WSN in SpecC

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Outlines

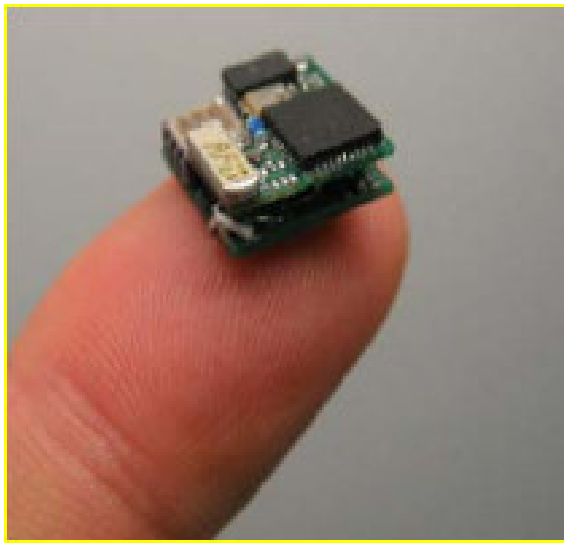
- ECO: Wireless Sensor Node System
- Specification Model
- Profiling & Computation Graphs Result
- Architecture Exploration
- Design Flow Issues

Goals

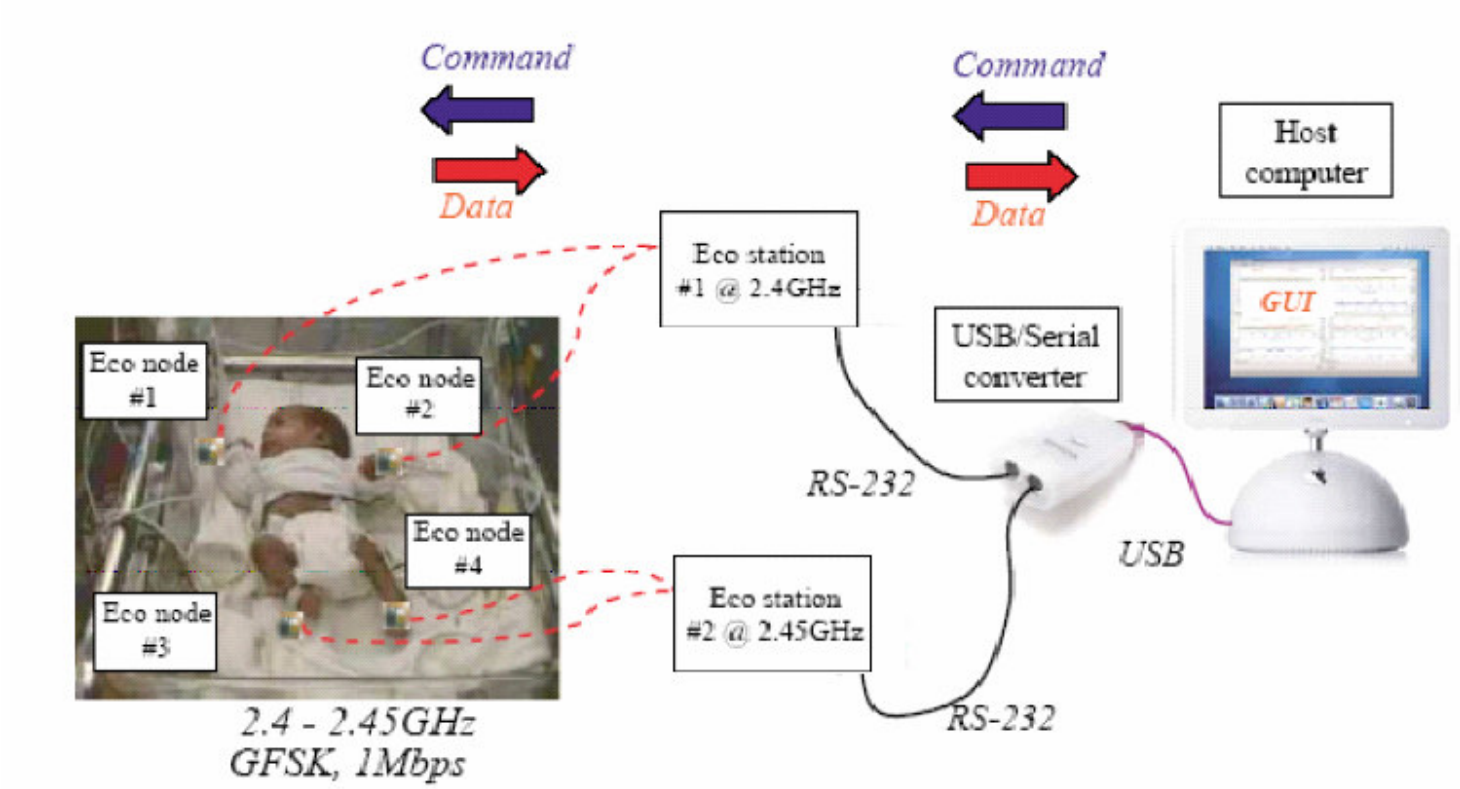
- Model WSN in SpecC
- Use Profiled Data for making hardware decision
- Architecture Exploration
- Follow the SpecC Design Methodology steps

Eco: WSN for measuring motion

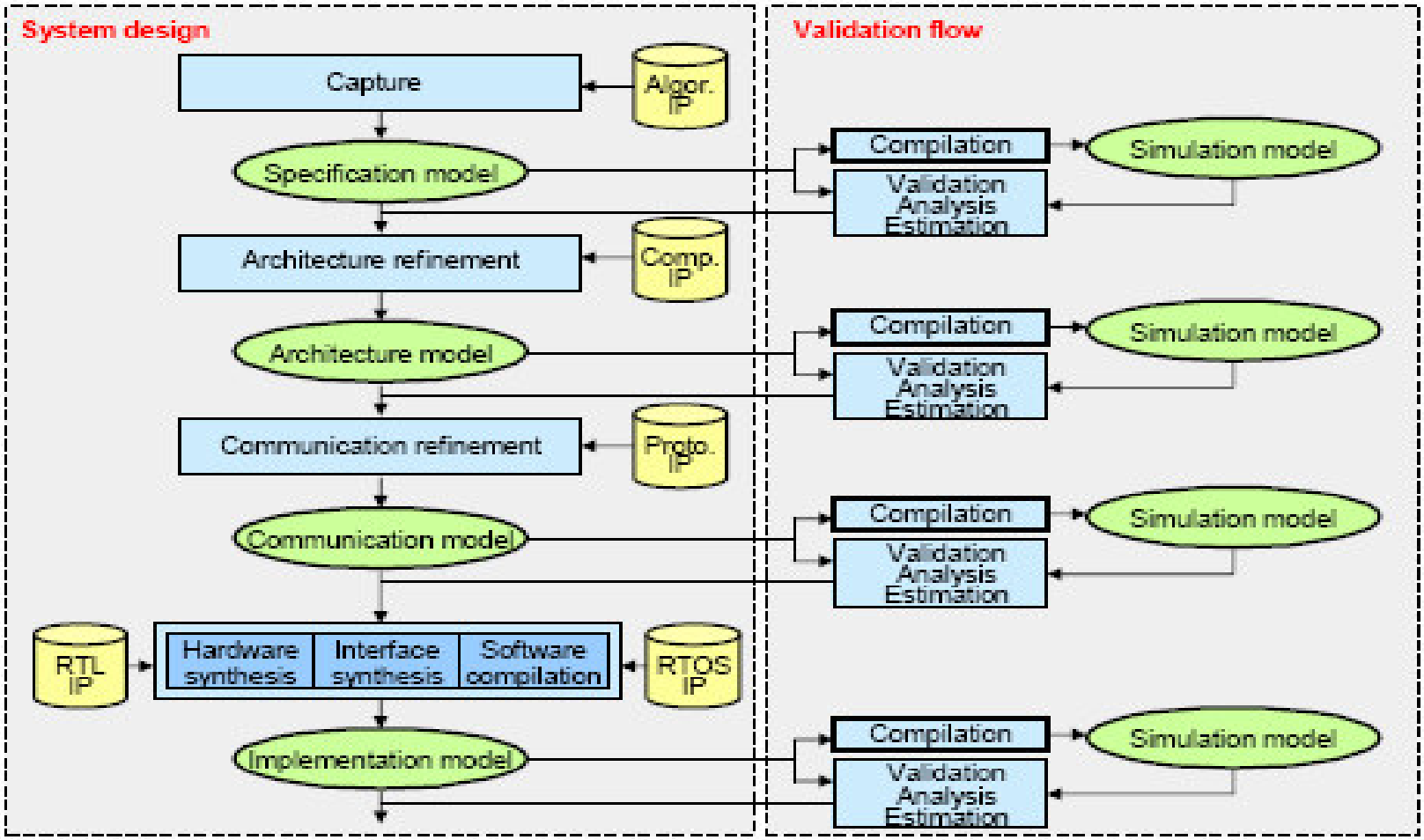
- Features
  - Ultra Compact
  - Light Weight
  - Low Power
  - Real Time Motion Monitoring
- Used for monitoring motion of premature infants
- Designed by Prof. Pai Chou, Chulsung Park & Jinfeng Liu



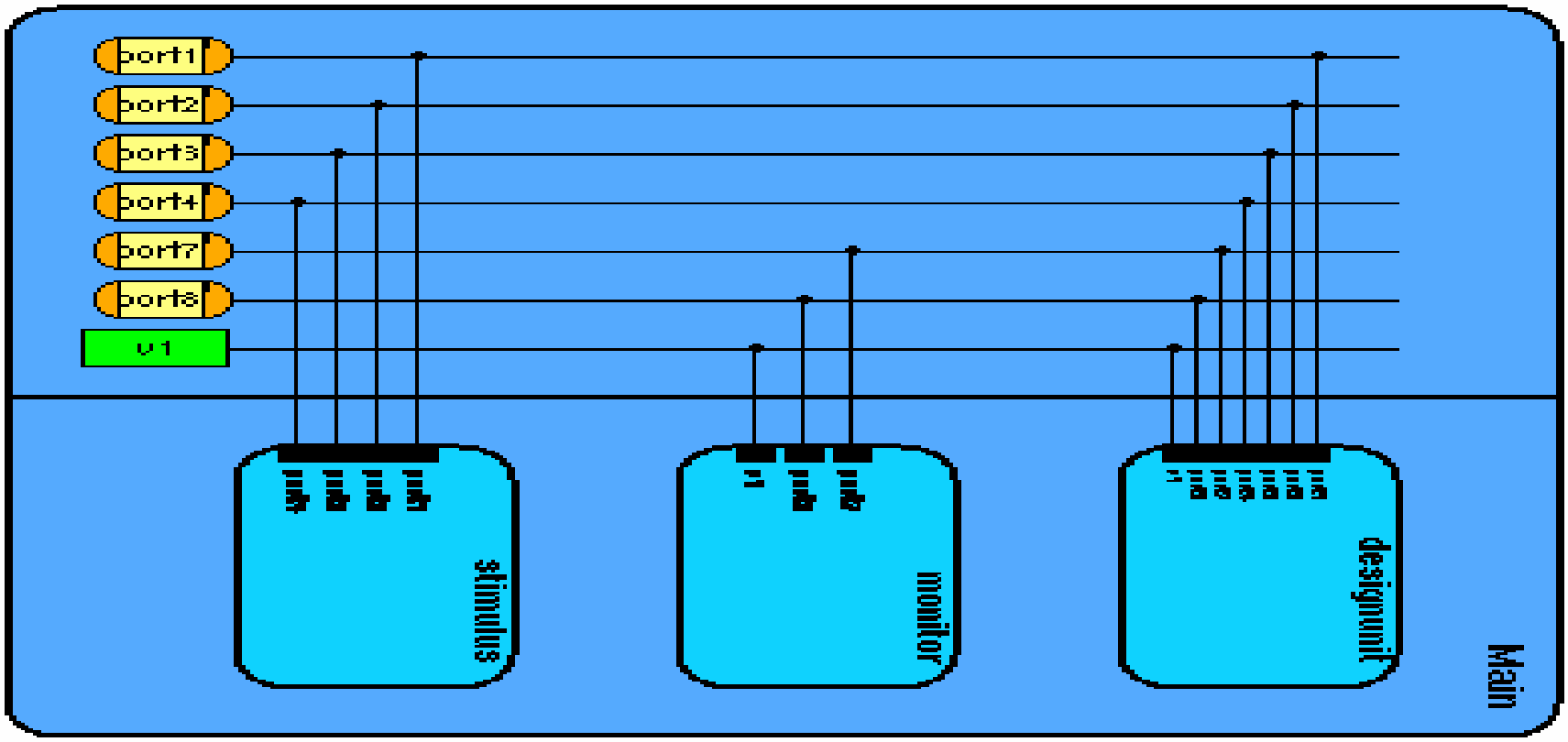
SYSTEM CONFIGURATION



SpecC Design Methodology



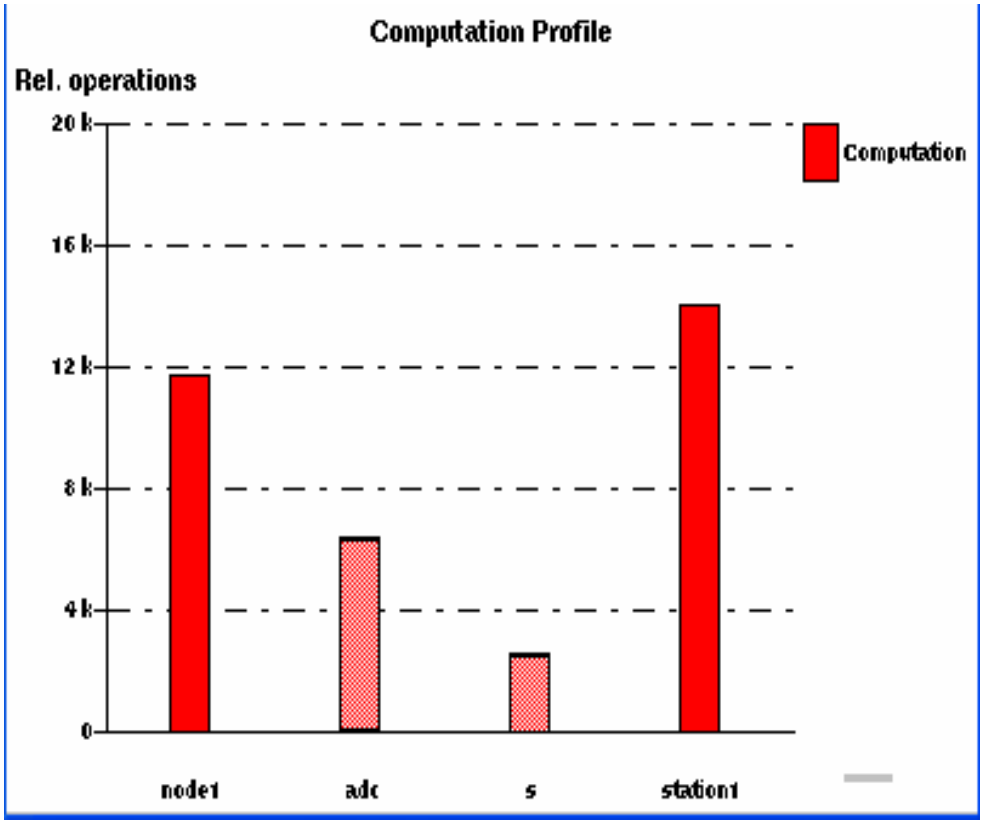
Testbench


port1
port2
port3
port4
port7
port8
v1
stimulus
monitor
designunit
Main

Specification Model/Hierarchy

- SCE Environment

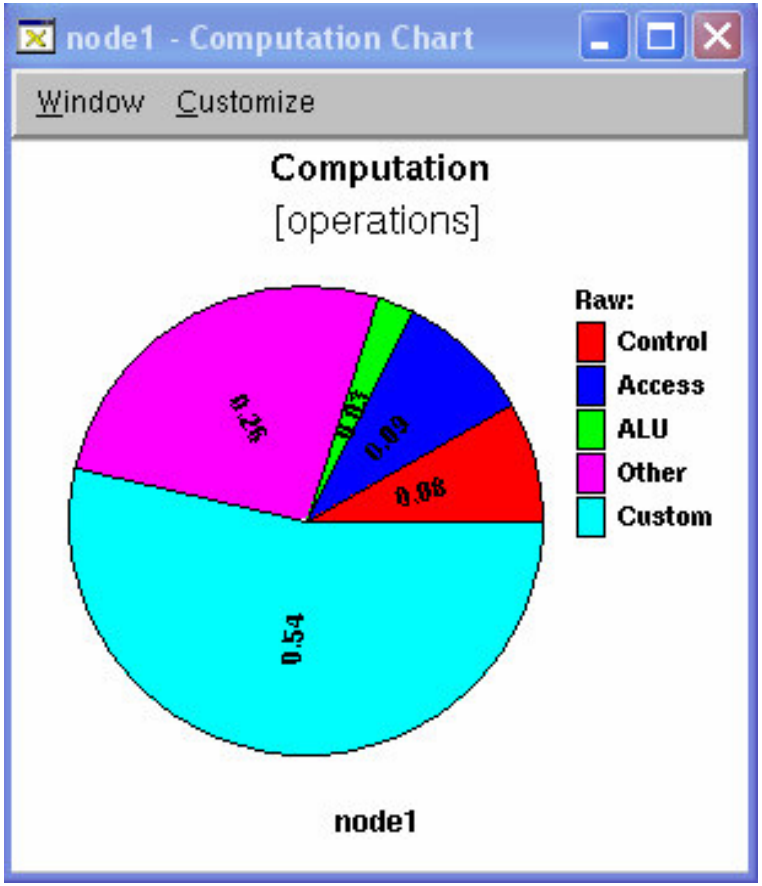
Result of Profiling

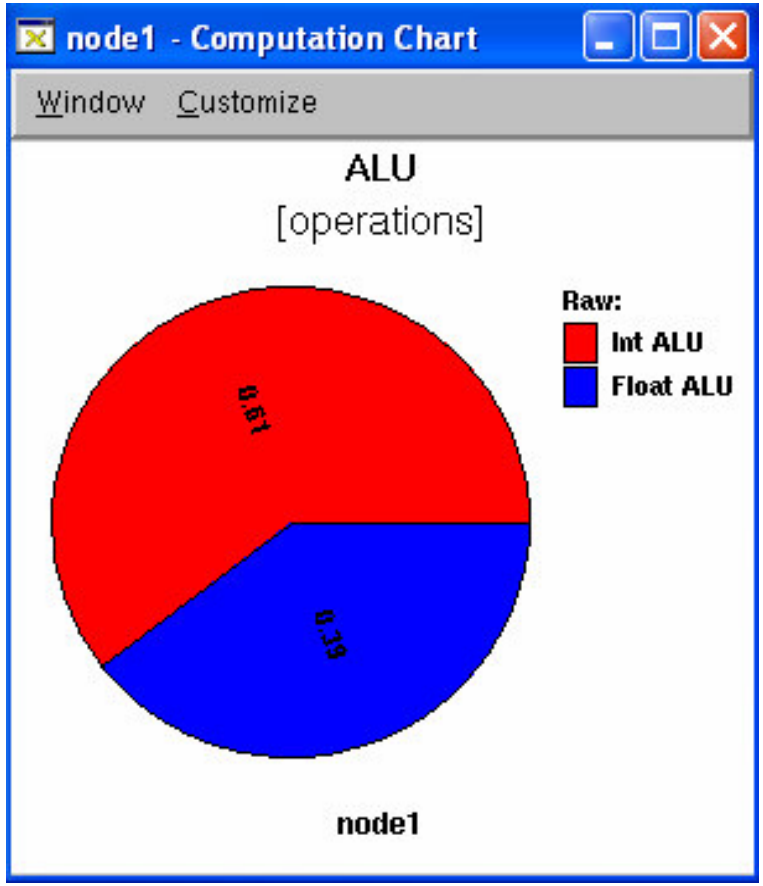


Conclusion from Graph

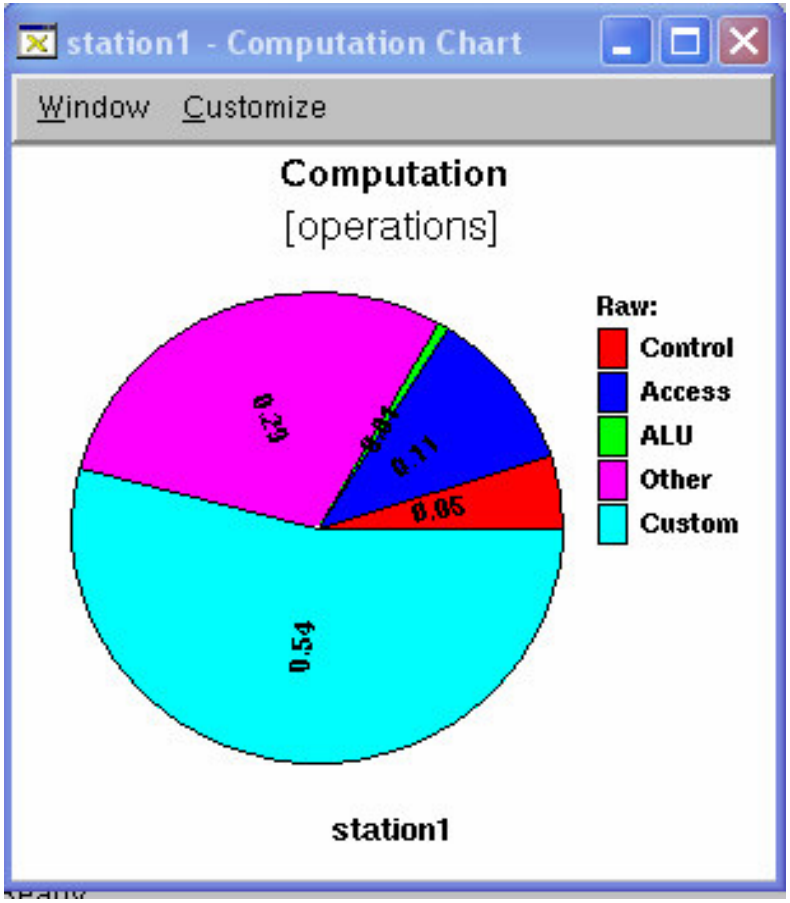
- Any Guesses???

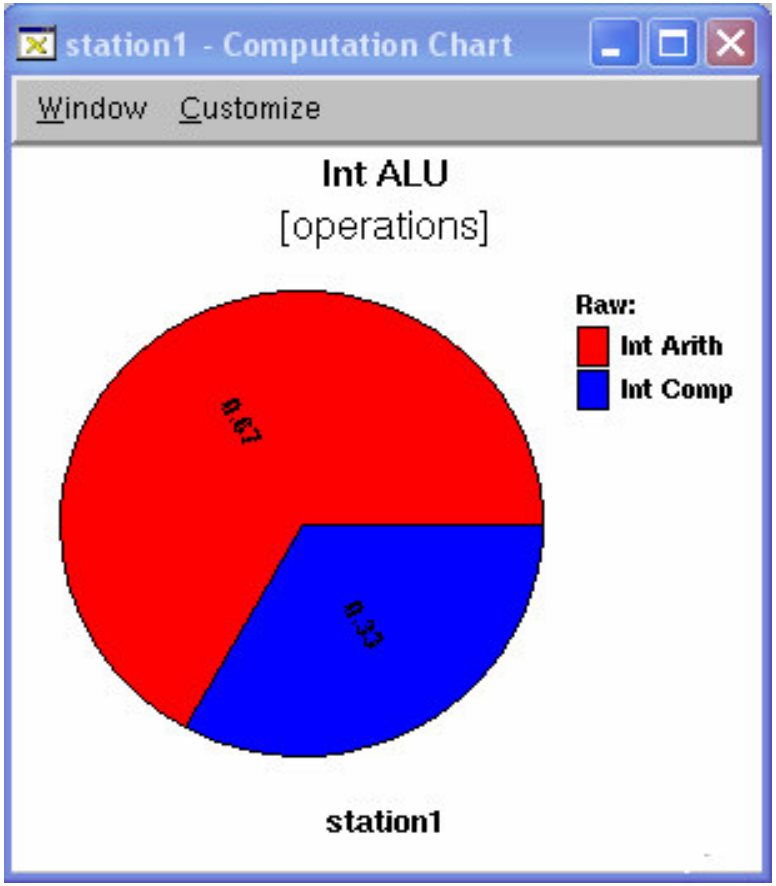
Computational Graphs



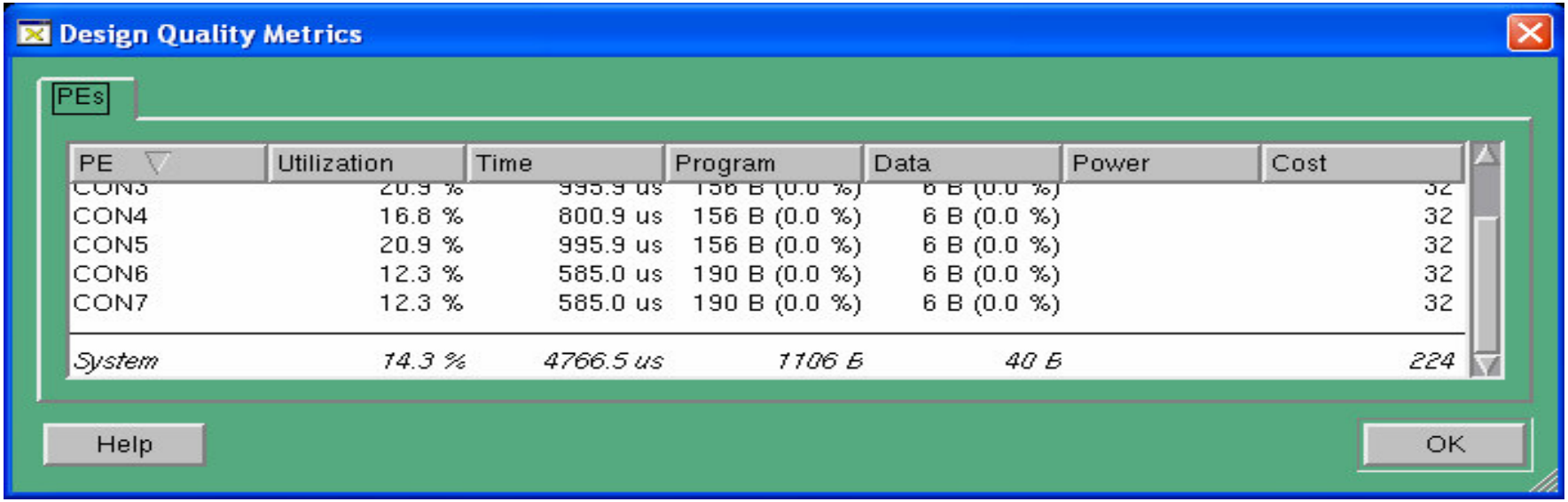


Computational Graphs



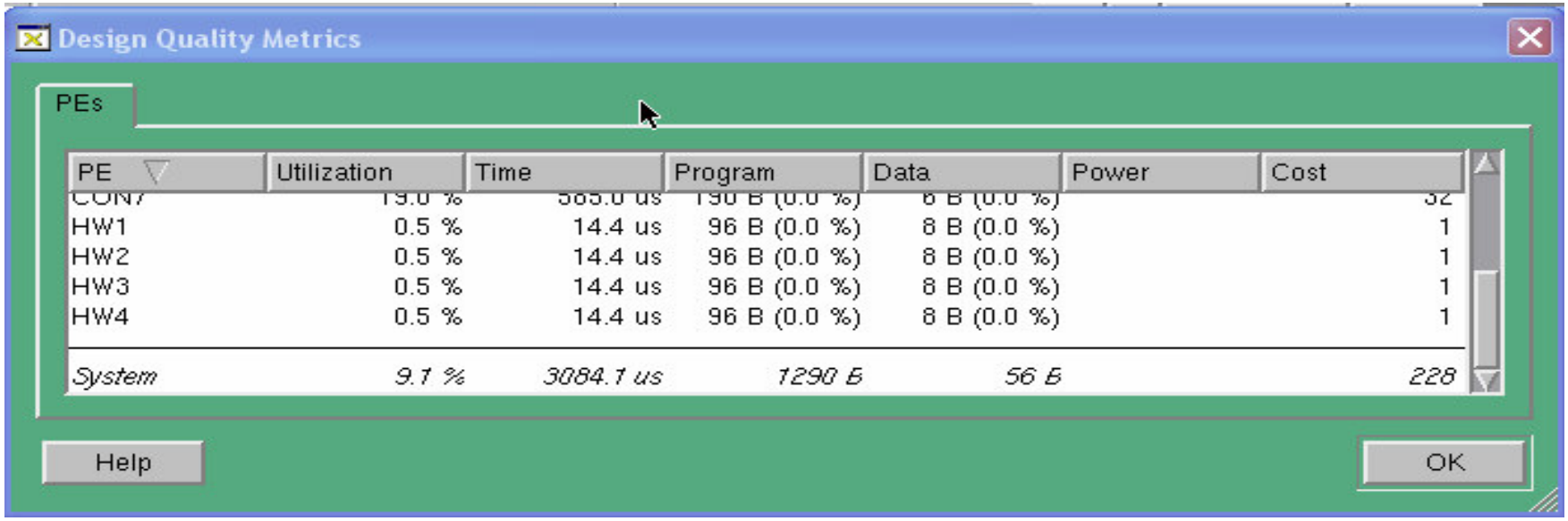


Architecture Exploration 1



- When each Node and Station Behavior is assigned an Controller
- System time = 4.7665ms

Architecture Exploration 2



- When ADC behavior are assigned separate Hardware
- System Time = 3.0841ms

Architecture Refinement

- Specification Model Looks almost like Architecture Model
- Unable to Complete the Architecture Model
  - Errors like:
  - ERROR #5023: "v2" is accessed concurrently.
  - 'scar': abnormal exit!
  - identify global variables ...stops
- Scheduling: No need to do scheduling in this case as everything needs to be assigned to different hardware and everything needs to run concurrently

Communication Refinement

- Need to skip this step
- Limited database in the tool

C Code Generation

- Sorry to say!!! No Results

Suggestions

- Though communication with channel looks easy and nice but be careful with concurrent communication …..you may end up with deadlocks
- I think we should discuss few design example in detail in the class, so that we could decide with some guidelines that needs to be followed in the specification model so that we end with some architecture model
- In the last, everyone is welcomed to play with the specification model, maybe one of you can generate a architecture model for me

Future Improvement

- Try to fix the working architecture model, so that actual simulation is possible
- Describe 8051 microcontroller for comparing the performance

THANK YOU