Internship Summary Presentation

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Introduction

About Broadcom

- 2011 Net Revenue of **$7.39 Billion**
  Founded in **1991**
- Initial Public Offering in **April 1998** (NASDAQ-BRCM)
- A **Global Leader** in Semiconductors for Wired and Wireless Communications
- Broad IP Portfolio with More than **17,800** U.S. and Foreign Patents and Applications
- One of the **Largest Volume** Fabless Semiconductor Suppliers
- **~11,200** Employees Worldwide

Broadcom Products

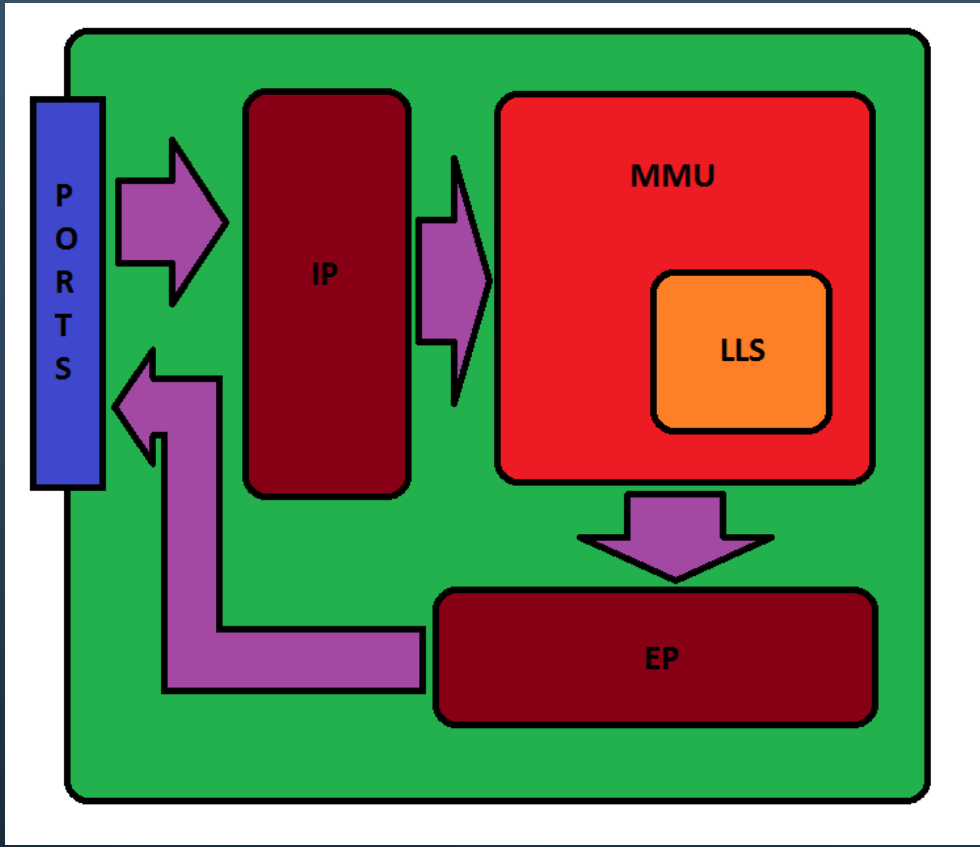
OVERVIEW OF THE INTERNSHIP

- BCM Andover Office (Infrastructure and Network Group)
- From Jul 23, 2012 to Dec 21, 2012
  - Summer: Full-time
  - Fall: Part-time
- Major 2 Projects:
  - Linked List Scheduler
  - Split Lot Test

Linked List scheduler(LLS)

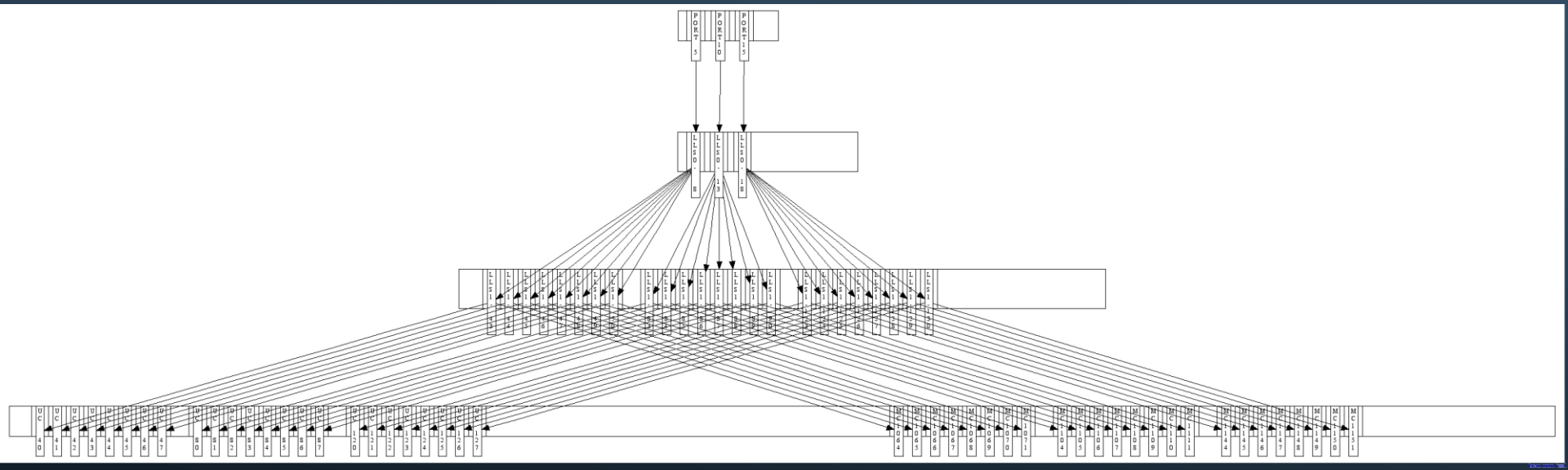
Linked List Scheduler(LLS)

- What is MMU?
  - The Memory Management Unit (MMU) is capable of providing line rate buffering across all packet sizes for 100Gbps of Ethernet traffic.
  - It all started with queuing. A network processor has a certain amount of processing ability. If the rate of the coming packages reached a point, any packages that arrives at the chip has to go through so waiting time. During the waiting time, they resident inside the memory and we have to figure out a way to deal with these waiting packages and make sure everyone got the service they deserve. So here we have the MMU.



Linked List Scheduler(LLS)

- What is LLS?
  - The Linked List Scheduler design operates as part of the larger MMU(Memory Management Unit) design that includes the Queuing and Payload Storage components.
  - is responsible for selecting which queue is next to transmit a packet within each port, applying strict priority, minimum guarantees, weighted fairness and max shaping scheduling policies.

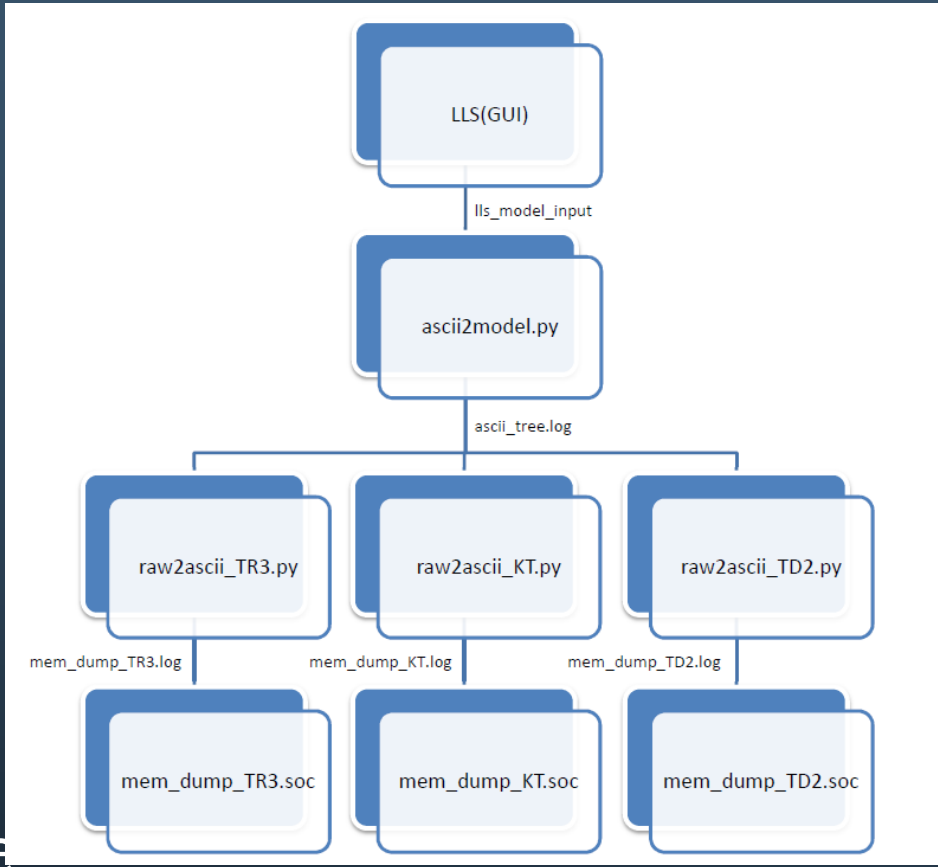


Linked List Scheduler(LLS)

- Modeling Of LLS
  - The LLS modeling exists to provide an easy path to visualize the settings of the LLS within all devices that contain the LLS (typically found inside the MMU of XGS devices when present).

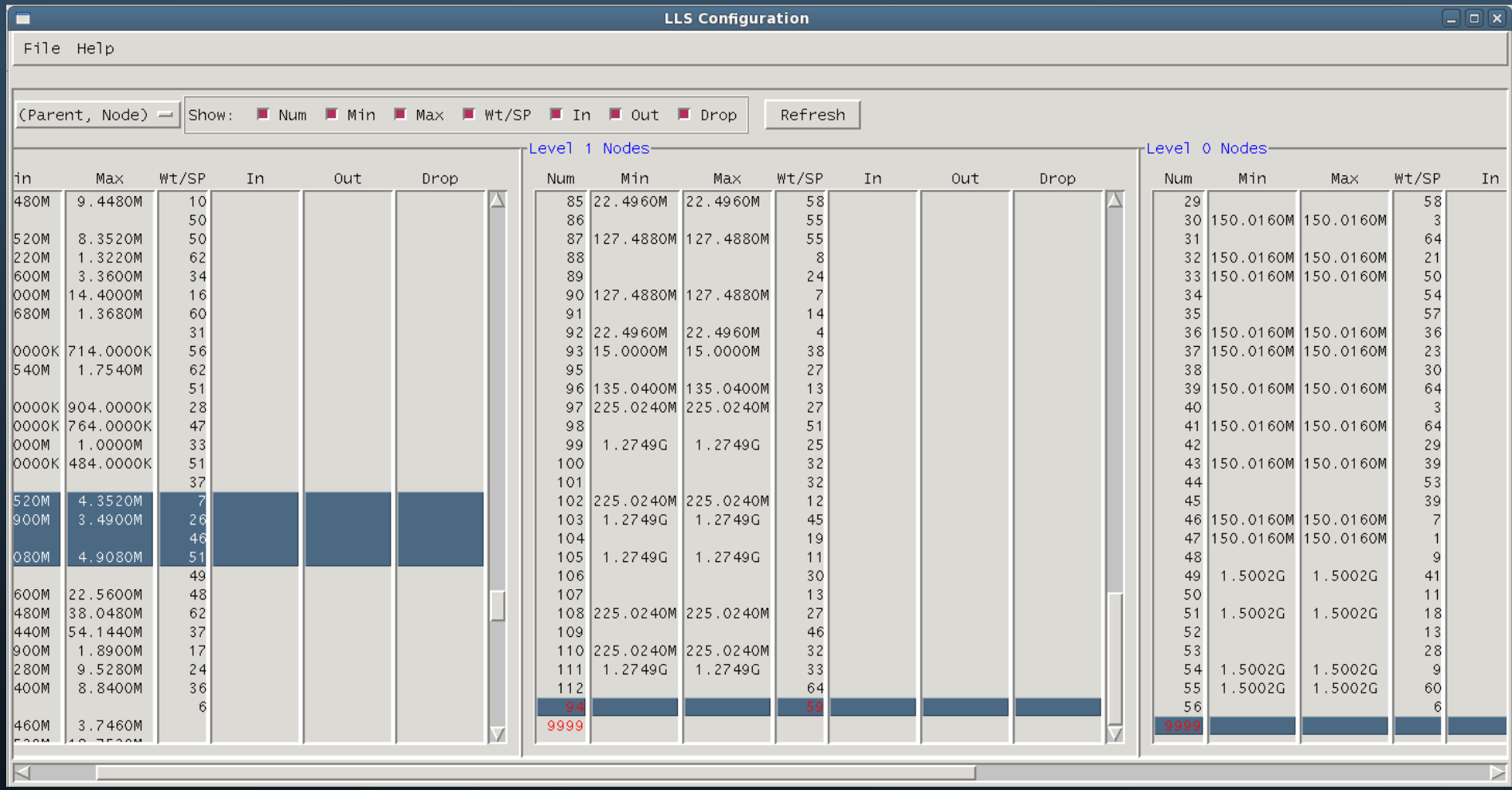
Linked List Scheduler(LLS)

- Theory Of Operation
  - mem_dump
    - Collects the raw memory
  - Ascii_tree
    - Convert into a human readable file
  - Tree to CSV
    - Convert into a machine readable file



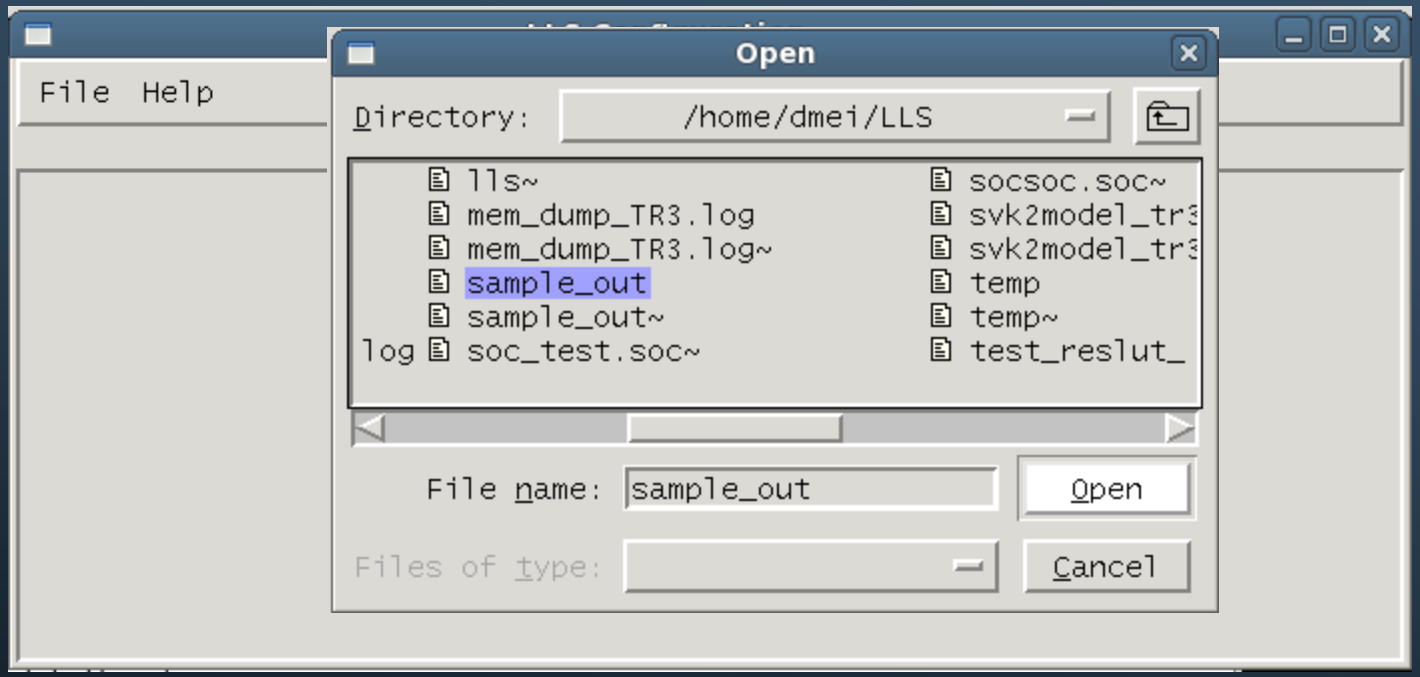
Linked List Scheduler(LLS)

- Demonstrations



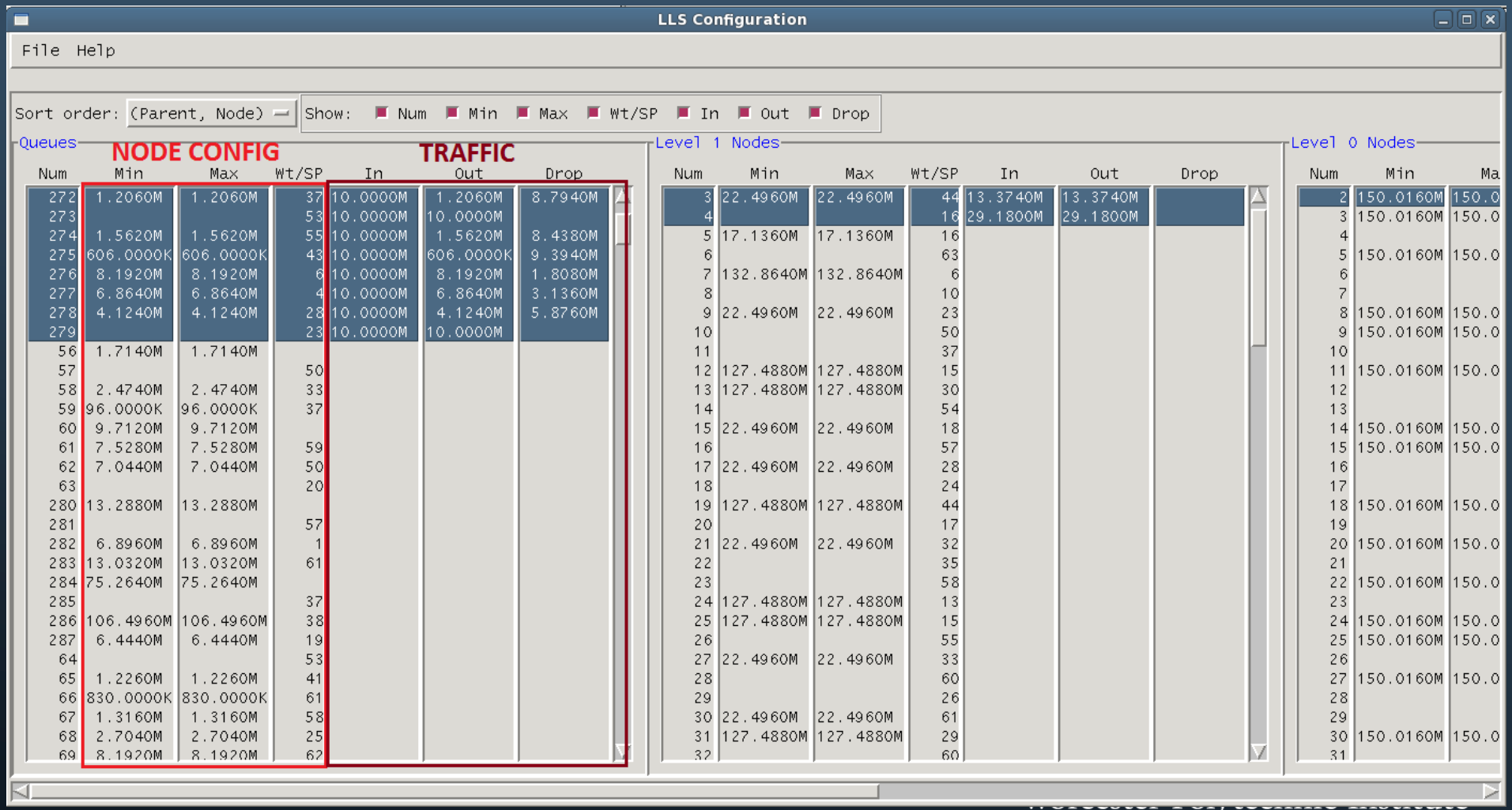
Linked List Scheduler(LLS)

- Bringing Up the GUI



Linked List Scheduler(LLS)

- Navigate the Tree



Linked List Scheduler(LLS)

- Error Check:

	Error Type	Note
1	Not Leading to an actual Port	Finished
2	EF and WERR cannot be configured at the same node	Finished
3	L2 nodes must be Strict Pri if marked as EF	Finished
4	In a group of queues that lead to l1, only one of the queues in the set is allowed to be EF	Finished

Linked List Scheduler(LLS)

- Supported Device

	Device name	Note
1	Triumph 3	Fully Supported
2	Katana	Fully Supported
3	Katana 2	Fully Supported
4	Trident 2	Started memory dump

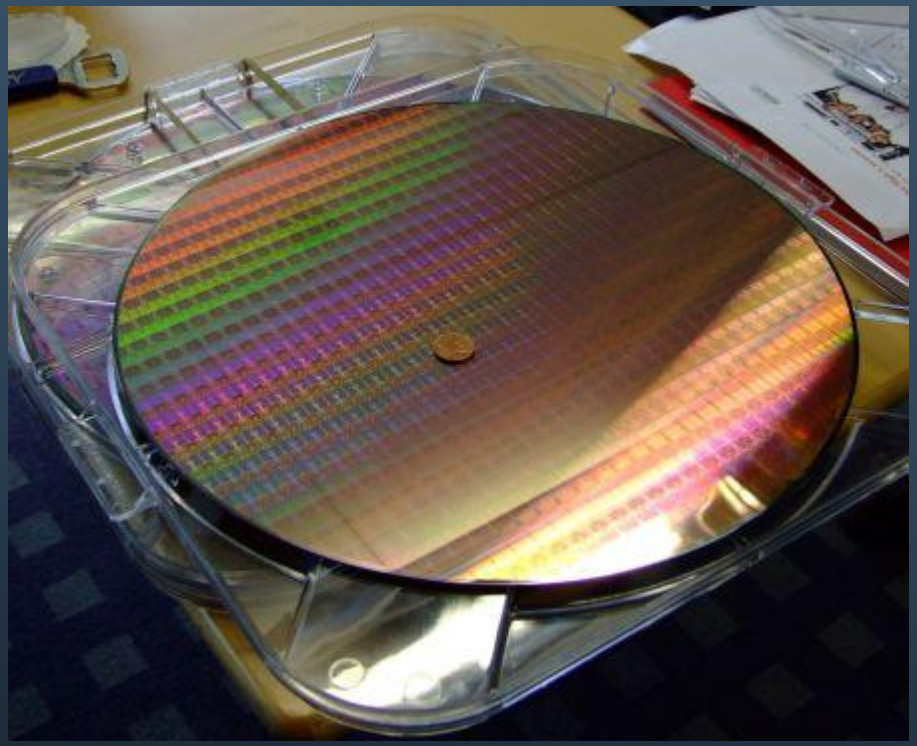
Linked List Scheduler(LLS)

- Future Work
  - Allow the user to change the parameters and see impact on traffic
  - Reverse Function
  - Support more devices and scheduling features

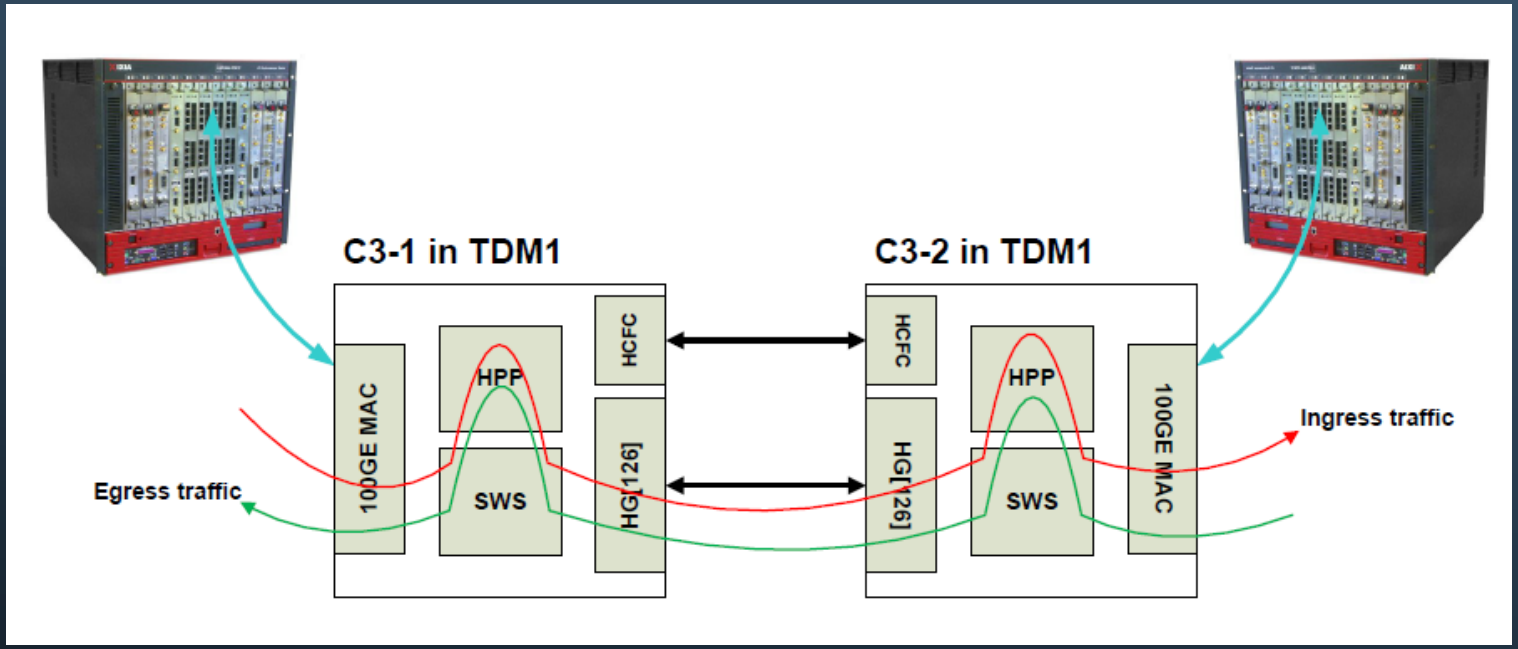
Split Lot Test

Split Lot Test

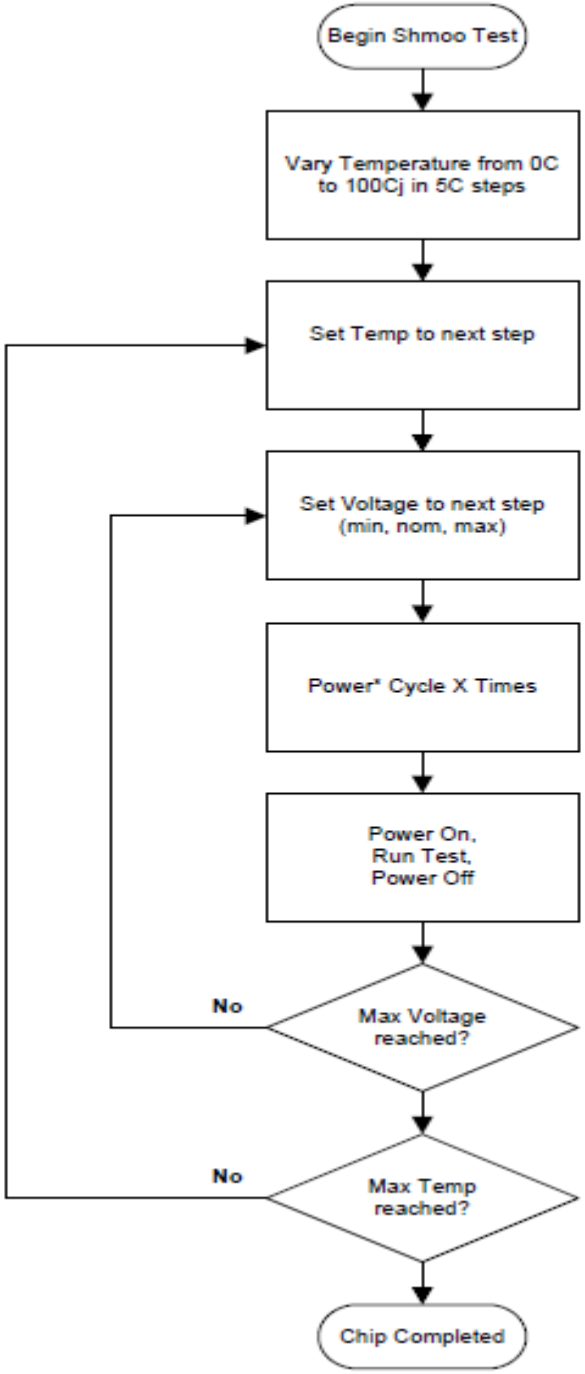
- Background
  - Fabrication Parameters change during manufacturing
  - Corners: FF, FS, SF, SS, TT
  - Temperature: -40 ºC ~ 110 ºC
  - Voltage: -3% ~ + 3%



Test Environment




MECHANICAL DEVICES
Manual Control Screen
Flex TC


Begin Shmoo Test
Vary Temperature from 0C to 100Cj in 5C steps
Set Temp to next step
Set Voltage to next step (min, nom, max)
Power* Cycle X Times
Power On, Run Test, Power Off
Max Voltage reached?
No
Max Temp reached?
No
Chip Completed

Split Lot Test

- My contributions to the test
  - Executed 65% Split Lot tests
  - Developed a TCL script that automates the Thermo Stream
  - Developed a test case monitoring power consumption for FF parts in high Voltage
  - Maintained a database for test results

Conclusion

Conclusions

- What was ultimately achieved for the sponsor?
  - A set of tools: feed in memory dump, gives out the graphic tree.
  - Currently EA1. Aimed to have a Release Version 1.0 by the end of this year
  - Targeted user: Application Engineers. Try to give to customers in the future

Conclusions

- What did I learn from the internship?
  - Programming language: Python, TCL, Perl
  - Unix – general operation
  - Perforce – source code control
  - Jira – issue tracking
  - Confluence – wiki

Conclusions

- How will the internship impact my academic learning at WPI?
  - Motivation
    - Better choice in course selecting, skill developing and tool set learning
  - Management
    - Balance life, work and study
  - Multi-skills
    - Programming language, communicational skills, problem solving

Future

Future

- How will the internship prepare me for my future career as an engineer?
  - Inspiration
    - Engineers are like designers
    - Design is Boundless
  - Co-operation
    - Being capable and willing to work with others
  - Education
    - Learning curve is steep

Future

- What are my next steps?
  - A Future engineer
- Some of my thoughts…
  - Take advantage of our hallmark
    - Being proud of a WPI student
  - Research: Turn money into Technology / Innovation: Turn technology into money

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