

**Nanyang Technological University
Nanyang Business School**

BC2402 – Designing and Developing Databases
Semester 1, 2020

Individual Assignment

COVID'19 – Safe Check-In & Trace Together

1. INTRODUCTION

Case Background



The Government has progressively built up the digital infrastructure and engineering capabilities as the foundation of our Smart Nation. These enable us to respond decisively and swiftly to the COVID-19 outbreak with a suite of digital tools to help disseminate timely and accurate information to Singaporeans, and to enable our fellow agencies to better manage the crisis.

In this individual assignment, we focus on a sample dataset specific to two apps, namely

- TraceTogether
- SafeEntry

Source: <https://www.healthhub.sg/apps/38/tracetgether-app>

What is the TraceTogether app?

A person who has been in contact with someone infected with COVID-19 has a higher chance of being infected. When the person exposed can be identified through contact tracing, he or she can get adequate care and treatment.

Identifying those who have been exposed involves interviewing the person infected. The person infected recounts their movements and all the people they have been in contact with before and after testing positive for COVID-19.

TraceTogether is an app that is designed to supplement current contact tracing efforts. It works by exchanging short-distance Bluetooth signals between phones to detect other participating TraceTogether users in close proximity.

Records of such encounters are stored locally on each user's phone. If a user is interviewed by MOH as part of the contact tracing efforts, he/she can consent to send his/her TraceTogether data to MOH.

This facilitates the contact tracing process and enables contact tracers to inform TraceTogether users who are close contacts of COVID-19 cases more quickly. Informed, users can take the necessary action sooner, such as monitoring his own health closely for signs of flu-like symptoms. Early detection could potentially help reduce the risk of the spread of the virus, and better protect our families and loved ones

The TraceTogether app is available for download on App Store and Google Play Store. For more details, visit tracetgether.gov.sg.

Key Benefits

- If you're exposed, you'll be contacted more quickly and you'll be able to get tested earlier. If you show symptoms, they'll be detected earlier and you can quickly get yourself treated.
- Likewise, if your family members or friends are exposed, they'll also be contacted more quickly and tested earlier. And if they show symptoms, these will be detected earlier and they can quickly get themselves treated.
- The app supports healthcare workers and contact tracers. When you use the app, you'll be part of a larger community committed to stopping the spread of COVID-19.

Key Features

- The application is simple and easy-to-use. Simply download the app, grant the app permission to log data and turn on your Bluetooth.
- The mobile app uses Bluetooth signals to determine if you are near another TraceTogether user. No location data is collected.
- The data logged by the app remains encrypted in the mobile device where it is installed at all times. Only those who test positive for COVID-19 will be asked to share the data logged to speed up contact tracing.
- TraceTogether is voluntary. Users opt-in and can withdraw their consent at any time. The app's functionality is active only during outbreaks and when contact tracing is a critical part of stopping the spread.

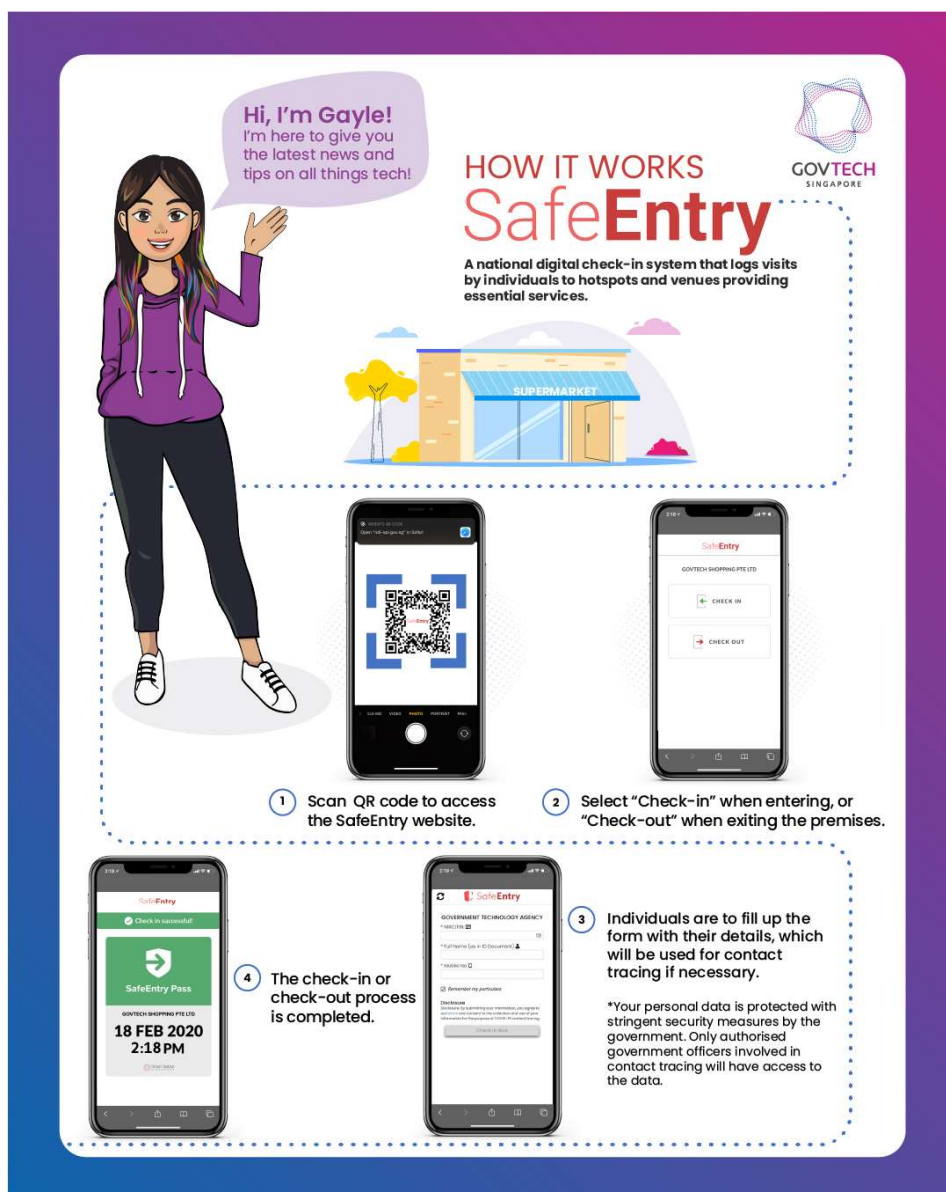
Source: <https://www.gov.sg/article/digital-contact-tracing-tools-for-all-businesses-operating-during-circuit-breaker>

What is the SafeEntry app?

SafeEntry is a national digital check-in system developed by GovTech, which logs individuals' entry into a venue.

The system captures details that enable contact tracers to find close contacts of infected cases quickly. Individuals scan a QR code on their mobile devices, and particulars such as their name, NRIC/FIN and mobile number are logged.

Should there be a confirmed case at that location, contact tracing can be sped up using information from SafeEntry, which in turn helps prevent new clusters from forming.



Where is SafeEntry used at?

SafeEntry will be deployed extensively across Singapore, especially at places with a higher risk of non-transient contact, such as workplaces, malls and supermarkets.

From 23 Apr 2020, the Government had started using SafeEntry at hotspots, workplaces of essential services, and selected public venues. The use of SafeEntry will be expanded to all operating businesses from 12 May 2020, to allow employees and visitors' entry and exit timings to be logged.

SafeEntry is not mandatory at places like MRT stations and parks, where transient populations are on the move. However, the public is still encouraged to scan the QR codes put up to help contact tracing efforts.

Is my data safe?

Yes. Data collected by SafeEntry is only used by authorised personnel for contact tracing purposes. Stringent measures are in place to safeguard the data in accordance with the Government's data security standards.

2. PROJECT DELIVERABLES

The due date for the assignment is 2 October 2020 (23:59 hrs NTULearn server time)

There is one key deliverable (and an optional deliverable), namely

- A. 1 x SQL script file
- B. 1 x DB implementation (optional; if you need to make changes to the database design)

A. SQL script file

You are tasked to develop some SQL scripts to query the data, as follows:

1. Based on the list of shopping malls, what are the sector names?

| | |
|---|------------|
| | sector |
| ▶ | central |
| | east |
| | north |
| | north_east |
| | north-west |
| | south |
| | west |

2. How many shopping malls has “city” (consider both upper and lower cases) in its name?

| Mall_Name |
|-------------------|
| City Square Mall |
| City Gate Mall |
| CityLink Mall |
| Great World City |
| Ngee Ann City |
| Raffles City |
| Suntec City |
| Velocity |
| Changi City Point |
| City Plaza |
| Northpoint City |
| VivoCity |

3. What are the top 3 most common surnames? Display the number of individuals of each.

| Surname | Amt |
|---------|-----|
| Tan | 8 |
| Kannan | 5 |
| Toh | 4 |

4. What is the age distribution among the data? Display the number of individuals by age in descending order.

| age | AMT |
|-----|-----|
| 47 | 7 |
| 44 | 4 |
| 62 | 3 |
| 60 | 3 |
| 72 | 3 |
| 59 | 3 |
| 57 | 3 |
| 36 | 3 |
| 35 | 3 |
| 25 | 3 |
| 22 | 3 |
| 50 | 3 |
| 66 | 3 |
| 39 | 3 |
| 89 | 2 |

[51 rows returned]

5. What is the percentage of individuals in essential services among all individuals in the dataset?

| | PercOFEssen |
|---|-------------|
| ▶ | 0.1010 |

6. What is the percentage of female who is working in essential services among all female in the dataset?

| | PercOFEssenFemale |
|---|-------------------|
| ▶ | 0.0980 |

7. What is the percentage of male who is between 22 to 45 years (inclusive of 22 and 45) old working in essential services among all male of the age range?

| | PercOFEssenMale22To45yo |
|---|-------------------------|
| ▶ | 0.0476 |

8. How many unique people have checked in at shopping malls in the west sector?

| | UniquePpl |
|---|-----------|
| ▶ | 99 |

9. What are the top 3 shopping malls in the east sector with the most instances of checked in (an individual can perform multiple instances of check-in at a mall)?

| | Location | AMT |
|---|----------|-----|
| ▶ | 77 | 37 |
| | 93 | 34 |
| | 69 | 31 |

10. What are the top 3 shopping malls in the west sector with the most checked in after 6pm (including 6pm sharp)?

| | Location | AMT |
|---|----------|-----|
| ▶ | 154 | 16 |
| | 161 | 14 |
| | 171 | 13 |

11. What is the check-in distribution among sectors? Display the number of individuals of each.

| | Sector | AmtOfCheckIns |
|---|------------|---------------|
| ▶ | north-west | 479 |
| | north_east | 386 |
| | central | 1467 |
| | east | 667 |
| | north | 333 |
| | west | 504 |
| | south | 56 |

12. How many unique people checked in at "Tiong Bahru Plaza" between 1-May-2020 and 28-June-2020?

| | PplTBP |
|---|--------|
| ▶ | 14 |

13. How many people checked in at “Tiong Bahru Plaza” between 1-May-2020 and 28-June-2020, who are female and older than 40 years old (40 yo inclusive)?

| PplTBP |
|--------|
| 3 |

14. Who (and on which day and month) has checked in at “Tiong Bahru Plaza” or at “Alexandra Central” more than once on a day?

| ID | Day | Month | Amt |
|---------|-----|-------|-----|
| 6674342 | 18 | 6 | 2 |

15. Display the instances of check-in at each shopping mall when it was at the maximum crowdedness level?

| Mall_Name | Amt |
|-------------------------|-----|
| Limbang Shopping Ce... | 5 |
| Eastpoint Mall | 10 |
| Marsiling Mall | 6 |
| Parkway Parade | 4 |
| Orchard Central | 10 |
| Hougang Mall | 6 |
| Singapore Shopping C... | 5 |
| Big Box | 7 |
| PointyLips Point | 2 |
| Hougang 1 | 7 |
| City Gate Mall | 4 |
| Marina Square | 6 |
| Greenridge Shopping ... | 7 |
| Bishan Junction 8 | 5 |
| Capitol Piazza | 5 |

[172 rows returned]

16. Which are the shopping malls with more female check-ins than male check-ins?

| Location | FemaleAmt | MaleAmt |
|----------|-----------|---------|
| 105 | 16 | 10 |
| 85 | 14 | 9 |
| 37 | 20 | 12 |
| 129 | 18 | 14 |
| 166 | 15 | 11 |
| 48 | 11 | 9 |
| 55 | 11 | 10 |
| 83 | 12 | 6 |
| 1 | 15 | 6 |
| 69 | 18 | 13 |
| 106 | 13 | 8 |
| 25 | 18 | 5 |
| 133 | 12 | 9 |
| 7 | 17 | 11 |
| 104 | 14 | 12 |

[81 rows returned]

17. Who are the individuals with multiple check-ins at a shopping mall, sort results in descending order?

| ID | Location | checkInAmt |
|---------|----------|------------|
| 8998540 | 159 | 4 |
| 7249581 | 163 | 4 |
| 9210882 | 117 | 3 |
| 8595465 | 93 | 3 |
| 7692087 | 16 | 3 |
| 7561599 | 20 | 3 |
| 7575862 | 79 | 3 |
| 7042433 | 75 | 3 |
| 7714384 | 63 | 3 |
| 6817591 | 141 | 3 |
| 7561599 | 79 | 3 |
| 7575862 | 108 | 3 |
| 7665802 | 26 | 3 |
| 7223225 | 124 | 3 |
| 7575862 | 96 | 3 |

[357 rows returned]

18. Show individuals (an individual who checked in with two different mobile numbers are considered two occasions of check-ins) who had multiple check-ins at a shopping mall?

| ID | location | checkInAmt |
|---------|----------|------------|
| 7328517 | 77 | 2 |
| 6998317 | 105 | 2 |
| 8780003 | 67 | 2 |
| 8809821 | 129 | 2 |
| 7549415 | 113 | 2 |
| 8998540 | 159 | 4 |
| 8011605 | 161 | 2 |
| 7815465 | 1 | 2 |
| 9210882 | 117 | 3 |
| 7575862 | 44 | 2 |
| 7324496 | 145 | 2 |
| 8595465 | 93 | 3 |
| 7788460 | 135 | 2 |
| 8684609 | 55 | 2 |
| 8455793 | 118 | 2 |
| 8998540 | 113 | 2 |

[357 rows returned]

19. Among the list of individuals in the dataset, what are the mobile numbers that appear to be in proximity in at least one occasion?

| MobileNO | NearByMobileNo |
|----------|----------------|
| 89641065 | 96767204 |
| 82358904 | 98292664 |
| 88659920 | 88673561 |
| 82513299 | 95510713 |
| 87275425 | 96434040 |
| 84002054 | 98988131 |
| 84693045 | 95546248 |
| 81879877 | 83784495 |
| 81522949 | 96980181 |
| 89032684 | 89396549 |
| 87401429 | 82905677 |
| 81659929 | 93167314 |
| 88576527 | 96887065 |
| 85804088 | 92383863 |
| 85720570 | 89789506 |

[2450 rows returned]

20. Mobile numbers were manually entered into the system during check-ins. Are there any problems with the mobile numbers? If so, what are those?

| MobileNO |
|------------|
| 89819473a |
| 880885 |
| 902726 |
| 9061362 |
| 817085883 |
| 910025149 |
| 899881773 |
| 869711894 |
| 841855729 |
| 89139 662 |
| 81 997264 |
| 857868 58 |
| 908 91148 |
| 892712 |
| 828aa20993 |
| 8945cc2912 |
| 8@3565519 |
| 841a52130 |
| 89189 292 |

[19 rows returned]

3. SUBMISSION

A submission folder will be made available on NTULearn. Only one submission is required. In the event that you are submitting more than 1 file (e.g., DB implementation), please zip the files and make a single submission.

The submission must be made by 2 October 2020, 23:59.