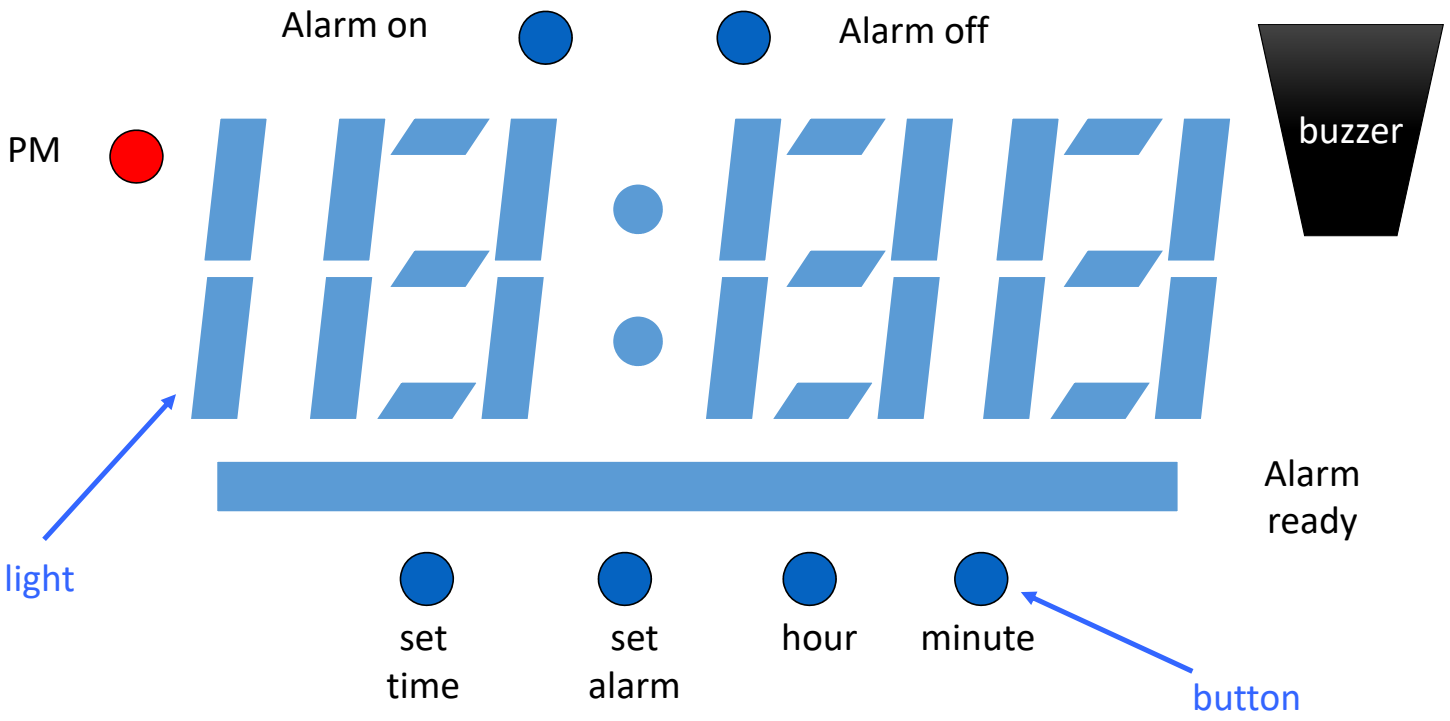
Computing Platforms

- Example: alarm clock

Alarm clock interface



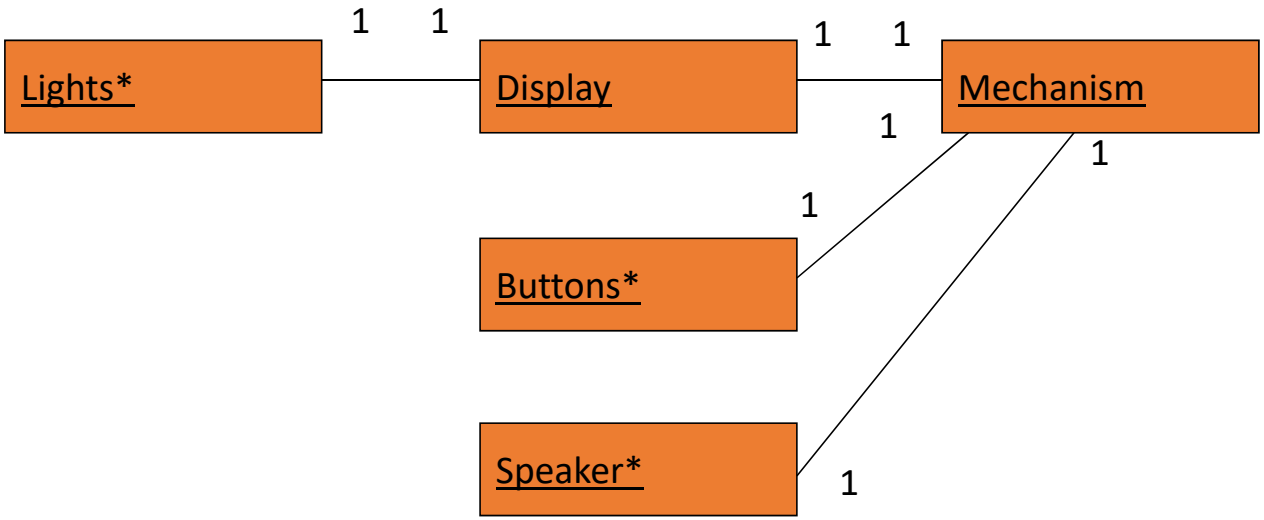
Operations

- Set time: hold set time, depress hour, minute.
- Set alarm time: hold set alarm, depress hour, minute.
- Turn alarm on/off: depress alarm on/off.

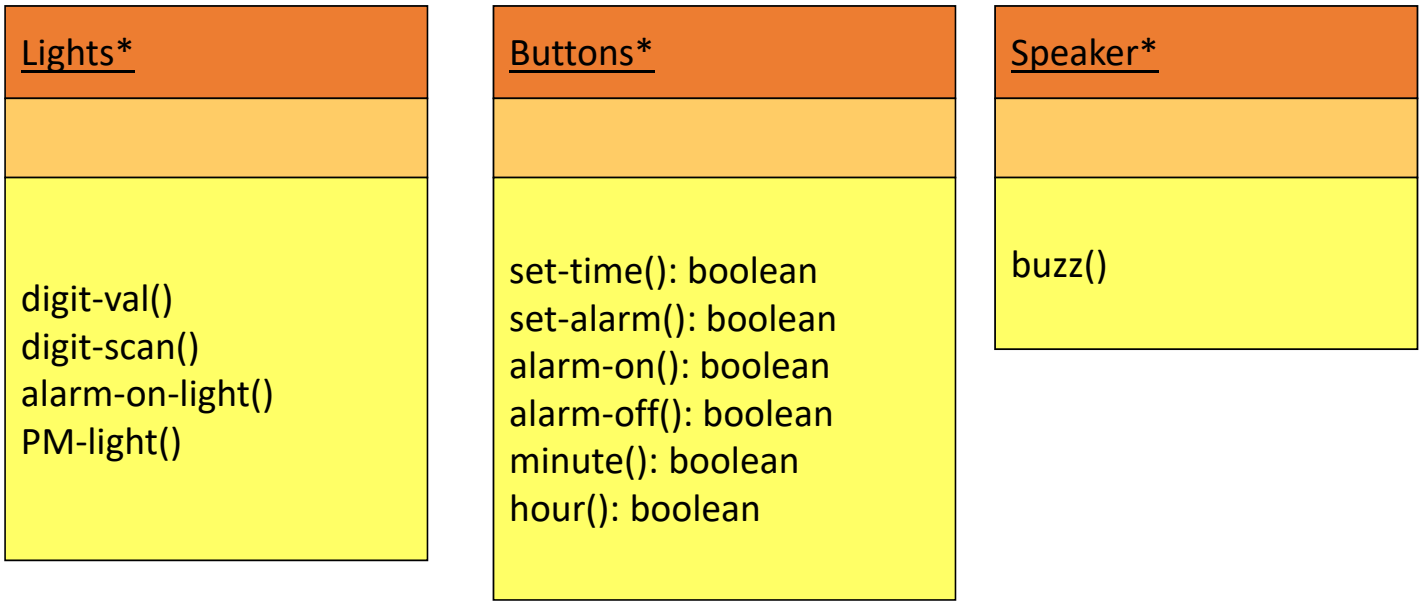
Alarm clock requirements

name	alarm clock
purpose	24-hour digital clock with one alarm
inputs	set time, set alarm, hour, minute, alarm on/off
outputs	four-digit display, PM indicator, alarm ready, buzzer
functions	keep time, set time, set alarm, turn alarm on/off, activate buzzer by alarm
performance	hours and digits, no seconds; not high precision
manufacturing cost	consumer product
power	AC
physical size/weight	fits on stand

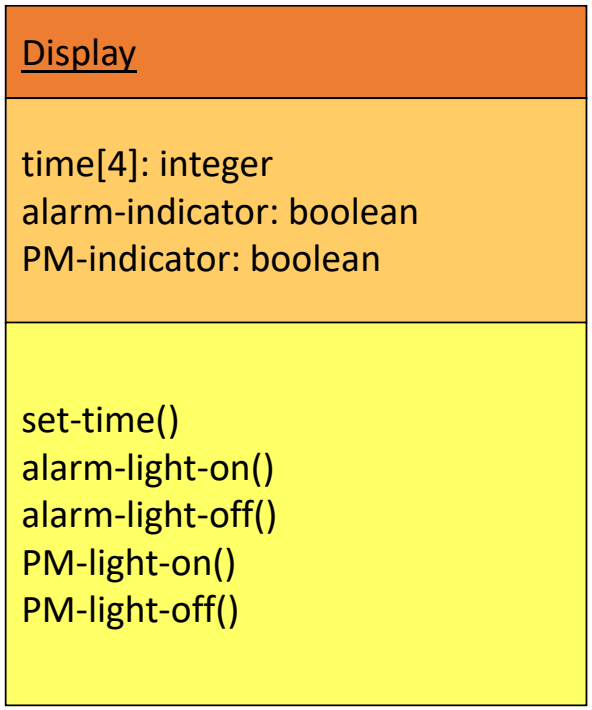
Alarm clock class diagram



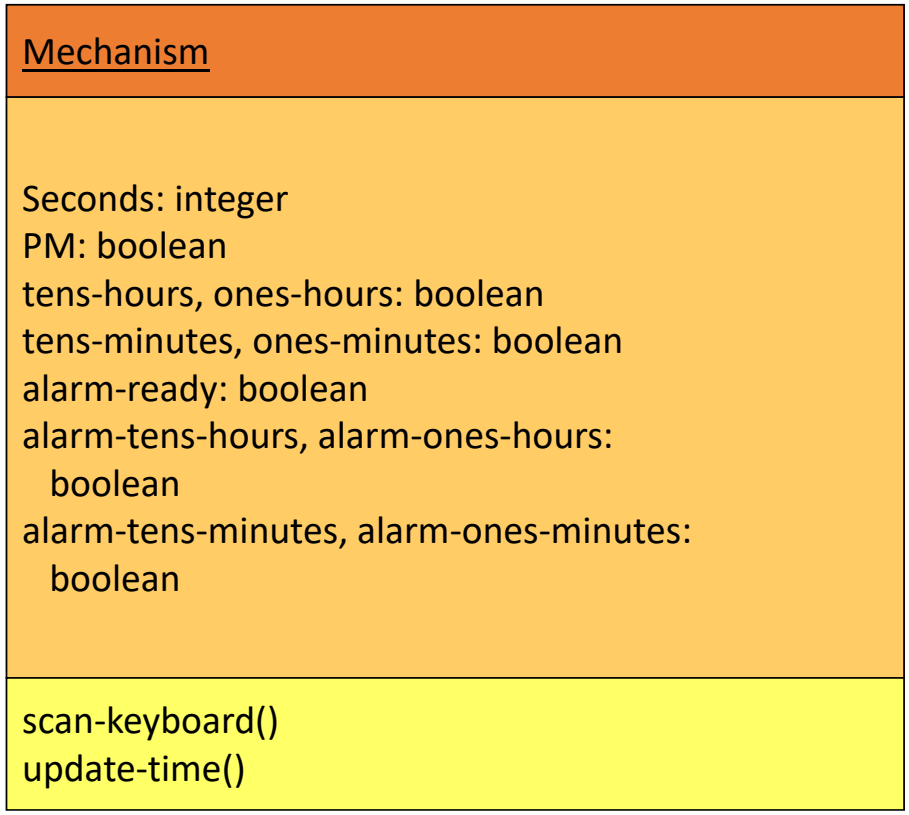
Alarm clock physical classes



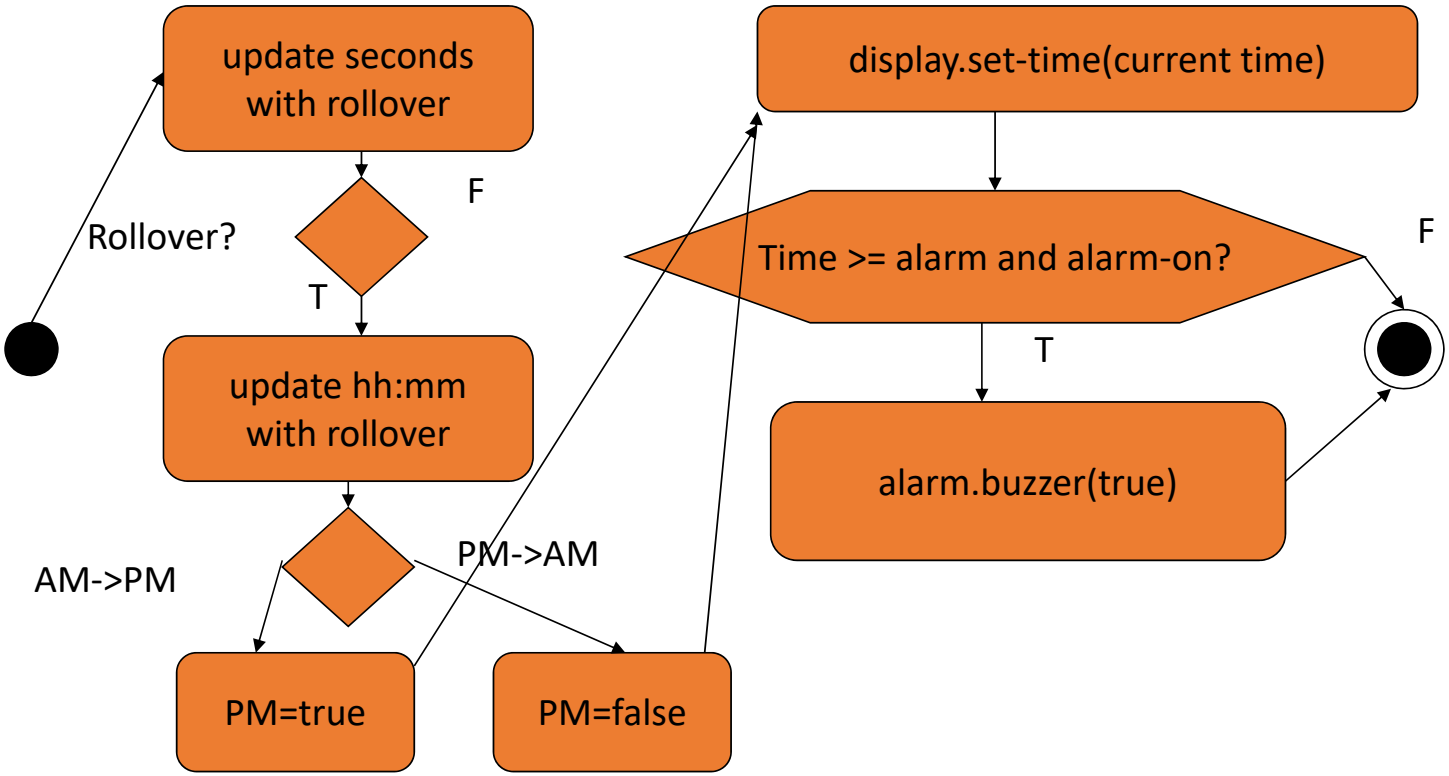
Display class



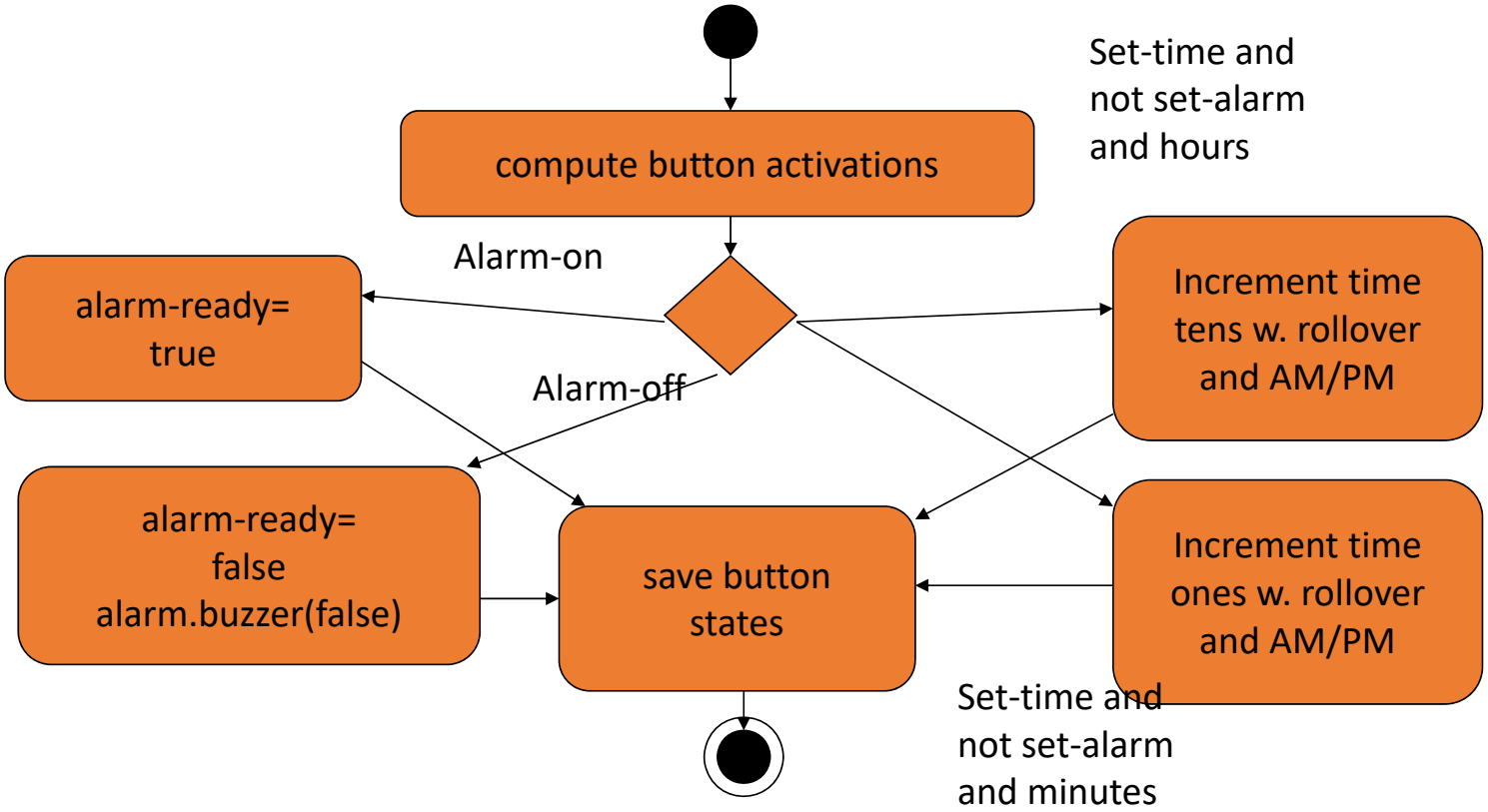
Mechanism class



Update-time behavior



Scan-keyboard behavior



System architecture

- Includes:
  - periodic behavior (clock);
  - aperiodic behavior (buttons, buzzer activation).
- Two major software components:
  - interrupt-driven routine updates time;
  - foreground program deals with buttons, commands.

Interrupt-driven routine

- Timer probably can’t handle one-minute interrupt interval.
- Use software variable to convert interrupt frequency to seconds.

Foreground program

- Operates as while loop:

```
while (TRUE) {
        read_buttons(button_values);
        process_command(button_values);
        check_alarm();
}
```

Testing

- Component testing:
  - test interrupt code on the platform;
  - can test foreground program using a mock-up.
- System testing:
  - relatively few components to integrate;
  - check clock accuracy;
  - check recognition of buttons, buzzer, etc.