Abstract of a paper for 1986 Rochester FORTH Conference

A Requirement Definition Language, Simulator and Test Harness For Programmable Logic Control Systems (PLCs)

A C Daly, B J Mercer, C L Stephens
Computer Solutions Limited

In order to validate the design and specification of a large distributed PLC based control system for an accelerator a FORTH application program has been built that simulates the operation of that control system. The FORTH compiler was extensively modified to provide forms and structures that could be understood by engineers with knowledge of ladder diagrams but no knowledge of computer languages or of FORTH. As well as providing an infix compiler a major addition was the inclusion of special structures to allow the necessary representation of simultaneity. The simulation included a database of plant variables with upper and lower limits as well as default initial states. A display description interpreter was devised that allowed dynamic changes of the nature and format of the simulations two operator interface displays; if necessary while the simulation was running. Mouse activated display interaction was provided.

Implementation of this required a major change in the standard polyFORTH multi-tasker in order both to cope with the large (> 350) number of tasks and the requirements of the simultaneity structure chosen. A recent enhancement to the simulation has been to provide real world I/O rather than computer variables and these can then be used to subject the delivered control system to the anticipated enviornment to ensure that the PLC's programming meets its specification.