

THE UNIVERSITY OF HONG KONG
HKU SPACE Community College

Introduction to Database Systems

Case Study

Due Date	:	CL01 14/Apr/2022 CL02 22/Apr/2022 CL03 19/Apr/2022 CL04 14/Apr/2022
Total Marks	:	100 (75 marks for the database design, test data, SQLs; 25 marks for the technical report)
Weight	:	20% of the total assessment of this course
Submission	:	Softcopy (through SOUL) – MS Word or PDF report, and SQLite database with SQLs

Requirements:

1. Select one of the cases from the pool in this document.
2. Study the business scenario and make necessary assumptions.
3. Plan for core features to be supported.
4. Design a database for the data model.
5. Prepare test data and produce test results.
6. Furnish a technical report stating:
 - business needs
 - database design
 - test results
 - assumptions and limitations
 - conclusion

Note: Hand-drawn diagrams are acceptable. Make sure they are clearly readable.

Case 1 – Vehicle rental services

Healthy Cycling Rental Services provides various types of bicycles for rent, especially on holidays. Customers are not required to register for memberships. On the contrary, a deposit per vehicle is to be paid by the customers. A database is to be designed to handle this based on the following Deposit Form.

Healthy Cycling Rental Services
Deposit Form

Name David ChungPhone 9003 0288Date 7 March

Vehicle ID	Vehicle Type	Deposit
<i>H352</i>	<i>Type F</i>	<i>200</i>
<i>R160</i>	<i>Type K</i>	<i>100</i>
<i>Y638</i>	<i>Type K</i>	<i>100</i>
Total Deposit		<i>400</i>

Time started 11:45Time returned

Rent and Deposit

Type	Description	1 hour	2 hours	Whole Day	Deposit
A	Bicycle for adult	25	40	60	150
K	Tricycle for kid	20	35	50	100
F	4 wheels Family Size	50	70	90	200

** sample data for illustration only*

Additional information:

- Based on a phone number, a customer can have only one transaction per day.
- Each transaction can rent for one or more vehicles.
- Deposit has to be paid before taking the vehicles.
- Hours of hire are rounded up to complete hour.
- Rents will be computed upon returns of all the vehicles in the transaction.
- Balance will be settled as Deposit minus Rents.

Assumptions:

- The company has sufficient vehicles for rent.
- The condition of each vehicle is good for rent.
- Customers would return vehicles in proper condition on the same day.
- Deposit will not be refunded if customers cannot return the vehicles on the same day.

Case 2 – Flight reservations

The reservation department of an airline makes use of the following paper-based form to record confirmed passenger reservations. The airline has issues that this form cannot handle special requests of passengers. Examples of special requests can be child meal, vegetarian meal, use of wheel chairs, over-sized luggages, etc. A database is to be designed to handle the reservations as well as special requests.

Flight #	Date	From	To	Passenger #	Passenger Name	Class Code	Cabin
CFX36	05 Apr	Hong Kong	Manila	TR364582	Trevors, Ray	Y	Economy
CFX36	05 Apr	Hong Kong	Manila	WA346528	Wong, Albert	F	First
CFX36	05 Apr	Hong Kong	Manila	SK602439	Smiths, Kelvin	B	Business
CFX37	05 Apr	Manila	Hong Kong	WA346528	Wong, Albert	B	Business
CFX37	05 Apr	Manila	Hong Kong	YH830168	Yeung, Helen	Y	Economy
CFX82	05 Apr	Hong Kong	Bangkok	PE045262	Pang, Esther	B	Business
CFX83	05 Apr	Bangkok	Hong Kong	PE045262	Pang, Esther	B	Business
CFX36	06 Apr	Hong Kong	Manila	WA346528	Wong, Albert	Y	Economy
CFX82	06 Apr	Hong Kong	Bangkok	DL935347	Davis, Ludd	Y	Economy

Legend:

- A flight number represents a trip from the departing city to the destinating city without stopping over any other cities.
- For regular flights on daily basis, the same flight number represents the same trip at the same time interval on every day.
- For flights of the same trip but different time intervals, different flight numbers are assigned.

Additional information:

- There is no additional charge per special request.
- A passenger may have many special requests in a flight.
- It is not required to save current special requests of a passenger for use in future flights.
- Passengers in a group (e.g. a family having 4 members) are handled individually.

Additional requirements:

- Generate reports on passenger activities with special requests
- Generate reports on flight reservations
- Generate usage reports of special requests

Explain the objectives of the reports in terms of managing the airline services

Case 3 – Computer laboratory booking

The College has five well-equipped computer laboratories for lectures and practical exercises. Fixed 90-minute time slots are allocated on daily basis to each of the laboratories. Time slots that have not been allocated to lectures are available for booking. A database is to be created to handle the booking of these resources.

**Community College
Booking Form**

			Office use only
Date	Computer Laboratory	Time Slot	Available
7 Mar	KMC2307	C	No
7 Mar	KMC2307	D	Yes

Requested by Howard Chu Contact number 9003 0688

Computer laboratories and time slots

Computer Laboratory	Time Slot	Time Slot
KMC0608	A 08:30-10:00	E 14:30-16:00
KMC0609	B 10:00-11:30	F 16:00-17:30
KMC2306	C 11:30-13:00	G 17:30-19:00
KMC2307	D 13:00-14:30	
KMC2308		

Mondays to Fridays only

** sample data for illustration only*

Additional information:

- All booking requests are handled on first come first served basis.
- Entries in a single booking form are handled individually.
- College office will check availability before confirming a request.
- If students find difficulties to book a time slot, priority may be set in future.

Assumptions:

- College office will reserve time slots for all scheduled lectures before the commencement of a semester.
- No time slot is shared by two or more booking requests.

Case 4 – Community virus test

During serve pandemic disease attack, citizens have to take virus tests facilitating screening for quarantine. The following table has been used at early stage for recording test results in a community. In the subsequent mandatory virus test, it was required to record test results as well as to find out who have not taken any tests. Therefore, a list of citizens is now ready. A database is to be created to handle this.

Date	Citizen Number	Name	DoB	Centre Code	Centre Name	Test Type	Result
25Feb	JHE38	Henry E JONES	19Jul2002	E06	Evergreen Clinic	PCR	Negative
27Feb	CFS27	CHAN Fong Sum	07Feb1996	E06	Evergreen Clinic	PCR	Negative
28Feb	SKH65	SHEUNG Kin Hong	14Oct1950	N21	Norstorm Hosptial	RAT	Negative
02Mar	TNH07	TAI Nin Han	08Aug2021	E06	Evergreen Clinic	RAT	Negative
05Mar	NSK29	NG Sai King	03Apr1981	E06	Evergreen Clinic	RAT	Positive
05Mar	NSK29	NG Sai King	03Apr1981	N21	Norstorm Hospital	PCR	Negative
06Mar	TSL12	TAI Sai Lung	26Aug2018	E06	Evergreen Clinic	IBN	Negative
08Mar	FCT18	FONG Chun Tai	02Feb2020	N21	Norstorm Hospital	IBN	Negative
11Mar	SKH65	SHEUNG Kin Hong	14Oct1950	S17	Southern Polyclinics	PCR	Negative
11Mar	TNH07	TAI Nin Han	08Aug2021	S17	Southern Polyclinics	IBB	Negative

Additional information:

- Each citizen can take at most one test each day per test centre.
- Test types PCR and RAT are tests for citizens of age 3 or above.
- Test types IBB and IBN are tests for infant of age 2 or below.
- To be a valid test, citizen should take a test that is suitable for his/her age.
- Any one without taken a vaild test will be highlighted for follow-up.

Additional requirements:

- Insert additional test data into the database including at least 18 virus test records and some citizen records who have not taken any virus tests
- Generate reports on citizens taking / not yet taken virus tests
- Generate reports on test centre performance
- Generate reports for special requests as appropriate

Explain the objectives of the reports in terms of managing the community tests

Case 5 – Round robin league

A group of eight male volley ball teams play round robin league for champion. Each team plays one match with every other seven teams. One championship point is given to the winning team and no point is given to the team lost the match. After all matches, champion will be awarded to the team with highest championship points. A database is to be developed to handle this.

Male Volley Ball Championship Round Robin League

Round One

Date 12 Sep

Match	Result
<i>A vs B</i>	<i>3:2</i>
<i>E vs F</i>	<i>0:3</i>

Match	Result
<i>C vs D</i>	<i>1:3</i>
<i>G vs H</i>	<i>3:0</i>

Championship Points after the Round:

Team	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>	<i>G</i>	<i>H</i>
Points	<i>1</i>	<i>0</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>1</i>	<i>1</i>	<i>0</i>

Round Two

Date 14 Sep

Match	Result
<i>A vs E</i>	<i>3:1</i>
<i>B vs F</i>	<i>3:2</i>

Match	Result
<i>C vs G</i>	<i>2:3</i>
<i>D vs H</i>	<i>0:3</i>

Championship Points after the Round:

Team	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>	<i>G</i>	<i>H</i>
Points	<i>2</i>	<i>1</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>1</i>	<i>2</i>	<i>1</i>

** sample data for illustration only*

Additional information:

- Each round involves all teams playing matches each other at the same time.
- Points after each round should be displayed in the form of a score board.
- For each team, a chart of matches played with other teams will be shown.
- At the end of the league, if two teams score the same highest points, champion will be awarded to the team that has won the other.
- For each championship league, the number of teams can be 6 or 8 or 10 or 12.

Assumptions:

- There is no plan to have HOME and AWAY matches in the league.

Case 6 – IT help desk

The following table has been used by the IT help desk to record service requests made by staff members of the company. When a service request is received, the date and time together with the caller's extension number are recorded. Problem and problem type are in free text style to record the details and the nature of the problem. Once resolved, the date and time are marked in order to denote the request has been resolved. Sometimes, remarks are made to record the solutions applied. It is not well organised. Therefore, a database is to be created to optimise the recording system.

Date & Time	Extension Number	Staff Name	Problem	Problem Type	Resolved	Remarks
14Mar 12:05	5318	Nelson Ng	Cannot sign-on	Security	14Mar 14:25	Reset password
15Mar 09:35	7602	Steve Tam	Paper jam	Printer	15Mar 09:40	
15Mar 10:40	7602	Steve Tam	Paper jam again	Printer	15Mar 11:15	Replace printer toner
16Mar 16:10	6293	Doris Luk	No display	Desktop	16Mar 16:30	
18Mar 17:25	5026	Wu Xiaoyu	Forget password	Security	21Mar 10:05	Reset password
21Mar 11:50	5318	Nelson Ng	Toner low	Printer	21Mar 12:25	Replace printer toner
21Mar 15:15	6293	Doris Luk	Desktop hang-up	Desktop		

Additional information:

- The record should have the name of the IT helper who handled a request.
- The problem description and problem types should be well-defined.
- The entry of solutions should be mandatory and be formulated.
- Any delay in resolving a request will be highlighted for follow-up.

Additional requirements:

- Insert additional test data into the database including at least 15 service request records and some being not yet resolved
- Generate reports on service requests resolved / not yet resolved
- Generate reports on problems and solutions
- Generate reports for special requests as appropriate

Explain the objectives of the reports in terms of managing the help desk services

Marker Expectations

The following serves as guidelines when marking student submissions.

Part 1 – Database, test data, SQLs

Database	50 marks
<i>should satisfy the business needs and may cater for future enhancement</i>	
Test data	10 marks
<i>be meaningful and be able to test the design and functionalities</i>	
SQLs	15 marks
<i>should be relevant to produce test results</i>	

Part 1 Total:	75 marks
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Part 2 – Technical report

Business needs	5 marks
<i>state the functional requirements including data input and output</i>	
Database design	5 marks
<i>explain the design and justify derived attributes, if any</i>	
Test results	5 marks
<i>show evidences that fulfil stated business needs</i>	
Assumptions and limitations	5 marks
<i>should be reasonable and support the design within the defined scope</i>	
Conclusion	5 marks
<i>evaluate self-performance and list future enhancement</i>	

Part 2 Total:	25 marks
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Part 1 and Part 2:	100 marks
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