Abstract

Cost, reliability and time are the three main quality attributes of a software system. Nowadays much software are designed on COTS component in order to facilitate timely development with reduced cost and improved reliability. Software designed to handle critical control systems have very high reliability requirements. Fault tolerance is designed in these systems for some or all of the software modules so that execution can be resumed even after failure with minimal loss of data and time. Designing fault tolerance requires extra resources. Even though reliability requirement are very high the developers cannot spend endless resources on any project. This is a trade off problem between reliability and cost. Many such problems have been discussed in literature considering distinct objectives and constraints and have given good results. An effective approach to discuss this problem is to formulate a multi-objective problem
with cost minimization and reliability maximization as the two objectives with an upper bound on cost and lower bound on reliability. In this paper we formulate this bi-criteria problem and discuss the solution methodology. The problem is formulated for consensus recovery block fault tolerant scheme. In case a feasible solution for the problem exists, criterion vector approach is used to solve the problem and otherwise if the bounds are contradictory a goal programming approach is used to solve the problem to obtain a compromised solution. Alternative goal solutions are obtained assigning different weights for the objective to facilitate the decision maker with correct decision.

References

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Index Terms

Computer Science          Software Engineering

Keywords

Software Reliability     Fault Tolerance     Cots Products     Optimization     Goal Programming
Trade Off Problem