Cryptol: Arithmetic Logic Unit provides correct output for all switches

Description Create a functional specification for a sn74as181a Arithmetic Logic Unit in Cryptol. Create a specification for the wiring of the ALU in Cryptol. Show that the functional specification matches the function of the wiring diagram, at least when the mode bit M is high. Show that the functional specification correctly adds when the M bit is low. This is an example of a combinational circuit.

Purpose Shows some features of Cryptol that do not exist in most other languages and shows how to set up a functional and netlist specification for combinational circuits.

Audience This module is intended for:

1 The general public
2 K-12 and college classes on cyber defense
3 preparation for proficiency in the use of tools and a computing environment suitable for the study of cyber defense

Objectives After completing the module:

1 writing a functional specification of a combinational circuit is understood
2 writing a netlist specification is understood
3 comparing a functional specification of a combinational circuit with a netlist is understood

Keywords ALU, hardware, functional specification, netlist
Category cybersecurity > education

Delivery java applets and written documentation in pdf format

Team John Franco and Ethan Link

Assessment The applets provide the means for experimentation. Questions are asked in the documentation that help with the set up of experiments. The ideas that learners come up with is evidence that the module was successful.

Workflow No particular schedule was established

Environment All materials are contained in a single jar file. The jar file can be run on any computer where java version 11 or higher and some pdf reader such as acroread or evince are available. The jar file may be executed in the cyber range or

learners may download the jar file (which is considered to be an executable file) and run it on their personal computers.