TechTrek 2024

Challenge Statement

20th January 2024

Introduction

With the opening of borders, more are seen travelling. One key preparation for a trip would be to plan out an itinerary. Factor in travel destination and preference, expenses should be tabulated and spent within a given budget.

Challenge Statement

You are a group of developers in a travel agency, tasked to create a Proof-of-Concept itinerary planning web application that allows users to create, remove and edit destinations and plan according to their budget. The application should allow users to plan for their own trip with destinations and budget in mind. This must be a **web application**.

All requirements included below are meant to be a guideline to guide your team on how to tackle this challenge statement. You should treat this challenge like an actual work project, and not as a test. Do communicate actively with your assessors for any other additional areas to consider.

*For each module, there will be a Frontend task and an accompanying Backend task as illustrated by the table below.

Module		Basic Requirements (Frontend)	Basic Requirements (Backend)
Login	**[1]**	User must be able to login	Server must be able to authenticate a user's identity, using JSON Web Tokens for authentication
Dashboard	**[2]**	Display the itineraries created by the user with the following details: • Itinerary Title • Budget • Country • List of Destinations included	Returns a list of itineraries from the ***Itinerary, ItineraryDestination, Destination & Country*** table
Itinerary	**[3]**	Create new itinerary	Insert itinerary chosen from frontend into ***Itinerary*** table
	[4]	Edit existing itinerary	Ensure the ***Itinerary*** table is updated for each change
	[5]	Remove existing itinerary	Delete itinerary from the ***Itinerary*** table
Destination	**[6]**	Create new destination	Insert destination chosen from frontend into ***Destination*** table

	[7]	Edit existing destination	Ensure the ***Destination*** table is updated for each change
	[8]	Remove existing destination	Delete destination from the ***Destination*** table

Basic Application Requirements (Frontend):

- You must render a login page
  - User must be able to login [1].
- You must render a dashboard
  - **Display** user's existing itineraries [2].
    - Itinerary Title
    - Budget
    - Country
    - List of Destinations included
- User must be able to:
  - **Create** new itinerary [3].
  - **Edit** existing itinerary [4].
    - Edit one or more chosen destinations from the table.
  - **Remove** existing itinerary [5].
    - Remove one or more of the itineraries shown in the table.
  - **Create** new destination [6].
  - **Edit** existing destination [7].
  - **Remove** existing destination [8].

Basic Application Requirements (Backend):

- You must set up a valid authentication API
  - Server must be able to authenticate a user's identity **[1]**.
- You must set up the respective API with the following functionalities:
  - Return a list of itineraries from the ***Itinerary, ItineraryDestination, Destination & Country*** table [2].
  - Insert itinerary chosen from frontend into ***Itinerary*** table [3].
  - Ensure the ***Itinerary*** table is updated for each change [4].
  - Delete itinerary from the ***Itinerary*** table [5].
  - Insert destination chosen from frontend into ***Destination*** table [6].
  - Ensure the **Destination** table is updated for each change [7].
  - Delete destinations from the ***Destination*** table [8]**.**

Basic Application Requirements (Integrate):

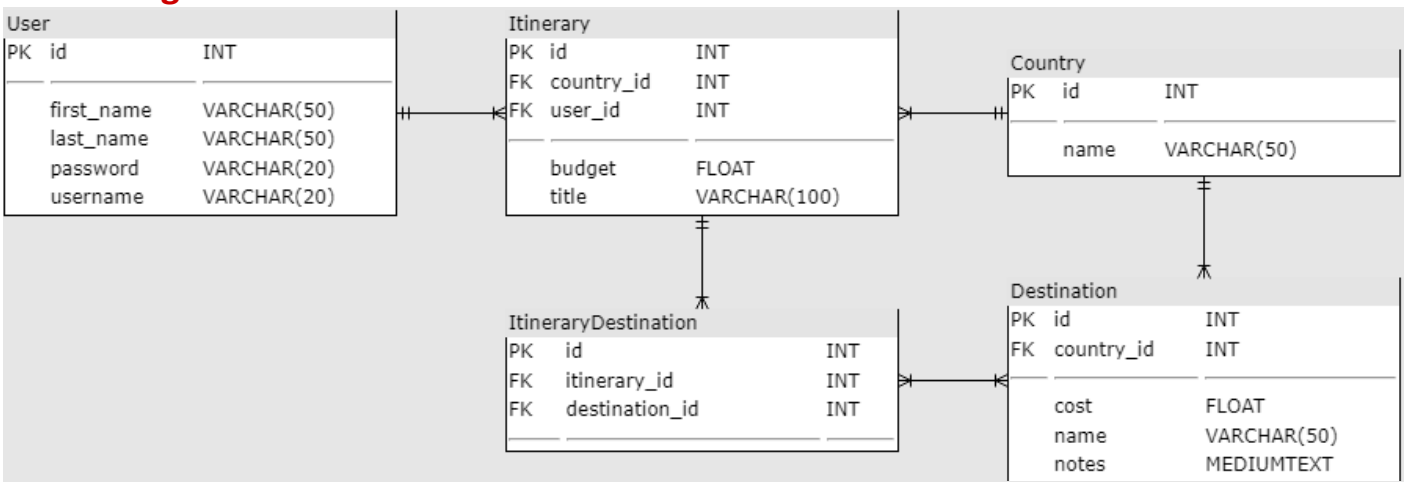
- Integration is a crucial requirement for this hackathon. The front end and back end should be ***integrated*** seamlessly.

Data provided

You will be given:

- Data in *SQL* format
  - The entries provided are not exhaustive and you can add more to suit the needs of your application
  - Entity Relationship Diagram (ERD). The following ER diagram is provided as a reference. We have provided datasets for ***User***, ***Itinerary*** and ***Destination*** entities.

ERD Diagram



SQL Data

tecktrek24.sql

Database Example

User Table

(PK) ID	1
First_name	Irene
Last_name	Lim
Password	iLoveTT!23
Username	IreneLim123

Itinerary Table

(PK) ID	2
(FK) Country_ID	4
(FK) User_ID	1
Budget	200
Title	Dinner

Destination Table

(PK) ID	3
(FK) Country_ID	4
Cost	170
Name	Dusk Restaurant & Bar
Notes	No reservation needed!

ItineraryDestination Table

(PK) ID	1
(FK) Itinerary_ID	2
(FK) Destination_ID	3

Country Table

(PK) ID	4
Name	Singapore

Extension Modules

The following modules are extensions and are fully optional. You should tackle these extensions individually and showcase your knowledge in the relevant pillars. To recap, the pillars are:

1) Application Development and Support
2) DevOps and Site-Reliability Engineering
3) ICT Infrastructure

You will showcase your work in these modules together with the main challenge during the presentation segment of TechTrek. Each of the extension modules are separate from the Main Challenge. Do remember to highlight the pillar you are showcasing your skills in.

Do remember that these Extension Modules are meant for you to showcase your domain knowledge. You will be presenting your thoughts and decisions to the assessors, so remember to take into account their suggestions/clarifications.

Pillars	Modules	Requirements
Application Development and Support	**DEV 1**	Project Lead
	DEV 2	Application Support
DevOps and Site-Reliability Engineering	**SRE 1**	Availability & Mean Downtime, SRE Principles
	SRE 2	Write Unit Testing
ICT Infrastructure	**ICT 1**	Dockerization
	ICT 2	Cloud Technology

Application Development and Support Modules

[DEV 1]

As an Application Developer, there is a need for proper planning of how the project should progress. For this challenge, you are an Application Lead in charge of this project. Not only do you need lead a project effectively, but also demonstrate your ability to ensure its security, resource optimization, cost-efficiency, and technical robustness.

Requirements:

Some things to consider includes (and are not limited to):

1. Security concerns
2. Manpower requirements
3. Cost of production
4. Timeline

Remember to justify your thought processes clearly and to the best of your ability.

[DEV 2]

As an Application Developer, there is a need to consider how best to support an application post production. For this challenge, you are an Application Support Lead, and highlight methods for the support and improvement of the application described by the Main Challenge Statement.

Requirements:

Some things to consider includes (and are not limited to):

1. How to push out improvements
2. Managing Downtime
3. Managing Manpower requirements
4. How to handle fallbacks

Remember to justify your thought processes clearly and to the best of your ability.

DevOps and Site-Reliability Engineering Modules

[SRE 1]

Downtime is a common challenge for development of any software. Additionally, it is important to design and promote a service management strategy that works for your developed product to build a functional application. For this challenge, you are a Senior Site-Reliability Engineer. You are tasked to consider the issues of Accessibility, Mean Downtime for the application, and apply Site-Reliability Engineering (SRE) principles described in the Main Challenge.

Requirements:

Some things to consider includes (and are not limited to):

1. How to measure Accessibility
2. How to measure Mean Downtime
3. Factors to decrease Mean Downtime
4. Identify Service Level Objectives and Indicators
5. Develop risk acceptance and mitigation plan

Remember to justify your thought processes clearly and to the best of your ability.

[SRE 2]

To ensure the application functions as intended, it is important to write unit tests to check for software failures. For this module, you will be writing unit tests for your application.

Requirements:

- Write sufficient unit testing for your application
- Ensure that there is at least 60% coverage under statements, branch, functions, and lines

ICT Infrastructure Modules

[ICT 1]

With increased interest in cloud technology, Dockerization has developed to ease the burden between application development and cloud deployment. For this challenge, you are a Cloud Engineer Specialist. You are tasked to look into the application of Docker technology for an application described by the Main Challenge Statement.

Requirements:

Some things to consider includes (and are not limited to):

1. Requirements for the application to be Dockerized
2. Pros and Cons of Dockerization of an application
3. Steps should an update of the application be required

Remember to justify your thought processes clearly and to the best of your ability.

[ICT 2]

Cloud services have seen an increased interest over the past few years, with more and more developers using cloud technology to deploy their applications. For this challenge, you are a Cloud Engineer Specialist. You will be looking into deploying your application through Amazon Web Services (AWS) or Google Cloud Platform (GCP).

Requirements:

- Choose either AWS or GCP to deploy your application
- Explain the benefits of your chosen cloud platform, and how it can benefit the company
    - Pros and Cons of the chosen cloud technology
        - Which option is the most cost effective
        - Which option is the best fit for the applications