A1 - Designing Mobile Application (30%)

1. Assessment Theme: Digital Nutrition

The Digital Nutrition Journey: Food Quality Score Visualisation Application

Introduction

Digital health technologies have transformed how we monitor, assess, and improve our health outcomes. Within this domain, nutrition applications represent a significant advancement in helping individuals understand and enhance their dietary patterns. This article provides an in-depth explanation of a specialised nutrition application focused on food quality score visualisation—specifically designed for patients who have already undergone professional dietary assessment.

Take a look at this official guide from Australian Government's Department of Health and Ageing:
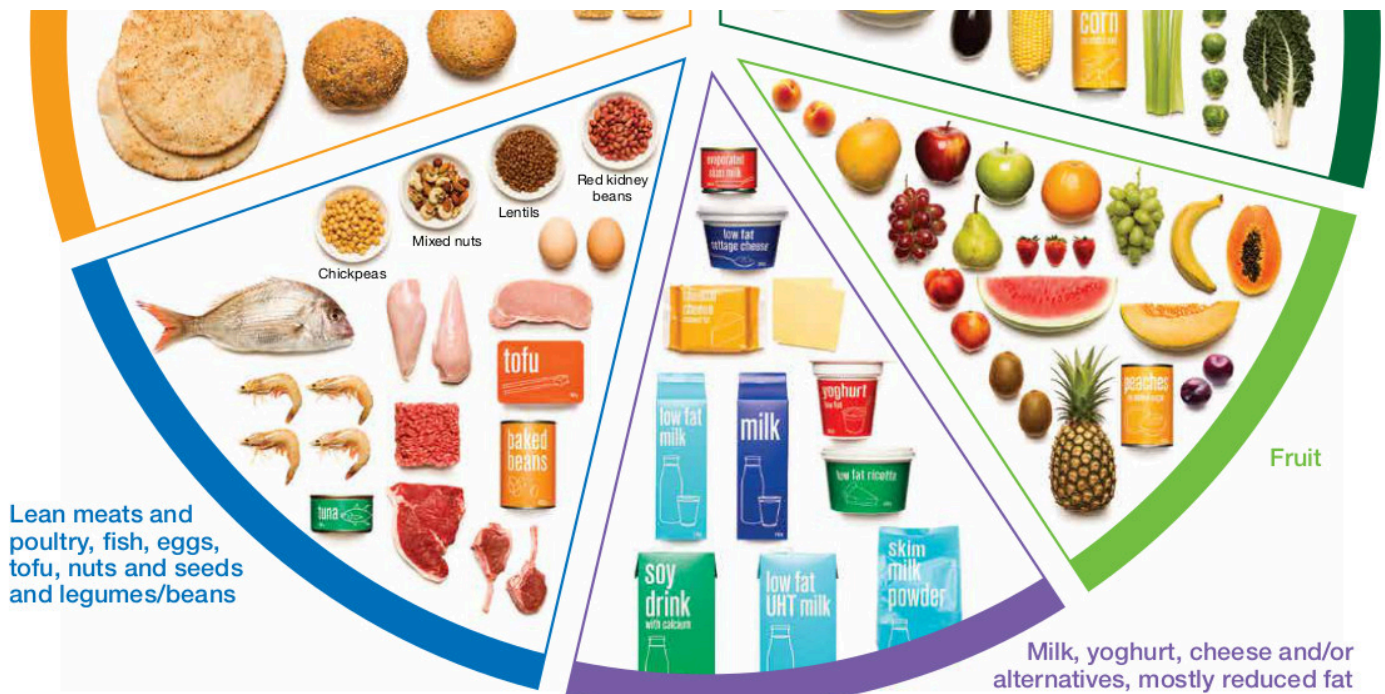
Use small amounts

Only sometimes and in small amounts

Unlike general consumer applications such as MyFitnessPal that primarily focus on calorie counting and macronutrient tracking, this application (that we will build as part of this assignment) serves as an extension of **clinical care**. It bridges the gap between professional dietary assessment and the daily nutritional choices patients make in their lives, providing them with personalised insights based on scientifically validated dietary quality metrics. In the next section, we'll unpack more about dietary assessments.

Understanding Dietary Assessment and Food Recalls

Before exploring the application's functionality, it is important to understand the clinical process that precedes its use. When patients visit a dietitian or nutritionist, one of the primary assessment methods used is a food recall survey. This procedure involves the healthcare professional conducting a structured interview where patients describe in detail everything they have eaten and drunk over a specified period—typically the previous 24 hours.

During this recall process, the clinician records not only what foods were consumed but also details including:

- Portion sizes and quantities
- Methods of preparation
- Timing of consumption
- Contextual factors such as where and with whom the meal was eaten

This detailed information provides clinicians with comprehensive data about a patient's dietary patterns, nutrient intake, and overall eating behaviours. The clinician then analyses this information using standardised tools that generate various nutritional assessments, including a food quality score based on established dietary guidelines.

The Healthy Eating Index for Australian Adults (HEIFA-2013) represents one such scoring system, evaluating the degree to which an individual's diet aligns with the Australian Dietary Guidelines. This multidimensional assessment examines consumption patterns across various food groups including vegetables, fruits, whole grains, protein sources, dairy products, and discretionary foods, while also considering factors such as sodium, sugar, and alcohol intake.

In Brief

As part of this unit's major assessment (60% spread over A1 & A3) you will build a digital nutrition app called NutriTrack that helps patients visualise their food quality scores after they have visited a clinician/dietician and conducted a food recall survey.

The Food Quality Score Visualisation Application represents an important advancement in nutrition technology that bridges clinical assessment and everyday dietary choices. By helping patients understand their personalised dietary quality scores through intuitive visualisations and providing actionable, evidence-based recommendations, the application empowers individuals to make informed nutritional decisions.

For IT students developing this application, the project offers rich learning opportunities across technical, design, and health domains. Most importantly, it provides experience creating technology that has tangible impacts on health outcomes—turning abstract nutritional guidance into practical, personalised support that helps individuals navigate their nutritional journey with confidence and clarity.

By focusing on visualisation, education, and behavioural support rather than simply tracking calories or macronutrients, this application exemplifies how thoughtfully designed technology can extend and enhance the impact of clinical care, ultimately supporting better nutritional choices and improved health outcomes.

Credit

This assessment spec was designed by Delvin Varghese in association with Associate Professor Tracy McCaffrey (Department of Nutrition, Dietetics and Food at Monash University). The spec is based on a current real-world problem faced in the field of Nutrition Studies.

2. The Problem in Digital Nutrition

The Role of the Food Quality Score Visualisation Application

After patients have completed their clinical assessment, they often leave with a wealth of information but may struggle to contextualise this information or translate it into actionable changes. This is where our specialised application provides significant value.

The application allows patients to claim their profile using their unique identifier provided by their healthcare professional. Upon accessing their account, patients can view a comprehensive visualisation of their food quality scores derived from their recall survey data. Rather than presenting this information as complex numerical data, the application translates these scores into intuitive visual representations that clearly communicate dietary strengths and areas for improvement.

The core purpose of this application extends beyond mere data presentation. It serves as a personalised nutrition companion that provides:

1. **Contextualised Interpretation**: Helping patients understand what their scores mean in relation to dietary guidelines and health outcomes.
2. **Targeted Recommendations**: Suggesting specific, actionable changes based on identified areas for improvement within their dietary pattern.
3. **Motivational Support**: Delivering positive reinforcement for healthy choices while providing encouraging messages to support dietary changes.
4. **Educational Content**: Offering evidence-based information about nutrition principles in accessible language.
5. **Goal-Setting Framework**: Enabling patients to set realistic, incremental goals for dietary improvement.

3. How Mobile Apps can help!

Technical Foundation and User Experience

From a technical perspective, the application integrates with clinical systems to securely access patient data. The scores generated from the food recall survey are stored in a structured format (typically CSV files) that the application can interpret and transform into visual representations.

The user experience is designed to be intuitive and accessible, even for individuals with limited technological proficiency. After completing a simple authentication process to claim their profile, patients navigate through a series of screens that progressively reveal different aspects of their dietary assessment:

1. **Overview Dashboard**: Presents a comprehensive summary of their overall food quality score and key metrics.
2. **Detailed Breakdown**: Shows performance across individual dietary components (vegetable intake, fruit consumption, whole grain choices, etc.).
3. **Comparative Analysis**: Places their scores in context by comparing them to reference values from dietary guidelines.
4. **Recommendation Centre**: Provides personalised suggestions for dietary improvements based on their specific scores.
5. **Resource Library**: Offers educational materials including recipe ideas, meal planning tips, and nutritional information.

The application employs data visualisation techniques specifically designed to communicate nutritional concepts clearly, using colour coding, intuitive icons, and progressive disclosure of information to prevent overwhelming users.

Behavioural Science Foundation

The application is built upon established principles of behaviour change theory, recognising that knowledge alone is rarely sufficient to drive sustainable dietary improvements. It incorporates elements such as:

- **Self-Monitoring**: Enabling patients to track their progress over time.
- **Goal Setting**: Facilitating the establishment of specific, measurable, achievable, relevant, and time-bound (SMART) nutritional goals.
- **Positive Reinforcement**: Celebrating achievements and improvements, no matter how small.
- **Implementation Intentions**: Helping patients plan specific actions for overcoming barriers to dietary change.
- **Social Support**: Providing options to share progress with healthcare providers or support networks.

The integration of these behavioural techniques transforms the application from a simple data visualisation tool into a comprehensive dietary support system.

4. Android Skills you will learn

User Interface (UI) & Form Elements

- **Layout and Arrangement:** Understanding **Jetpack Compose UI components**, using **Column, Row, and Box** for structuring screens.
- **Interactive UI Elements:**
  - **Buttons:** Handling click events and user interactions.
  - **Checkboxes:** Managing selection states and integrating UI state changes.
  - **DatePicker:** Allowing users to select dates effectively.
  - **ProgressBar:** Displaying progress updates dynamically.
  - **Form Validation:** Implementing **input validation** for text fields and other UI components.

Working with Data (CSV Handling)

- **Reading CSV Files:** Learning how to **parse and read structured data** from CSV files.
- **Basic Computation & Scoring:** Performing **calculations based on user input**, such as computing a nutrition score.

Navigation Between Screens

- **Multi-Screen Navigation:** Implementing **Compose Navigation** with multiple screens.
- **Passing Data Between Screens:** Learning how to use **NavArguments** for transferring data.

Using ImageView

- **Displaying Images:** Using **Image() composable** to show static and dynamic images.

Modals & Dialogs

- **Creating Pop-ups:** Displaying **modals/dialogs** for additional information or user prompts.
- **Adding & Dismissing Text:** Managing user interactions in modals.

Persistent Storage with Shared Preferences

- **Using SharedPreferences (DataStore alternative):** Storing simple key-value data like user preferences and scores for **persistent state management**.

5a. App Specifications

Here's a formal specification document for students to build the *NutriTrack* app. This document outlines the required screens, navigation, validation, and CSV integration.

See 9. Expected Output for a visual demonstration of what you should build.

NutriTrack - Student Implementation Specification

Version: 1.0
Prepared for: FIT2081 - Mobile App Development
Date: March 2025

1. Overview

NutriTrack is a mobile application designed to help users track their food intake and receive insights into their dietary habits. The goal of this assignment is for students to implement the core functionalities of the app using Kotlin and Jetpack Compose.

This specification outlines the **required screens, navigation structure, data handling, and validation rules.** Students must extract user data from a **pre-provided CSV file** that contains patient IDs and food quality scores.

2. App Structure & Navigation

Naming: Package name MUST include student's firstname and student ID.

Students must implement a **basic navigation system** with two primary screens:

1. **Home** (Displays food quality score and allows edits)
2. **Insights** (Displays detailed food score breakdown)

3. Screens & Functionality

3.1. Welcome Screen (Landing Page)

- **Purpose**: Introduces the app and provides a disclaimer.
- **Elements**:
    - App logo and name ("NutriTrack")
    - Disclaimer text

- External URL to Monash Nutrition Clinic
- **Login button** → Navigates to the login screen
- TextView with Student Name + ID to distinguish your app. Write this in the format: "Alex Scott (14578373)". This can be placed anywhere on your Welcome Screen. Optional to display this on other pages.

3.2. Login Screen

- **Purpose**: Allows users to authenticate using a pre-registered ID and phone number.
- **Elements**:
  - **Dropdown**: User ID (loaded from CSV file)
  - **Text field**: Phone number (must match the one in the CSV)
  - **Continue button** → Proceeds to the questionnaire if validation is successful
  - **Validation Rules**:
    - User ID must exist in the CSV file
    - Phone number must match the registered number in the CSV
    - If invalid, display an **error message**

3.3. Food Intake Questionnaire

- **Purpose**: Captures dietary preferences and meal timing data.
- **Elements**:
  - **Checkboxes**: Select food categories (Fruits, Vegetables, Grains, etc.)
  - **Persona Selection** (Buttons for six categories)
  - **Dropdown**: Select best-fitting persona
  - **Time pickers**:
    - What time do you eat your biggest meal?
    - What time do you go to sleep?
    - What time do you wake up?
  - **Save button** → Stores data locally in SharedPreferences.

3.4. Home Screen (Food Quality Score)

- **Purpose**: Displays the user's food quality score.
- **Elements**:
  - **Greeting**: "Hello, [User's ID]"
  - **Edit button** → Navigates back to the questionnaire
  - **Food Score Display** (Loaded from the CSV)
  - **Explanation text**: What the Food Quality Score represents
  - **Navigation options** (Bottom bar or buttons)

3.5. Insights Screen (Detailed Breakdown)

- **Purpose**: Displays a category-wise breakdown of the user's food score.
- **Elements**:

- **Progress bars** for:
    - Vegetables, Fruits, Grains & Cereals, Whole Grains, Meat, Dairy, etc.
- **Total Score Calculation** (Loaded from CSV)
- **Buttons**:
    - "Share with someone"
    - "Improve my diet" → Currently it doesn't need to do anything but in our future assignment, this will navigate to NutriCoach screen.

4. Data Handling & CSV Integration

Students must **extract and use data** from a **CSV file**.

- When logging in, the app must check **User ID and Phone Number** from the CSV.
- After login, the **Food Quality Score** is retrieved and displayed on the Home and Insights screens.

> **i** **Validation Tip:** Ensure that invalid user entries return an **error message** before allowing access.

5. Requirements & Assessment Criteria

5.1. Core Requirements (Must-Have)

Implement all five screens (Welcome, Login, Questionnaire, Home, Insights)
Read and validate **User ID & Phone Number** from CSV
Display **Food Quality Score** from CSV
Implement **basic navigation** (either bottom bar or buttons)

5.2. What is NOT Required (Future Work in Assignment 3)

"Settings" screen
"NutriCoach" - Advanced AI-based recommendations for patients

Sample CSV File Structure

Create a .CSV file with the following contents and use this in your emulator/device for testing purposes.

> ✅ Hint: use Device Explorer in Android Studio to create/open files in Emulator from within Android Studio. You can use this to create or transfer the CSV file to your device.

> ❌ **UPDATE**: there were duplicate phone numbers in the original specs, so this has now been updated to change and make each phone number unique. Apologies for any confusion!

```
PhoneNumber,User_ID,Sex,HEIFAtotalscoreMale,HEIFAtotalscoreFemale,DiscretionaryHEIFAscoreMale,Discr
61436567330,4,Male,41.67,46.17,10,10,1.88,0.5,0.5,0.04,0,0,0,0,0,0,0.04,0,0,0,0,0,0,0,0,0,0,0,1.67,
61436567331,1,Female,42.84,43.84,10,10,0.45,1,1,1.19,0,0,0,0.83,0,0,0,0.36,0,0,0,0,0,0,0,0,0,0,0.84
61436567332,2,Female,45.09,47.34,5,5,4.11,0.5,0.5,0.29,0,0,0,0.1,0,0,0.18,0.01,7.5,7.5,1.26,5,0,1.0
61436567333,5,Male,42.5,45.5,5,5,4.42,3,4,3.18,0.37,1,0.6,1.2,0.52,0.37,0.13,0.35,0,0,0.01,0,0,0,0,
61436567334,6,Female,44.25,47.5,10,10,0.93,0.5,0.5,0.27,0,0,0.1,0.03,0,0,0.14,0,0,0,0,0,0,0,0,0,0,0
61436567335,17,Male,52.17,53.42,10,10,1.91,0,0,0,0,0,0,0,0,0,0,1.25,1.25,0.95,0,0.95,0,0,0,0,1.
61436567336,24,Female,54.75,59.25,10,10,0.69,1,1,1.84,0,0,0,0.63,0.36,0,0.03,0.83,1.25,1.25,0.94,0,
61436567337,26,Male,38,42.5,2.5,2.5,5.06,1,1,1.26,0,0,0,0,0,0,0.42,0.84,0,0,0,0,0,0,0,0,0,0,0,0,0
61433327331,28,Female,51.75,54,10,10,2.25,4,5,3,1.2,2,0,0,0,1.2,0.6,1.2,0,0,0,0,0,0,0,0,0,0,0,0,0
```

Important Notes: The CSV has scoring for both Male and Female participants. Depending on the Sex of the User, score accordingly i.e. for Female users, only look at HEIFAtotalscore<u>Female</u> and other scores that end in <u>Female</u>.

Persona Images

These are the images to display on the Persona screens for each of the 6 personas on their respective Modal.

📄 Persona_Images.zip

Credit: designed using DALL-E

5b. Screen Mockup: Specifications

In 5a, you developed an app based on a pre-provided mockup (see 9. Expected Output). In this sub-task you will design your own mockup for ONE screen of this app.

> ⚠️ Note: this is just a design activity. You don't have to develop anything in Android Studio for this subtask.

Low-Fidelity Mockup of the Food Intake Questionnaire (Screen 3)

Objective:
Redesign **Screen 3 (Food Intake Questionnaire)** with a more user-friendly layout. You must **present an alternative way** for users to input their dietary preferences while ensuring that all required functionalities remain intact.

Requirements:

- Create a **low-fidelity wireframe/mockup** (hand-drawn or digital) that proposes a different way to structure Screen 3.
- Ensure that your mockup includes all the functionality currently included in Screen 3:
  - **Food category selection** (Checkboxes, dropdowns, or other input methods)
  - **Persona selection** (How users pick or learn about personas)
  - **Meal timing inputs** (Current/Alternative ways to enter meal timings)
- Clearly **label each UI element** in your mockup, even if the drawing is rough.
- Include a **brief explanation (50-100 words)** of why your design improves the user experience.

Submission:

- In Moodle, upload your **mockup image(s)** along with a short explanation in one PDF file.
- Name your file: **Firstname_Lastname_Screen3Mockup.pdf**
  - Page 1: Mockup image(s)
  - Page 2: Short explanation

6. Marking Rubric

7. What to submit?

<u>**For Moodle**</u>,

Submission 1a: ZIP file of your Android Studio ZIP file (Part 5a)

Submission 1b: PDF file of your Mockup (Part 5b)

Submission expectations: Please put both your Zip file (Submission 1a) and Design PDF (Submission 1b) inside one zip file as below

A1_JaneDoe_STUDENTID.zip

--------<YourAssignmentZipName>.zip

--------DesignReport.pdf

For Submission 1a, You must ZIP your Android files into a single file and upload it to the Assignment 1 submission link that can be found on Moodle-->Assessments.
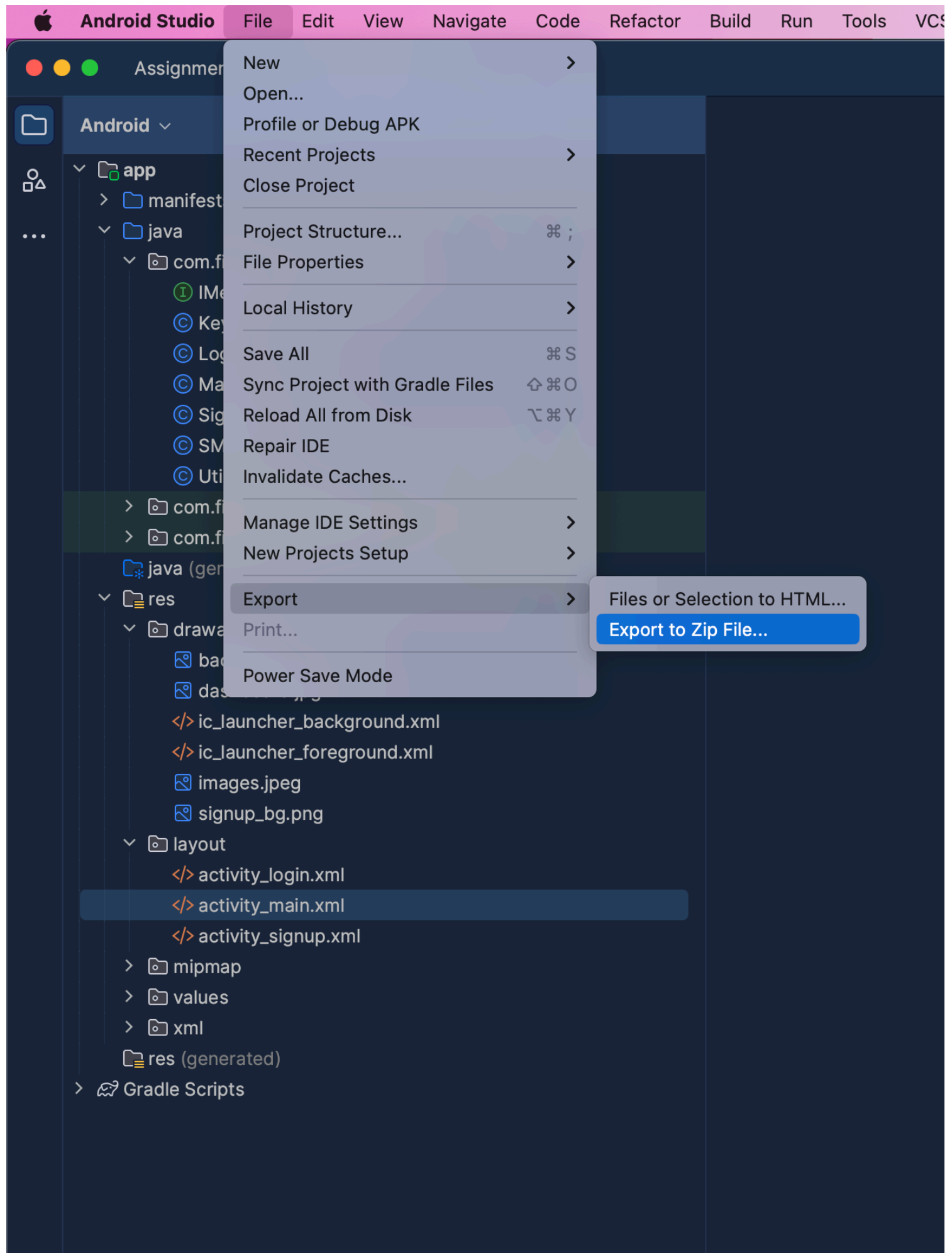
How to ZIP your Android project?

From Android Studio-->File-->Export-->Export to Zip FIle...

Save the exported file in a new folder, add the PDF (design output) and zip this new folder before uploading it to Moodle.

8. Late Submissions

Monash policy outlines the requirements for calculating penalties for assessment tasks submitted after the due date within the Marking and Feedback Procedure (sections 1.10 - 1.14). Specifically it states:

> 1.12 Unless an extension or special consideration has been granted, students who submit an assessment task after the due date will receive a late-submission penalty of 5 percent of the available marks in that task. A further penalty of 5 percent of the available marks will be applied for each additional day (24-hour period), or part thereof, the assessment task is overdue.

The Assessment Regime Procedure also states what mark should be used for threshold hurdle requirements. Specifically it states:

> 4.15 Where a late penalty is applied to an assessment task with a threshold hurdle, the penalised mark will be used to determine if the hurdle has been met.

Read more here:

https://www.monash.edu/learning-teaching/teachhq/Assessment/marking-and-grading/how-to/calculating-late-penalties

Short Extensions and Special Considerations

You can't request an extension from your chief examiner – instead, use the form below to apply for a short extension, or an extension through special consideration.

The application deadline is **11.55pm on the day your assessment is due or scheduled**.

https://www.monash.edu/students/admin/assessments/extensions-special-consideration

> **i**   **The rules for late submission penalties have changed for teaching periods that commence on or after 22 July 2024.**

9. Persona Description

10. Expected Output

Appendix: Why is this of value to me as an IT student?

The Value for IT Students Developing This Application

For information technology students developing this application, the project offers a valuable opportunity to work at the intersection of multiple disciplines:

1. **Health Informatics**: Applying IT principles to healthcare challenges and understanding how clinical data is structured and utilised.
2. **User Experience Design**: Creating interfaces that effectively communicate complex health information to diverse user populations, including those with varying levels of health literacy.
3. **Data Visualisation**: Transforming numerical health metrics into intuitive visual representations that facilitate understanding and action.
4. **Behaviour Change Technology**: Implementing features that support sustainable health behaviour modifications based on psychological principles.
5. **Healthcare Integration**: Understanding how standalone applications can complement clinical care within broader healthcare ecosystems.

This multidisciplinary exposure provides valuable experience that extends beyond typical software development projects, preparing students for careers in the rapidly growing digital health sector.

Industry Patterns

This is a highly lucrative sector, and there are lots of opportunities for those interested in a career in digital health.

▶ Expand

Let's see some industry trends..

Trend Report 1

> The global digital dietitian market size is expected to reach USD 3.50 billion by 2030, registering a CAGR of 15.2% from 2024 to 2030, according to a new report by Grand View Research, Inc. Increasing adoption of healthcare apps is expected to spur market growth. Since Zoe, a health science company, was launched in April 2022, 130,000 individuals have signed up for the service. At one stage, it had a waiting list of 250,000. The service employs a stool sample, a wearable continuous glucose monitor (CGM), and a pinprick blood test to recommend "smarter food choices for your body." Furthermore, the growing adoption of digital health solutions, including digital dietitian solutions, and rising awareness among people regarding health are expected to drive market growth.

Source: https://www.grandviewresearch.com/press-release/global-digital-dietitian-market
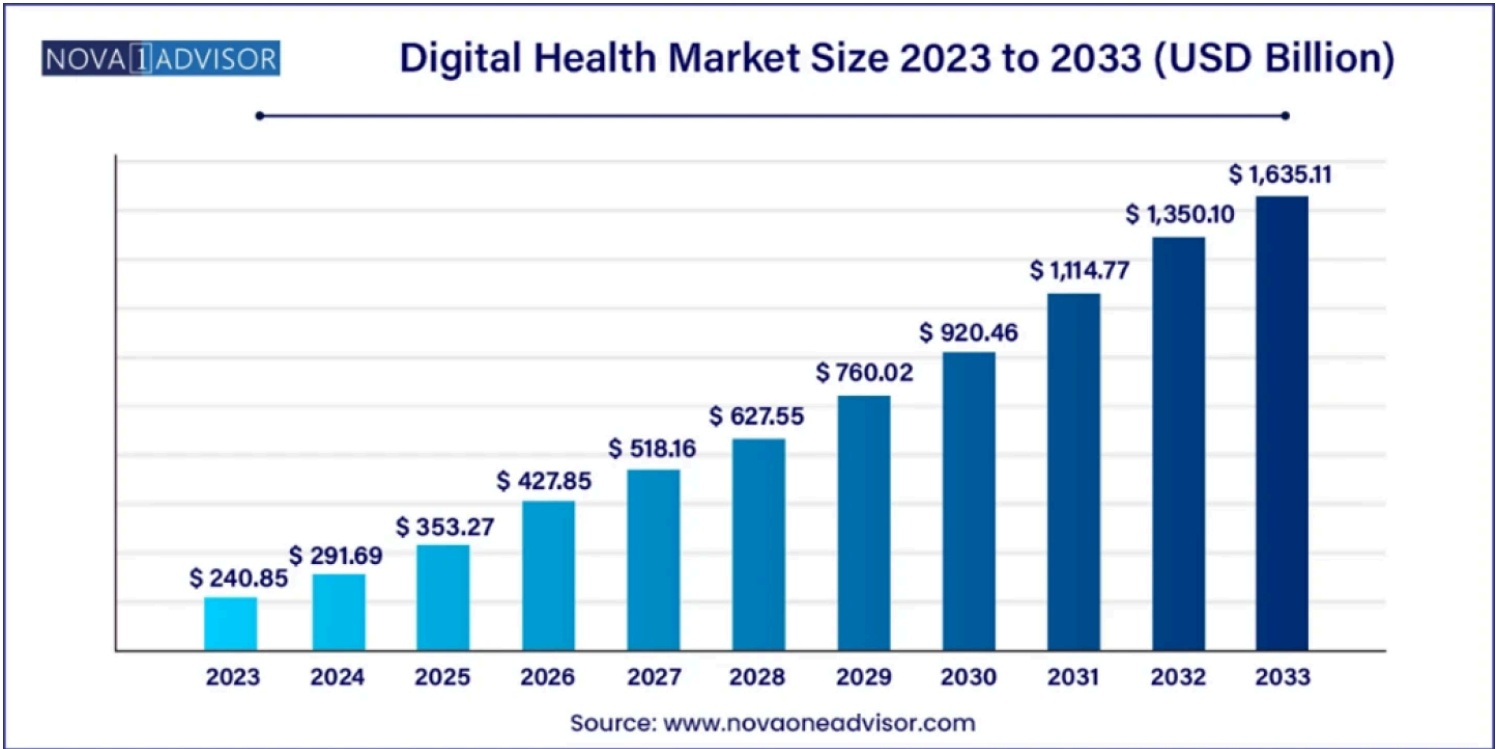
Trend Report 2

> * Revenue in the Digital Fitness & Well-Being market is projected to reach US$65.73bn in 2025.
> * Revenue is expected to show an annual growth rate (CAGR 2025-2029) of 6.14%, resulting in a projected market volume of US$83.43bn by 2029.
> * User penetration will be 16.22% in 2025 and is expected to hit 18.64% by 2029.
> * The average revenue per user (ARPU) is expected to amount to US$51.86.
> * In global comparison, most revenue will be generated United States (US$16.51bn in 2025).

Source: https://www.statista.com/outlook/hmo/digital-health/digital-fitness-well-being/worldwide

Trend Report 3

> Digital Health Market Size to Hit USD 1,635.11 Billion by 2033
>
> According to Nova One Advisor, the global digital health market size was exhibited at USD 240.85 billion in 2023 and is projected to hit around USD 1,635.11billion by 2033, growing at a CAGR of 21.11% during the forecast period 2024 to 2033.

Digital Health Market Size 2023 to 2033 (USD Billion)

Year	Value
2023	$ 240.85
2024	$ 291.69
2025	$ 353.27
2026	$ 427.85
2027	$ 518.16
2028	$ 627.55
2029	$ 760.02
2030	$ 920.46
2031	$ 1,114.77
2032	$ 1,350.10
2033	$ 1,635.11

Source: www.novaoneadvisor.com

Source: https://www.biospace.com/press-releases/digital-health-market-size-to-hit-usd-1-635-11-billion-by-2033
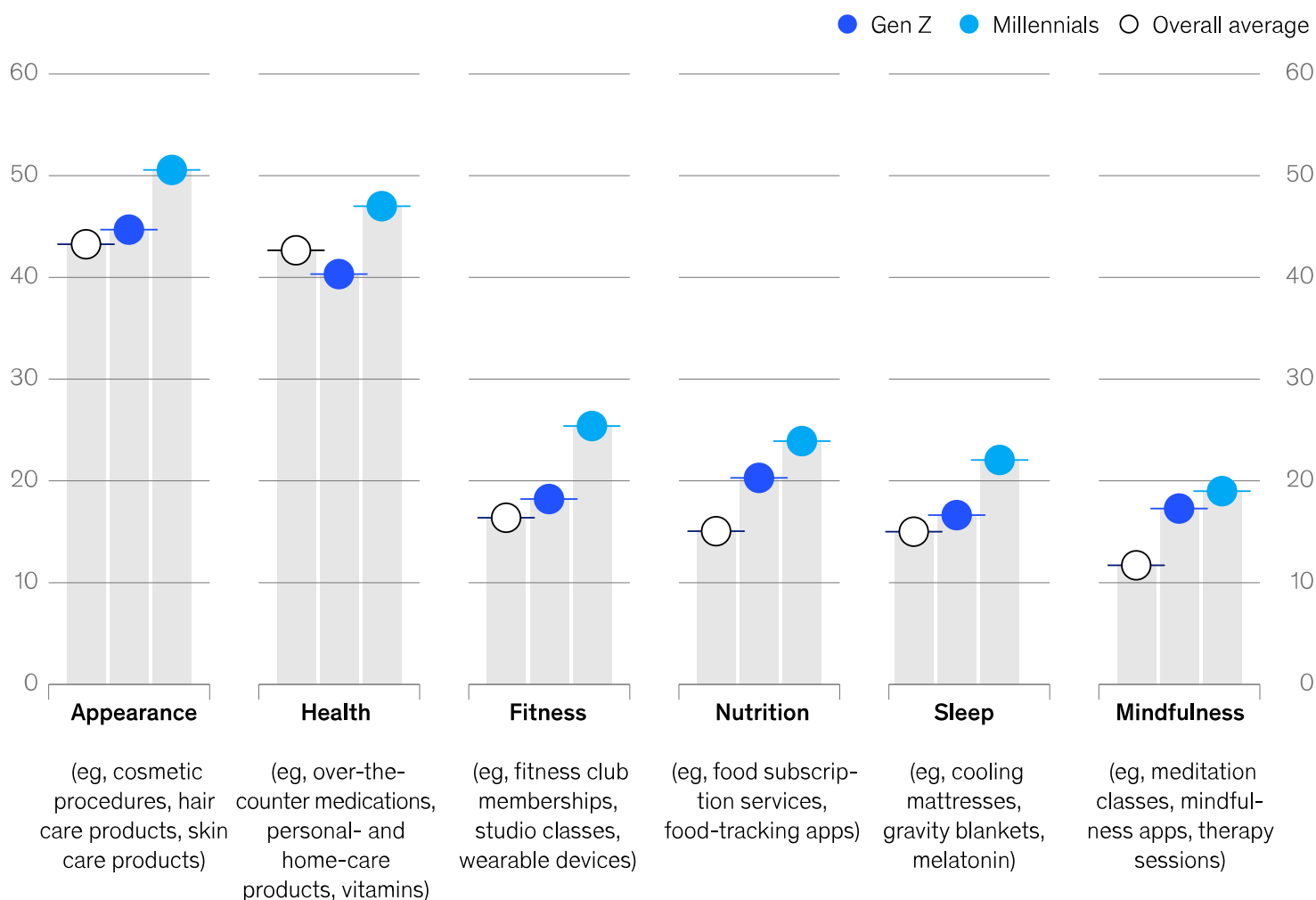
Trend Report 4

> In the United States alone, we estimate that the wellness market has reached $480 billion, growing at 5 to 10 percent per year. Eighty-two percent of US consumers now consider wellness a top or important priority in their everyday lives, which is similar to what consumers in the United Kingdom and China report (73 percent and 87 percent,

respectively).

This is **especially true among Gen Z and millennial consumers**, who are now purchasing more wellness products and services than older generations, across the same dimensions we outlined in our previous research: health, sleep, nutrition, fitness, appearance, and mindfulness

Millennial and Gen Z consumers are spending more on health and wellness than older consumers.

US health and wellness purchases, by product/service type and generation,[1]
% of respondents (n = 2,007)

● Gen Z   ● Millennials   ○ Overall average

Appearance	Health	Fitness	Nutrition	Sleep	Mindfulness
(eg, cosmetic procedures, hair care products, skin care products)	(eg, over-the-counter medications, personal- and home-care products, vitamins)	(eg, fitness club memberships, studio classes, wearable devices)	(eg, food subscription services, food-tracking apps)	(eg, cooling mattresses, gravity blankets, melatonin)	(eg, meditation classes, mindfulness apps, therapy sessions)

[1]Average across all products in each category. Percentage of respondents who purchased at least once in past 12 months.
Source: McKinsey Future of Wellness Survey, Aug 2023

McKinsey & Company

Source: https://www.mckinsey.com/industries/consumer-packaged-goods/our-insights/the-trends-defining-the-1-point-8-trillion-dollar-global-wellness-market-in-2024

Appendix: Privacy & Ethics

Privacy and Ethical Considerations

A critical aspect of any digital health application is its commitment to patient privacy and data security. As such apps process sensitive health information, they need to adhere to relevant healthcare privacy regulations and implements robust security measures, including:

- Secure authentication protocols
- Encrypted data storage and transmission
- Clear consent procedures for data usage
- Transparent privacy policies
- Options for patients to control their data

These measures ensure that patients can trust the application with their personal health information, which is essential for engagement and adoption.

For the purpose of this assignment, since we are not deploying this application with real-world users, we are not going to worry about these factors as much. But if you are ever building a patient-facing application, these are major considerations!

Appendix: How the Scoring works

Appendix: NutriTrack vs general nutrition apps

Appendix: Want to learn more about dietary recall?

Optional - for those wanting to dig deeper into this domain

Learn more about Intake24, a digital dietary recall platform developed in collaboration by Monash University, Cambridge University (UK) and Newcastle University (UK).

https://intake24.com/features
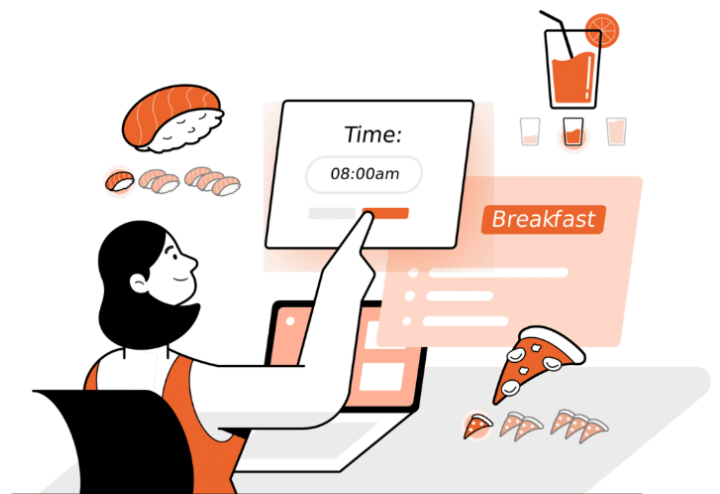
FAQs & Clarifications

> ⚠️ **Assignment 1 must be completed using Jetpack Compose. Using XML layouts (covered in Week 1) is not allowed for this assignment.**

>> *Do the visualisations on Screen 6: Insights need to be interactive?*

▶ Expand

>> *Can we use stock images or must we create our own LOGO?*

▶ Expand

>> *Should the external link to the Monash Nutrition Clinic be a clickable link that directs you to the website upon clicking?*

▶ Expand

>> *Do I need to replicate the expected output exactly, including texts, icons, and layout?*

▶ Expand

>> *Am I allowed to use third-party libraries, such as OpenCSV, to achieve functionality?*

▶ Expand

>> *Why is the progress bar for saturated fats missing on the Insights screen?*

▶ Expand

>> *Mockup: How would we improve the layout of the screen 3 of the app?*

▶ Expand

>> *Double/Float Value: Is it to show the Food Quality Score in float (41.67/100)?*

▶ Expand

>> *Share Button: What to share using this button?*

▶ Expand

**>> *Mockup: Are we allowed to split the questionnaire across multiple screens*

▶ Expand

>> TopBar Button: Top bar back button 'Food intake questionnaire'?

▶ Expand

>> Are headers or cover pages considered part of the word count for the screen mock up design? is the 10% leniency in play?

▶ Expand

>> Should the questionnaire page launch for the first time a user logs in?

▶ Expand

>> For the returning user, will the login screen go straight to the home screen with preferences loaded from the CSV?

▶ Expand