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Matric: 19/ENG06/069

Department: Mechanical Engineering

Course: ENG 224

Online Assignment.

1. Conceptualization: An application software to automate the irrigation system of the ABUAD farm, Ado-Ekiti by monitoring the temperature of the soil, determining its moisture content, setting up a timed irrigation plan, notifying its administrators of water shortages, and being user exclusive (password protected).

b.) Specification:

- Application name: Smart Irrigation.
- Specified user access due to password protection.
- Daily reports on temperature of the soil and its moisture content.
- Set-up of a time interval for release of water into the soil.
- Use of an alarm system to draw the attention of the administrator to low water levels in the tanks used for water storage.
- Smart feedback to enable the administrator to understand the status of the soil, using notifications made available on a specified time interval.

c.) Design: The application is designed using a user friendly interface, such that information is easily accessible and all commands and feedback can be immediate and can be accessed remotely, such that the administrator can interact with the system while working from home or any other location and still receive virtual simulations of processes being carried out by the system on the farm and control the usage of resources based on the needs of the management.

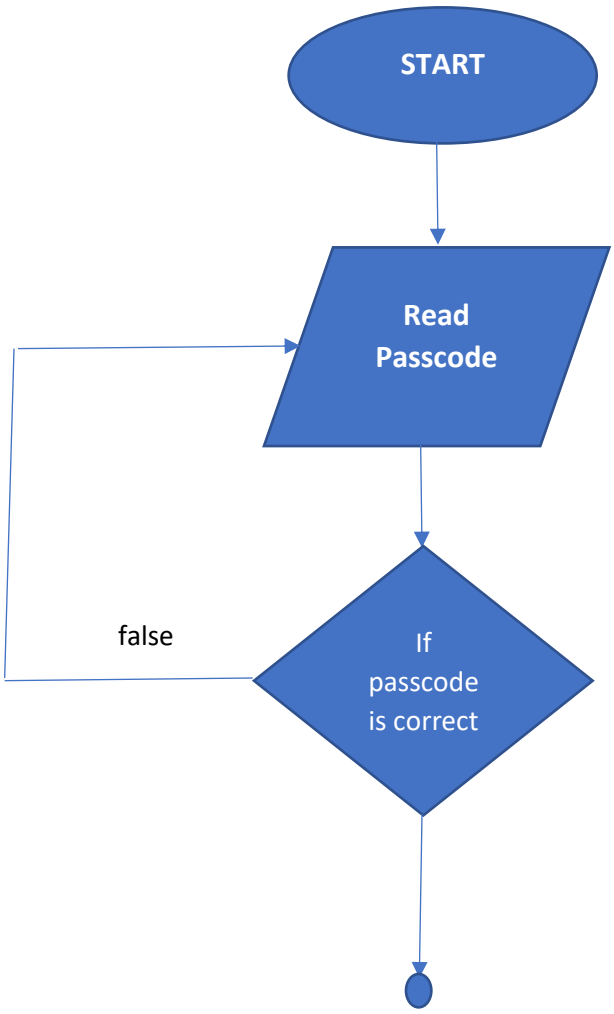
d.) Implementation: The codes for the "Smart Irrigation" application are written and compiled using C# and Python programming languages, for ease of creation and maximum efficiency as well. When implemented following the specified design instructions, the application is expected to run smoothly.

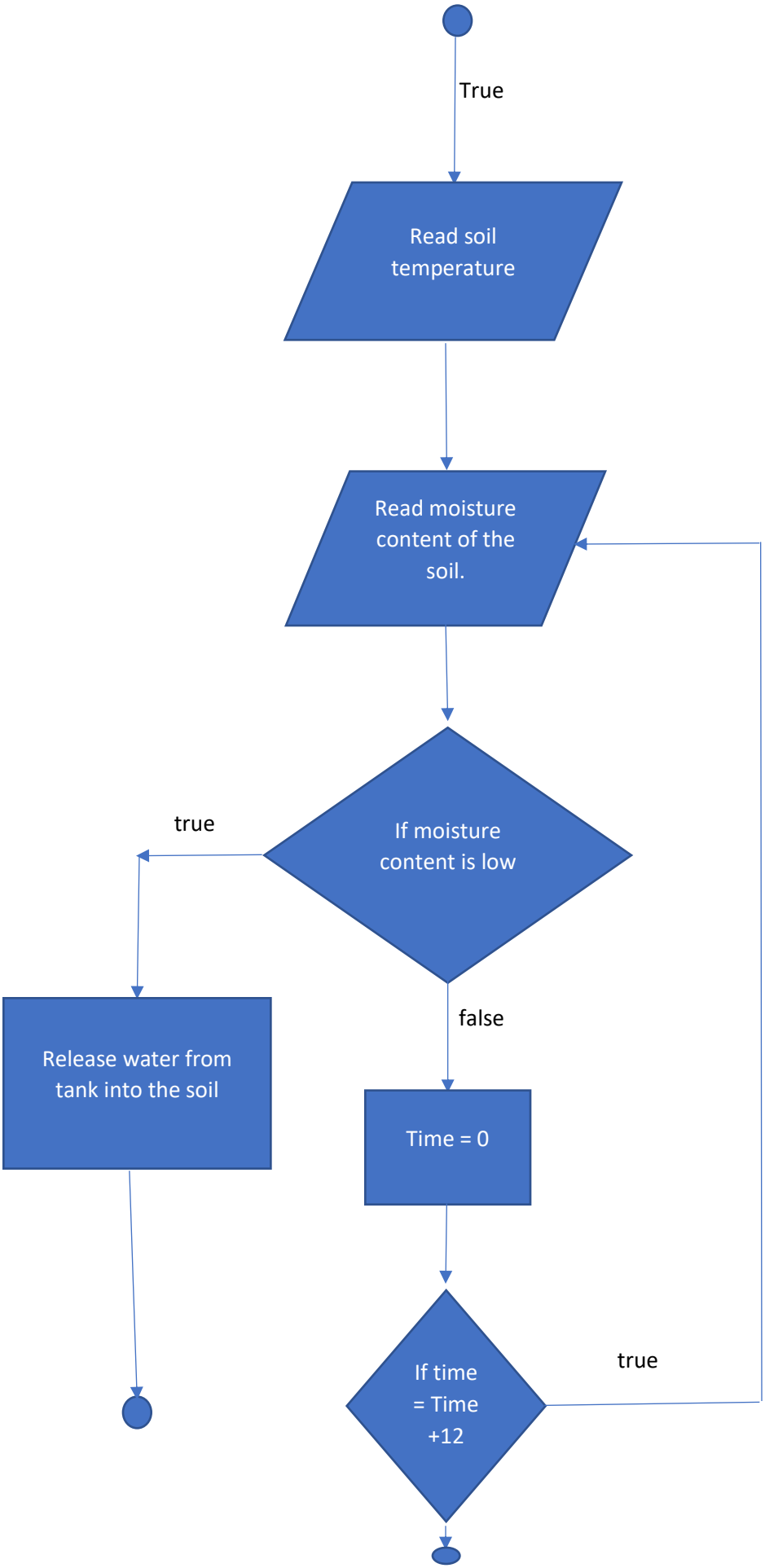
e.) Testing and Debugging: The application is tested using a virtual miniature prototype of the ABUAD farm, to see how effective or feasible the software is to the system, and also to check compatibility and smooth running of the application. The codes are also modified where errors are found, either in areas of functionality or ease of access.

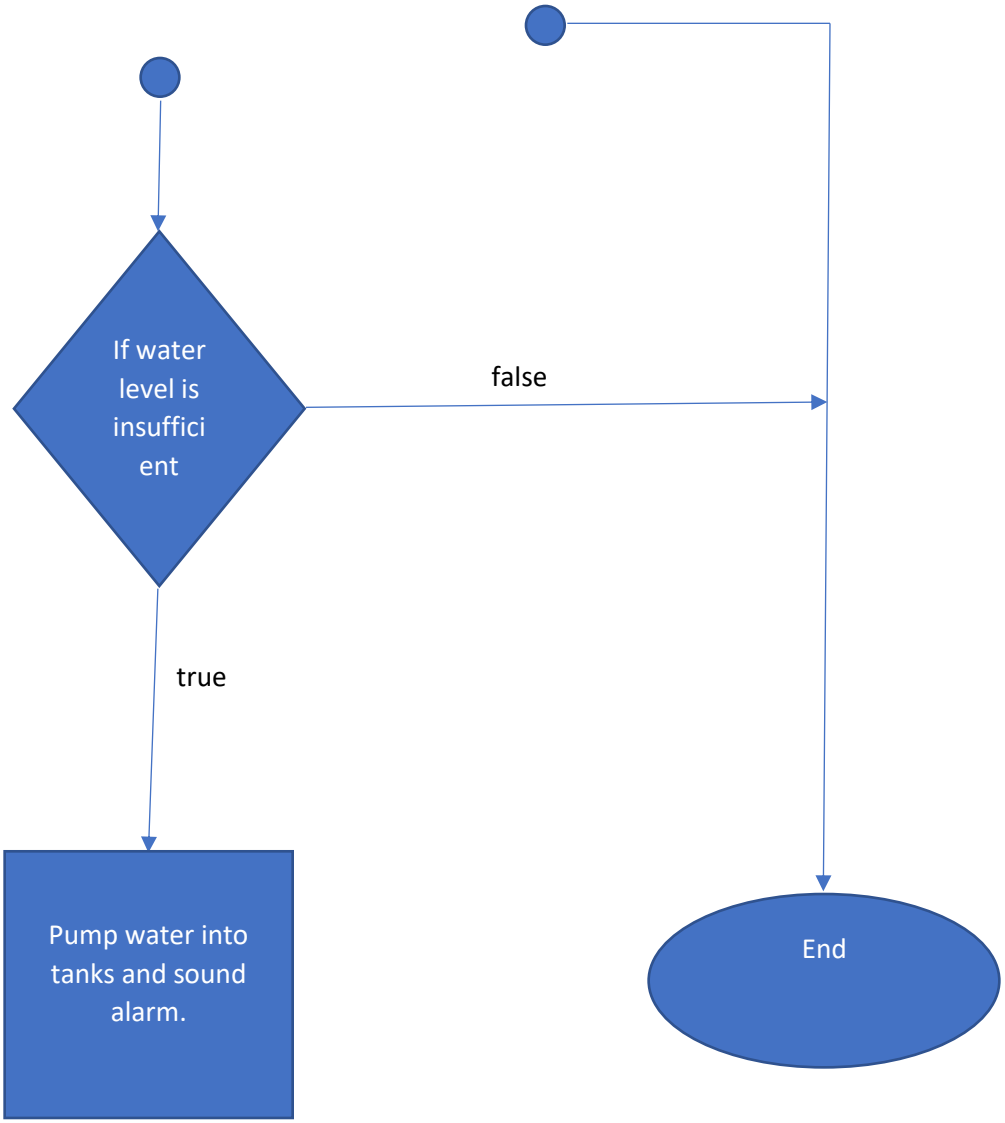
f.) Release and Update: After passing the various tests conducted on the system to see its efficiency and compatibility, the application is released and is bi-annually tested and improvements made in form of updates that are installed as the work progresses.

2. Hardware and Software features:
   a.) The main hardware features of the application are the desktops, phones or other communication devices on which it can be used. Other hardware features (considering the system as a whole) include; the underground pipes which release water in the soil, the sensors embedded in the roots of the plants and the farm surrounding to detect moisture content, and the tanks which are used to store water for the irrigation of the soil.
   b.) The software components include; the mode of security through which the application can be accessed, the virtual alarm system which would emit large sound waves at the farm site and urgent notifications on the control devices on which the application is installed, and the memory units of the device accessed by the application to store relevant irrigation data for analysis purposes.

3. Flowchart.




True
Read soil temperature
Read moisture content of the soil.
If moisture content is low
true
false
Release water from tank into the soil
Time = 0
If time = Time +12
true



Algorithms.

Start

Read passcode

If passcode = 22134

Read soil temperature

Else

Read passcode

Read Soil moisture content

If Soil moisture content < 20

    Release water into soil

Else if water level insufficient

    Pump water into tanks and Sound alarm

Else

    Read Time = 0

If Time = Time + 12

   Release water into soil

Else

    End.

4. **Top-Down Design approach:**