



Performance from Experience

An Approach to Executing Ptolemy Classic Models under Ptolemy II

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Motivation

- Simulation Framework for Photonics CAD Consortium (PCAD*)
- Ptolemy Classic Wavelength Domain Simulator (WDS) from MONET
- Why not stay with Ptolemy Classic?
 - Make use of the Java-based Vergil GUI and related improvements
 - Access MoML for model representation
 - Type checking is supported better in Ptolemy II
- Must support legacy implementations of stars
 - Many existing Ptolemy Classic C++ stars, galaxies, and universes
 - Performance issues for computationally intensive stars
- Client/Server architecture across Windows and UNIX platforms

* www.pcad-team.com



Performance from Experience

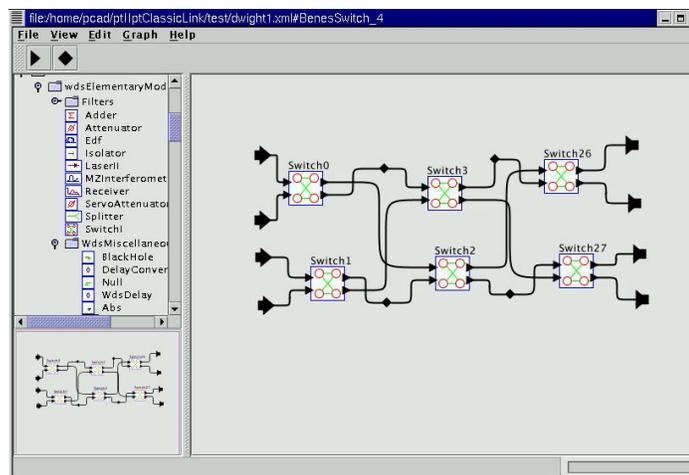
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PCAD Team



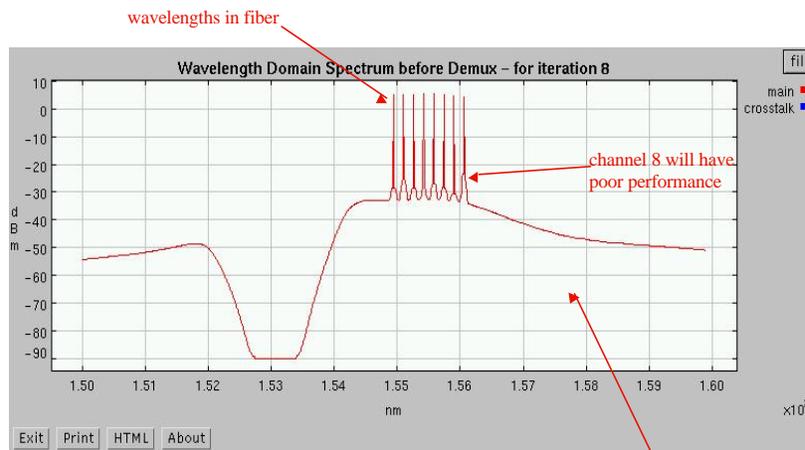
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Internal Structure of Benes Switch

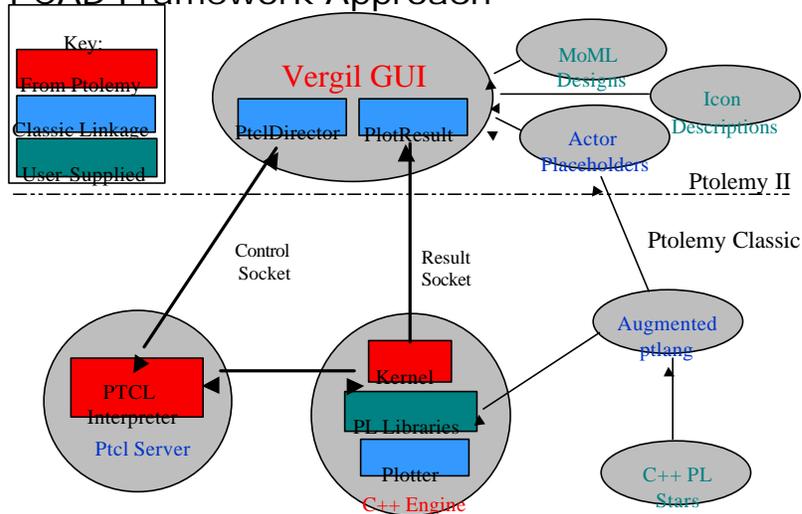


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Sample Output



PCAD Framework Approach



Components of the Hybrid System

- Augmented ptlang code generator
 - Automated class generation for Java placeholder actors
 - Parameters: names, types, and default values
 - Ports: names, directionality, and data types
 - Binds SVG icon description to actor (with default icons)
- Ptcldirector class
 - Does not schedule or fire any Java stars directly
 - Creates a script describing topology and parameters of the Universe
 - Opens a control socket from Vergil to a ptcl server instance
 - Creates a single PlotResult instance and advertises its socket port
- PlotResult class
 - Opens a single server socket for PlotResult requests
 - Manages PlotFrame instances for display of simulation results
 - Distributes incoming simulation result data to the correct PlotFrame

Components of the Hybrid System (cont.)

- Ptolemy TCL (ptcl) interpreter
 - Interpreter unchanged from the standard Ptolemy Classic version
 - Display class in kernel is replaced by the Plotter or TPlotter classes
 - Functions of pxgraph replaced by PlotResult client code
- Vergil Configuration (vergilConfiguration.xml)
 - Director Library includes a director derived from Ptcldirector
 - Actor Library includes a placeholder actor for each Classic star
- Server Dispatcher
 - Dispatches a separate ptcl server instance for each simulation run
 - Multiple model windows can be opened and run simultaneously
 - C++ instance can crash without affecting other current simulations

Process Flows

- Model Creation
 - The user creates a model from the placeholder actors
 - The user configures actor parameters and director parameters
 - The model is saved as a MoML universe or galaxy
- Model Execution in PctlDirector
 - Prefire:
 - The model script is created in the pctl language
 - A socket is opened to a new pctl instance
 - The script is transmitted and interpreted, errors are caught
 - Fire:
 - A script is sent telling pctl to execute the model N iterations ('run N')
 - Postfire:
 - Simply returns false
 - StopFire:
 - A halt script is sent to pctl, and haltRequested is set

Process Flows (continued)

- Plotting
 - Stars requiring static plots or histograms instantiate a Plotter
 - Stars requiring multi-iteration sequence plots instantiate a TPlotter
 - AddPoint is used to send data points to either class
 - Plotter::terminate formats and sends a plot/histogram as PlotML
 - Tplotter::initialize causes an empty PlotFrame to be sized and drawn
 - Tplotter::terminate causes one point to be added to each dataset
- Errors
 - Errors caught during scripting are reported on Vergil
 - Errors caught by pctl interpreter are returned on the control socket

Caveats

- Not intended to solve the general problem
 - Only tested with SDF domain
 - Some features unimplemented, I.e., multi-portholes
- No tokens pass directly between Java actors and C++ stars
- Type mismatches between Ptolemy II and Classic
- Simulation Control and Error Reporting are not complete

Summary

- Ptolemy Classic simulations can be built and executed in Vergil
- Classic linkage plugs seamlessly into Ptolemy II
- Makefile support for Windows DLL's and UNIX/Linux shared libs
- The ptcl servers can execute on one or more remote hosts
- Performance essentially the same as Ptolemy Classic execution
- Java actors are generated automatically by ptlang extensions
- Most built-in SDF stars function in the hybrid system, except:
 - Some special port data types are not supported
 - Stars using pxgraph will display on the server machine

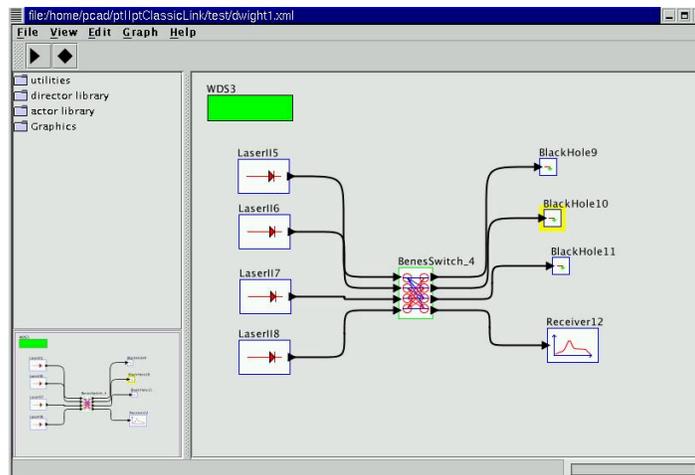
Network Design Tools, Inc.

- Spun off from Telcordia Technologies March, 2001
- Located in Monmouth County, New Jersey
- Based on three software tools from Telcordia Applied Research
 - Wavelength Network Designer (WaND)
 - Strategic Analysis Tool (SWAT)
 - Wavelength Domain Simulator (WDS)



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Benes Switch with Sources and Sinks



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