

**Databases**

Year 1 Semester 2

## SCHOOL OF INFOCOMM TECHNOLOGY

Diploma in Information Technology

Diploma in Data Science

Diploma in Cybersecurity & Digital Forensics

**Common Test (OPEN BOOK)**(20% of Module Assessment)

**Revision Paper**

Date of TEST : 15 Dec 2021

Time of TEST : 11am to 12 noon

**Note 1: This is a 1-hour paper.**

**(Note 2: The Date & Time reflected above is for the ACTUAL TEST.**

**Your tutor will inform you if there are any changes to the date/time).**

INSTRUCTIONS TO CANDIDATES:

1. Write your Student Number, Name, Module Group and Seat Number CLEARLY in the boxes provided above.
2. This paper consists of **10** pages including this cover page. Check carefully to make sure your set is complete.
3. Answer **ALL** questions in the spaces provided.
4. There is one appendix attached as:

**Appendix 1: ‘Pilot of the Airwaves’ Case Scenario** for Questions 1 & 2.

1. **DO NOT** detach any pages from this booklet.
2. This is an open book test. **NO** electronic devices and programmable calculators are permitted.

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| **Grade** |  |

**QUESTION 1: 50 marks**

In the context of Relational Theory, answer the following questions with reference to the ‘Pilot of the Airwaves’ case scenario given in Appendix 1.

1. (i) For the DiscJockey relation, suggest its list of candidate keys and rank them in the order of suitability as primary key.

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| Djid  Petname (DJ must pick unique petname) |
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| Ppl can have same names thus in DB design name is not a candidate key |
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1. What do you understand by the term ‘null’? What happens if a new disc jockey, May Lim is given ‘null’ as her DjId?

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| Null means that the value is unknown or unavailable. If May Lim has DjId, of null, it means that her DjId is unknown and entity integrity is compromised since DjId is the primary key of the DiscJockey relation |
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1. The primary key for DiscJockeyRoster relation is given as a composite key of ProgrammeNo and DjId. Is this necessary? Explain why? Can DjId on its own be the primary key?

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| Yes it is necessary. Because DjId by itself cannot uniquely identify every tuple in and cannot be the primary key as Djs can host more than one programmme. ProgrammeNo on its own also cannot be the PK as a programme can be hosted by more than one DJ. Thus we need to combine them too uniquely identify disk jockey roster. |
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1. What you understand by the term ‘degree of a relation’? Give the degree of ProgrammeSchedule.

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| Degree of a relation refers to the number of columns there are in a relation. Also can be known that as the number of attributes of a relation. Programme Schedule has a degree of 4. |
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1. What do you understand by the term ‘domain’? Give the domain of the attribute ScheduledTime.

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| Domain is the range of acceptable values for a column / attribute. Domain for scheduled time is in range 0000 to 2359 and I must be within the PTime value for the specific programmeNo. |
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(17 marks)

1. Identify the types of violation on relational integrity arising from the following actions. For each violation, explain how it occurs. You are **NOT** required to write any SQL statements.

Insert the following tuple into the DiscJockeyRoster relation.

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| --- | --- | --- |
| ***<ProgrammeNo>*** | ***<DjId>*** | ***Role*** |
| Pg05 | Dj005 | Lead presenter |

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| Will violate referential integrity violation. ProgrammeNo in discjockeyroster is a foreign key referencing programme no in programmeschedule relation. Pg05 does not exist in programme schedule. Hence above tuple will not have a matching programmeNo value in programme schedule |
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* + 1. Delete the following tuple from the Song relation.

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| --- | --- | --- | --- | --- |
| ***SongId*** | ***Title*** | ***Artist*** | ***Duration (min)*** | ***Genre*** |
| So001 | Pilotting the Airwaves | Charles Bore | 3:40 | Pop |

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| --- |
| Referential integrity is compromised as So001 exists as a foreign key in the playlist relation and if it is deleted, So001 in the playlist relation will not be a primary key in a relation and there will be tuples in a playlist relation without a matching songId in song relation |
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* + 1. Insert the following tuple into Playlist Relation.

|  |  |  |  |
| --- | --- | --- | --- |
| ***<ProgrammeNo>*** | ***<SongId>*** | ***SequenceNo*** | ***ScheduledTime*** |
| Pg01 | Jo001 | 3 | 0927 |
| Entity integrity violation The primary key for playlist relation is a composite key (prgNo, sequence No). There is already a tuple with PK (Pg01, 3) so it is not possible to insert a new tuple with duplicate PK (Pg01, 3). | | | | | |
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(21 marks)

1. For each of the following statements, state True or False and briefly explain why it is so.
   1. A song is sung by two singers. It is possible to have a second attribute named ‘Artist’ so that the names of both singers can be stored in the two Artist attributes in Song relation.

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| False because attribute names must be unique in a relation and there is already an artist column / attribute |
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* 1. Some of the programmes have quiz questions. Listeners can call in to answer them and win a prize. In order to keep track of the winners and prizes, a new relation called PrizeWinner is required.

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| True. Because there is no relation named PrizeWinner |
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* 1. A new channel is introduced to play classical music. The existing tables will be sufficient to hold the data requirement of this new channel.

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| True. The data for the new channel can be inserted into the channel relation and the classical songs can be inserted into the song relation. |
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(12 marks)

**QUESTION 2: 50 marks**

Appendix 1 shows six relations in the ‘Pilot of the airwaves’ system database.

1. Figure 2(a) is the Data Dictionary for the DiscJockey relation. Write the SQL code to create the table in the database, including the necessary constraints. You may assume that the Channel Relation has been created.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Attribute Name | Description | Data Type and Length | Constraint | Null Value |
| DjId | Unique identifier for each DJ | char(5) | Primary Key | No |
| Name | The name of the DJ | varchar(30) |  | No |
| Gender | The gender of the DJ | char(6) | Values: Male, Female | Yes |
| ChannelId | The channel that the DJ works for | char(4) | Foreign Key ->  Channel(ChannelId) | No |
| PetName | The pet name of the DJ | varchar(20) |  | Yes |

Figure 2(a): Data Dictionary for DiscJockey relation

CREATE TABLE DiscJockey (

DjId char(5) Primary Key,

Name varchar(30) not null,

Gender char(6) Null check (gender in (‘Male’,’Female’)),

ChannelId char(4) not null ,

PetName varchar(20) Null,

Constraint fk\_djChannelid foreign key (ChannelId) reference Channel(ChannelId)

)

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| Create Table DiscJockey (  DjId char(5) Primary Key,  Name varchar(30) not null,  Gender char(6) null check(Gender in (‘Male’,’Female’)),  ChannelId char(4) not null,  PetName varchar(20) null,  Constraint fk\_ChannelId Foreign Key (ChannelId) references Channel(ChannelId)  ) |
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(10 marks)

1. The room which channel “Double Three” normally uses to air its programmes is being renovated. The channel is now moved to room B02-33. Write the SQL code to reflect this change in the database.

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| UPDATE Channel  SET RoomLocation = ‘B02-33’  WHERE Channel name = ‘Double Three’ |
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| Update channel  Set roomLocation = ‘B02-33’  Where ChannelName = ‘Double Three’ |
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(10 marks)

1. Write the SQL code to list the details of all programmes that are scheduled to be aired in August 2009. Display the list according to the alphabetical order of the programme titles. You are required to provide 2 versions, one using DATE function and one without the use of DATE function.

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| Select \*  From programmeSchedule  Where datepart(year, PDate) = 2009 and datepart(month, PDate) = 8  Order by title  Select \*  From ProgrammeSchedule  Where PDate between ‘01Auguest 2009’ and ’31 August 2009’  SELECT \*  FROM ProgrammeSchedule  WHERE PDate between ’01 August 2009’ and ’31 August 2009’  ORDER BY Title  SELECT \*  FROM ProgrammeSchedule  WHERE datepart(month, PDate) = 8 and datepart(year, PDate)=2009  ORDER BY Title ASC |
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(10 marks)

1. The programme director wants to know which female disc jockey has a role as a ‘Lead presenter’. Write the SQL code to list the details of these disc jockeys together with their programme numbers.

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| Select dj.DjId, dj.Name, dj.PetName, dj.ChannelId, djr.ProgrammeNo  From discjockey dj  Inner join discjockeyroster djr  On dj.djId = djr.djId  Where dj.Gender = ‘Female’ and djr.Role = ‘Lead presenter’  SELECT DJR.ProgrammeNo, DjId, Name, Gender, ChannelId, PetName (DJ \*)  FROM DiscJockey d  INNER JOIN  DiscJockeyRoster r  ON r.DjId = d.DjId  WHERE Role = ‘Lead presenter’ AND Gender = ‘Female’ |
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(10 marks)

1. A new disc jockey, Irine Soh (ID = ‘Dj006’), has been hired to anchor a new Mandarin channel called “Nine Three Hundred” (ID = ‘9300’) which will be launched soon. It will be using room B02-03 to air its programmes. Write the SQL code to include this new information in the database.

**Insert into Channel (ChannelId, Channel name, Language, RoomLocation)**

**Values(‘9300’, ‘Nine Three Hundered’, ‘Mandarin’, ‘B02-03’)**

**Insert into DiscJockey (DjId, Name, Gender, ChannelId, Petname)**

**Values(‘Dj006’, ‘Irine Soh’, ‘Female’, ‘9300’, NULL)**

**Insert into channel before discjockey to prevent referential integrity**

**INSERT INTO Channel(channelid, channelname, language, roomlocation)**

**VALUES(‘9300’, ‘Nine Three Hundred, ‘Mandarin’, ‘B02-03’)**

**INSERT INTO DiscJockey(DjId, Name, Gender, ChannelId, PetName)**

**Values(‘DJ006’, ‘Irine Soh’, ‘Female’, ‘9300’, null)**

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(10 marks)

**Appendix 1: ‘Pilots of the Airwave’ Case Scenario**

‘Pilots of the Airwave’ is an application package that has been developed by ApeX Software House to allow disc jockeys of its clients to be creative in making their programmes interesting and engaging. It has a huge collection of songs licensed from the various major music publishers together with jingles from advertisers. It allows the capturing and updating of information about the disc jockeys and scheduling of programme sessions.

A programme director will start scheduling the programmes months ahead before rostering disc jockeys for the programmes. Each programme may be hosted by one or more disc jockeys. Each disc jockey may host many programmes. These disc jockeys, working for the different channels, will then plan two weeks in advance the playlists of what songs to be played during the programmes they host. They will be told what jingles to play for advertisers. Broadcasting and recording for each channel are done in the same sound room and there is no sharing of sound rooms.

During the programme, the songs are played in the sequence given and the time scheduled in the playlist. However, the disc jockeys can override this sequence and timing on a need basis. When an override is used, the playlist will be updated to reflect what is actually played in a particular session. The playlists will then be used for auditing purpose and to adjust payment of royalties to the copyright owners of the songs.

Having this new system has brought about many benefits for everyone. One benefit the disc jockeys can enjoy is that they can plan the time for the songs, the jingles and the talk time, allowing for the news reading and the traffic conditions reporting. Another benefit is that they may even make sure that a particular song is not played more than a certain number of times within a period of time. Moreover, the automatic play feature of a playlist is particularly useful when there is only jockey on duty and there is a need for a rest break.

The following relations contain complete list of test data for the system.

**DiscJockey Relation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***DjId*** | ***Name*** | ***Gender*** | ***<ChannelId>*** | ***PetName*** |
| Dj001 | Jaramie Lee | Female | 9033 | JL |
| Dj002 | Alvin Toh | Male | 9033 | Chipmunk |
| Dj003 | Horace Png | Male | 9500 | Hooray |
| Dj004 | Jerald See | Male | 9500 | I see |
| Dj005 | Michelle Cheng | Female | 9500 | Meshare |

**Channel Relation**

|  |  |  |  |
| --- | --- | --- | --- |
| ***ChannelId*** | ***Channel name*** | ***Language*** | ***RoomLocation*** |
| 9033 | Double Three | English | B01-33 |
| 9500 | 95 Oldies | English | B01-05 |
| 9333 | Three Tree | Mandarin | B01-13 |

**(Continued on next page…)**

**Appendix 1: ‘Pilots of the Airwaves’ Case Scenario (Con’td)**

**Song Relation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***SongId*** | ***Title*** | ***Artist*** | ***Duration (min)*** | ***Genre*** |
| So001 | Pilotting the Airwaves | Charles Bore | 3:40 | Pop |
| So002 | More changes | Blue or Black | 4:20 | Soft Rock |
| So003 | My way to heaven | Led Astray | 7:20 | Heavy metal |
| So004 | Land of Confusion | Superman | 3:30 | Soft Rock |
| Jo001 | Cool Consulate | Advertisement | 0:25 | Jingle |
| Jo002 | Wonderful world | Advertisement | 0:30 | Jingle |
| So005 | Drunk with Love | Which Dion | 4:06 | Pop |
| … | … | … | … | … |

**ProgrammeSchedule Relation**

|  |  |  |  |
| --- | --- | --- | --- |
| ***ProgrammeNo*** | ***PDate*** | ***PTime*** | ***Title*** |
| Pg01 | 04/08/09 | 0900-1100 | Good Morning Singapore |
| Pg02 | 04/08/09 | 2200-2400 | Take it Easy |
| Pg03 | 05/08/09 | 1100-1400 | Midday cruising |
| Pg04 | 08/08/09 | 1400-1700 | Lazy Friday Afternoon |
| Pg06 | 11/08/09 | 0900-1100 | Good Morning Singapore |

**Playlist Relation**

|  |  |  |  |
| --- | --- | --- | --- |
| ***<ProgrammeNo>*** | ***SequenceNo*** | ***<SongId>*** | ***ScheduledTime*** |
| Pg01 | 1 | So002 | 0910 |
| Pg01 | 2 | Jo001 | 0915 |
| Pg01 | 3 | So001 | 0920 |
| Pg02 | 2 | So001 | 2210 |
| Pg03 | 5 | So003 | 1200 |
| Pg04 | 4 | So005 | 1420 |

**DiscJockeyRoster Relation**

|  |  |  |
| --- | --- | --- |
| ***<ProgrammeNo>*** | ***<DjId>*** | ***Role*** |
| Pg01 | Dj001 | Lead presenter |
| Pg01 | Dj002 | Assistant presenter |
| Pg02 | Dj003 | Co-presenter |
| Pg02 | Dj004 | Co-presenter |
| Pg01 | Dj004 | Assistant presenter |

**Important Notes:**

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| 1. **Character and Date columns are left-justified.** 2. **Integer and numeric columns are right-justified.** 3. **Date values are in ‘DD/MM/YYYY’ format.** 4. **Tables with the last row showing “…” indicates that there are more data rows which are not shown.** |

---- END OF PAPER ----