

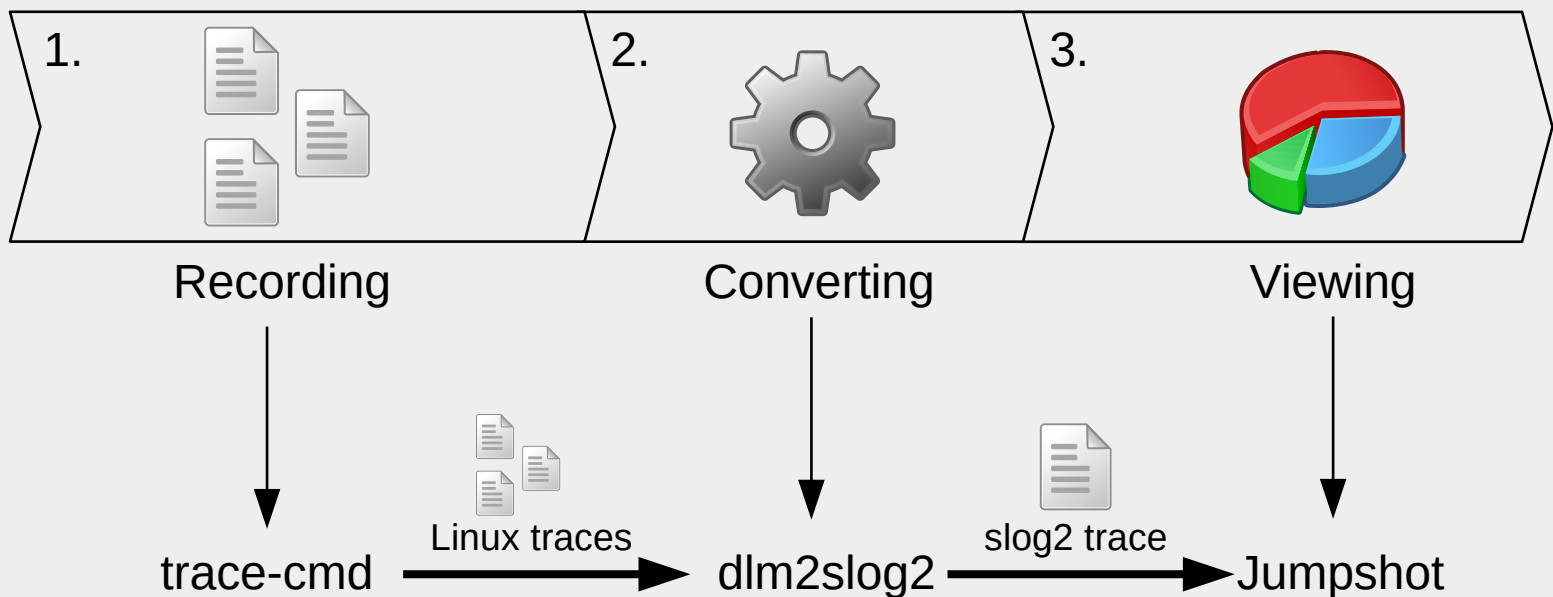
bring network and time together using Linux tracing

Alexander Aring

What to expect from this talk?

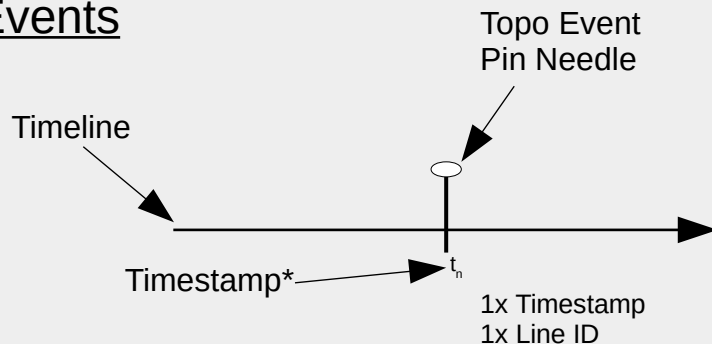
- Get into Time Synchronized Traces
- Software to Visualize DLM (net protocol)
 - trace-cmd (Upstream User Space Tool, C)
 - slog2sdk (Tracing Framework for MPI Apps, Java)
 - dlm2slog2 (DLM Trace Converter “bridge”)
- Using slog2sdk is optional
- DLM is an Application Example here!

Our Pipeline Steps

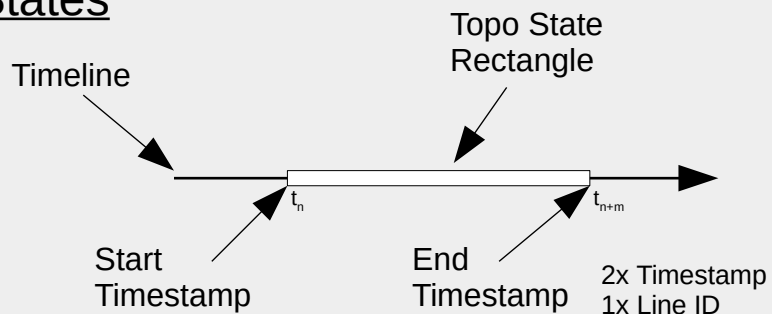


Visualizing Traces (slog2)

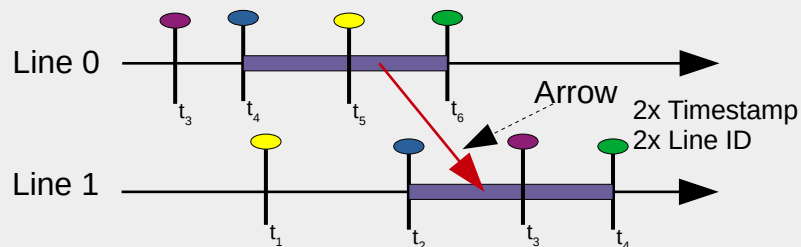
Events



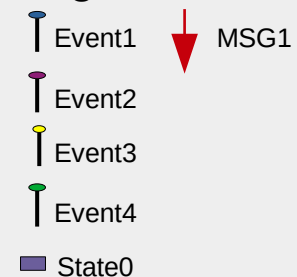
States



Example (GANTT)

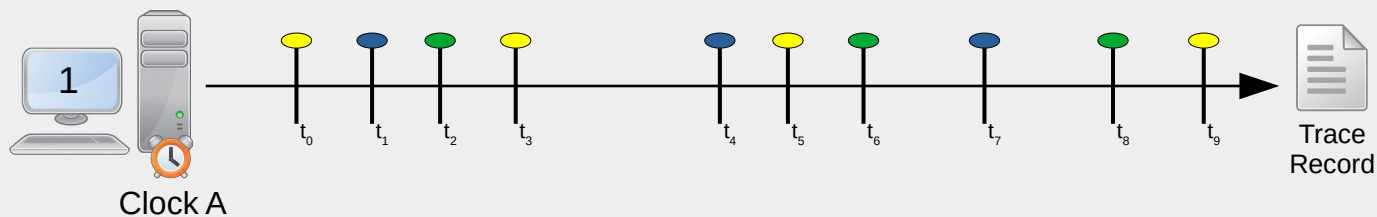


Legend

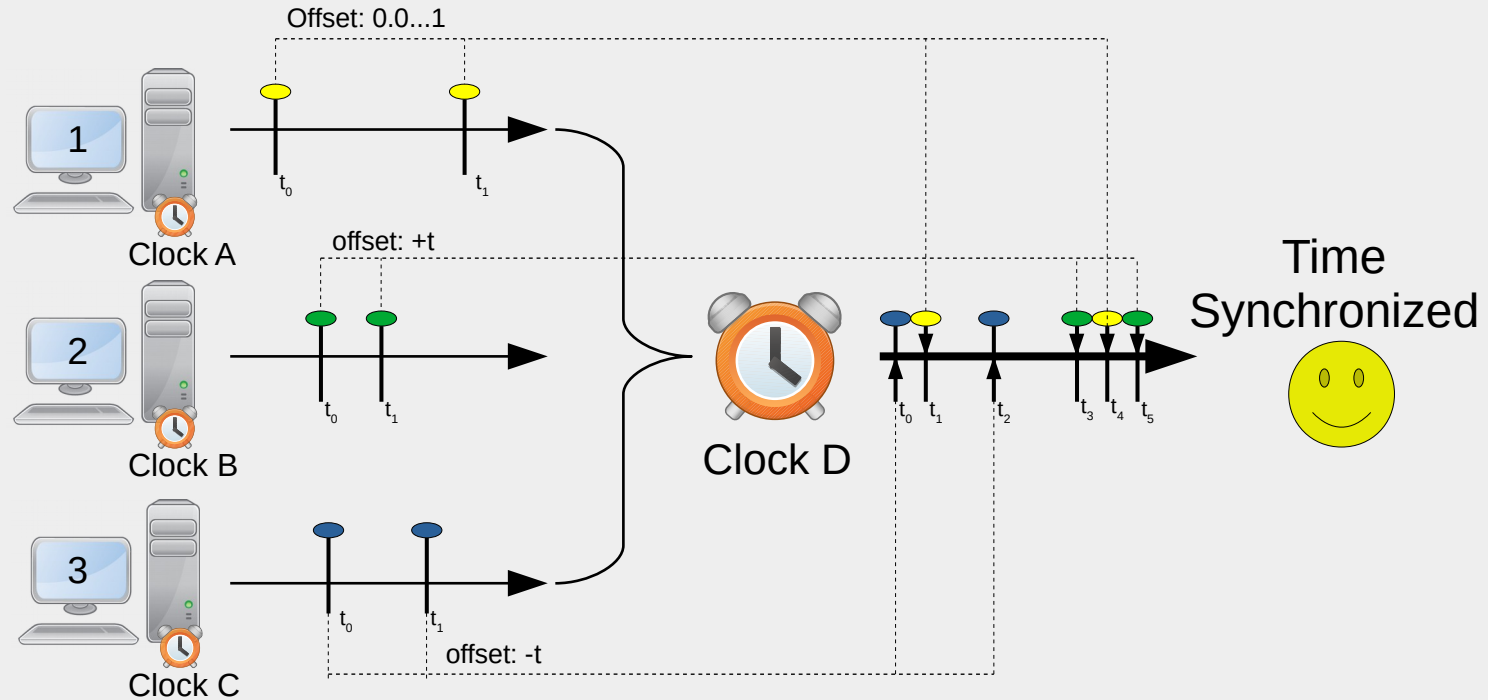


Local Tracing

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



Time synchronized Tracing



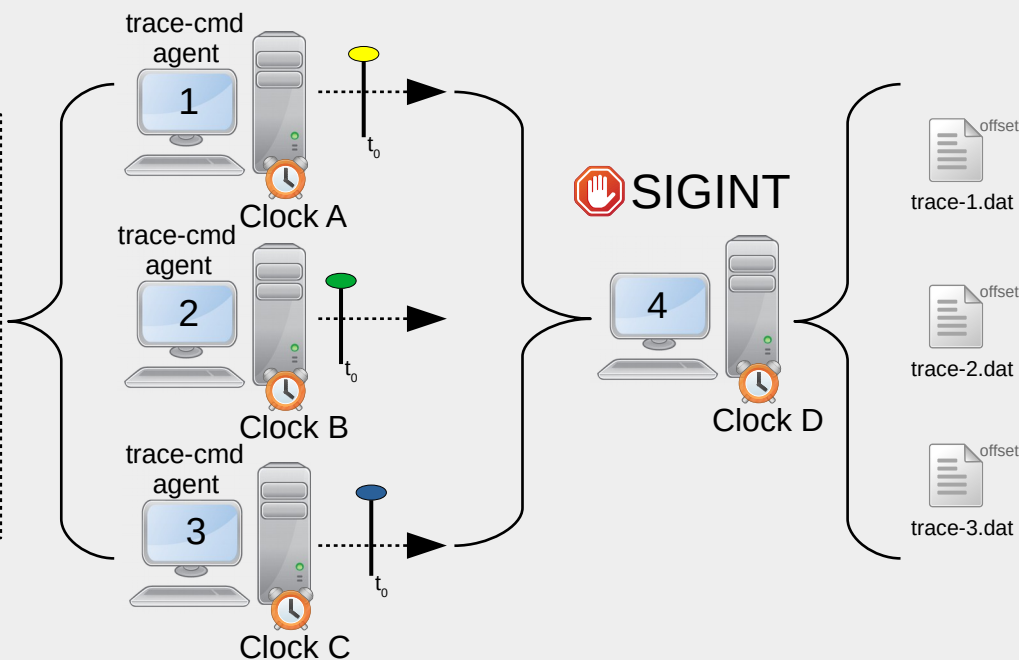
trace-cmd Time Synchronization



```
trace-cmd record \  
-A 1 -e ... -A 2 -e ...
```



- Filtering
- TimeSync
 - KVM
 - PTP
- Socket
 - IP
 - VSOCK



Next Slides Notice!

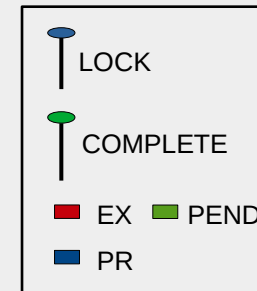
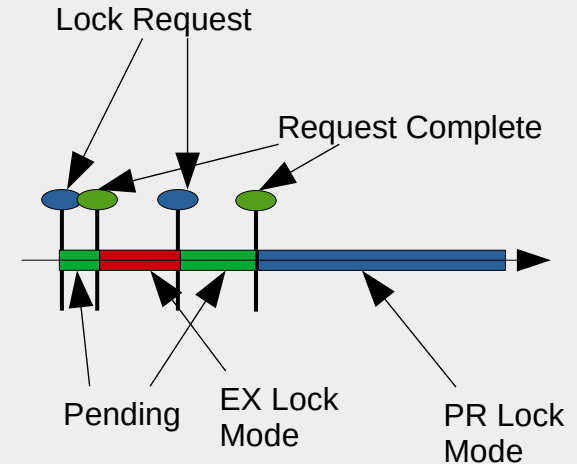
We close the Time Synchronization chapter

Every Timeline shown in the next slides are
Time Synchronized!

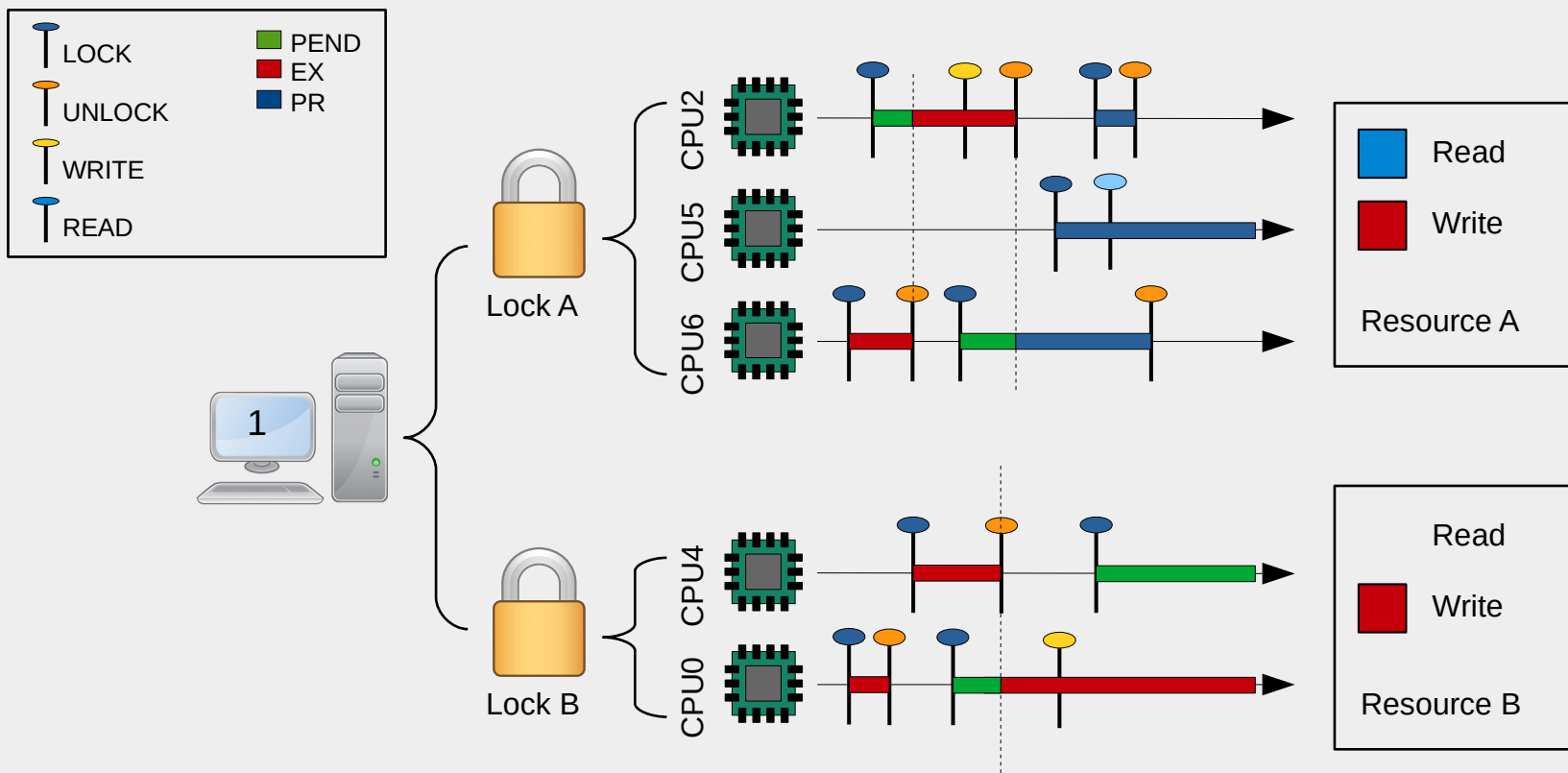
We will look now how we can use it for DLM!

Linux Distributed Lock Manager

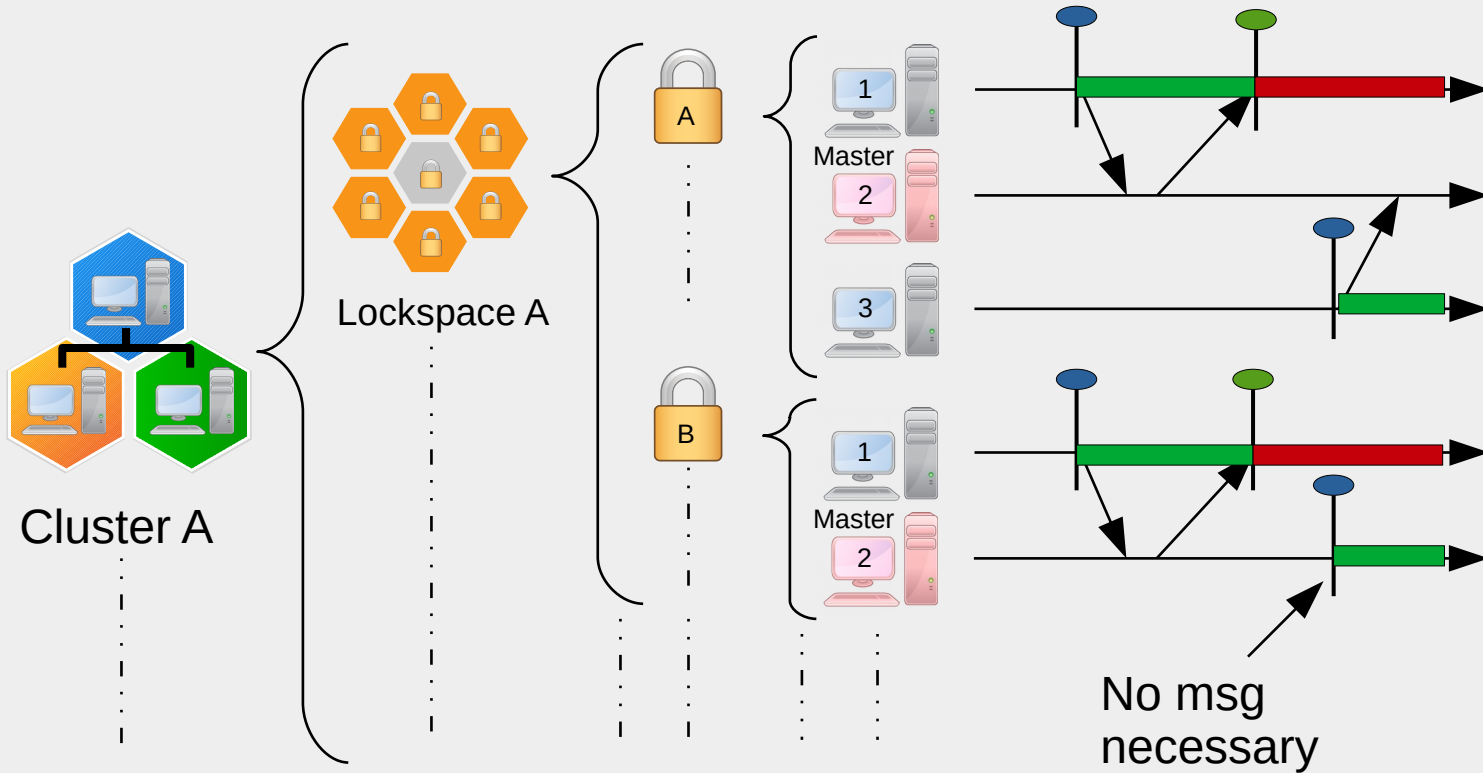
- Networking Protocol
- Requires Cluster Manager
- Asynchronous API
- Locks have Lock Modes
- Principle Lock Masters



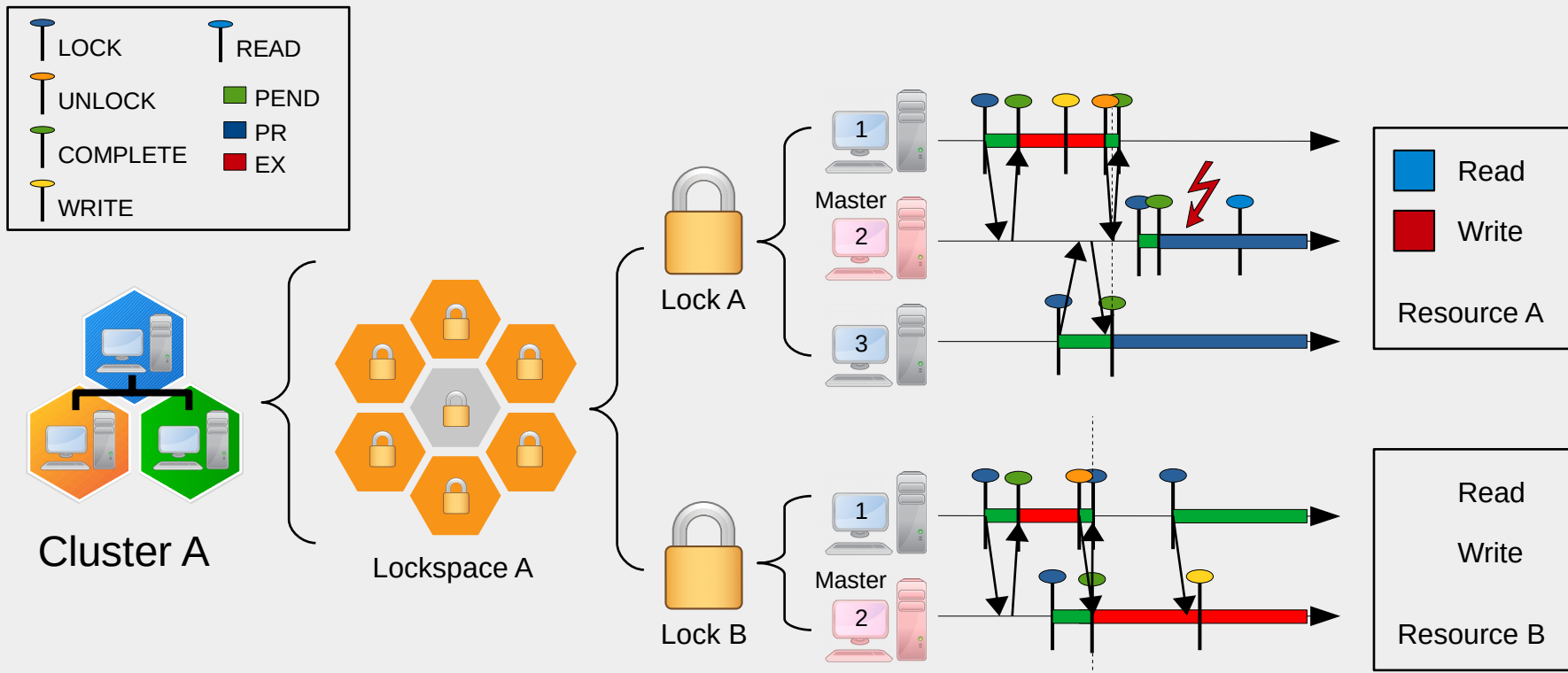
Traced Local Locking



DLM Linux-Cluster Hierarchy

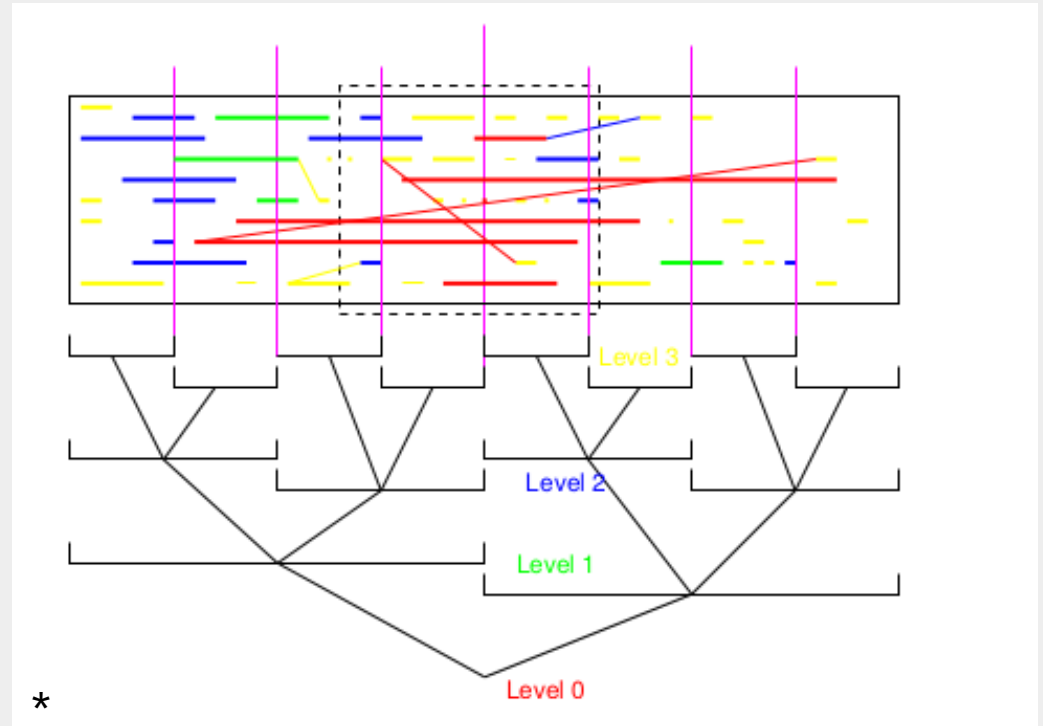


Traced Clustered DLM Locking



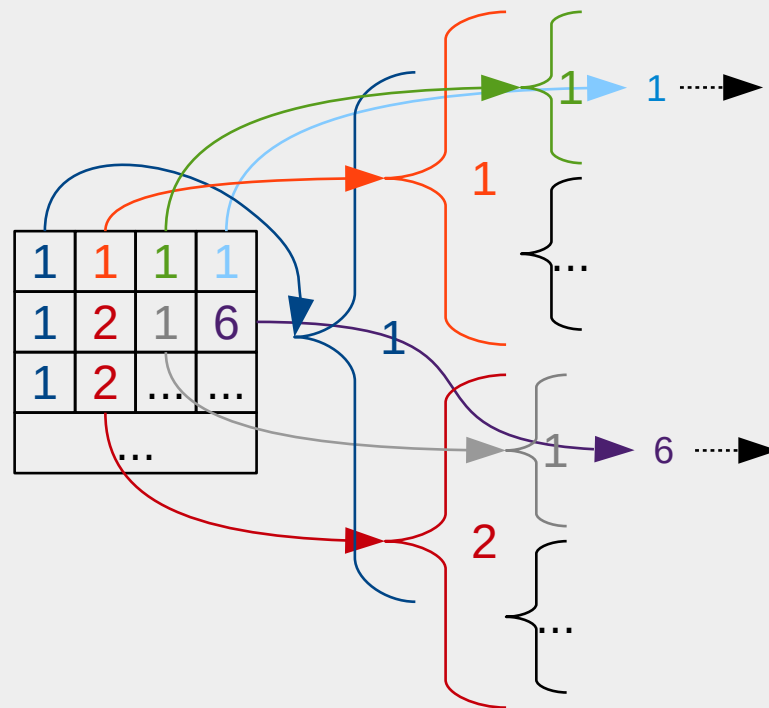
SLOG2 Format Timeline Scaling

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



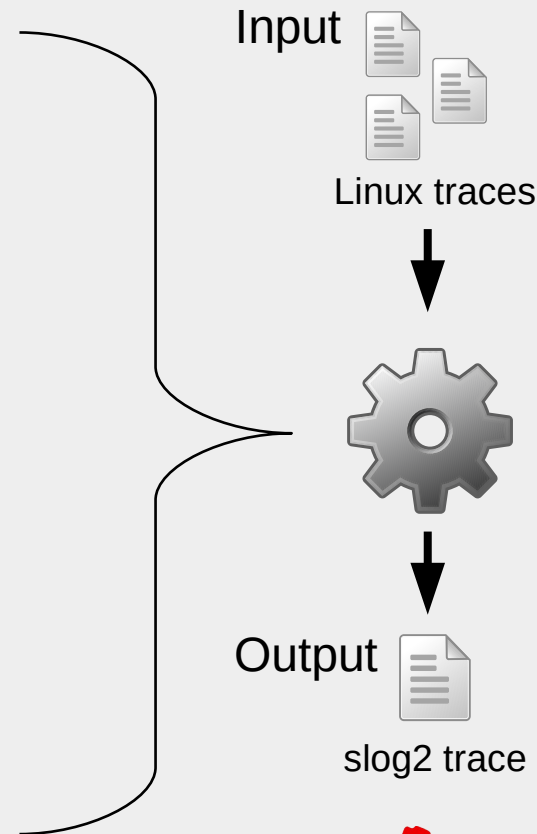
SLOG2 YCoordMap

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



dIm2slog2

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



dlm2slog2



Menu About

Add Node

- Nodeid: 1	Select Linux Trace Filepath	./examples/dlm_traces/trace-5.dat
- Nodeid: 2	Select Linux Trace Filepath	./examples/dlm_traces/trace-4.dat
- Nodeid: 3	Select Linux Trace Filepath	./examples/dlm_traces/trace-3.dat

Analyze Resources

Available Resources				Filtered Resources			
#Events	Lockspace ID	Resource Name		#Events	Lockspace ID	Resource Name	
315	0x08e4f48a18	3 1d9df		1551	0x08e4f48a18	2 450ea7	
315	0x08e4f48a18	3 805d		1063	0x08e4f48a18	3 449eb3	
308	0x08e4f48a18	3 11		370	0x08e4f48a18	5 451252	
266	0x08e4f48a18	2 45107a		364	0x08e4f48a18	3 4037	
263	0x08e4f48a18	3 91120f		327	0x08e4f48a18	3 1f9b37	
246	0x08e4f48a18	5 451121		299	0x08e4f48a18	5 45107a	
182	0x08e4f48a18	2 451252		222	0x08e4f48a18	3 6f3af7	
180	0x08e4f48a18	5 45108e					
134	0x08e4f48a18	2 451121					
123	0x08e4f48a18	5 45107e					
111	0x08e4f48a18	5 45107b					
105	0x08e4f48a18	5 45107c					
84	0x08e4f48a18	2 45107c					
81	0x08e4f48a18	5 451088					
78	0x08e4f48a18	2 45107e					
71	0x08e4f48a18	2 45107b					
70	0x08e4f48a18	5 200557					
67	0x08e4f48a18	5 2005cf					
67	0x08e4f48a18	5 917b5f					
67	0x08e4f48a18	5 917b5e					
66	0x08e4f48a18	5 917b6a					
66	0x08e4f48a18	5 2005db					
62	0x08e4f48a18	5 45107d					
61	0x08e4f48a18	2 917b6a					
61	0x08e4f48a18	2 4513e8					
60	0x08e4f48a18	5 4514e3					
60	0x08e4f48a18	5 45112b					
58	0x08e4f48a18	2 26c46b					
58	0x08e4f48a18	2 451088					
58	0x08e4f48a18	2 200557					
58	0x08e4f48a18	2 917b5e					

Select Slog2 Filepath: ./example.slog2

Generate and Save

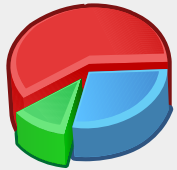
100%

Linux Traces

Available

Filtered

To Slog2



Jumpshot

Legend

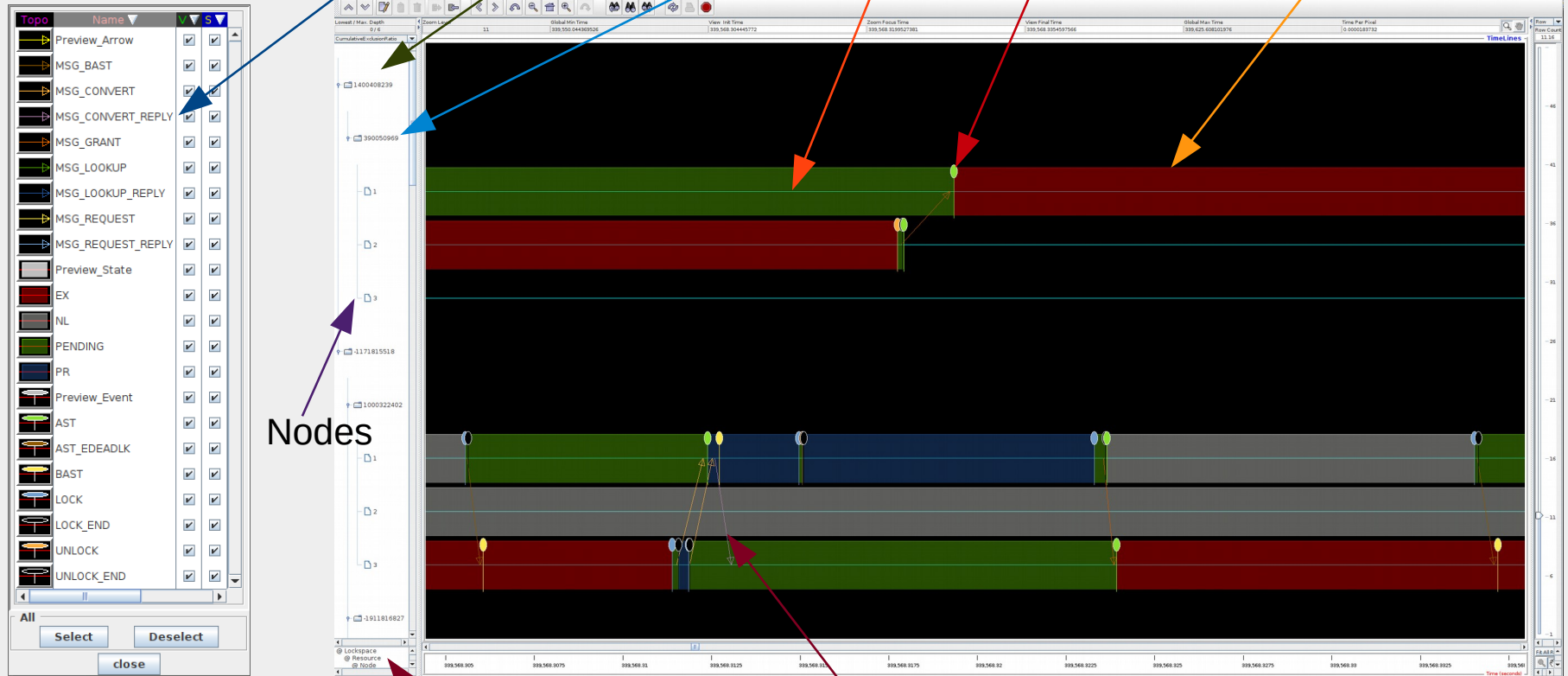
Lockspace

Lock

Timelines

Events

States

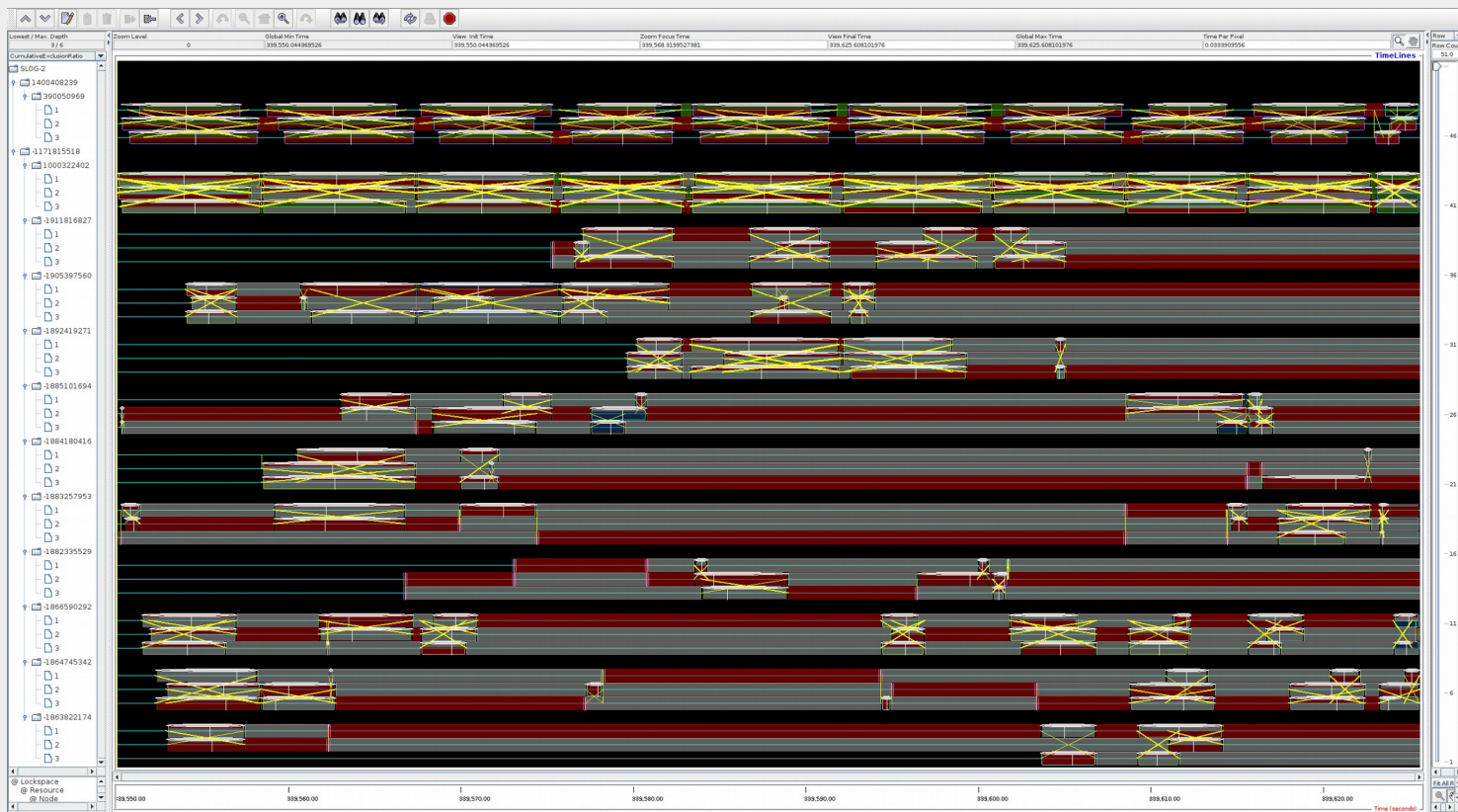


Nodes

YCoordMap

Arrows

Jumpshot Non-zoomed Preview



Future Work

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

End

Thanks

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