ANNEXURE 1

SIR DATABASES

Software-artifact Infrastructure Repository (SIR) is a repository of software-related artifacts meant to support rigorous controlled experimentation with program analysis and software testing techniques, and education in controlled experimentation.

The repository contains many Java and C, C++, and C# software systems, in multiple versions, together with supporting artifacts such as test suites, fault data, and scripts. The repository also includes documentation on how to use these objects in experimentation, supporting tools that facilitate experimentation, and information on the processes used to select, organize, and enhance the artifacts, and supporting tools that help with these processes.

The details of the datasets used in this study from http://sir.unl.edu/portal/index.php, http://sir.unl.edu/php/previewfiles.php are deadlock, elevator, alarm clock, producer-consumer and chess playing.

C++ & Java Programs

Object-oriented programs used in this research work are partitioned into three different complexities. Lines of code (LOC), Variable range (VR) and Number of conditions (NOCs) for low complexity programs are given below:

1. **Low** Complexity Programs (LCP)
LOC range = [100–150]

Variable range = [5–10]

Number of conditions = [5–10]

For *Binary search tree* program, the LOC is 133 and NOCs are 14. The maximum time required to execute a LCP is 500ms. Number of faults detected for *Binary search tree* is 2. Number of test cases generated is 270 with initial population 40.

2. **Medium** Complexity Programs (MCP)

   LOC range = [300–800]

   Variable range = [11–20]

   Number of conditions = [15–25]

   For *Banking transactions* program, the LOC is 500 and NOCs are 28. The maximum time required to execute a MCP is 800ms. Number of faults detected for *Binary search tree* is 5. Number of test cases generated is 400 with initial population 40.

3. **High** Complexity Programs (HCP)

   LOC range = [1500–2200]

   Variable range = [21–60]

   Number of conditions = [40–60]

   For *Soda vending machine* program, the LOC is 1600 and NOCs are 120. The maximum time required to execute a HCP is 1500ms. Number of faults detected for *Soda vending machine* is 11. Number of test cases generated is 800 with initial population 80.
System Testing

A sample of ATM system with input state representation, Construction of EFSM matrix and output of generated as well as reduced test cases are given below:

(a) EFSM representation of ATM System

(b) Constructing EFSM Matrix
(c) Output produced for ATM