BINUS University

Academic Career: *Undergraduate / ~~Master / Doctoral / International / BASE / BINUS Online~~*)*	**Class Program:** *Regular / ~~Global Class~~*)*
☒ **Mid Exam** ☐ **Compact Term Exam** ☐ **Final Exam** ☐ **Others Exam : ____________**	**Term : Odd / ~~Even~~ / ~~Compact~~ *)** **Period (Only for *BINUS Online*): 1 / 2 *)**
☒ **Kemanggisan** ☐ **Senayan** ☐ **Semarang** ☐ **Alam Sutera** ☐ **Bandung** ☐ **Bekasi** ☐ **Malang**	**Academic Year :** **2024/2025**

Exam Type*	:	~~Onsite~~ / Online (1 week)	Faculty / Dept.	:	Engineering / Computer Engineering
Day / Date**	:	Friday / 08 November 2024	Code - Course	:	CPEN6222010 - Mobile Application Development for Engineering
Time**	:	13:00	Code - Lecturer	:	D5855 - Johannes, S.Kom., M.T.
Exam Specification***	:	☐ Open Book ☐ Open Notes ☐ Close Book ☐ Submit Project ☐ Open E-Book ☐ Oral Test	BULC (Only for BINUS Online)	:	
			Class	:	**LB40**
Equipment***	:	☐ Exam Booklet ☒ Laptop ☐ Drawing Paper – A3 ☐ Calculator ☐ Tablet ☐ Drawing Paper – A2 ☐ Dictionary ☐ Smartphone ☐ Notes	Student ID ***	:	**2702407514**
			Name ***	:	**Elvin Aurelius Yamin**
			Signature ***	:	Elvin

*) *Strikethrough the unnecessary items* **) *For Online Exam, this is the due date* ***) *Only for Onsite Exam*

Please insert the test paper into the exam booklet and submit both papers after the test.

The penalty for CHEATING is DROP OUT!

Learning Outcome for
☒ Mid Exam ☐ Final Exam

LO 1: Explain fundamental concepts of software design and mobile application development
LO 2: Solve problem related to software design and mobile application development

Verified by,

Wiedjaja (D1530) and sent to Department on Oct 16th, 2024

I. Concept (30%)

1. [LO1 – 10 Points]
   Explain what is the difference between Stateless and Stateful widget?
   When do you use them? Provide an example foreach.

   - Stateless Widgets are immutable; once they are created, they cannot change. They're ideal for UI components that don't require interaction or state changes.
     - Example: A simple text display widget or a static button.

```
class Greeting extends StatelessWidget {
  final String text;

  Greeting(this.text);

  @override
  Widget build(BuildContext context) {
    return Text(text);
  }
}
```

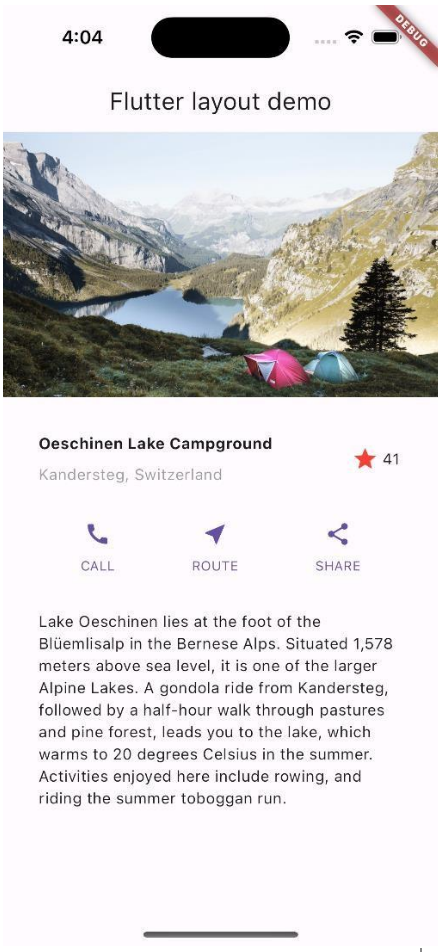
   - Stateful Widgets maintain a mutable state, allowing them to update based on user interaction or other events. These widgets are used for dynamic elements in the UI.
     - Example: A counter that increments on button press.

```
class Counter extends StatefulWidget {
  @override
  _CounterState createState() => _CounterState();
}

class _CounterState extends State<Counter> {
  int count = 0;

  void increment() {
    setState(() {
      count++;
    });
  }

  @override
  Widget build(BuildContext context) {
    return Column(
      children: [
        Text('Count: $count'),
        ElevatedButton(onPressed: increment, child: Text('Increment')),
      ],
    );
  }
}
```



Flutter layout demo

Oeschinen Lake Campground
Kandersteg, Switzerland
★ 41

Lake Oeschinen lies at the foot of the Blüemlisalp in the Bernese Alps. Situated 1,578 meters above sea level, it is one of the larger Alpine Lakes. A gondola ride from Kandersteg, followed by a half-hour walk through pastures and pine forest, leads you to the lake, which warms to 20 degrees Celsius in the summer. Activities enjoyed here include rowing, and riding the summer toboggan run.

2. [LO1 – 10 Points]
   From Flutter layout tutorial page here, draw a diagram of the widget tree for that UI.
   See Figure 1.

```
Column
├── AppBar
│   └── Text("Flutter layout demo")
├── Image.asset('images/lake.jpg')
├── Padding
│   └── Column
│       ├── Text("Oeschinen Lake Campground")
│       ├── Text("Kandersteg, Switzerland")
│       ├── Row
│       │   ├── Icon(Icons.star, color: Colors.red)
│       │   └── Text("41")
│       ├── Row
│       │   ├── Column
│       │   │   ├── IconButton(Icons.call)
│       │   │   └── Text("CALL")
│       │   ├── Column
│       │   │   ├── IconButton(Icons.near_me)
│       │   │   └── Text("ROUTE")
│       │   ├── Column
│       │   │   ├── IconButton(Icons.share)
│       │   │   └── Text("SHARE")
│       └── Padding
│           └── Text("Lake Oeschinen lies at the foot of the Blüemlisalp the… ")
└── BottomNavigationBar
```

Explanation
1. Column: The main layout structure that stacks the widgets vertically.
2. AppBar: Displays the title of the app ("Flutter layout demo").
3. Image.asset: Displays the main image of the location.
4. Padding: Adds padding around the Column widget containing the campground details.
   - Column: Holds the campground details.
     - Text Widgets: Display the title ("Oeschinen Lake Campground") and location ("Kandersteg, Switzerland").
     - Row (Rating Section): Contains the star icon and rating count ("41").
     - Row (Action Buttons): Contains the three buttons (CALL, ROUTE, SHARE), each Column with an IconButton and Text label.
     - Padding with Text: Displays the description of the lake and activities.
5. BottomNavigationBar: (Not explicitly visible here but often used in this layout).

Figure 1 - Flutter layout Demo

3. [LO1 – 10 Points]
   Explain what is responsive and adaptive in Flutter?

   - **Responsive design:** adjust layout and UI elements according to the screen size to provide an ideal experience for users across various devices (e.g., phone, tablet, desktop).
   - **Adaptive design:** the UI and components adapt based on the device's platform (example, Android or iOS) to give a native feel on each system. Flutter has widgets like LayoutBuilder for responsive layouts & uses platform-specific widgets like Cupertino for adaptive behavior.

Verified by,

Wiedjaja (D1530) and sent to Department on Oct 16th, 2024

II. Project (70%)

4. [LO2 – 20 Points]
Imagine that you get a Flutter project to build Fashion shop apps that sells shoes, with many variation of shoes. Create a Dart file that contains a class named Shoes, that has properties of id, size, shoe_color, gender, brand, type, and limited_edition. Below are the requirements:
   - The class must be constructed using a named arguments.
   - The id of each new item should be managed using Dart uuid package.
   - Within the same model file, create an enum of ShoeColors that contains at least 4 colors of your choosing.
   - Within the same model file, create an enum of Gender that contains male and female.
   - Within the same model file, create an enum of Brands that contains at least 4 brands of your choosing.
   - The limited_edition parameter is a boolean type.

Project Structure:

```
lib/
├── main.dart
├── models/
│   └── shoes.dart
├── providers/
│   └── shoe_provider.dart
├── screens/
│   ├── home_screen.dart
│   └── shoe_detail_screen.dart
└── widgets/
    ├── shoe_card.dart
    └── shoe_list.dart
```

main.dart

```dart
import 'package:flutter/material.dart';
import
'package:flutter_riverpod/flutter_riverpod.dart';
import 'screens/home_screen.dart';

void main() {
  runApp(ProviderScope(child: MyApp()));
}

class MyApp extends StatelessWidget {
  @override
  Widget build(BuildContext context) {
    return MaterialApp(
      title: 'Fashion Shop',
      theme: ThemeData(
        primarySwatch: Colors.blue,
      ),
      home: HomeScreen(),
    );
  }
}
```

models/shoes.dart

```dart
import 'package:uuid/uuid.dart';

final uuid = Uuid();

enum ShoeColors { red, blue, green, black }
enum Gender { male, female }
enum Brands { Nike, Adidas, Puma, Reebok }

class Shoes {
  final String id;
  final double size;
  final ShoeColors shoeColor;
  final Gender gender;
  final Brands brand;
  final String type;
  final bool limitedEdition;

  Shoes({
    String? id,
    required this.size,
    required this.shoeColor,
    required this.gender,
    required this.brand,
    required this.type,
    required this.limitedEdition,
  }) : id = id ?? uuid.v4();
}
```

providers/shoe_provider.dart

```dart
import
'package:flutter_riverpod/flutter_riverpod.dart';
import '../models/shoes.dart';

final shoeProvider =
StateProvider<List<Shoes>>((ref) => []);
```

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screens/home_screen.dart

```dart
import 'package:flutter/material.dart';
import '../widgets/shoe_list.dart';

class HomeScreen extends StatelessWidget {
  @override
  Widget build(BuildContext context) {
    return Scaffold(
      appBar: AppBar(
        title: Text('Fashion Shop'),
      ),
      body: ShoeList(),
    );
  }
}
```

screens/shoe_detail_screen.dart

```dart
import 'package:flutter/material.dart';
import '../models/shoes.dart';

class ShoeDetailScreen extends StatelessWidget {
  final Shoes shoe;

  ShoeDetailScreen({required this.shoe});

  @override
  Widget build(BuildContext context) {
    return Scaffold(
      appBar: AppBar(
        title: Text(shoe.brand.toString()),
      ),
      body: Padding(
        padding: const EdgeInsets.all(16.0),
        child: Column(
          crossAxisAlignment:
CrossAxisAlignment.start,
          children: [
            Text('Size: ${shoe.size}'),
            Text('Color: ${shoe.shoeColor}'),
            Text('Gender: ${shoe.gender}'),
            Text('Limited Edition:
${shoe.limitedEdition ? 'Yes' : 'No'}'),
          ],
        ),
      ),
    );
  }
}
```

widgets/shoe_card.dart

```dart
import 'package:flutter/material.dart';
import '../models/shoes.dart';
import '../screens/shoe_detail_screen.dart';

class ShoeCard extends StatelessWidget {
  final Shoes shoe;

  ShoeCard({required this.shoe});

  @override
  Widget build(BuildContext context) {
    return Card(
      child: ListTile(
        title: Text(shoe.brand.toString()),
        subtitle: Text('Size: ${shoe.size} - Color:
${shoe.shoeColor}'),
        onTap: () {
          Navigator.of(context).push(
            MaterialPageRoute(
              builder: (ctx) =>
ShoeDetailScreen(shoe: shoe),
            ),
          );
        },
      ),
    );
  }
}
```

widgets/shoe_list.dart

```dart
import 'package:flutter/material.dart';
import
'package:flutter_riverpod/flutter_riverpod.dart';
import '../providers/shoe_provider.dart';
import 'shoe_card.dart';

class ShoeList extends ConsumerWidget {
  @override
  Widget build(BuildContext context, WidgetRef
ref) {
    final shoes = ref.watch(shoeProvider).state;
    return ListView.builder(
      itemCount: shoes.length,
      itemBuilder: (ctx, index) => ShoeCard(shoe:
shoes[index]),
    );
  }
}
```

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5. [LO2 – 50 Points]
Create a simple BMI calculator app which has two pages for navigation. You must following the same application layout as presented in Figure 2 below, but you may customize all the widgets styles and colors.

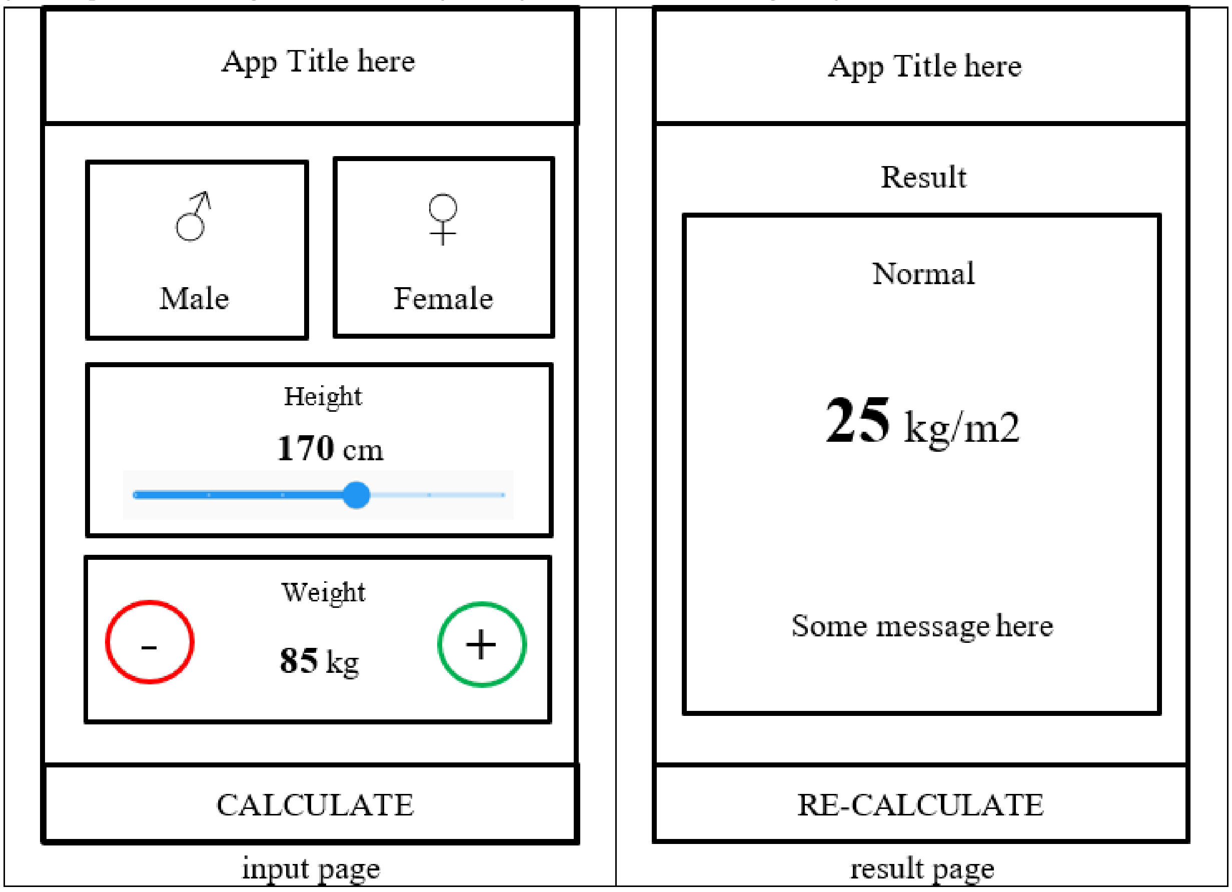

Figure 2 - Application Layout

App description:
The app consists of 2 pages for navigation. Both page should have a title on top of it and a button for navigation at the bottom. On the input page, user should choose his/her gender, then input their height using a Slider Widget (Slider class - material library - Dart API (flutter.dev)), and finally input their weight with the help of 2 buttons. When pressed, the "CALCULATE" button will navigate the user to the result page showing all the calculation result with some messages at the bottom. The "RE-CALCULATE" button will take the user back to the input page.

The BMI classifications are as follow :

Table 1 – BMI Classification based on gender

Female		**Male**	
Underweight	< 17 kg/m2	Underweight	< 18 kg/m2
Normal	17 - 23 kg/m2	Normal	18-25 kg/m2
Overweight	23-27 kg/m2	Overweight	25-27 kg/m2
Obese	> 27 kg/m2	Obese	> 27 kg/m2

The formula for BMI calculation is :

$$BMI = \frac{mass\ (in\ kg)}{height\ (in\ m)^2}$$

Note : The formula calculate height in meter while the user input is in centimeter. A conversion must be made withinyour code.

Verified by,

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Project Structure :

- main.dart
- screens
  - home_page.dart
  - result_page.dart
- widgets
  - gender_selection.dart
  - height_selection.dart
  - weight_selection.dart

Scoring will be based on the following criteria :

a) [LO2 – 10 Points] Able to navigate between pages.
b) [LO2 – 10 Points] App layout with complete widgets are presented.
c) [LO2 – 10 Points] Widgets functionality (buttons and slider).
d) [LO2 – 10 Points] Able to do calculations based on user input.
e) [LO2 – 10 Points] Following the project structure requirements.

Your task :

1. (Mandatory) Video recording
   - Record a short demonstration video (< 5 min) to demonstrate all your app functionality.
   - Demonstrate all variations in Table 1 classifications.
   - The recording must be made available online for scoring.
     Provide the link to your video repository in yourexam answer sheet.
   - Recording upload date must be clearly visible. Any upload after the exam submission date will not be graded.
2. (Mandatory) Attach only your code (not the whole project) as a zip file.

Terminal/ git clone https://github.com/AureliusBinus/bmi_calculator
DEMO/ https://www.youtube.com/watch?v=3P-rrYF_vfc

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