Class Outline

for

Oil Field Monitoring

Programming Assignment 1
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Table of Contents

1.0 System Overview

Oilfield Instrumentation-USA relies on a complex array of sensors on each drilling rig to monitor the state of all operations. These sensors feed data to a server mounted on the rig. The server is connected to a network which enables workers on there rig as well as managers back at the company offices to monitor all aspects of the operations. This program has been designed to simulate those sensors on oil rigs and display the relevant information in a command prompt.

2.0 Relevant Terms and Acronyms

- ROP - an acronym for rate of penetration, the rate at which the drill bit is drilling
- PSI - pounds per square inch, a unit of measurement for pressure
- BBL - an abbreviation for barrels (of oil in this instance)
- casing pressure - pressure inside of the bit casing

3.0 Requirements

3.1 SimulationMain

3.1.1 Member Variables

- theSim: instance of the Simulation class

3.1.2 Member Functions

- main:
  - initiates the simulation (starts the program)
  - no arguments
  - no return value

3.2 Simulation

3.2.1 Member Variables

- *w: pointer to an instance of the Well class
- *s: pointer to an instance of the Server class
- *d: pointer to an instance of the Display class
- *sen: pointer to an instance of the Sensor class

3.2.2 Member Functions

- startServer:
  - instantiates Server class
  - no arguments
  - no return value

3.3 Server

3.3.1 Member Variables

- m_hDepth: variable passed from the HoleDepth class containing the hole depth data
- m_ROP: variable passed from the ROP class containing the rate of penetration data
- m_bDepth: variable passed from the BitDepth class containing the bit depth data
- m_pPressure: variable passed from the PumpPressure class containing the pressure data
- m_cPressure: variable passed from the CasingPressure class containing the pressure data
- m_tMax: variable passed from the TorqueMax class containing the torque data
- m_fOut: variable passed from the FlowOut class containing the flow out data
- m_mpVolume: variable passed from the MudPitVolume class containing the volume data

3.3.2 Member Functions

- update:
  - function that triggers the system to check for new data from the sensors
  - accepts an instance of the Server class
  - no return value

- subscribe:
  - registers a user. this function will activate a data stream in the Display class
  - accepts an instance of the Display class
  - no return value
- unsubscribe:
  - unregisters a user. this function will deactivate a data stream in the Display class
  - accepts an instance of the Display class
  - returns a bool value

3.4 Display

3.4.1 Member Variables

- m_hDepth: variable passed from the HoleDepth class containing the hole depth data
- m_ROP: variable passed from the ROP class containing the rate of penetration data
- m_bDepth: variable passed from the BitDepth class containing the bit depth data
- m_pPressure: variable passed from the PumpPressure class containing the pressure data
- m_cPressure: variable passed from the CasingPressure class containing the pressure data
- m_tMax: variable passed from the TorqueMax class containing the torque data
- m_fOut: variable passed from the FlowOut class containing the flow out data
- m_mpVolume: variable passed from the MudPitVolume class containing the volume data

3.4.2 Member Functions

- update:
  - function that triggers the system to check for new data from the sensors
  - accepts an instance of the Server class
  - no return value

3.5 Well

3.5.1 Member Variables

- m_hDepth: variable passed from the HoleDepth class containing the hole depth data
- m_ROP: variable passed from the ROP class containing the rate of penetration data
- m_bDepth: variable passed from the BitDepth class containing the bit depth data
- m_pPressure: variable passed from the PumpPressure class containing the pressure data
- m_cPressure: variable passed from the CasingPressure class containing the pressure data
- m_tMax: variable passed from the TorqueMax class containing the torque data
- m_fOut: variable passed from the FlowOut class containing the flow out data
- m_mpVolume: variable passed from the MudPitVolume class containing the volume data

3.5.2 Member Functions

- update:
  - function that triggers the system to check for new data from the sensors
  - accepts an instance of the Server class
  - no return value

3.6 Sensor

3.6.1 Member Variables

- m_hDepth: variable passed from the HoleDepth class containing the hole depth data
- m_ROP: variable passed from the ROP class containing the rate of penetration data
- m_bDepth: variable passed from the BitDepth class containing the bit depth data
- m_pPressure: variable passed from the PumpPressure class containing the pressure data
- m_cPressure: variable passed from the CasingPressure class containing the pressure data
- m_tMax: variable passed from the TorqueMax class containing the torque data
- m_fOut: variable passed from the FlowOut class containing the flow out data
- m_mpVolume: variable passed from the MudPitVolume class containing the volume data

3.6.2 Member Functions

- report:
  - request for a data feed from the sensor
  - no arguments
  - no return value
- update:
  - function that triggers the system to check for new data from the sensors
  - accepts an instance of the Server class
  - no return value

3.7 HoleDepth

3.7.1 Member Variables

- m_hDepth: variable containing the hole depth data

3.7.2 Member Functions

- report:
  - request for a data feed from the sensor
  - no arguments
  - no return value
- getHoleDepth:
  - retrieve current data from this sensor
  - no arguments
  - returns a double
- setHoleDepth:
  - assigns a value to the associated member variable
  - accepts a double as an argument
  - no return value

3.8 ROP

3.8.1 Member Variables

- m_ROP: variable containing the rate of penetration data

3.8.2 Member Functions

- report:
  - request for a data feed from the sensor
  - no arguments
  - no return value
- getROP:
  - retrieve current data from this sensor
  - no arguments
  - returns a double
- setROP:
  - assigns a value to the associated member variable
  - accepts a double as an argument
  - no return value

3.9 BitDepth

3.9.1 Member Variables

- m_bDepth: variable containing the bit depth data

3.9.2 Member Functions

- report:
  - request for a data feed from the sensor
  - no arguments
  - no return value

- getBitDepth:
  - retrieve current data from this sensor
  - no arguments
  - returns a double
- setBitDepth:
  - assigns a value to the associated member variable
  - accepts a double as an argument
  - no return value

3.10 PumpPressure

3.10.1 Member Variables

- m_pPressure: variable containing the pressure data

3.10.2 Member Functions

- report:
  - request for a data feed from the sensor
  - no arguments
  - no return value
- getPumpPressure:
  - retrieve current data from this sensor
  - no arguments
  - returns a double
- setPumpPressure:
  - assigns a value to the associated member variable
  - accepts a double as an argument
  - no return value

3.11 CasingPressure

3.11.1 Member Variables

- m_cPressure: variable containing the pressure data

3.11.2 Member Functions

- report:
  - request for a data feed from the sensor
  - no arguments
  - no return value
- getCasingPressure:
  - retrieve current data from this sensor
  - no arguments
  - returns a double
- setCasingPressure:
  - assigns a value to the associated member variable
  - accepts a double as an argument
  - no return value

3.12 TorqueMax

3.12.1 Member Variables

- m_tMax: variable containing the torque data

3.12.2 Member Functions

- report:
  - request for a data feed from the sensor
  - no arguments
  - no return value
- getTorqueMax:
  - retrieve current data from this sensor

  - no arguments
  - returns a double
- setTorqueMax:
  - assigns a value to the associated member variable
  - accepts a double as an argument
  - no return value

3.13 FlowOut

3.13.1 Member Variables

- m_fOut: variable containing the flow out data

3.13.2 Member Functions

- report:
  - request for a data feed from the sensor
  - no arguments
  - no return value
- getFlowOut:
  - retrieve current data from this sensor
  - no arguments
  - returns a double
- setFlowOut:
  - assigns a value to the associated member variable
  - accepts a double as an argument
  - no return value

3.14 MudPitVolume

3.14.1 Member Variables

- m_mpVolume: variable containing the volume data

3.14.2 Member Functions

- report:
  - request for a data feed from the sensor
  - no arguments
  - no return value
- getMudPitVolume:
  - retrieve current data from this sensor
  - no arguments
  - returns a double
- setMudPitVolume:
  - assigns a value to the associated member variable
  - accepts a double as an argument
  - no return value