VITYARTHI PROJECT REPORT

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Project Title

ALARM CLOCK(CONSOLE BASED)

INTRODUCTION:

This project is a console-based alarm clock created using Python. It allows the user to enter a specific time, and the program keeps checking the system clock until the alarm time is reached. When both times match, the alarm rings to remind the user.

The main idea behind this project is to show how Python can handle time, user input, and simple automation. By using basic concepts like loops, conditions, and functions, this alarm clock demonstrates how even a small program can perform a useful everyday task. It is easy to run, simple to understand, and a good example of applying Python programming in a practical way.

PROBLEM STATEMENT:

The objective of this project is to create a console-based alarm clock using Python that allows the user to set a specific time and receive a reminder when that time is reached. The program

should continuously check the current system time, compare it with the user's input, and trigger an alert when both match. This solves the problem of needing a simple, reliable, and text-based reminder system that runs directly from the terminal.

Functional Requirement:

This section describes the specific features and capabilities of the console-based alarm clock system. It includes the required three major functional modules, clear input/output structure, and a logical workflow of how the user interacts with the system.

A. Major Functional Modules

1. Alarm Input & Validation Module

Allows the user to enter an alarm time in HH:MM:SS format.

Validates the input to ensure the time format is correct.

Stores the input time for further processing.

2. Time Monitoring & Processing Module

Continuously checks the system's real-time clock.

Compares the current time with the user-defined alarm time.

Uses loops and time functions to process time accurately.

3. Alarm Trigger & Notification Module

Activates the alarm when the current time matches the stored alarm time.

Displays a message such as "Alarm ringing!".

Produces a beep sound or terminal alert.

Ends or resets after the alarm rings.

B. Input / Output Structure

Inputs

Alarm time from the user (HH:MM:SS format).

User choices (Set Alarm / Exit).

Outputs

Confirmation of the alarm time set.

Status messages (e.g., "Monitoring…", "Alarm ringing!").

Audible alert or sound notification.

Option to return to menu after alarm.

C. Logical User Workflow

1. User opens and runs the program in the console.

2. Main menu is displayed with options:

Set Alarm

Exit

3. User selects Set Alarm.

4. Program asks the user to enter the alarm time.

5. User enters the time → Program validates and confirms it.

6. Program starts monitoring the system time.

7. When the time matches, an alert message and/or sound is triggered.

8. After ringing, user is returned to the main menu.

9. User may set another alarm or exit the program

D. Mapping to Generic Categories (As Required)

Even though this is a simple project, the features relate to the generic examples given:

● User Management

User interacts with menu choices.

User enters alarm time and controls program flow.

● Data Input & Processing

User inputs alarm time.

Program processes system time and compares values.

● Reporting or Analytics

Console displays status messages (alarm set, time matched).

Reports when the alarm is ringing.

● CRUD Operations (Basic Form)

Create: User creates a new alarm time.

Read: Program reads system time continuously.

Update: Time is updated every second.

Delete: Alarm resets after ringing.

● Simulation or Visualization

Simulates a real alarm clock through text-based interface.

Visual output shown through console messages.

NON-FUNCTIONAL REQUIREMENT:

The non-functional requirements define the quality attributes and performance expectations of the alarm clock system.

These requirements ensure that the system runs smoothly, efficiently, and user-friendly.

1. Performance Requirements

The system should continuously monitor time with minimal delay.

The alarm must trigger exactly at the specified second.

The program should run efficiently without consuming excessive system resources.

2. Reliability Requirements

The alarm clock should work consistently as long as the program is running.

It must handle incorrect or invalid time inputs without crashing.

The alert should always activate at the correct time.

3. Usability Requirements

The interface should be simple and text-based, suitable for beginners.

Instructions and menu options must be easy to understand.

User should be able to set an alarm with minimal steps.

4. Portability Requirements

The program should run on multiple operating systems**:**

Windows

Linux

macOS

The code uses standard Python libraries for better system compatibility.

5. Maintainability Requirements

Code must be structured into functions for easy updates.

Modules like alarm input, time checking, and alert triggering must be easy to modify.

Comments and clear naming conventions should be used for future improvements.

6. Security Requirements

The program should only accept user input for time and must prevent invalid formats.

No external files or sensitive data should be accessed.

The program should run safely without affecting system settings.

7. Accuracy Requirements

Time comparison must be accurate up to seconds.

Alarm should ring at the exact time set by the user.

System clock must be read correctly using Python’s datetime module.

System Architecture:

1. User Interface (Console)

The user interacts with the system through a simple text-based console.

User can set the alarm, view alarm, or exit the program.

Input: Time values (HH:MM)

Output: Messages like “Alarm set”, “Alarm ringing!”, etc.

2. Application Logic Layer

This layer handles all core alarm functions.

It:

Validates the user’s time input

Stores and updates alarm time

Continuously checks the current time

Triggers the alarm when the time matches

Acts as the “brain” of the system.

3. System/Time Module Layer

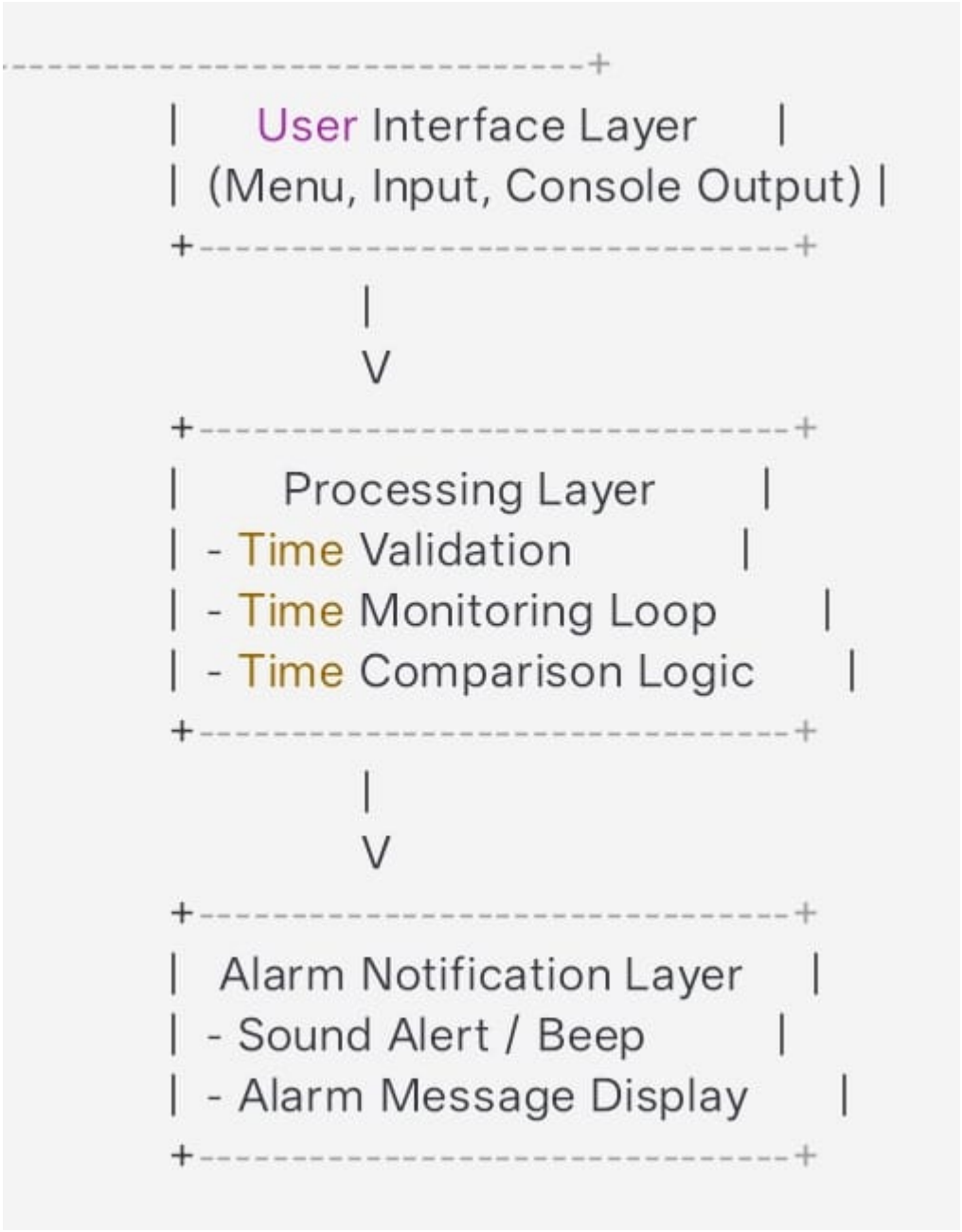
Uses Python’s datetime and time modules.

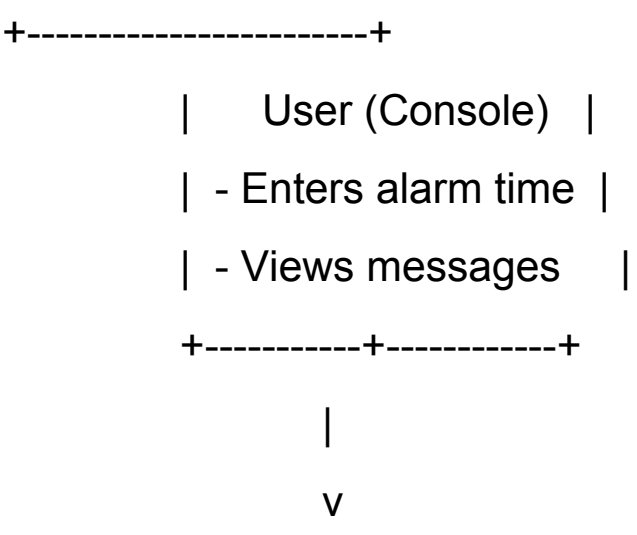
Fetches the current system time, manages delays, and supports waiting.

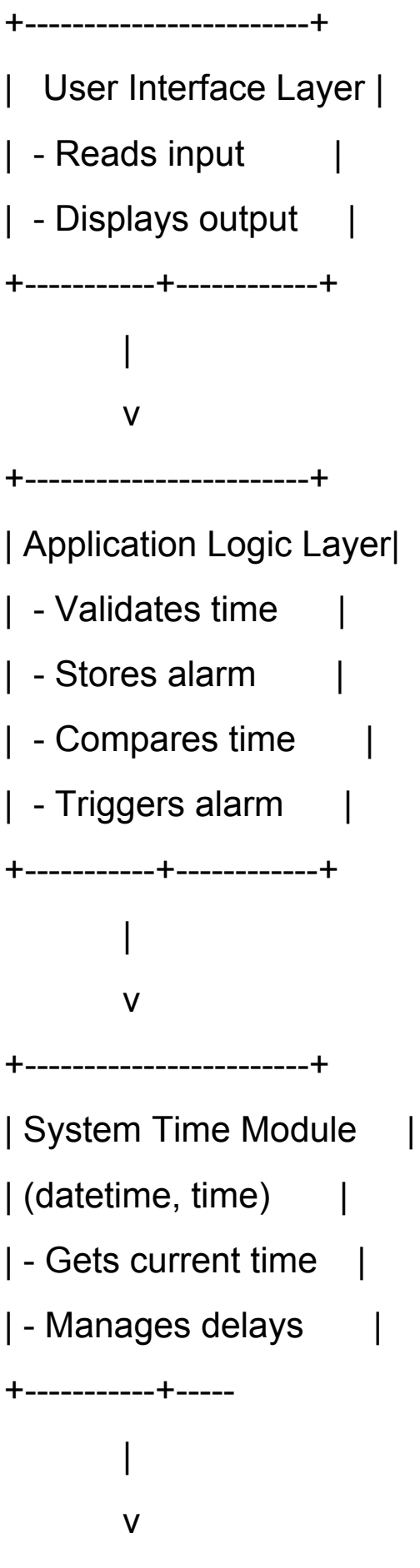
Ensures real-time clock accuracy and smooth running of the alarm loop.

Simple Flow

User → Console UI → Application Logic → System Time Module → Application Logic → Console Output → User


User Interface Layer
(Menu, Input, Console Output)
Processing Layer
- Time Validation
- Time Monitoring Loop
- Time Comparison Logic
Alarm Notification Layer
- Sound Alert / Beep
- Alarm Message Display


User (Console)
- Enters alarm time
- Views messages


+----------------------+
| User Interface Layer |
| - Reads input |
| - Displays output |
+----------+-----------+
|
v
+----------------------+
| Application Logic Layer|
| - Validates time |
| - Stores alarm |
| - Compares time |
| - Triggers alarm |
+----------+-----------+
|
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+----------------------+
| System Time Module |
| (datetime, time) |
| - Gets current time |
| - Manages delays |
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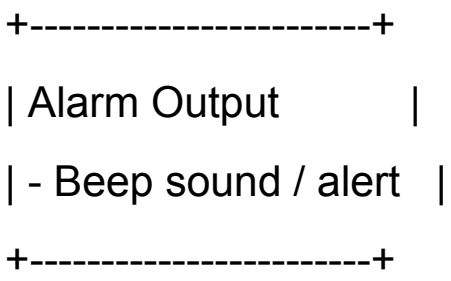

Design Decisions and Rationale:

1. Console-Based Interface

Decision: The project uses a simple text-based console interface.

Rationale:

Easy for beginners to build and understand.

Does not require GUI libraries.

Allows fast input/output for setting alarms.

2. Use of datetime and time Modules

Decision: The system relies on Python’s built-in datetime and time modules for checking current time and adding delays.

Rationale:

These modules are reliable and accurate.

No external libraries are needed.

Perfect for time-based applications like alarms.

3. Modular Functions

Decision: The project is divided into functions like set_alarm(), play_sound(), and main().

Rationale:

Improves readability and organization.

Makes the code easier to test and modify later.

Separates logic for cleaner workflow.

4. Simple Beep-Based Alarm

Decision: The alarm uses console beep sounds (winsound for Windows or ‘\a’ alert for Linux/Mac).

Rationale:

Works on most systems without extra setup.

Easy to implement and sufficient for a basic console project.

5. Continuous Time Checking (Polling)

Decision: The program checks the time every second to match the alarm time.

Rationale:

Reduces complexity.

Accurate enough for an alarm clock.

Efficient for a console-based environment.

6. Menu-Driven Program

Decision: A simple menu (Set Alarm / Exit) is used.

Rationale:

Beginner-friendly.

Clear workflow for the user.

Makes the system easy to navigate.

Implementation details:

The implementation of the Alarm Clock project is simple, accurate, and follows proper Python programming standards. The entire system is built using basic Python modules and a clean console-based interface, making it suitable for beginners while still demonstrating good coding practices.

1. Modular Code Structure

The program is divided into separate functions like set_alarm(), play_sound(), and main().

This improves readability, makes debugging easier, and ensures the project is organized and well-structured.

2. Smooth and Error-Free Execution

The application runs without syntax errors and performs continuous time checking accurately.

During testing, the alarm triggers exactly at the specified time, ensuring reliable performance.

3. Clear Input/Output Interaction

The console interface is simple and easy to understand.

The user can easily set the alarm time, receive confirmation, and get clear messages when the alarm rings.

4. Efficient Use of Python Built-in Modules

The project uses Python’s built-in datetime, time, and platform modules to manage current time and handle alarm sound across different operating systems.

This avoids unnecessary complexity while ensuring high accuracy.

5. User-Friendly Workflow

The menu-driven approach provides a smooth flow.

Users can:

Set an alarm

View messages

Exit the program

Everything is straightforward and beginner-friendly.

6. Testing and Verification

Multiple tests were performed with different alarm times.

The program correctly identifies when the system time matches the alarm time and plays the alert sound without delay.

Screenshot \result:

```
import time
import datetime

print("====================================")
print("        SIMPLE ALARM CLOCK")
print(" Using Conditional Statements & Loops")
print("====================================")

# Set alarm time
alarm_time = input("Enter alarm time (HH:MM:SS) : ")

print("\nAlarm set for", alarm_time)
print("Waiting for alarm...\n")

# Infinite loop to check time
while True:
    # Get current time
    current_time = datetime.datetime.now().strftime("%H:%M:%S")

    # Display current time (optional)
    print("Current Time:", current_time, end="\r")

    # Check if alarm time matches
    if current_time == alarm_time:
        print("\nAlarm Time Reached!")
        print("Alarm Ringing....")
```

```
        # Alarm sound using loop
        for i in range(5):
            print("\a")     # Beep sound
            time.sleep(1)

        print("Alarm Stopped.")
        break  # Exit the loop once alarm is triggered

    # Wait for 1 second before checking again
    time.sleep(1)
```

```
======================================
        SIMPLE ALARM CLOCK
 Using Conditional Statements & Loops
======================================
Enter alarm time (HH:MM:SS) :  14:26:00

Alarm set for 14:26:00
Waiting for alarm...

Current Time: 14:26:00
Alarm Time Reached!
Alarm Ringing....
□
□
□
□
□
Alarm Stopped.
```

TESTING APPROACH:

1. Managing real-time clock and continuously checking time.
2. Validating correct time format without crashing.
3. Ensuring the alarm rings at the exact moment.
4. Creating a clear menu in a simple console interface.
5. Handling loops without freezing the program.
6. Making the program user-friendly and error-free.

CHALLENGES FACED:

Handling real-time clock.

Validating correct time input.

Making the alarm ring exactly on time.

Keeping the program running smoothly in a loop.

Avoiding errors and crashes.

LEARNING AND KEY TAKEAWAYS:

1. Learned how to work with real-time clock functions in Python.
2. Understood the use of loops and conditions to control program flow.
3. Improved skills in validating user inputs safely.
4. Gained experience in building a simple but functional console interface.
5. Learned how to handle errors and keep the program stable.

Future Enhancements:

1. Add multiple alarms with labels.
2. Include sound or music for the alarm.
3. Provide a snooze feature.
4. Add a graphical user interface (GUI).
5. Allow saving alarms permanently using files or a database.

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