Database Project – Superhero TV shows

Ciaran Hegarty – 14316285

Introduction

 The database developed around the modern DC television shows and the various details of the shows and the viewing of them. The shows consist of many heroes and villains each with their own set of superpowers, some heroes and villains only appear on certain shows and are played by different actors. There are tables for heroes and villains which give details on them such as real name, first appearance and which show they currently appear in (if any). There are tables for each hero and their respective powers, and each show they have appeared in, the same goes for villains. A table for actors describes the actor's details and shows which hero and/or villain they play. There are tables for episodes, and individual showings of episodes as well.

The tv show table contains the name of the show, its release date, its number of seasons, its air day for new episodes and total viewership. The primary key here being name as its assumed that DC will not release two shows with the exact same name. The length of each new shows name must be less than 100 characters long as this is the maximum number the designed database will allow. This number is perhaps too big considering that the oracle window is quite small but it allows flexibility in name choosing.
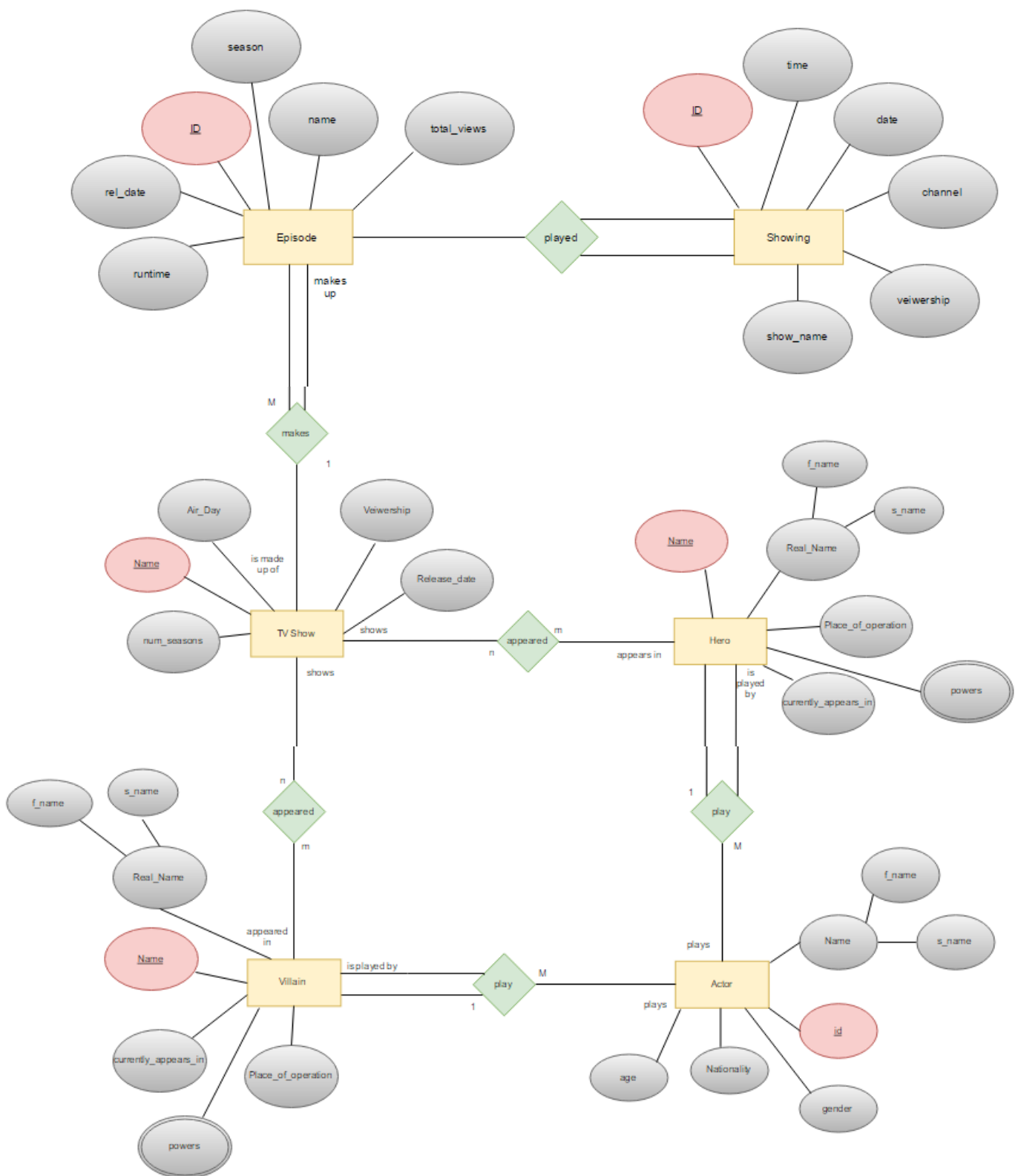
The heroes table contains the unique name of the superhero (primary key), real first name and surname, where they generally operate, and their first show appearance and current show appearance. The villains table is similar except that it doesn't include place of operations. As both heroes and villains can have several powers and appearances in shows corresponding to them, this lead to the production of tables for hero/villain name and power as a composite primary key and hero/villain name and tv show appearance as a composite primary key. The hero name and villain names are foreign keys in their powers and appearances tables.

A table for actors contains a unique id number for each actor, which is used as the primary key as actors could have the same names, first and second names for each actor, as well as their age, nationality, and hero, and/or villain they play. The hero and villain columns in the table are foreign keys to the name in heroes table and name in villains table, respectively.
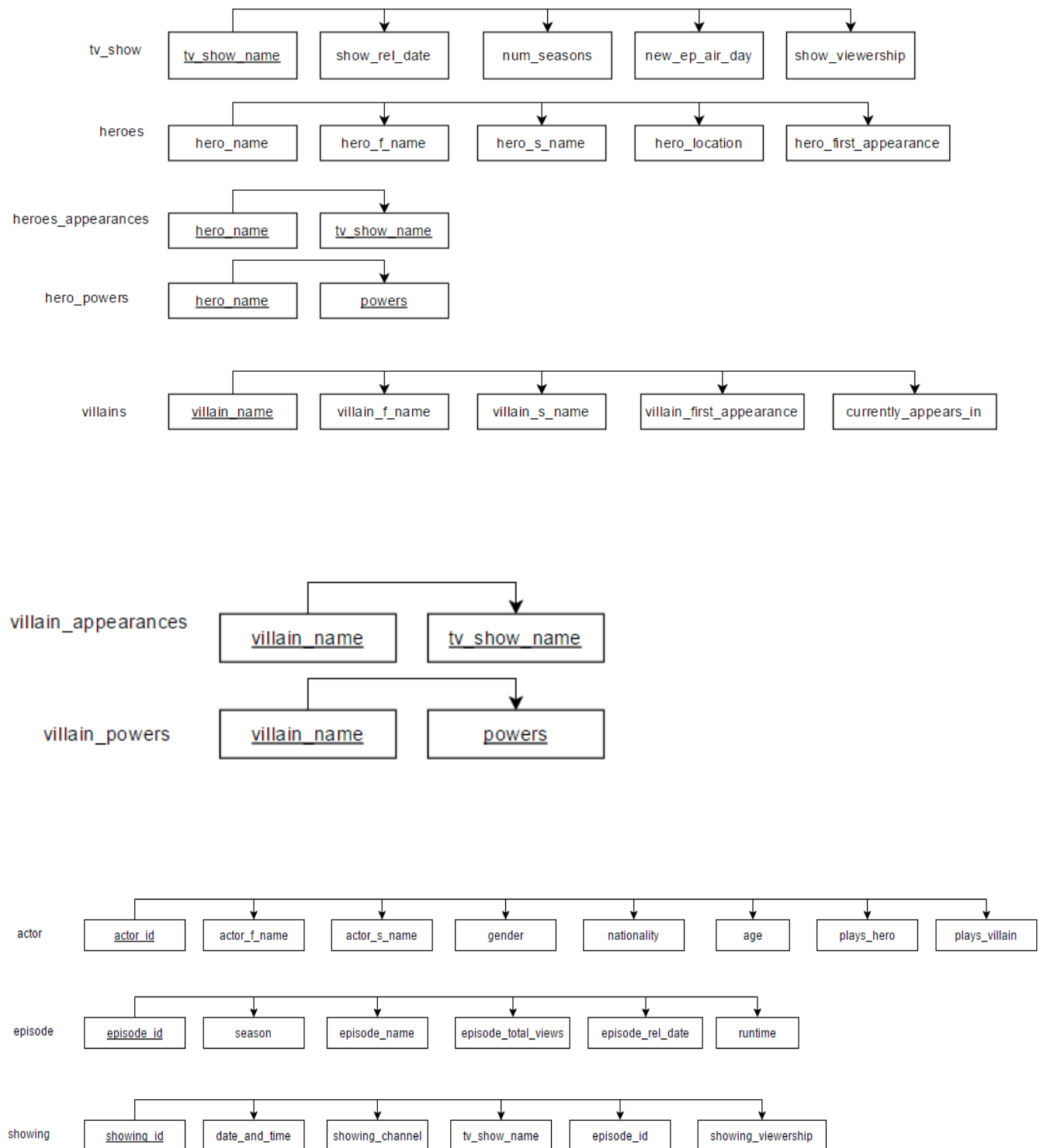
The episode table contain every episode across all tv shows so a unique number is used to identify them. The other columns in the table are episode name, which season it's in, the views for that episode, its air-date and which tv show its from, which is a foreign key in this table pointing to the tv show name in the tv show table.

Showings are for individual airings of each episode, so the primary key for this table is a unique id as the same episode can be shown multiple times. It contains the date of the showing, which channel it was shown on, the show name, the episode number and the views for this particular airing. The show name and episode number are both foreign keys in this table.
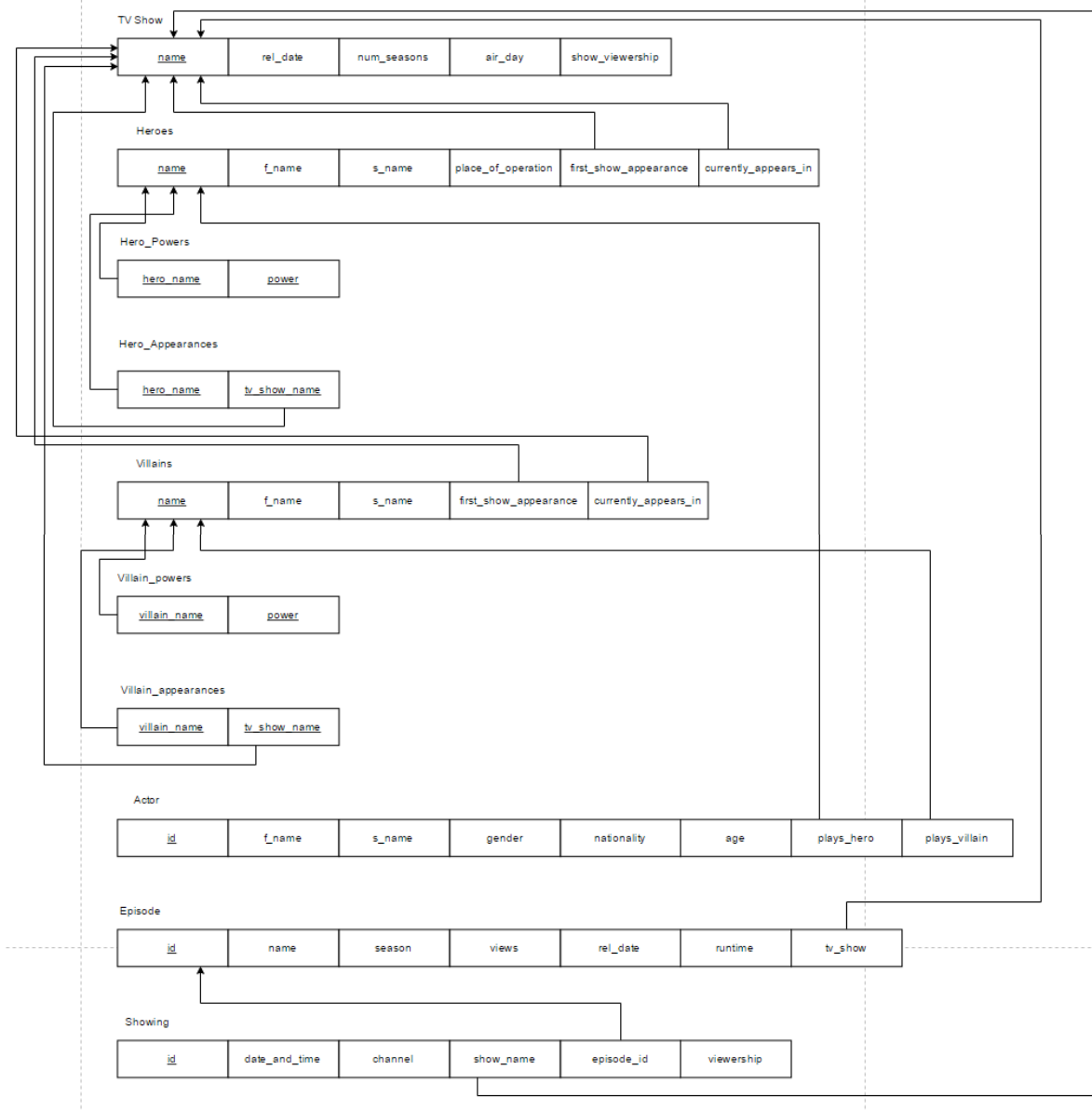
Entity Relation Diagram

Dependency Diagram

tv_show

tv_show_name	show_rel_date	num_seasons	new_ep_air_day	show_viewership

heroes

hero_name	hero_f_name	hero_s_name	hero_location	hero_first_appearance

heroes_appearances

hero_name	tv_show_name

hero_powers

hero_name	powers

villains

villain_name	villain_f_name	villain_s_name	villain_first_appearance	currently_appears_in

villain_appearances

villain_name	tv_show_name

villain_powers

villain_name	powers

actor

actor_id	actor_f_name	actor_s_name	gender	nationality	age	plays_hero	plays_villain

episode

episode_id	season	episode_name	episode_total_views	episode_rel_date	runtime

showing

showing_id	date_and_time	showing_channel	tv_show_name	episode_id	showing_viewership

Relational Schema Diagram

TV Show

name	rel_date	num_seasons	air_day	show_viewership

Heroes

name	f_name	s_name	place_of_operation	first_show_appearance	currently_appears_in

Hero_Powers

hero_name	power

Hero_Appearances

hero_name	tv_show_name

Villains

name	f_name	s_name	first_show_appearance	currently_appears_in

Villain_powers

villain_name	power

Villain_appearances

villain_name	tv_show_name

Actor

id	f_name	s_name	gender	nationality	age	plays_hero	plays_villain

Episode

id	name	season	views	rel_date	runtime	tv_show

Showing

id	date_and_time	channel	show_name	episode_id	viewership

Semantic Constraints

The first semantic constraint implemented in the database is that the age of an actor cannot be greater than 105. This was done by altering the table after its creation with the line:

ALTER TABLE actor MODIFY age INT CHECK (age<105);

This could have been implemented during the creation of the table by including CHECK(age<105) when writing the age column code, but this shows of the use of other functions of SQL.

Another semantic constraint is that the genders of the actors can only be represented by m or f, the following line updates the actor table to cause this:

ALTER TABLE actor MODIFY gender VARCHAR(1) CHECK (gender IN('m','f'));

When creating tables and a text entry is expected, some are limited to a certain number of characters for example tv show name has to be less than 100 characters and villains powers must be less than 50 characters.

Attributes that are required to be entered are given the NOT NULL constraint so that entries to that table with null entries for that column will be rejected.

Trigger

The trigger implemented in the database is designed to add a new entry to the hero appearances table whenever a new hero is inserted into the heroes table by taking the hero's name and first show appearance from the new hero entry and adding it to the hero appearances table.

```
CREATE TRIGGER new_hero_appearance

        AFTER INSERT ON heroes

        FOR EACH ROW BEGIN

        UPDATE heroes_appearances

                SET hero_name=NEW.name,

                        tv_show_name=NEW.currently_appears_in;

END new_hero_appearance;

.

RUN;
```

Security

Different levels of control can be issued depending on which area the user works in, for example the casting director would be given read and update privileges to the actor table and with the option to grant for any subordinates they may have that would need same privileges.

GRANT WRITE, UPDATE, READ ON actor TO CDirector with GRANT OPTION;

The casting director may also need to read the table of heroes in order to cast for the role so we can grant this using:

GRANT READ ON heroes TO CDirector WITH GRANT OPTION;

If the casting director grant these privileges to others who maybe aren't supposed to have access every single one of them can be retracted in order with the line:

REVOKE READ ON heroes FROM CDirector;

Depending on the roles, other privileges can be given to different users in order to allow them to do their work.

Code

```
CREATE TABLE tv_show(name VARCHAR(100) NOT NULL, rel_date DATE NOT NULL, num_seasons
INT NOT NULL, air_day VARCHAR(10) NULL, show_viewership INT NOT NULL,PRIMARY KEY(name));

INSERT INTO tv_show VALUES('The Flash',date '2014-10-7',3,'Tuesday',4000000);

INSERT INTO tv_show VALUES('Arrow',date '2012-10-12',5,'Wednesday',3000000);

INSERT INTO tv_show VALUES('Supergirl',date '2015-10-25',2,'Monday',1000000);

INSERT INTO tv_show VALUES('Legends Of Tomorrow',date '2016-01-21',2,'Thursday',2000000);

INSERT INTO tv_show VALUES('Constantine',date '2013-10-15',1,NULL,500000);

CREATE TABLE heroes(name VARCHAR(100) NOT NULL, f_name VARCHAR(30) NULL, s_name
VARCHAR(30) NULL, place_of_operation VARCHAR(50) NOT NULL, first_show_appearance
VARCHAR(100) NOT NULL, currently_appears_in VARCHAR(100) NULL, FOREIGN
KEY(first_show_appearance) REFERENCES tv_show(name),FOREIGN_KEY(currently_appears_in)
REFERENCES tv_show(name), PRIMARY KEY(name));

INSERT INTO heroes VALUES('Flash','Barry','Allen','Central City','The Flash','The Flash');

INSERT INTO heroes VALUES('Green Arrow','Oliver','Queen','Star City','Arrow','Arrow');

INSERT INTO heroes VALUES('Supergirl','Kara','Danvers','National City','Supergirl','Supergirl');

INSERT INTO heroes Values('Atom','Ray','Palmer','Timestream','Arrow','Legends Of Tomorrow');

INSERT INTO heroes Values('White Canary','Sara','Lance','Timestream','Arrow','Legends Of
Tomorrow');

INSERT INTO heroes Values('Heatwave','Mick','Rory','Timestream','The Flash','Legends Of
Tomorrow');

INSERT INTO heroes Values('Firestorm','Jefferson',' Jackson','Timestream','The Flash','Legends Of
Tomorrow');

INSERT INTO heroes Values('Martian Manhunter','Jonn','Jones','National City','Supergirl','Supergirl');

INSERT INTO heroes Values('Black Canary','Dinah','Lance','Star City','Arrow',NULL);

INSERT INTO heroes Values('Kid Flash','Wally','West','Central City','The Flash','The Flash');

INSERT INTO heroes Values('Speedy','Thea','Queen','Star City','Arrow','Arrow');

INSERT INTO heroes Values('Jesse Quick','Jesse','Quick','Central City','The Flash',NULL);

CREATE TABLE heroes_appearances(hero_name VARCHAR(100) NOT NULL, tv_show_name
VARCHAR(100) NOT NULL, FOREIGN KEY(hero_name) REFERENCES heroes(name),FOREIGN
KEY(tv_show_name) REFERENCES tv_show(name), PRIMARY KEY(hero_name, tv_show_name));


INSERT INTO heroes_appearances VALUES('Supergirl','The Flash');

INSERT INTO heroes_appearances VALUES('Supergirl','Supergirl');

INSERT INTO heroes_appearances VALUES('Supergirl','Arrow');
```

```sql
INSERT INTO heroes_appearances VALUES('Supergirl','Legends Of Tomorrow');

INSERT INTO heroes_appearances VALUES('Green Arrow','The Flash');

INSERT INTO heroes_appearances VALUES('Green Arrow','Legends Of Tomorrow');

INSERT INTO heroes_appearances VALUES('Green Arrow','Arrow');

INSERT INTO heroes_appearances VALUES('Atom','The Flash');

INSERT INTO heroes_appearances VALUES('Atom','Arrow');

INSERT INTO heroes_appearances VALUES('Atom','Legends Of Tomorrow');

INSERT INTO heroes_appearances VALUES('Flash','Supergirl');

INSERT INTO heroes_appearances VALUES('Flash','Arrow');

INSERT INTO heroes_appearances VALUES('Flash','The Flash');

INSERT INTO heroes_appearances VALUES('Kid Flash','The Flash');

INSERT INTO heroes_appearances VALUES('Flash','Legends Of Tomorrow');

INSERT INTO heroes_appearances VALUES('Speedy','Arrow');

INSERT INTO heroes_appearances VALUES('Speedy','The Flash');

INSERT INTO heroes_appearances VALUES('Speedy','Legends Of Tomorrow');

INSERT INTO heroes_appearances VALUES('Black Canary','The Flash');

INSERT INTO heroes_appearances VALUES('Black Canary','Arrow');

INSERT INTO heroes_appearances VALUES('White Canary','Legends Of Tomorrow');

INSERT INTO heroes_appearances VALUES('White Canary','Arrow');

INSERT INTO heroes_appearances VALUES('White Canary','The Flash');

INSERT INTO heroes_appearances VALUES('Heatwave','The Flash');

INSERT INTO heroes_appearances VALUES('Heatwave','Arrow');

INSERT INTO heroes_appearances VALUES('Heatwave','Legends Of Tomorrow');

CREATE TABLE hero_powers(hero_name VARCHAR(100) NOT NULL, powers VARCHAR(50) NOT NULL, FOREIGN KEY(hero_name) REFERENCES heroes(name), PRIMARY KEY (hero_name,powers));


INSERT INTO hero_powers VALUES('Supergirl','super strength');

INSERT INTO hero_powers VALUES('Supergirl','heat vision');

INSERT INTO hero_powers VALUES('Supergirl','frost breath');

INSERT INTO hero_powers VALUES('Supergirl','invulnerability');

INSERT INTO hero_powers VALUES('Supergirl','super speed');
```

```sql
INSERT INTO hero_powers VALUES('Supergirl','flight');

INSERT INTO hero_powers VALUES('Flash','super speed');

INSERT INTO hero_powers VALUES('Flash','super endurance');

INSERT INTO hero_powers VALUES('Flash','intangibility');

INSERT INTO hero_powers VALUES('Flash','throw lightning');

INSERT INTO hero_powers VALUES('Kid Flash','super speed');

INSERT INTO hero_powers VALUES('Kid Flash','super endurance');

INSERT INTO hero_powers VALUES('Jesse Quick','super speed');

INSERT INTO hero_powers VALUES('Jesse Quick','super endurance');

INSERT INTO hero_powers VALUES('Green Arrow','bow and arrow expert');

INSERT INTO hero_powers VALUES('Green Arrow','combat expert');

INSERT INTO hero_powers VALUES('Speedy','bow and arrow expert');

INSERT INTO hero_powers VALUES('Speedy','combat expert');

INSERT INTO hero_powers VALUES('Atom','miniaturisation');

INSERT INTO hero_powers VALUES('Atom','lasers');

INSERT INTO hero_powers VALUES('Heatwave','fire gun');

INSERT INTO hero_powers VALUES('Martian Manhunter','super strength');

INSERT INTO hero_powers VALUES('Martian Manhunter','flight');

INSERT INTO hero_powers VALUES('Martian Manhunter','intangibility');

INSERT INTO hero_powers VALUES('Martian Manhunter','shapeshifting');

INSERT INTO hero_powers VALUES('Martian Manhunter','telepathy');

CREATE TABLE villains(name VARCHAR(100) NOT NULL, f_name VARCHAR(30) NULL, s_name
VARCHAR(30) NULL, first_show_appearance VARCHAR(100) NOT NULL, currently_appears_in
VARCHAR(100) NULL, FOREIGN KEY(first_show_appearance) REFERENCES tv_show(name), FOREIGN
KEY(currently_appears_in) REFERENCES tv_show(name), PRIMARY KEY(name));


INSERT INTO villains VALUES('Reverse Flash','Eobard','Thawn','The Flash','Legends Of Tomorrow');

INSERT INTO villains VALUES('Zoom','Hunter','Zolomon','The Flash',NULL);

INSERT INTO villains VALUES('Damian Dark','Damian','Dark','Arrow','Legends Of Tomorrow');

INSERT INTO villains VALUES('The Rival','Edward','Clarisis','The Flash',NULL);

INSERT INTO villains VALUES('Vandal Savage','Vandal','Savage','The Flash',NULL);

INSERT INTO villains VALUES('The Dominators',NULL,NULL,'The Flash',NULL);
```

INSERT INTO villains VALUES('Cyborg Superman','Hank','Henshaw','Supergirl','Supergirl');

INSERT INTO villains VALUES('Mirror Master','Sam','Scudder','The Flash', NULL);

INSERT INTO villains VALUES('Parasite',NULL,NULL,'Supergirl', NULL);

INSERT INTO villains VALUES('Deathstroke','Slade','Wilson','Arrow', NULL);

INSERT INTO villains VALUES('Killer Frost','Caitlin','Snow','The Flash', 'The Flash');

INSERT INTO villains VALUES('Prometheus',NULL,NULL,'Arrow','Arrow');

INSERT INTO villains VALUES('Dr Alchemy',NULL,NULL,'The Flash','The Flash');

CREATE TABLE villain_appearances(villain_name VARCHAR(100) NOT NULL, tv_show_name VARCHAR(100) NOT NULL, FOREIGN KEY(villain_name) REFERENCES villains(name),FOREIGN KEY(tv_show_name) REFERENCES tv_show(name), PRIMARY KEY(villain_name, tv_show_name));

INSERT INTO villain_appearances VALUES('Reverse Flash','The Flash');

INSERT INTO villain_appearances VALUES('Reverse Flash','Arrow');

INSERT INTO villain_appearances VALUES('Reverse Flash','Legends Of Tomorrow');

INSERT INTO villain_appearances VALUES('Damian Dark','Arrow');

INSERT INTO villain_appearances VALUES('Damian Dark','The Flash');

INSERT INTO villain_appearances VALUES('Damian Dark','Legends Of Tomorrow');

INSERT INTO villain_appearances VALUES('The Dominators','Arrow');

INSERT INTO villain_appearances VALUES('The Dominators','The Flash');

INSERT INTO villain_appearances VALUES('The Dominators','Legends Of Tomorrow');

INSERT INTO villain_appearances VALUES('Vandal Savage','Arrow');

INSERT INTO villain_appearances VALUES('Vandal Savage','The Flash');

INSERT INTO villain_appearances VALUES('Vandal Savage','Legends Of Tomorrow');

INSERT INTO villain_appearances VALUES('Prometheus','Arrow');

INSERT INTO villain_appearances VALUES('Killer Frost','The Flash');

INSERT INTO villain_appearances VALUES('Dr Alchemy','The Flash');

INSERT INTO villain_appearances VALUES('Zoom','The Flash');

INSERT INTO villain_appearances VALUES('The Rival','The Flash');

INSERT INTO villain_appearances VALUES('Cyborg Superman','Supergirl');

CREATE TABLE villain_powers(villain_name VARCHAR(100) NOT NULL, powers VARCHAR(50) NOT NULL, FOREIGN KEY(villain_name) REFERENCES villains(name), PRIMARY KEY(villain_name, powers));

INSERT INTO villain_powers VALUES('Cyborg Superman','super strength');

INSERT INTO villain_powers VALUES('The Rival','super speed');

INSERT INTO villain_powers VALUES('The Rival','super endurance');

INSERT INTO villain_powers VALUES('Zoom','super speed');

INSERT INTO villain_powers VALUES('Zoom','intangibility');

INSERT INTO villain_powers VALUES('Zoom','time travel');

INSERT INTO villain_powers VALUES('Zoom','super endurance');

INSERT INTO villain_powers VALUES('Reverse Flash','super speed');

INSERT INTO villain_powers VALUES('Reverse Flash','intangibility');

INSERT INTO villain_powers VALUES('Reverse Flash','time travel');

INSERT INTO villain_powers VALUES('Reverse Flash','super endurance');

INSERT INTO villain_powers VALUES('Vandal Savage','immortal');

INSERT INTO villain_powers VALUES('Deathstroke','combat expert');

INSERT INTO villain_powers VALUES('Deathstroke','swords expert');

INSERT INTO villain_powers VALUES('Prometheus','combat expert');

INSERT INTO villain_powers VALUES('Prometheus','weapons expert');

INSERT INTO villain_powers VALUES('Killer Frost','ice blast');

INSERT INTO villain_powers VALUES('Killer Frost','throw ice');

INSERT INTO villain_powers VALUES('Dr Alchemy','magic');

CREATE TABLE actor(id INT NOT NULL, f_name VARCHAR(20) NOT NULL, s_name VARCHAR(20) NOT NULL, gender VARCHAR(1) NOT NULL, nationality VARCHAR(50) NULL, age INT NULL, plays_hero VARCHAR(100) NULL, plays_villain VARCHAR(100) NULL, FOREIGN KEY(plays_hero) REFERENCES heroes(name), FOREIGN KEY(plays_villain) REFERENCES villains(name), PRIMARY KEY(id));

ALTER TABLE actor MODIFY age INT CHECK (age<105);

ALTER TABLE actor MODIFY gender VARCHAR(1) CHECK (gender IN('m','f'));

INSERT INTO actor VALUES(1,'Grant','Gustin','m','American',26,'Flash',NULL);

INSERT INTO actor VALUES(2,'Stephen','Amell','m','Canadian',35,'Green Arrow',NULL);

INSERT INTO actor VALUES(3,'Melissa','Benoist','f','American',28,'Supergirl',NULL);

INSERT INTO actor VALUES(4,'Danielle','Panabaker','f','American',30,NULL,'Killer Frost');

INSERT INTO actor VALUES(5,'Katie','Cassidy','f','American',32,'Black Canary',NULL);

INSERT INTO actor VALUES(6,'Keiynan','Lonsdale','m','Australian',24,'Kid Flash',NULL);

INSERT INTO actor VALUES(7,'Matt','Letscher','m','American',46,NULL,'Reverse Flash');

CREATE TABLE episode(id INT NOT NULL, season INT NOT NULL, name VARCHAR(100) NOT NULL, views INT NOT NULL, rel_date DATE NOT NULL, runtime INT NOT NULL, tv_show VARCHAR(100) NOT NULL, FOREIGN KEY (tv_show) REFERENCES tv_show(name), PRIMARY KEY(id));

INSERT INTO episode VALUES(238,3,'Invasion',2000000,date'2016-11-29',43,'The Flash');

INSERT INTO episode VALUES(239,5,'Invasion(2)',1700000,date'2016-11-30',43,'Arrow');

INSERT INTO episode VALUES(240,3,'Invasion(3)',1400000,date'2016-12-1',43,'Legends Of Tomorrow');

INSERT INTO episode VALUES(241,3,'Cousin',56500,date'2016-10-3',43,'Supergirl');

INSERT INTO episode VALUES(243,3,'Dark',80000,date'2016-11-2',43,'Arrow');

INSERT INTO episode VALUES(246,3,'Hex',58000,date'2016-11-3',43,'Legends Of Tomorrow');

INSERT INTO episode VALUES(256,3,'Medusa',500000,date'2016-11-21',43,'Supergirl');

INSERT INTO episode VALUES(210,3,'Mirrors',532100,date'2016-11-22',43,'The Flash');

CREATE TABLE showing(id INT NOT NULL, data_and_time TIMESTAMP NOT NULL, channel VARCHAR(50) NOT NULL, show_name VARCHAR(100) NOT NULL, episode_id INT NOT NULL, viewership INT NOT NULL, FOREIGN KEY(episode_id) REFERENCES episode(id), FOREIGN KEY(show_name) REFERENCES tv_show(name), PRIMARY KEY(id));

INSERT INTO showing VALUES(2220,date'2016-12-12','Channel 4','The Flash', 238, 222000);

INSERT INTO showing VALUES(2406,date'2016-12-10','RTE2','Supergirl', 256, 256300);

INSERT INTO showing VALUES(2156,date'2016-12-1','TV3','The Flash', 210, 2500);

INSERT INTO showing VALUES(2106,date'2016-12-5','E4','Arrow', 243, 75630);

INSERT INTO showing VALUES(9453,date'2016-12-2','TG4','Arrow', 239, 647400);

INSERT INTO showing VALUES(4564,date'2016-10-16','ITV2','Supergirl', 241, 987650);

INSERT INTO showing VALUES(1234,date'2016-12-13','Channel 4','The Flash', 238, 467470);

INSERT INTO showing VALUES(5647,date'2016-11-5','RTE1','Legends Of Tomorrow', 246, 32170);

UPDATE showing SET channel = 'Film 4' WHERE show_name='The Flash';

CREATE VIEW current_villains AS SELECT name, currently_appears_in FROM villains WHERE currently_appears_in IS NOT NULL;

CREATE TRIGGER new_hero_appearance

        AFTER INSERT ON heroes

        FOR EACH ROW BEGIN

```
        UPDATE heroes_appearances
                SET hero_name=NEW.name,
                        tv_show_name=NEW.currently_appears_in;
END new_hero_appearance;
.
RUN;
```