PECL2 – MySQL Database

by

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2ºGIC E & 2ºGII E

Databases I

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Introduction

This practice was made using as base the requirements provided at PECL1 and the previous practice made. For that reason, it was needed to make a set of changes to the previous practice to get the request results from the new one.

Changes made to PECL1. The changelog is as follows:

- The relation “composes” has been removed due to a relational redundancy with relation “contains” which, even though the path is longer, can reach also to the same information and to the difficulty for implementing it.
- The relation “buysTicket” has a new field called “date_ticket_bought” which symbolizes the day in which the user purchased the ticket. It also has a “ticket_number” field now included which indicates the number of the tickets from the ones he/she has bought for a same concert with a maximum number of tickets that a user can buy for it.
- The entities “Physical” and “Digital” along with the “is a” relation have been removed due to the difficulty of implementing inheritance with MySQL. Instead, the entity “Disc” was changed to get the data regarding the previous two entities having the fields which were part from both. Now it has a “model_disc” field which indicates if it is a physical or a digital disc. If it is a physical disc, the “disc_type” field will have either “CD” or “LP” as an indicator of the disc´s physical format. If it´s a digital disc, the “song_format” field will indicate if it has a “mp3”, “wav”, “wma” or “flac” digital format, and the “size_disc” field will contain the disc´s size in megabytes. Whenever one of the options is taken the fields related with the other will be put to null.
- The field “phoneNumbers” in musician has been substituted by the “phoneNumberMobile” and “phoneNumberHome” fields. This has been done due to the difficulty implementing multivalued attributes and to simplify the program.
- “The relations givesOpinionConcert” and “givesOpinionDisc” both have new fields called “points_rate_concert” and “points_rate_disc” respectively, which indicate the score that a user has given to a concert or disc, being the lowest score a 0 and the highest one a 10. The field “opinion” has been removed as it was unnecessary as the user only gives its opinion with a score.
- The “duration” field of the entity “song” has been changed from a varchar to an int which indicates the duration in seconds. This allows us to compare song durations in an easy manner.
- Cardinality constraints are mostly gone due to the difficulty of correctly implementing it using MySQL. Instead, it was used the field “ticket_number” in the case of the relation “buyTicket” and in the rest of cases to represent it, it was used foreign keys in the relations tables like “plays”, “belongs” and “contains” letting us to have different number of relations between the different entities.
- Some minor renames have been made, which should seem obvious.
- The entity “Instrument” isn’t anymore a weak-entity to avoid more complexity in the database.

Advantages from this new model

- This new model lets the database be more organized and reduces the complexity from the weak entities which were created in the previous model.
- If a new insertion is made regarding the entity “disc”, the user doesn’t need to indicate to which kind of disc does he/she wants to introduce it.
- If a new insertion is made regarding the entities “instrument” and “song” it is not needed to specify the id from the musician, in the case of the “instrument”, or else have problems regarding having as

discriminator the primary key of two other entities plus their attribute consider part of the discriminator, in the case of the “song”.

- Reduction of complexity comparing difference of timing.

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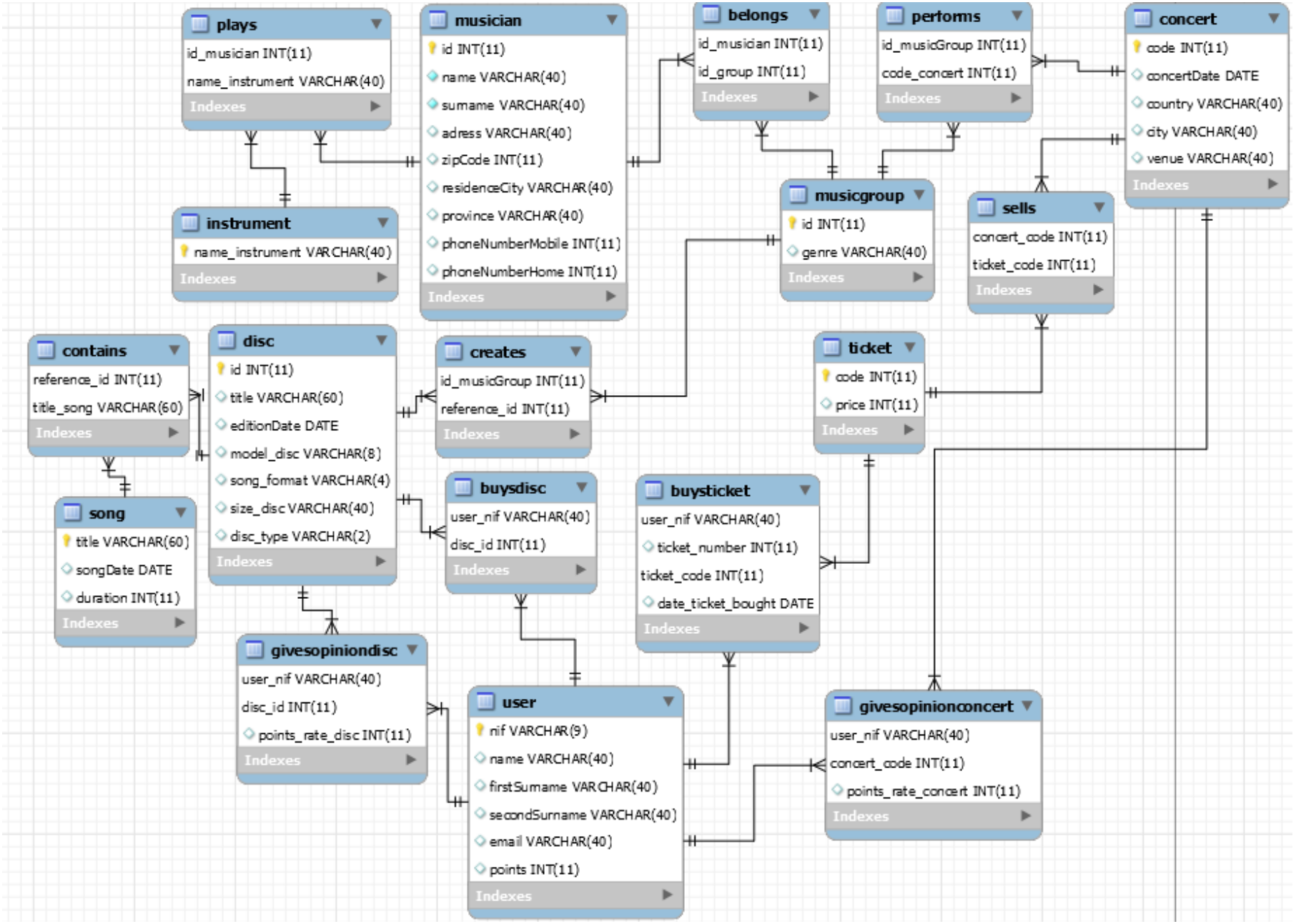
The following diagram was obtained using reverse engineering from MySQL and accurately illustrates the current database structure:



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Queries and results:

1.Show all Jazz groups

Query:

```
SELECT
    musicgroup.id
FROM
    musicgroup
WHERE
    musicgroup.genre = 'Jazz';
```

Result:

There are only two Jazz groups in the database and their ids are these:

	id
▶	110
	270
*	NULL

2. Show the name of all musicians playing drums

Query:

```
SELECT DISTINCT
    musician.name
FROM
    (musician
    INNER JOIN plays ON musician.id = plays.id_musician)
        INNER JOIN
    instrument ON plays.name_instrument = instrument.name_instrument
WHERE
    instrument.name_instrument = 'Drums';
```

Result:

There are only four musicians which plays the drums in the database and these are their names:

	name
▶	Lars
	Art
	Alen
	Albert

3. Show the name of all Jazz saxophonists

Query:

```
SELECT DISTINCT
    musician.name
FROM
    musician,
    plays,
    instrument,
    musicgroup,
    belongs
WHERE
    musicgroup.id = belongs.id_group
        && belongs.id_musician = musician.id
        && musician.id = plays.id_musician
        && plays.name_instrument = instrument.name_instrument
        && instrument.name_instrument = 'Saxophone'
        && musicgroup.genre = 'Jazz';
```

Result:

There are only two saphonists which are in a Jazz group in the database and these are their names:

	name
▶	Jimmy
	John

4. Show all the groups that have given concerts in Spain

Query:

```
SELECT DISTINCT
    musicgroup.id
FROM
    musicgroup,
    performs,
    concert
WHERE
    musicgroup.id = performs.id_musicGroup
        && performs.code_concert = concert.code
        && concert.country = 'Spain';
```

Result:

From the six music groups, only four of them makes at least a concert in Spain and these are their ids.

	id
▶	270
	110
	330
	781

5. Show all discs with more than 10 songs

Query:

```
SELECT
    disc.title
FROM
    contains,
    disc
WHERE
    contains.reference_id = disc.id
GROUP BY disc.title
HAVING COUNT(contains.title_song) > 10;
```

Result:

From the fifteen groups there are in the database, seven of them contains more than ten songs and these are their titles:

	title
▶	The Rolling Stones
	12 X 5
	Voodoo Lounge
	A Bigger Bang
	Revolcón
	Blue & Lonesome
	Aftermath

6. Show all groups with more than 3 members

Query:

```
#6
SELECT
    musicgroup.id
FROM
    musicgroup,
    belongs,
    musician
WHERE
    belongs.id_musician = musician.id
        && belongs.id_group = musicgroup.id
GROUP BY musicgroup.id
HAVING COUNT(musician.id) > 3;
```

Result:

All the music groups in the database have more than three members and these are their ids:

	id
▶	110
	270
	330
	362
	430
	781

7. Show all reviews of discs issued by users who have purchased at least three discs

Query:

```
SELECT
    user.name, disc.title, givesopiniondisc.points_rate_disc
FROM
    givesopiniondisc,
    user,
    buysdisc,
    disc
WHERE
    givesopiniondisc.disc_id = disc.id
        && givesopiniondisc.user_nif = user.nif
        && buysdisc.user_nif = user.nif
GROUP BY disc.title
HAVING COUNT(buysdisc.disc_id) >= 3;
```

Result:

Only nine of the fourteen users in the database have bought at least three discs and here it is their names with the score they gave to same of the discs they bought and the name of the disc they are given they opinion.

name	title	points_rate_disc
James	Master of Puppets	7
James	Highway to Hell	5
Pedro	The Incredible Jazz Guitar ...	7
Pedro	Giant Steps	8
Pedro	A Love Supreme	8
Heins	Some Girls	10
Igor	Revolcón	9
Espinete	A Bigger Bang	7
Bobin	La patera	6
Johnathan	12 X 5	10
Moira	Aftermath	5
Yoko	En mi hambre mando yo	9
Yoko	Voodoo Lounge	8
Yoko	Blue & Lonesome	9

8. Show all vinyl records that have at least one song longer than 5 minutes and have been recorded by a Rock group.

Query:

```
#8
SELECT DISTINCT
    disc.id, disc.title
FROM
    musicgroup,
    creates,
    disc,
    contains,
    song
WHERE
    song.title = contains.title_song
        && musicgroup.id = creates.id_musicGroup
        && disc.id = creates.reference_id
        && contains.reference_id = disc.id
        && musicgroup.genre = 'Rock'
        && song.duration > 300
        && disc.model_disc = 'Physical'
        && disc.disc_type = 'lp';
```

Result:

There are six discs made by Rock music groups which are vinyl, but only three of them have at least one song which is longer than 5 minutes and these are their ids and titles:

id	title
3492	La patera
5738	Voodoo Lounge
7329	Aftermath

9. Show the name of the musicians of groups that have given concerts at Madrid and have put on sale tickets with a price higher than 100 euros.

Query:

```
SELECT DISTINCT
    musician.name
FROM
    musician,
    belongs,
    musicgroup,
    performs,
    concert,
    sells,
    ticket
WHERE
    concert.city = 'Madrid'
        && ticket.price > 100
        && concert.code = sells.concert_code
        && sells.ticket_code = ticket.code
        && musicgroup.id = performs.id_musicGroup
        && performs.code_concert = concert.code
        && belongs.id_group = musicgroup.id
        && belongs.id_musician = musician.id;
```

Result:

There are only two concerts which were in Madrid registered at the database and both, their tickets cost more than 100 euros and each of them is from a different music group. Here it is shown the names of the members from both music groups:

name
Wynton
Tommy
Art
John
Paul
Wes
Jimmy
Percy
Albert

10. Show the opinions of the users attending the concerts shown form the previous query.

As it was said in the previous practice that the users could give their opinion, but it wasn't compulsory to give it not only at the discs they buy, but also at the concerts they bought the ticket, and at these practice was not said anything regarding these point, we considered that not all the users they went to a concert gave an opinion.

Query:

```
SELECT DISTINCT
    user.nif, user.name, givesopinionconcert.points_rate_concert
FROM
    concert,
    sells,
    ticket,
    givesopinionconcert,
    user,
    buysticket
WHERE
    concert.city = 'Madrid'
        && ticket.price > 100
        && concert.code = sells.concert_code
        && sells.ticket_code = ticket.code
        && user.nif = buysticket.user_nif
        && ticket.code = buysticket.ticket_code
        && givesopinionconcert.concert_code = concert.code
        && user.nif = givesopinionconcert.user_nif
GROUP BY user.nif;
```

Result:

These are the scores given from the users which went to the previous two concerts with the nif and the name from the user who gave the opinion:

nif	name	points_rate_concert
1238471	James	8
2321423	Pedro	9
2374827	Heins	6
4917493	Pierre	8

11. Find the songs and composer names for Heavy Metal albums published during 2018.

Query:

```
SELECT
    song.title, musician.name
FROM
    musician,
    belongs,
    musicgroup,
    creates,
    disc,
    contains,
    song
WHERE
    musician.id = belongs.id_musician
        && belongs.id_group = musicgroup.id
        && musicgroup.id = creates.id_musicGroup
        && creates.reference_id = disc.id
        && disc.id = contains.reference_id
        && contains.title_song = song.title
        && YEAR(disc.editionDate) = '2018'
        && musicgroup.genre = 'Metal';
```

Result:

From the two music groups from heavy metal, only one has made a disc in 2018. These are titles of the songs with the names of the members of the music group. As there are four members the names from the songs from the disc will be repeated four times.

title	name
Battery	Kirk
Battery (Live)	Kirk
Damage, Inc.	Kirk
Disposable Heroes	Kirk
Leper Messiah	Kirk
Master of Puppets	Kirk
Orion	Kirk
The Thing That Should Not Be	Kirk
The Thing That Should Not Be (Live)	Kirk
Welcome Home (Sanitarium)	Kirk
Battery	Lars
Battery (Live)	Lars
Damage, Inc.	Lars
Disposable Heroes	Lars
Leper Messiah	Lars
Master of Puppets	Lars
Orion	Lars
The Thing That Should Not Be	Lars
The Thing That Should Not Be (Live)	Lars
Welcome Home (Sanitarium)	Lars

title	name
Battery	James
Battery (Live)	James
Damage, Inc.	James
Disposable Heroes	James
Leper Messiah	James
Master of Puppets	James
Orion	James
The Thing That Should Not Be	James
The Thing That Should Not Be (Live)	James
Welcome Home (Sanitarium)	James
Battery	Robert
Battery (Live)	Robert
Damage, Inc.	Robert
Disposable Heroes	Robert
Leper Messiah	Robert
Master of Puppets	Robert
Orion	Robert
The Thing That Should Not Be	Robert
The Thing That Should Not Be (Live)	Robert
Welcome Home (Sanitarium)	Robert

12. Show name of the Jazz group guitarists having digital discs together with the name and format of such discs and their size in MB.

Query:

```
SELECT DISTINCT
    musician.name, disc.title, disc.song_format, disc.size_disc
FROM
    musician,
    belongs,
    musicgroup,
    disc,
    creates,
    plays,
    instrument
WHERE
    musicgroup.id = creates.id_musicGroup
        && creates.reference_id = disc.id
        && musician.id = plays.id_musician
        && musician.id = belongs.id_musician
        && musicgroup.id = belongs.id_group
        && instrument.name_instrument = plays.name_instrument
        && instrument.name_instrument = 'Guitar'
        && disc.model_disc = 'Digital'
        && musicgroup.genre = 'Jazz';
```

Result:

There is only a Jazz guitarist which has at least one digital disc. This is its name, the title of the disc, the format of the song and the size of the disc:

	name	title	song_format	size_disc
▶	Wes	The Incredible Jazz Guitar of Wes Montgomery	WAV	2048 MB

13. Show name and surname of the users who bought tickets during 2018 for jazz groups and published opinions about those concerts.

Query:

```
SELECT DISTINCT
    user.name, user.firstSurname, user.secondSurname
FROM
    user,
    givesopinionconcert,
    concert,
    sells,
    ticket,
    buysticket,
    performs,
    musicgroup
WHERE
    concert.code = sells.concert_code
        && sells.ticket_code = ticket.code
        && user.nif = buysticket.user_nif
        && ticket.code = buysticket.ticket_code
        && givesopinionconcert.concert_code = concert.code
        && concert.code = performs.code_concert
        && performs.id_musicGroup = musicgroup.id
        && user.nif = givesopinionconcert.user_nif
        && musicgroup.genre = 'Jazz'
        && YEAR(buysticket.date_ticket_bought) = '2018';
```

Result:

From the fourteen users in the database, only one of them bought tickets during 2018 for jazz groups and published an opinion of the concert. This is his name and his surnames:

	name	firstSurname	secondSurname
▶	Pedro	López	Perez

14. Show the title, and the songs for any disc bought by users whose ratings on that disc were 8 or more points.

Query:

```
SELECT
    disc.title, song.title, givesopiniondisc.points_rate_disc
FROM
    givesopiniondisc,
    disc,
    buysdisc,
    contains,
    song
WHERE
    buysdisc.user_nif = givesopiniondisc.user_nif
        && disc.id = givesopiniondisc.disc_id
        && buysdisc.disc_id = disc.id
        && disc.id = contains.reference_id
        && contains.title_song = song.title
GROUP BY song.title
HAVING AVG(givesopiniondisc.points_rate_disc) >= 8;
```

Result:

These are the title of the discs, the titles of its songs and the average score the disc obtained by the user which is superior or equal to 8.

	title	title	points_rate_disc
▶	Giant Steps	Countdown	8
	Giant Steps	Cousin Mary	8
	Giant Steps	Giant Steps	8
	Giant Steps	Mr. P.C.	8
	Giant Steps	Naima	8
	Giant Steps	Spiral	8
	Giant Steps	Syeeda ´s Song Flute	8
	A Love Supreme	Part 1: "Acknowledgment"	8
	A Love Supreme	Part 2: "Resolution"	8
	A Love Supreme	Part 3: "Pursuance"	8
	A Love Supreme	Part 4: "Psalm"	8
	En mi hambre mando yo	Ángeles del suelo	9
	En mi hambre mando yo	Bienvenido al secadero	9
	En mi hambre mando yo	Canaleros	9
	En mi hambre mando yo	El día que lluevan pianos	9
	En mi hambre mando yo	La majada	9
	En mi hambre mando yo	Las últimas habitaciones	9
	En mi hambre mando yo	Ojalá me quieras libre	9
	En mi hambre mando yo	Pedimiento	9
	En mi hambre mando yo	Plomo en los bolsillos	9
	En mi hambre mando yo	Sobran bueyes	9

title	title	points_rate_disc
The Rolling Stones	Can I Get a Witness	8
The Rolling Stones	Carol	8
The Rolling Stones	Honest I Do	8
The Rolling Stones	I am a King Bee	8
The Rolling Stones	I Just Want to Make Lov...	8
The Rolling Stones	Little by Little	8
The Rolling Stones	Mona (I Need You Baby)	8
The Rolling Stones	Now I have Got a Witnes...	8
The Rolling Stones	Route 66	8
The Rolling Stones	Tell Me (You are Coming ...	8
The Rolling Stones	Walking the Dog	8
The Rolling Stones	You Can Make It If You Try	8
12 X 5	2120 South Michigan Ave...	10
12 X 5	Around and Around	10
12 X 5	Confessing the Blues	10
12 X 5	Congratulations	10
12 X 5	Empty Heart	10
12 X 5	Good Times, Bad Times	10
12 X 5	Grown Up Wrong	10
12 X 5	If You Need Me	10
12 X 5	It is All Over Now	10
12 X 5	Susie Q	10
12 X 5	Time Is on My Side	10
12 X 5	Under the Boardwalk	10

title	title	points_rate_disc
Some Girls	Beast of Burden	10
Some Girls	Before They Make Me Run	10
Some Girls	Far Away Eyes	10
Some Girls	Just My Imagination (Run...	10
Some Girls	Lies	10
Some Girls	Miss You	10
Some Girls	Respectable	10
Some Girls	Shattered	10
Some Girls	Some Girls	10
Some Girls	When the Whip Comes D...	10

15. Find the groups and their members that never performed in Spain and have recorded discs with more than 10 songs.

Query:

```
SELECT DISTINCT
    musicgroup.id, musicgroup.genre, musician.id, musician.name
FROM
    musician,
    belongs,
    musicgroup,
    performs,
    concert
WHERE
    musician.id = belongs.id_musician
        && belongs.id_group = musicgroup.id
        && musicgroup.id = performs.id_musicGroup
        && performs.code_concert = concert.code
        && musicgroup.id NOT IN (SELECT
            musicgroup.id
        FROM
            musicgroup,
            performs,
            concert
        WHERE
            musicgroup.id = performs.id_musicGroup
                && performs.code_concert = concert.code
                && 'Spain' = concert.country)
        && musicgroup.id IN (SELECT
            creates.id_musicGroup
        FROM
            creates,
            disc,
            contains
        WHERE
            creates.reference_id = disc.id
                && disc.id = contains.reference_id
        GROUP BY disc.id
        HAVING COUNT(contains.title_song) > 10);
```

Result:

There are only two groups in the database which didn't performed any concert in Spain, but only one has recorded at least one disc with more than 10 songs. This is the id from the group with the genre of the group and the id and name from each of its members:

id	genre	id	name
430	Rock	4136534	Kutxi
430	Rock	4949365	David
430	Rock	4949485	Cesar
430	Rock	5453651	Alen
430	Rock	7376429	Eduardo

16. Show song names and composer names for groups not performing any concert during 2017.

Query:

```
SELECT
    disc.title, contains.title_song, musician.name
FROM
    (((((musician
    INNER JOIN belongs ON musician.id = belongs.id_musician)
    INNER JOIN musicgroup ON belongs.id_group = musicgroup.id)
    INNER JOIN creates ON musicgroup.id = creates.id_musicGroup)
    INNER JOIN disc ON creates.reference_id = disc.id)
    INNER JOIN contains ON disc.id = contains.reference_id)
WHERE
    musicgroup.id NOT IN (SELECT
            musicgroup.id
        FROM
            musicgroup,
            performs,
            concert
        WHERE
            musicgroup.id = performs.id_musicGroup
                && performs.code_concert = concert.code
                && '2017' = YEAR(concert.concertDate));
```

Result:

All the music groups except one have not performed any concert in 2017 and this are the titles of the discs, with its songs and the musician of the group. The songs will be repeated as many times as members of the groups are. From the fifteen discs of the database, fourteen discs are shown as output. For that reason, it

will be shown over here the a part of the results obtained.

title	title_song	name
Giant Steps	Countdown	Wynton
Giant Steps	Cousin Mary	Wynton
Giant Steps	Giant Steps	Wynton
Giant Steps	Mr. P.C.	Wynton
Giant Steps	Naima	Wynton
Giant Steps	Spiral	Wynton
Giant Steps	Syeeda´s Song Flute	Wynton
Giant Steps	Countdown	Tommy
Giant Steps	Cousin Mary	Tommy
Giant Steps	Giant Steps	Tommy
Giant Steps	Mr. P.C.	Tommy
Giant Steps	Naima	Tommy
Giant Steps	Spiral	Tommy
Giant Steps	Syeeda´s Song Flute	Tommy
Giant Steps	Countdown	Art
Giant Steps	Cousin Mary	Art
Giant Steps	Giant Steps	Art
Giant Steps	Mr. P.C.	Art
Giant Steps	Naima	Art
Giant Steps	Spiral	Art
Giant Steps	Syeeda´s Song Flute	Art
Giant Steps	Countdown	John
Giant Steps	Cousin Mary	John
Giant Steps	Giant Steps	John
Giant Steps	Mr. P.C.	John
Giant Steps	Naima	John
Giant Steps	Spiral	John
Giant Steps	Syeeda´s Song Flute	John
Giant Steps	Countdown	Paul

Difficulties:

At first, we had some problems regarding the creation of tables with foreign keys as we wanted to put as primary keys, the primary keys from other entities, but that have more than one field as primary key. We learnt how it worked, but it wasn't used at the final version from the database.

There were also during a time some complications regarding limited cardinality, regarding the number of tickets from a specific concert bought by a user; inheritance, in the case of the types of discs; and considering the order of how the different insertions needed to be made. Even though we had those problems, finally we could solve them.

Finally, we had a few problems with the command "not in" from MySQL at the begging, making us to see that we need to compare it with something to get the correct result from the query instead of nothing.