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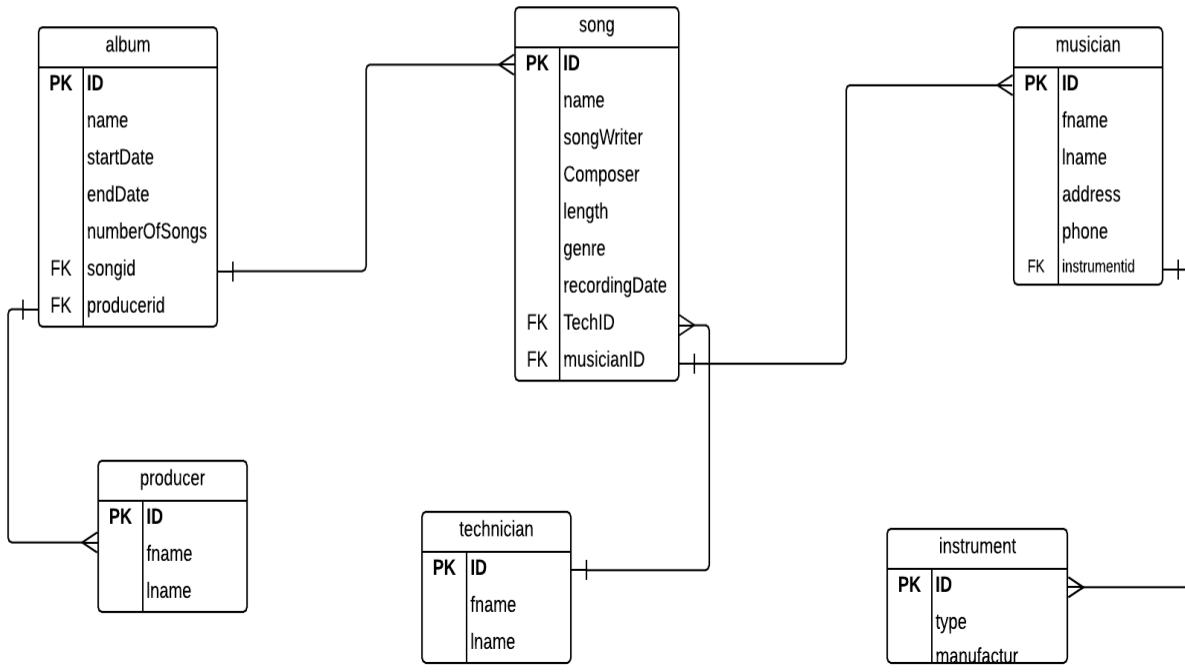
ראשוני לפני הנתקנים מתיאור העולם: ERD

Recording Studio ERD Before 3NF
Chen Gutman & Avital Kahani | July
29, 2019

Legend Marks

Entity	
Attributes	

one
many



סכמה ראשונית:

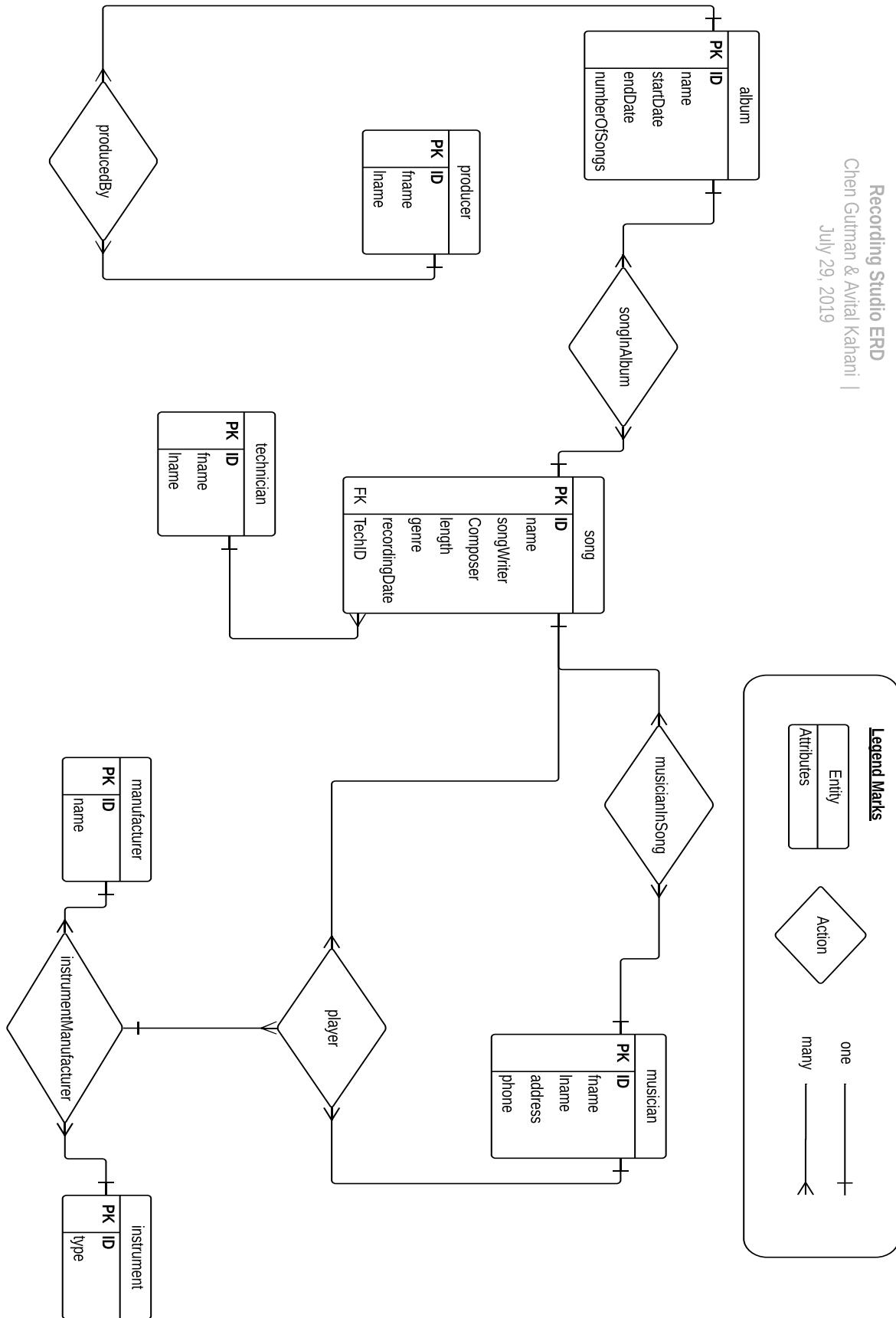
musician (idmusician: int, musician_fname: string, musician_lname: string, musician_address: string, musician_phone: string, instrument: string)
song (idsong: int, song_name: sting, song_length: string, song_writer: string, song_composer: string, song_rdate: date, song_genre: string, song_techid: int ,techid: int, musicianid: int)
album (idalbum:int, album_name: string, album_sdate: date, album_edate: date, album_num_of_songs: int, producerid: int)
producer (idproducer: int, producer_fname: string, producer_lname: string)
technician (idtechnician: int, technician_fname: string, technicianc_lname: string)
instrument (idinstrument: int, instrument_type: int, manufactur : string)

הנחות שהנחנו לבנית ה-ERD לאחר בירמול

בاهינתן תיאור העולם, יצרנו את הטבלאות העיקריות (musician , song , album , producer , technician,Instrument and manufacturer) שכל אחת מהן מכילה את התכונות הרלוונטיות. לאחר מכן, בונים טבלאות הקשורות לפיה הלוגיקה שהסקנו :

- בטבלת המוזיקאי בחרנו בחרכו באנטיאן `idmusician` להיות primarykey עבור הטבלה זו, בטבלת השירים בחרנו בזיהוי `idsong` כforeignkey עבור הטבלה זו, בטבלת `musician_in_song` שמקירה את המפתחות הנ"ל.
- בטבלת כל הנגינה בחרנו בזיהוי `idinstrument` להיות primarykey עבור הטבלה זו, בטבלת היוצרים בחרנו בזיהוי `idmanufacturer` כforeignkey עבור הטבלה זו, בטבלת `instru_manu` שמקירה את המפתחות הנ"ל.
- לקחנו מטבלת המוזיקאי את הזיהוי `idminstru` שבחרנו פעמיים נוספת, בטבלת המקשרות שבינו לכל הנגינה והיצרני בחרנו בזיהוי `idminstru` כforeignkey עבור הטבלה זו, בטבלת `player` שמקירה את המפתחות הנ"ל.
- לקחנו מטבלת השירים את הזיהוי `idalbum` שבחרנו פעמיים נוספת, בטבלת האלבום שבה בחרנו בזיהוי `idsong` כforeignkey עבור הטבלה זו, בטבלת `songs_in_album` שמקירה את המפתחות הנ"ל.
- בטבלת השירים בחרנו בזיהוי `song_techid` להיות foreignkey עבור הטבלה זו, שאנו המפתח הזה קיירנו לטבלת הטכנאים לפי primarykey שהוא `idtechnician`.
- לקחנו מטבלת האלבום את הזיהוי `idproducer` שבחרנו פעמיים נוספת, בטבלת `produced_by` שמקירה את הזיהוי `idproducer` כforeignkey עבור הטבלה זו, בטבלת `producer` שמקירה את המפתחות הנ"ל.

לאחר נרמול ל- 3NF :



מה מכך כל טבלת ACTION :

instru_manu		player		songInAlbum		musicianInSong		producedBy	
PK	ID	FK	musicianid	FK	songid	FK	musicianid	FK	producerID
FK	instrumentid	FK	songid	FK	albumid	FK	songid	FK	albumID
FK	manufacturerid	FK	instru_manuid						

סכמה לאחר גרמול ל- 3NF :

musician (idmusician: int, musician_fname: string, musician_lname: string, musician_address: string, musician_phone: string)

song (idsong: int, song_name: sting, song_length: string, song_writer: string, song_composer: string, song_rdate: date, song_genre: string, song_techid: int)

album (idalbum:int, album_name: string, album_sdate: date, album_edate: date, album_num_of_songs: int)

producer (idproducer: int, producer_fname: string, producer_lname: string)

technician (idtechnician: int, technician_fname: string, technicianc_lname: string)

produced_by (producer_id: int, album_id: int)

songs_in_album (song_id: int, albumid: int)

musician_in_song (musician_in_song_id: int, songid: int)

instrument (idinstrument: int, instrument_type: int)

manufacturer (idmanufacturer: int, manufacturer_name: string)

player (player_mid: int, player_sid: int, player_im_id: int)

instru_manu (idinstru_manu: int, instrument_id: int, manufacturer_id: int)

הפעולות באלגברה יחסית SQL

$$1. \pi_{count(dsdistinct idalbum)} \left(\sigma_{album_sdate \geq y1 \wedge album_edate \leq y2} (album) \right)$$

```
--1-----countNumberOfAlbumBetween-----
SELECT COUNT(distinct idalbum) AS counter FROM album
WHERE album_sdate >= ? AND album_edate <= ?;
```

$$2. \pi_{count(dsdistinct idalbum)} \left(\sigma_{album_sdate \geq y1 \wedge album_edate \leq y2} (album) \right)$$

```
--2-----countNumberOfSongsBetween-----
SELECT COUNT(distinct idsong) AS counter FROM song
WHERE song_rdate BETWEEN ? AND ? AND idsong IN (SELECT songid FROM musician_in_song
WHERE musician_in_song_id = (SELECT idmusician FROM musician
WHERE musician_fname = ? AND musician_lname = ?));
```

$$3. \pi_{count(dsdistinct idalbum)} \left(\sigma_{album_sdate \geq y1 \wedge album_edate \leq y2} (album) \right)$$

```
--3-----countNumberOfDiffAlbumsForMusician-----
SELECT COUNT(distinct albumid) AS counter FROM songs_in_album
WHERE song_id IN (SELECT idsong FROM song
WHERE song_rdate BETWEEN ? AND ? AND idsong IN (SELECT songid FROM musician_in_song
WHERE musician_in_song_id = (SELECT idmusician FROM musician
WHERE musician_fname = ? AND musician_lname = ?)));
```

$$4. \pi_{count(dsdistinct idalbum)} \left(\sigma_{album_sdate \geq y1 \wedge album_edate \leq y2} (album) \right)$$

```
--4-----popularInstrument-----
SELECT instrument_type FROM instrument
WHERE idinstrument = (SELECT im.instrument_id FROM player AS p, instru_manu AS im
WHERE p.player_im_id = im.idinstru_manu
GROUP BY (im.instrument_id)
ORDER BY COUNT(im.instrument_id) DESC
LIMIT 1);
```

$$5. \pi_{count(dsdistinct idalbum)} \left(\sigma_{album_sdate \geq y1 \wedge album_edate \leq y2} (album) \right)$$

```
--5-----listOfInstrumentsInAlbum-----
SELECT instrument_type FROM instrument
WHERE idinstrument IN (SELECT instrument_id FROM instru_manu
WHERE idinstru_manu IN (SELECT player_im_id FROM player
WHERE player_sid IN (SELECT song_id FROM songs_in_album
WHERE albumid = (SELECT idalbum FROM album
WHERE album_name = ?))));
```

$$6. \pi_{count(dsdistinct idalbum)} \left(\sigma_{album_sdate \geq y1 \wedge album_edate \leq y2} (album) \right)$$

```
--6-----mostProductiveProducer-----
SELECT producer_fname, producer_lname FROM producer
WHERE idproducer = (SELECT producer_id FROM (SELECT producer_id FROM produced_by
WHERE album_id IN (SELECT idalbum FROM album
WHERE album_sdate >= ? AND album_edate <= ?)) AS temp
GROUP BY temp.producer_id
ORDER BY COUNT(*) DESC
LIMIT 1);
```

$$7. \pi_{count(ds \in \{id\}_{album}} \left(\sigma_{album_sdate \geq y_1 \wedge album_edate \leq y_2} (album) \right)$$

```
--7-----mostPopularManufacturer-----
SELECT manufacturer_name FROM manufacturer
WHERE idmanufacturer = (SELECT im.manufacturer_id FROM player AS p, instru_manu AS im
WHERE p.player_im_id = im.idinstru_manu
GROUP BY (im.manufacturer_id)
ORDER BY COUNT(im.manufacturer_id) DESC
LIMIT 1);
```

$$8. \pi_{count(ds \in \{id\}_{musicians}} (musicians)$$

```
--8-----numberOfMusicians-----
SELECT COUNT(distinct idmusician) AS counter FROM musician
```

$$9. \pi_{count(ds \in \{id\}_{album}} \left(\sigma_{album_sdate \geq y_1 \wedge album_edate \leq y_2} (album) \right)$$

```
--9-----musicianCollaborator-----
SELECT musician_fname, musician_lname FROM musician
WHERE idmusician=(SELECT musician_in_song_id FROM(SELECT musician_in_song_id FROM musician_in_song
WHERE songid IN(SELECT songid FROM musician_in_song
GROUP BY songid HAVING COUNT(*)>1
ORDER BY COUNT(*) DESC))AS temp
GROUP BY temp.musician_in_song_id
ORDER BY COUNT(*) DESC
LIMIT 1);
```

$$10. \pi_{song_genre} \sigma_{count(*)} \gamma_{song_genre, count(*)} (song)$$

```
--10-----mostPopularGenre-----
SELECT song_genre FROM song
GROUP BY song_genre
ORDER BY COUNT(*) DESC
LIMIT 1;
```

$$11. \pi_{count(ds \in \{id\}_{album}} \left(\sigma_{album_sdate \geq y_1 \wedge album_edate \leq y_2} (album) \right)$$

```
--11-----mostProductiveTechnician-----
SELECT technician_fname, technician_lname FROM technician
WHERE idtechnician=(SELECT song_techid FROM song
WHERE idsong IN(SELECT idsong FROM song
WHERE song_rdate between ? and ?)
GROUP BY song_techid
ORDER BY COUNT(*) DESC
LIMIT 1);
```

$$12. \pi_{album_name} \sigma_{album_sdate} \gamma_{album_sdate} (album)$$

```
--12-----firstAlbum-----
SELECT album_name FROM album ORDER BY album_sdate ASC LIMIT 1;
```

13. $\pi_{count(ds \in \text{distinct id}_{\text{album}})} \left(\sigma_{\text{album}_{sdate} \geq y_1 \wedge \text{album}_{edate} \leq y_2} (\text{album}) \right)$

```
--13-----listOfSongsInMultiAlbums-----
SELECT song_name FROM song
    WHERE idsong IN (SELECT song_id FROM songs_in_album
    GROUP BY song_id
    HAVING COUNT(*)>1
    ORDER BY COUNT(*) DESC);
```

14. $\pi_{count(ds \in \text{distinct id}_{\text{album}})} \left(\sigma_{\text{album}_{sdate} \geq y_1 \wedge \text{album}_{edate} \leq y_2} (\text{album}) \right)$

```
--14-----listOfTechInEntireAlbum-----
SELECT technician_fname,technicianc_lname FROM technician
    WHERE idtechnician IN ( SELECT song_techid FROM song
    WHERE idsong IN (SELECT song_id FROM songs_IN_album
        WHERE albumid IN (SELECT tia.idalbum FROM (SELECT distinct a.idalbum,s.song_techid FROM song AS s,album AS a
            WHERE a.idalbum IN (SELECT albumid FROM songs_in_album
                WHERE song_id=s.idsong)) AS tia
            GROUP BY tia.idalbum
            HAVING COUNT(tia.idalbum)=1));
```

15. $\pi_{count(ds \in \text{distinct id}_{\text{album}})} \left(\sigma_{\text{album}_{sdate} \geq y_1 \wedge \text{album}_{edate} \leq y_2} (\text{album}) \right)$

```
--15-----mostVersatileMusician-----
SELECT musician_fname,musician_lname FROM musician
    WHERE idmusician =(SELECT i.musician_in_song_id FROM musician_in_song AS i,song AS s
    WHERE i.songid=s.idsong
    GROUP BY i.musician_in_song_id
    ORDER BY COUNT(distinct s.song_genre) DESC
    LIMIT 1);
```

תוכן כל הطالות:

אלבומים-

idalbum	album_name	album_sdate	album_edate	album_num_of_songs
1	No.6 Collaborations Project	2018-05-24	2019-05-24	4
2	Lemonade	2018-06-23	2019-07-24	4
3	damn	2016-03-01	2017-04-02	2
4	starboy	2016-02-22	2016-11-25	3
5	purpose	2014-01-01	2015-09-01	3
6	A night at the opera	1975-08-01	1975-11-30	3
7	Abbey Road	1969-02-22	1969-08-20	3
8	Classics	1969-02-22	1975-11-30	3
9	New generation greatest hits	2014-06-01	2019-05-23	4
10	All Time Greatest Hits	1969-02-22	2017-04-10	4

כלי נגינה ויצרנים-

idinstru_manu	instrument_id	manufacturer_id
700	507	600
701	500	601
702	501	603
703	502	608
704	505	609
705	500	603
706	502	609
707	507	601
708	501	601
709	502	607
710	505	600
711	508	600
712	503	607
713	504	605
714	506	603

idinstrument	instrument_type
500	bass
501	piano
502	drums
503	gong
504	electric keyboard
505	acoustic guitar
506	cymbal
507	classic guitar
508	electric guitar
509	trumpet

יצרנים-

idmanufacturer	manufacturer_name
600	YAMAHA
601	Ibanez
602	Fender
603	Gibson
604	HARMAN
605	SHURE
606	Sennheiser
607	Roland
608	Kawai
609	Martin&co

טכנאים-

idtechnician	technician_fname	technician_lname
400	David	Mualem
401	Avital	Kahani
402	Chen	Gutman
403	Eyal	Shenitzky
404	Robert	Samuel
405	Adam	Levin
406	Maya	Dor
407	Naama	Menashe
408	Asaf	Simcha
409	Corry	Fox

שירים-

idsong	song_name	song_length	song_writer	song_composer	song_rdate	song_genre	song_technical_id
300	I don't care	3:39	Ed Sheeran	Poo Bear	2019-01-30	pop	403
301	cross me	3:26	Chancelor Bennett	Fred Gibson	2018-10-12	R&B	400
302	beautiful people	3:17	Ed Sheeran	Fred Gibson	2018-08-30	Rock	404
303	best part of me	4:03	Abby Smith	Ed Sheeran	2019-04-10	pop	402
304	sorry	3:52	Beyonce Knowles	Sean Rhoden	2014-09-14	R&B	403
305	formation	3:26	Beyonce Knowles	Khalif Brown	2015-06-19	Trap	401
306	6 inch	4:20	Beyonce Knowles	The Weekend	2015-02-21	R&B	409
307	freedom	4:50	Beyonce Knowles	Kendrick Lamar	2015-05-12	R&B	408
308	DNA	3:05	Kendrick Lamar	Micheal Williams	2016-04-11	hip hop	407
309	humble	2:57	Kendrick Lamar	Micheal Williams	2016-12-13	hip hop	406
310	starboy	3:50	The Weeknd	Martin Mckenny	2016-06-20	R&B	405
311	side walk	3:51	The Weeknd	Martin Mckenny	2016-09-21	R&B	406
312	I feel it coming	4:29	The Weeknd	Martin Mckenny	2016-10-29	pop	408
314	love yourself	3:53	Ed Sheeran	Benny Blanco	2014-01-31	pop	409
315	sorry	3:20	Justin Bieber	Justin Tratner	2014-04-09	pop	400
316	what do you mean	3:26	Justin Bieber	Poo Bear	2015-07-05	pop	401
317	Bohemian Rhapsody	5:55	Freddie Mercury	Freddie Mercury	1975-09-10	pop	404
318	Sweet Lady	4:03	Brian May	Brian May	1975-10-22	Rock	404
319	Love Of My Life	5:55	Freddie Mercury	Freddie Mercury	1975-11-05	Rock	404
320	Something	2:29	George Harrison	George Harrison	1969-05-02	Rock	409
321	Here Comes The Sun	3:06	George Harrison	George Harrison	1969-08-19	pop	409
322	Come Together	4:19	John Lennon	Paul McCartney	1969-07-30	Rock	409

מדיינאי-

idmusician	musician_fnname	musician_lname	musician_address	musician_phone
110	Ed	Sheeran	Framlingham, Suffolk, England	054-5566779
111	Justin	Beiber	Stratford, Ontario, Canada	054-1123555
112	Chancelor	Bennet	Chicago, Illinois, U.S.	050-9871122
113	Beyonce	Knowles	Houston, Texas, U.S.	052-1111222
114	PnB	Rock	Philadelphia, Pennsylvania, U.S.	054-1222352
115	Khalid	Robinson	El Paso, Texas, U.S.	054-9256252
116	The	Weeknd	Toronto, Ontario, Canada	054-555555252
117	Abbey	Smith	West Memphis, Arkansas, U.S.	055-32569844
118	Kendrick	Lamar	Compton, California, U.S.	052-6656525
119	Freddie	Mercury	Stone Town,Â Sultanate of Zanzibar	054-2233159
120	Brian	May	Hampton, London, England	052-1000187
121	Roger	Taylor	King's Lynn,Â Norfolk, England	050-5645875
122	John	Deacon	Leicester, England	052-4587445
123	George	Harrison	Liverpool, England	054-3625948
124	Paul	McCartney	Liverpool, England	052-1541269
125	John	Lennon	Liverpool, England	052-3625947
126	Ringo	Starr	Liverpool, England	050-32541541

מפיקים

מפיק ואלבומים

מוזיקאי ושיר-

musician_in_song_id	songid
110	300
111	300
110	301
112	301
114	301
110	302
115	302
110	303
117	303
113	304
113	305
113	306
116	306
113	307
118	308
118	309
116	310
116	311
118	311
116	312
110	314
111	314
111	315
111	316
119	317
120	317
121	317
122	317
119	318
120	318
121	318
122	318
119	319
120	319
121	319
122	319
123	320
124	320
125	320
126	320
123	321
124	321
126	321
123	322
124	322
125	322
126	322

producer_id	album_id
200	1
201	1
202	1
203	1
204	2
206	2
202	3
205	3
201	4
206	4
201	5
203	5
206	5
208	6
209	7
208	8
209	8
200	9
201	9
202	9
203	9
204	9
205	9
206	9
202	10
204	10
205	10
206	10
208	10
209	10

idproducer	producer_fname	producer_lname
200	Ed	Sheeran
201	Benny	Blanco
202	Fred	Gibson
203	Max	Martin
204	Beyonce	Knowles
205	James	Blake
206	Thomas	Benz
207	Mike	Elizondo
208	Roy	Baker
209	George	Martin

אלבומים ושיר -

מוזיקאי שמן -

song_id	albumid	player_mid	player_sid	player_im_id
300	1	123	320	700
301	1	122	317	701
302	1	122	318	701
303	1	122	319	701
304	2	124	320	701
305	2	125	320	702
306	2	121	318	703
307	2	126	320	703
308	3	123	321	704
309	3	117	303	705
310	4	124	321	705
311	4	124	322	705
312	4	126	321	706
314	5	123	322	707
315	5	119	317	708
316	5	125	322	708
317	6	126	322	709
318	6	110	303	710
319	6	120	319	710
320	7	120	317	711
321	7	120	318	711
322	7	121	317	712
317	8	119	319	713
321	8	121	319	714
322	8			
300	9			
305	9			
309	9			
310	9			
305	10			
309	10			
317	10			
321	10			