IS 475/675 Database Design and Implementation Project
Parts 2 & 3 Combined

What is the purpose of these two parts of the project?

The objectives of these parts of the project are to revise your logical model and validate that model through the implementation of a prototype database for Replica Toys. These parts of the project require you to:

- Evaluate and ==revise== as necessary the logical data model submitted for part 1.   An important final deliverable for this project is a complete logical data model in third normal form.

- Design a prototype physical data model that will generate the result tables listed in this document.

- Create a prototype physical data model using the SQL Server database management system. You do not have to include each of the attributes on your logical model on your prototype physical data model, but you do have to include all the attributes that are in the sample data provided in the Excel workbook "ReplicaToysData.xlsx".

- Import the data provided in the Excel workbook entitled "ReplicaToysData.xlsx". Put the data in the tables in your database so that the data is not redundant. I recommend using the SQL Server Import/Export utility to import the data into a single table. Then use the INSERT INTO/SELECT FROM statement to parse the data from the single table and input it into each of the tables in your database.

- Write SQL queries to generate the requested result tables.

What are the deliverables?

1. **Memo.** Write the memo as though you are writing to a client who has requested the database prototype. Avoid writing this to "your teacher" – make the assumption that you have been hired by Replica Toys to create a database for post-sales product registration and problem reporting, and then write your memo to that client. Make sure you cover the following in the memo:

- **An explanation of the data model.** When describing your data model, you can assume that the reader knows how to read an ERD.   ==Include both your logical and physical ERD's (discussed in bullet points below) as appendices to the memo==.

- **A recommendation for the next step in the implementation of the system.** Imagine you are being paid to develop this prototype for Replica Toys. Use the memo to help "sell" your next set of services by outlining what tasks should occur next in the "recommended next step" section.   To write the recommendation, think back to a class where you learned about the systems development life cycle (SDLC) or re-read chapter 1 of your database text to understand what should happen after you design a database. What happens after you present a prototype to your client? What should you do next to get agreement that the data model is a good representation of the data required for the application? This is what you need to write as the recommendation for the next step.

- **A revised logical data model.** This deliverable is an ERD. If your logical data model (documented with an ERD) turned in for part 1 did not have any problems noted by me, then simply turn in that ERD. If you found you needed to modify the design to address my concerns then turn in a revised ERD. You must have a logical data model in third normal form as one of the deliverables for this part of the project.

- **A copy of your original logical data model with my comments.** Turn in your original ERD (submitted for part 1) with my comments so I can compare the original with the revised model.

- **A physical data model for the prototype database.** This deliverable will be an ERD of the database implemented for the prototype. Since the prototype should include only those tables necessary to store the data in the Excel workbook (ReplicaToyData.xlsx) and produce the required queries, this ERD will be a sub-set of the revised logical data model. Make sure that your physical data model stores the data with minimal redundancy.

2. **A prototype database.** Create the tables necessary to store the data in the Excel workbook ReplicaToyData.xlsx with minimal data redundancy. Make sure you create appropriate data types for all fields in all tables. Create appropriate constraints. Hint: There are 20 different problem reports and 40 different tests in the sample data set provided in the Excel workbook. There are 40 different people.

Document this deliverable as follows:
CREATE TABLE statements. Turn in all SQL statements used to create tables.
SELECT * FROM each_tbl. Turn in the complete contents of all tables in the prototype database.
Please do NOT turn in any SQL INSERT statements.

3. **SQL Queries.** Turn in the code and the output for the queries on the next page using the same format as used on the SQL homework assignments (HW#6, 7, 8). Please place the code before the output generated in the printed output for each requested query. Provide documentation/comments for all views and CTEs so that I understand the purpose of the views and/or CTEs in your code.

4. **Electronic version of the SQL Queries.** Upload a file (only one file, not separate files for each query!) with the SQL code for your queries to the IS475/ReplicaToys directory on the h: assignment uploads drive. The file can be a Word document or txt file. Name the file with your last name (or the last name of your team members). For example my file name would be EdbergD. I may want to test your queries with your database, so I need an electronic copy of the SQL code for the queries.

5. **The name of the database where your test tables reside.** I have access to all databases on our server, so I don't need a login but I need to know the name of the database to look at your database and run your queries online.

What are the required SQL queries?

The SQL queries are designed to test the quality control part of your database – there are no queries required for the marketing, registration, survey questions or returned toys part of your database. .

1. The sample data provided in ReplicaToysData.xlsx maintains referential integrity, but there are always other types of data accuracy/integrity issues that are not validated through a referential integrity constraint. For example, are there any tests that were conducted BEFORE a problem report was created? It should be impossible to have a test conducted prior to a problem report created, but it is always possible that a person input the dates incorrectly. Check the dates in the problemreport and test tables to see which problem reports or tests might have incorrect dates. Here is the full result table:

	ReportID	ReportDate	CompleteDate	ProblemDescription	TestID	TestDate
1	12	2017-11-12 00:00:00.000	NULL	On-board electronics include switch that interferes with nearby cellular service.	38	2017-10-03 00:00:00.000
2	20	2017-10-23 00:00:00.000	2017-11-02 00:00:00.000	Battery life is significantly shorter than expected.	39	2017-10-15 00:00:00.000
3	20	2017-10-23 00:00:00.000	2017-11-02 00:00:00.000	Battery life is significantly shorter than expected.	40	2017-10-15 00:00:00.000

2. Which problem reports have a report date in October of the current year? Include the data as shown in the columns below. The DaysInSystem was calculated with a GETDATE() of the day I ran this query, which was November 24, 2017. Your DaysInSystem should be calculated using the GETDATE() when you execute your query, so it will be different than the ones shown for those problem reports that are not yet complete (have a null value for the CompleteDate). Sort the result table by ReportDate. Here is the full result table:

	ReportDateOutput	ReportID	Serial#	CompleteDate	DaysInSystem	Model#	ModelName	ReporterName	ReporterType	ProblemType
1	Oct 02, 2017	14	1902386-01	Not Complete	53	CHVSUV	Chevy Truck SUV	Starrett, C.	Customer	Poor Operation - toy tips over during use
2	Oct 03, 2017	17	1902385-02	Not Complete	52	BMWSC9	BMW Sports Car Large	Lange, V.	Customer	Poor Operation Quality - toy hurt user
3	Oct 10, 2017	15	1902393-02	Oct 10, 2017	0	LXSED5	Lexus Sedan Large	Ferreira, L.	Distributor	Inadequate Finish - toy does not look good
4	Oct 11, 2017	18	1902385-02	Oct 11, 2017	0	BMWSC9	BMW Sports Car Large	Ferreira, L.	Distributor	Inadequate Finish - toy does not look good
5	Oct 18, 2017	19	1902393-02	Nov 03, 2017	16	LXSED5	Lexus Sedan Large	Kappel, Y.	Distributor	Inadequate Finish - toy does not look good
6	Oct 21, 2017	13	1902396-01	Oct 23, 2017	2	MASSUV	Maserati Levante	Dickman, A.	Distributor	Other
7	Oct 23, 2017	20	1902392-01	Nov 02, 2017	10	LXSED3	Lexus Sedan Medium	Arterberry, M.	Distributor	Inadequate Finish - toy does not look good
8	Oct 24, 2017	16	1902392-01	Oct 24, 2017	0	LXSED3	Lexus Sedan Medium	Lupo, H.	Distributor	Inadequate Finish - toy does not look good

3. Modify the report created for question #2 to remove the ProblemType description and include each of the tests that were performed for each problem report. The result table should still include only those problem reports with a report date in October of the current year. Include all of the problem reports displayed in question #2 whether or not a test has been completed for that problem report. The full result table is provided on the next page.

	ReportDateOutput	ReportID	Serial#	CompleteDate	DaysInSystem	Model#	ModelName	ReporterName	ReporterType	TestDate	TestDescription	TesterName	TestComplete
1	Oct 02, 2017	14	1902386-01	Not Complete	53	CHVSUV	Chevy Truck SUV	Starrett, C.	Customer	Oct 02, 2017	Attempted to re-create by attempting a sharp turn w...	Patton, E.	Y
2	Oct 03, 2017	17	1902385-02	Not Complete	52	BMWSC9	BMW Sports Car Large	Lange, V.	Customer	Oct 08, 2017	Check electromagnetic brake for signs of failure.	Ibbott, N.	Y
3	Oct 03, 2017	17	1902385-02	Not Complete	52	BMWSC9	BMW Sports Car Large	Lange, V.	Customer	Oct 09, 2017	Check axle/wheel assembly for irregularities.	Ibbott, N.	Y
4	Oct 03, 2017	17	1902385-02	Not Complete	52	BMWSC9	BMW Sports Car Large	Lange, V.	Customer	Oct 09, 2017	Check onboard computer for any irregularities.	Ibbott, N.	Y
5	Oct 03, 2017	17	1902385-02	Not Complete	52	BMWSC9	BMW Sports Car Large	Lange, V.	Customer	Oct 10, 2017	Attempted to simulate error, but was too funny. Se...	Ibbott, N.	N
6	Oct 10, 2017	15	1902393-02	Oct 10, 2017	0	LXSED5	Lexus Sedan Large	Ferreira, L.	Distributor	NULL	NULL	NULL	NULL
7	Oct 11, 2017	18	1902385-02	Oct 11, 2017	0	BMWSC9	BMW Sports Car Large	Ferreira, L.	Distributor	NULL	NULL	NULL	NULL
8	Oct 18, 2017	19	1902393-02	Nov 03, 2017	16	LXSED5	Lexus Sedan Large	Kappel, Y.	Distributor	NULL	NULL	NULL	NULL
9	Oct 21, 2017	13	1902396-01	Oct 23, 2017	2	MASSUV	Maserati Levante	Dickman, A.	Distributor	Oct 21, 2017	Contacted shipping regarding error.	Cavey, K.	Y
10	Oct 21, 2017	13	1902396-01	Oct 23, 2017	2	MASSUV	Maserati Levante	Dickman, A.	Distributor	Oct 21, 2017	Contacted production regarding error.	Cavey, K.	Y
11	Oct 21, 2017	13	1902396-01	Oct 23, 2017	2	MASSUV	Maserati Levante	Dickman, A.	Distributor	Oct 21, 2017	Contacted inventory regarding error.	Cavey, K.	Y
12	Oct 23, 2017	20	1902392-01	Nov 02, 2017	10	LXSED3	Lexus Sedan Medium	Arterberry, M.	Distributor	Oct 15, 2017	Tested battery for extra heat during normal use and...	McCaig, P.	N
13	Oct 23, 2017	20	1902392-01	Nov 02, 2017	10	LXSED3	Lexus Sedan Medium	Arterberry, M.	Distributor	Oct 15, 2017	Tested battery at high usage and extended exposu...	McCaig, P.	N
14	Oct 24, 2017	16	1902392-01	Oct 24, 2017	0	LXSED3	Lexus Sedan Medium	Lupo, H.	Distributor	NULL	NULL	NULL	NULL

4. Modify the report for question #3 to remove the detailed information about each test and simply provide a count of the tests that were completed for each problem report in the database (remove the condition looking for problem reports in October of the current year). The result table is shown below.

	ReportDateOutput	ReportID	Serial#	CompleteDate	DaysInSystem	Model#	ModelName	ReporterName	ReporterType	CountOfTests
1	Oct 02, 2017	14	1902386-01	Not Complete	53	CHVSUV	Chevy Truck SUV	Starrett, C.	Customer	1
2	Oct 03, 2017	17	1902385-02	Not Complete	52	BMWSC9	BMW Sports Car Large	Lange, V.	Customer	4
3	Oct 10, 2017	15	1902393-02	Oct 10, 2017	0	LXSED5	Lexus Sedan Large	Ferreira, L.	Distributor	0
4	Oct 11, 2017	18	1902385-02	Oct 11, 2017	0	BMWSC9	BMW Sports Car Large	Ferreira, L.	Distributor	0
5	Oct 18, 2017	19	1902393-02	Nov 03, 2017	16	LXSED5	Lexus Sedan Large	Kappel, Y.	Distributor	0
6	Oct 21, 2017	13	1902396-01	Oct 23, 2017	2	MASSUV	Maserati Levante	Dickman, A.	Distributor	3
7	Oct 23, 2017	20	1902392-01	Nov 02, 2017	10	LXSED3	Lexus Sedan Medium	Arterberry, M.	Distributor	2
8	Oct 24, 2017	16	1902392-01	Oct 24, 2017	0	LXSED3	Lexus Sedan Medium	Lupo, H.	Distributor	0
9	Nov 02, 2017	9	1902385-01	Nov 12, 2017	10	BMWSC9	BMW Sports Car Large	Lestrange, E.	Customer	3
10	Nov 02, 2017	1	1902389-02	Nov 10, 2017	8	JSSLUX	Jaguar Sedan Luxury	Arrigucci, T.	Customer	2
11	Nov 02, 2017	10	1902389-02	Not Complete	22	JSSLUX	Jaguar Sedan Luxury	Medved, H.	Customer	4
12	Nov 05, 2017	11	1902390-02	Not Complete	19	LAMHUR	Lamborghini Huracan	Ventura, H.	Customer	3
13	Nov 11, 2017	2	1902390-01	Nov 16, 2017	5	LAMHUR	Lamborghini Huracan	Medved, H.	Customer	1
14	Nov 12, 2017	12	1902389-01	Not Complete	12	JSSLUX	Jaguar Sedan Luxury	Dunai, H.	Customer	3
15	Nov 16, 2017	3	1902393-02	Nov 22, 2017	6	LXSED5	Lexus Sedan Large	Comtois, J.	Customer	2
16	Nov 20, 2017	4	1902391-01	Nov 29, 2017	9	LXSED1	Lexus Sedan hybrid design	Samuel, I.	Customer	4
17	Nov 26, 2017	5	1902394-01	Not Complete	-2	MASGHI	Maserati Ghibli	Stasiuk, M.	Customer	1
18	Nov 30, 2017	6	1902391-01	Not Complete	-6	LXSED1	Lexus Sedan hybrid design	Hearn, D.	Customer	4
19	Dec 10, 2017	7	1902393-03	Dec 10, 2017	0	LXSED5	Lexus Sedan Large	Arterberry, M.	Distributor	1
20	Dec 18, 2017	8	1902394-04	Not Complete	-24	MASGHI	Maserati Ghibli	Ventura, H.	Customer	2

5. Which problem report(s) that are not completed (have a complete date that is null) has/have the largest count of tests? Do not use the SELECT TOP option to determine the answer.

	ReportDateOutput	ReportID	Serial#	CompleteDate	DaysInSystem	Model#	ModelName	ReporterName	ReporterType	CountOfTests
1	Oct 03, 2017	17	1902385-02	Not Complete	52	BMWSC9	BMW Sports Car Large	Lange, V.	Customer	4
2	Nov 02, 2017	10	1902389-02	Not Complete	22	JSSLUX	Jaguar Sedan Luxury	Medved, H.	Customer	4
3	Nov 30, 2017	6	1902391-01	Not Complete	-6	LXSED1	Lexus Sedan hybrid design	Hearn, D.	Customer	4

6. Time for a new query! Summarize problem reports issued for each model of vehicle in the database. Count the total number of problem reports and tests by model. Count the total number of injury reports for each model. Determine the earliest date that a problem was reported and the most recent date that a problem was reported for a given model. Count the tests for each model. Determine the earliest date that a test was done and the most recent date that a test was done for a given model. Include all models in the database. Result table:

	ModelNumber	ModelDescription	CountOfReports	CountofInjuryReports	MostRecentReportDate	EarliestReportDate	CountOfTests	MostRecentTestDate	EarliestTestDate
1	ARSTEL	Alpha Romeo Stelvio SUV low clearance sports	0	0	n/a	n/a	0	n/a	n/a
2	BMWSC3	BMW Small sports car 2 door petite seats	0	0	n/a	n/a	0	n/a	n/a
3	BMWSC8	BMW Medium sports car 2 door large seats	0	0	n/a	n/a	0	n/a	n/a
4	BMWSC9	BMW Large sports car 4 doors very low clearance	3	1	Nov 02, 2017	Oct 03, 2017	7	Nov 08, 2017	Oct 08, 2017
5	CHVSUV	High Clearance Chevy Truck 4 door Extended Body	1	0	Oct 02, 2017	Oct 02, 2017	1	Oct 02, 2017	Oct 02, 2017
6	FRDTRK	Ford High Clearance Truck 2 door Fog Lights	0	0	n/a	n/a	0	n/a	n/a
7	JCSUV7	Low clearance crossover SUV combination sports c...	0	0	n/a	n/a	0	n/a	n/a
8	JSSLUX	Jaguar Sedan 2 door medium clearance leather sea...	3	0	Nov 12, 2017	Nov 02, 2017	9	Nov 22, 2017	Oct 03, 2017
9	LAMHUR	Lamborghini Huracan sports car very low clearance	2	0	Nov 11, 2017	Nov 05, 2017	4	Nov 16, 2017	Nov 14, 2017
10	LXSED1	Lexus Sedan 2 door low clearance based on hybrid ...	2	2	Nov 30, 2017	Nov 20, 2017	8	Dec 02, 2017	Nov 21, 2017
11	LXSED3	Lexus Sedan 2 door medium clearance leather seats	2	0	Oct 24, 2017	Oct 23, 2017	2	Oct 15, 2017	Oct 15, 2017
12	LXSED5	Lexus Sedan 4 door medium clearance leather seat...	4	0	Dec 10, 2017	Oct 10, 2017	3	Dec 10, 2017	Nov 21, 2017
13	MASGHI	Maserati Ghibli Luxury Sedan Leather Seats	2	0	Dec 18, 2017	Nov 26, 2017	3	Dec 20, 2017	Nov 30, 2017
14	MASGRT	Maserati Gran Turismo Luxury Sedan Leather Seats	0	0	n/a	n/a	0	n/a	n/a
15	MASSUV	Maserati Levante SUV low clearance sports	1	0	Oct 21, 2017	Oct 21, 2017	3	Oct 21, 2017	Oct 21, 2017
16	RRVSUV	Range Rover medium clearance land rover style SUV	0	0	n/a	n/a	0	n/a	n/a

7. Which model(s) has/have the most problem reports associated with it? Do not use the SELECT TOP 1 to determine the answer.

	ModelNumber	ModelDescription	CountOfReports	CountofInjuryReports	MostRecentReportDate	EarliestReportDate	CountOfTests	MostRecentTestDate	EarliestTestDate
1	LXSED5	Lexus Sedan 4 door medium clearance leather sea...	4	0	Dec 10, 2017	Oct 10, 2017	3	Dec 10, 2017	Nov 21, 2017

8. Which model(s) has/have a problem description with the word "battery" in it and also had an injury description? The result table is displayed below.

	ModelNumber	ModelName	ReportID	ReportDate	ProblemDescription	TypeDescription	ReportingPerson	TestID	TestDate	TestDescription	TestingPerson
1	LXSED1	Lexus Sedan hybrid design	6	11/30/2017	During use battery caught fire.	Poor Operation Quality - toy hurt user	Hearn, D.	11	11/30/2017	Tested battery for extra heat during normal use and charging	Ibbott, D.
2	LXSED1	Lexus Sedan hybrid design	6	11/30/2017	During use battery caught fire.	Poor Operation Quality - toy hurt user	Hearn, D.	12	11/30/2017	Tested battery for extra heat during normal use and charging at high/low temperatures.	Ibbott, D.
3	LXSED1	Lexus Sedan hybrid design	6	11/30/2017	During use battery caught fire.	Poor Operation Quality - toy hurt user	Hearn, D.	13	12/01/2017	Tested battery for extra heat after extended period with extreme temperature variations.	Ibbott, D.
4	LXSED1	Lexus Sedan hybrid design	6	11/30/2017	During use battery caught fire.	Poor Operation Quality - toy hurt user	Hearn, D.	14	12/02/2017	Tested battery at high usage and extended exposure to high heat.	Ibbott, D.

9. What type of person reports the most problems based on a count of problem reports? Result table:

	Reporter	CountOfReports
1	Customer	13

10. Which models have had no problem reports?

	ModelNumber	ModelName	ModelDescription	StandardPrice
1	ARSTEL	Alpha Romeo Stelvio	Alpha Romeo Stelvio SUV low clearance sports	1367.99
2	BMWSC3	BMW Sports Car Small	BMW Small sports car 2 door petite seats	675.55
3	BMWSC8	BMW Sports Car Medium	BMW Medium sports car 2 door large seats	788.99
4	FRDTRK	Ford Super Truck	Ford High Clearance Truck 2 door Fog Lights	855.99
5	JCSUV7	Jaguar Crossover SUV-7	Low clearance crossover SUV combination sports c...	695.99
6	MASGRT	Maserati Gran Turismo	Maserati Gran Turismo Luxury Sedan Leather Seats	1899.99
7	RRVSUV	Range Rover SUV	Range Rover medium clearance land rover style SUV	995.99