

ISTD 50.001

INTRODUCTION TO INFORMATION SYSTEMS & PROGRAMMING

Fall 2017

1-D Android Project

Last updated on 11 Nov 2017.

Introduction

Changi Airport Terminal 4 has just opened, and so we expect more visitors to Singapore in the coming years. In this project, you are going to design and develop a travel app for Singapore with useful functions. The app system runs on Android.

Project Requirements

[50 %] Function 1: Features of the App

Function 2: Tourist Attraction Locator

[50 %] Function 3: Daily Itinerary Planning

Work in a team with a **maximum of three members**.

Deliverables

1. Source Code
2. APK file
3. A write-up in PDF format, maximum 2 A4-sized pages with font-size 12.

Please submit this to the e-Dimension link provided.

Function 1: Features of your app

Visitors come to Singapore for many reasons, e.g. to shop, to visit our tourist attractions or to attend events. Think of a suitable theme for tourists and implement it in at least two activities in your app. You have to use at least four of the following android features taught in class:

- A suitable implicit intent
- Query a suitable API and display the data
- RecyclerView
- SQLiteDatabase
- Preference Fragment (with at least three preferences that can be changed)
- Internal JSON storage
- Firebase
- Any other feature that you picked up on your own
- Function 2 (see next page)

You also need to implement a method to navigate between the activities in your app (including function 3).

Describe your implementation briefly in your write-up (maximum one paragraph).

To avoid any doubt:

- A RecyclerView with data stored as a JSON database locally in the app counts as two features.
- Storing data in an SQLite Database, displaying the result of queries in a RecyclerView and clicking any list item launches an Implicit Intent counts as three features

Scoring Rubrics For Function 1

Criterion / Score	0 – 5 points	6 – 7 points	8 – 10 points
Features	Less than four	At least four	At least four
Relevance of design theme to project	Not relevant	Somewhat relevant	Relevant
UI-design	Not user-friendly	Somewhat user-friendly	User-friendly
Creative use of features	Not creative	Somewhat creative	Creative

Note: A single score will be awarded based on all criteria. You can score a maximum of 10 points in this part, that would correspond to 50% of the Android project.

Function 2: Tourist Attraction Locator

You may incorporate this feature as part of either Function 1 or Function 3 or both.

“Sentosa” →



Incorporate a google map fragment in your app that will show location markers.

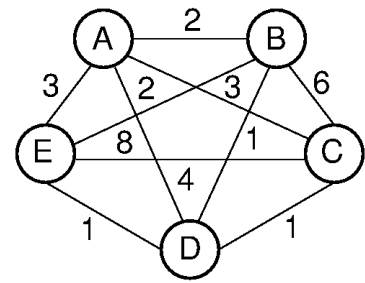
Some ideas:

The user could be asked to enter a tourist attraction location and the map will display a marker. The user should be able to enter the attraction in various formats, and the system should be robust to typos, e.g., “Resorts World Sentosa”, “Sentosa”, “sentozza” for Resorts World Sentosa. You may want to explore the use of regular expression or other ways of specifying the acceptable user inputs. This is the basic requirement. You are free to try other creative ideas for enhancing the attraction locator.

If you incorporate this as part of Function 3, the results could be displayed in the form of markers on this map with additional information.

Function 3: Daily Itinerary Planning

Ask user to enter a list of attractions that s/he would like to visit during a day, and enter a certain amount of budget for local transportation. There are three modes of transport - on foot (free but slow), public transport (cheap), and taxi (fast but expensive). The system tries to figure out the optimal route: The user always begins at the hotel and come back to it, but the system can choose the order in which the user can visit the attractions and how s/he could travel to the next attraction. The system needs to minimize the total time that the user spends on travelling between attractions and the constraint is that s/he has to stay within the daily transport budget. The user interface of the activity should support the user input as well as display the result of the algorithm.



Data collection: Collect and store all the data in your system: the list of attractions, and the tables of costs and times needed to travel between locations. Some data are provided at the end of this handout, but you can collect more information using Internet, e.g., <http://gothere.sg>. Collect all data in advance - querying an API for location/distance information is not necessary.

Exhaustive enumeration: (i.e. brute force) One algorithm to find the optimal route and the associated transport modes is to enumerate all the possible routes and transport modes exhaustively, and select the one with the minimal total time within the budget constraint. Given a list of n attractions, what is the time complexity for this exhaustive algorithm to solve the problem? In other words, how many candidate solutions must be examined? Implement this into your system.

Fast approximate solver: What if you wanted to visit 100 attractions? The above algorithms are too ineffective (i.e., they take far too long to be of any practical use, especially on a mobile device). In this part, you are asked to come up with a much more effective algorithm, i.e., the algorithm runs fast and gives an answer that is always close to the optimum. Your algorithm does not need to find the exact optimal route in this case, but it should still find a reasonably good one (i.e., the total transport time is close to the minimum, and the transport cost must be within the budget constraint). State and explain your algorithm, justify your design (i.e., explain why you would hope that your algorithm usually finds a reasonably good solution), state its time complexity and implement that into your system.

Compare these solvers in terms of the optimality of the results and running time on the mobile phones, using the **provided data** (see next page) and with a transportation budget of 20 dollars (Hotel: Marina Bay Sands). To avoid any doubt, you do not need to have 100 locations stored in your app.

You are free to augment the data given, and you may use your own data if you wish, e.g. if you want to investigate the best way to visit a number of hospitals in Singapore ... please go ahead!

Scoring Rubrics For Function 3

Criterion / Score	0 – 5 points	6 – 7 points	8 – 10 points
Algorithm	Implement the brute force algorithm	Implement the fast solver and brute force algorithm	Implement the fast solver and brute force solver
UI-design & display of results	Not user-friendly Result are displayed in a very simple manner	Somewhat user-friendly Results are displayed in a somewhat informative manner	User-friendly Results are displayed in an informative manner
Write-Up	Sparse and with little explanation	Some details are provided, explanation is somewhat clear	Most details are provided and explanation is clear

Note: A single score will be awarded based on all criteria. You can score a maximum of 10 points in this part, that would correspond to 50% of the Android project.

Travelling Time Required and Cost of Transportation

Travel by Public Transportation

To: From:	Marina Bay Sands	Singapore Flyer	Vivo City	Resorts World Sentosa	Buddha Tooth Relic Temple	Zoo
Marina Bay Sands		\$0.83 17 min	\$1.18 26 min	\$4.03 35 min	\$0.88 19 min	\$1.96 84 min
Singapore Flyer	\$0.83 17 min		\$1.26 31 min	\$4.03 38 min	\$0.98 24 min	\$1.89 85 min
Vivo City	\$1.18 24 min	\$1.26 29 min		\$2.00 10 min	\$0.98 18 min	\$1.99 85 min
Resorts World Sentosa	\$1.18 33 min	\$1.26 38 min	\$0.00 10 min		\$0.98 27 min	\$1.99 92 min
Buddha Tooth Relic Temple	\$0.88 18 min	\$0.98 23 min	\$0.98 19 min	\$3.98 28 min		\$1.91 83 min
Zoo	\$1.88 86 min	\$1.96 87 min	\$2.11 86 min	\$4.99 96 min	\$1.91 84 min	

Remark: the public transportation from “Resorts World Sentosa” to “Vivo City” is free-of-charge.

Travel by Taxi

To: From:	Marina Bay Sands	Singapore Flyer	Vivo City	Resorts World Sentosa	Buddha Tooth Relic Temple	Zoo
Marina Bay Sands		\$3.22 3 min	\$6.96 14 min	\$8.50 19 min	\$4.98 8 min	\$18.40 30 min
Singapore Flyer	\$4.32 6 min		\$7.84 13 min	\$9.38 18 min	\$4.76 8 min	\$18.18 29 min
Vivo City	\$8.30 12 min	\$7.96 14 min		\$4.54 9 min	\$6.42 11 min	\$22.58 31 min
Resorts World Sentosa	\$8.74 13 min	\$8.40 14 min	\$3.22 4 min		\$6.64 12 min	\$22.80 32 min
Buddha Tooth Relic Temple	\$5.32 7 min	\$4.76 8 min	\$4.98 9 min	\$6.52 14 min		\$18.40 30 min
Zoo	\$22.48 32 min	\$19.40 29 min	\$21.48 32 min	\$23.68 36 min	\$21.60 30 min	

Travel on Foot

To: From:	Marina Bay Sands	Singapore Flyer	Vivo City	Resorts World Sentosa	Buddha Tooth Relic Temple	Zoo
Marina Bay Sands		14 min	69 min	76 min	28 min	269 min
Singapore Flyer	14 min		81 min	88 min	39 min	264 min
Vivo City	69 min	81 min		12 min	47 min	270 min
Resorts World Sentosa	76 min	88 min	12 min		55 min	285 min
Buddha Tooth Relic Temple	28 min	39 min	47 min	55 min		264 min
Zoo	269 min	264 min	270 min	285 min	264 min	

List of some Tourist Attractions in Singapore from A-Z (Your system does not need to contain all attractions)

Abdul Gaffoor Mosque
Al-Abrar Mosque
ArtScience Museum
Asian Civilisations Museum
Bright Hill Temple (Khong Meng San Phor Kark See Temple)
Buddha Tooth Relic Temple
Bukit Timah Nature Reserve
Cathedral of the Good Shepherd
Central Catchment Nature Reserve
Central Sikh Temple
Changi Prison Chapel and Museum
Chijmes
Chinatown Heritage Centre
Chinese and Japanese Gardens
Chinese Methodist Church
Church of St Gregory the Illuminator
Crane Dance
East Coast Park
Esplanade - Theatres on the Bay
Eu Yan Sang Chinese Medical Hall
Fort Canning Park
Gardens by the Bay
Geylang Serai Market
G-Max Reverse Bungy
Hajjah Fatimah Mosque
Haw Par Villa
HortPark
House of Tan Teng Niah
Images of Singapore
Istana
Jamae Mosque
Joo Chiat Street
Jurong Bird Park
Katong
Kranji War Memorial
Kusu Island
Kwan Im Thong Hood Cho Temple
Lau Pa Sat (Telok Ayer Market)
Leong San See Temple
Maghain Aboth Synagogue
Malay Heritage Centre
Malay Village

Mandai Orchid Gardens
Marina Barrage
Marina Bay Sands Casino
Marina Bay Sands SkyPark
Maxwell Road Hawker Centre
Merlion Park
Mount Faber Park
Nagore Durgha Shrine
National Museum of Singapore
National Orchid Garden
NEWater Visitor Centre
Old Parliament House
Peranakan Museum
Pulau Ubin
Raffles Hotel
Raffles Place
Red Dot Design Museum
Resort World Sentosa Casino
Sentosa Skyline Luge and Skyride
Singapore Art Museum
Singapore Bazaar and Flea Market
Singapore Botanic Gardens
Singapore Butterfly and Insect Kingdom
Singapore Discovery Centre
Singapore F1 Grand Prix
Singapore Flyer
Singapore Mint Coin Gallery
Singapore Navy Museum
Singapore Night Safari
Singapore Philatelic Museum
Singapore River
Science Centre Singapore
Singapore Zoo
Siong Lim Temple
Sisters' Islands
Songs of the Sea
Sri Krishnan Temple
Sri Mariamman Temple
Sri Srinivasa Perumal Temple
Sri Thandayuthapani Temple
Sri Veeramakaliamman Temple
St Andrew's Cathedral
St John's Island
Statues of Sir Stamford Raffles
Sultan Mosque
Sungei Buloh Nature Park

Supreme Court & City Hall

Temple of 1,000 Lights (Sakyamuni Buddha Gaya Temple)

The Padang

The Southern Ridges

Thian Hock Keng Temple

Treetop Walk at MacRitchie Reservoir

Underwater World

Universal Studios Singapore

Wonder Full at Marina Bay Sands

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