BMI Calculator – A Health Monitoring app

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BONAFIDE CERTIFICATE

Certified that this project report titled **"BMI Calculator – A Health Monitoring App"** is the bonafide work of **"MADHU BALAN C.K (220701514)"** who carried out the work under my supervision. Certified further that to the best of my knowledge the work reported herein does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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ABSTRACT

In today’s health-conscious world, maintaining an ideal body weight has become essential to prevent various health issues such as obesity, cardiovascular diseases, and diabetes. One of the most widely accepted and straightforward methods to evaluate a person's health status is the Body Mass Index (BMI). BMI is a simple calculation based on a person's height and weight that categorizes individuals into underweight, normal weight, overweight, or obese. The aim of this project is to develop an Android-based mobile application, named **BMI Calculator**, that allows users to compute their BMI and understand their health category in a matter of seconds.

This application was developed using **Android Studio** with **Kotlin**, leveraging various core Android components such as Activities, Fragments, ConstraintLayout, and Intents. The app features an intuitive and responsive user interface that accepts height and weight as input and displays the calculated BMI along with a descriptive message indicating the user's health category. It provides instant results without the need for an internet connection, making it suitable for quick offline health assessments.

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CHAPTER 1
INTRODUCTION

1.1 GENERAL

In the modern era, where sedentary lifestyles and unhealthy dietary habits have become increasingly common, maintaining physical health is a priority for people of all age groups. Awareness about personal health and fitness has grown, and individuals are seeking convenient tools to help monitor key health indicators. One such important indicator is the **Body Mass Index (BMI)**, which provides a simple yet effective way to assess whether a person is underweight, normal weight, overweight, or obese based on their height and weight.

BMI is widely used by healthcare professionals and fitness experts as a preliminary diagnostic tool to identify potential health risks associated with body weight. However, not everyone has access to medical tools or resources at all times. This is where mobile technology plays a vital role in democratizing access to personal health information. With smartphones becoming an integral part of daily life, mobile applications can act as powerful tools to promote health awareness and self-monitoring.

This project titled **BMI Calculator** is a mobile application developed for the Android platform using **Kotlin** programming language and **Android Studio IDE**. The primary purpose of the application is to provide a fast, easy-to-use interface for users to input their height and weight, calculate their BMI, and receive instant feedback on their health category. The application is lightweight, intuitive, and designed to work completely offline, making it accessible to a wider audience without the need for internet connectivity.

The app utilizes modern Android components such as **Activities**, **Fragments**,

ConstraintLayout, and **Intent-based navigation** to deliver a smooth and interactive user experience. The core functionality is implemented using **Kotlin's concise syntax and object-oriented features**, which ensures code readability and maintainability.

In its current state, the app focuses on the essential function of BMI calculation with clear categorization (Underweight, Normal, Overweight, Obese), and a clean, minimalistic UI for maximum user convenience. It also provides scope for enhancements such as saving historical BMI records, visualizing trends using graphs, adding user authentication, and switching between metric and imperial units.

This project not only provides a useful utility for users but also serves as a practical learning platform for students and beginner developers to understand the fundamentals of Android application development. Through this project, developers can gain hands-on experience in working with user input, data validation, layout design, intent handling, activity lifecycle management, and UI feedback mechanisms.

In summary, the **BMI Calculator app** bridges the gap between health and technology by offering a simple tool for BMI monitoring, while at the same time offering educational value to those learning mobile application development.

1.2 OBJECTIVE

The main objective of the **BMI Calculator** project is to develop a fully functional, interactive, and user-centric mobile application that allows users to quickly calculate their Body Mass Index (BMI) and interpret the result in relation to their health status. BMI is an important metric in personal health monitoring, as it helps indicate whether a person is underweight, of normal weight, overweight, or obese. This app aims to provide users with an efficient tool that supports instant BMI computation based on the height and weight they input, without the need for internet access, login credentials, or any complicated user setup. From a development standpoint, this project also serves as a practical implementation of essential Android application development concepts, particularly using **Kotlin** programming and **Android Studio**. It helps the developer understand and apply UI building techniques with XML and ConstraintLayout, activity lifecycle management, inter-component communication through **Intents**, and logical structuring using **Fragments** and custom data classes.

The app is structured to promote modularity, scalability, and maintainability by clearly separating UI elements, logic, and navigation. This project enhances hands-on experience with Android components and reinforces software engineering principles like abstraction, code reuse, and separation of concerns. Moreover, the BMI Calculator is developed in a way that it can be extended in the future with additional features such as user profile management, persistent data storage, dark mode support, unit conversion between metric and imperial systems, and health analytics. The ultimate goal is not only to offer a useful health utility to users but also to build a strong foundation for the developer to transition into more complex mobile application projects with confidence and clarity.

1.3 EXISTING SYSTEM

There are numerous BMI calculator applications currently available on digital platforms such as the Google Play Store, many of which are part of broader health and fitness apps. Examples include **Google Fit**, **Samsung Health**, **HealthifyMe**, and standalone apps like **BMI Calculator – Weight Loss Tracker**. These applications often offer a wide range of features beyond basic BMI computation, including calorie tracking, water intake logging, fitness goal setting, diet planning, integration with wearable devices, and synchronization with cloud services. While these apps are helpful for comprehensive health monitoring, they also introduce several drawbacks, particularly when it comes to users who simply wish to calculate their BMI quickly and privately. The majority of these apps require internet access, and many enforce mandatory user registration or sign-in via email, Google account, or social media platforms. This not only adds unnecessary friction to the user experience but also raises concerns about data collection, privacy, and information sharing.

From a learning and development perspective, these existing systems are generally developed with complex architectures that involve multiple layers of frontend, backend, API integration, database storage, real-time updates, and advanced design patterns such as MVVM or Clean Architecture. This makes them extremely difficult to replicate or analyze for beginners or student developers. Additionally, many of these apps are not open source, which limits the ability of learners to study their code or understand the internal workings. These applications are often optimized for commercial use rather than educational clarity. Therefore, despite their technical sophistication and rich feature sets, these apps do not align with the needs of beginner developers or users seeking simplicity. A more focused, minimal, and educationally driven solution is required — one that demonstrates key Android principles while remaining easy to use, accessible offline, and free from unnecessary complexities.

1.4 PROPOSED SYSTEM

To address the limitations of the existing systems and provide a focused, accessible solution, we propose a custom-built Android application named **BMI Calculator**. This app is designed specifically for simplicity, user convenience, and educational value.

CHAPTER 2
RELATED WORKS

The development of the BMI Calculator Android application is based on a comprehensive understanding of existing mobile applications, Android development frameworks, health monitoring techniques, and software architecture principles. In order to design an efficient, lightweight, and educationally meaningful app, a broad literature and technology review was conducted. This survey included exploring existing health and fitness applications, analyzing Android programming concepts, and referring to a wide range of academic and practical development resources. The insights gained from this survey informed both the design and functionality of the BMI Calculator, ensuring that it is both user-friendly and technically sound. Additionally, the literature survey helped determine the boundaries of functionality to avoid feature overload, ensuring that the final product would remain accessible to everyday users.

One of the first areas explored during the project was the landscape of existing applications offering BMI calculation. Several well-known apps were studied, such as Google Fit, HealthifyMe, MyFitnessPal, and the BMI Calculator app by Maple Media. Google Fit provides a full-fledged fitness tracking experience, with BMI calculation integrated as a minor feature. It offers data visualization, syncing with wearables, and continuous tracking. However, its complexity and dependency on user accounts and internet connectivity make it unsuitable for users seeking a quick, offline BMI tool. HealthifyMe, on the other hand, focuses on personalized weight loss and fitness planning. Its BMI calculation feature is more prominent, but it is surrounded by layers of additional services like meal tracking, personal coaching, and subscription models. The BMI Calculator app by Maple Media stands out as a simple, clean, and easy-to-use tool focused solely on BMI calculation. It provided valuable inspiration for user interface layout and the categorization of BMI results into ranges such as underweight, normal, overweight, and obese. However, even this app includes advertisements and requires occasional internet access, which the proposed BMI Calculator project aimed to avoid. From this analysis, it became evident that there was a gap in the market for a fully offline, distraction-free, and educational BMI calculator tailored to beginner developers and users who prefer simplicity.

The next part of the research involved a thorough review of the technologies used to build modern Android applications. Central to this was the Android SDK, which provides all the essential APIs and tools required for mobile development. Using Android Studio as the integrated development environment allowed for efficient code writing, debugging, and UI design. The choice of Kotlin as the primary programming language significantly influenced the structure and readability of the project. Kotlin, being modern, concise, and null-safe, allowed for the creation of cleaner and more reliable code compared to Java. The BMI Calculator application employed fundamental Android components such as Activities, Fragments, and ConstraintLayouts. Activities served as the main screen controllers, while Fragments allowed for modular and reusable UI sections, especially in the input form. The use of ConstraintLayout ensured a responsive and adaptive interface, capable of handling various screen sizes without nested layout issues.

Intents played a key role in enabling communication between different parts of the app. For instance, the BMI result calculated on one screen was passed to the result display screen using Intent extras. This not only demonstrated the proper handling of inter-component communication but also reflected best practices in Android development. Additional elements like EditTexts for user input, Buttons for triggering calculations, and TextViews for displaying results were integrated according to material design guidelines. These components were styled for clarity and ease of use, adhering to Android’s best UI/UX standards. The project also used basic form validation techniques to ensure that inputs for weight and height were positive numbers and not left blank. This prevented application crashes and enhanced the user experience. The user experience was further optimized by keeping the interface minimal, ensuring accessibility to a wide range of users, including those who are not tech-savvy.

In addition to exploring Android components, the project examined various software design patterns and development principles. Object-oriented programming principles were followed rigorously, with the logic for BMI calculation encapsulated in a separate Kotlin class. This modular approach made the application easier to maintain and scale in the future. Concepts such as separation of concerns and reusability were prioritized. UI code, logic, and navigation were distinctly separated, reflecting principles of MVC (Model-View-Controller), which is commonly adapted in Android development. Although the project did not employ advanced architectural components like ViewModel, LiveData, or Room database in its initial version, these were identified as potential enhancements for future versions of the app. These design decisions were guided by the goal of building a robust yet lightweight app, providing students with a scalable project structure that could be reused or extended in other academic or real-world apps.

The literature review also included numerous online educational platforms, open-source codebases, and documentation resources. The official Android Developers website served as the primary reference for understanding the use of Intents, Fragments, layout managers, and activity lifecycle. Kotlin’s official documentation on kotlinlang.org was essential for mastering syntax, understanding null safety, and leveraging data classes. Online learning platforms such as Udemy, YouTube channels like Coding in Flow, and technical blogs from Medium and GeeksforGeeks were instrumental in building foundational knowledge. These platforms provided tutorials on creating forms, handling user input, switching between screens, and applying layout constraints. Stack Overflow was frequently referenced for troubleshooting runtime errors and understanding community-recommended solutions to common issues. The support of these resources ensured that the project was not just a theoretical exercise but a practical application of real-world programming techniques.

Another important element in the research was analyzing the user interface patterns of other utility apps. Even though the BMI Calculator is functionally simple, achieving an elegant and intuitive user interface required studying layout techniques from more complex apps. Observing how professional apps handled spacing, alignment, font sizing, color coding, and interactive elements helped in building an aesthetically pleasing design. Material Design principles were followed to ensure visual consistency, while testing on multiple screen sizes helped optimize the user experience. In particular, the influence of minimalist design trends from modern wellness apps was evident in the final layout and navigation flow. The inclusion of color-coded results for different BMI categories, large input fields, and simple feedback messages made the app both functional and user-friendly.

Furthermore, the review acknowledged the importance of scalability and feature extension in mobile app design. Although the current version of the BMI Calculator offers only basic functionality, the architecture supports several enhancements. These may include storing BMI history locally using SQLite or Room database, integrating Firebase for cloud storage and user authentication, supporting dark mode for accessibility, and implementing notifications for regular health checks. Visualization features such as line graphs or pie charts to show historical BMI trends could also be added using libraries like MPAndroidChart. The project is structured in a way that these features can be incorporated with minimal disruption to the existing codebase. This extensibility makes the app suitable for academic use, individual health tracking, or even integration into larger healthcare management platforms. Furthermore, the integration of speech-to-text for voice-based input or multilingual support could significantly improve accessibility for a broader demographic, especially users with visual impairments or language barriers.

Another consideration for future development, based on literature and comparative research, is the inclusion of AI-powered health suggestions. Leveraging lightweight machine learning models or pre-trained APIs can enable the app to give personalized tips based on a user's BMI history and input patterns. For instance, the app could eventually provide simple dietary suggestions or activity recommendations using Android’s ML Kit or TensorFlow Lite. While this was beyond the scope of the current implementation, the groundwork laid by the modular structure of the app ensures that such features can be added in future versions without architectural overhaul. Additionally, ethical design considerations such as privacy and data security were explored during this review. Any future version of the BMI Calculator that incorporates cloud storage or user data collection would be developed following the guidelines of GDPR and other data protection regulations to maintain user trust and compliance.

Expanding upon ethical and inclusive design, the literature also emphasized the growing need for sustainable and eco-conscious app development practices. While digital applications have minimal physical impact, their design and architecture still influence energy consumption, server load, and battery usage on mobile devices. Lightweight and optimized codebases not only improve performance but also reduce unnecessary processor cycles, contributing to energy efficiency. Therefore, the BMI Calculator’s focus on offline capabilities, local data handling, and limited background processing aligns with environmentally sustainable software practices. In parallel, emphasis was placed on inclusive user experiences, such as adapting font sizes for the visually impaired, supporting regional languages, and designing with accessible color contrasts, ensuring the app remains useful and welcoming to a broader audience. These considerations, though often overlooked, are crucial in building applications that truly serve diverse communities in a responsible and forward-thinking manner.

In conclusion, the literature survey conducted for the BMI Calculator project was extensive and multidimensional. It combined the analysis of real-world applications, study of core Android technologies, understanding of software engineering principles, and exploration of community-driven resources. This thorough background study ensured that the application not only meets user needs with accuracy and simplicity but also serves as a solid educational project for those beginning their journey in Android development. The application represents a thoughtful integration of technical knowledge, user-centric design, and scalable architecture, laying the foundation for future innovation and learning. Through this project, the student developer not only gained experience in coding and debugging but also learned how to research, plan, and execute a real-world software solution from start to finish. This blend of practical skills and theoretical insights makes the BMI Calculator project a complete and impactful learning experience.

CHAPTER 3
SYSTEM DESIGN

3.1 GENERAL

System design plays a crucial role in the development of mobile applications. It defines the architecture, components, modules, user interactions, and data flow that enable the application to function reliably and efficiently. For the BMI Calculator project, the system design focuses on simplicity, usability, modularity, and scalability. The design process emphasizes maintaining a clean separation of concerns between the user interface, logic, and data handling to ensure the application remains easy to maintain and extend in the future.

The system architecture for the BMI Calculator follows a straightforward pattern inspired by the Model-View-Controller (MVC) design paradigm. The app consists of three main layers: the User Interface Layer (View), the Logic and Control Layer (Controller), and the Data Layer (Model). This separation allows each layer to be independently modified or enhanced without affecting the others. The User Interface Layer is built using XML layouts with ConstraintLayout to support responsive and flexible screen designs. The Logic Layer, written in Kotlin, handles the BMI calculation, validation, and activity navigation. The Data Layer involves simple data models to represent user input and result states, which can later be extended to include persistent storage or cloud integration.

3.1.1 ARCHITECTURE DIAGRAM

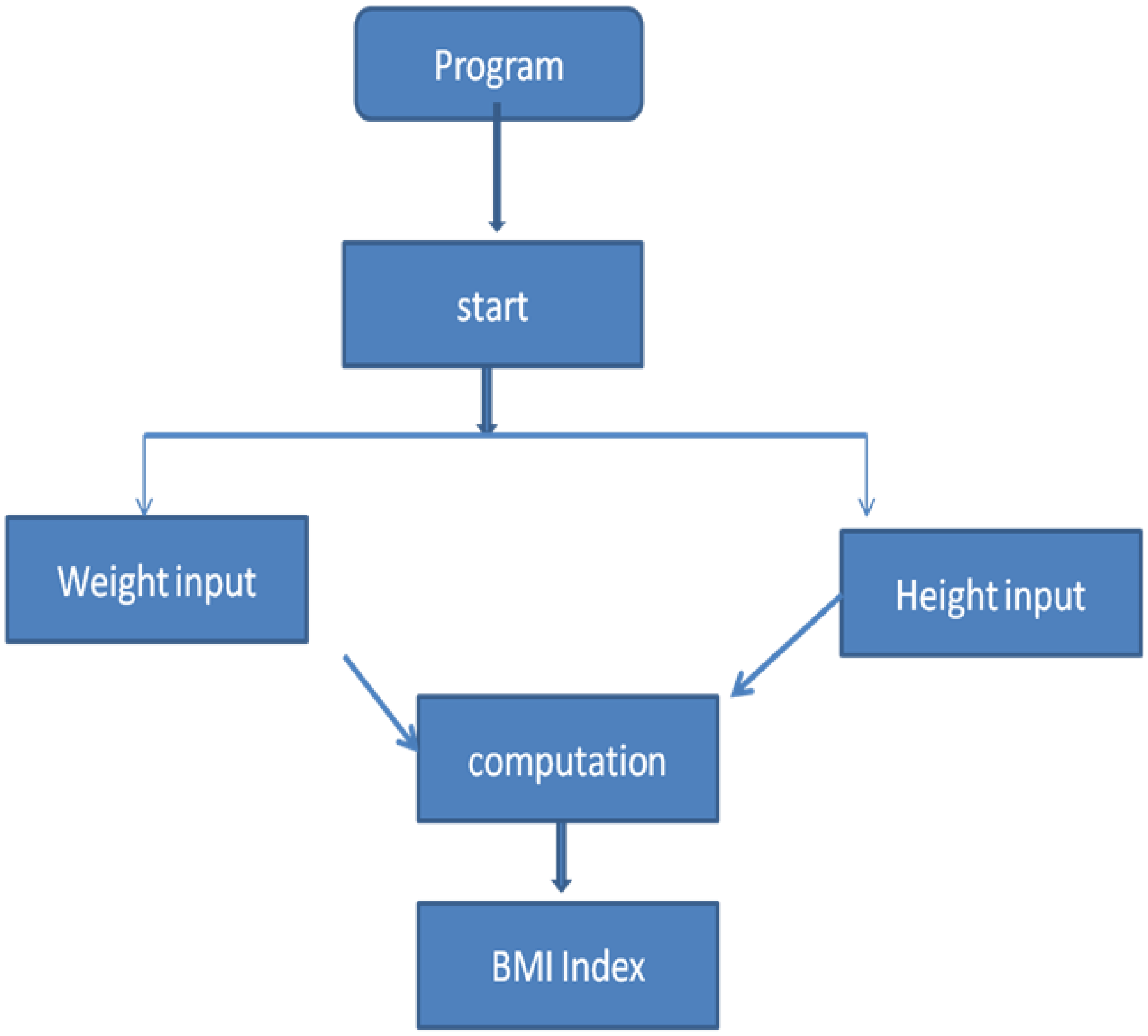


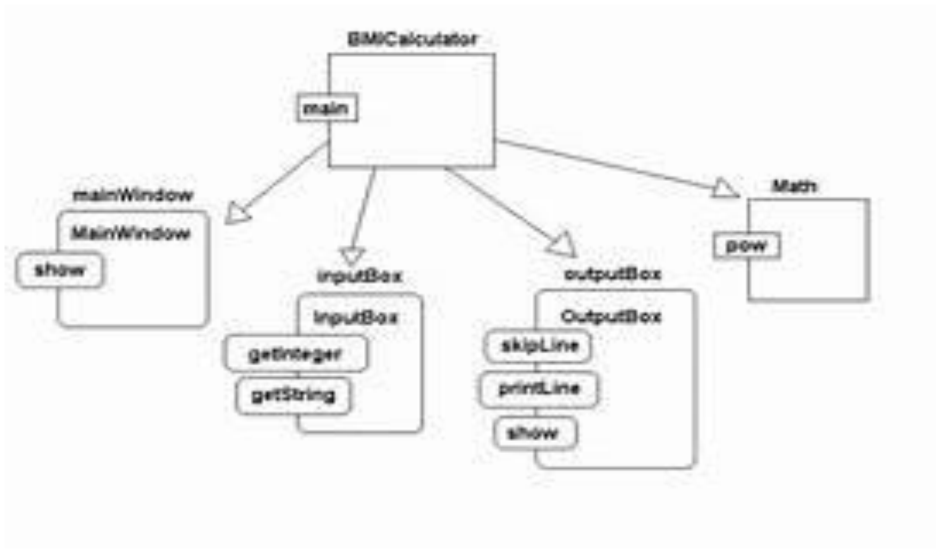
Figure 3.1: Architecture Diagram

The application begins with a main activity that serves as the entry point. Upon launching, users are presented with a clean interface where they can input their height and weight. These inputs are collected using EditText components, which are validated to ensure that users enter appropriate, non-empty, and numerically valid values. Upon pressing the "Calculate" button, the application processes the input data using a BMI calculation function defined in a separate Kotlin class or within the activity logic. This function implements the standard formula: BMI = weight (kg) / [height (m)]^2. The result is categorized into one of several predefined health categories: underweight, normal, overweight, or obese.

Once the BMI and category are determined, the result is passed to another activity using an Intent. The Intent acts as a communication mechanism between the input activity and the result display activity. In the result activity, the calculated BMI value and its category are extracted from the Intent and displayed to the user using TextView components. This approach demonstrates effective use of component interaction and data transfer in Android, reinforcing a core concept of mobile application design.

To improve the user experience, the application includes input validation mechanisms that display error messages if the input fields are empty or contain invalid data. These validations prevent application crashes and guide the user in providing correct data. In addition, the design includes basic styling for UI elements, such as button colors, spacing, text sizing, and color-coded category indicators to help users better understand their BMI status at a glance. The application uses intuitive visual elements and alignment to maintain a clean and minimal design that enhances usability, especially for non-technical users.

3.1.2 USE CASE DIAGRAM



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The architecture also supports future enhancements such as adding a database for storing BMI records, implementing user authentication, and visualizing BMI trends using graphs or charts. These features can be integrated with minimal changes to the current design due to the loosely coupled and modular nature of the architecture. For instance, if Room database is integrated later, the Data Layer can be updated to include persistent storage without modifying the UI or logic layers. Similarly, integrating Firebase for cloud functionality would primarily affect the data storage and user authentication modules, leaving the core logic intact.

A deeper insight into the system can be derived from analyzing a representative class diagram of the BMI Calculator application. The diagram showcases several components working together in a structured manner. At the core of the system is the BMICalculator class, which serves as the main controller. This class initiates the application and orchestrates the interaction among all other modules. It begins by interacting with the MainWindow class, responsible for displaying the initial graphical interface using the show() method. Once the user launches the app, this window becomes the primary space where all user interactions begin. For gathering input such as height and weight, the system relies on the InputBox class, which includes methods like getInteger() to collect numerical data and getString() for string-based entries, possibly used for user prompts or unit selection.

Following data collection, the application proceeds to perform the BMI computation using the Math class, specifically leveraging the pow() method to calculate the square of the user's height, an essential part of the BMI formula. This encapsulation of the math logic ensures code reusability and cleanliness. Once the BMI is calculated, the OutputBox class takes charge of presenting the results to the user. It offers multiple methods: skipLine() to format the output with line spacing, printLine() to display messages such as the BMI value and health category, and show() to render the final output interface. This structured interaction between input, processing, and output components exemplifies a clean and modular design.

What makes this architecture particularly effective is its clear separation of concerns. Each class has a single responsibility, making the system easier to debug, test, and extend. For instance, should there be a need to change how the data is input (e.g., from manual typing to voice recognition), only the InputBox class would need to be updated. Similarly, enhancements to the display or output format would be isolated to the OutputBox class.

3.1.3 ACTIVITY DIAGRAM

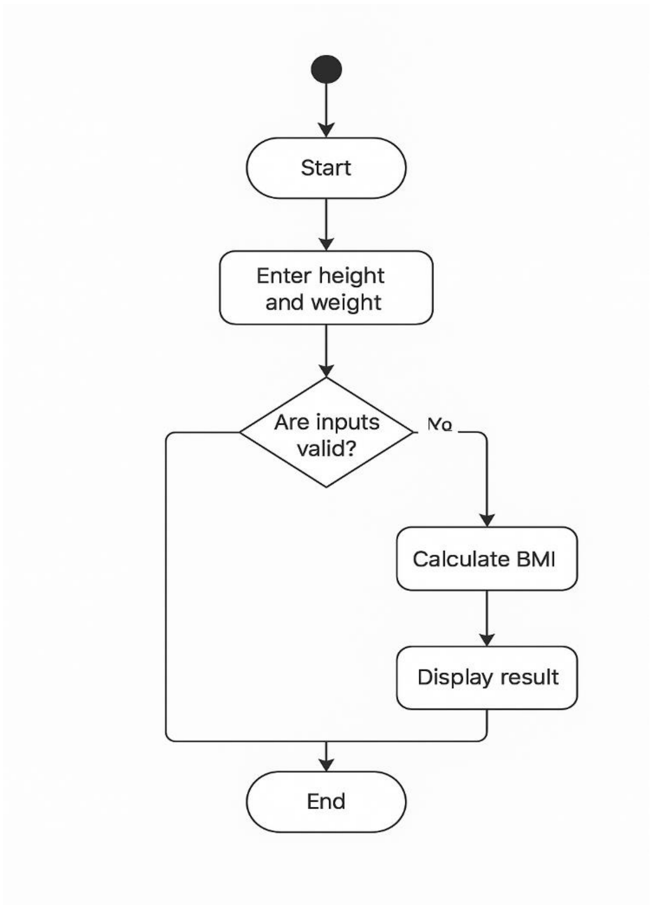

Figure 3.3: Activity Diagram

The activity diagram provides a clear visual representation of the control flow within the BMI Calculator application, showing how the user and system interact step-by-step from launching the application to displaying the final result. It outlines the sequence of operations and the decisions made throughout the process, ensuring a logical and efficient execution path.

The process begins with a **Start** node, indicating the launch of the application. The user is then prompted to **enter their height and weight** using the input form provided in the user interface. These inputs are critical for the BMI calculation and must be correctly entered to proceed. After receiving the inputs, the application reaches a **decision point** where it checks the **validity of the input values**. This includes ensuring that both height and weight are non-zero, positive numerical values, and not left empty.

If the inputs are found to be invalid, the system redirects the user back to the input step, possibly displaying error messages to guide corrections. This loop continues until valid inputs are provided. Once the inputs are validated successfully, the application proceeds to the next activity, which is to **calculate the BMI** using the standard formula: **BMI = weight (kg) / (height in meters × height in meters)**. This computed value is then used to determine the user's health category such as underweight, normal, overweight, or obese.

After the calculation, the system transitions to the **Display Result** step, where the calculated BMI value and the corresponding health message are shown to the user through the result screen. Finally, the process terminates at the **End** node, completing the user flow.

This activity diagram ensures that the user cannot proceed without entering correct values, minimizing errors and enhancing usability. It supports a clean and user-friendly experience while maintaining the logical structure of the application’s core operations.

3.1.4 SEQUENCE DIAGRAM

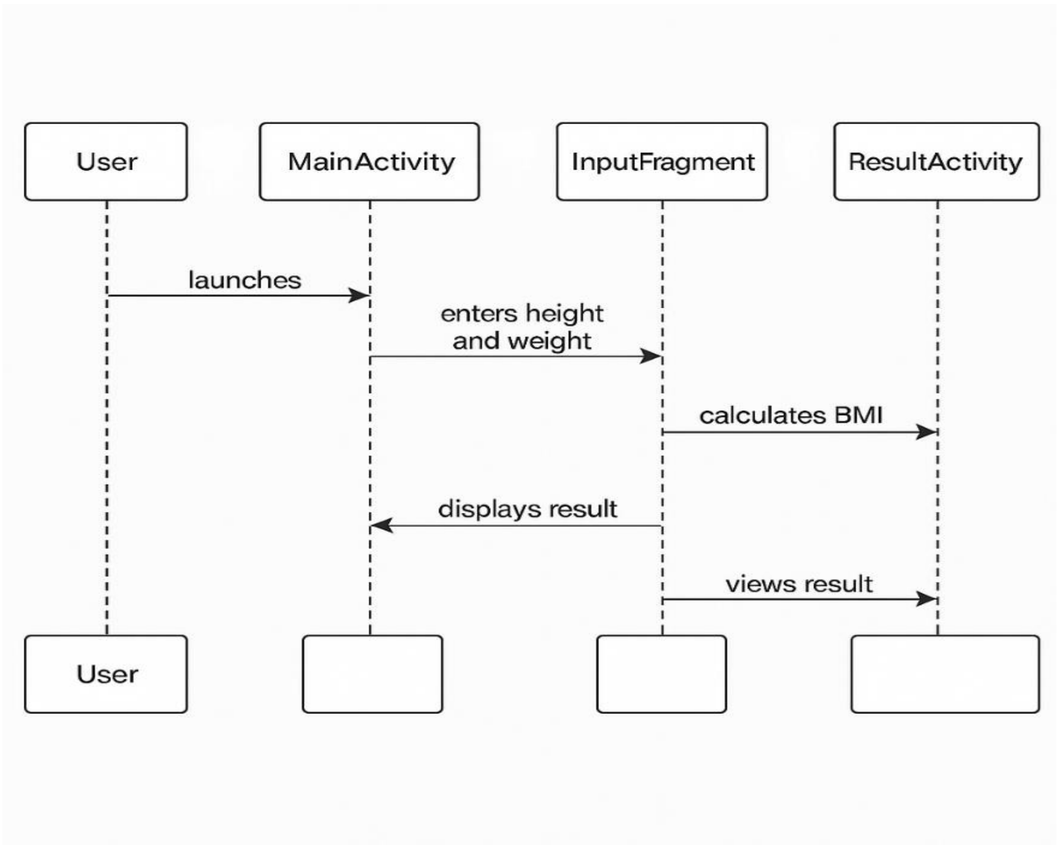

Figure 3.4: Sequence Diagram

The sequence diagram provides a dynamic view of how the components in the BMI Calculator application interact over time to perform the core functionality — calculating and displaying the Body Mass Index based on user input. It focuses on the flow of messages between objects such as the user, activities, and utility classes, thereby illustrating the order in which operations are carried out.

DATA FLOW DIAGRAM.

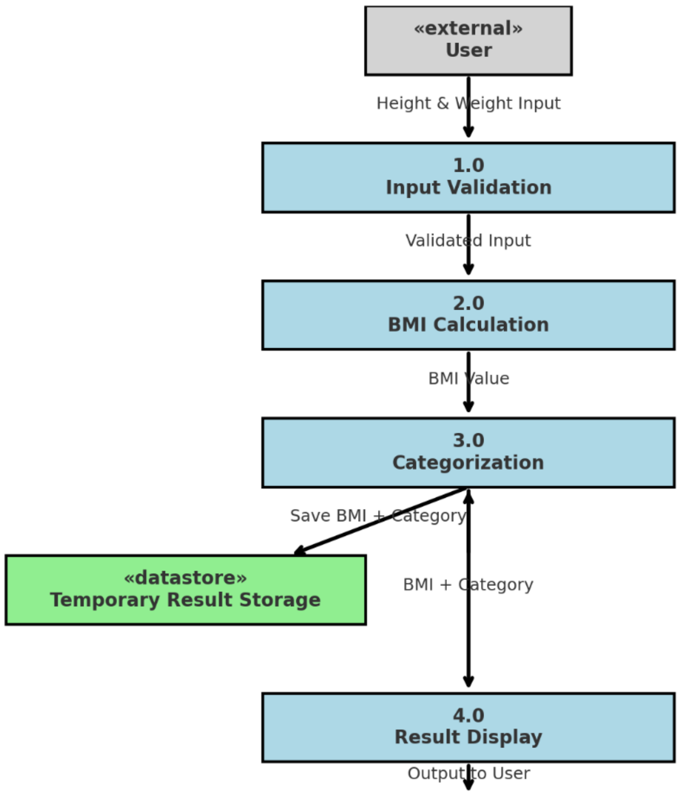

Figure 3.5: Data Flow Diagram

The Data Flow Diagram (DFD) offers a clear and systematic representation of how data moves within the BMI Calculator application. It illustrates the flow of user inputs, internal processing, and the resulting outputs through various processes and data stores. The DFD enhances the understanding of the application's functionality by visualizing the interaction between external entities (users), processes (calculations and validations), and data repositories (temporary storage within memory or variables).

The DFD for the BMI Calculator starts with the **User**, who acts as the external entity providing input data — specifically **height** and **weight**. This input is captured through the application's UI components such as EditText fields within the MainActivity or InputFragment. The data then flows into the **Input Validation Process**, where the app checks whether the entered values are non-empty, numeric, and positive. If the inputs are invalid, the system generates error messages that are immediately sent back to the user for correction via the UI.

Once validated, the clean input data is passed to the **BMI Calculation Process**, where the core logic of the app resides. This process involves computing the BMI using the formula:

BMI = weight (kg) / [height (m)]^2

The computed BMI value is then forwarded to a **Categorization Process**, where it is analyzed and mapped to a predefined health category such as **Underweight**, **Normal**, **Overweight**, or **Obese**. Both the raw BMI value and its corresponding category are temporarily stored in memory variables, representing a simple, non-persistent **Data Store** within the app.

Following this, the processed data flows to the **Result Display Process**, which uses an **Intent** to launch the ResultActivity. The result is extracted from the Intent and shown to the user using UI elements like TextView. At this point, the user can review the result and choose to either exit the application or re-initiate the process by going back to the input screen.

This flow ensures that all data is properly handled, validated, and processed in a linear and secure manner. While the current version uses in-memory variables as the data store, future enhancements could involve integrating a local database (e.g., Room) or cloud storage (e.g., Firebase) for persistent storage, user history tracking, and analytics. The DFD thereby supports both the current lightweight flow and potential expansions for more robust data handling in future iterations of the application.

3.2 SYSTEM REQUIREMENTS

The proposed system requires some software and hardware requirements which helps to develop efficient web-application. These requirements help to use the application in a productive manner to save time and storage.

3.2.1 HARDWARE REQUIREMENTS

The successful development and execution of the BMI Calculator application depend on a set of predefined hardware and software resources. These requirements ensure that the application can be developed, tested, and deployed in an optimal environment. This section outlines the minimum hardware and software specifications necessary for the development process as well as the end-user experience.

The hardware requirements focus on the physical resources needed to run Android Studio, execute the emulator or deploy the app to a physical device, while the software requirements emphasize the development tools, frameworks, and platform versions used to build and test the application.

Table 3.1: Hardware Requirements

COMPONENTS	SPECIFICATION
Processor	Intel Core i3 or AMD Ryzen 3 (Quad-Core)
Memory Size	256 GB (Minimum)
HDD	40 GB (Minimum)
Graphics Processing Unit (GPU)	6 GB GDDR6/5X/5

3.2.2 SOFTWARE REQUIREMENTS

The development and deployment of the BMI Calculator mobile application require a well-configured software environment that supports modern Android development practices. At the core of this environment is the operating system, which can be Windows 10/11, macOS Monterey or newer, or Ubuntu 20.04 LTS and above. These platforms provide stable environments for running development tools such as Android Studio. Android Studio, the official IDE recommended by Google for Android development, is the primary tool used to design, code, build, and test the application. It includes integrated features such as a layout editor, emulator manager, debugger, and Gradle build system, making it a comprehensive solution for mobile app development. The project is written in Kotlin, which is a modern, expressive, and concise programming language fully supported by Android. Kotlin offers advantages such as null safety, type inference, and interoperability with Java, making it ideal for building robust and efficient Android applications. The app targets API Level 33 (Android 13), ensuring compatibility with recent Android devices while utilizing the latest features available in the Android SDK. Gradle, the automated build tool bundled with Android Studio, is used to manage project dependencies, compile source code, and generate the APK. For testing purposes, developers may use either the built-in Android Emulator or a physical Android device connected via USB.

COMPONENTS	**SPECIFICATION**
Operating System	Windows 10/11 (64-bit)
Software	Python (Version 3.9 or higher)
Tools	Google Colaboratory or Anaconda Jupyter Notebook

CHAPTER 4
PROJECT DESCRIPTION

4.1 MODULES

4.1.1 User Interface (UI) Module – XML-based Android Interface

The User Interface Module is the front-facing component of the BMI Calculator app, designed using XML layouts in Android Studio with ConstraintLayout as the base for structure and responsiveness. This module allows users to enter their height and weight through two input fields (`EditText`) and interact with the app using buttons such as “Calculate” and “Reset.” The layout is intentionally minimal and user-friendly, ensuring a smooth experience for all types of users, regardless of their technical background. Once data is entered, the UI sends it to the logic module for processing and then transitions to a result screen where the calculated BMI and its interpretation are displayed. The UI is designed using Material Design principles to ensure consistency, clarity, and accessibility, with clear text, defined margins, color cues for health categories, and easy navigation. The module acts as the main gateway between the user and the app’s backend logic, handling both data input and result display in a coherent and visually intuitive manner.

In addition to handling layout and interaction, this module ensures that users are guided through the BMI calculation process with contextual hints and labels. Input fields contain placeholder hints to help the user understand the expected format (e.g., "Enter height in cm"). The button elements are styled with appropriate feedback behaviors such as ripple animations and state changes to indicate presses.

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4.1.2 BMI Calculation Module-Formula Logic & Categorization

This module is the core computational engine of the BMI Calculator. Once the input data is validated and passed from the UI and validation modules, it is routed to this logic block where the actual BMI is calculated. The calculation uses theglobally recognized formula: **BMI=weight(kg)/[height(m)]^2**.Since the user inputs height in centimeters, the module first converts this value into meters before applying the formula. The result is a floating-point value typically rounded to two decimal places. Once the BMI value is computed, the module classifies the result into a specific health category using standard medical ranges. These categories include Underweight (BMI < 18.5), Normal (18.5–24.9), Overweight (25–29.9), and Obese (30 and above). The logic for these classifications is implemented using simple conditional statements (`if/else`) in Kotlin, making the code clean, readable, and easy to debug.

The categorization result, along with the exact BMI value, is then prepared to be passed via Intent to the result activity. By separating this logic into its own module, the application maintains clarity and flexibility. If future updates require regional or gender-based BMI variations, or support for other units like pounds and inches, this logic can be extended or replaced independently of the UI or result modules. This design ensures the app remains adaptable and prepared for further expansion while keeping its current implementation lightweight and efficient for real-time use.

4.1.3 Result Display Module-Intent based output handling

The result display module is triggered after the BMI and its corresponding category are computed. Using Android’s Intent mechanism, the calculated BMI and health status are passed from the main activity to a new result activity. This new screen is responsible for visually presenting the result to the user in a clean and understandable format. The layout includes a TextView for displaying the numerical BMI result and another TextView for the health classification. To enhance readability and engagement, the health category is color-coded — for instance, blue for underweight, green for normal, orange for overweight, and red for obese — allowing the user to visually identify their status at a glance.

This module also reinforces user engagement by offering options like “Recalculate” or “Back,” allowing the user to return to the input screen to try again with new values. By separating the result display into its own activity, the code adheres to Android's best practice of single-responsibility components and improves navigation flow. This separation also improves user experience, as users can focus on reading and interpreting their result without the clutter of input fields or extra UI elements on the same screen. Overall, this module ensures a meaningful conclusion to the user's journey through the app by presenting the key information in a well-designed and accessible format.

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CHAPTER-5

IMPLEMENTATIONS AND RESULTS

5.1 PERFOMANCE EVALUATION

The performance evaluation of the BMI Calculator app revolves around several key metrics to ensure its effectiveness and usability. First, **user interaction and usability** are crucial aspects to assess. The app's design must be simple and intuitive, allowing users to easily input their height and weight and receive their BMI calculation. Feedback from users is gathered to ensure the app provides a smooth and enjoyable experience. **Accuracy** is the most vital factor, as the app's primary function is to calculate the BMI correctly. This is verified by comparing the app's calculations against known correct values to confirm precision. The app's **UI responsiveness** is tested to ensure that it adapts seamlessly to various screen sizes and orientations, providing a consistent experience across different devices. In addition, **app stability** is assessed through extensive testing to ensure that the app runs smoothly without crashes or errors during normal usage. **Performance metrics** such as app launch time, memory usage, and response time for user inputs are closely monitored to ensure that the app operates efficiently on a variety of devices, from low-end to high-end smartphones. Finally, **user feedback** is gathered from a small test group to gain insights into the app's usability and design. This feedback is crucial for understanding user satisfaction with the BMI interpretation and the overall design.

CHAPTER-6

CONCLUSION AND FUTURE WORK

6.1 CONCLUSION

The BMI Calculator app effectively fulfills its purpose of providing an easy-to-use tool for users to calculate their Body Mass Index. By incorporating a simple yet functional design, the app enables users to input their height and weight, calculate their BMI, and receive an interpretation of the results based on standard BMI categories. The app's interface is clean and intuitive, ensuring users can navigate through the process effortlessly. In terms of accuracy, the app delivers reliable results, consistently calculating BMI values that align with standard formulas. This reinforces the app's role as a trusted tool for individuals looking to monitor their health. Overall, the app's development reflects a balance between simplicity, functionality, and user-friendliness, which is essential for engaging users and enhancing their experience. The inclusion of clear BMI classifications adds value by offering meaningful interpretations that help users understand their health status. The project successfully demonstrates how mobile applications can be used to deliver vital health-related information in an accessible and user-friendly format.

6.2 FUTURE WORK

While the current version of the BMI Calculator app provides a solid foundation, there is considerable potential for future improvements and enhancements.

One significant area of development is the **integration of additional health metrics**. For example, adding features like body fat percentage or waist-tohip ratio calculations could offer users a more comprehensive view of their health. Furthermore, the app could incorporate a **user profile system** where individuals can track their BMI history over time, set health goals, and monitor their progress with personalized insights.

Another important addition would be the incorporation of **diet and fitness recommendations** based on the user's BMI. By integrating APIs that provide dietary plans or workout routines tailored to different BMI categories, the app could evolve into a more holistic health tool. Moreover, the app could benefit from **multi-language support** to cater to a wider, global audience, improving its accessibility for users who speak different languages.

For improved usability, **voice input functionality** could be added, enabling users to speak their height and weight instead of manually entering the data. This feature would make the app more accessible, particularly for individuals with disabilities or those who prefer hands-free interaction. Additionally, **advanced data visualization** could be implemented to provide users with visual representations of their BMI history and trends, offering a clearer understanding of their health journey.

Finally, expanding the app’s functionality to include **integration with wearable devices** like fitness trackers and smartwatches would allow users to sync their data, further personalizing the experience. These enhancements could turn the BMI Calculator app into a comprehensive, all-in-one health tracking tool.

SOURCE CODE

```
package com.example.bmicalculator

import android.os.Bundle
import android.widget.*
import androidx.appcompat.app.AppCompatActivity

class MainActivity : AppCompatActivity() {

    private lateinit var etWeight: EditText
    private lateinit var etHeight: EditText
    private lateinit var btnCalculate: Button
    private lateinit var tvResult: TextView

    override fun onCreate(savedInstanceState: Bundle?)
{
        super.onCreate(savedInstanceState)
        setContentView(R.layout.activity_main)

        // Bind views
        etWeight = findViewById(R.id.etWeight)
        etHeight = findViewById(R.id.etHeight)
        btnCalculate = findViewById(R.id.btnCalculate)
        tvResult = findViewById(R.id.tvResult)

        // Set button click listener
        btnCalculate.setOnClickListener {
            val weightStr = etWeight.text.toString()
            val heightStr = etHeight.text.toString()

            if (weightStr.isEmpty() || heightStr.isEmpty()) {
                Toast.makeText(this, "Please enter both
height and weight", Toast.LENGTH_SHORT).show()
```

```
                return@setOnClickListener
            }

            try {
                val weight = weightStr.toFloat()
                val heightInCm = heightStr.toFloat()
                val heightInMeter = heightInCm / 100

                val bmi = weight / (heightInMeter *
    heightInMeter)
                val category = when {
                    bmi < 18.5 -> "Underweight"
                    bmi < 24.9 -> "Normal weight"
                    bmi < 29.9 -> "Overweight"
                    else -> "Obese"
                }

                val result = "BMI: %.2f\nCategory:
    %s".format(bmi, category)
                tvResult.text = result
            } catch (e: NumberFormatException) {
                Toast.makeText(this, "Invalid input",
    Toast.LENGTH_SHORT).show()
            }
        }
    }
}
```

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