

# Paratick

## Reducing Timer Overhead in Virtual Machines

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ICPP 2021

9-12 August 2021

Online

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# Introduction & Background

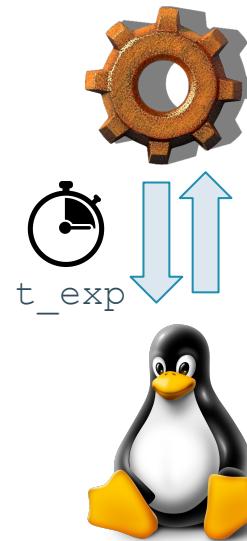
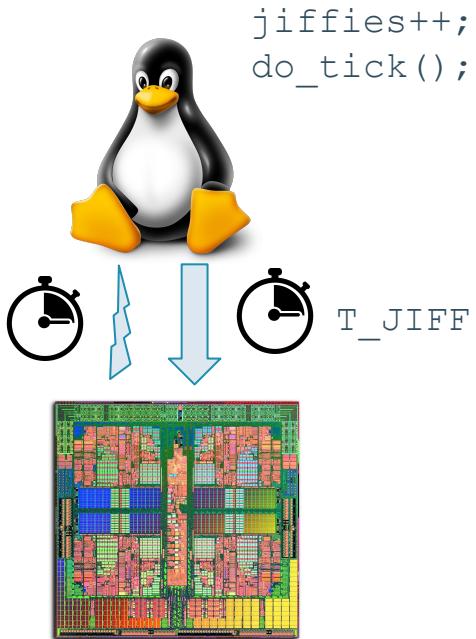
Paratick: Reducing Timer Overhead in Virtual Machines

Stijn Schildermans et. al.

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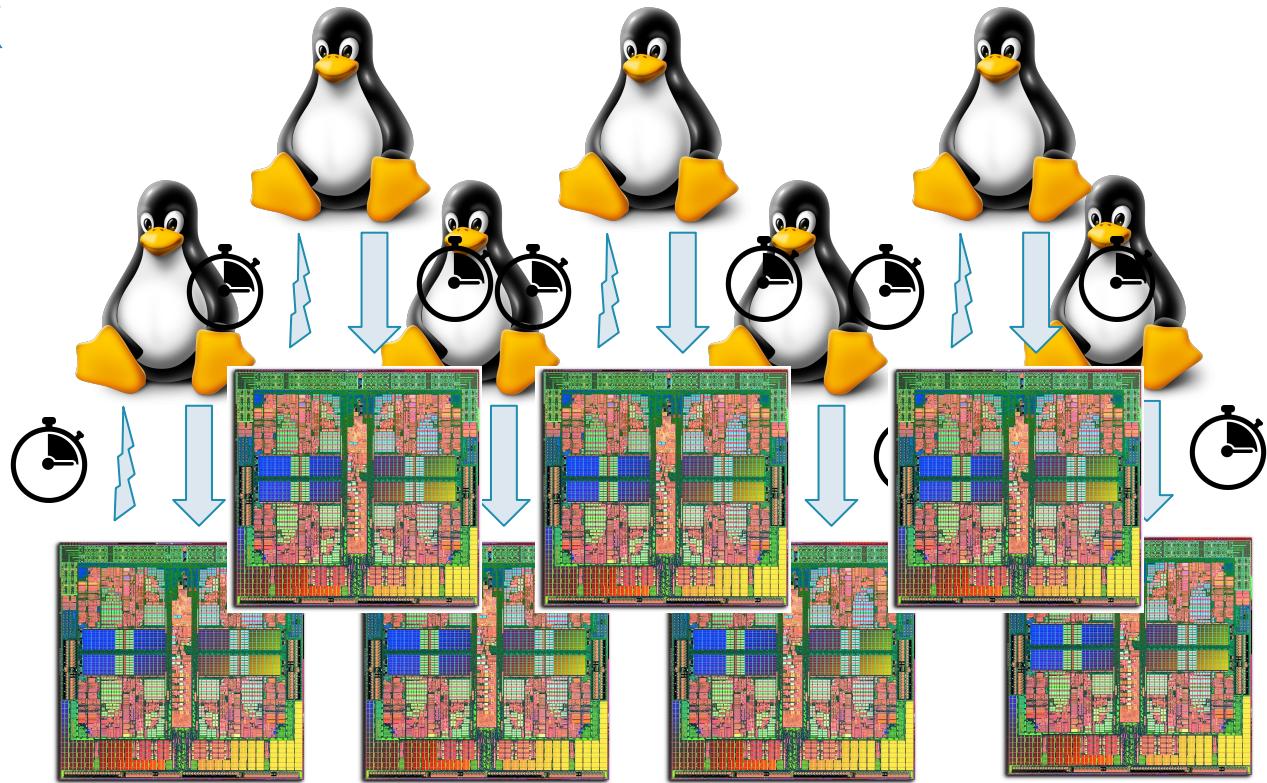
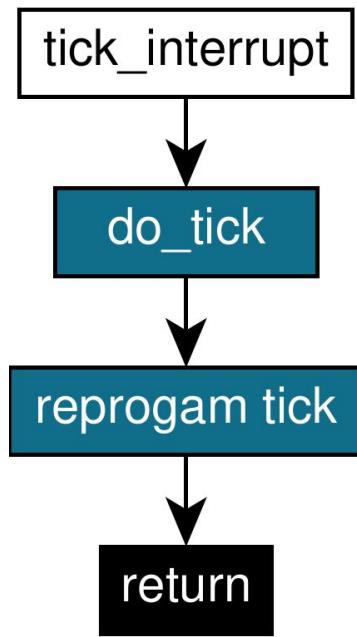
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# Timekeeping

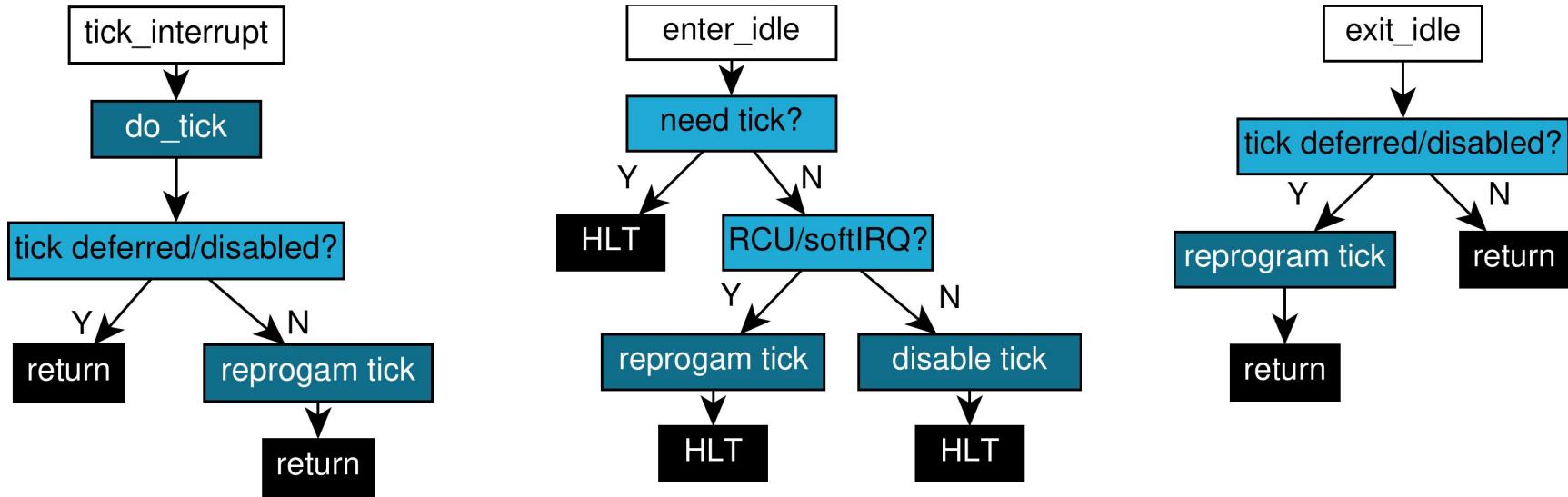


```
softirq(t_exp / T_JIFF)
```

# Periodic Tick



# Tickless Kernels





# Motivation

## Virtualizing the Scheduler Tick

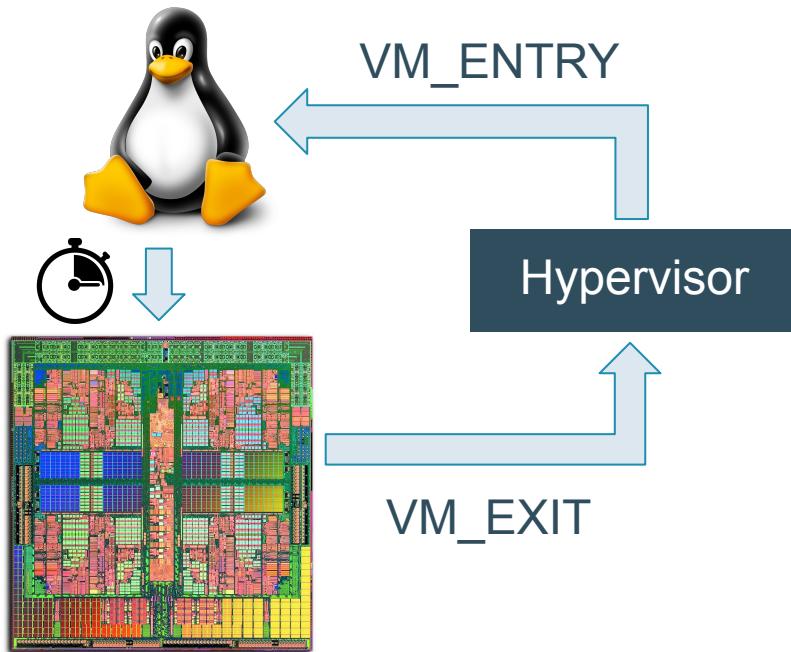
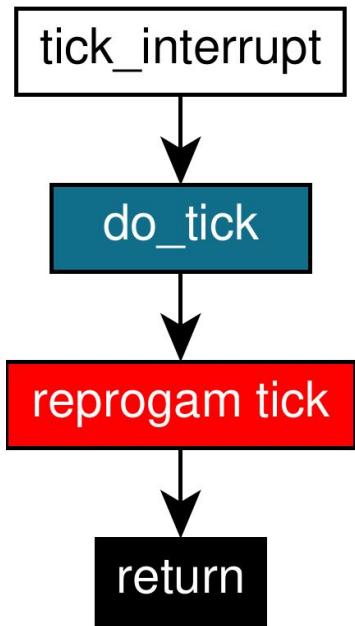
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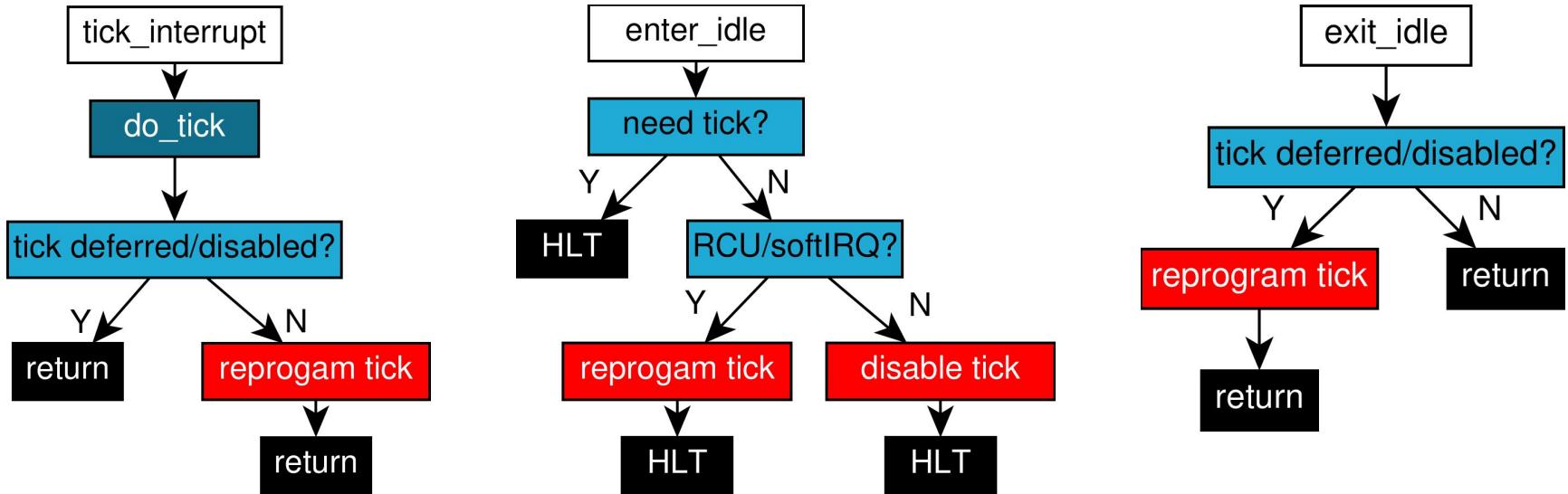
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# Periodic Tick



# Tickless Kernels





# Concept & Implementation

## Virtual Scheduler Ticks & Paratick

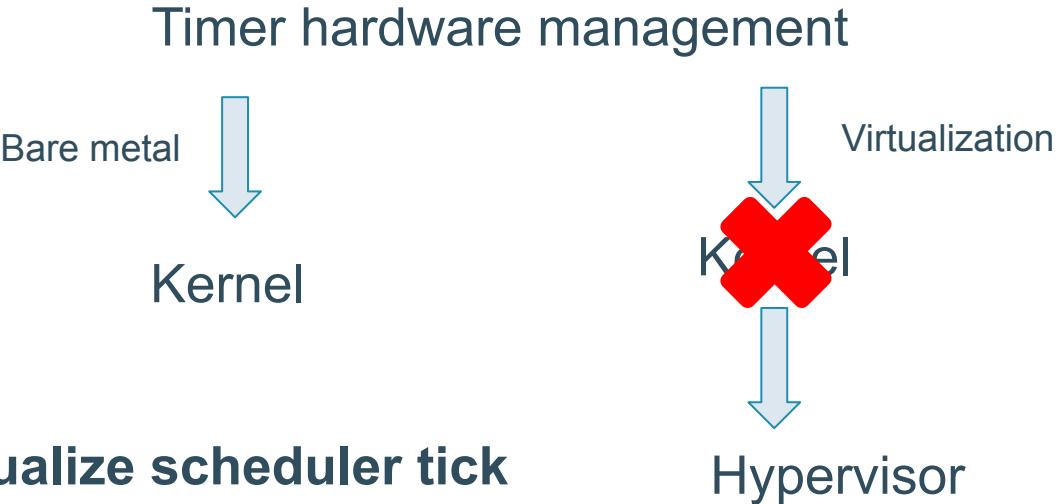
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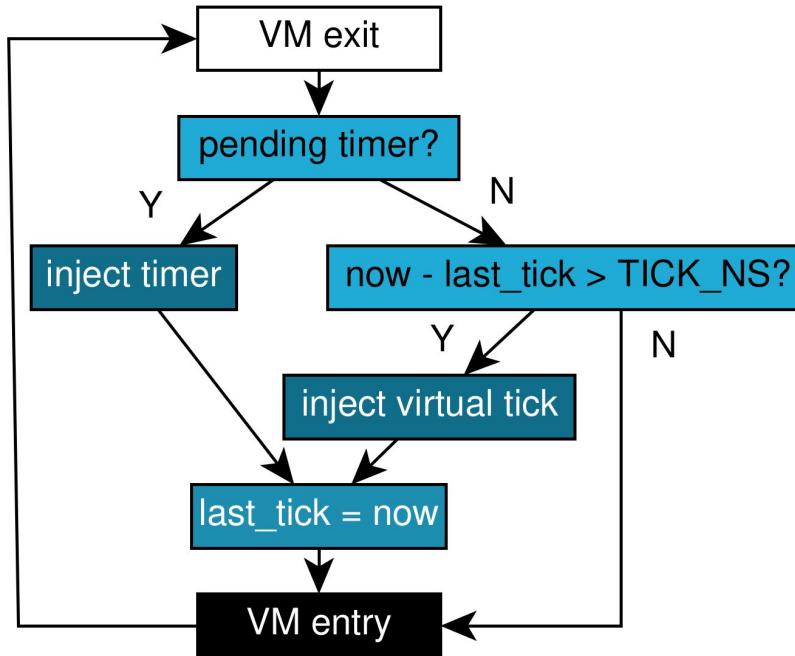
# Virtual Scheduler Ticks



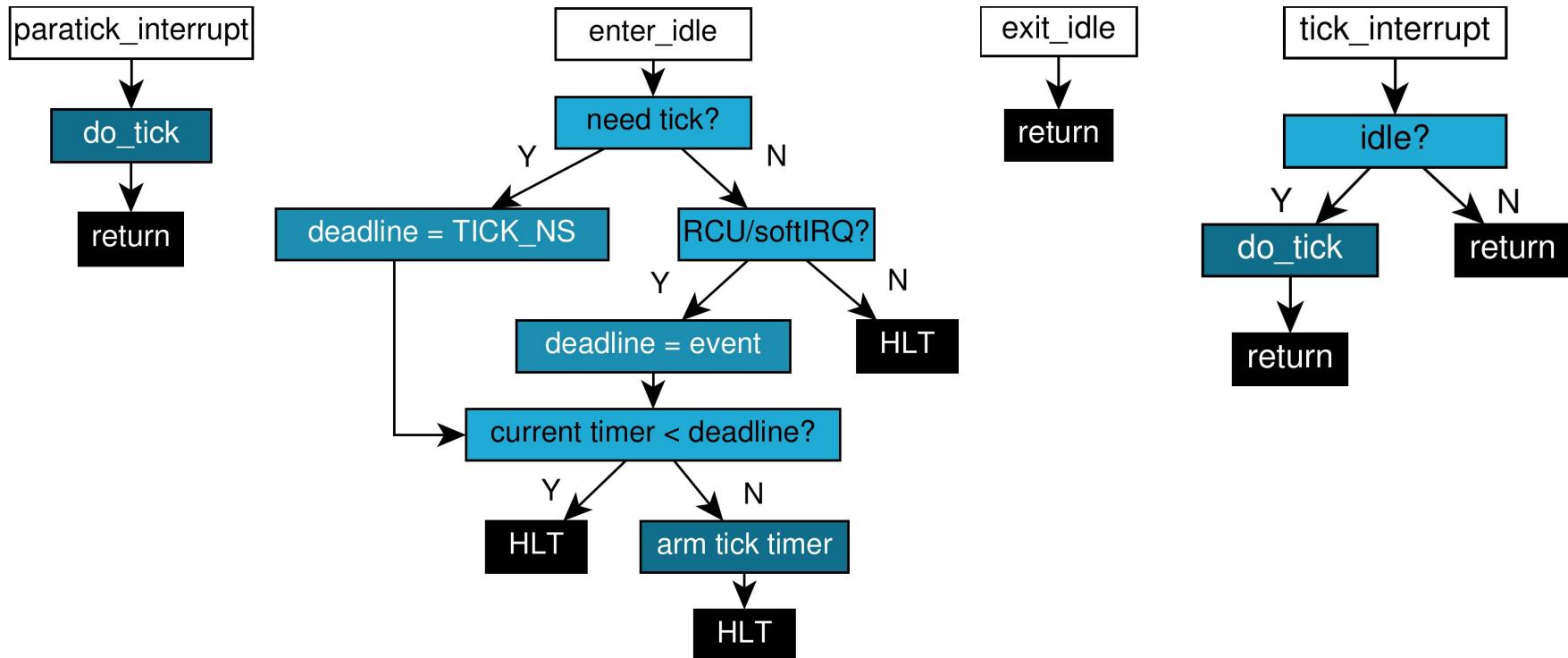
⇒ **Paravirtualize scheduler tick**

- Guest request ticks at certain frequency
- Host injects ticks periodically

# Paratick -- Host



# Paratick -- Guest





# Evaluation

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# Evaluation

Paratick performance relative to tickless kernel

Workload	VM exits	Throughput	Execution time
Sequential	-50%	+7%	-2%
Multithreaded	-44%	+14%	-2%
I/O	-34%	+20%	-18%



# Conclusion

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# Conclusion

## Timekeeping in virtual machines

- Periodic ticks
  - Idle
  - Overcommitted
- Tickless kernels
  - Blocking synchronization
  - I/O

⇒ Virtual scheduler ticks (== Paravirtualizing the scheduler tick)

- VM exits
- Throughput
- Execution time