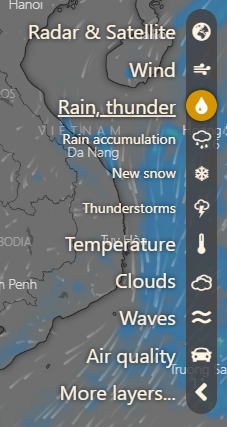
|  |  |
| --- | --- |
|  | **End Semester Examination**  **SASTRA Deemed to be University, Thirumalaisamudram, Thanjavur – 613 401.**  Course Code: CSE314R01  Course Name: Software Engineering Practices  Duration: 3 hrs Max.Marks:100 |

Software “Windy” is developed by “Ivo”, a kiter and jet pilot who seeks the wind, waves and Meteorological Aerodrome Reports (METARS) almost constantly with a goal to provide the best weather forecasting service in the world. During hurricane season, the software becomes the major source of weather information for governments, institutions and individuals in affected area for virtually saving lives. The software uses GFS (Global Forecast System) and NEMS (NOAA Environmental Modeling System) as the main forecast models. The software launches a new weather radar, thunderstorm forecast and many other big innovations to better forecast weather. The software analyses wind, rain and thunder, temperature, clouds, waves and air quality on the globe. Under wind section, the software predicts gusty winds which is a prediction of increase in the speed of winds. Rain and thunder tab previews the rain accumulation, new snow and thunderstorms. The temperature tab measures the temperature in Celsius and Fahrenheit. Temperature tab also measures humidity, a measure of how wet the air is. Clouds tab displays low clouds, cloud base and visibility. Low clouds are the clouds with a base below 6,500 ft. cloud base is the lowest altitude of the visible portion of the cloud. Cloud visibility refers to the ability to have a comprehensive view into all the activity within the cloud network. Wave tab, elucidates Swell, Swell 2 and sea temperature. Swell is a series of mechanical waves that propagate along the interface between water and air under the predominating influence of gravity. Swell 2 is a smaller swell produced by another remote wind. Sea temperature is the water temperature close to the ocean’s surface. Finally, the air quality tab displays NO2, PM2.5 and Aerosol. NO2, a gaseous air pollutant composed of nitrogen and oxygen. PM2.5 is an air pollutant that is a concern for people's health when levels in air are high. Aerosol is a multifaceted agent affecting air quality, weather and climate through many mechanisms.



1. a). Having understood the overall goals and objectives of the software, what software process model, Ivo would have been chosen to develop the software. Justify the reason. Explain the chosen process model. (10 marks)

b). Prepare Software Requirement Specification document of the software. (15 marks)

2. a). The software allows the user to view rain accumulation of a particular region. Rain accumulation is interpreted using the following color codes:

|  |  |
| --- | --- |
| **Rain Accumulation (in millimetres)** | **Color code** |
| <=5 | Purple |
| >5 and <=10 | Blue |
| >10 and <=20 | Green |
| >20 and <=40 | Yellow |
| >40 and <=100 | Orange |
| >100 | Red |

Alternatively, when user moves the cursor to a particular location in the region, the rain accumulation in millimetres is shown as pop-up to the user. Software also allows users to view the rain accumulation with five different timelines such as next 12 hrs, next 24 hours, next 3 days, next 5 days and next 10 days. Create use case template for this scenario ‘Rain Accumulation’. (10 marks)

b). The subsystems of the software and the expected LOC for each of the subsystems is shown as a table given below. The historical data indicates that average productivity of commercial software of this type is 700 LOC/pm. Burdened labour rate is $1800 per month. Based on the LOC and the historical productivity of the organization, compute efforts in person/months. Compare the Effort in person-months for the same software using Putnam and Myer’s.

|  |  |
| --- | --- |
| **Subsystems** | **Estimated LOC** |
| Wind | 20,000 |
| Rain, Thunder | 33,000 |
| Temperature | 12,500 |
| Clouds | 15,800 |
| Waves | 18,550 |
| Air quality | 5,200 |

1. marks)

3.a). Draw the architectural context diagram of the software. Explain the target system using archetypes. Elaborate the archetypes as call-and-return architecture of components. (10 marks)

b). Write down the practices, software engineers use to ensure the single mindedness of an object-oriented component with suitable example from ‘windy’ software. (15 marks)

4. a). You might have created an OO component with single mindedness in section vi, use the component and perform the testing methods applicable at class level. (10 marks)

b). Recall the table we created in section iii, for the interpretation of rain accumulation as color codes, convert the color code logic into flow graph, compute cyclomatic complexity. Ensure the correctness of cyclomatic complexity using number of predicates and number of closed regions. Analyze the independent paths of the flow graph. (15 marks)