School of Computing
ST1501 Data Engineering CA1
AY2021/2022 Semester 1

A.   Instructions and Guidelines

1.   This is an **INDITUAL** assignment which requires the student to design and setup a database to support a business scenario and demonstrate the competency in writing SQL statement.

2.   The deadline of this assignment is on 7/6/2021.

3.   Submissions should be made via the ST1501 CA1 Assignment Submission link by the stated deadline.

4.   Deliverable should be a zip file with the following file-naming convention: "**ST1501-YourClass-YourStudentID-YourName.zip**".

5.   Zip file should include the following items:

    A word document to show the

    a.   Database Relational Diagram showing all participation and cardinality contraints, strong and weak entity types, normal and identifying relationships, generalization etc. (Use ER Assistant to draw the database relational diagram).

        Enter each table, primary key, foreignkKey, attributes in the table shown in <u>Appendix A</u>.

    b.   Two SQL Scripts: Create <u>all tables</u> SQL Script, Insert <u>all records</u> SQL Script (the file extension should .sql)

    c.   The SQL SELECT statements to support the four required queries (refer to the Section C). See <u>Appendix B</u>

    d.   For Query 4, you need to add additional relations to fulifill the requirements of query 4. Show the expanded segment in <u>Appendix C.</u>

6.   A compulsory demo/interview will be conducted. During the session, you may need to give a short demonstration of the database that you have created and the SQL statements that you have submitted. Your module tutor will ask questions related to database design, SQL statements.

7.   This assignment will account for **35%** of the module grade.

8.   No marks will be awarded, if the work is copied or you have allowed others to copy your work.

9. 50% of the marks will be deducted for assignments that are received within ONE (1) calendar day after the submission deadline. No marks will be given thereafter. Exceptions to this policy will be given to students with valid LOA on medical or compassionate grounds. Students in such cases will need to inform the module tutor as soon as reasonably possible. Students are not to assume on their own that their deadline has been extended.

B.   The Business Scenario

In this assignment, you are introduced to a website to find jobs available for job seekers.

- You may refer to Job Street's website (www.jobstreet.com.sg) for an overall understanding of job enquiries and member registration.
- Design a conceptual data model (ERD) for the database to be implemented to facilitate the following features:
  - o   Registration of a member
  - o   Enquiry of jobs by members
  - o   Review of companies by members

Member Registration

- A new job seeker signs up as a member to Job Street with his name, email and a password. The email is used as the login identification for each member.

- The profile of the member is captured as shown in the following screenshots:
  - Specialization and preferences

- o Specialization refers to broad areas such as IT software, IT networking/system administration, Education, Banking/Financial, Human Resource etc.
- o Work location refer to states in Malaysia, cities outside of Singapore or any areas within Singapore. There is no need to differentiate areas within Singapore.
- o All monthly salary expectation are given in Singapore Dollars.

- Qualification

Institute/University *	Institute/University Location *

Qualification *	Field of Study *

Graduation Date *

- o The graduation date includes month and year of graduation.
- o Only the highest qualification is recorded for each member.
- o The qualification is required for members who are not students.
- o If a member is a student, he/she is required to enter the following details for his current school/institute of study:
  - Name of School/Institute
  - Year of Admission to School/Institute
  - Current level of Study (eg. first year, secondary 4, JC 1 etc)
  - Course of Study

- Work experience

Position Title *	Company Name *

Joined Duration *

Year	Month	To	☐ Present

Specialization * ❓	Role *

Industry *	Position Level *

Mobile number * ❓

65	Number

o A member can enter more than one work experience. The same attributes will be captured for each work experience entered by a member. Some members may not have any working experience (for example, fresh graduates or students).

o If present is not selected, the end date (year and month) of the work experience will be captured.

o Roles indicate the broad category of jobs such as Management, Software Engineer/Programmer, Software Engineer, Sales, Researcher, Training, others etc.

o Examples of position level are non-Executive, Entry level, Junior Executive, Senior Executive, Manager, Senior Manager etc.

o Example of a member's work experience:

- Skill
  A member needs to enter the skills that he has acquired. For each skill, the proficiency level (beginner, intermediate or advance) is captured. Each member has at least one skill.

- Language
  A member can enter more than one language that he is proficient in. For each language, the proficiency level (0(poor) to 10(excellent)) for spoken and written must be entered. The member has to indicate his primary language.

Jobs Posted by Companies
- Companies registered with JobStreet can post job vacancies.
- The following details are captured for each company:
  - Company Registration No (unique for each company)
  - Company name
  - Address
  - Industry
  - Working hours (eg. 9 am to 6 pm Monday to Friday)
  - Company Size (eg. given as a range such as 1 – 50, 51 – 100, etc)

- For each job vacancy, the following details are posted:

- Job Title
- Work location (eg. North-East, South-West etc in Singapore)
- Job advertisement date
- Job application closing date
- Job level (eg. non-Executive, Entry level, Junior Executive, Senior Executive, Manager, Senior Manager etc)
- Specialization (each job is classified under one specialization)
- Salary (can be given as a range eg SGD 2000 to 2500)
- Job responsibilities (A brief textual description)

You may omit the job requirements.

Enquiry of Jobs

- Enquiry of jobs can be done via:
  - Job title or keywords in a job title
  - Specialization
  - Minimum Salary

A job enquiry screen typically contains the following:

Job Title
Name of Company
Work Location
Salary Range (eg. SGD 2500 – 3500)
Job Responsibility: (brief description of job responsibility)

- A member can view the summary profile of other applicants who have applied for a specific job:

15 other applicants for this position

7 Local Applicants | 8 Foreign Applicants

Position Title	Expected Salary	Experience	Education Level	Specialization
-	SGD 2000	0	Bachelor Degree	-
-	SGD 2200	0	Diploma	-
Software Programmer	SGD 2500	5 years	Bachelor Degree	IT-Software
Java Developer	SGD 3000	16 years	Diploma	IT-Software
Software Analyst	SGD 5000	2 years	Bachelor Degree	IT-Software
Senior Programmer	SGD 5000	9 years	Post Graduate Diploma	IT-Software
Project Leader	SGD 7000	12 years	Master	IT-Software

As of 10 October 2016 (Monday) 15:30 hours

Review of Companies by Members

Members can only review companies that they have previously worked in.

- The overall rating of a member's experience in the company ranges from 1 to 5.
- A member can submit more than one review, each for a different company that he has worked in. Each company may be reviewed by different members.
- The date of review must be kept in the database.

Note: All screenshots are referenced/adapted from www.jobstreet.com

C.   Required Tasks

As a data specialist, you are asked to design and setup the database to support the business scenario.

(a)   Design the database to support the business scenario described in Section B. You should state the assumptions in your database design, if you find the user cases are not specific enough.

(b)   Create the database (create the tables) in the **Microsoft SQL Server** based on your database design.
  - The database should be named as **JobStreet999999** where 9999999 is to be replaced by your admission number.
  - The Database diagram and SQL scripts are to be submitted.

    Sample records for Member, Company and Work Experience tables are provided below. You may decide on the appropriate datatype and sizes for the attributes. You must indicate the Primary key, Foreign Key(s) in the statements. No need to include referential actions.

Member

	Email	FirstName	LastName	Password	Nationality	ResidentCountry	ExpectedSalary	PRCountry	YrStartWork
1	alanang@gmail.com	Alan	Ang	GoofieWord	Singapore	Singapore	7000.00	NULL	1980
2	LeeBB@gmail.com	Beng	Lee	opopiuy	Singapore	Singapore	5000.00	Singapore	1990
3	LeeCY@Gmail.com	ChuanYong	Lee	xvytyu	Hong Kong	Singapore	4500.00	Singapore	1990
4	LinJJ@gmail.com	JJ	Lin	ggghhh123	Taiwan	Singapore	5000.00	Singapore	1984
5	Prisca@Yahoo.com	Prisca	Lee	HuaHien	Singapore	Singapore	8000.00	NULL	1985
6	Robert@gmail.com	Robert	Lin	cvbnu768	Taiwan	Singapore	4000.00	Singapore	1969

Company

	CompanyNo	CompanyName	Industry
1	C1230	Aston Systems and Maintenance	Pipes and Sewage
2	C1234	Good Earth Pte Ltd	Engineering
3	C3456	MidEast Bank	Finance and Services
4	C4568	Huat Heng Constructions	Plumbing

Work Experience

	Email	StartYear	StartMonth	Position	EndYear	EndMonth	PositionLevel	Role	companyNo	specialization
1	alanang@gmail.com	2012	Aug	Programmer	NULL	NULL	Jr Executive	Systems	C4568	Civil Engineering
2	LeeBB@gmail.com	1999	Apr	Manager	NULL	NULL	Manager	Management	C3456	Banking
3	LinJJ@gmail.com	1980	Jan	Engineer	1982	May	Executive	Operations	C4568	Civil Engineering
4	LinJJ@gmail.com	1984	Jun	Manager	1990	Dec	Manager	Operations	C1234	Geology
5	LinJJ@gmail.com	1991	Feb	Director	NULL	NULL	Seniore Mgmt	Management	C4568	Civil Engineering
6	Prisca@Yahoo.com	1990	Jul	Sales Executive	1992	May	Executive	Sales	C3456	Banking
7	Prisca@Yahoo.com	1993	Jan	Director	NULL	NULL	Director	Management	C1230	Thermo-Fluid Enginering

(c)   Demonstrate the database can support the following queries by writing the SELECT statement for the following scenarios. The SQL statements and the query results need to be submitted. Insert the appropriate rows into the respective tables by examining the data as shown. You are required to show the SQL statements to produce exactly what is shown.

Query 1

i)   The first column is arranged in alphabetical descending order and the third column is arranged in ascending order of year of employment.

	Name of Member	Email Address	Employment History	The industry
1	Prisca Lee	Prisca@Yahoo.com	1990 Jul to 1992 May--Sales Executive(MidEast Bank)	Finance and Services
2	Prisca Lee	Prisca@Yahoo.com	1993 Jan--Current Job --Director(Aston Systems and Maintenance)	Pipes and Sewage
3	JJ Lin	LinJJ@gmail.com	1980 Jan to 1982 May--Engineer(Huat Heng Constructions)	Plumbing
4	JJ Lin	LinJJ@gmail.com	1984 Jun to 1990 Dec--Manager(Good Earth Pte Ltd)	Engineering
5	JJ Lin	LinJJ@gmail.com	1991 Feb--Current Job --Director(Huat Heng Constructions)	Plumbing
6	Beng Lee	LeeBB@gmail.com	1999 Apr--Current Job --Manager(MidEast Bank)	Finance and Services
7	Alan Ang	alanang@gmail.com	2012 Aug--Current Job --Programmer(Huat Heng Constructions)	Plumbing

Query 2

ii)   The most current job held by the members and the years on the job.

	Name of Member	Latest current job	Number of years on current job
1	JJ Lin	Director	27
2	Prisca Lee	Director	25
3	Beng Lee	Manager	19
4	Alan Ang	Programmer	6

Query 3

iii)   The number of employees who are currently working in companies which are not in the industry related to Finance. A subquery is required to be demonstrated.

	companyNo	companyName	No of employees
1	C1230	Aston Systems and Maintenance	1
2	C4568	Huat Heng Constructions	2

Query 4

iv)   Assume that we want to track the awards given to members during their course of employment. Awards for example can be 'Best Employee of the Year', 'Top Sales Person' etc. Expand the relevant part of the database to include the following:

The same award may be given by several companies and each company may give several awards. Awards should have the AwardNo as Primary Key, AwardName to describe the award, Monetary value for the award differs from company to company and is kept as datatype decimal (7,2) in the database.

Samples of the data are listed as an aid for your expansion.

	AwardNo	AwardName
1	A1234	Best Sales Person
2	A2311	Top Performing Manager
3	A3212	Outstanding Employee of the Year

	CompanyNo	AwardNo	Value
1	C1230	A2311	2000.00
2	C1230	A3212	4000.00
3	C3456	A2311	3000.00
4	C3456	A3212	6000.00
5	C4568	A3212	5000.00

	Email	StartYear	StartMonth	AwardNo
1	alanang@gmail.com	2012	Aug	A3212
2	LeeBB@gmail.com	1999	Apr	A2311
3	Prisca@Yahoo.com	1990	Jul	A2311
4	Prisca@Yahoo.com	1990	Jul	A3212
5	Prisca@Yahoo.com	1993	Jan	A2311

A member may be conferred several awards throughout his/her employment history across several jobs or on the same job. The same award may be conferred on several members.
Show the relevant expanded database in Appendix C.

Show by query statements, the awards conferred on individual employees as follows:

	Name of Member	Name of Company	Award Description and Value
1	Alan Ang	Huat Heng Constructions	Outstanding Employee of the Year- $5000.00
2	Beng Lee	MidEast Bank	Top Performing Manager- $3000.00
3	Prisca Lee	Aston Systems and Maintenance	Top Performing Manager- $2000.00
4	Prisca Lee	MidEast Bank	Outstanding Employee of the Year- $6000.00
5	Prisca Lee	MidEast Bank	Top Performing Manager- $3000.00

D. Assessment Criteria

Components	Weightage
Database Design (Database Diagram) • The database supports the described business scenario. • The chosen table names, field names and attributes are descriptive. • The database is normalized.	30%
Database Creation • The Create Table SQL script implements the database design, including the primary key and foreign key definition. • The Insert Records SQL script creates enough data for testing.	10%
Expansion of Database • The expansion to implement the awards given to members by company	15%
The Four Query Statements • The SQL query statement implemented the for the four scenarios. • The SQL query results show that the design supports the four query scenarios. No mark will be given to the query if the database design cannot support the required query scenario.	30%
CA1 Assignment Demo/Interview The CA1 Demo/Interview will be conducted where you have: • To explain the database design and the submission • To explain/answer questions given by the module tutor	15%

*** End of Assignment Specifications ***

Appendix A

<u>Database Relational Diagram</u>

	List all the relations, PK, FK and all non key attributes for the database relation diagram				
No	**Relation Name**	**Primary Key**	**Non-key Attribute(s)**	**Foreign Key(s)**	**Referenced Relation**
1					
2					
3					
…..					
……					

Appendix B

List the SQL queries and their corresponding results

Query 1
Query 1 results
Query 2
Query 2 results

Query 3

Query 3 results

Query 4

Query 4 results

Appendix C

Expanded Database Relational Diagram (only relevant parts need be shown)