

# Simple Lock Performance Improvements

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Application Development Subcommittee

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# Background

- Simple locks are a type of lock used for locking and serialization
  - Primarily used in the z/TPF file system, logical record cache support, and other related areas
  - An ECB might give up control while waiting for a simple lock

```
#include <sys/simplelock.h>

simple_lock(&(mySimpleLock));

    // Perform operations under lock here
    . . .

simple_unlock(&(mySimpleLock));
```

# Pain Points

- On a z/TPF system with multiple I-streams and high simple lock usage, multiple I-streams might be competing for the same simple lock at the same time
- High simple lock contention between I-streams might:



Reduce throughput in areas with simple lock contention



Increase CPU usage and impact system performance

# Value Statement

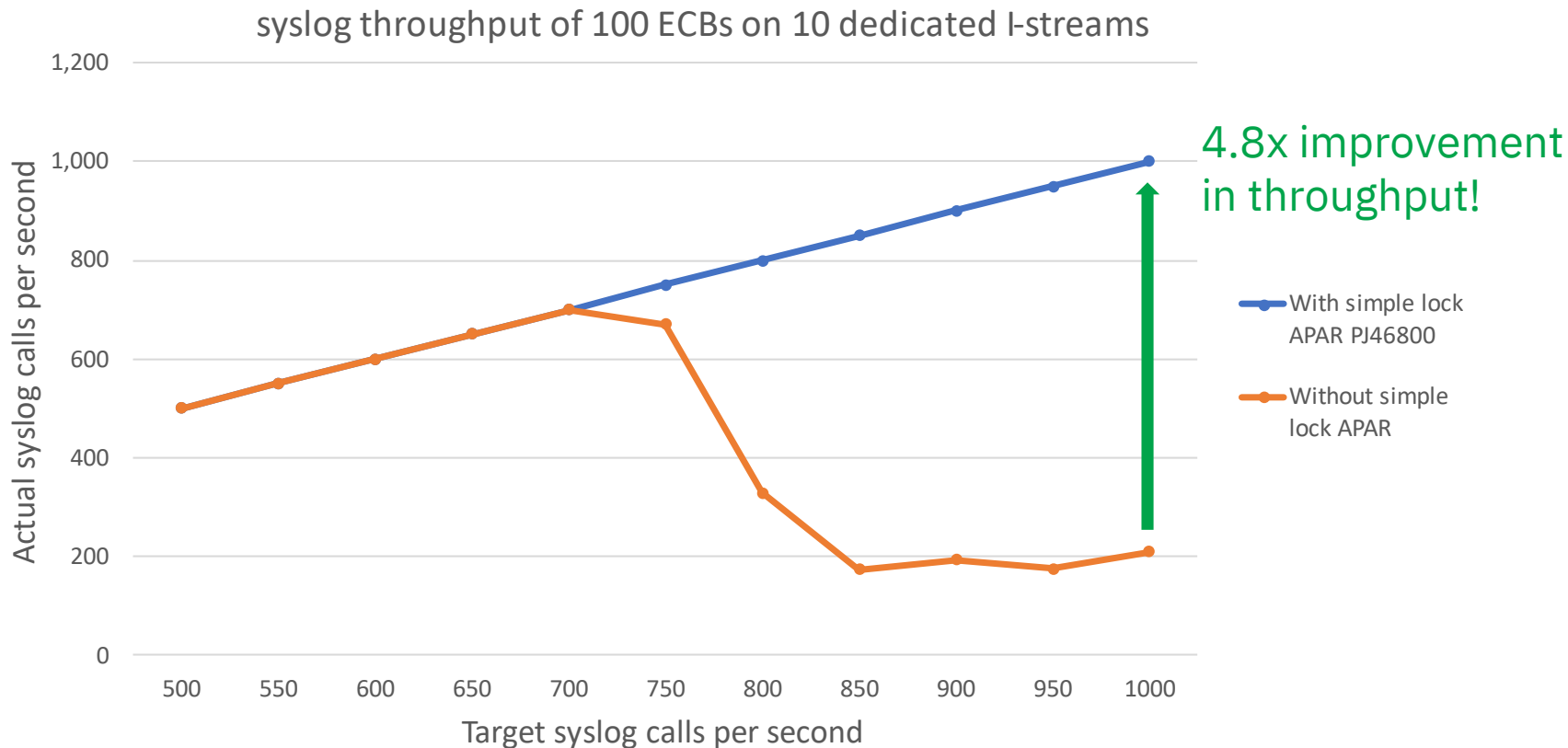


Sophie  
System programmer

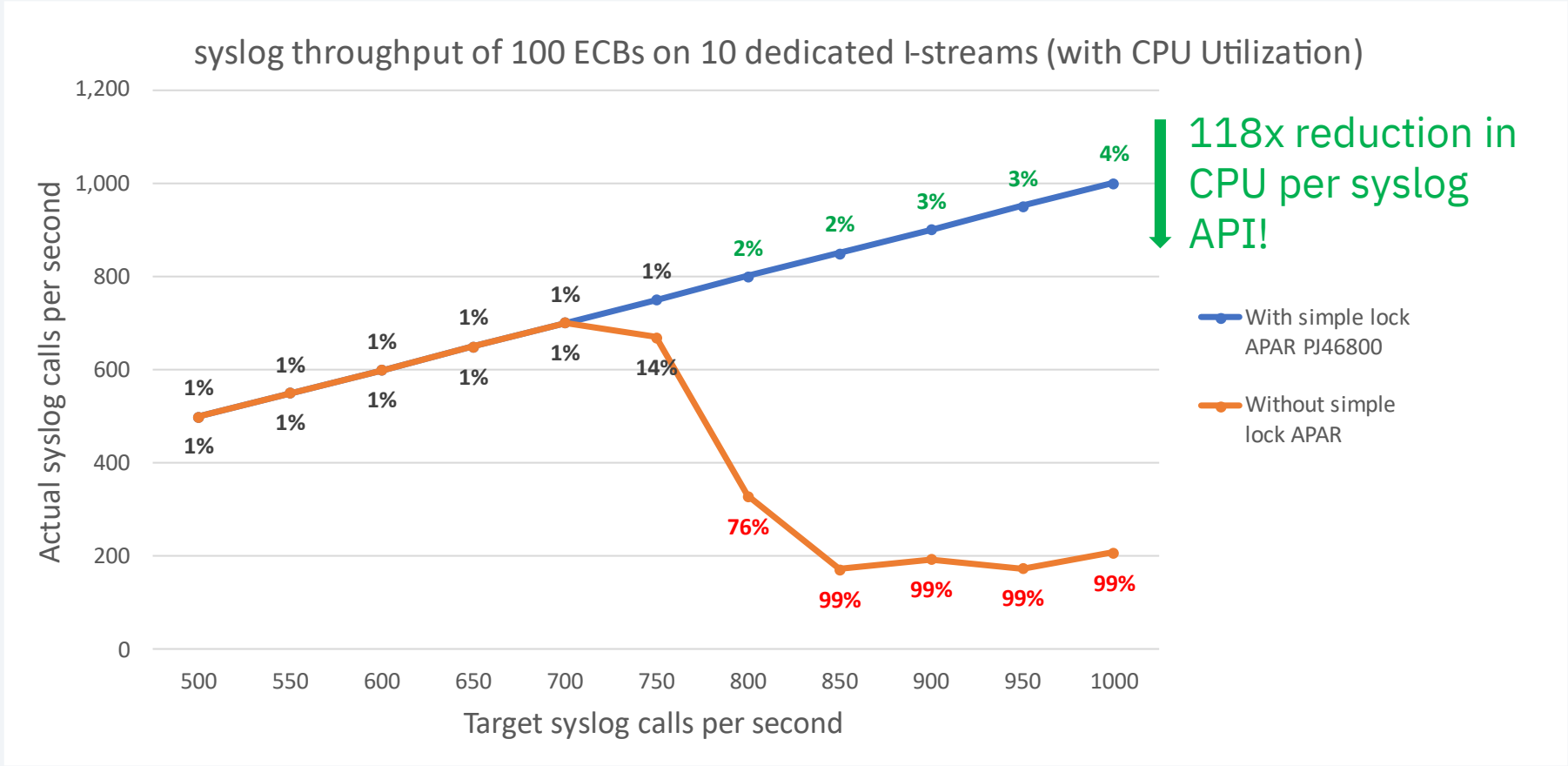
A systems programmer can **improve system performance and reduce CPU utilization** in multiple I-stream environments with high simple lock contention without making any application changes.

**Delivered in [APAR PJ46800](#) (August 2022)**

# Sample Results: syslog() Throughput



# Sample Results: CPU Utilization



# Example Software Profiler ETIM Reports (ZTRAP EI) showing High Simple Lock Contention for the Same Workload

Without simple lock APAR:

- 99% CPU Utilization
- High counts for compare-and-swap-grand (CSG) instructions in slockc.goff
- CSG is a costly update-then-compare instruction when in a loop
- High counts indicate high contention

SSU	PROG	DISP	INST	COUNT
	BSS	CFVS - slockc.goff		
P	00000000000009C		CSG	208
P	0000000000001A6		TMLL	206
P	0000000000001AE		NILL	57
P	0000000000001BE		CSG	7943
P	0000000000001C4		BRC	67
P	0000000000002D4		CSG	237

With simple lock APAR PJ46800:

- 8% CPU Utilization
- Much smaller counts for simple compare, test, and branch instructions in slockc.goff
- Read-only instructions in loops and CSG used only when needed
- Small counts indicate some contention

SSU	PROG	DISP	INST	COUNT
	BSS	CFVS - slockc.goff		
P	000000000000090		ICMH	4
P	0000000000000F8		LGHI	2
P	00000000000014C		E558 (CGHSI)	149
P	000000000000156		TM 80	37
P	00000000000015E		BRCTG	54

# Migration Considerations for APAR PJ46800

- Most customers can simply apply the APAR to take advantage of this enhancement
  - Simple locks are rarely used directly by applications or defined in application data structures
  - Application updates are required only if the application references fields in the simplelock structure
- Contains CP changes – A TLD load is required



# Thank you

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