Arduino based Real Time Clock with Alarm

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1. **Introduction to the concept:**

- In this project, an Arduino based Real Time Clock with alarm is designed.
- A Real Time Clock or RTC is a battery powered clock that measures time even when there is no external power, or the microcontroller is reprogrammed. An RTC displays a clock and calendar with all timekeeping functions.
- The battery, which is connected to the RTC is a separate one and is not related or connected to the main power supply. When the power is restored, RTC displays the real time irrespective of the duration for which the power is off.
- Such Real Time Clocks are commonly found in computers and are often referred to as just CMOS (Complementary Metal Oxide Semiconductor).

2. **Need of concept:**

★ Most microcontrollers and microprocessors have built in timers for keeping time. But they work only when the microcontroller is connected to the power supply.
★ When the power is turned on, the internal timers reset to 0. Hence, a separate RTC chip is included in applications like data loggers for example, which does not reset to 0 when the power is turned off or reset.
★ Real Time Clocks are often useful in data logging applications, time stamps, alarms, timers, clock builds etc.
★ In this project, a Real Time Clock, which displays accurate time and date along with an alarm feature is designed.

3. **Design methodology:**

1) Purpose and Requirements Specification –

❖ Purpose: This Arduino based Real time clock is a digital clock to display real time. Real time clock means it runs even after power failure.

- ❖ Behavior: The alarm can then be set for any desired time with the help of push buttons.

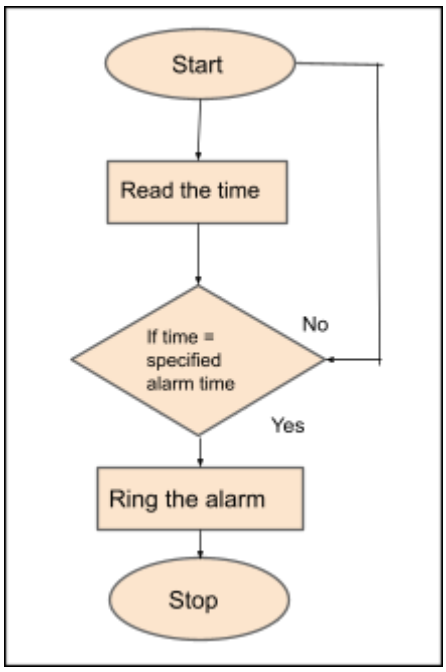
- ❖ System Management Requirement: No remote monitoring and control access, only available locally.

- ❖ Data Analysis Requirement: Nothing to analyse.

- ❖ Application Deployment Requirement: Application is deployed locally.

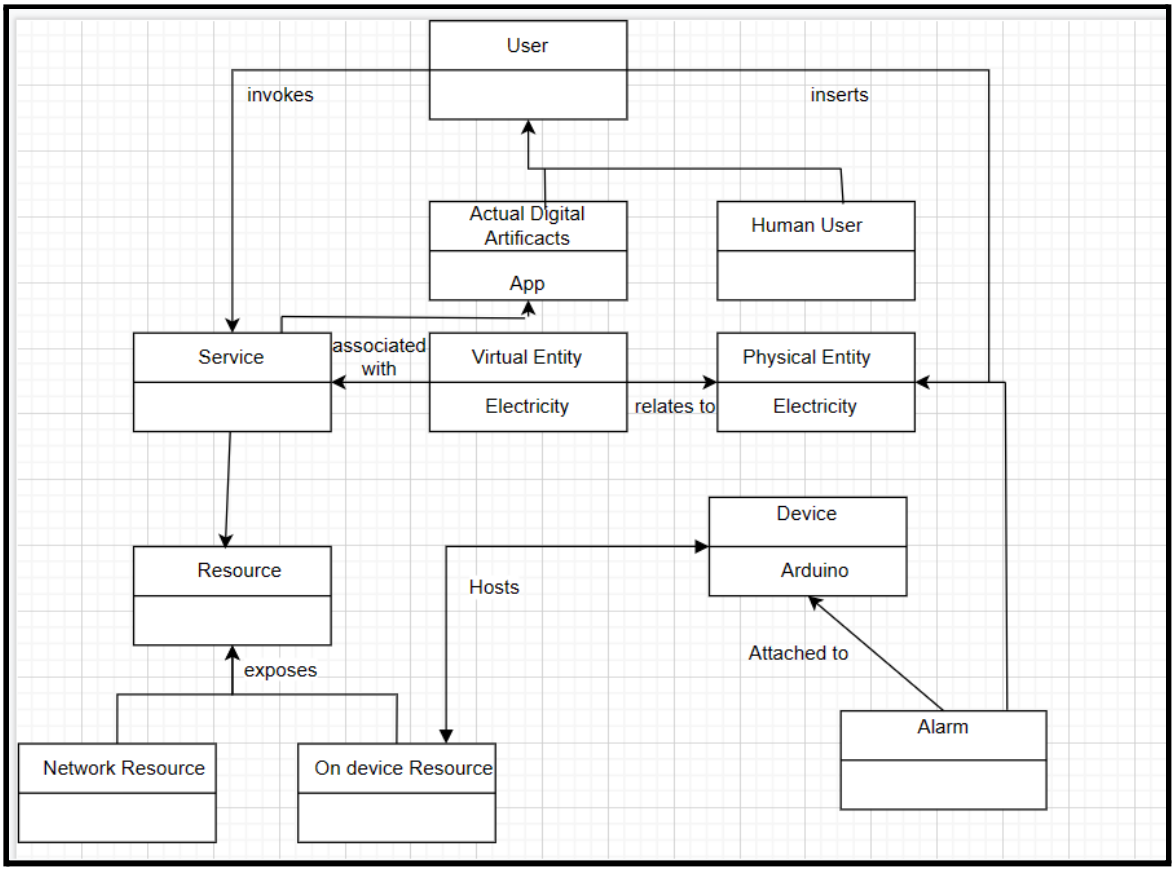
2) Process specifications –

- Here Arduino is used for reading time from and displayed on a LCD.
- IC sends time/date using 2 lines to Arduino.
- A buzzer is also used for alarm indication, which beeps when the alarm is activated.
- A block diagram is shown below to understand the working of this Real-Time Clock.



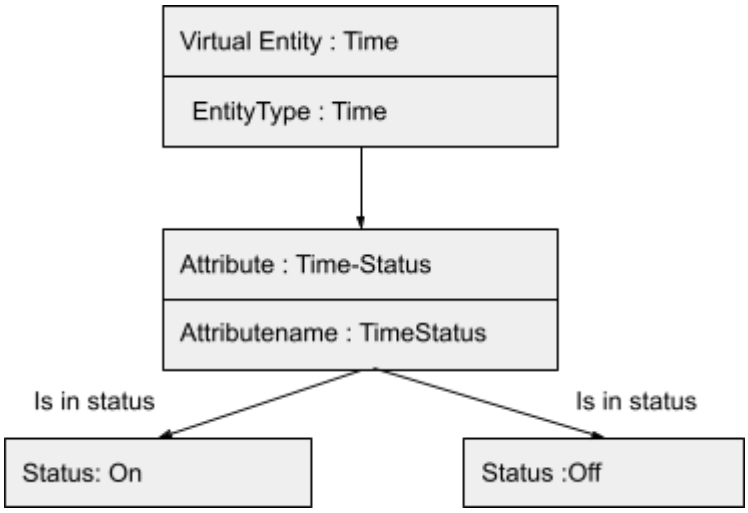
3) Domain model Specification –

- Physical Entity - Electricity
- Virtual Entity - Electricity
- Devices - Alarm, Arduino
- Resources - Software components on device
- Services:
    - Service that reads the time and displays it
    - Service that rings the alarm at the correct time



4) <u>Information Model Specification</u> –

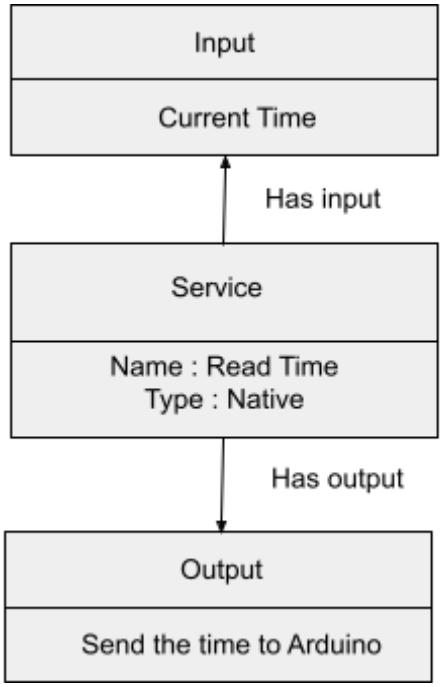
- This model adds more details to virtual entities by defining their attributes and relations.
- In this case there is 1 virtual entity - electricity



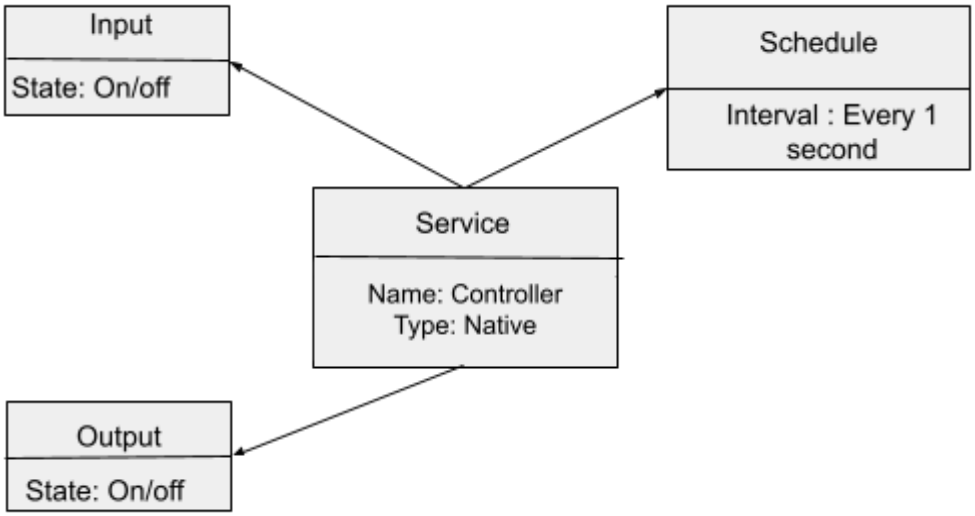
5) Service Specification –

- The clock should run even after power failure.
- The alarm should ring for the desired time.

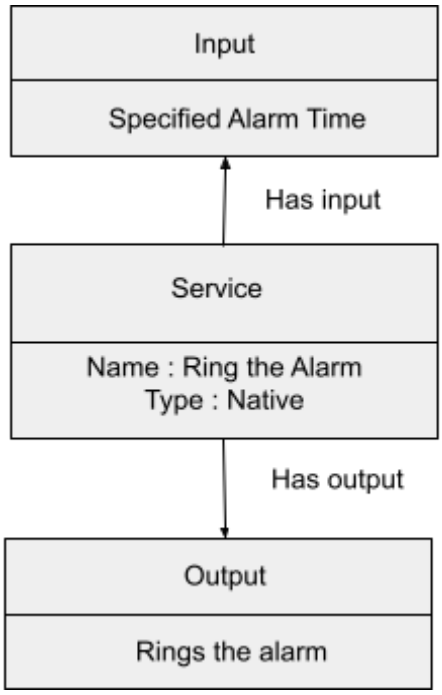
READ THE CURRENT TIME



CONTROLLER SERVICE:

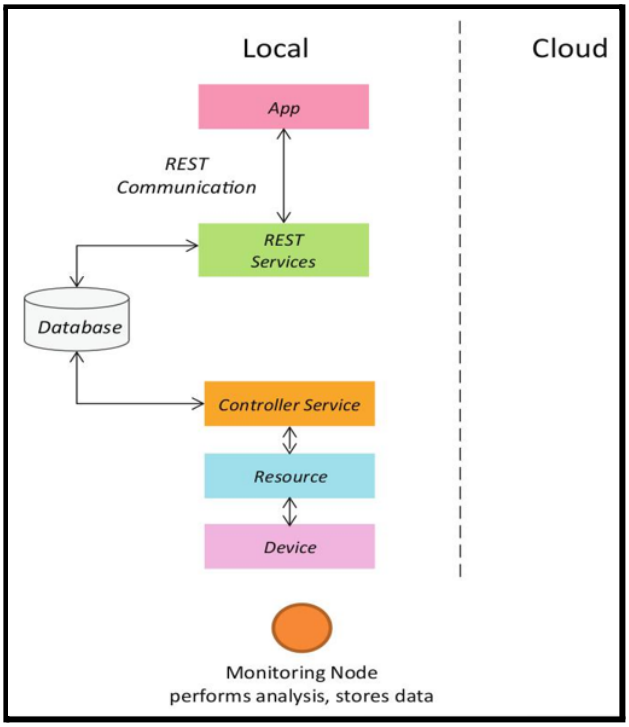


ALARM:



6) IoT level Specification –

As the system has a single node that does the sensing and performs analysis, the system is an example of level 1.


Local
Cloud
App
REST
Communication
REST
Services
Database
Controller Service
Resource
Device
Monitoring Node
performs analysis, stores data