School of Computing

Academic Session 2019/2020, Semester II

SCSJ2203: Software Engineering

Problem Solving 2: Object-Oriented Detailed Design

INSTRUCTIONS:

Ensure you write your team name, each team member's full name and matric number on the first page of your team submission. Only the team leader should submit the file by uploading via the e-learning or as required by the course lecturer.

Teams who are caught copying other teams' work will be penalised by getting an 'F' grade for the concerned problem solving. This includes committing plagiarism by copying resources from the Internet without any citation or direct copy with citation, which should be quoted where applicable. Teams that allow their work to be copied will be penalised too.

Read the questions carefully and discuss with your team members. Answer all questions within the given time. Your answers could be typed or written or as required by the lecturer. At the end of the answer, include the screen captures as the proof of your team distance and online discussion using any mediums your team has agreed.

Important Note: Respective course lecturer has the right to assign the problem solving as an individual assessment if the need arises during the online teaching and learning (OTnL) period and/or Movement Control Order (MCO)

Question:

Given the case study below, answer the following questions.

Malaysian Meteorological Department (MetMalaysia) is in the process of developing a Flood Forecasting and Warning System (FFWS). The system collects data, performs some data processing and transmits the data for further processing to alert people if water level of an identified river is at risk. Three important hydrological data that should be considered in the system are water depth level, rainfall and speed of water flow at rivers in different regions.

FFWS should collect the data at each identified location using three sensors (depth sensors, rainfall sensors, flow sensors). A depth sensor is used in each river for measuring the water level. A rainfall sensor is used to gather and measure the amount of rainfall over a set period. A flow sensor is used to measure average speed of water flow (velocity).

Once FFWS is activated by a meteorologist, the hydrological data are collected by reading the data from all sensors (identified by sensor ID, river name and its location, region ID) sent to the centralized monitoring station in MetMalaysia for every 15 minutes interval during the monitoring mode. Monitoring station processes the data received and when more than 50% of the sensors data in a particular area indicates that the water level, rainfall and velocity are greater than a threshold, local warning is activated. Meanwhile, for a query-based mode, the meteorologist as a user at the central monitoring station may request report of hydrological data at a particular region of the monitoring area.

FFWS uses Google map Web service for the location monitoring assistance and Short Message Service (SMS) service from cellular service provider to alert the local residents when warning is activated.

a) Draw a **design class diagram** for FFWS that includes the dependency relationships. Identify required attributes and methods/operations for all classes.

(16 marks)

b) Based on the design class diagram in (a), identify suitable subsystems for FFWS. Draw a **package diagram** to represent the subsystems that you have identified. Include the classes in respective subsystems without attributes and operations. It is not necessary to show a multi-layer package.

(5 marks)

c) Draw a **sequence diagram** for the scenario activate flood warning. The diagram should include the three stereotypes <<boundary>>, <<control>>, <<entity>>.

(9 marks)

30 marks

Total marks: 3/100