OMSE 532: Family Architecture Exercise

The Floating Weather Station Family

Floating weather stations are buoys that float at sea and that are equipped with sensors to monitor wind speed. Each FWS has an on-board computer that maintains a history of recent wind speed data. At regular intervals the buoy transmits the wind speed using a radio transmitter.

Our group will be developing the software for a new class of low-cost floating weather stations. These stations are designed to be dropped from aircraft to drift with the currents. It is anticipated that we will produce floating weather stations in a variety of configurations to meet different customer needs. In particular, we will produce versions with a small number of sensors that are low cost but low accuracy. We will also develop higher cost versions with more sensors and/or more accurate sensors that produce more accurate results.

The FWS buoys are a candidate family, since they all have certain requirements in common, but may be configured in a variety of ways, including different types and numbers of wind speed sensors, and the length of time covered by the history of wind speed readings that they maintain.

We will apply the commonality analysis process to the software that resides on the FWS on-board computer and operates the buoy.

The currently line of buoys includes the following models. It is anticipated that additional models may be added if we find that customers need different configurations. It is also anticipated that we may enhance the buoy capabilities by adding air temperature and water temperature sensors. A strategic goal is to support the production of buoys customized to individual customers.

Model: FWS Mark I

Our economy model. Achieves good accuracy and fair reliability at low cost using two CHU-1 low-resolution wind speed sensors and two CHU-2 high-resolution sensors. The on-board computer system enhances sensor accuracy by providing a weighted average of the sensor values over five sequential readings. Life of the low-cost battery is conserved by reading the sensors and transmitting data only once every 20 minutes.

Model FWS Mark V

Striking a balance between cost and efficiency, the Mark V supports a wide range of FWS applications. Reliable and accurate wind speed data gathering is supported by an array of five CHU-1 low-resolution sensors and five CHU-2 high-resolution sensors. Accuracy is software enhanced by providing a weighted average of the sensor readings. Each sensor is read once a minute with the readings averaged over three readings before being transmitted.

Model: FWS UltraScan 5000

Our best floating weather station. Designed to be deployed from your yacht, the UltraScan 5000 provides continuous, up-to-date, and accurate wind speed readings over a wide range of weather conditions. High reliability and high accuracy is assured by an array of 8 FX/L low-resolution and 12 FX/H high-resolution wind speed sensors. The UltraScan provides the most up-to-date data, scanning the sensors every 20 seconds and sending the weighted average every 60 seconds. Data precision is ensured by the transmission of double-length data messages. In addition, the FWS offers an optional emergency SOS signaling capability.

Assignment:

Overall goal of the assignment is to develop a common architecture for the FWS family. Products of the exercise will include:

a) Due Week 9: A commonality analysis for the FWS family produced by filling in the missing parts of the CA specification template.
b) Due Week 10:
    a) A module guide for the FWS architecture giving a brief prose description of the secret of each module. Produce the module guide by filling in missing parts of the Module Guide template. The guide should describe any design issues that arise
    b) Interface specifications: a sketch of the leaf module interfaces describing:
        - The service(s) provided by the module
        - Secret(s) of the module
        - Associated variabilities