TempHeating Challenge Notes

Application Description

The application returns value for actual temperature (TACTUAL) of a hardware device based on a range of temperature and time values.

The application makes use of formulas provided to carry out these calculations. These formulas are coded as different functions/methods and are used alongside one another to calculate the result. The functions/methods are as follows:

- getTmeas() – this function/method uses temperature to assign a measured temperature value based on the range the temperature falls in
    - (Given in table)
- tSatLookUp() – This function/method takes in the previously recorded TMEAS value and finds/allocates saturation offset value based off this.
    - (Given in table)
- getTheat() – This function/method uses time, temperature and measured temperature as parameter to calculate the value of Theat.
    - adapts THEAT formula provided:
      $THEAT(t, \Delta TSAT, \Delta Ti)$ = ΔTc + ($\Delta TSAT - \Delta Tc$) (1 – e^ $-t/\ \boldsymbol{\tau}$)
      //THEAT is TC plus (value for TSAT minus Tc) multiplied by (1 minus euleur number of -t over time constant)

- getTactual – This function/method uses the different values gotten from the other functions to find the actual temperature.
    - Adapts TACTUAL formula provided:
      $TACTUAL(t) = TMEAS(t) - THEAT(t, \Delta TSAT, \Delta Tc)$
      // TACTUAL at time t is TMEAS at time t minus THEAT.

Flow of program

1. Within the main function/method the TACTUAL function/method is called which calls the getTmeas function/method and assigns the value to a variable for storing the TMEAS value.
2. Next getTheat is called,
    a. It first calls the TsatLookUp function/method to get a TSAT value
    b. it uses this TSAT value to calculate the THEAT(as per formula).
3. Now we can calculate and return TACTUAL using The TMEAS and THEAT values.

Cyclomatic Complexity of functions

- getTmeas() – 6
- tSatLookUp() – 7
- get tHeat() – 7 +1 = 8
- getTactual() – 6+8+1 = 15

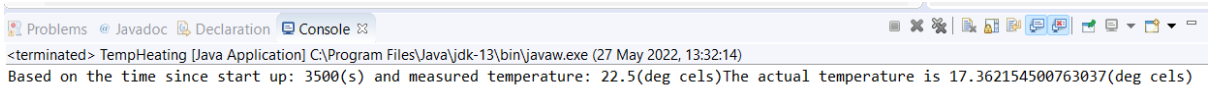
Unit testing

Unit testing done to test the functions/methods of the program. Testing performed using ‘assertEquals()’(java method) / ‘Assert::AreEqual()’ (C++ function) which returns true if arguments match, arguments are: expected output and actual output of function/method.

Expected output for ‘getTheat()’ and ‘getTactual()’ was calculated by passing the same values for time and temperature into the associated formulas and calculating result manually. For ‘getTmeas()’ and ‘satLookUp()’ expected values were taken from the table.

Sample Output

JAVA Program



C++ UNIT TEST