

Introduction to Database Systems

Winter 2020

April 9th, 2020

Prepared by:

Philip Akkerman
Shivdeep Khangura
Karina Bissessar

Prepared for:

COSC 3P32
Professor Sheridan Houghten

TABLE OF CONTENTS

TABLE OF CONTENTS	2
RELATIONAL SCHEMAS	3
CREATE TABLES	3
TRIGGERS	6
IMPLEMENT FUNCTIONALITY	8
TABLE DATA	9
DIVISION OF LABOUR	12

RELATIONAL SCHEMAS

Character (<u>cname</u> , alias, gender, pname) JediSith (<u>cname</u> , level) DroidName (<u>cname</u> , dtype) DroidMainSkill (dtype, main_skill) Political_Unit (<u>uname</u> , utype) Planet (<u>pname</u> , x, y, z) Battle (<u>bname</u> , byear, pname, uname) VehicleType (<u>vname</u> , vtype)	TypeHyperSpace (<u>vtype</u> , hyperspace_capability) Position (<u>cname</u> , <u>uname</u> , pfrom, pto) Mentorship (<u>mname</u> , <u>aname</u> , uname, mfrom, mto) VUsedIn (<u>vname</u> , <u>bname</u>) UsesV (<u>cname</u> , <u>vname</u>) Weapon (<u>cname</u> , <u>wtype</u> , <u>wcolour</u> , <u>since</u>)
--	--

CREATE TABLES

```
CREATE TABLE Character(  
    cname CHAR(30),  
    alias CHAR(30),  
    gender CHAR,  
    pname CHAR(30),  
    PRIMARY KEY (cname),  
    UNIQUE (alias),  
    FOREIGN KEY (pname) REFERENCES Planet  
    ON DELETE CASCADE  
    ON UPDATE CASCADE)
```

```
CREATE TABLE JediSith(  
    cname CHAR(30) PRIMARY KEY,  
    level CHAR(30),  
    FOREIGN KEY (cname) REFERENCES Character  
    ON DELETE CASCADE ON UPDATE CASCADE  
CONSTRAINT ValidLevel CHECK(level IN ('Padawan', 'Knight', 'Master'));
```

```
CREATE TABLE DroidName(  
    cname CHAR(30),  
    dtype CHAR(30),  
    PRIMARY KEY (cname),  
    FOREIGN KEY (cname) REFERENCES Character  
    FOREIGN KEY (dtype) REFERENCES Droidskill)
```

```
CREATE TABLE DroidMainSkill(  
    dtype CHAR(30),  
    main_skill CHAR(30),  
    PRIMARY KEY (dtype))
```

```
CREATE TABLE Political_Unit(  
    uname CHAR(30),  
    utype CHAR(30),  
    PRIMARY KEY(uname))
```

```
CREATE TABLE Planet(  
    pname CHAR(30),  
    x REAL,  
    y REAL,  
    z REAL,  
    PRIMARY KEY(pname),  
    UNIQUE(x, y, z))
```

```
CREATE TABLE Battle(  
    bname CHAR(30) PRIMARY KEY(bname),  
    byear INTEGER,  
    pname CHAR(30) NOT NULL,  
    uname CHAR(30) NOT NULL,  
    FOREIGN KEY(pname) REFERENCES Planet  
    ON DELETE NO ACTION  
    ON UPDATE CASCADE,  
    FOREIGN KEY (uname) REFERENCES Political_unit  
    ON DELETE NO ACTION  
    ON UPDATE CASCADE)
```

```
CREATE TABLE VehicleType(  
    vname CHAR(30) PRIMARY KEY,  
    vtype CHAR(30) FOREIGN KEY(vtype) REFERENCES TypeHyperSpace)
```

```
CREATE TABLE TypeHyperSpace(  
    vtype CHAR(30),  
    hyperspace_capability BIT,  
    PRIMARY KEY (vtype))
```

```
CREATE TABLE Position(  
    cname CHAR(30),  
    uname CHAR(30),  
    pfrom INTEGER  
    pto INTEGER  
    PRIMARY KEY(cname, uname),  
    FOREIGN KEY(cname) REFERENCES Character,  
    FOREIGN KEY(uname) REFERENCES Political_Unit,  
    CONSTRAINT positionYear  
    CHECK (pfrom <= pto))
```

```
CREATE TABLE Mentorship(  
    aname CHAR(30),  
    mname CHAR(30),  
    mfrom INTEGER,  
    mto INTEGER,  
    uname CHAR(30),  
    PRIMARY KEY(aname, mname),  
    FOREIGN KEY(aname) REFERENCES JediSith(cname)  
    ON DELETE NO ACTION  
    ON UPDATE NO ACTION,  
    FOREIGN KEY(mname) REFERENCES JediSith(cname)  
    ON DELETE NO ACTION  
    ON UPDATE NO ACTION)  
    CONSTRAINT mentorshipDate CHECK(mfrom <= mto))
```

```
CREATE TABLE VUsedIn(  
    vname CHAR(30),  
    bname CHAR(30),  
    PRIMARY KEY(vname, bname),  
    FOREIGN KEY(vname) REFERENCES VehicleType  
    ON DELETE CASCADE  
    ON UPDATE CASCADE,  
    FOREIGN KEY(bname) REFERENCES Battle  
    ON DELETE CASCADE  
    ON UPDATE CASCADE)
```

```
CREATE TABLE UsesV(  
    cname CHAR(30),  
    vname CHAR(30),  
    PRIMARY KEY(cname, vname))  
    FOREIGN KEY(cname) REFERENCES Character  
    ON DELETE CASCADE  
    ON UPDATE CASCADE,  
    FOREIGN KEY(vname) REFERENCES VehicleType  
    ON DELETE CASCADE  
    ON UPDATE CASCADE)
```

```
CREATE TABLE Weapon(  
    wtype CHAR(30),  
    wcolour CHAR(30),  
    cname CHAR(30) NOT NULL,  
    since INTEGER,  
    PRIMARY KEY(wtype, wcolour, cname),  
    FOREIGN KEY(cname) REFERENCES Character  
    ON DELETE CASCADE  
    ON UPDATE CASCADE)
```

TRIGGERS

```
CREATE OR REPLACE FUNCTION verify_poli_unit_insert()
RETURNS trigger AS
$BODY$
DECLARE icheck CHAR(30);
BEGIN
    icheck = NULL;
    SELECT U.uname INTO icheck FROM Political_Unit U WHERE U.uname NOT IN
(SELECT P.uname FROM Position P);
    INSERT INTO Position(cname, uname, pfrom, pto)
    VALUES ('default',icheck,0,1);
RETURN NULL;
END;
$BODY$
LANGUAGE plpgsql VOLATILE
COST 100;
```

```
CREATE TRIGGER insertOnPoliticalUnit
AFTER INSERT ON Political_Unit
FOR EACH ROW
EXECUTE PROCEDURE verify_poli_unit_insert()
```

```
CREATE OR REPLACE FUNCTION verify_delete_position()
RETURNS trigger AS
$BODY$
BEGIN
    DELETE FROM Political_Unit WHERE uname NOT IN(SELECT uname FROM Position);
RETURN NULL;
END;
$BODY$
LANGUAGE plpgsql VOLATILE
COST 100;
```

```
CREATE TRIGGER deleteOnPosition
AFTER DELETE ON Position
FOR EACH ROW
EXECUTE PROCEDURE verify_delete_position();
```

```
CREATE OR REPLACE FUNCTION verify_update_position()
RETURNS trigger AS
$BODY$
BEGIN
    DELETE FROM Political_Unit WHERE uname NOT IN(SELECT uname FROM Position);
RETURN NULL;
END;
$BODY$
LANGUAGE plpgsql VOLATILE
COST 100;
```

```
CREATE TRIGGER updateOnPosition
AFTER UPDATE ON Position
FOR EACH ROW
EXECUTE PROCEDURE verify_update_position();
```

```
CREATE OR REPLACE FUNCTION verify_jedi_weapon()
RETURNS trigger AS
$BODY$
DECLARE icheck char(30);
BEGIN
    icheck = NULL;
    SELECT W.cname INTO icheck
    FROM JediSith J, Weapon W
    WHERE W.cname <> J.cname AND W.wtype = 'lightsaber';
    IF icheck <> NULL
    THEN DELETE FROM Weapon V WHERE V.cname = icheck;
    END IF;
RETURN NULL;
END;
$BODY$
LANGUAGE plpgsql VOLATILE
COST 100;gsql VOLATILE
COST 100;
```

```
CREATE TRIGGER lightsaberCheck
AFTER INSERT ON Weapon
FOR EACH ROW
EXECUTE PROCEDURE verify_jedi_weapon()
```

IMPLEMENT FUNCTIONALITY

Given a character name, output all the basic information about that character, including home planet and (if applicable) Jedi/Sith-specific information or Droid-specific information.

```
CREATE VIEW CharacterInfo (cname, alias, gender, pname, dtype, mainskill, level) AS
SELECT C.cname, C.alias, C.gender, C.pname, D.dtype, M.main_skill, J.level
FROM Character C LEFT JOIN JediSith J ON (C.cname=J.cname) LEFT JOIN
DroidName D ON (C.cname=D.cname) LEFT JOIN DroidMainSkill M ON (D.dtype =
M.dtype);
```

Given a weapon, output all information on that weapon, including the names of the characters that use that weapon (if any).

```
CREATE VIEW WeaponInfo (wtype, wcolour, cname, since) AS
SELECT W.wtype, W.wcolour, W.cname, W.since
FROM Weapon W;
```

Given a vehicle, output the names of the characters that use that vehicle (if any) and the battles in which the vehicle is used (if any).

```
CREATE VIEW VehicleInfo (vname, bname, cname) AS
SELECT V.vname, V.bname, U.cname
FROM VUsedIn V, Battle B, Character C, UsesV U
WHERE V.vname=U.vname AND V.bname=B.bname AND U.cname=C.cname;
```

Given a political unit, output all information on mentorships approved by that political unit,
i.e. character names and levels of each participant in the mentorship, along with the start and end dates of that mentorship.

```
CREATE VIEW MentorshipInfo (aname, mname, mfrom, mto, uname, level) AS
SELECT M.aname, M.mname, M.mfrom, M.mto, M.uname, J.level
FROM Mentorship M, Political_unit P, JediSith J
WHERE M.uname=P.uname and J.cname = M.aname;
```

Given a planet name, output the coordinates of that planet, as well as the names of the characters who have that home planet.

```
CREATE VIEW PlanetInfo (pname, x,y,z, cname) AS
SELECT P.pname, P.x, P.y, P.z, C.cname
FROM Planet P, Character C
WHERE P.pname=C.pname;
```


TABLE DATA

PLANETS:

```
INSERT INTO Planet VALUES ('Tatooine', 60, 035, 22);
INSERT INTO Planet VALUES ('Earth', 63, 822, 75);
INSERT INTO Planet VALUES ('Kashyyyk', 763, 564, 323);
INSERT INTO Planet VALUES ('Coruscant', 0, 0, 0);
INSERT INTO Planet VALUES ('Naboo', 4, 45, 3);
INSERT INTO Planet VALUES ('Alderaan', 5, 48, 2);
INSERT INTO Planet VALUES ('Hoth', 55, 563, 76);
INSERT INTO Planet VALUES ('Geonosis', 26, 367, 876);
INSERT INTO Planet VALUES ('Yavin', 1, 684, 97);
INSERT INTO Planet VALUES ('Bespin', 856, 47, 43);
INSERT INTO Planet VALUES ('Mustafar', 54, 82, 944);
INSERT INTO Planet VALUES ('Ryloth', 451, 64, 43);
INSERT INTO Planet VALUES ('Kamino', 5, 969, 23);
INSERT INTO Planet VALUES ('Corellia', 361, 69, 433);
INSERT INTO Planet VALUES ('Moraband', 13, 75, 553);
INSERT INTO Planet VALUES ('Onderon', 29, 6, 735);
```

CHARACTERS

```
INSERT INTO Character VALUES ('Anakin Skywalker', 'Darth Vader', 'Male', 'Tatooine');
INSERT INTO Character VALUES ('Chewbacca', 'Chewy', 'Male', 'Kashyyyk');
INSERT INTO Character VALUES ('Padme Amidala', 'Queen Amidala', 'Female', 'Naboo');
INSERT INTO Character VALUES ('Jarjar Binks', NULL, 'Male', 'Naboo');
INSERT INTO Character VALUES ('Sheev Palpatine', 'Darth Sidius', 'Male', 'Naboo');
INSERT INTO Character VALUES ('Bail Organa', 'Senator Organa', 'Male', 'Alderaan');
INSERT INTO Character VALUES ('Leia Organa', 'Princess Leia', 'Female', 'Alderaan');
INSERT INTO Character VALUES ('Luke Skywalker', NULL, 'Male', 'Tatooine');
INSERT INTO Character VALUES ('Jaba the Hutt', NULL, 'Male', 'Tatooine');
INSERT INTO Character VALUES ('R2D2', 'Artoo', NULL, 'Naboo');
INSERT INTO Character VALUES ('C3P0', 'Threepio', NULL, 'Tatooine');
INSERT INTO Character VALUES ('Obi-Wan Kenobi', 'General Kenobi', 'Male', 'Coruscant');
INSERT INTO Character VALUES ('Kwi-Gon Jinn', NULL, 'Male', 'Coruscant');
INSERT INTO Character VALUES ('Darth Maul', NULL, 'Male', 'Coruscant');
```

DROIDS

```
INSERT INTO DroidMainSkill(dtype, main_skill)
VALUES('Astromech','Hacking');
INSERT INTO DroidName (cname, dtype)
VALUES('R2D2', 'Astromech');
INSERT INTO DroidMainSkill(dtype, main_skill)
VALUES('Protocol', 'Translation');
INSERT INTO DroidName (cname, dtype)
VALUES('C3P0', 'Protocol');
```

JEDI/SITH

```

INSERT INTO JediSith VALUES('Luke Skywalker', 'Master');
INSERT INTO JediSith VALUES('Anakin Skywalker', 'Knight');
INSERT INTO JediSith VALUES('Obi-Wan Kenobi', 'Master');
INSERT INTO JediSith VALUES('Kwi-Gon Jinn', 'Master');
INSERT INTO JediSith VALUES('Darth Maul', 'Knight');

```

POLITICAL UNITS

```

INSERT INTO Political_Unit VALUES('Onderon rebels', 'Rebel insurgency');
INSERT INTO Political_Unit VALUES ('Rebel Alliance', 'Resistance movement');
INSERT INTO Political_Unit VALUES ('Jedi Order', 'Religious organization');
INSERT INTO Political_Unit VALUES ('Galactic Republic', 'Republic');
INSERT INTO Political_Unit VALUES ('Galactic Empire', 'Fascist dictatorship');

```

POSITIONS

```

UPDATE Position SET cname = 'Leia Organa' WHERE uname='Rebel Alliance'
UPDATE Position SET cname = 'Obi-Wan Kenobi' WHERE uname='Jedi Order'
UPDATE Position SET cname = 'Sheev Palpatine' WHERE uname='Galactic Republic'
UPDATE Position SET cname = 'Sheev Palpatine' WHERE uname='Galactic Empire'
UPDATE Position SET cname = 'Saw Gerrara' WHERE uname='Onderon Rebels'
UPDATE Position SET cname = 'Jarjar Binks' WHERE uname='Naboo'
INSERT INTO Position VALUES ('Padme Amidala', 'Naboo');

```

BATTLES

```

INSERT INTO Battle VALUES('Onderonian Civil War',-22, 'Onderon', 'Onderon rebels');
INSERT INTO Battle VALUES('Battle of Yavin', 0, 'Yavin', 'Rebel Alliance');
INSERT INTO Battle VALUES('Duel on Mustafar',-19, 'Mustafar', 'Jedi Order');
INSERT INTO Battle VALUES('Battle of Ryloth', -22, 'Ryloth', 'Galactic Republic');
INSERT INTO Battle VALUES('Battle of Kamino',-21, 'Kamino', 'Galactic Republic');
INSERT INTO Battle VALUES('Battle of Naboo',-32, 'Naboo', 'Naboo');
INSERT INTO Battle VALUES('Battle of Geonosis', -22, 'Geonosis', 'Galactic Republic');
INSERT INTO Battle VALUES('Battle of Kashyyyk',-19, 'Kashyyyk', 'Galactic Empire');
INSERT INTO Battle VALUES('Battle of Coruscant',-19, 'Coruscant', 'Galactic Republic');
INSERT INTO Battle VALUES('Battle of Hoth',3, 'Hoth', 'Rebel Alliance');

```

WEAPONS

```

INSERT INTO Weapon VALUES('Bowcaster', 'Black', 'Chewbacca');
INSERT INTO Weapon VALUES('Blaster Pistol', 'Black', 'Leia Organa');
INSERT INTO Weapon VALUES('Blaster Pistol', 'Silver', 'Padme Amidala');
INSERT INTO Weapon VALUES('Blaster Pistol', 'Gold', 'Bail Organa');
INSERT INTO Weapon VALUES('Lightsaber', 'Red', 'Anakin Skywalker');
INSERT INTO Weapon VALUES('Lightsaber', 'Blue', 'Luke Skywalker');
INSERT INTO Weapon VALUES('Lightsaber', 'Green', 'Kwi-Gon Jinn');
INSERT INTO Weapon VALUES('Lightsaber', 'Red', 'Darth Maul');
INSERT INTO Weapon VALUES('Lightsaber', 'Blue', 'Obi-Wan Kenobi');
INSERT INTO Weapon VALUES('Blaster', 'Black', 'Saw Gerrara');

```

Example that doesn't satisfy requirements so it is not entered:

```

INSERT INTO Weapon VALUES('Lightsaber', 'Blue', 'Jarjar Binks');

```

MENTORSHIP

```
INSERT INTO Mentorship VALUES('Obi-Wan Kenobi', 'Luke Skywalker', 5, 10, 'Jedi Order');
INSERT INTO Mentorship VALUES('Kwi-Gon Jinn', 'Anakin Skywalker', 1540,1541, 'Jedi
    Order');
INSERT INTO Mentorship VALUES(Sheev Palpative, Darth Maul, 9, 50, 'Galactic Republic');
```

VEHICLE TABLES (all 4 of them)

```
INSERT INTO VUsedIn VALUES(Millennium Falcon, Battle of Yavin);
INSERT INTO VUsedIn VALUES(Koensayr BTL, Duel on Mustafar);
INSERT INTO VUsedIn VALUES(Red Five, Battle of Kamino);
INSERT INTO VUsedIn VALUES(Executor, Battle of Naboo);
```

```
INSERT INTO UsesV VALUES(Anakin Skywalker, Executor);
INSERT INTO UsesV VALUES(Chewbacca, Millennium Falcon);
INSERT INTO UsesV VALUES(Sheev Palpative, Red Five);
INSERT INTO UsesV VALUES(Darth Maul, Scimitar);
```

```
INSERT INTO VehicleType VALUES(Executor,Super Star Destroyer);
INSERT INTO VehicleType VALUES(Red Five, X-wing);
INSERT INTO VehicleType VALUES(Koensayr BTL,Y-wing);
INSERT INTO VehicleType VALUES(Millennium Falcon, Corellian Light Freighter)
INSERT INTO VehicleType VALUES(Scimitar, Sith Infiltrator);
INSERT INTO VehicleType VALUES(Eclipse, Star Dreadnaught);
```

```
INSERT INTO TypeHyperSpace VALUES(Super Star Destroyer, TRUE);
INSERT INTO TypeHyperSpace VALUES(X-wing, TRUE);
INSERT INTO TypeHyperSpace VALUES(Y-wing, TRUE);
INSERT INTO TypeHyperSpace VALUES(Corellian Light Freighter, TRUE);
INSERT INTO TypeHyperSpace VALUES(Sith Infiltrator, TRUE);
INSERT INTO TypeHyperSpace VALUES(Star Dreadnaught, TRUE);
```

DIVISION OF LABOUR

Philip Akkerman	Position (<u>cname</u> , <u>uname</u> , pfrom, pto) Mentorship (<u>mname</u> , <u>aname</u> , uname, mfrom, mto) VUsedIn (<u>vname</u> , <u>bname</u>) UsesV (<u>cname</u> , <u>vname</u>) Weapon (<u>cname</u> , <u>wtype</u> , <u>wcolour</u> , <u>since</u>) CREATE TRIGGER insertOnPoliticalUnit CREATE TRIGGER lightsaberCheck CREATE VIEW CharacterInfo Documentation Presentation
Shivdeep Khangura	Political_Unit (<u>uname</u> , utype) Planet (<u>pname</u> , x, y, z) Battle (<u>bname</u> , byear, pname, uname) VehicleType (<u>vname</u> , vtype) TypeHyperSpace (<u>vtype</u> , hyperspace_capability) CREATE TRIGGER deleteOnPosition CREATE TRIGGER lightsaberCheck CREATE VIEW WeaponInfo CREATE VIEW MentorshipInfo Documentation Presentation
Karina Bissessar	Character (<u>cname</u> , alias, gender, pname) JediSith (<u>cname</u> , level) DroidName (<u>cname</u> , dtype) DroidMainSkill (<u>dtype</u> , main_skill) CREATE TRIGGER updateOnPosition CREATE TRIGGER lightsaberCheck CREATE VIEW VehicleInfo CREATE VIEW PlanetInfo Documentation Presentation