High Performance Discrete Event Simulation

Fred Love and Rebecca Curtis, Missouri University of Science and Technology

**Abstract**—Supercomputing paradigms and high performance computers have played an intricate role in bridging the gap between application demands and what technology can provide. The emergence of the CDC600 supercomputer marks the first major gain towared narrowing the computation gap. This paper explores the performance features of the CDC6600 as well as the enhancements provided by its successor, the CDC7600. A discrete event simulator written in SystemC will be used the vehicle of exploration.

**Index Terms**—High Performance Computing, Performance Measures, Hardware Simulation

——————————  ——————————

# 1 Introduction

T

HE demand for increasing computational capability continues to necessitate the development of higher performance computer technology. A survey of the computational requirements for various scientific applications suggests that existing computers are insufficient to handle future workloads. This trend requires the advancement of higher performance computing systems to both address these shortcomings and to keep pace with successive applications. This paper briefly explores the genesis of applying supercomputer technology, and then describes a SystemC based event simulation engine for two pioneering architectures.

The next section will offer an overview of the CDC6600 and CDC7600 to provide reader with foundation necessary to discuss the event simulator. Section 3 briefly introduces the SystemC library to facilitate exploring implementation details of the simulator. Section 4 closely examines the simulator implementation and mock execution results for select program inputs. Lastly, the paper concludes and discuesses potential future work.

# 2 Cray SuperComputers

## 2.1 CDC6600

## 2.2 CDC7600

# 3 The SystemC Library

# 4 SIMULATOR IMPLEMENTATION

# 5 CONCLUSION AND FUTURE WORK

# Appendix

Appendices, if present, will appear online as supplemental material. In the event multiple appendices are required, they will be labeled “Appendix A,” “Appendix B, “ etc.