Abstract

In mission critical systems, like air traffic control system, defense and other real time systems where softwares are used, a failure can cause a great loss as because the severity of consequences due to failure is quite high. Hence, the software reliability is of utmost importance. The reliability prediction is easy, provided the operational profile of a given software application is known. But for COTS software, it is difficult or sometimes rather impossible to get the exact operation profile of the application. Therefore, reliability evaluation based on operation profile becomes difficult. Hence, methodology based on the execution scenario analysis of the COTS components has been formulated to predict maximum and minimum reliability values, thereby providing the range of reliability values the software component or application can have, irrespective of any operation profile.

An input domain based approach is developed for the reliability assessment of elementary COTS software components. For a COTS component, the reliability assessment is done by subsequent breaking of the composite components into their subcomponents until the elementary component (*which cannot be broken further*) is obtained. The approach for the reliability assessment of elementary COTS software components is applied to every elementary software component. The approach for the prediction of maximum and minimum reliability is applied to every execution scenario of the

composite components and subcomponents to obtain the maximum and minimum reliability values for the composite component or application. As a case study, the proposed methodologies are applied to *Windows notepad,* and the results are obtained.

Further, an approach to assess the reliability of the COTS software for a specified operation profile is also developed using *fragile point* analysis. This approach detects most of the errors including the operational errors and also reduces many test cases which would otherwise have been required to test the software. The proposed approaches are all applied to suitable applications and the results obtained are verified.