Shrinking microprocessor feature size will increase the soft-error rates to unacceptable levels in the near future. While reliable systems typically employ hardware techniques to address soft-errors, software techniques can provide a less expensive and more flexible alternative. This paper presents a control-flow error classification and proposes new software based control-flow error detection techniques. The new techniques are better than the previous ones in the sense that they detect errors in all the branch-error categories. We also compare the performance of our new techniques with that of the previous ones using our dynamic binary translator.