bring network and time together using Linux tracing

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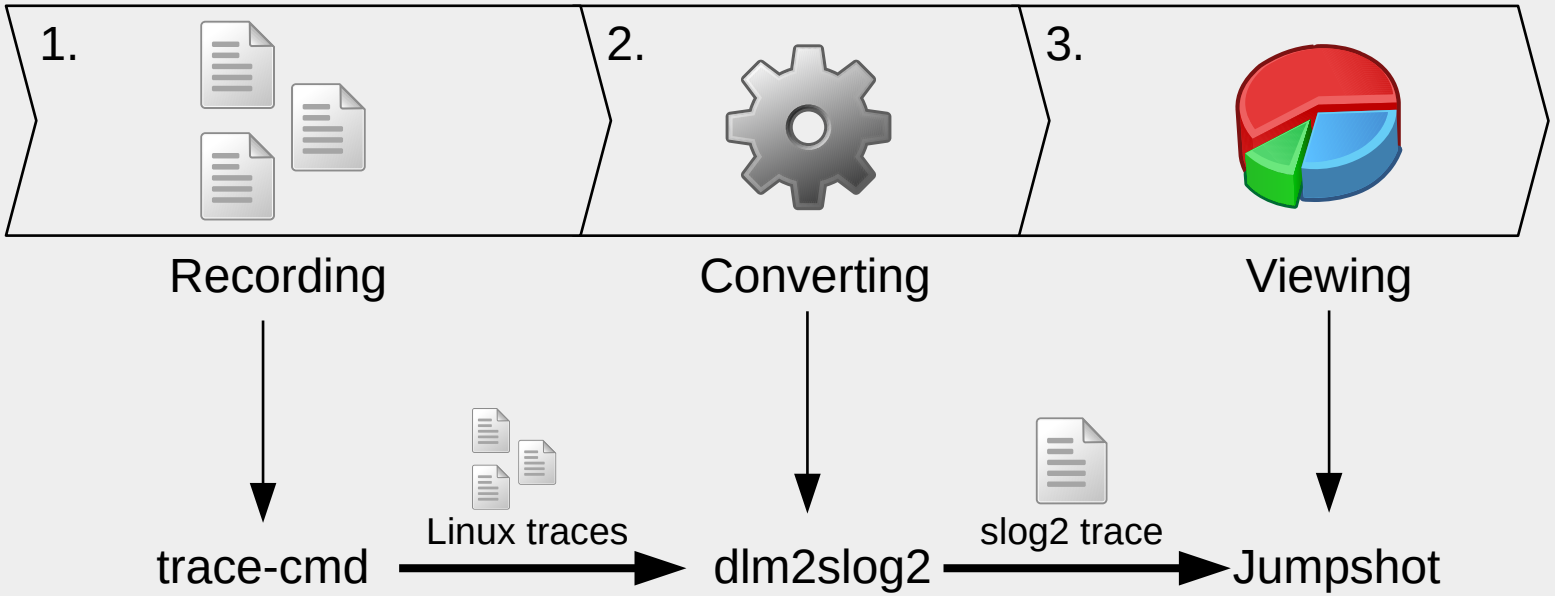
What to expect from this talk?

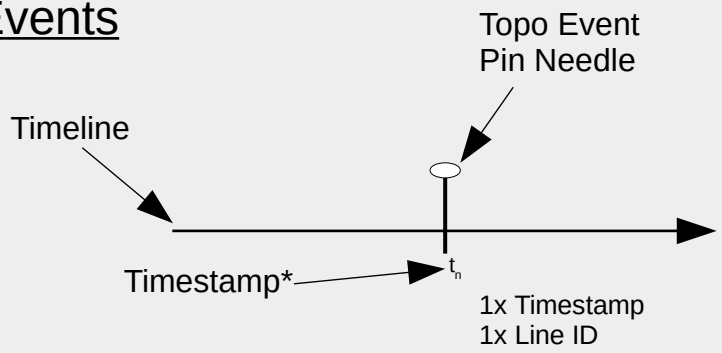
- Get into Time Synchronized Traces
- Software to Visualize DLM (net protocol)
  - trace-cmd (Upstream User Space Tool, C)
  - slog2sdk (Tracing Framework for MPI Apps, Java)
  - dlm2slog2 (DLM Trace Converter “bridge”)
- Using slog2sdk is optional
- DLM is an Application Example here!

Our Pipeline Steps

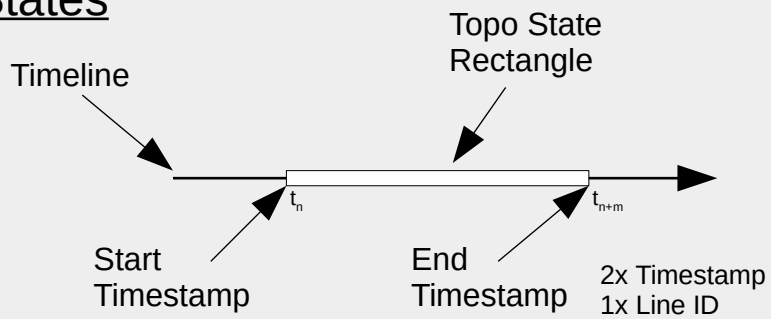


Visualizing Traces (slog2)

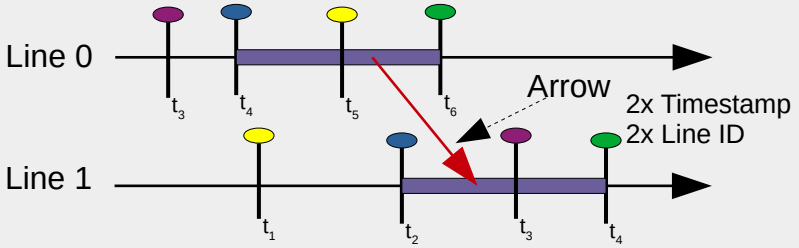
Events

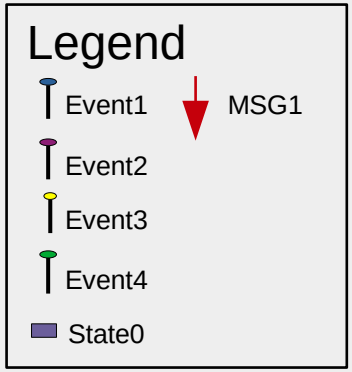


States



Example (GANTT)





*Timestamp is one of common Linux trace events fields, beside PID, CPU, etc. and user specific fields

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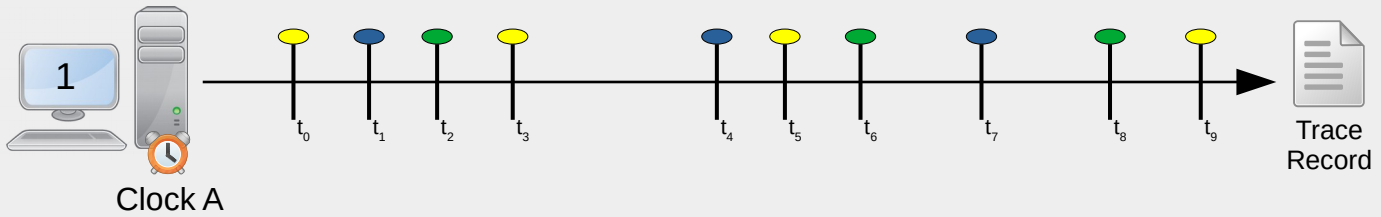
Local Tracing

- Clocks are in reality more complex
- Clocks are shown as trace-cmd user



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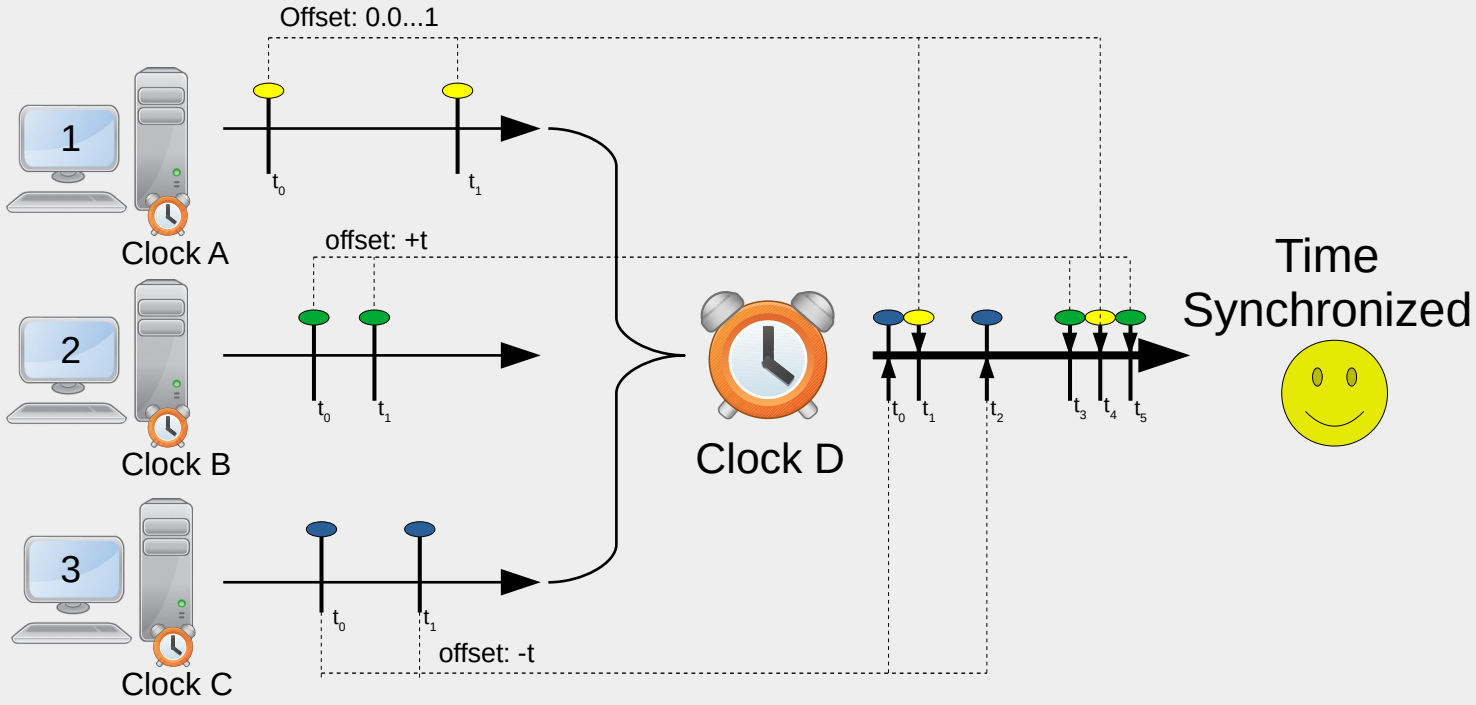
Time synchronized Tracing



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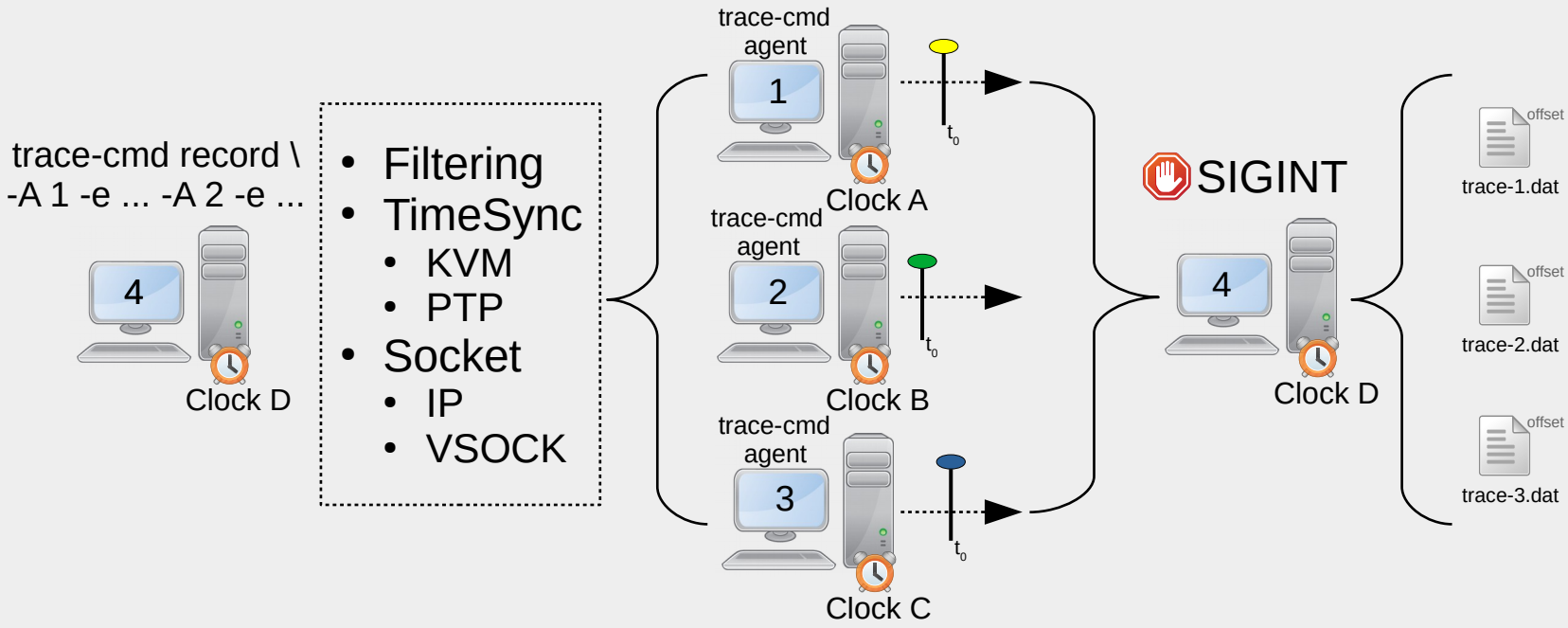
trace-cmd Time Synchronization



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Next Slides Notice!

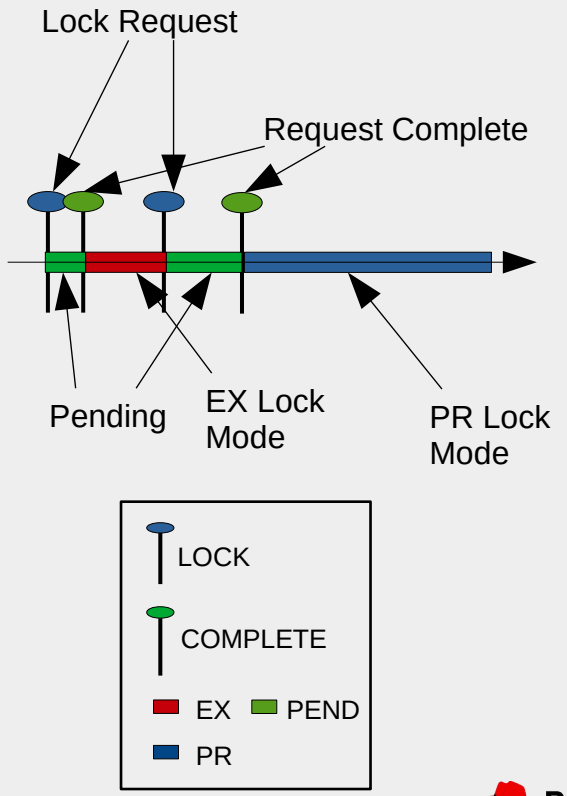
We close the Time Synchronzation chapter

Every Timeline shown in the next slides are Time Synchronized!

We will look now how we can use it for DLM!

Linux Distributed Lock Manager

- Networking Protocol
- Requires Cluster Manager
- Asynchronous API
- Locks have Lock Modes
- Principle Lock Masters



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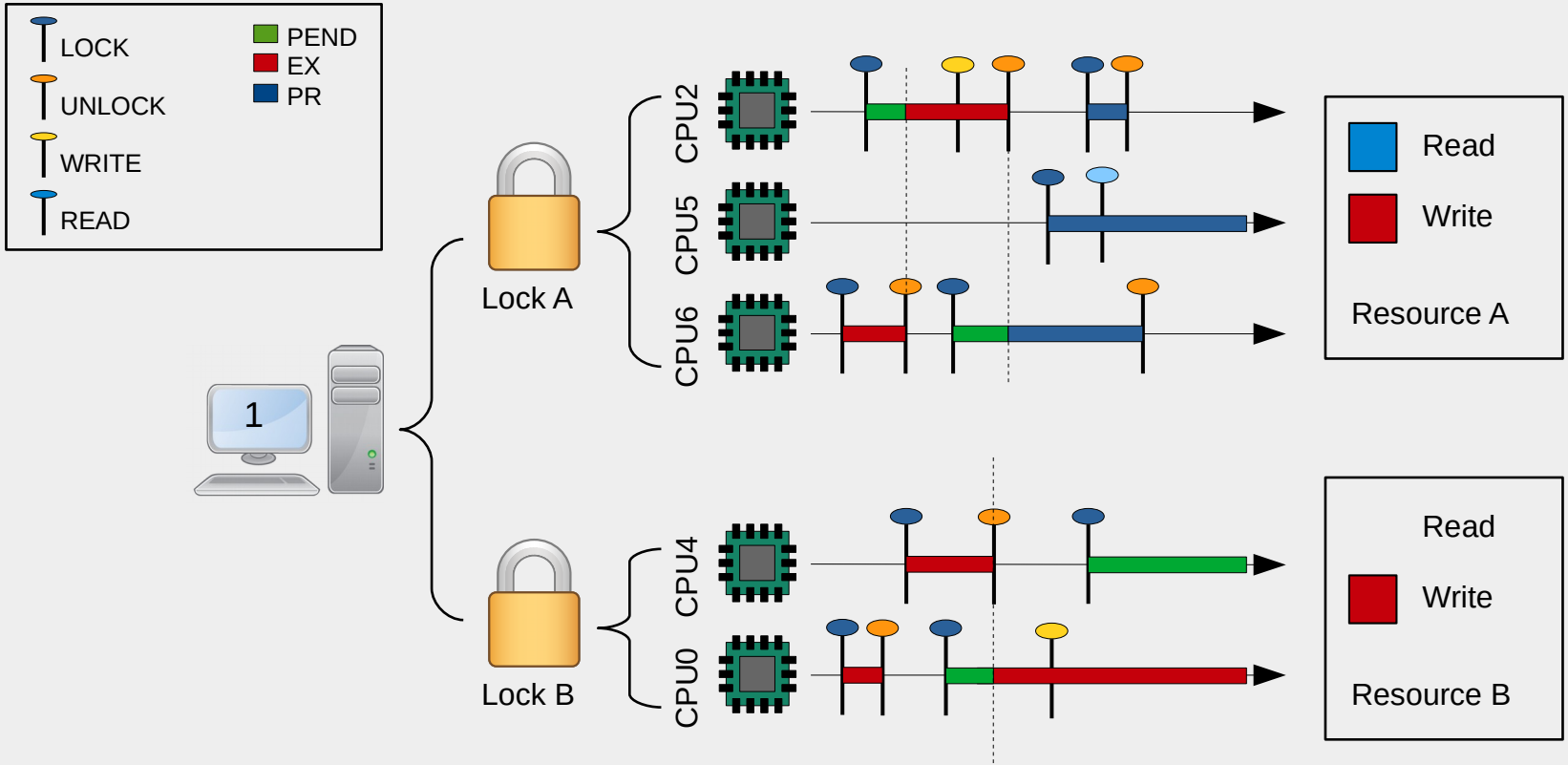
Traced Local Locking



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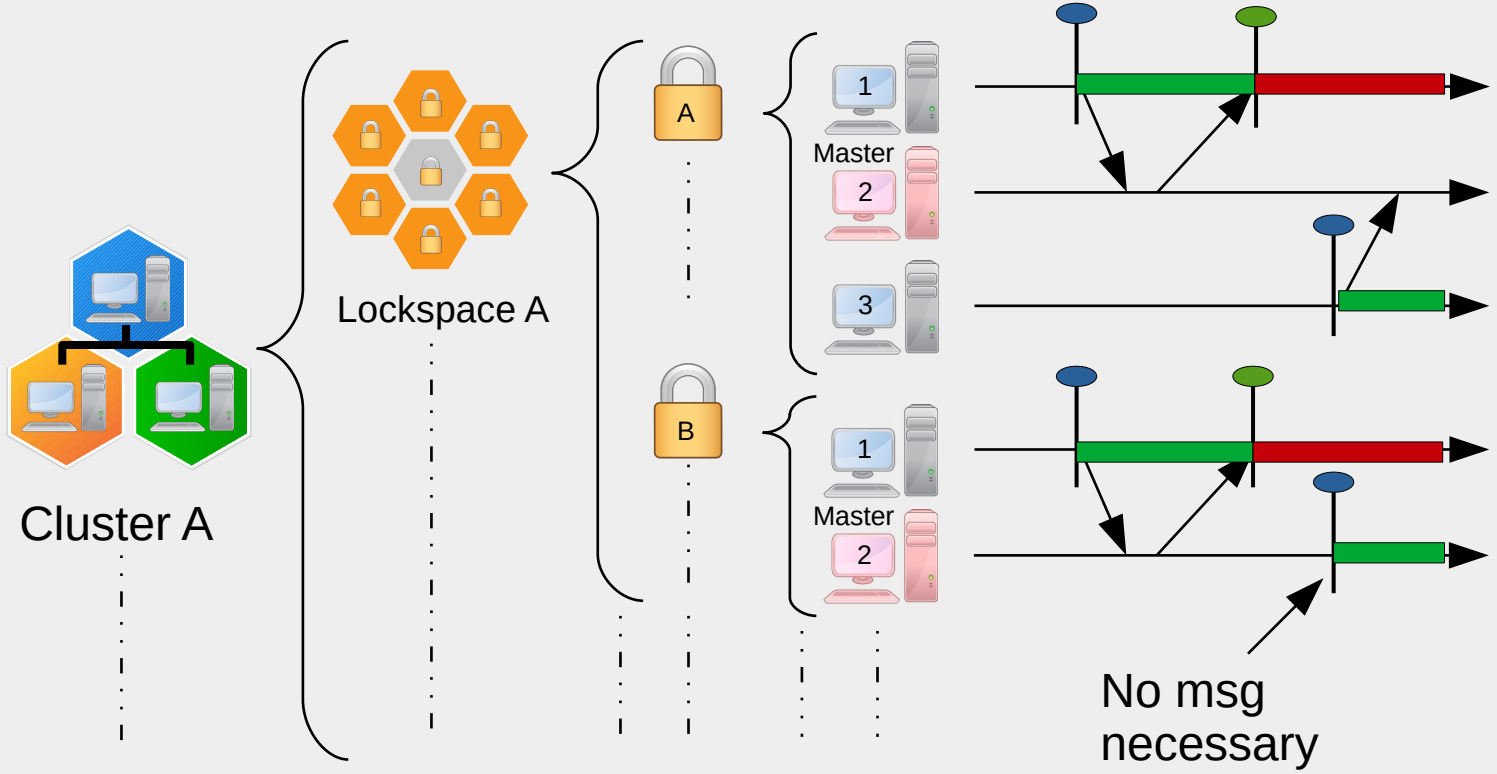
DLM Linux-Cluster Hierachy



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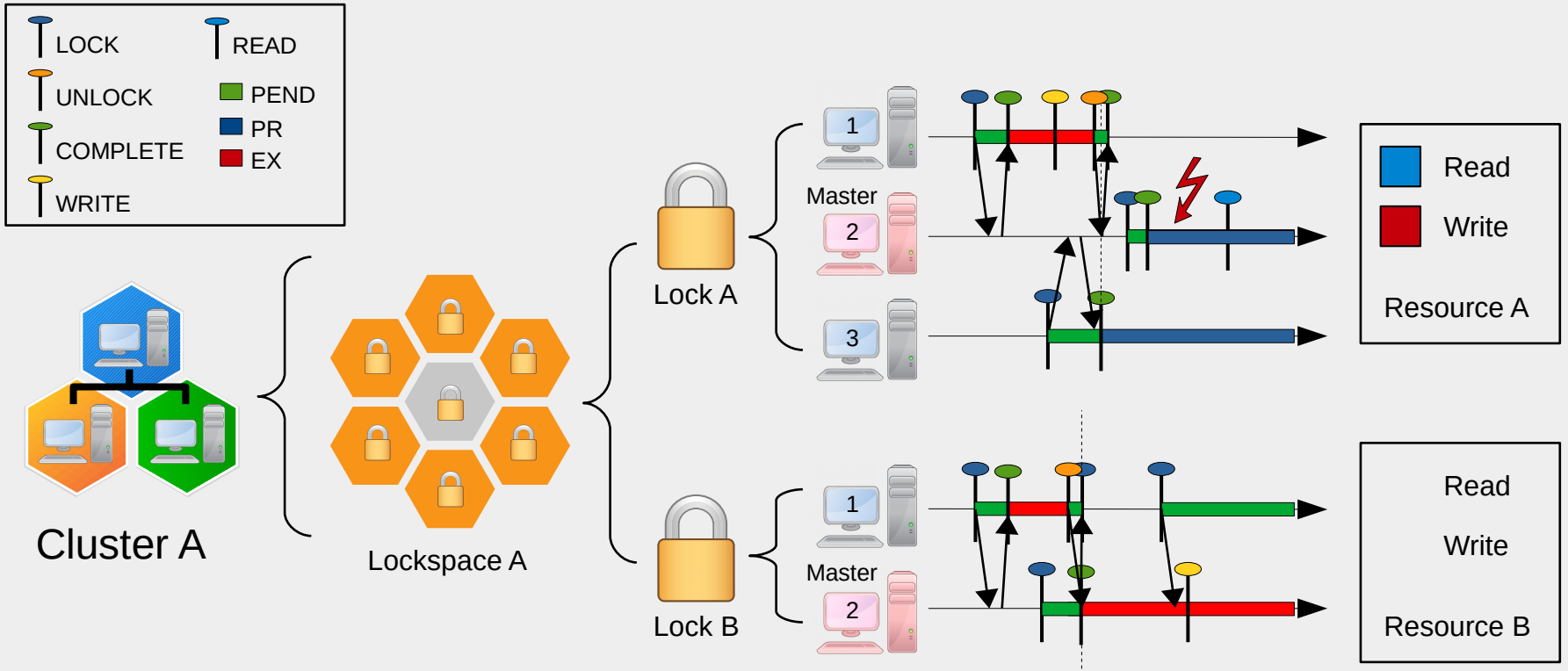
Traced Clustered DLM Locking



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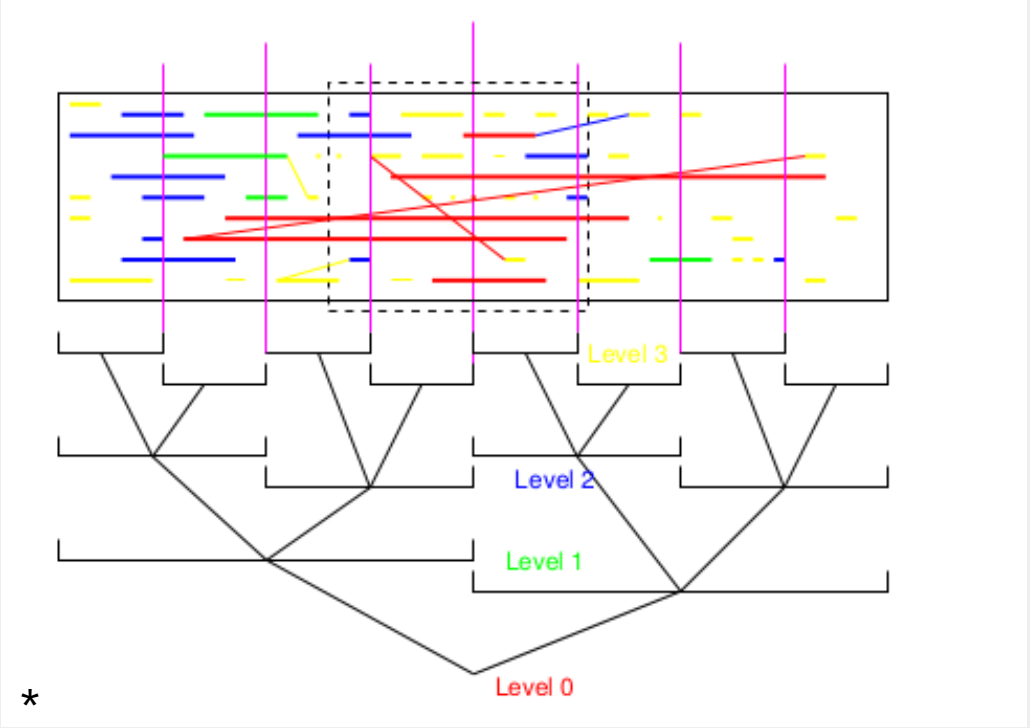
SLOG2 Format Timeline Scaling

- YA Fileformat?
- Large Records
- Level Of Detail
- Partial-Read
- Zooming
- X-Axis Scaling
- Y-Axis?

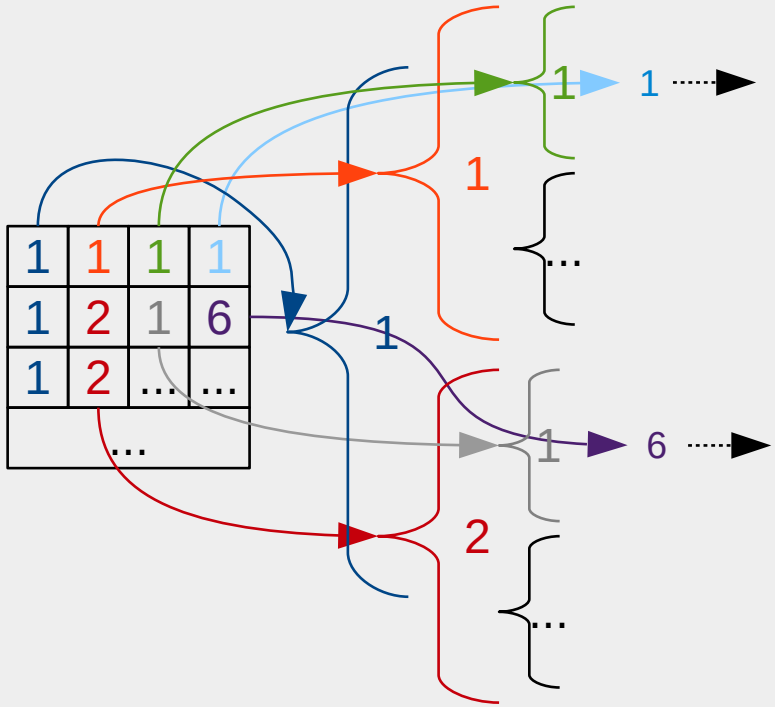


*

*Image from slog2 paper: https://ftp.mcs.anl.gov/pub/mpi/slog2/slog2-paper.pdf

SLOG2 YCoordMap

- Multidimensional Array
- Columns for Y-Axis
- Column to LineID*
- DLM Cluster Hierarchy



*LineID is the last column inside the YCoordMap

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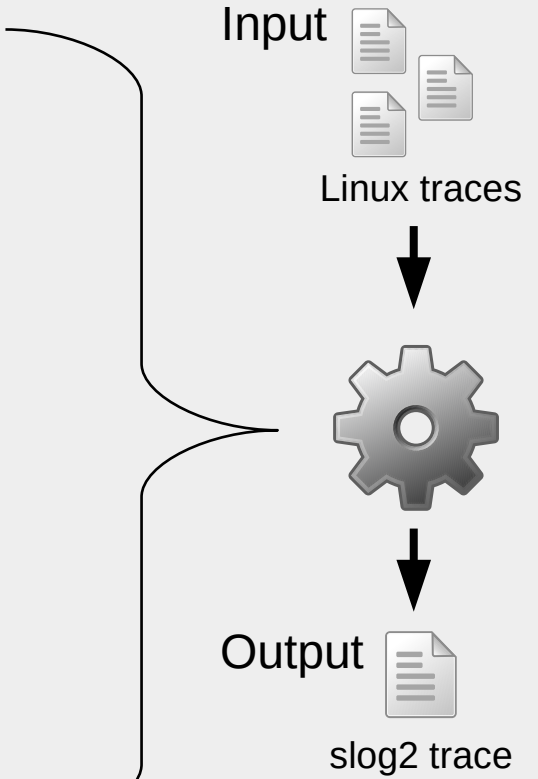
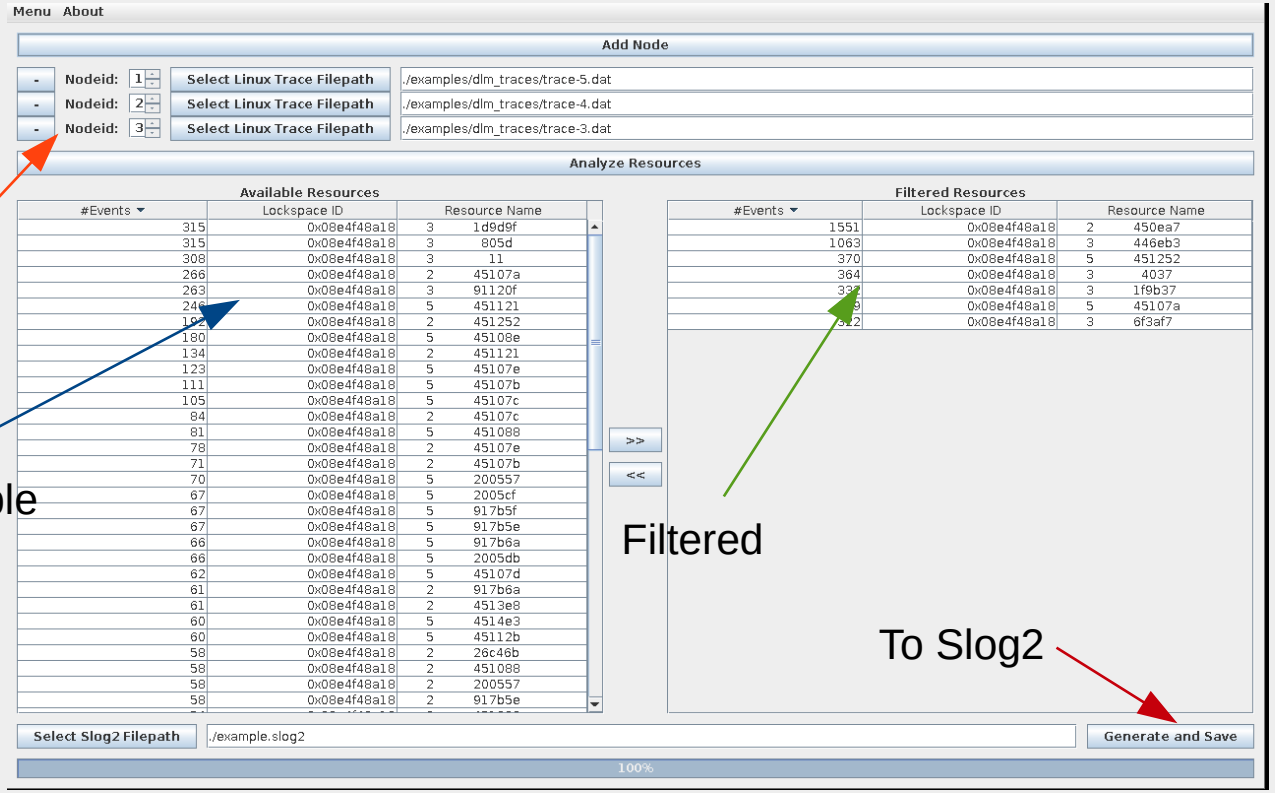
dlm2slog2

1) Analyze
   - Java-Bindings (Parsing)
   - Overview about Locks
2) User Filtering
   - Provide Way Scale Y-Axis
3) Generate
   - Events and States
   - Generates YCoordMap



dlm2slog2



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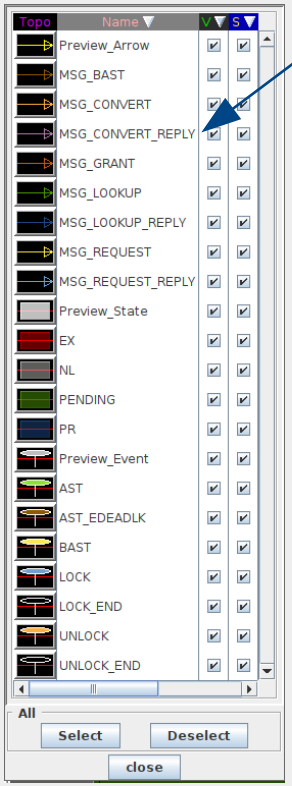
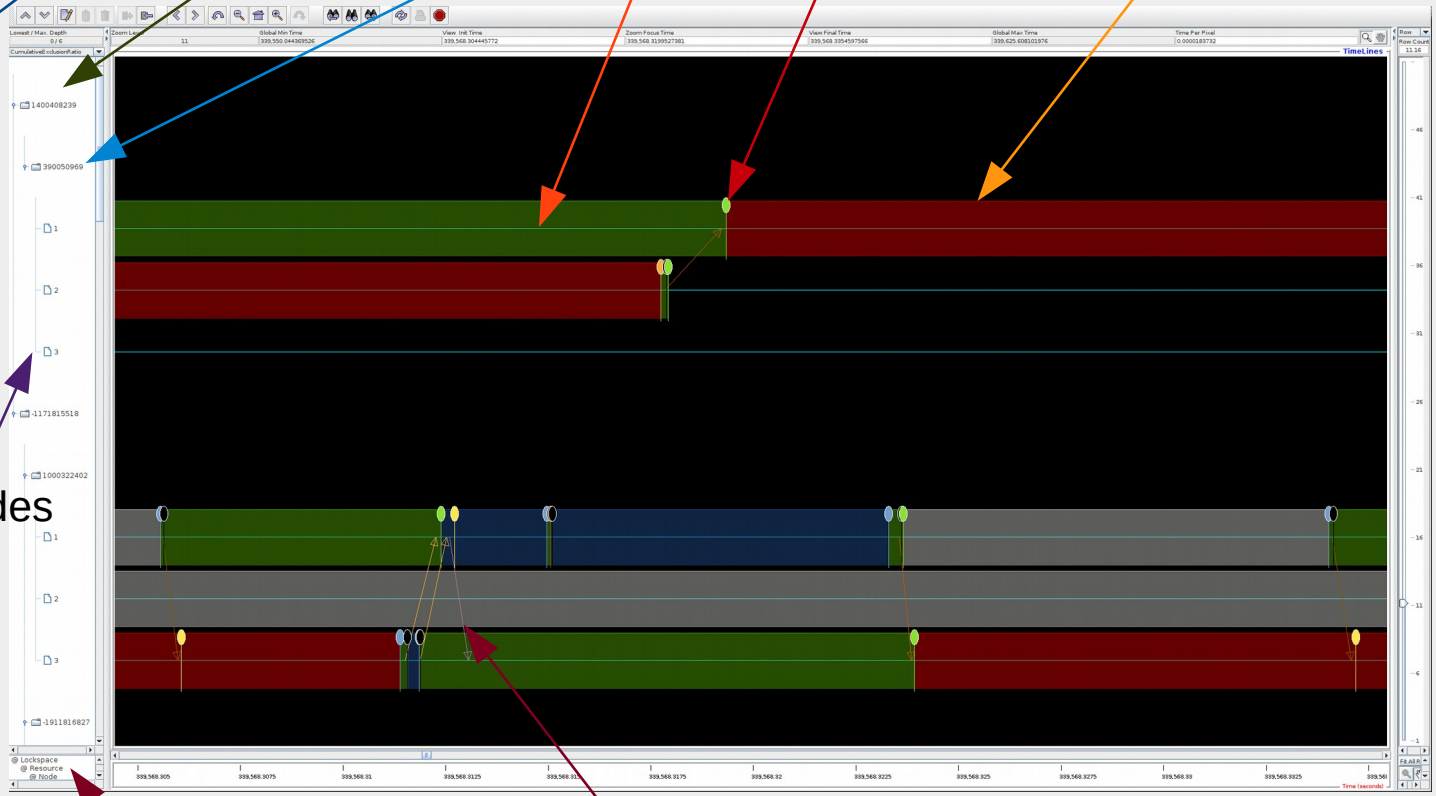
Jumpshot





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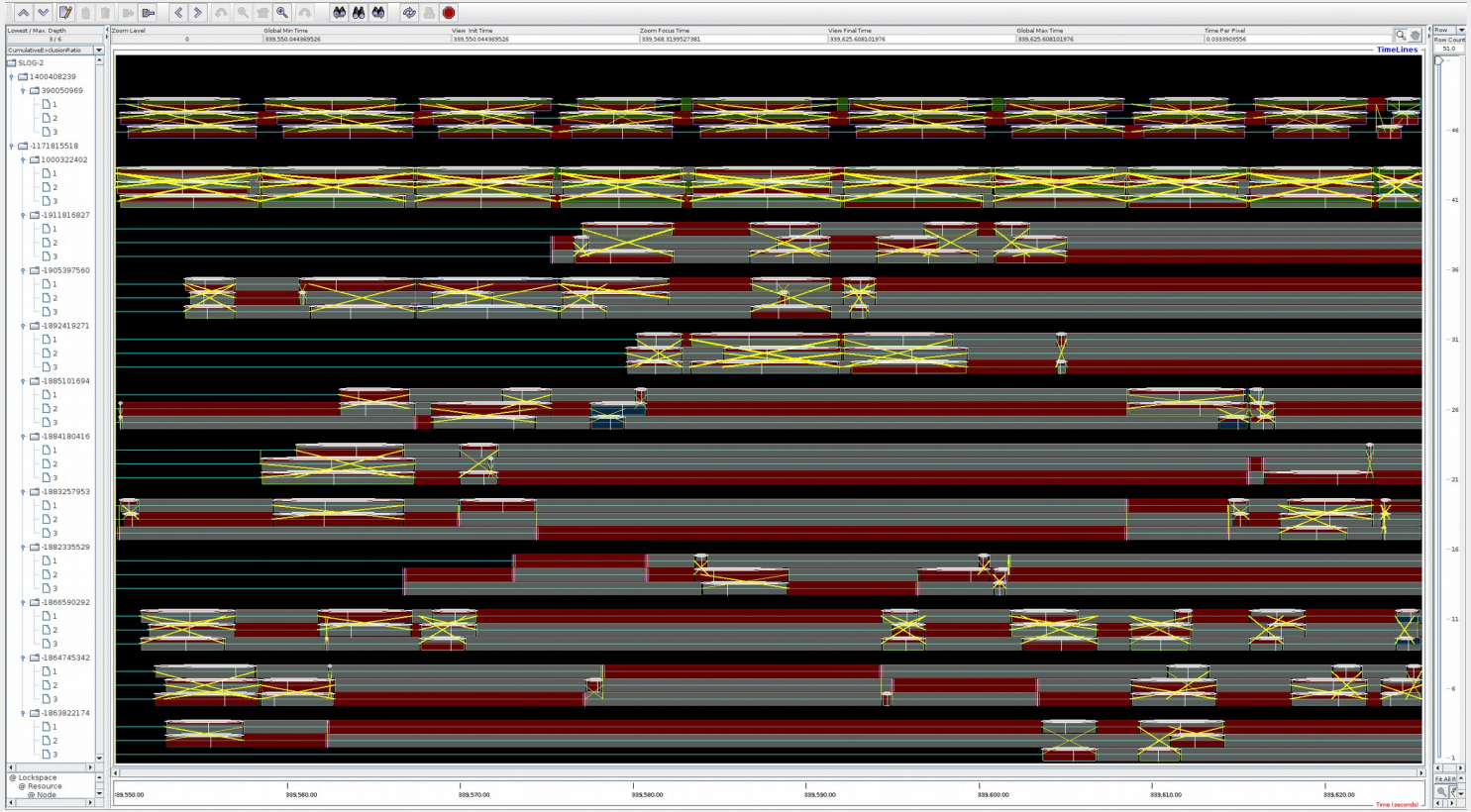
Jumpshot Non-zoomed Preview



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Future Work

- Continuous Kernel Integration
  - DLM Locktorture Test
  - Check for Lock incompatible Modes
- Runtime Kernel Optizimation
  - Predigt and Switch Lock Master
  - Networking Queues with skb mark?

End

Thanks

https://gitlab.com/netcoder/dlm2slog2/-/wikis/home