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Separating JavaScript Applications by Processes



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Motivation: Crashing Browsers

- ▶ JS-enabled browsers are an important application platform of today
 - Not only for web browsing
 - Extension platforms too (e.g., WRT of S60)
- ▶ However: browsers *do* crash...
- ▶ In the classic approach, the crash of a tab/window kills all the other tabs/windows as well.



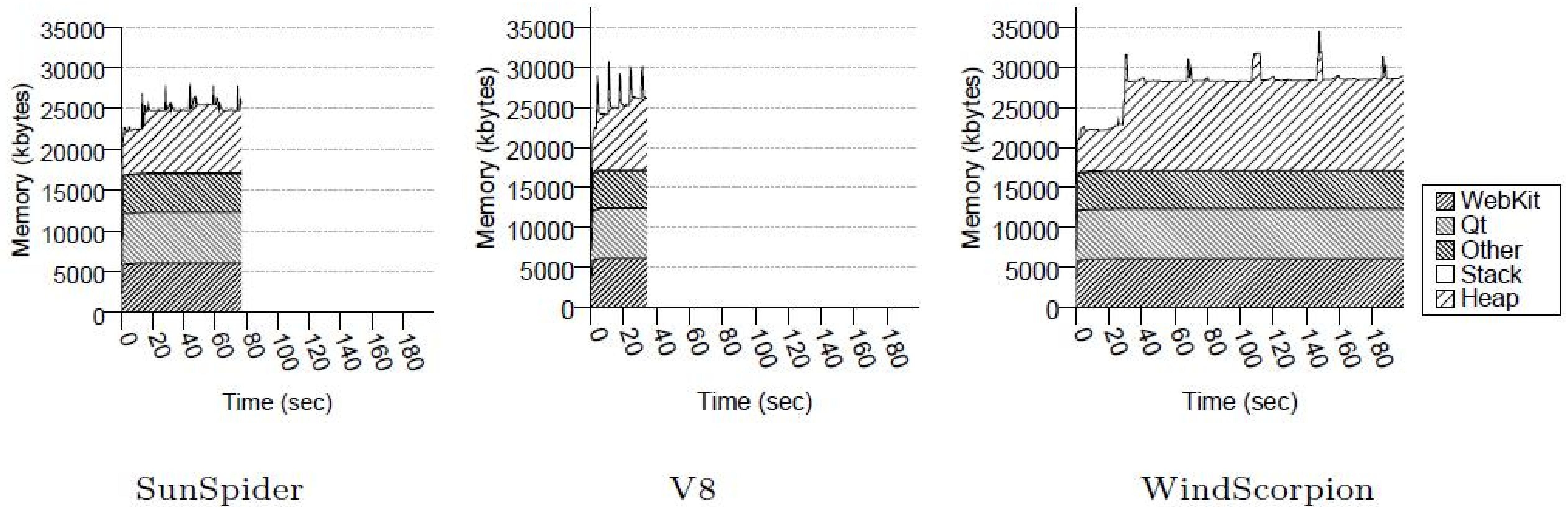
Motivation: Process Per Tab

- ▶ New browsers start a new process per new tab/window
- ▶ Pros:
 - Avoids bad user experience
 - Lowers the security risk of browsing
- ▶ Cons:
 - Increasing memory consumption?
 - Performance overhead?
- ▶ *Is there a price to pay?*

Measurements

- ▶ Browser: QtWebKit
- ▶ Platform: x86, Linux
 - single-core
 - dual-core
- ▶ Benchmarks:
 - SunSpider
 - V8
 - WindScorpion
- ▶ Measured:
 - Running time
 - Memory usage (WebKit, Qt, other libs, stack, heap)

Comparison of Benchmarks

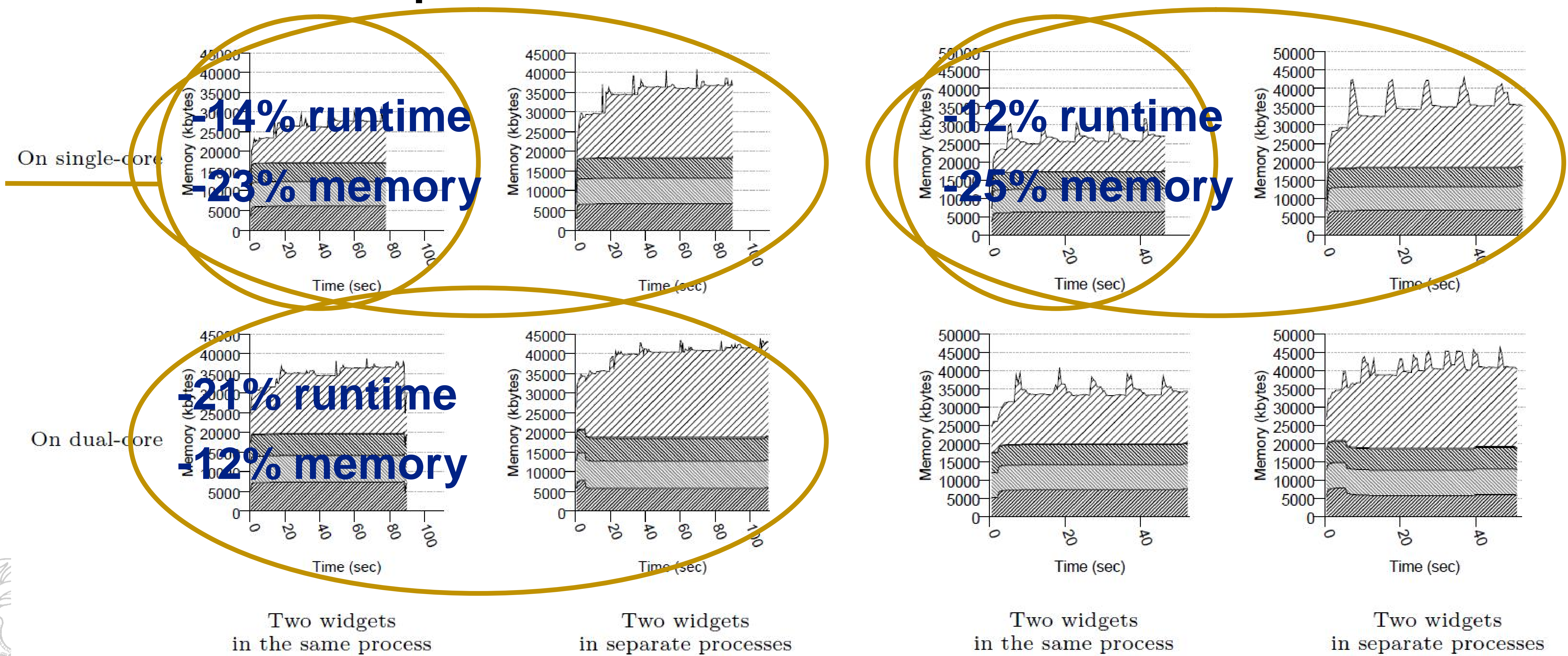


- ▶ Runtime: V8 < SunSpider < WindScorpion
- ▶ Memory usage:
 - Stack is negligible
 - WebKit ~ Qt ~ other libraries
 - Heap consumes the most

Observations with SS & V8

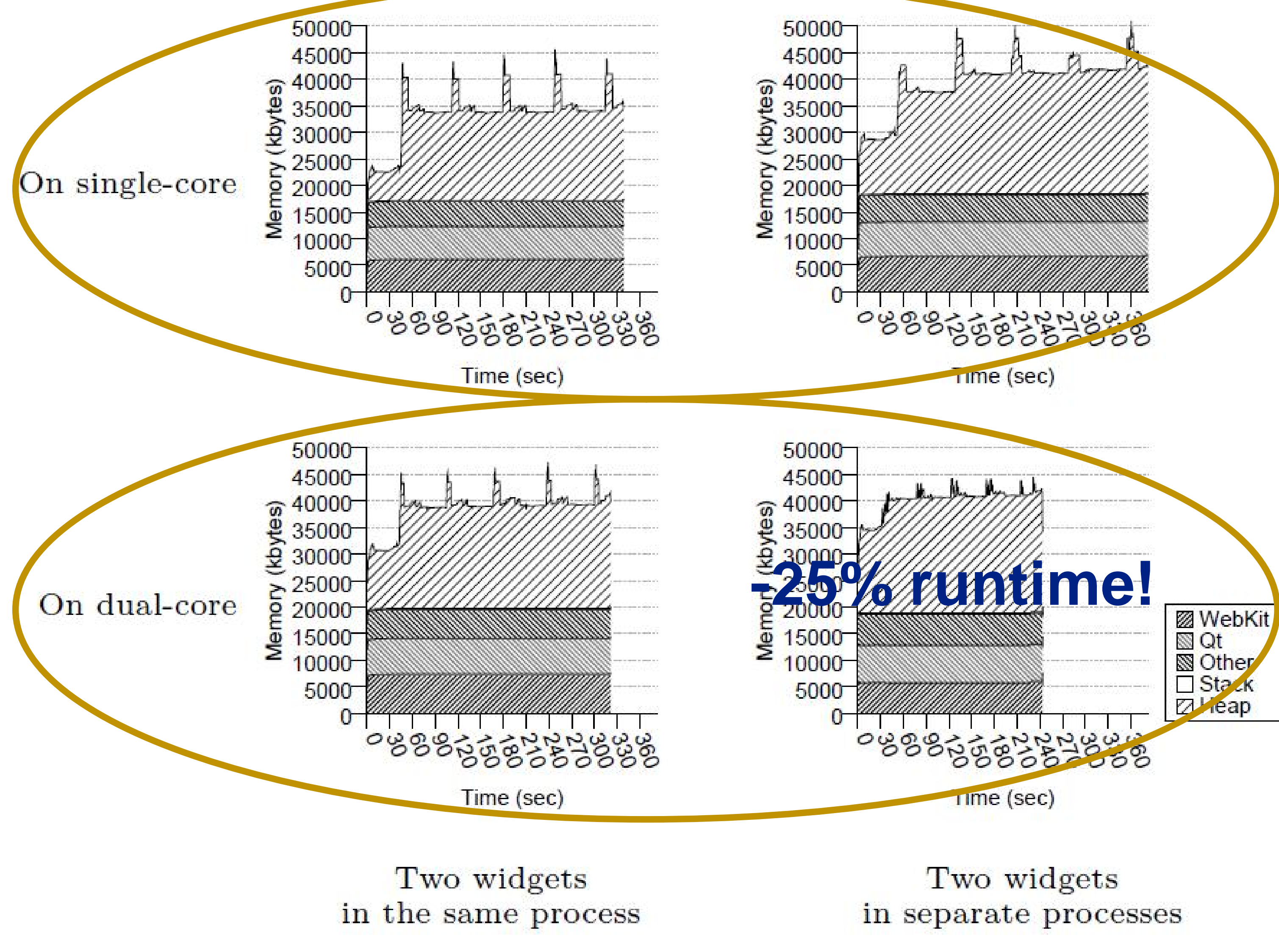
SunSpider

V8



- ▶ Single-core, same-process execution is the fastest and least memory hungry
- ▶ Often, same-process execution wins over separate-process mode

Observations with WS



- ▶ On single core: same-process execution is still the winner
- ▶ On dual core: separating processes is 25% faster with no memory overhead(!)

Rationale behind?

- ▶ SunSpider and V8 are artificial micro benchmarks of quick JS programs
- ▶ WindScorpion consists of long-running, close-to-real-life programs
- ▶ (Currently, that's only speculation)



Summary

- ▶ On single-core setups:
 - Separate-process execution is more costly (both in performance and memory consumption) than same-process execution
- ▶ On dual (multi?) cores:
 - Long running JS programs might benefit from being executed in separate processes
- ▶ Knowing the ‘price’ can help making design decisions for resource constrained devices (e.g., mobile phones)

Future Work

- ▶ This is a research-initiating work
- ▶ We already faced several questions:
 - Why is WS behaving differently?
 - More than 2 parallel JS applications?
 - Web content besides JS?
 - Different memory allocators?
 - Different architectures?
 - JIT or interpreted execution?
- ▶ These questions set up a research agenda.



Thank you!