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SUBJECT	Information Technology	DATE	November 2023
GRADE	Grade 11	MARKS	150
EXAMINER	D Kench and K Aitken	DURATION	3 hrs
MODERATOR	IT Department		

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY:

This paper consists of **11** pages. Please check that your paper is complete.

- Answer ALL questions.
- Read each question carefully. Code according to the question.
- Sample outputs have been provided for reference.
- Put question numbers as comments in the program.
- Save your work frequently. No additional time will be allocated if you are negligent in this regard.
- If a piece of code is not working, comment it out and carry on with other questions. Uncomment it before submission.

Question	1	2	3	4	5	6	Total	%
Possible Marks	50	27	31	6	20	16	150	100
Actual Marks								

SECTION A

SQL

50 MARKS

Spotify is an online music streaming platform. You are provided with a database called **Spotify** with a table called **tblSpotify**. The table contains information about the most streamed Spotify songs released in 2023. The field names, data type and field description are shown below:

tblSpotify in Design View

Field Name	Data Type	
songID	AutoNumber	Unique Autonumber key
song	Short Text	Song title
artists	Short Text	Artist or artists who performed the song
DateReleased	Date/Time	The date the song was released in Spotify
inSpotifyPlaylists	Number	The number of Spotify play lists that include the song
inSpotifyCharts	Number	The number of Spotify charts that list the song
streams	Number	The number of times the song has been streamed
bpm	Number	The beats per minute of the song
musicKey	Short Text	The song's key
Acoustic	Yes/No	The song does not use electronic or electrical instruments

When multiple artists have collaborated on a song, all names are included in the artists' column, separated by a comma. The last 3 columns provide musical information about the song: beats per minute, the primary key in which the song is played, and whether it is acoustic (the instruments used are not electric or electronic).

Some sample data is shown below:

tblSpotify in Datasheet View

songID	song	artists	DateReleased	inSpotifyPlaylists	inSpotifyCharts	streams	bpm	musicKey	Acoustic
1	Seven (feat. Latto)	Latto, Jung Kook	2023/07/14	553	147	141381703	125	B	☐
2	LALA	Myke Towers	2023/03/23	1474	48	133716286	92	C#	☐
3	vampire	Olivia Rodrigo	2023/06/30	1397	113	140003974	138	F	☐
5	WHERE SHE GOES	Bad Bunny	2023/05/18	3133	50	303236322	144	A	☐
6	Sprinter	Dave, Central Cee	2023/06/01	2186	91	183706234	141	C#	☐
7	Ella Baila Sola	Eslabon Armado, Peso Pluma	2023/03/16	3090	50	725980112	148	F	☐
8	Columbia	Quevedo	2023/07/07	714	43	58149378	100	F	☐
9	fukumean	Gunna	2023/05/15	1096	83	95217315	130	C#	☐
10	La Bebe - Remix	Peso Pluma, Yng Lvcas	2023/03/17	2953	44	553634067	170	D	☐
11	un x100to	Bad Bunny, Grupo Frontera	2023/04/17	2876	40	505671438	83	F#	☐
12	Super Shy	NewJeans	2023/07/07	422	55	58255150	150	F	☐
13	Flowers	Miley Cyrus	2023/01/12	12211	115	1316855716	118		☐
14	Daylight	David Kushner	2023/04/14	3528	98	387570742	130	D	☒
17	Cupid - Twin Ver.	Fifty Fifty	2023/02/24	2942	77	496795686	120	B	☐

QUESTION ONE

SQL

50 MARKS

Write SQL queries to do the following:

Paste the answers in the **SQL AnswerSheet.rtf** provided.

- 1.1 Display all the artists and songs sorted in alphabetical order of artists then song.

Correct output of the first 14 rows:

artists	song
(G)I-DLE	Queencard
A\$AP Rocky, Metro Boomin, Roisee	Am I Dreaming (Metro Boomin & A\$AP Rocky, Roisee)
Agust D	Haegeum
Ana Castela, AgroPlay	Nosso Quadro
Ariana Grande, The Weeknd	Die For You - Remix
Arijit Singh, Sachin-Jigar, Amitabh	Phir Aur Kya Chahiye (From "Zara Hatke Zara Bachke")
Bad Bunny	WHERE SHE GOES
Bad Bunny, Eladio Carrion	Coco Chanel
Bad Bunny, Grupo Frontera	un x100to
Becky G, Peso Pluma	Chanel
Big One, Duki, Lit Killah, Maria Becerra	Los del Espacio
Big One, FMK, Ke personajes	Un Finde CROSSOVER #2
Billie Eilish	What Was I Made For? [From The Motion Picture "Barbie"]
Bizarrap, Peso Pluma	Peso Pluma: Bzrp Music Sessions, Vol. 55

(4)

- 1.2 Create a query to find all the slow songs in key F or F#. You decide a mellow song is either acoustic or has a low bpm. List the songs in key F or F# and are either acoustic or have a bpm less than 100. Display the **song**, **artists**, **bpm**, **key** and **acoustic** fields.

Correct output:

song	artists	bpm	musicKey	acoustic
un x100to	Bad Bunny, Grupo Frontera	83	F#	☐
Say Yes To Heaven	Lana Del Rey	100	F#	☒
Snow On The Beach (feat. M	Lana Del Rey, Taylor Swift	110	F#	☒
Hummingbird (Metro Boom	James Blake, Metro Boomin	81	F#	☐
Never Felt So Alone	Labrinth	98	F	☒
REMIX EXCLUSIVO	Feid	87	F	☐
SORRY NOT SORRY	Tyler, The Creator	96	F#	☐
Heaven	Niall Horan	92	F	☐

(5)

- 1.3 Find the percentage of the **inSpotifyCharts** divided by **inSpotifyPlayLists** rounded to 2 decimal places. Name this field **Percentage**. Add a field called **Ratio** to display the values of the **inSpotifyCharts** and **inSpotifyPlayLists** fields combined with a colon. Display the **songs**, **artists**, combined **Ratio** field and calculated **Percentage** field.

Correct output of the first 14 rows:

song	artists	Ratio	Percentage
Seven (feat. Latto) (Explicit Ver.)	Latto, Jung Kook	147:553	26.58
LALA	Myke Towers	48:1474	3.26
vampire	Olivia Rodrigo	113:1397	8.09
WHERE SHE GOES	Bad Bunny	50:3133	1.6
Sprinter	Dave, Central Cee	91:2186	4.16
Ella Baila Sola	Eslabon Armado,	50:3090	1.62
Columbia	Quevedo	43:714	6.02
fukumean	Gunna	83:1096	7.57
La Bebe - Remix	Peso Pluma, Yng l	44:2953	1.49
un x100to	Bad Bunny, Grupo	40:2876	1.39
Super Shy	NewJeans	55:422	13.03
Flowers	Miley Cyrus	115:12211	0.94
Daylight	David Kushner	98:3528	2.78
Cupid - Twin Ver.	Fifty Fifty	77:2942	2.62

(7)

- 1.4 List the songs that were released 6 or more months ago. Display the **song**, **artists**, **dateReleased**, and the number of months.

Correct output of the first 14 rows:

song	artists	dateRelease	NumMonth:
LALA	Myke Towers	2023/03/23	7
Ella Baila Sola	Eslabon Armado,	2023/03/16	7
La Bebe - Remix	Peso Pluma, Yng l	2023/03/17	7
un x100to	Bad Bunny, Grupo	2023/04/17	6
Flowers	Miley Cyrus	2023/01/12	9
Daylight	David Kushner	2023/04/14	6
Cupid - Twin Ver.	Fifty Fifty	2023/02/24	8
Classy 101	Feid, Young Miko	2023/03/31	7
Like Crazy	Jimin	2023/03/24	7
Last Night	Morgan Wallen	2023/01/31	9
TQG	Karol G, Shakira	2023/02/23	8
El Azul	Junior H, Peso Plu	2023/02/10	8
Die For You - Remix	Ariana Grande, Th	2023/02/24	8
Baby Don't Hurt Me	David Guetta, An	2023/04/06	6

(5)

- 1.5 List the songs whose number of streams is above average. Display the **song**, **artists** and **streams**.

Correct output of the first 14 rows:

song	artists	streams
WHERE SHE GOES	Bad Bunny	303236322
Sprinter	Dave, Central Cee	183706234
Ella Baila Sola	Eslabon Armado,	725980112
La Bebe - Remix	Peso Pluma, Yng l	553634067
un x100to	Bad Bunny, Grupo	505671438
Flowers	Miley Cyrus	1316855716
Daylight	David Kushner	387570742
Cupid - Twin Ver.	Fifty Fifty	496795686
Classy 101	Feid, Young Miko	335222234
Like Crazy	Jimin	363369738
Peso Pluma: Bzrp Music Sessions, Vol. 55	Bizarrap, Peso Plu	200647221
Last Night	Morgan Wallen	429829812
TQG	Karol G, Shakira	618990393
TQM	Fuerza Regida	176553476

(6)

- 1.6 List the total streams for each artist. Display the **artists** and the total streams as a field called **TotalStreams**.

Correct output of the first 14 rows:

artists	TotalStream
(G)I-DLE	96273746
A\$AP Rocky, Metro Boomin, Rois	94186466
Agust D	118810253
Ana Castela, AgroPlay	233801632
Ariana Grande, The Weeknd	518745108
Arijit Singh, Sachin-Jigar, Amitab	64533040
Bad Bunny	303236322
Bad Bunny, Eladio Carrion	250305248
Bad Bunny, Grupo Frontera	505671438
Becky G, Peso Pluma	161460990
Big One, Duki, Lit Killah, Maria Be	123122413
Big One, FMK, Ke personajes	142095275
Billie Eilish	30546883
Bizarrap, Peso Pluma	200647221

NOTE: The order may vary in MySQL.

artists	TotalStreams
Latto, Jung Kook	141 381 703
Myke Towers	133 716 286
Olivia Rodrigo	140 003 974
Bad Bunny	303 236 322
Dave, Central Cee	183 706 234
Eslabon Armado, Peso Pluma	725 980 112
Quevedo	233 548 723
Gunna	95 217 315
Peso Pluma, Yng Lvcas	553 634 067
Bad Bunny, Grupo Frontera	505 671 438
NewJeans	518 794 821
Miley Cyrus	1 316 855 716
David Kushner	387 570 742
Fifty Fifty	636 477 650

(5)

- 1.7 Find the highest number of playlists of each artist. Display the **artists** and the maximum number of playlists. Only display the artists who have a maximum above 3000.

The correct output is shown below:

artists	MostPlayLists
Ariana Grande, The Weeknd	3408
Bad Bunny	3133
Calvin Harris, Ellie Goulding	5120
David Guetta, Anne-Marie, Coi Lera	4277
David Kushner	3528
Eslabon Armado, Peso Pluma	3090
Karol G, Shakira	4284
Miley Cyrus	12211
PinkPantheress, Ice Spice	5184
Shakira, Bizarrap	5724

NOTE: The order may vary in MySQL.

artists	MaxStreams
Bad Bunny	3 133
Eslabon Armado, Peso Pluma	3 090
Miley Cyrus	12 211
David Kushner	3 528
Karol G, Shakira	4 284
Ariana Grande, The Weeknd	3 408
David Guetta, Anne-Marie, Coi Leray	4 277
PinkPantheress, Ice Spice	5 184
Calvin Harris, Ellie Goulding	5 120
Shakira, Bizarrap	5 724

(7)

- 1.8 Write a SQL statement to add the song "This Love" by Taylor Swift, released in 2023/5/6.

(4)

- 1.9 Taylor Swift has re-released many of her songs this year. All her songs should include the text "(Taylor's version)" in the title. Write an SQL query to change the songs whose artist is Taylor Swift, and the song title does NOT contain the text "(Taylor's version)".

The following records should be updated:

SongID	artists	NewTitle
70	Taylor Swift	Enchanted (Taylor's version)
194	Taylor Swift	Better Than Revenge (Taylor's version)
207	Taylor Swift	Hits Different (Taylor's version)

(7)

SCENARIO

The radio station 94.7 has a morning slot called "Classic or Not", where a song 10 years or older is played and listeners vote if they think the song is a classic. A programmer wants to find a song that could be classic.

The programmer has generated a list of 50 classic songs using ChatGPT. The list is stored in a text file called "Songs.txt". The text file has many duplicates, and not all the songs are 10 years or older. Each line of the text file stores the details of a song in the format:

- **song name** – the song title
- **artist(s) name** - some songs have a second featured artist prefixed with "ft."
- **date released** – the date the song was released
- **points** – the points the song was awarded by Spotify

Sample data:

```
Rolling in the Deep,Adele,03/05/2010,18748
Uptown Funk,Mark Ronson ft. Bruno Mars,10/11/2014,22562
Shape of You,Ed Sheeran,06/01/2017,14411
Happy,Pharrell Williams,21/11/2013,17942
Happy,Pharrell Williams,21/11/2013,17942
Someone Like You,Adele,24/01/2011,13369
Rolling in the Deep,Adele,03/05/2010,18748
Get Lucky,Daft Punk ft. Pharrell Williams,19/04/2013,18784
Old Town Road,Lil Nas X ft. Billy Ray Cyrus,03/12/2018,17689
Viva la Vida,Coldplay,25/05/2008,20052
```

QUESTION 2**27 MARKS**

Use the class diagram to code a **Song** class.

Song
- songName : string - artists : string - dateReleased : Date - points : integer <u>+ numOlder10 : integer</u>
+ Constructor(tN : string, a : string, dR : Date, p : integer) + getSongName() : string + getArtists() : string + getDateReleased() : Date + getPoints() : integer + getYear() : integer + isOlder10Years() : boolean + toString() : string

- 2.1 Create a class called **Song**. (1)
- 2.2 Create the **songName**, **artists**, **dateReleased** and **points** fields. Ensure the fields cannot be accessed from outside the class. (3)
- 2.3 Create a static **numOlder10** field that is accessible outside the class. (2)
- 2.4 Code a parameterised constructor to assign values to the **songName**, **artists**, **dateReleased** and **points** fields. (3)
- 2.5 Code accessor methods for the **songName**, **artists**, **dateReleased** and **points** fields. (4)
- 2.6 Code the **getYear** method to return the song's age in years. (4)
- 2.7 Code the **isOlder10Years** method to return true if the song is 10 years or older, otherwise false. Use the method you coded in 2.6. (4)
- 2.8 Add code to the constructor method to increment the **numOlder10** field if the song is 10 years or older. Use the method you coded in 2.7. (2)
- 2.9 Create a **toString** method to return the values of the **Song** object. The string must be returned in the following format:

```
<songName>▼"by"▼<artists>
<tab>age▼"years old"▼-"points▼<points>
```

NOTE: ▼ indicates a space.

Example:

```
Uptown Funk by Mark Ronson ft. Bruno Mars
  8 years old - points 22562
```

(4)

QUESTION 3**31 MARKS**

- 3.1 Code a class called **SongManager**. (1)
- 3.2 Add an array called **sArr** that can hold 200 **Song** objects and a **size** field that can Song the size of the array. (5)
- 3.3 Add a constructor to read the data from **Songs.txt**, create **Song** objects and add them to the array called **sArr**.

- Scan and loop through the entire file.
- Extract the data from each line.
- Create a **Song** object, add it to the array and increment the **size** counter.

(11)

3.4 Code a method called **sort** to sort the array alphabetically according to the song name. (8)

3.5 Code a **toString** method. This method should return a string with each song's details stored in the array called **sArr** on a new line. Each song should be returned in their **toString** format. (6)

QUESTION 4

6 MARKS

4.1 Code an application class called **SongUI**, with a **main** method. (1)

4.2 Add code to instantiate a **SongManager** object. (1)

4.3 Add code to sort and display the songs.

The first and last 5 songs of the output are as follows:

```
Bad Romance by Lady Gaga
    13 years old - points 29096
Blinding Lights by The Weeknd
    3 years old - points 23082
Blinding Lights by The Weeknd
    3 years old - points 23082
Boulevard of Broken Dreams by Green Day
    18 years old - points 18394
Boulevard of Broken Dreams by Green Day
    18 years old - points 18394

Uptown Funk by Mark Ronson ft. Bruno Mars
    8 years old - points 22562
Uptown Funk by Mark Ronson ft. Bruno Mars
    8 years old - points 22562
Viva la Vida by Coldplay
    15 years old - points 20052
Viva la Vida by Coldplay
    15 years old - points 20052
Viva la Vida by Coldplay
    15 years old - points 20052
```

(2)

4.4 Add code to display the number of songs that are 10 years or older using the field you created in Question 2.3. The correct output is shown below:

```
Number of Possible Classics 32
```

(2)

QUESTION 5

20 MARKS

The text file contains many duplicate entries.

- 5.1 In the **SongManager** class, code a method called **shiftLess** that will remove an array element by replacing the element with the following array elements. The method will receive the index of the array element to be replaced as a parameter.
Before removing the array element, the method must decrement the **numOlder10** field (created in Question 2.3) if the song is 10 years or older. Use the method created in Question 2.7. (8)
- 5.2 In the **SongManager** class, code **removeDups** method to remove any duplicate songs in the array. A song is a duplicate if the song name, artists and release date are the same. (9)
- 5.3 In the **SongUI** class, add code to call the **removeDups** method from the **SongManager** class and display the array afterwards.

The first and last 5 songs of the output are as follows:

```
Bad Romance by Lady Gaga
    13 years old - points 29096
Blinding Lights by The Weeknd
    3 years old - points 46164
Boulevard of Broken Dreams by Green Day
    18 years old - points 36788
Can't Stop the Feeling! by Justin Timberlake
    7 years old - points 14978
Chasing Pavements by Adele
    15 years old - points 27502

Someone Like You by Adele
    12 years old - points 13369
Thinking Out Loud by Ed Sheeran
    9 years old - points 39762
Toxic by Britney Spears
    19 years old - points 15656
Uptown Funk by Mark Ronson ft. Bruno Mars
    8 years old - points 45124
Viva la Vida by Coldplay
    15 years old - points 60156
```

- 5.4 Add code to display the updated number of songs 10 years or older using the field you created in Question 2.3.

The correct output is shown below:

```
Number of Possible Classics 21
```

QUESTION 6**16 MARKS**

The text file "Played.txt" stores the song names and artists played before on 947. Each text file line is in the format **songName** and **artists** separated by a comma.

Sample data:

```
Radio Gaga,Queen
Hallelujah,Leonard Cohen
Smooth Operator,Sade
Smooth,Santana ft. Rob Thomas
Clocks,Coldplay
Boulevard of Broken Dreams,Green Day
Rehab,Amy Winehouse
```

- 6.1 In the **SongManager** class, code a method called **searchInFile** to determine if a song is in the text file "Played.txt". The method will be sent the song name and artists as parameters. The method must:
- Scan and loop through the entire file.
 - Extract the data from each line.
 - Return true if the data matches the song name and artists parameters
 - Return false if the parameters do not match any data in the text file. (9)
- 6.2 In the **SongManager** class, code a method called **findClassic** search through the array and return the first song that is not in the text file "Played.txt", is 10 years or older and has more than 25 000 points. (6)
- 6.3 In the **SongUI** class, add code to display the song returned in Question 6.2.

Correct output:

```
The classic is Empire State of Mind by Jay-Z ft. Alicia Keys
```

(1)