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FÉDÉRALE DE LAUSANNE

Databases Project – Spring 2018

Team No: 02

Names: Zeineb SAHNOUN – Nourchene BEN ROMDHANE – Mehdi HACHICH

Contents

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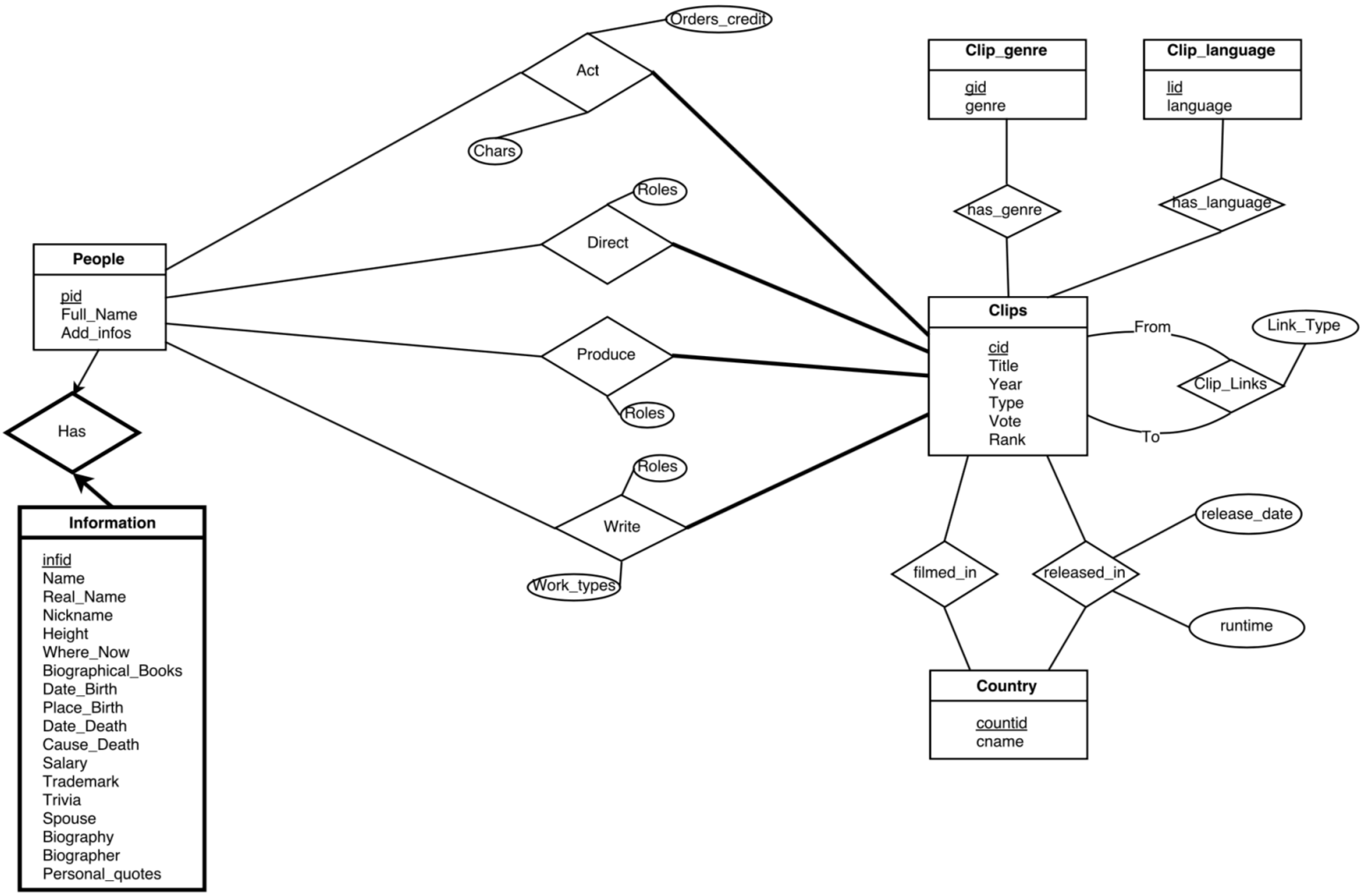
Deliverable 1

Assumptions

- We assumed that an actor/director/producer/writer may not participate in a clip.
- A clip has at least one actor/director/producer/writer that participates in it.
- After examinating the data, we found that a person has 0 or 1 biography.

Entity Relationship Schema



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Description of the ER diagram:

- We choose to create an entity People which gathers the actors, directors, producers and writers, since they have the same attributes. We can differentiate them by their relation with the clip.
- We choose to represent the biography of each person by a weak entity Information because without a person, a biography does not exist.
- We choose to represent the clips by an entity named Clips. Since a clip can be released in many countries, we decided to create an entity named Country. We used the same reasoning for entities Clip_genre and Clip_language (A clip can have many genres and languages).
- We choose to create an integer id for each entity, since strings are not efficient.

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```
CREATE TABLE People(
        pid INTEGER,
        full_name CHAR(32),
        add_infos CHAR(32),
        PRIMARY KEY (pid))

CREATE TABLE Informations(
        inf_id INTEGER,
        name CHAR(32),
        real_name CHAR(32),
        nickname CHAR(32),
        height CHAR(10),
        where_now CHAR(64),
        biographical_books CHAR(128),
        date_birth CHAR(32),
        place_birth CHAR(32),
        date_death CHAR(32),
        cause_death CHAR(32),
        salary FLOAT,
        trademark CHAR(128),
        trivia CHAR(128),
        spouse CHAR(32),
        biography
        biographer CHAR(32)
        personal_quotes CHAR(128)
        pid CHAR(10) NOT NULL,
        PRIMARY KEY (inf_id, pid),
        FOREIGN KEY (pid) REFERENCES People (pid), ON DELETE CASCADE)

CREATE TABLE Act(
        pid INTEGER,
        cid INTEGER,
        orders_credits CHAR(10)
        chars CHAR(64),
        PRIMARY KEY (pid, cid),
        FOREIGN KEY (pid) REFERENCES People (pid)
        FOREIGN KEY (cid) REFERENCES Clips (cid))

CREATE TABLE Direct(
        pid INTEGER,
        cid INTEGER,
        roles CHAR(64),
        PRIMARY KEY (pid, cid),
        FOREIGN KEY (pid) REFERENCES People (pid)
        FOREIGN KEY (cid) REFERENCES Clips (cid))

CREATE TABLE Produce(
        pid INTEGER,
        cid INTEGER,
        roles CHAR(64),
        PRIMARY KEY (pid, cid),
        FOREIGN KEY (pid) REFERENCES People (pid)
        FOREIGN KEY (cid) REFERENCES Clips (cid))
```

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```
CREATE TABLE Write(
        pid INTEGER,
        cid INTEGER,
        roles CHAR(64),
        work_types CHAR(32),
        PRIMARY KEY (pid, cid),
        FOREIGN KEY (pid) REFERENCES People (pid)
        FOREIGN KEY (cid) REFERENCES Clips (cid))

CREATE TABLE Clips(
        cid INTEGER NOT NULL,
        clipid_to INTEGER NOT NULL,
        - - needed by the Clip_links relationship
        title CHAR(64),
        vote INTEGER,
        rank FLOAT,
        year INTEGER,
        link_type CHAR(32),
        PRIMARY KEY (cid))
        FOREIGN KEY (cid_to) REFERENCES Clips (cid))

CREATE TABLE Country(
        countid INTEGER,
        cname CHAR(32),
        PRIMARY KEY(countid))

CREATE TABLE Released(
        cid INTEGER,
        countid INTEGER,
        release_date CHAR(32),
        release_country CHAR(32),
        PRIMARY KEY (cid,countid),
        FOREIGN KEY (cid) REFERENCES Clips(cid),
        FOREIGN KEY (countid) REFERENCES Country(countid))


CREATE TABLE Clip_genre(
        gid INTEGER,
        gnome CHAR(20)
        PRIMARY KEY (gid))

CREATE TABLE Has_genre(
        cid INTEGER,
        gid INTEGER,
        PRIMARY KEY (cid,gid),
        FOREIGN KEY (cid) REFERENCES Clips(cid),
        FOREIGN KEY (gid) REFERENCES Clip_genre(gid))

CREATE TABLE Clip_language(
        lid INTEGER,
        langage CHAR(20)
        PRIMARY KEY (lid))


CREATE TABLE Has_language(
        cid INTEGER,
        lid INTEGER,
        PRIMARY KEY (cid,lid),
        FOREIGN KEY (cid) REFERENCES Clips(cid),
        FOREIGN KEY (lid) REFERENCES Clip_langage(lid))
```

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```
CREATE TABLE Filmed_in(
        countid INTEGER,
        cid INTEGER,
        PRIMARY KEY (cid,countid),
        FOREIGN KEY (cid) REFERENCES Clips(cid),
        FOREIGN KEY (countid) REFERENCES Country(countid))
```

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Deliverable 2

Changes in the ER Diagram

- Following the feedback we got for deliverable 1, we changed the runs_for and released_in relationships as ternary relationships as suggested. We also made ACT a ternary relationship and added the Character entity. We also created new weak entities for spouse and BiographicalBooks.

- When loading the data, we noticed there was a large number of clip_links which were between the same two clips but with different link_types, so we decided to make clip_links a ternary relashionship and create a new entity called link_types (see ER Diagram)

- When loading the data, we noticed that Add_infos field was seperated to many values just like the orders_credit and Roles, so we made it an attribute of the relation act instead of an attribute of People.

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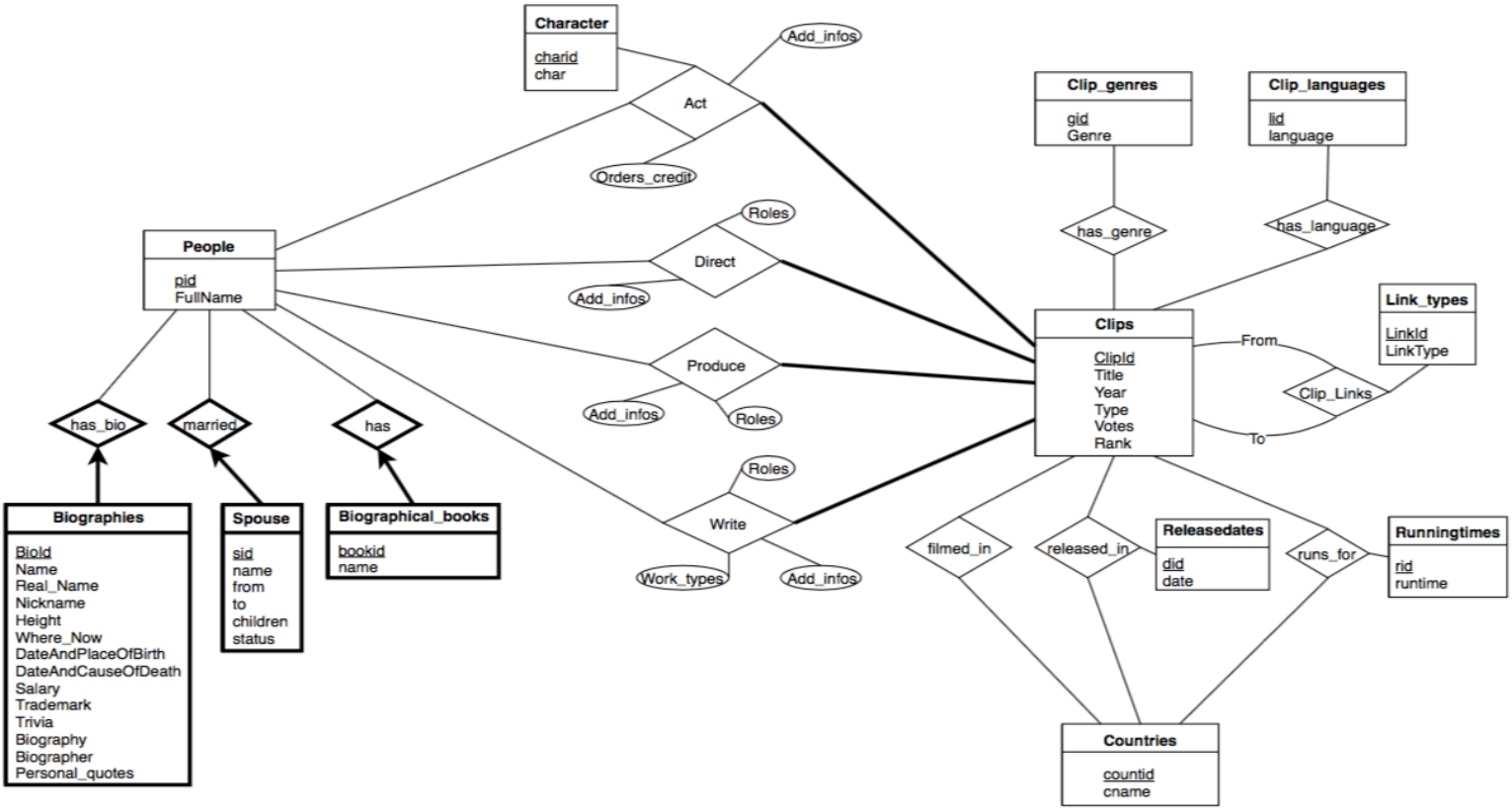
New the ER Diagram



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New DDL Commands

```
CREATE TABLE people(
        pid INTEGER,
        FullName VARCHAR2(100),
        PRIMARY KEY (pid));

CREATE TABLE act(
        pid INTEGER,
        ClipIds INTEGER,
        charid INTEGER,
        OrdersCredit INTEGER,
        AddInfos VARCHAR2(100),
        PRIMARY KEY (pid, ClipIds, charid),
        FOREIGN KEY (pid) REFERENCES People,
        FOREIGN KEY (ClipIds) REFERENCES Clips,
        FOREIGN KEY (charid) REFERENCES Character);

CREATE TABLE Direct(
        pid INTEGER,
        ClipIds INTEGER,
        Roles VARCHAR2(90),
        AddInfos VARCHAR2(350),
        PRIMARY KEY (pid, ClipIds),
        FOREIGN KEY (pid) REFERENCES People,
        FOREIGN KEY (ClipIds) REFERENCES Clips );

CREATE TABLE Produce(
        pid INTEGER,
        ClipIds INTEGER,
        Roles VARCHAR2(100),
        AddInfos VARCHAR2(250),
        PRIMARY KEY (pid, ClipIds),
        FOREIGN KEY (pid) REFERENCES People,
        FOREIGN KEY (ClipIds) REFERENCES Clips);

CREATE TABLE Write(
        pid INTEGER,
        ClipIds INTEGER,
        Roles VARCHAR2(60),
        AddInfos VARCHAR2(400),
        WorkTypes CHAR(32),
        PRIMARY KEY (pid, ClipIds),
        FOREIGN KEY (pid) REFERENCES People,
        FOREIGN KEY (ClipIds) REFERENCES Clips);

CREATE TABLE Biographical_books(
        bookid INTEGER,
        name VARCHAR2(400),
        pid INTEGER NOT NULL,
        PRIMARY KEY (bookid, pid),
        FOREIGN KEY (pid) REFERENCES People (pid) ON
DELETE CASCADE);

CREATE TABLE biographies(
        BioId INTEGER,
        pid INTEGER NOT NULL,
        FullName VARCHAR(80),
        RealName VARCHAR(250),
        Nickname VARCHAR(400),
        DateAndPlaceOfBirth VARCHAR(150),
        Height VARCHAR(20),
        biography BLOB,
        biographer VARCHAR(150),
        DateAndCauseOfDeath VARCHAR(250),
        Trivia BLOB,
        PersonalQuotes BLOB,
        Salary BLOB,
        Trademark BLOB,
        WhereAreTheyNow BLOB,
        PRIMARY KEY (BioId, pid),
        FOREIGN KEY (pid) REFERENCES People (pid) ON
        DELETE CASCADE);


CREATE TABLE married(
        pid INTEGER,
        sid INTEGER,
        name VARCHAR2(150),
        since INTEGER,
        untill INTEGER,
        children VARCHAR2(80),
        status VARCHAR2(80),
        PRIMARY KEY (pid , sid),
        FOREIGN KEY (pid) REFERENCES People ON DELETE
        CASCADE);

CREATE TABLE Clips(
        ClipIds INTEGER,
        Title VARCHAR2(400),
        Year INTEGER,
        Type VARCHAR2(20),
        Votes INTEGER,
        Rank FLOAT,
        PRIMARY KEY (ClipIds));

CREATE TABLE Link_types(
        LinkId INTEGER,
        LinkType VARCHAR2(30),
        PRIMARY KEY(LinkId));
```

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```
CREATE TABLE Clip_Links(
        ClipFrom INTEGER,
        ClipTo INTEGER,
        LinkId INTEGER,
        PRIMARY KEY (ClipFrom , ClipTo, LinkId),
        FOREIGN KEY (ClipFrom) REFERENCES Clips (ClipIds),
        FOREIGN KEY (ClipTo) REFERENCES Clips (ClipIds),
        FOREIGN KEY (LinkId) REFERENCES Link_types
(LinkId));

CREATE TABLE Character(
        charid INTEGER,
        Chars VARCHAR2(800),
        PRIMARY KEY (charid));

CREATE TABLE Clip_languages(
        lid INTEGER,
        Langage VARCHAR2(80),
        PRIMARY KEY (lid));

CREATE TABLE has_language(
        ClipId INTEGER,
        lid INTEGER,
        PRIMARY KEY (ClipId,lid),
        FOREIGN KEY (ClipId) REFERENCES Clips(ClipIds),
        FOREIGN KEY (lid) REFERENCES Clip_languages(lid));


CREATE TABLE countries(
        countid INTEGER,
        CountryName VARCHAR2(50),
        PRIMARY KEY(countid));

CREATE TABLE filmed_in(
        ClipId INTEGER,
        countid INTEGER,
        PRIMARY KEY (ClipId, countid),
        FOREIGN KEY (ClipId) REFERENCES Clips(ClipIds),
        FOREIGN KEY (countid) REFERENCES
        Countries(countid));

CREATE TABLE released_in(
        ClipId INTEGER,
        countid INTEGER,
        did INTEGER,
        PRIMARY KEY (ClipId, countid, did),
        FOREIGN KEY (ClipId) REFERENCES Clips(ClipIds),
        FOREIGN KEY (countid) REFERENCES
Countries(countid),
        FOREIGN KEY (did) REFERENCES Releasedates(did));

CREATE TABLE Releasedates(
        did INTEGER,
        Releasedate INTEGER,
        PRIMARY KEY(did));

CREATE TABLE Clip_genre(
        gid INTEGER,
        Genre VARCHAR2(20),
        PRIMARY KEY (gid));

CREATE TABLE Has_genre(
        ClipId INTEGER,
        gid INTEGER,
        PRIMARY KEY (ClipId,gid),
        FOREIGN KEY (ClipId) REFERENCES Clips(ClipIds),
        FOREIGN KEY (gid) REFERENCES Clip_genre(gid));

 CREATE TABLE Runningtimes(
        rid INTEGER,
        runtime INTEGER,
        PRIMARY KEY(rid));

CREATE TABLE Runs_for(
        ClipId INTEGER,
        countid INTEGER,
        rid INTEGER,
        PRIMARY KEY (ClipId, countid, rid),
        FOREIGN KEY (ClipId) REFERENCES Clips(ClipIds),
        FOREIGN KEY (countid) REFERENCES
        Countries(countid),
        FOREIGN KEY (rid) REFERENCES Runningtimes(rid));
```

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Data Loading

- We had to ignore 7 rows from the Biographies.cvs file because they had more entries than expected (more commas ,)

- The running_times and release_dates tables given to us had NAN countryname for more than half of their entries. Given our ER Diagram, we cannot have NAN in countryname field, after getting advice from the TAs we decided to set the null countrynames to value 'Other' to avoid dropping data.

- The RunningTime field of the table running_times was corrupted, each cell had its own time format. We first dropped the entries which had RunningTime =NAN(which represent *7% of the table)* as they don't add any information. Then to make the field uniform we decided to keep all the running times in minutes.
  For that we created some patterns (example : *str.extract('(\d+)(\.|\'|\s*minutes|\s*mins|\s*min)')* and dropped the entries which does not fit this pattern(which represent *0.1% of the table*)
  (see fig1 & fig2 below for data before/after cleaning)

	ClipId	ReleaseCountry	RunningTime
87	1778609	Australia	11 x 15 mins
1780	1819408	UK	30 6 episodes
2087	1827372	Germany	13x3
3834	1857131	NaN	45/90
5020	1875416	UK	3x60
7899	1949906	Australia	13 x 48
9239	1972720	USA	28.30
9805	1984856	Germany	30-60
12331	2022709	NaN	44;40
14634	2052443	UK	13 x 30mins

figure1: some of the data before cleaning

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	ClipId	CountryName	runtime
0	4	USA	83
1	1773811	Other	30
2	1773839	USA	30
3	1773843	Other	30
4	1773856	Other	30
5	1773857	Other	30

figure2: some of the data after cleaning

- After examining the queries (in particular query h of deliverable 3), we decided to represent the NAN values in Act.OrdersCredit with the default value 0 that way we can have the column as INTEGER type.

- The Spouse field of the Biographies table had many informations at once (name of the spouse, beginning and ending of the marriage, number of children, status of the relationship). Thus we created a pattern and extracted those informations under different fields. (some patterns used were *str.extract("\;(.*)"), str.extract("\) \((.*)\)"*)
There were also many spouses on the same field separated by this character |. So we extracted them each on a different line. *(see fig3 & fig4 below for data before/after cleaning)*

Spouse	pid
'Jacklyn Zeman' (14 February 1979 - 1981) (divorced)	30
'Angela Arabo' (? - ?)	47
'Rosamond Broughton' (10 October 1938 - 16 March 1995) (his death); 6 children	103
'Linda' (? - 5 August 2005) (his death)	143
'Almina Wombwell' (26 June 1895 - 5 April 1923) (his death); 2 children	215
'Ottilie Losch' (1 September 1939 - 1947) (divorced)|'Anne Wendell' (17 July 1922 - 1936) (divorced); 2 children	230
'Jean Wallop' (7 January 1956 - 11 September 2001) (his death); 3 children	237
'Fiona Aitken' (18 February 1998 - present); 1 child|'Jayne Wilby' (16 December 1989 - January 1998) (divorced); 2 children	247
'Dr. Lao Sealey' (23 April 2005 - present)	321
'Krishnaveni Jikki' (? - present)	329
'Maurice Jose de Leon' (24 June 1961 - 11 June 1964) (divorced)|'Joseph E. McDonald' (6 April 1967 - January 1969) (divorced)|'Ronald Fisher' (1970 - 5 January 2010) (her death); 1 child	387

figure3: data before

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name	pid	sid	from	to	children	status
Jacklyn Zeman	30	40876	1979.0	1981.0	NaN	divorced
Angela Arabo	47	5002	NaN	NaN	NaN	NaN
Rosamond Broughton	103	83183	1938.0	1995.0	6 children	his death
Linda	143	57765	NaN	2005.0	NaN	his death
Almina Wombwell	215	3565	1895.0	1923.0	2 children	his death
Ottilie Losch	230	74510	1939.0	1947.0	NaN	divorced
Anne Wendell	230	6424	1922.0	1936.0	2 children	divorced
Jean Wallop	237	43561	1956.0	2001.0	3 children	his death
Fiona Aitken	247	30327	1998.0	NaN	1 child	NaN
Jayne Wilby	247	43254	1989.0	1998.0	2 children	divorced

figure4: data after

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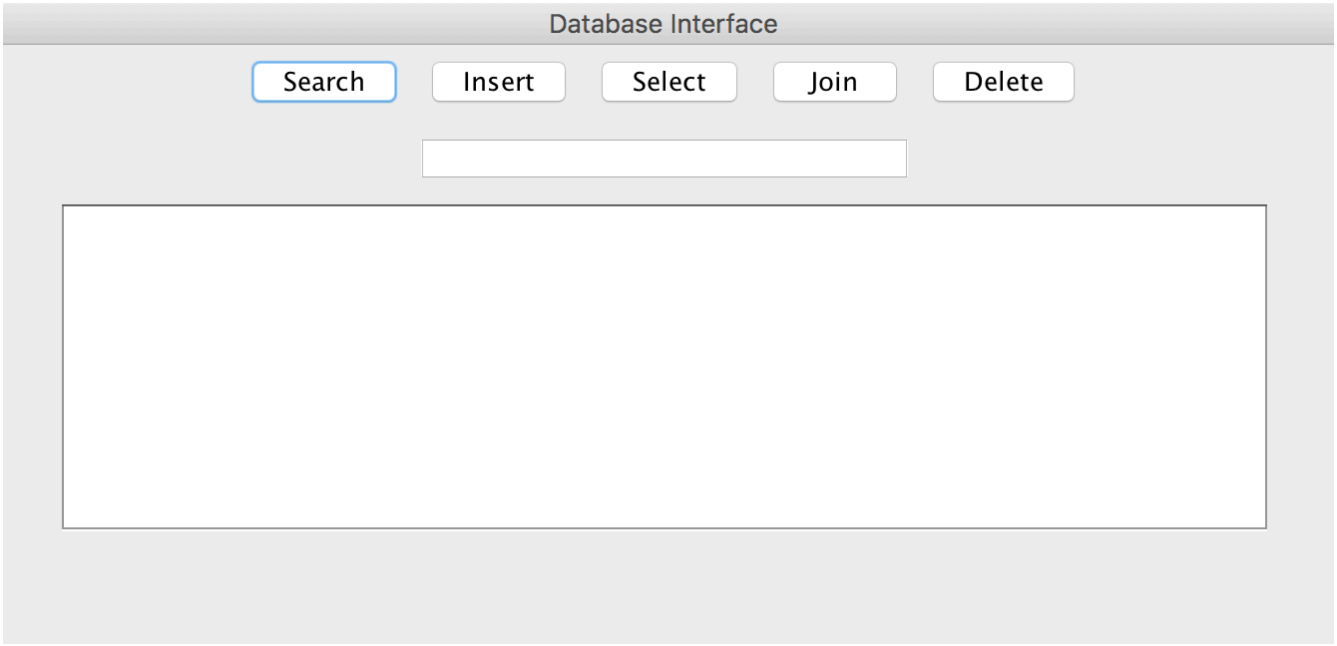
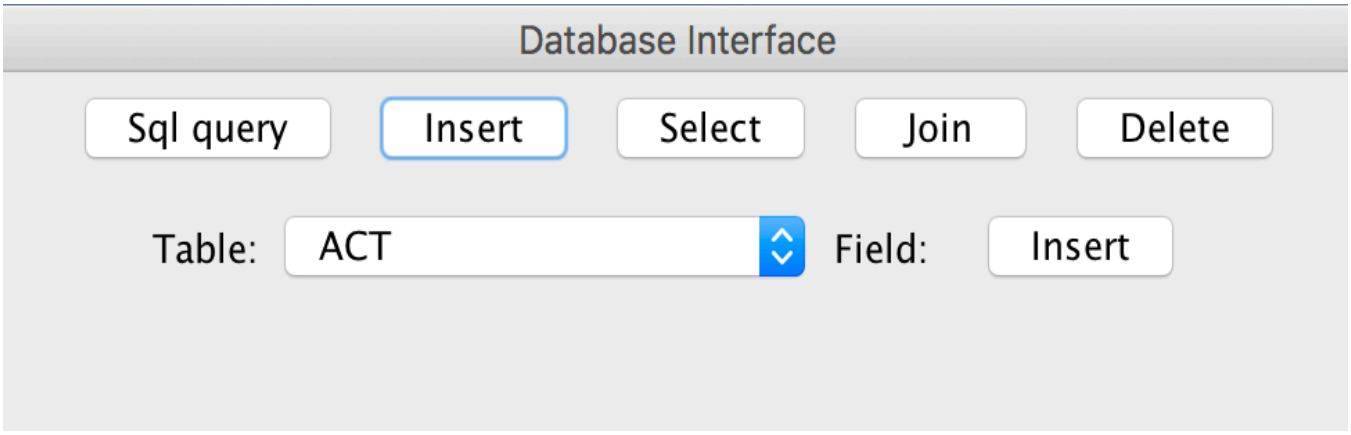
Interface

Here we implemented our first version of the interface. You can find the screenshots below :





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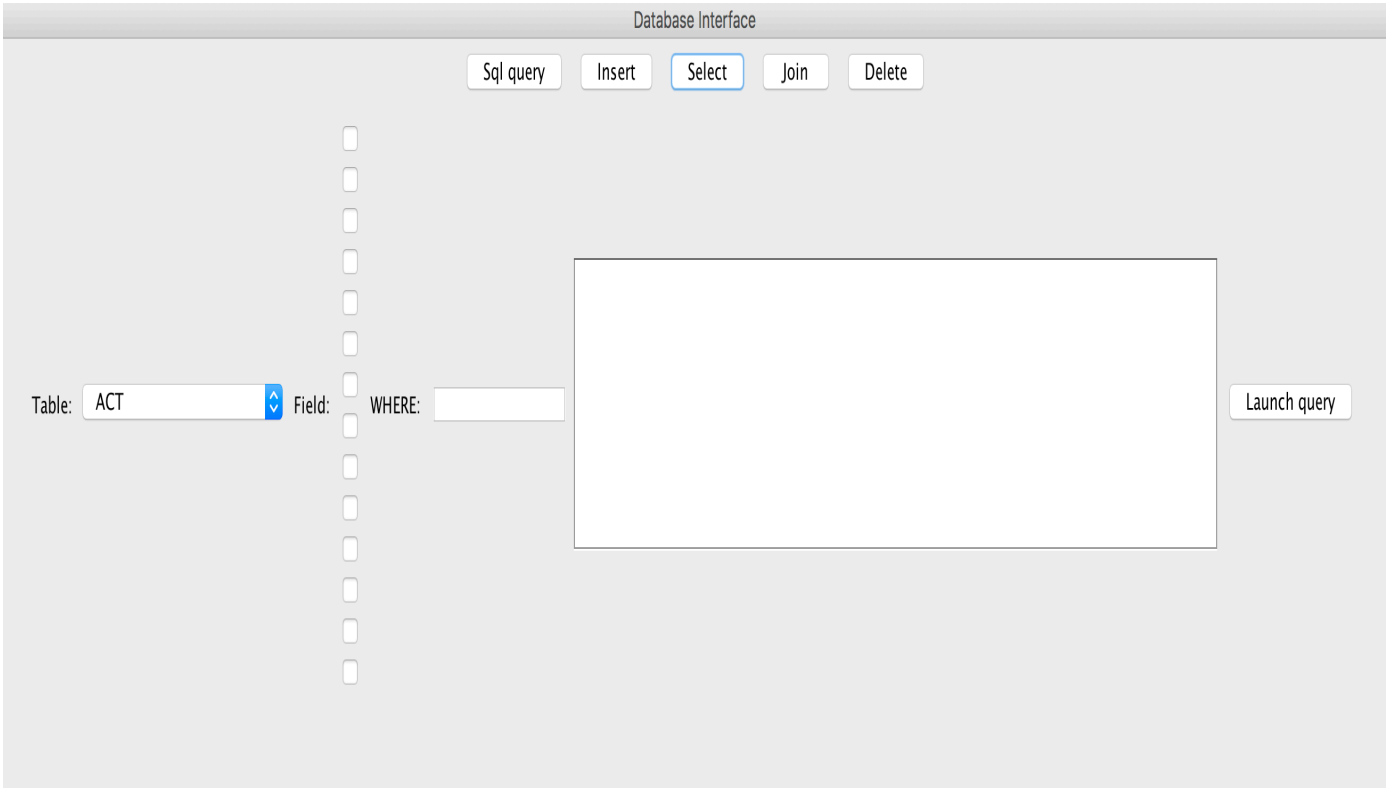

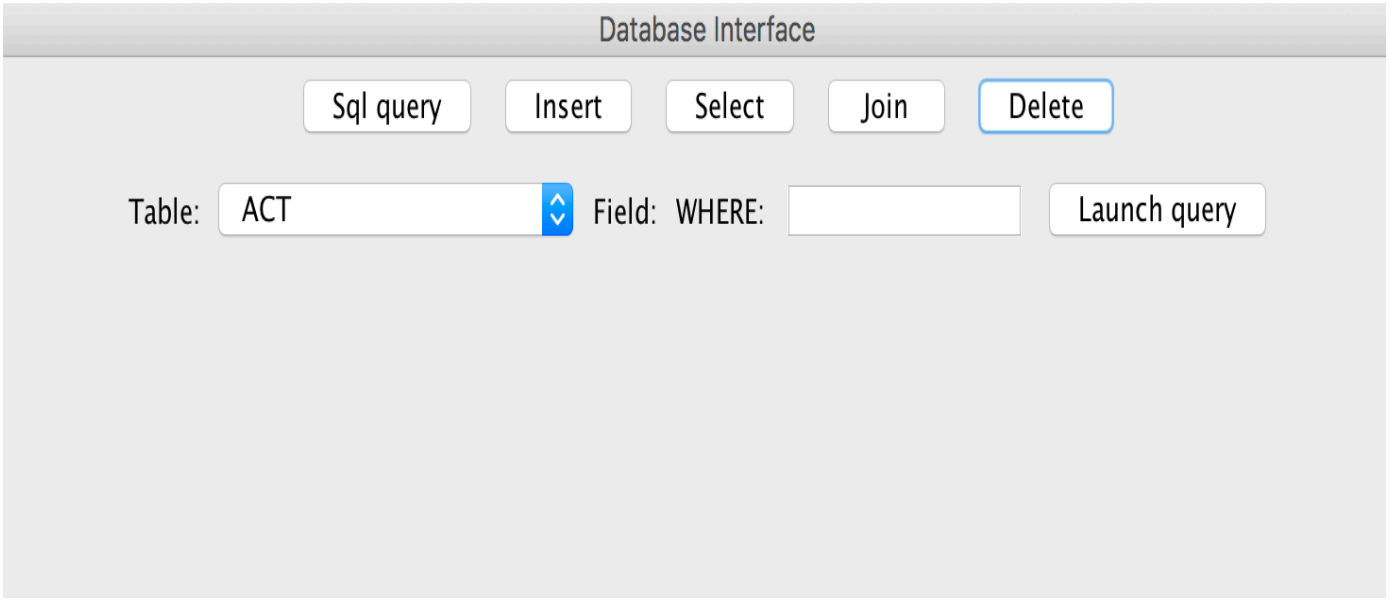

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Deliverable 3

Query Implementation

MILESTONE 2

Query a:

Description of logic: Prints the name and length of the 10 longest clips that were released in France.

```
SELECT c.title, rt.runtime
FROM runs_for rf, runningTimes rt, clips c, countries cn
WHERE c.CLIPIDS=rf.clipid AND rf.rid=rt.rid AND rf.countid=cn.countid
AND cn.COUNTRYNAME='France'
ORDER BY rt.runtime DESC
FETCH FIRST 10 ROWS ONLY;
```

Query b:

Description of logic: Computes the number of clips released per country in 2001.

```
SELECT cn.countryname, COUNT(r.clipid) AS number_of_clips
FROM released_in r, releasedates rd, countries cn
WHERE r.did=rd.DID AND rd.RELEASEDATE='2001' AND cn.COUNTID=r.COUNTID
GROUP BY cn.countryname;
```

Query c:

Description of logic: Computes the numbers of clips per genre released in the USA after 2013.

```
SELECT g.genre, COUNT(hg.clipid) AS number_of_clips
FROM clip_genre g, has_genre hg, released_in r, RELEASEDATES rd, countries cn
WHERE hg.gid=g.gid AND r.DID=rd.DID AND rd.RELEASEDATE>2013 AND r.countid=cn.countid
AND cn.countryname='USA' AND r.CLIPID=hg.CLIPID
GROUP BY g.genre;
```

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Query d :

Description of logic: Prints the name of actor/actress who has acted in more clips than anyone else.

```
SELECT fullname FROM

(SELECT p.fullname, COUNT(ac.clipids) AS number_of_clips

FROM people p, act ac, clips c

WHERE p.pid=ac.PID and ac.CLIPIDS=c.CLIPIDS

GROUP BY p.fullname

ORDER BY number_of_clips DESC

FETCH FIRST 1 ROWS ONLY);
```

Query e :

Description of logic: Prints the maximum number of clips any director has directed.

```
SELECT number_of_clips FROM

(SELECT d.pid, COUNT(d.clipids) AS number_of_clips

FROM direct d, clips c

WHERE d.CLIPIDS=c.CLIPIDS

GROUP BY d.pid

ORDER BY number_of_clips DESC

FETCH FIRST 1 ROWS ONLY);
```

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Query f:

Description of logic: Prints the names of people that had at least 2 different jobs in a single clip.

```
SELECT people.fullname

FROM people

WHERE people.pid IN

(SELECT pid FROM

(SELECT pid, Clipids FROM act GROUP BY pid, Clipids

UNION ALL

SELECT pid, Clipids FROM direct

UNION ALL

SELECT pid, Clipids FROM produce

UNION ALL

SELECT pid, Clipids FROM write)

GROUP BY pid, clipids

HAVING COUNT(*) > 1);
```

Query g:

Description of logic: Print the 10 most common clip languages.

```
SELECT language FROM

(SELECT cl.language, COUNT(hl.clipid) AS number_of_clips

FROM clip_languages cl, has_language hl

WHERE cl.lid=hl.lid

GROUP BY cl.language

ORDER BY number_of_clips DESC

FETCH FIRST 10 ROWS ONLY);
```

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Query h:

Description of logic: Prints the full name of the actor who has performed in the highest number of clips with a user-specified type.

```
--suppose the user specified type is Fantasy

SELECT fullname FROM

(SELECT p.fullname, COUNT(ac.clipids) AS number_of_clips

FROM people p, act ac, clips c, has_genre hg, clip_genre g

WHERE p.pid=ac.PID AND ac.CLIPIDS=c.CLIPIDS

AND c.clipids=hg.clipid AND hg.gid=g.gid AND g.GENRE='Fantasy'

GROUP BY p.fullname

ORDER BY number_of_clips DESC

FETCH FIRST 1 ROWS ONLY);
```

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MILESTONE 3

Query a:

Description of logic: Prints the names of the top 10 actors ranked by the average rating of their 3 highest-rated clips that where voted by at least 100 people.

```
SELECT p.fullname
FROM people p
WHERE p.pid IN
  (SELECT pid FROM
   (SELECT ac.pid,c.rank, row_number()
   OVER (PARTITION BY ac.pid ORDER BY c.rank DESC) AS index_clip_per_actor
   FROM clips c, act ac
   WHERE ac.CLIPIDS=c.CLIPIDS AND c.votes>100 AND ac.pid IN
    (SELECT pid FROM
     (SELECT DISTINCT ac.pid, ac.clipids
     FROM act ac)
    GROUP BY pid
    HAVING count(*)>5))
    WHERE index_clip_per_actor<4
    GROUP BY pid
    ORDER BY AVG(rank) DESC
    FETCH FIRST 10 ROWS ONLY);
```

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Query b:

Description of logic: Computes the average rating of the top-100 rated clips per decade in decreasing order.

```
SELECT decade, AVG(rank) FROM
 (SELECT clipids, rank, decade,
 row_number() OVER (PARTITION BY decade ORDER BY rank DESC) AS index_clip_per_decade
 FROM
  (SELECT clipids, rank, FLOOR(year/ 10) * 10 AS decade
  FROM clips
  WHERE rank IS NOT NULL and year IS NOT NULL))
WHERE index_clip_per_decade < 101
GROUP BY decade
ORDER BY AVG(rank) DESC;
```

Query c:

Description of logic: For any video game director, prints the first year he/she directed a game, his/her name and all his/her game titles from that year.

```
SELECT fullname, year, game_titles FROM
 (SELECT year, fullname, game_titles,
 row_number() OVER (PARTITION BY fullname ORDER BY year) AS index_year_per_pid
 FROM
  (SELECT c.year, p.fullname,
  LISTAGG(c.title, ' , ') WITHIN GROUP (ORDER BY c.title) AS game_titles
  FROM direct d, clips c, people p
  WHERE d.clipids=c.CLIPIDS AND p.pid=d.pid AND c.type='VG'
  GROUP BY p.fullname,c.year))
WHERE index_year_per_pid=1;
```

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Query d:

Description of logic: For each year, prints the title, year and rank-in-year of top 3 clips, based on their ranking.

```
SELECT year,
LISTAGG(title, ' / ') WITHIN GROUP (ORDER BY rank DESC) as top3_clips_titles,
LISTAGG(rank, ' / ') WITHIN GROUP (ORDER BY rank DESC) as top3_clips_ranks
FROM
 (SELECT year, title, rank,
 row_number() OVER (PARTITION BY year ORDER BY rank DESC) AS index_clip_per_year
 FROM clips
 WHERE year IS NOT NULL and rank IS NOT NULL)
WHERE index_clip_per_year<4
GROUP BY year;
```

Query e:

Description of logic: Prints the names of all directors who have also written scripts for clips, in all of which they were additionally actors (but not necessarily directors) and every clip they directed has at least two more points in ranking than any clip they wrote.

```
SELECT p.fullname FROM people p,
  (WITH T AS
    (SELECT d.pid, c.rank
    FROM direct d, clips c
    WHERE c.clipids=d.clipids AND c.rank IS NOT NULL
    AND d.pid IN (SELECT DISTINCT pid FROM write)
    AND d.pid NOT IN
     (SELECT distinct pid FROM
       (SELECT w.pid, w.clipids FROM write w
```

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```
        WHERE (w.pid, w.clipids) NOT IN

        (SELECT ac.pid, ac.clipids FROM act ac))))

    SELECT T.pid, MIN(T.rank) AS min_rank_directed, MAX(c.rank) AS max_rank_written

    FROM T, WRITE w, clips c

    WHERE w.pid=T.pid AND w.clipids=c.clipids AND c.rank IS NOT NULL

    GROUP BY T.pid) S

WHERE S.min_rank_directed > S.max_rank_written+2 AND p.pid=S.pid;
```

Query f:

Description of logic: Prints the names of the actors that are not married and have participated in more than 2 clips that they both acted in and co-directed it.

```
SELECT DISTINCT p.fullname

FROM people p, married m

WHERE p.pid NOT IN m.PID AND p.pid IN

(SELECT pid FROM

 (SELECT pid, count(*) as nbr_clips_he_acted_directed from

   (SELECT pid, clipids FROM

     (SELECT pid, clipids, COUNT(*) AS number_of_jobs from

       (SELECT DISTINCT pid, Clipids FROM act

       UNION ALL

       SELECT pid, Clipids FROM direct)

     GROUP BY pid , clipids)

   WHERE number_of_jobs>1)

 GROUP BY pid)

WHERE nbr_clips_he_acted_directed>2);
```

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Query g:

Description of logic: Prints the names of screenplay story writers who have worked with more than 2 producers.

```
SELECT fullname FROM people WHERE PID IN
 (SELECT w.pid FROM
  (SELECT w.pid, w.clipids
  FROM write w
  WHERE w.worktypes='screenplay') w
 LEFT OUTER JOIN
  (SELECT p.clipids, COUNT(*) AS number_of_producers
  FROM produce p
  GROUP BY p.clipids) p
 ON w.clipids=p.clipids
 WHERE number_of_producers>2);
```

Query h:

Description of logic: Computes the average rating of an actor's clips (for each actor) when she/he has a leading role.

```
WITH T AS
 (SELECT pid, AVG(rank) AS average FROM
  (SELECT DISTINCT ac.pid, ac.clipids, ac.orderscredit, c.rank
  FROM act ac, clips c
  WHERE orderscredit<4 AND orderscredit>0 AND rank IS NOT NULL AND c.clipids=ac.clipids)
 GROUP BY pid)
SELECT p.fullname, T.average
FROM people p, T
WHERE p.pid=T.pid;
```

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Query i:

Description of logic: Computes the average rating for the clips whose genre is the most popular genre.

```
SELECT AVG(c.rank)
FROM clips c, has_genre hg,
   (SELECT gid, COUNT(*) AS nbr_clips
   FROM has_genre
   GROUP BY gid
   ORDER BY nbr_clips DESC
   FETCH FIRST 1 ROWS ONLY) s
WHERE hg.clipid=c.CLIPIDS AND hg.gid=s.gid
GROUP BY hg.gid;
```

Query j:

Description of logic: Prints the names of the actors that have participated in more than 100 clips, of which at least 60% where short but not comedies nor dramas, and have played in more comedies than double the dramas. Prints also the number of comedies and dramas each of them participated in.

```
SELECT p.fullname, l.nbr_of_comedy_clips, l.nbr_of_Drama_clips FROM people p,
 (SELECT DISTINCT s1.pid, s1.nbr_of_clips_per_genre AS nbr_of_comedy_clips, s2.nbr_of_clips_per_genre AS
nbr_of_Drama_clips
 FROM
 (SELECT pid, genre, COUNT(*) AS nbr_of_clips_per_genre FROM
  (SELECT pid, cg.genre
  FROM act a, clip_genre cg, has_genre hg
  WHERE a.clipids=hg.clipid AND hg.gid=cg.gid AND (cg.genre='Comedy' OR cg.genre='Drama'))
 GROUP BY pid, genre) s1
 JOIN
 (SELECT pid, genre, COUNT(*) AS nbr_of_clips_per_genre FROM
  (SELECT pid, cg.genre
```

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```
   FROM act a, clip_genre cg, has_genre hg

   WHERE a.clipids=hg.clipid AND hg.gid=cg.gid AND (cg.genre='Comedy' OR cg.genre='Drama'))

 GROUP BY pid, genre) s2

 ON s1.pid=s2.pid

 WHERE s1.genre='Comedy' AND s1.nbr_of_clips_per_genre>2*s2.nbr_of_clips_per_genre AND
s2.genre='Drama'

 AND s1.pid IN

 (SELECT R.pid FROM

  (SELECT pid, genre, nbr_of_clips_of_actor, COUNT(*) AS nbr_of_clips_per_genre

   FROM

    (WITH T AS

     (SELECT DISTINCT pid, nbr_of_clips_of_actor FROM

      (SELECT a.pid, COUNT(*) AS nbr_of_clips_of_actor

      FROM act a

      GROUP BY a.pid)

     WHERE nbr_of_clips_of_actor>100)

    SELECT T.pid, T.nbr_of_clips_of_actor, cg.genre

    FROM T, act a, clip_genre cg, has_genre hg

    WHERE T.pid=a.pid AND a.clipids=hg.clipid AND hg.gid=cg.gid)

  GROUP BY pid, genre, nbr_of_clips_of_actor) R

  WHERE (R.nbr_of_clips_per_genre > 0.6 * R.nbr_of_clips_of_actor and R.genre='Short'))) l

WHERE p.pid=l.pid;
```

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Query k:

Description of logic: Prints the number of Dutch movies whose genre is the second most popular one.

```
--We considered as movies the clips with types 'TV' and 'V'

SELECT COUNT(*) AS nbr_of_movies

FROM CLIP_LANGUAGES cl, has_language hl, clips c, has_genre hg

WHERE cl.lid=hl.lid AND cl.LANGUAGE='Dutch' AND c.CLIPIDS=hl.CLIPID AND

c.CLIPIDS=hg.CLIPID AND (c.type='V' or c.type='TV') AND hg.gid IN

 (SELECT gid FROM

  (SELECT gid, rownum AS rn FROM

   (SELECT gid, COUNT(*) AS nbr_clips

   FROM has_genre

   GROUP BY gid

   ORDER BY nbr_clips DESC

   FETCH FIRST 2 ROWS ONLY))

 WHERE rn=2);
```

Query l:

Description of logic: Prints the name of the producer whose role is coordinating producer, and who has produced the highest number of movies with the most popular genre.

```
--We considered as movies the clips with types 'TV' and 'V'

WITH T AS

 (SELECT pid, COUNT(*) as nbr_of_clips from

  (SELECT p.pid, p.CLIPIDS

  FROM produce p, has_genre hg, clips c

  WHERE p.ROLES='coordinating producer' AND p.CLIPIDS=hg.clipid AND p.CLIPIDS=c.clipids

  AND (c.type='V' OR c.type='TV') AND hg.GID IN

   (SELECT gid FROM
```

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```
    (SELECT gid, COUNT(*) AS nbr_clips
    FROM has_genre
    GROUP BY gid
    ORDER BY nbr_clips DESC
    FETCH FIRST 1 ROWS ONLY)))
  GROUP BY pid
  ORDER BY nbr_of_clips DESC
  FETCH FIRST 1 ROW ONLY)
SELECT p.fullname
FROM people p, T
WHERE p.pid=T.pid;
```

Query Analysis

- First of all, by looking into the documentation of Oracle, we found that:
  "Oracle Database enforces a UNIQUE key or PRIMARY KEY integrity constraint on a table by creating a unique index on the unique key or primary key. This index is automatically created by the database when the constraint is enabled. »
  So we decided to change our DDL commands so that we declare every unique attribute with the keyword UNIQUE. This way we have automatically created unique indexes for those attributes.

- Also, we rewrote some of our queries, to make them more efficient. We excluded projections that were not necessary and we factored the subqueries that were used multiple times in the same statement.
  This way we were able to improve the running time of some queries (figures below)

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Costs before

```
--query a
select p.fullname
from people p
where p.pid in
  (select pid from
    (select pid,avg(rank) from
      (select ac.pid,c.CLIPIDS,c.rank, row_number()
      over (partition by ac.pid order by c.rank desc) as index_clip
      from clips c, act ac
      where ac.CLIPIDS=c.CLIPIDS and c.votes>100 and ac.pid in
        (select pid from
          (select ac.pid, ac.clipids, count(*)
          from act ac
          group by ac.pid, ac.clipids)
        group by pid
```

ultat de requête ×
SQL | Toutes les lignes extraites : 10 en 37,045 secondes

```
select p.fullname from people p,
    (with T as
      (select d.pid, d.clipids, c.rank
      from direct d, clips c
      where c.clipids=d.clipids and c.rank is not null
      and d.pid in (select distinct pid from write)
      and d.pid not in
        (select distinct pid from
          (select w.pid, w.clipids from write w minus
            (select w.pid, w.clipids from write w, act ac
            where w.pid= ac.pid and  w.clipids=ac.clipids))))
    select T.pid, min(T.rank) as min_rank_directed, max(c.rank) as
    from T, write w, clips c
    where w.pid=T.pid and w.clipids=c.clipids and c.rank is not nul
    group by T.pid) S
where S.min_rank_directed > S.max_rank_written+2 and p.pid=S.pid;

--query f
```

tie de script × Résultat de requête ×
SQL | Toutes les lignes extraites : 22 en 15,496 secondes

```
--query l
with T as
  (select pid, count(*) as nbr_of_clips from
    (select p.pid, p.CLIPIDS
    from produce p, has_genre hg, clips c
    where p.ROLES='coordinating producer' and p.CLIPIDS=hg.clipi
    and (c.type='V' or c.type='TV') and hg.GID in
      (select gid from
        (select gid, count(*) as nbr_clips
        from has_genre
        group by gid
        order by nbr_clips desc
        FETCH FIRST 1 ROWS ONLY)))
  group by pid
  order by nbr_of_clips desc
  FETCH first 1 row only)
select p.fullname
from people p, T
where p.pid=T.pid;
```

ultat de requête ×
SQL | Toutes les lignes extraites : 1 en 0,927 secondes

Costs after

```
--query a
select p.fullname
from people p
where p.pid in
    (select pid from
      (select ac.pid,c.rank, row_number()
      over (partition by ac.pid order by c.rank desc) as index_c
      from clips c, act ac
      where ac.CLIPIDS=c.CLIPIDS and c.votes>100 and ac.pid in
        (select pid from
          (select distinct ac.pid, ac.clipids
          from act ac)
        group by pid
        having count(*)>5))
        where index_clip_per_actor<4
        group by pid
        order by avg(rank) desc
        FETCH FIRST 10 ROWS ONLY);
```

ésultat de requête ×
SQL | Toutes les lignes extraites : 10 en 30,776 secondes

```
--query e
select p.fullname from people p,
    (with T as
      (select d.pid, c.rank
      from direct d, clips c
      where c.clipids=d.clipids and c.rank is not null
      and d.pid in (select distinct pid from write)
      and d.pid not in
        (select distinct pid from
            (select w.pid, w.clipids from write w
            where (w.pid, w.clipids) not in
            (select ac.pid, ac.clipids from act ac))))
    select T.pid, min(T.rank) as min_rank_directed, max(c.rank)
    from T, write w, clips c
    where w.pid=T.pid and w.clipids=c.clipids and c.rank is not
    group by T.pid) S
where S.min_rank_directed > S.max_rank_written+2 and p.pid=S.pi
```

ésultat de requête ×
SQL | Toutes les lignes extraites : 22 en 7,502 secondes

```
--query l
with T as
  (select pid from
    (select p.pid, p.CLIPIDS
    from produce p, has_genre hg, clips c
    where p.ROLES='coordinating producer' and p.CLIPIDS=hg.cli
    and (c.type='V' or c.type='TV') and hg.GID in
        (select gid
        from has_genre
        group by gid
        order by count(*) desc
        FETCH FIRST 1 ROWS ONLY))
  group by pid
  order by count(*) desc
  FETCH first 1 row only)
select p.fullname
from people p, T
where p.pid=T.pid;
```

ultat de requête ×
SQL | Toutes les lignes extraites : 1 en 0,792 secondes

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Optimizations using indexes :

Query C

Initial Running time: 1,107 seconds

Optimized Running time: 0,936 seconds

Résultat de requête

SQL | 50 lignes extraites en 0,936 secondes

	FULLNAME		YEAR	GAME_TITLES
1	Abe Goro (II)	...	2003	Atsumare!! Made in Wario
2	Abe Masamichi	...	1995	Tekken 2
3	Abe Naomitsu	...	1997	G Darius
4	Abe Yukio (III)	...	1997	RayStorm
5	Abed Ramzi	...	2008	Slumber Party Slaughterhouse: The Game
6	Adair Peter (I)	...	1995	In the 1st Degree
7	Adams Mike (XII)	...	2003	Wanted: A Wild Western Adventure
8	Agostini De	...	1997	Il tesoro di Venezia
9	Airey Jeremy	...	1997	Clayfighter 63 1/3
10	Akamatsu H.	...	1987	Dracula II: Noroi no fûin
11	Akatsuka Tetsuya	...	2005	Soulcalibur III
12	Akiaten Brandon	...	2007	NBA '08 Featuring the Life: Vol 3
13	Akibayashi Koji	...	1987	Heavy Barrel
14	Akiyama Naoki	...	2005	Radiata Stories

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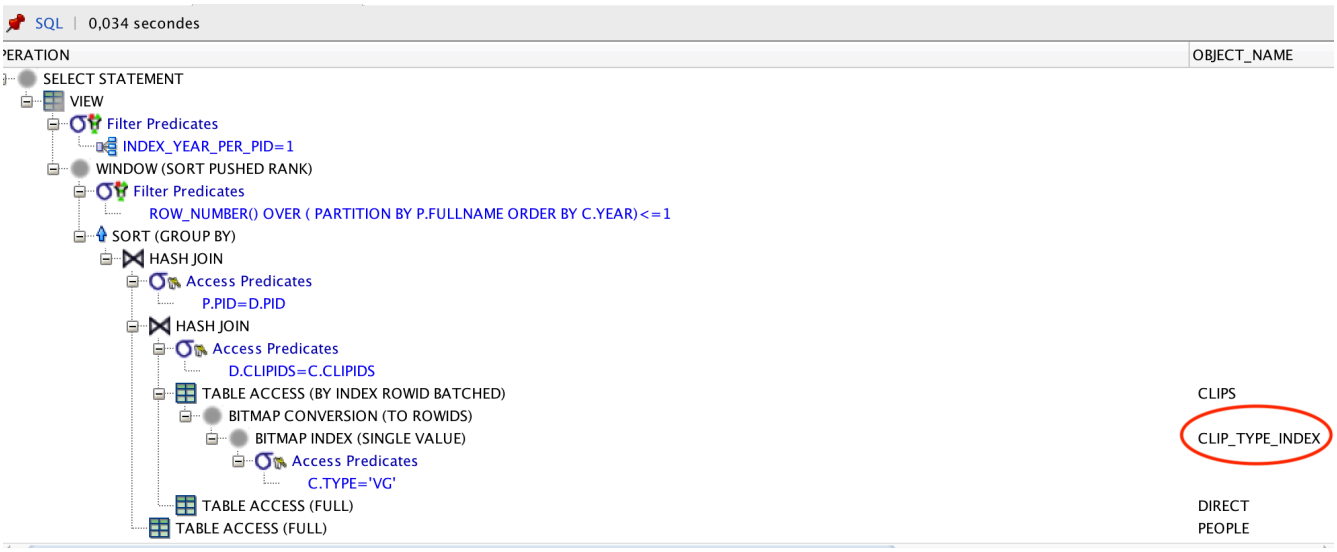
Initial plan :

Improved plan :



For this query, we decided to create a bitmap index on the attribute Type of the entity Clips, in order to avoid doing a full scan on the table Clips, and then to minimize the cost. The Bitmap index does not store a pointer to a record in a file sorted on the index, but a value encoded on one bit (true or false) for each value in the column indexed (2 bits for a cardinality 2, 3 for a cardinality 3, etc.) in a file sorted on the key. Bitmap indexes make searching very quick and easy in some cases and that's why we are essentially using these indexes in this project.

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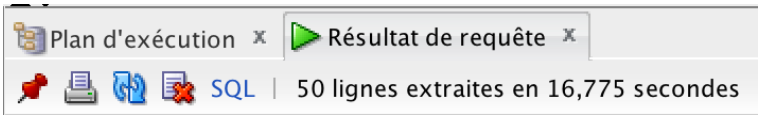
Query J

Initial running time : 16,775 seconds



Optimized running time : 9,532 seconds

Résultat de requête

SQL | 50 lignes extraites en 9,532 secondes

	FULLNAME		NBR_OF_COMEDY_CLIPS	NBR_OF_DRAMA_CLIPS
1	Chamberlin Riley	...	75	32
2	Turpin Ben	...	114	9
3	Thomas Billie 'Buckwheat'	...	96	1
4	Roland Ruth	...	113	23
5	Smith Pete (I)	...	101	9
6	Brennan John E.	...	121	6
7	Burns Bobby (I)	...	132	22
8	Sterling Ford	...	145	20
9	Deed André	...	152	2
10	Questel Mae	...	252	5
11	Dillon Edward	...	154	71
12	Arbuckle Roscoe 'Fatty'	...	114	3
13	Bunny John	...	121	11
14	Nash Clarence	...	174	7

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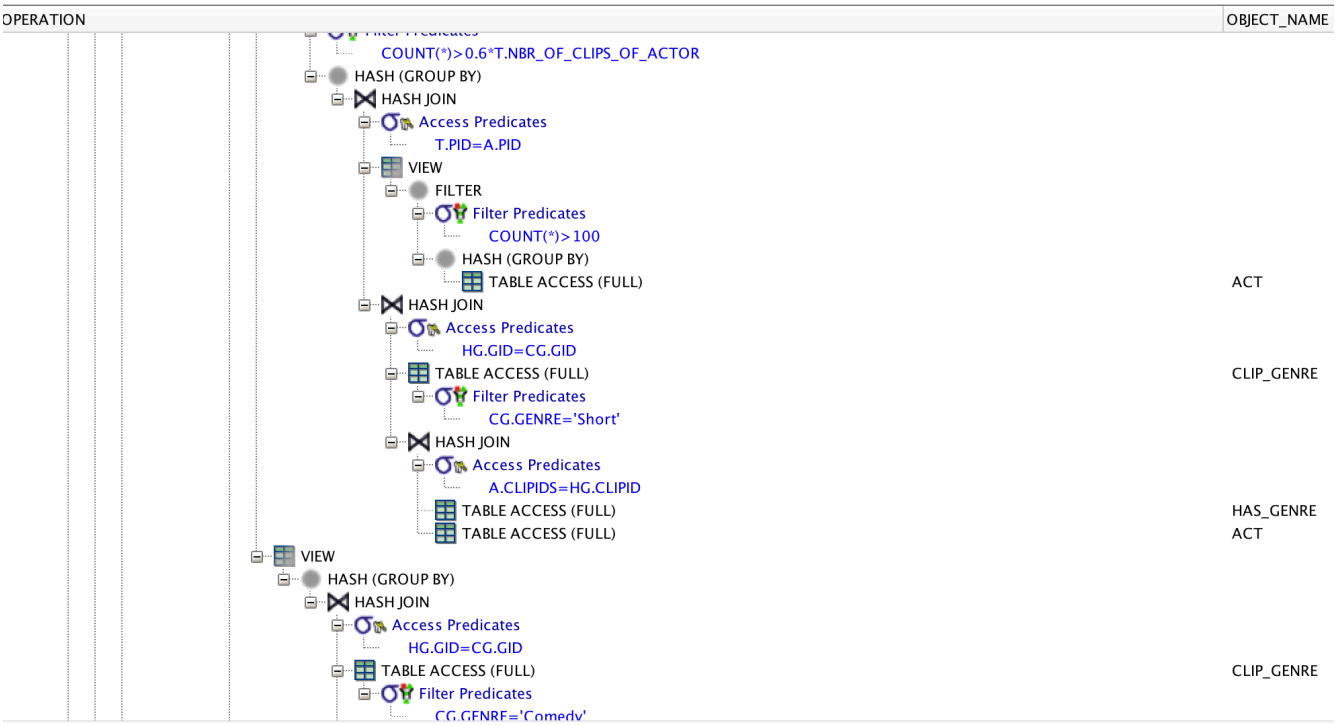
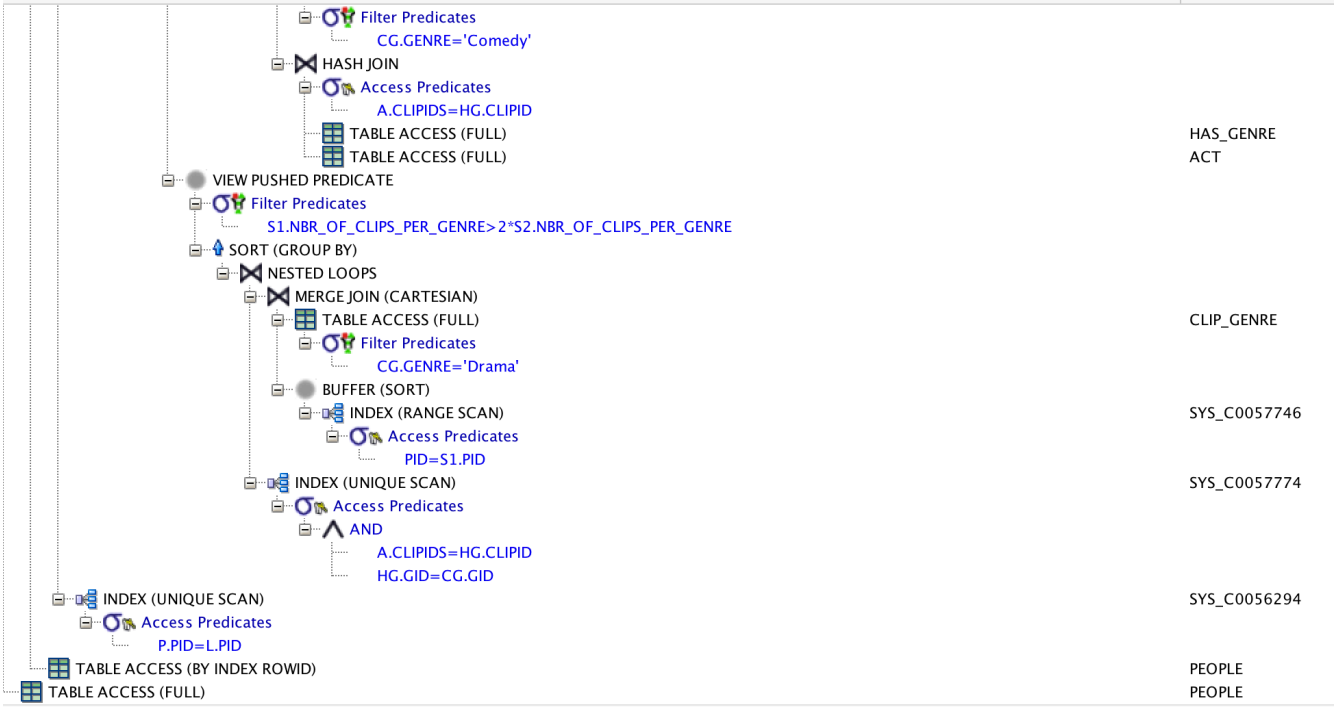
Initial plan :





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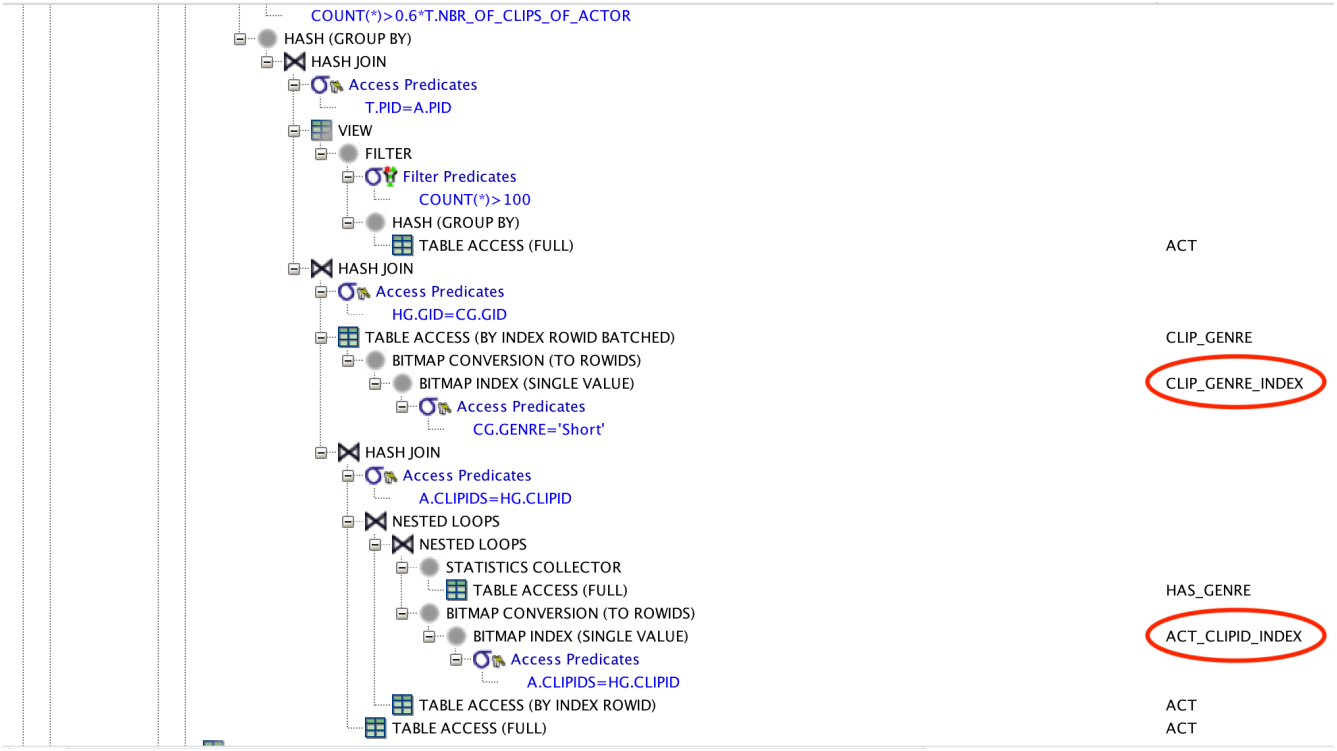
Improved plan :



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For this query, we tried to pay attention to the initial plan, and we noticed that there are several fully scan on the table Clip_genre to access to the attribute genre. So, we decided to create an index on this attribute in order to minimize the cost and to improve the performance : it was successful.

We also created an index on the attribute ClipIds of the table Act to avoid on fully scan on this table.

Query K

Initial running time :

SQL | Toutes les lignes extraites : 1 en 0,679 secondes

	NBR_OF_MOVIES
1	867

Optimized running time :

SQL | Toutes les lignes extraites : 1 en 0,473 secondes

	NBR_OF_MOVIES
1	867

Initial plan :

Résultat de requête | Plan d'exécution

SQL | 39,652 secondes

	OBJECT_NAME
WINDOW (SORT PUSHED RANK)	
Filter Predicates	
ROW_NUMBER() OVER (ORDER BY COUNT(*) DESC)<=2	
HASH (GROUP BY)	
TABLE ACCESS (FULL)	HAS_GENRE
HASH JOIN	
Access Predicates	
C.CLIPIDS=HG.CLIPID	
NESTED LOOPS	
STATISTICS COLLECTOR	
NESTED LOOPS	
HASH JOIN	
Access Predicates	
CL.LID=HL.LID	
TABLE ACCESS (FULL)	CLIP_LANGUAGES
Filter Predicates	
CL.LANGUAGE='Dutch'	
TABLE ACCESS (FULL)	HAS_LANGUAGE
TABLE ACCESS (BY INDEX ROWID)	CLIPS
Filter Predicates	
OR	
C.TYPE='TV'	
C.TYPE='V'	
INDEX (UNIQUE SCAN)	SYS_C0057731
Access Predicates	
C.CLIPIDS=HL.CLIPID	
INDEX (RANGE SCAN)	SYS_C0057774
Access Predicates	
C.CLIPIDS=HG.CLIPID	
TABLE ACCESS (FULL)	HAS_GENRE

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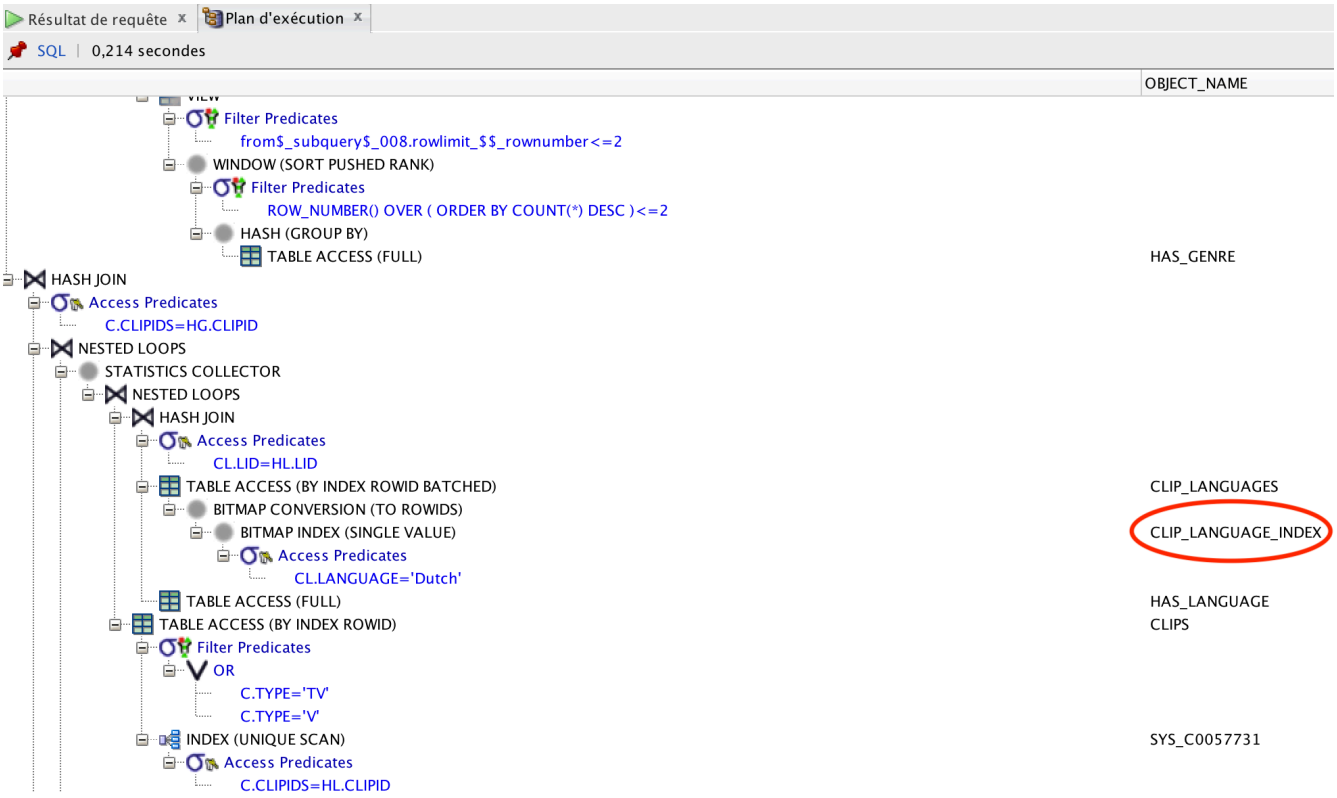
Improved plan :



As for the other queries, we tried to avoid some fully scan. Indeed, we created an index on the attribute language of the table Clip_languages

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Interface

Design logic Description

We left the same implementation for the interface (a java application), but we improved it and added the following functionalities:

- Predefined queries: Running and obtaining the results of all the queries that we needed to implement for this project.

- Search: Improved the key-word based search: the user can now search in a specific table or in all the tables of our database. We didn't see the utility in searching numbers, we have many tables containing only ids, so our keyword-based search concerns only variables with type char or varchar in the tables that contain at least such an attribute

- Update: We added the possibility to update/modify the values of the attributes of chosen rows in a table.

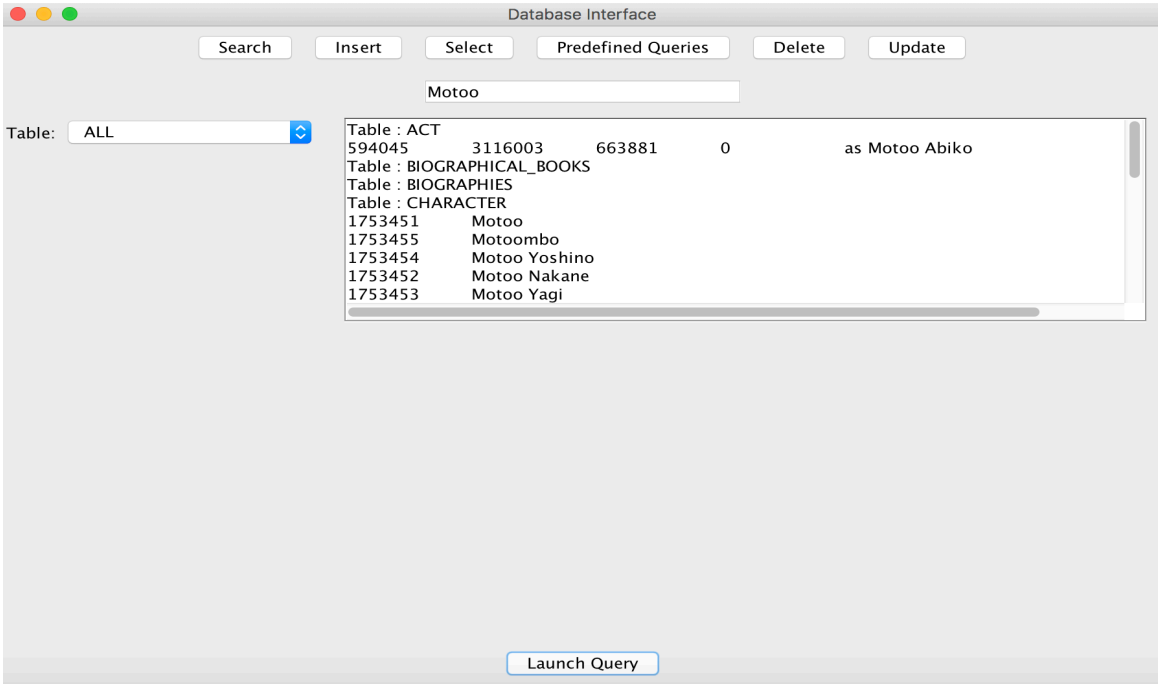
-Insert, Select and Delete functionalities stayed the same.

Screenshots

Here are some screen shots of the functionalities of our interface:

1) Keyword based search:

In all the tables:



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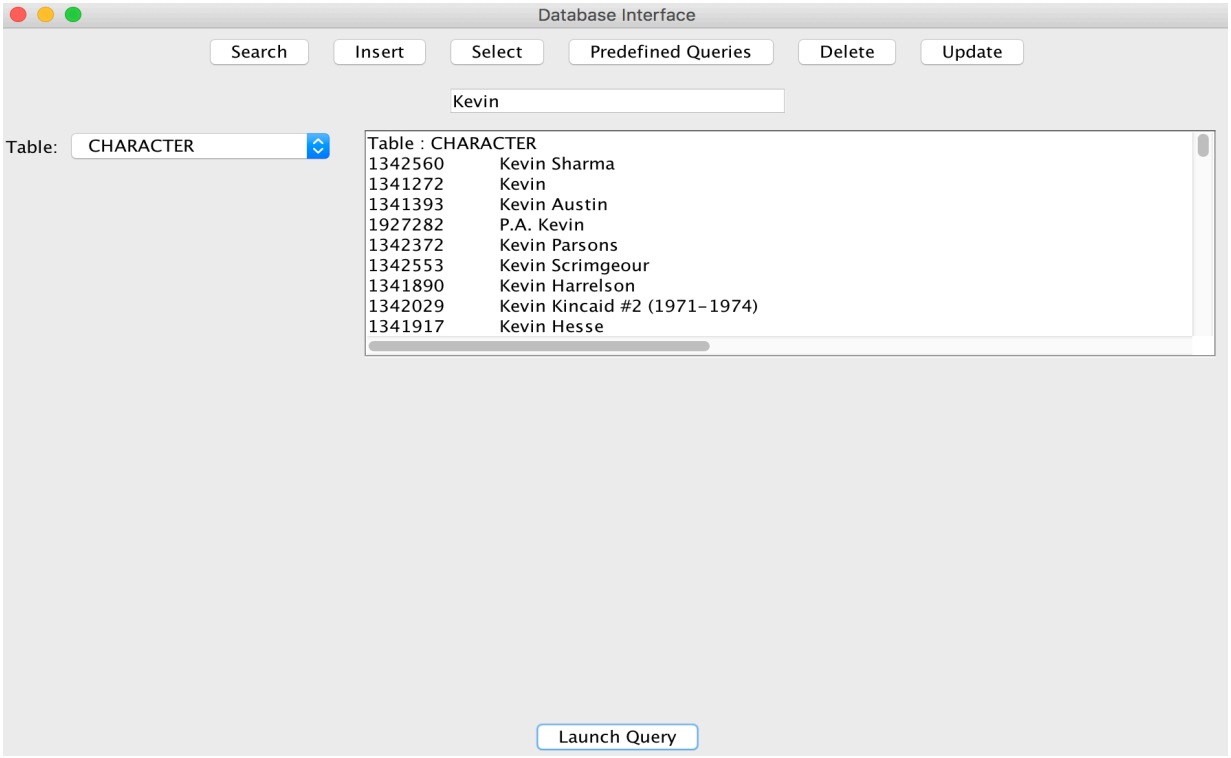
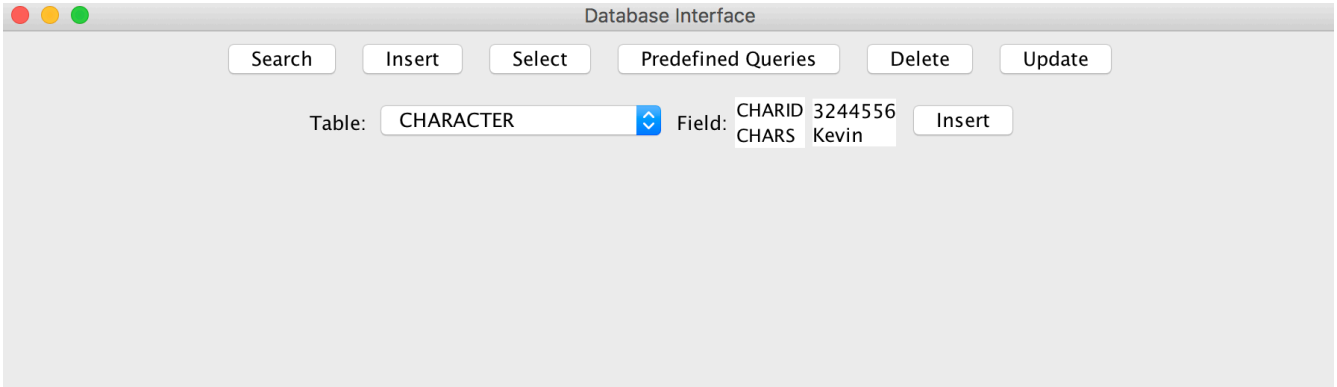
In a specific table:



2) Insert

Here, for example, we insert a new row in the table CHARACTER with charid = 3244556 and chars = Kevin



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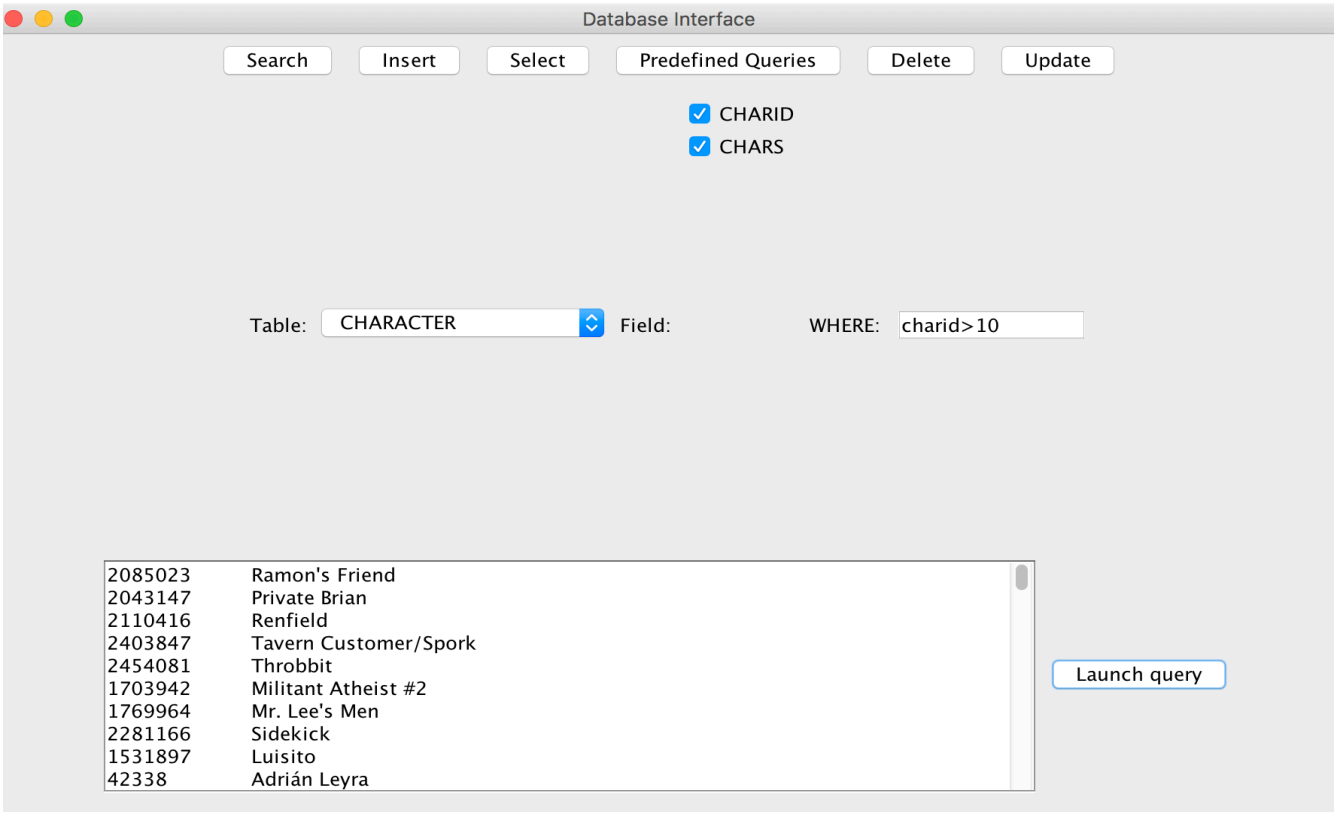
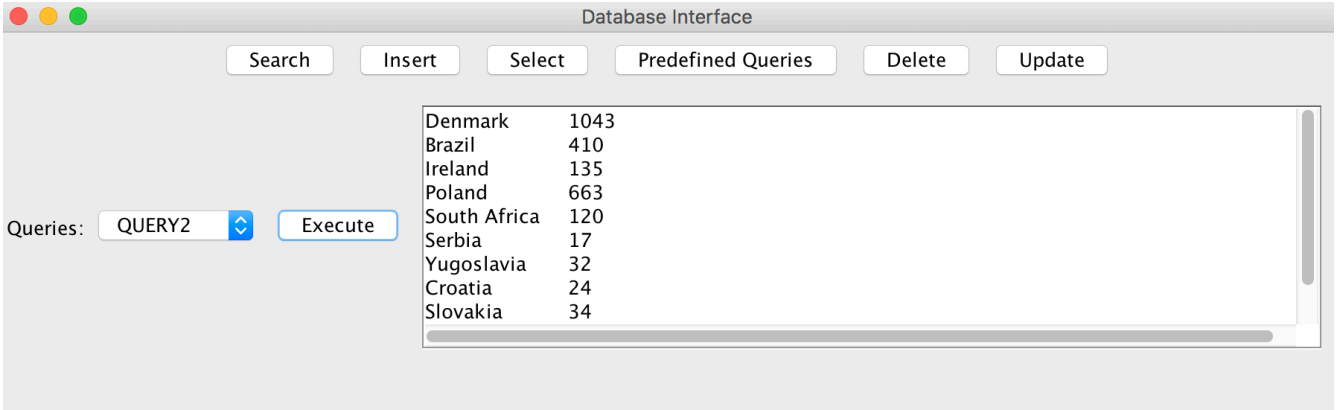
3) Select

Here, we select all the rows in character that satisfy the condition:



4) Predefined queries:

We can see below the result of query b from milestone 2



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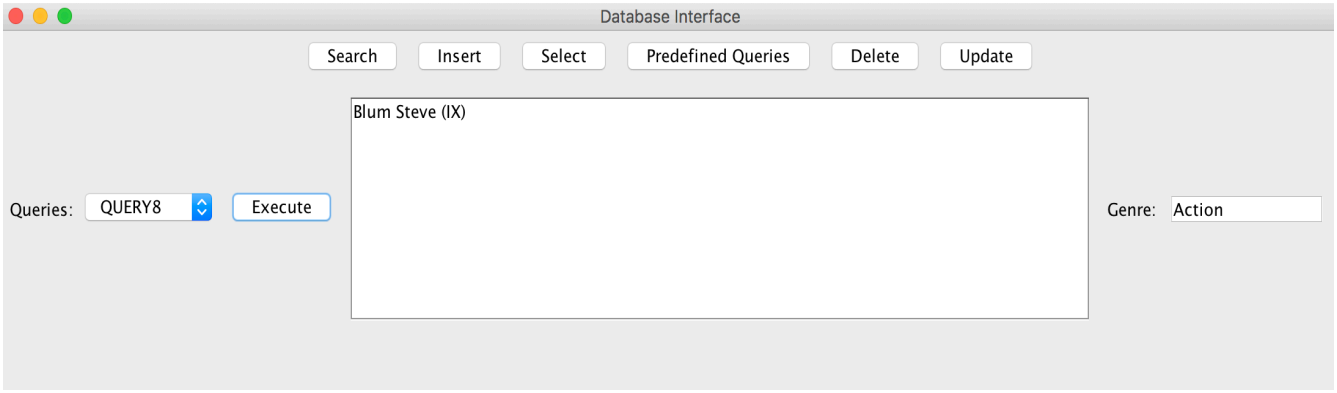
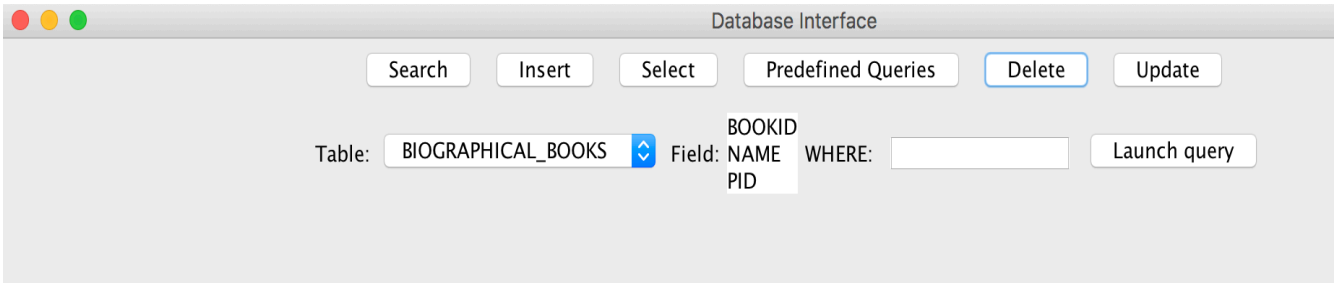
And here we know that query h from milestone 2 requires a parameter (clip genre) entered by the user. Below we can see of the query for genre = Action



5) Delete



6) Update

Here we can see that we can update the values of all the rows that satisfy a certain condition. The values of the attributes can stay the same or we can modify the ones we want by replacing oldValue by a new one.