cid |
| PK, FK2 | ag_id |

Coaches
| PK, FK1 | cid |
| | num_years_coaching |

Head_Coaches
| PK, FK1 | hc_id |

AC_Positions
| PK, FK1 | ac_id |
| PK, FK2 | ac_roster_id |

Assistant_Coaches
| PK, FK1 | ac_id |

AC_Rosters
| PK | ac_roster_id |

tid — ag_id — pid — ag_id — ac_roster_id — ag_id — cid — pid — hc_id — cid — cid — roster_id — ac_id

3)   In order to prove that the database is in 3NF, we must establish first that it is in 1NF, meaning that all data is atomic. This is apparent when looking at the ER diagram. There is no field that could require a set of values (we assume people have one address and one phone number). 2NF says that the entire primary key should determine each non-primary field. To check this we only need to look only at tables with composite keys. These tables are "eligibilities" and "ac_positions," each of which has no fields that aren't part of the composite primary key. Therefore they have no functional dependencies and keep the database in 2NF. To prove that the database is in 3NF we must show that no fields are dependent on anything but the primary key. This is shown in the functional dependencies above. All fields in the "people" table are dependent on pid (the primary key), all fields in the "players" table are dependent on pl_id, all fields in the "coaches" table are dependent on cid, all fields in the age_groups table are dependent on ag_id, and all fields in the "teams" table are dependent on tid. The rest of the tables have no functional dependencies because all of the fields in the tables are part of their primary keys.