

Exercise 4: Database schema

Delivery: 9.11.2015

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Schema:Notation: primary key, foreign key

- Elector: id, name, sex, birthday, wahlkreis2009, wahlkreis2013, vote2009, vote2013, vote2017
- Vote: id, year, erststimme, zweitstimme, wahlkreis
- Party: id, name, abkuerzung, color
- PartyInElection: party, year, erststimmen, zweitstimmen, wonDistricts, fivePercentTaken
- FederalLand: id, name, residents2009, residents2013
- Wahlkreis: id, name, federalLand
- WahlkreisInElection: wahlkreis, year, residents, winnerParty, winnerCandidate, wahlbeteiligung
- Candidate: id, name, jahrgang
- CandidateInElection: candidate, year, erststimmen, rank, party, wahlkreis, federalLand
- RunsForElection: federalLand, party, year

Normal forms:

- This schema is in 1NF due to the use of a relational database system.
- It is also in 2NF, because all attributes, which are not in the primary key, depend on the primary key completely.
- The schema fulfills 3NF, because in no attribute, which is not in the primary key, depends on the primary key transitively.

Create scripts:

- create table Elector (

id	serial	primary key,
name	varchar(60),	
sex	char(1)	check (sex = 'm' or sex = 'f'),
birthday	date	not null,
wahlkreis2009	smallint	references Wahlkreis(id)),
wahlkreis2013	smallint	references Wahlkreis(id)),
vote2009	boolean	default false,
vote2013	boolean	default false,
vote2017	boolean	default false);

- create table Vote (

id	serial	primary key,
year	smallint	not null,
erststimme	smallint	references Candidate(id),
/* when "erststimme" is invalid, it has the value NULL*/		
zweitstimme	smallint	references Party(id),
/* when "zweitstimme" is invalid, it has the value NULL*/		
wahlkreis	smallint	references Wahlkreis(id));

- create table Party (

id	smallint	primary key,
name	varchar(100)	not null,
abkuerzung	varchar(30)	not null,
color	varchar(30));	

- create table PartyInElection (

party	smallint	references Party(id),
year	smallint	not null,
erststimmen	integer,	
zweitstimmen	integer,	
wonDistricts	smallint,	
fiverPercentTaken	boolean,	
primary key (party, year));		

- create table FederalLand (

id	smallint	primary key,
name	varchar(25)	not null,
residents2009	integer	not null check (residents2009 >= 0),
residents2013	integer	not null check (residents2013 >= 0));

- create table Wahlkreis (

id	smallint	primary key,
name	varchar(90)	not null,
federalLand	smallint	references FederalLand(id));

- create table WahlkreisInElection (

wahlkreis	smallint	references Wahlkreis(id),
year	smallint	not null,
residents	integer	not null,
winnerParty	smallint	references Party(id),
winnerCandidate	smallint	references Candidate(id),
wahlbeteiligung	numeric(5, 4),	
primary key (wahlkreis, year));		

- create table Candidate (

id	integer	primary key,
name	varchar(80)	not null,
jahrgang	smallint	not null);

- create table CandidateInElection (

candidate	integer	references Candidate(id),
year	smallint	not null,
erststimmen	integer,	
rank	smallint,	
party	smallint	references Party(id),
wahlkreis	smallint	references Wahlkreis(id),
federalland	smallint	references Federalland(id),
primary key (candidate, year));		

- create table RunsForElection (

federalLand	smallint	references FederalLand(id),
party	smallint	references Party(id),
year	smallint	not null,
primary key (federalLand, party, year));		