Contents

Project overview to convert QueensClassScheduleCurrentSemester Data into an ERD design and load the data

1. **You will use SQLDBM to design your database**.
2. You will design and create a new database (`QueensClassScheduleCurrentSemester`) from the single table (`Uploadfile.CoursesCurrentSemester`) on your local machine.
3. You will add the additional columns to all tables in this project
4. You create a table called Process.WorkflowSteps
5. Document your stored procedures
6. You will create a stored procedure called Process.usp_TrackWorkFlow
7. You will create stored procedures to load each of the individual tables into each of the tables based upon your ERD design just as you did in project 2.
8. Create a stored procedure Process.usp_ShowWorkflowSteps to query the table Process.WorkflowSteps.
9. Upload the final design and implementation into your database as backup file (.bak)
10. Create one PowerPoint with voice annotation describing the work and design decisions. Have detailed sections describing the sub topics below:
    a. Creating UDT (user defined datatypes) for one or more application columns in the database. All columns must be based upon a UDT link in the Northwinds Database. Demonstrate how the UDT is being reused. Attached is an extract of the UDT's used in the Northwinds Database as an example to assist you in your design of this new database.
    b. Create constraints in each of the tables for a proposed data entry system
        i. Default values
        ii. Required or optional
        iii. Unique columns
        iv. Business rule validations implemented
    c. Document each store procedure to describe the function and you design.
    d. Document your proposition used and explain the queries
    e. Review your data cleansing strategy
    f. Explain how the Redgate tools were helpful in your productivity (i.e., SQL Prompt, SQL doc, SQL Compare, etc.)
11. Create a PowerPoint with voice annotation describing the work
    a. Use the JDBC class library to execute the two stored procedures
        i. Project3.LoadQueensCourseSchedule
        ii. Process.usp_ShowWorkflowSteps and load the output into JTable for presentation in the video

iii. Show the analysis "Create queries with propositions that support your design decisions" and load the output into JTable for presentation in the video

Project tracking for a group project only

Non-technical Project Objective

It is important to learn how work as a team (collaborating). Support each other to meet the mutually agreed upon deliverables. Learn how to work in virtual meetings using Microsoft Team, Zoom, GoToMeeting, etc.

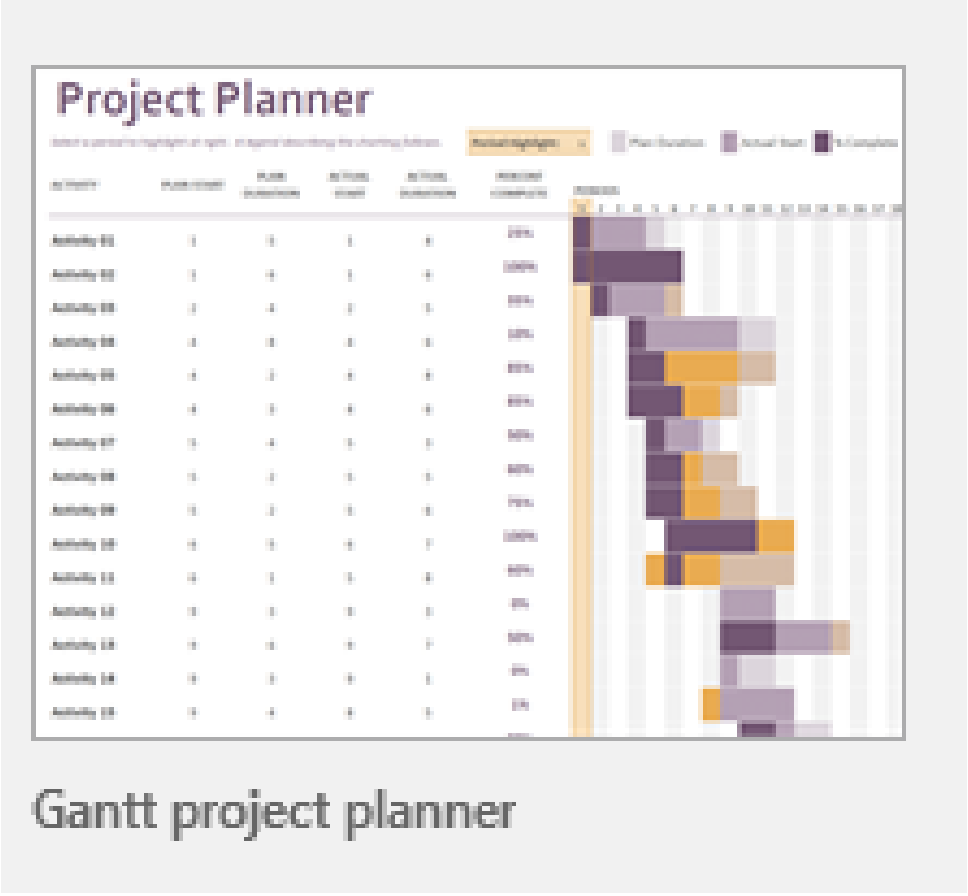
Industry is looking for team players. Individuals that are reliable and meet their deadlines.

Project Tracking techniques documentation using Excel and Word

1. **Provide meeting notes (word document) with an agenda and attendance**
2. **Develop a to-do list for the team members using the To-do list. Each project in the worksheet will be the name of the group member and their responsibilities for the project and due dates.**
3. **Track the deliverables by original due date and revise due by with notes explaining the delay.**

	A	B	C	D	E	F	G	H
1		To-do list						
2								
3		To be completed by:				Name		
4		Deadline:				Date		
5								
6		Project 1						
7		% done	Phase	Start By	Original Due By	Revised Due By	Number Of Days	Revision Notes
8		100%	Planning					
9		75%	Preparation					
10		50%	Task a					
11		25%	Task b					
12		0%	Task c					
13		0%	Task d					
14		0%	Paperwork					
15		0%	Hand-off					
16		0%	Follow-up					

1. **Use Gantt Project planner to track the summarized progress of the project. It will be managed by the project manager and shared with the group team1. The activity will be the individual tasks for each group member. Devise your own convention to include tracking delays.**
2.



Gantt project planner

[1] See attached "Group Number – Gantt project 1 planner.xlsx"

Create a new table DbSecurity.UserAuthorization in this project to add the following columns

An example of how to add the SchemaName UDT

```
create schema Udt
```

An example of how to add the User defined Datatypes

```
CREATE TYPE [Udt].[SuurogateKeyInt] FROM [int] NULL
CREATE TYPE [Udt].[DateAdded] FROM [int] NOT NULL
CREATE TYPE [Udt].[ClassTime] FROM nchar(5) NOT NULL
CREATE TYPE [Udt].[IndividualProject] FROM nvarchar (60) NOT NULL
CREATE TYPE [Udt].[ LastName] FROM [int] nvarchar(35) NOT NULL
CREATE TYPE [Udt].[ FirstName] FROM [int] nvarchar(20) NOT NULL
CREATE TYPE [Udt].[ GroupName] FROM [int] nvarchar(20) NOT NULL
```

- ✓ UserAuthorizationKey [Udt].[SuurogateKeyInt] NOT NULL, -- primary key
- ✓ ClassTime [Udt].[ClassTime] Null Default ('09:15')
- ✓ IndividualProject [Udt].[IndividualProject] null default('PROJECT 3')
- ✓ GroupMemberLastName [Udt].[LastName] NOT NULL,
- ✓ GroupMemberFirstName [Udt FirstName] NOT NULL,
- ✓ GroupName nvarchar(20) NOT NULL, default('Group #')
- ✓ DateAdded [Udt].[DateAdded] null default (sysdatetime())

Develop an ERD model in the SQL Diagram editor

Read Chapter 1 in the textbook to review

1. Pages 7 through 10 on "Normalization and the benefits of constraints."
2. Pages 19 through 25 on "Creating tables and defining data integrity"
3. Look at the handouts from the ERD portion of the class.

Inspect the data- Just a few of the anomalies are pointed out below:

```
/****** Script for SelectTopNRows command from SSMS  ******/
SELECT TOP (1000) [Semester]
      ,[Sec]
      ,[Code]
      ,[Course (hr, crd)]
      ,[Description]
      ,[Day]
      ,[Time]
      ,[Instructor]
      ,[Location]
      ,[Enrolled]
      ,[Limit]
      ,[Mode of Instruction]
  FROM [QueensClassSchedule].[Uploadfile].[CurrentSemesterCourseOfferings]
```

Notice the issues with the data

125 %

Results | Messages

	Semester	Sec	Code	Course (hr, crd)	Description	Day	Time	Instructor	Location	Enrolled	Limit	Mode of Instruction
178	Current Semester	01	11807	ANTH 240 (3,...	Essentials Of Archaeol...	M, W	9:15 AM - 10:30 AM	Pugh, Timothy	PH 311	20	20	Web-Enhanced
179	Current Semester	01	48210	ANTH 241 (3,...	The Aztecs, Mayas, A...	T, TH	12:15 PM - 1:30 PM	Suri, Miranda	RZ 347	36	37	In-Person
180	Current Semester	01	11839	ANTH 243 (3,...	Archaeology Of North ...	M	3:10 PM - 6:00 PM	Tache, Karine	PH 304	12	20	Hybrid
181	Current Semester	01	11827	ANTH 260 (3,...	Essent Biol Anthro	T, TH	9:15 AM - 10:30 AM	Forrest, Frances	PH 311	14	14	Web-Enhanced
182	Current Semester	01	11818	ANTH 279 (3,...	Vt:Topics Biol Anth	T, TH	1:40 PM - 2:55 PM	Plummer, Thomas	PH 311	17	17	Web-Enhanced
183	Current Semester	01	11844	ANTH 280 (3,...	Language and Social I...	T, TH	3:10 PM - 4:25 PM	Rodriguez Aponte, J...	PH 114	34	33	Web-Enhanced
184	Current Semester	01	62926	ANTH 2953 (...	Ind Std -Anth		-	Pechenkina, Ekateri...		1	1	In-Person
185	Current Semester	02	62476	ANTH 2953 (...	Ind Std -Anth		-	Tache, Karine		1	1	In-Person
186	Current Semester	01	48129	ANTH 302 (3,...	Ecology And Culture	T, TH	10:45 AM - 11:59 AM	Moore, James	PH 311	20	18	In-Person
187	Current Semester	01	11840	ANTH 354 (3,...	Time	T, TH	1:40 PM - 2:55 PM	Birth, Kevin	PH 351	15	15	In-Person
188	Current Semester	01	11837	ANTH 361 (3,...	Human Variation	M, W	10:45 AM - 12:00 PM	Madimenos, Felicia	PH 311	18	17	Web-Enhanced
189	Current Semester	01	56480	ANTH 390 (3,...	Senior Honor Thesis		-	Swedell, Larissa		1	1	In-Person
190	Current Semester	03	62480	ANTH 390 (3,...	Senior Honor Thesis		-	Pechenkina, Ekateri...		1	1	In-Person
191	Current Semester	02	56863	ANTH 390 (3,...	Senior Honor Thesis		-	Strassler, Karen		1	1	In-Person
192	Current Semester	1	57969	ANTH 3953 (...	Directed Studies		-	Pechenkina, Ekateri...		1	1	In-Person
193	Current Semester	01	44971	ARAB 101 (4, 4)	Elem Arabic 1	T, TH	10:05 AM - 11:55 AM	Soleimani, Kamal	QH 345C	25	25	In-Person
194	Current Semester	01	11250	ARAB 102 (4, 4)	Elem Arabic 2	T, TH	10:05 AM - 11:55 AM	Abdelghany, Hala	QH 265C	28	25	Web-Enhanced
195	Current Semester	02	56473	ARAB 306 (3, 3)	Advanced Arabic II	W	9:10 AM - 12:00 PM	Soleimani, Kamal	QH 26...	7	25	Web-Enhanced
196	Current Semester	02	11624	ARTH 001 (3,...	Introduction To Art	TH	5:00 PM - 7:50 PM	Clark, William	KP 403	52	50	In-Person
197	Current Semester	01	11623	ARTH 001 (3,...	Introduction To Art	T	9:10 AM - 12:05 PM	Zeuschner, Margaret	KP 404	40	40	In-Person
198	Current Semester	03	11625	ARTH 001 (3,...	Introduction To Art	TH	1:40 PM - 4:30 PM	Clark, William	KP 403	50	50	In-Person
199	Current Semester	01	11627	ARTH 101 (3,...	Hist Of Western Art 1	M	1:40 PM - 4:30 PM	Nici, John	KP 403	50	50	In-Person
200	Current Semester	01	11629	ARTH 102 (3,...	Hist Western Art 2	S	1:00 PM - 4:00 PM	Burnham, Mary	KP 403	42	50	In-Person
201	Current Semester	02	11630	ARTH 102 (3,...	Hist Western Art 2	M	1:40 PM - 4:30 PM	Wallace, Ian	KP 404	41	40	In-Person
202	Current Semester	03	11631	ARTH 102 (3,...	Hist Western Art 2	F	10:00 AM - 12:50 PM	Lee, Chae Eun	KP 403	53	50	In-Person
203	Current Semester	01	11632	ARTH 113 (3,...	Survey Modern Art	W	1:40 PM - 4:30 PM	Powers, Edward	KP 403	48	50	In-Person

These are some of the data anomalies and fix them in your ERD design

Results | Messages

	Semester	Sec	Code	Course (hr, crd)	Description	Day	Time	Instructor	Location	Enrolled	Limit	Mode of Instruction
172	Spring 2019	01	11809	ANTH 200 (3, 3)	History Of Anthropology	T, TH	9:15 AM - 10:30 AM	Birth, Kevin	PH 351	16	15	In-Person
173	Spring 2019	01	11811	ANTH 201 (3, 3)	Essentials Of Cultural Anthro	M, W	1:40 PM - 2:55 PM	Halliburton, Murphy	PH 114	10	12	Web-Enhanced
174	Spring 2019	01	11830	ANTH 210 (3, 3)	Peoples Of East Asia	T, TH	1:40 PM - 2:55 PM	Choi, Jimee	PH 302	11	11	Web-Enhanced
175	Spring 2019	01	48198	ANTH 220 (3, 3)	Food And Culture	M, W	5:00 PM - 6:15 PM	Barton, Scott	PH 114	11	12	In-Person
176	Spring 2019	01	11843	ANTH 225 (3, 3)	Medical Anthropology	M, W	10:45 AM - 12:00 PM	Augustyniak, Nadia	PH 347	20	20	Web-Enhanced
177	Spring 2019	02	11842	ANTH 239 (3, 3)	Vt:Topics Cult Anth	W	1:40 PM - 4:30 PM	Strassler, Karen	PH 304	19	20	In-Person
178	Spring 2019	01	11807	ANTH 240 (3, 3)	Essentials Of Archaeology	M, W	9:15 AM - 10:30 AM	Pugh, Timothy	PH 311	20	20	Web-Enhanced
179	Spring 2019	01	48210	ANTH 241 (3, 3)	The Aztecs, Mayas, And Olmecs	T, TH	12:15 PM - 1:30 PM	Suri, Miranda	RZ 347	36	37	In-Person
180	Spring 2019	01	11839	ANTH 243 (3, 3)	Archaeology Of North America	M	3:10 PM - 6:00 PM	Tache, Karine	PH 304	12	20	Hybrid
181	Spring 2019	01	11827	ANTH 260 (3, 3)	Essent Biol Anthro	T, TH	9:15 AM - 10:30 AM	Forrest, Frances	PH 311	14	14	Web-Enhanced
182	Spring 2019	01	11818	ANTH 279 (3, 3)	Vt:Topics Biol Anth	T, TH	1:40 PM - 2:55 PM	Plummer, Thomas	PH 311	17	17	Web-Enhanced
183	Spring 2019	01	11844	ANTH 280 (3, 3)	Language and Social Identity	T, TH	3:10 PM - 4:25 PM	Rodriguez Aponte, J...	PH 114	34	33	Web-Enhanced
184	Spring 2019	01	62926	ANTH 2953 (3, 3)	Ind Std -Anth		-	Pechenkina, Ekateri...		1	1	In-Person
185	Spring 2019	02	62476	ANTH 2953 (3, 3)	Ind Std -Anth		-	Tache, Karine		1	1	In-Person
186	Spring 2019	01	48129	ANTH 302 (3, 3)	Ecology And Culture	T, TH	10:45 AM - 11:59 AM	Moore, James	PH 311	20	18	In-Person
187	Spring 2019	01	11840	ANTH 354 (3, 3)	Time	T, TH	1:40 PM - 2:55 PM	Birth, Kevin	PH 351	15	15	In-Person
188	Spring 2019	01	11837	ANTH 361 (3, 3)	Human Variation	M, W	10:45 AM - 12:00 PM	Madimenos, Felicia	PH 311	18	17	Web-Enhanced
189	Spring 2019	01	56480	ANTH 390 (3, 3)	Senior Honor Thesis		-	Swedell, Larissa		1	1	In-Person
190	Spring 2019	03	62480	ANTH 390 (3, 3)	Senior Honor Thesis		-	Pechenkina, Ekateri...		1	1	In-Person
191	Spring 2019	02	56863	ANTH 390 (3, 3)	Senior Honor Thesis		-	Strassler, Karen		1	1	In-Person
192	Spring 2019	1	57969	ANTH 3953 (3, 3)	Directed Studies		-	Pechenkina, Ekateri...		1	1	In-Person
193	Spring 2019	01	44971	ARAB 101 (4, 4)	Elem Arabic 1	T, TH	10:05 AM - 11:55 AM	Soleimani, Kamal	QH 345C	25	25	In-Person
194	Spring 2019	01	11250	ARAB 102 (4, 4)	Elem Arabic 2	T, TH	10:05 AM - 11:55 AM	Abdelghany, Hala	QH 265C	28	25	Web-Enhanced
195	Spring 2019	02	56473	ARAB 306 (3, 3)	Advanced Arabic II	W	9:10 AM - 12:00 PM	Soleimani, Kamal	QH 26...	7	25	Web-Enhanced
196	Spring 2019	02	11624	ARTH 001 (3, 3)	Introduction To Art	TH	5:00 PM - 7:50 PM	Clark, William	KP 403	52	50	In-Person
197	Spring 2019	01	11623	ARTH 001 (3, 3)	Introduction To Art	T	9:10 AM - 12:05 PM	Zeuschner, Margaret	KP 404	40	40	In-Person
198	Spring 2019	03	11625	ARTH 001 (3, 3)	Introduction To Art	TH	1:40 PM - 4:30 PM	Clark, William	KP 403	50	50	In-Person
199	Spring 2019	01	11627	ARTH 101 (3, 3)	Hist Of Western Art 1	M	1:40 PM - 4:30 PM	Nici, John	KP 403	50	50	In-Person
200	Spring 2019	01	11629	ARTH 102 (3, 3)	Hist Western Art 2	S	1:00 PM - 4:00 PM	Burnham, Mary	KP 403	42	50	In-Person
201	Spring 2019	02	11630	ARTH 102 (3, 3)	Hist Western Art 2	M	1:40 PM - 4:30 PM	Wallace, Ian	KP 404	41	40	In-Person
202	Spring 2019	03	11631	ARTH 102 (3, 3)	Hist Western Art 2	F	10:00 AM - 12:50 PM	Lee, Chae Eun	KP 403	53	50	In-Person
203	Spring 2019	01	11632	ARTH 113 (3, 3)	Survey Modern Art	W	1:40 PM - 4:30 PM	Powers, Edward	KP 403	48	50	In-Person
204	Spring 2019	01	11635	ARTH 215 (3, 3)	Gothic Art	T	1:40 PM - 4:30 PM	Clark, William	KP 403	40	50	In-Person
205	Spring 2019	01	11637	ARTH 234 (3, 3)	Baroque Art In Italy	M	9:10 AM - 12:05 PM	Nici, John	KP 401	36	50	In-Person
206	Spring 2019	01	11639	ARTH 256 (3, 3)	Contemp Art Practices	TH	1:40 PM - 4:30 PM	Powers, Edward	KP 404	38	40	In-Person
207	Spring 2019	01	55262	ARTH 258 (3, 3)	Hist Of Photography	T	10:00 AM - 12:50 PM	Lebowitz, Anjuli	KP 403	51	50	In-Person
208	Spring 2019	01	18919	ARTH 286 (3, 3)	African Art	F	10:00 AM - 12:50 PM	Waldron, Lawrence	KP 401	23	35	In-Person
209	Spring 2019	01	11642	ARTH 300 (3, 3)	Sr Coll: Art Hist Mthds	TH	6:00 PM - 7:40 PM	Powers, Edward	KP 404	4	10	In-Person
210	Spring 2019	01	11641	ARTH 3203 (3, 3)	Internship: Art Hist		-	.		0	1	In-Person
211	Spring 2019	01	11640	ARTH 330 (6, 3)	Special Problems			.		0	1	In-Person

Create the table names and column names that are self-documenting.

1. All tables and columns should be defined using PascalCase which is a subset of camelCase where the first letter is capitalized. No underscores.
2. Create schema names that segregate the tables into sub-systems of your design.
3. There are various examples of data anomalies that needed be handled with constraints.
4. At a minimum 7 tables, the design should include the following tables
    a. Department
    b. Instructor who can work in one or more Departments
    c. Course should be a parent to the class table.
    d. Class
    e. Building Location
    f. Room Location within the Building Location
    g. Mode of Instruction
5. Create column names that are atomic. An example using the instructor column can be parsed into LastName, FirstName and a computed (derived) column of

the instructor's FullName (concat (LastName,', ', FirstName) which must be persisted.

6. Create self-documenting User defined Datatype names for all of the columns in your database. Include in the PowerPoint as a section dedicated to explaining your hierarchy and reuse.
7. Build in constraints with self-documenting names that enhance the data quality in your design such as (Max enrollment, Credits, etc.). The more the better to enhance the quality of your database.
8. Create Primary Keys and alternate indexes with an explanation of why you choose those alternate indexes for your application.

Include in all of the tables in this project the following additional columns

An example of how to add the SchemaName UDT

```
create schema Udt
go
```

An example of how to add the User defined Datatypes

```
CREATE TYPE [Udt].[SuurogateKeyInt] FROM [int] NULL
GO
CREATE TYPE [Udt].[DateAdded] FROM [int] NOT NULL
GO
CREATE TYPE [Udt].[DateOfLastUpdate] FROM [int] NOT NULL
GO
```

- ✓ UserAuthorizationKey `[Udt].[SuurogateKeyInt]` NOT NULL
- ✓ DateAdded `[Udt].[DateAdded] not` null default (sysdatetime())
- ✓ DateOfLastUpdate `[Udt].[DateOfLastUpdate]`not null default (sysdatetime())

All surrogate keys will use identity keys for all tables including the Process.WorkflowSteps table

Normalize your database model in 3NF

Leverage your knowledge from your CSCI-331 class. Look at http://www.databaseanswers.org as a source of tutorials for design considerations.

** Create a production set of tables to transform the Uploadfile table into the normalized tables of your design **

Create a Stored Procedures to load your production model.

1. Create a stored procedure to truncate the tables
2. Create stored procedures to add/drop foreign keys
3. Create stored procedures to load the individual tables as you did in the QueensClassScheduleCurrentSemester project

4. Create a single stored procedure that can load all of the production tables on demand using the FileUpload tables.

Document your stored procedures

```
-- ============================================
-- Author:          Your Name
-- Procedure:       Your stored procedure name
-- Create date:     The date
-- Description:     Define the actions of the stored procedure
-- ============================================
```

Create the table Process.WorkflowSteps table with the following columns

- WorkFlowStepKey INT NOT NULL, -- primary key
- WorkFlowStepDescription NVARCHAR(100) NOT NULL,
- WorkFlowStepTableRowCount INT NULL DEFAULT (0),
- StartingDateTime DATETIME2(7) NULL DEFAULT (SYSDATETIME()) ,
- EndingDateTime DATETIME2(7) NULL DEFAULT (SYSDATETIME()) ,
- Class Time CHAR(5) NULL DEFAULT ('09:15' OR '10:45'),
- UserAuthorizationKey INT NOT NULL

Create a stored procedure Process.usp_TrackWorkFlow to track each of the steps of your entire workflow of your project

This stored procedure will be incorporated within each of the stored procedures that you create to load the start schema. You have to design this stored procedure.

How define your input source to the target table

Part of the design is to create an Inline Table Value function for the source input query to load the specific table using your group name as a schema name.

```
--
============================================
======
-- Author:        Your Name
-- Procedure:           [Process].[usp_TrackWorkFlow]
-- Create date:  The date
-- Description: Define the actions of the stored procedure
--
============================================
======
ALTER PROCEDURE [Process].[usp_TrackWorkFlow]
   -- Add the parameters for the stored procedure here
   @StartTime DATETIME2,
   @WorkFlowDescription NVARCHAR(100),
   @WorkFlowStepTableRowCount int,
   @ UserAuthorizationKey int
```

Create queries with propositions that support your design decisions

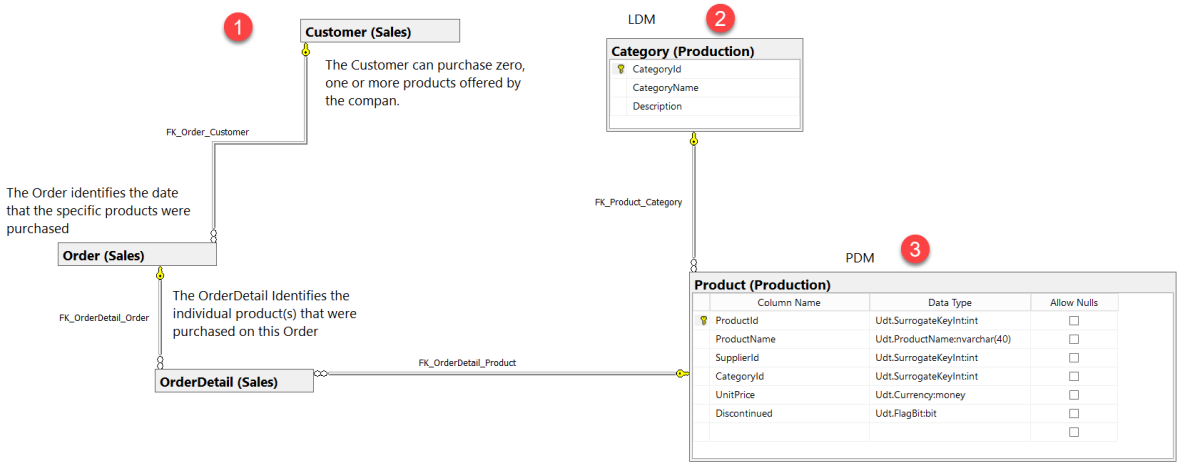
1. Show all instructors who are teaching in classes in multiple departments
2. How many instructors are in each department?
3. How may classes that are being taught that semester grouped by course and aggregating the total enrollment, total class limit and the percentage of enrollment.
4. 10 more queries of your choice and their proposition.

Create a voice annotated PowerPoint presentation describing your project lifecycle

1. Document your data cleansing issues. What were the anomalies identified and what you did to correct them?
2. Your naming conventions for columns, tables and schema names for separation of your SQL objects in the ERD.
3. Include in the PowerPoint as a section dedicated to explaining your hierarchy and reuse of self-documenting User defined Datatype names for all of the columns in your database.
4. Identify constraints used in your design to provide better data integrity and their purpose.
5. Document your index design decisions for Primary Keys and alternate indexes with an explanation of why you choose those alternate indexes for your application.

Do a detailed walkthrough of your database design

6. Do a detailed walkthrough of your database design?



   a. Create a Conceptual Data Model (CDM) that explains the entities and relationships.
   b. Create a Logical Data Model (LDM) that explains all of the required attributes that fully describe their entity which are required to be maintained by the application.

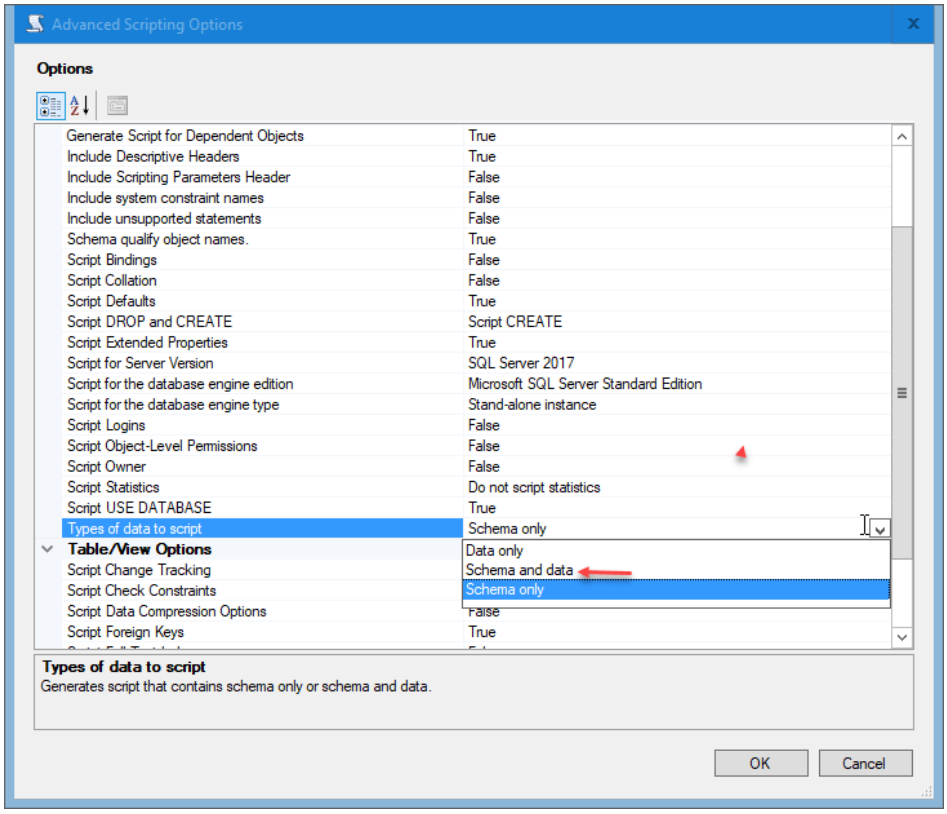
c. Create a Physical Data Model (PDM) that explains all of the Tables and foreign keys with their cardinality.
    i. Isolate table and foreign key relationships in subject areas.
    ii. Show the User Defined Datatypes as part of the PDM.

Describe your equivalent LoadStarSchema stored procedure for Project 3

7. Describe your equivalent LoadStarSchema stored procedure for Project 3
    a. Show the output of the Process.WorkflowSteps to identify all of your tables and the number of rows that are in each table.
    b. Demonstrate the InlineTableValued Functions that used to load the tables in your stored procedures.

Add anything additional that will enhance your presentation to separate your group from the other groups

8. Add anything additional that will enhance your presentation to separate your group from the other groups.
9. Files to be submitted in your VHDX file
    a. Screen shots of your ERD that shows the work implemented in your design.
    b. Project management tracking documents
    c. Use SQL Doc 5 from Redgate to fully document you coding effort
    d. Script the entire database into a .sql file with data in the advanced scripting option. (Change the version to the current version that you used this semester (i.e. SQL Server 2019 or newer)



e. Create a backup of your final database solution (ClassTimeLastNameFirstNameNameBIClass.bak)
f. Add files that pertained to the work in step "Create a voice annotated PowerPoint presentation describing your project lifecycle".

Submit in blackboard a link to a cloud file location that points to your work in a vhdx file with. Do not try to attach it to an email!