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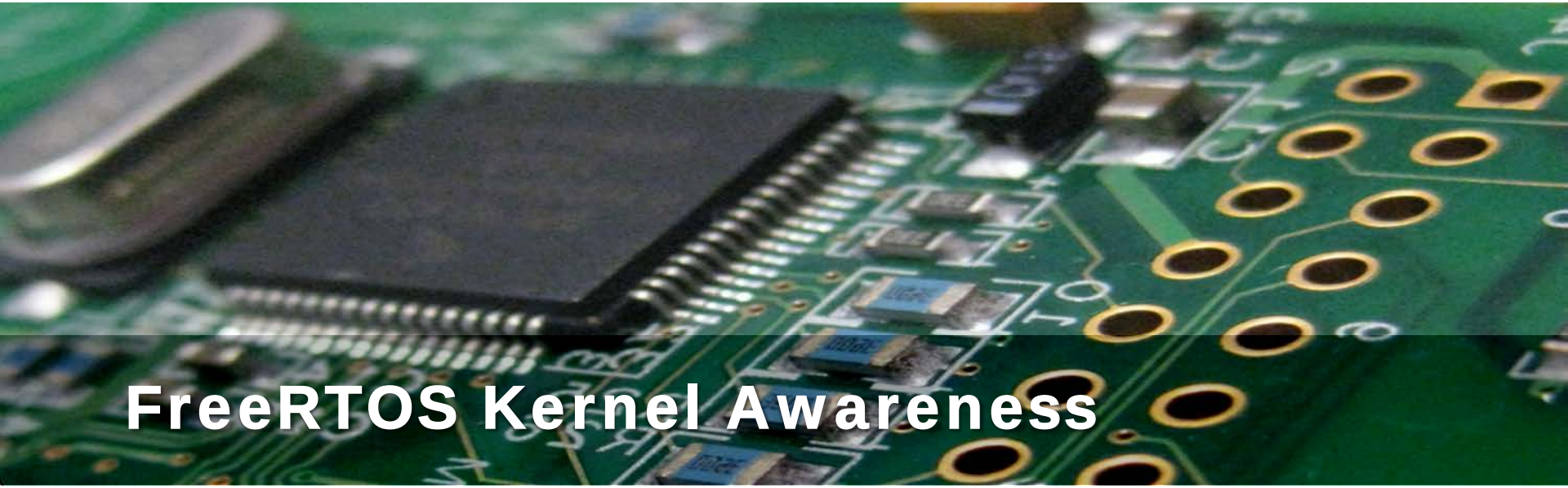


FreeRTOS Kernel Awareness

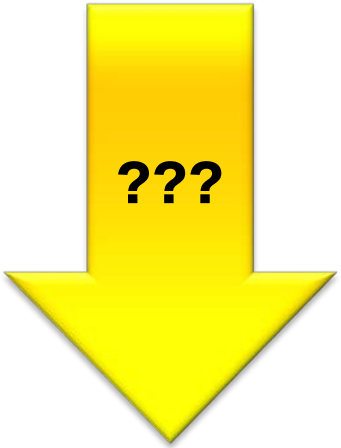
“Let's be aware of what is going on…”

Prof. Erich Styger
erich.styger@hslu.ch
+41 41 349 33 01

Learning Goals

- Problem: Information about tasks/queues

- Goal: FreeRTOS Kernel Awareness
  - Threads
  - Tasks, Heap
  - (Queue, Timer)

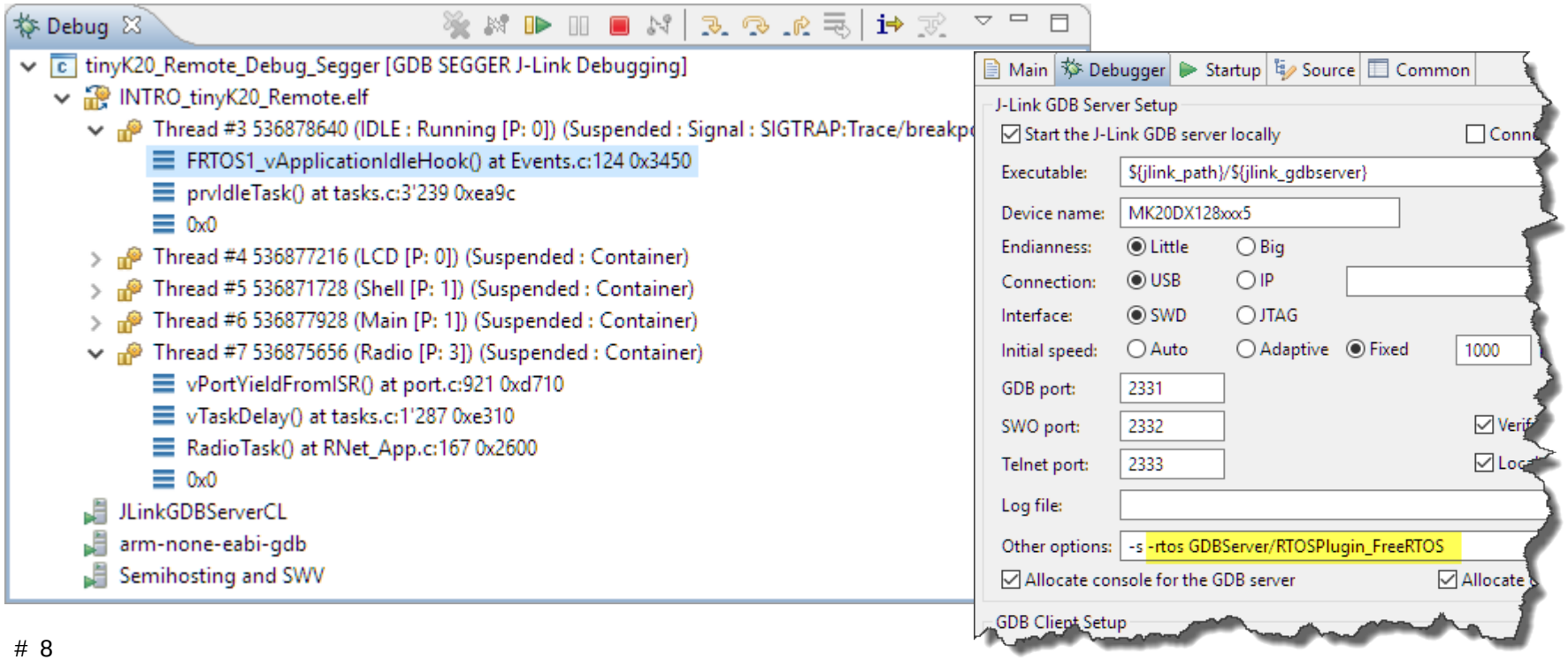


Task List (FreeRTOS)

TCB#	Task Name	Task Handle	Task State	Priority	Stack Usage	Event Object	Runtime
1	Shell	0x20000330	Blocked	1 (1)	20 B / 664 B		0x0 (0.0%)
2	Radio	0x20001288	Blocked	3 (3)	72 B / 880 B		0x1 (0.0%)
3	LCD	0x200018a0	Blocked	0 (0)	168 B / 600 B		0x17 (0.9%)
4	Main	0x20001b68	Blocked	1 (1)	0 B / 480 B		0x0 (0.0%)
5	IDLE	0x20001e30	Running	0 (0)	0 B / 512 B		0x99b (99.0%)
	Task Number:	0x0					
	Stack Base:	0x20001bd0					
	Stack Top:	0x20001dd0					
	Stack High Water Mark:	0x20001dd0					

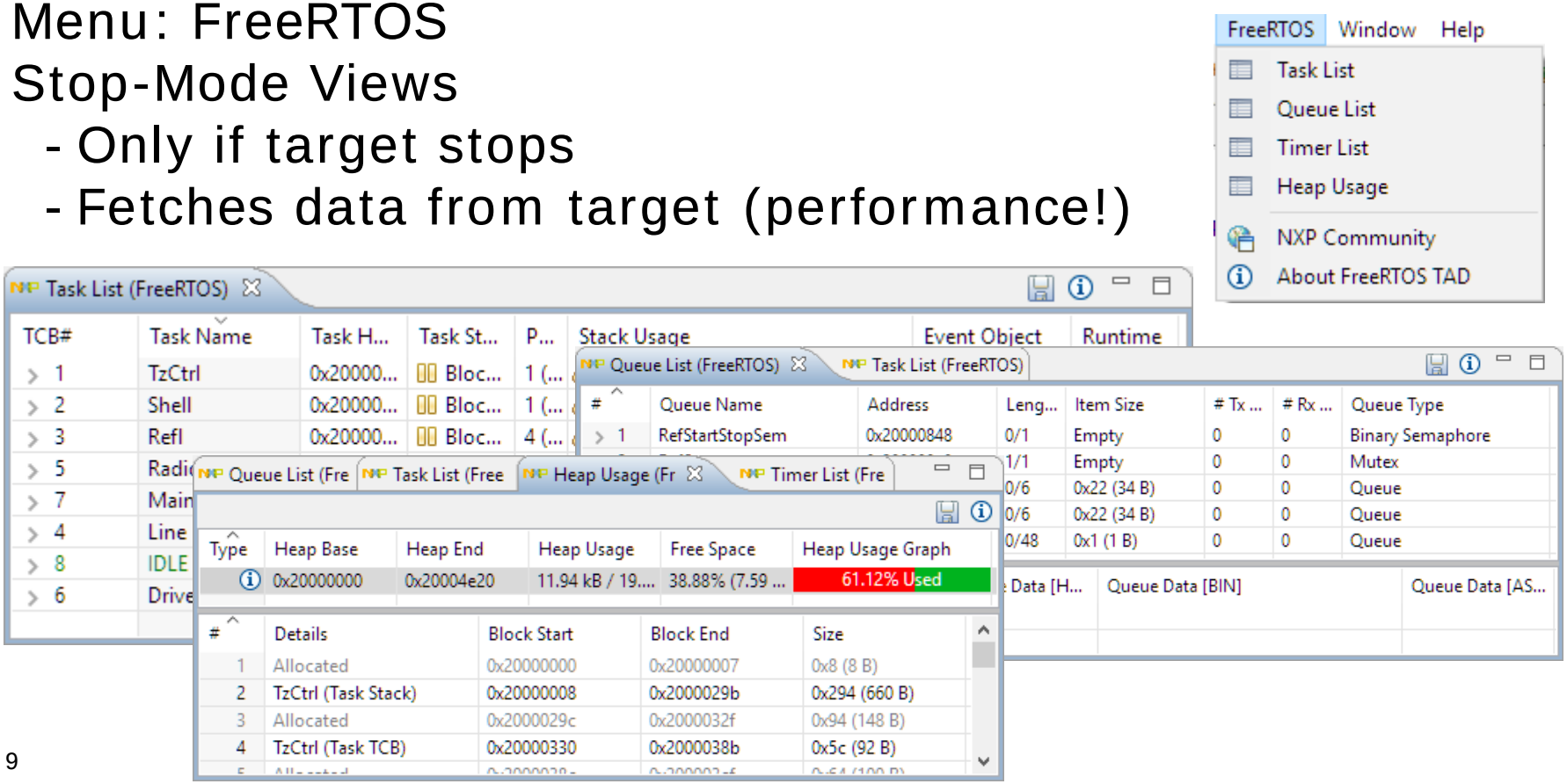
Thread Debugging (Segger)

- Debug view with threads
  Launch Configuration Setting (Segger)
  -rtos GDBServer/RTOSPlugin_FreeRTOS



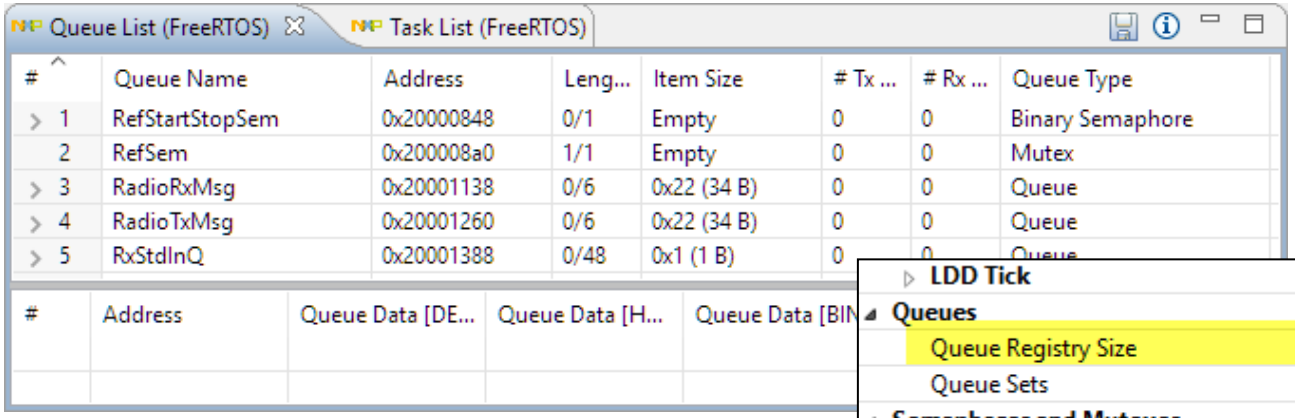
Kernel Awareness Views

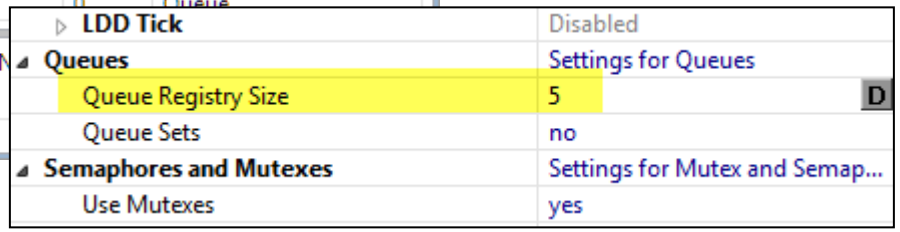
- http://freescale.com/lgfiles/updates/Eclipse/KDS
- https://mcuoneclipse.com/2016/07/06/freertos-kernel-awareness-for-eclipse-from-nxp/
- Menu: FreeRTOS
- Stop-Mode Views
  - Only if target stops
  - Fetches data from target (performance!)



Queues

- vQueueAddToRegistry()
- FreeRTOS Queue Registry Size > 0

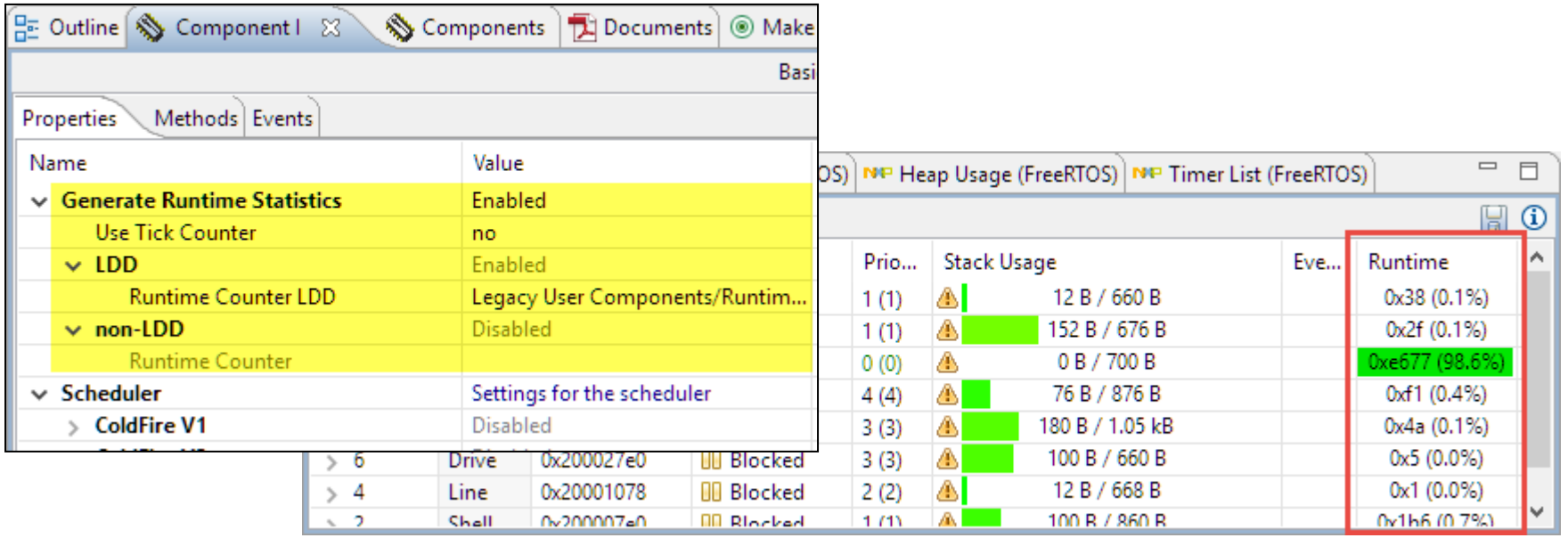





```
void SQUEUE_Init(void) {
  SQUEUE_Queue = FRTOS1_xQueueCreate(SQUEUE_LENGTH, SQUEUE_ITEM_SIZE);
  if (SQUEUE_Queue==NULL) {
    for(;;){} /* out of memory? */
  }
  FRTOS1_vQueueAddToRegistry(SQUEUE_Queue, "Shell");
#if PL_HAS_RTOS_TRACE
  RTOSTRC1_vTraceSetQueueName(SQUEUE_Queue, "ShellQueue");
#endif
}
```

Runtime Statistics

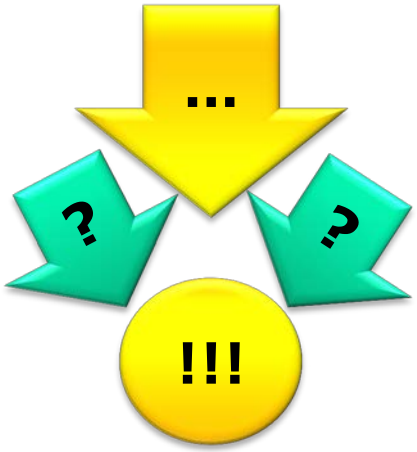
- How much time a task spends
- **configGENERATE_RUNTIME_STATS**
- Counting time for each task
  - Counter at task start and suspend time
  - SysTick (Ticks): limited resolution!
  - Timer (recommendation: 10x of Ticks)



Summary

- *Problem: Need info about tasks/queues/timers*

- Kernel Awareness
  - Segger: RTOS Threads in Debug View
  - NXP: Views for task, timer, queue, heap
  - Stop mode views



Lab: Kernel Awareness

- Enable threads in Debug view (Segger Debug Configuration)
- Use Heap usage view to inspect heap
- Use Task List to inspect tasks
- Enable performance counter to measure task relative performance