

Demo

Κόμπος: A Platform for Debugging Complex Concurrent Applications

Demo



C. Torres Lopez



E. Gonzalez Boix

work with



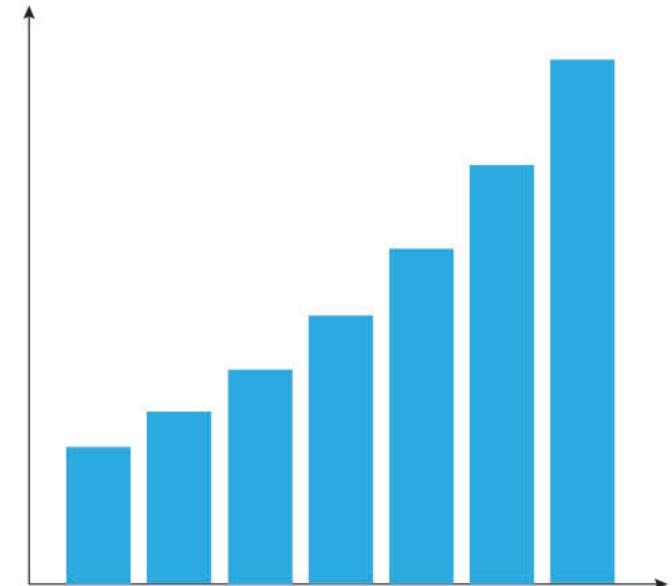
D. Aumayr



H. Mössenböck

Building an Online Sales-Data Processor

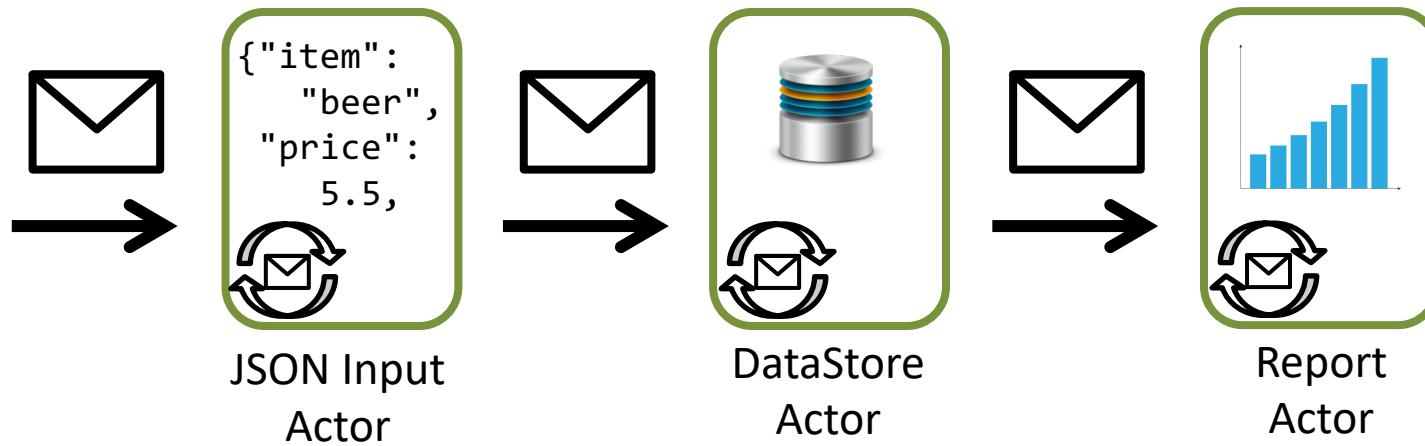
```
{"item": "beer",  
 "price": 5.5,  
 "quantity": 344,  
 "customer": "<Prog>",  
 "address": "Pleinlaan 2"}
```



Stream of Sales Events

- Track revenue
- Report sales revenue over time

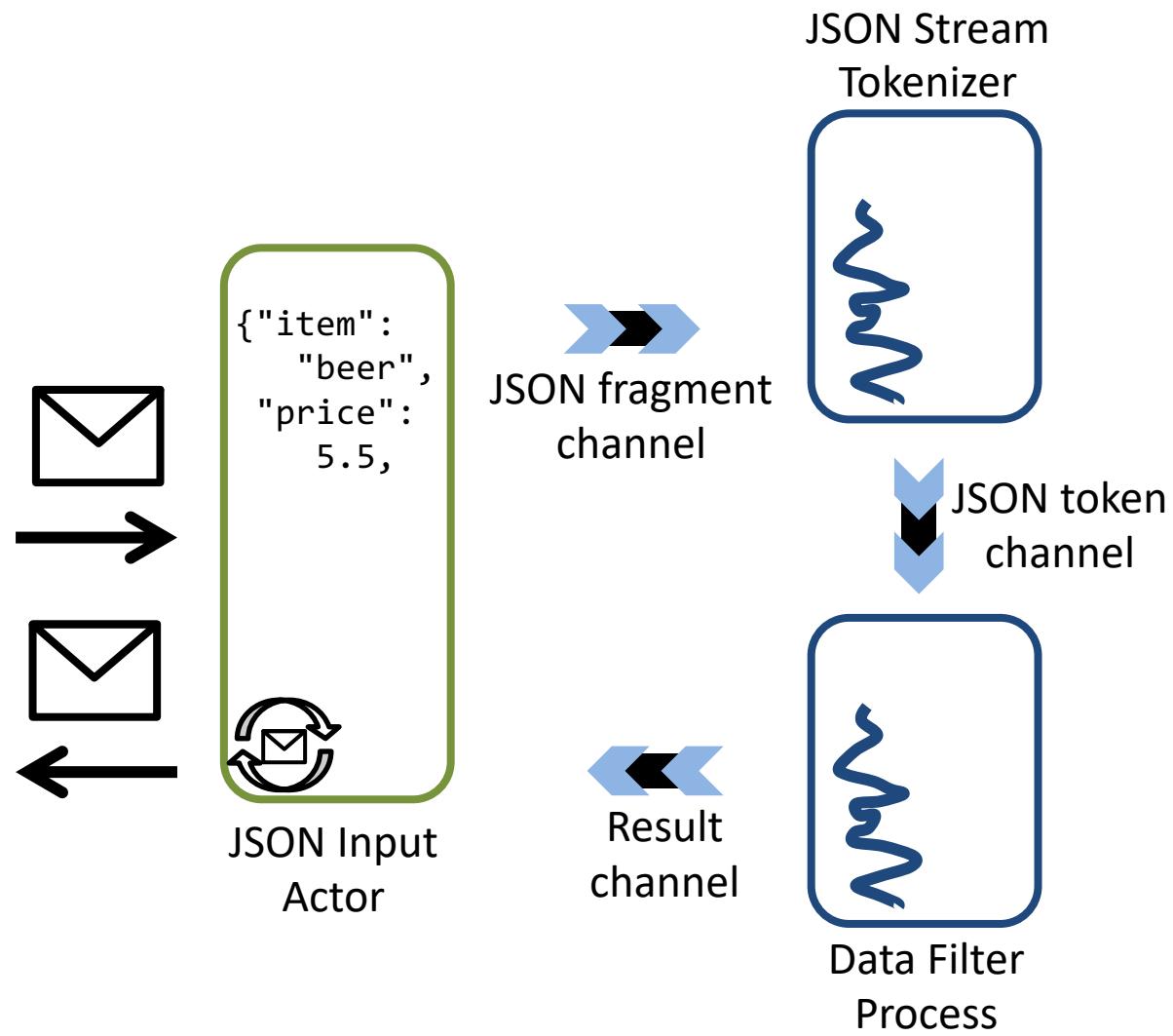
Subsystems as Asynchronous Activities



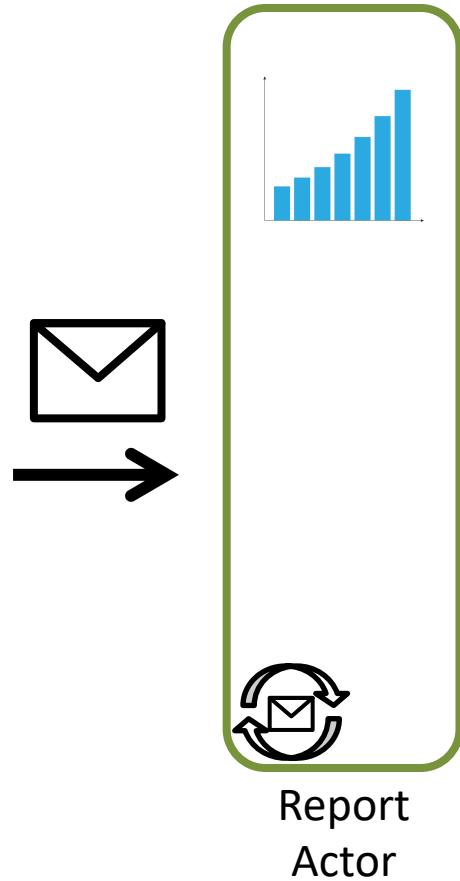
Use Actors as Main Abstraction
Event-Loop Model fits UI and System Paradigms

Parallelize JSON Processing

- Strict consumer/producer relationship
- Allow for pipeline parallelism



Sales Revenue Over Time based on Large Data Array



Construct Sum Tree
in parallel

1	2	1	1	2	1	2	1
---	---	---	---	---	---	---	---



Calculate Prefix Sum
in parallel

1	3	4	5	7	8	10	11
---	---	---	---	---	---	----	----



Parallel Prefix Sum Calculation
with fork/join parallelism



The good parts of Smalltalk on top of Truffle, Graal, and the JVM.

SOM_{NS}: A NEWSPEAK FOR CONCURRENCY RESEARCH

Newspeak: newspeaklanguage.org
SOM_{NS}: github.com/smarr/SOMns

Newspeak: A Smalltalk with a Syntax

```
class Ping new: cnt with: pong = (  
    private pingsLeft ::= cnt.  
    private pong      = pong.  
)  
|() ( Eventual Message Sent to mutable Field  
    public start = (  
        pong <-: ping: self.  
        pingsLeft ::= pingsLeft - 1.  
    )  
)
```



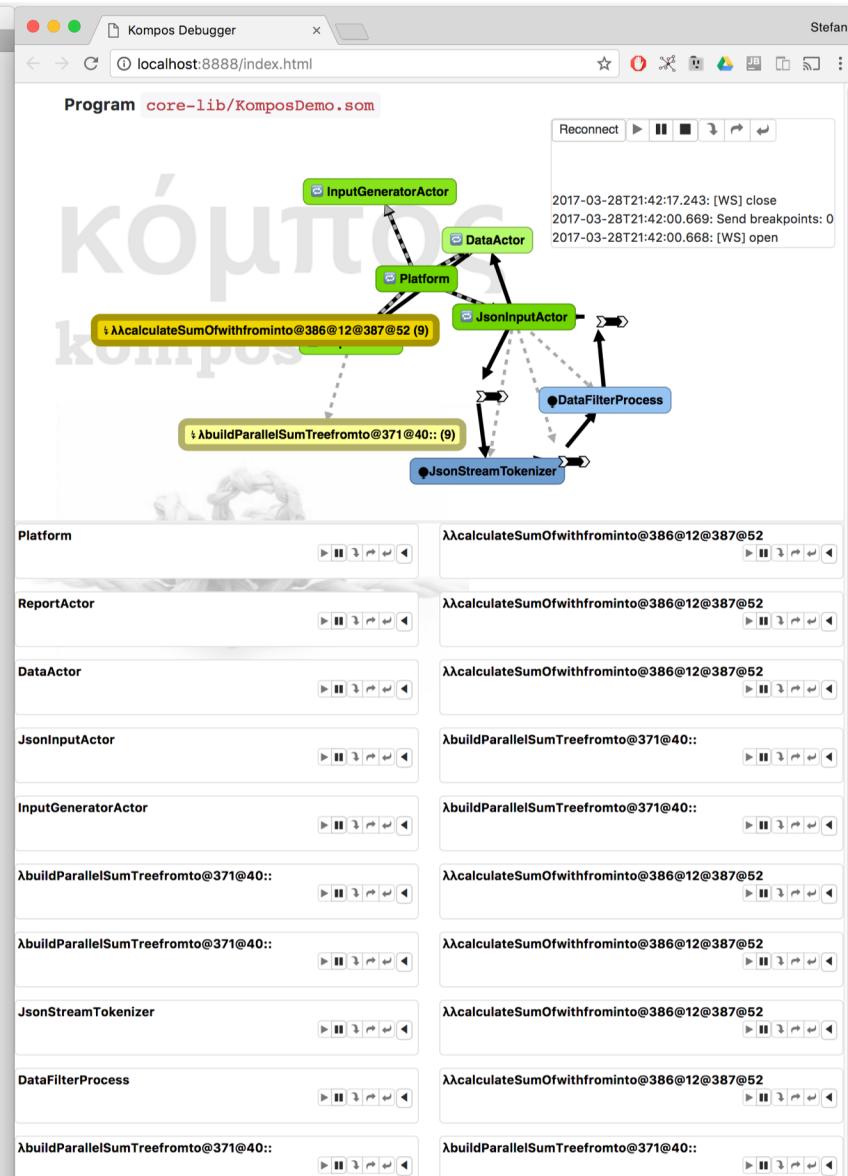
- Dynamically typed
- Class-based
- Actors + immutable Values
- File Syntax

SOM_{NS}

- Built on Truffle+Graal+JVM
- CSP, STM, Fork/Join, ...
- No images
- Minimal class library



Demo: A Sales-Data Processor

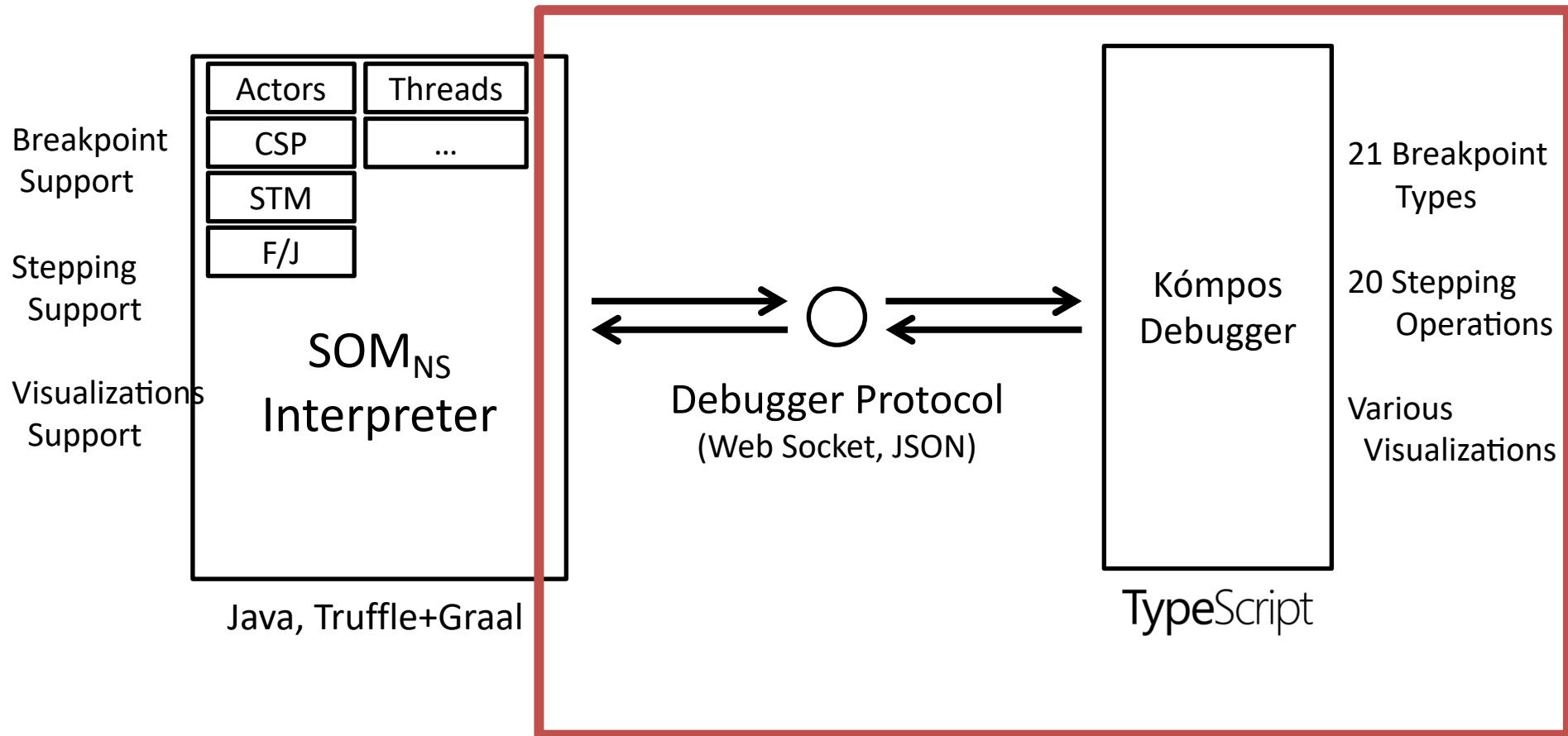


WRAP-UP/CONCLUSION

Too many Concepts, Too many Variations



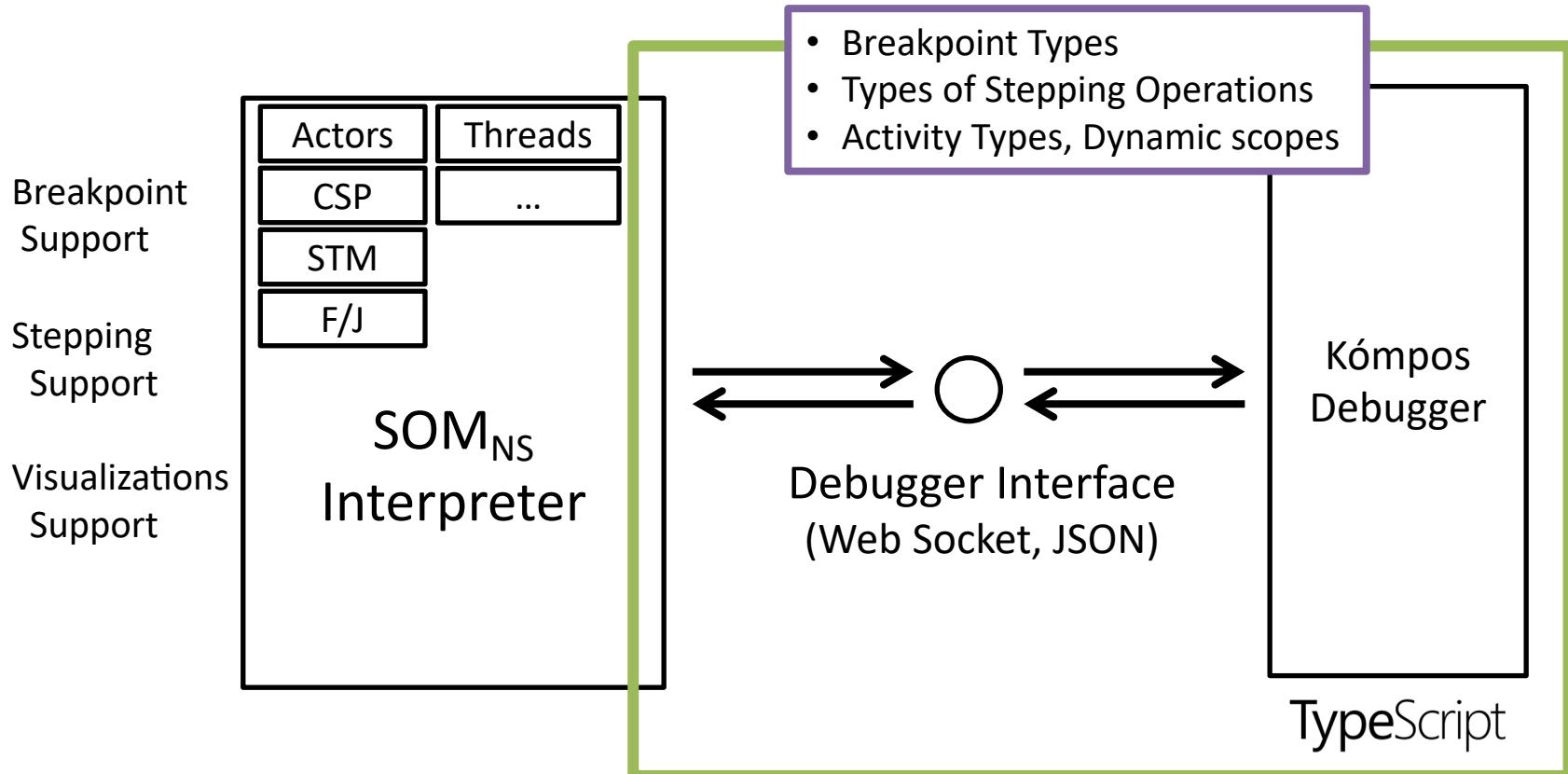
Kómpos Architecture



How to Abstract from Concurrency Models?

Abstract from Concurrency Models

- Interactions modeled via data
- Debugger agnostic of concepts



[A Concurrency-Agnostic Protocol for Multi-Paradigm Concurrent Debugging Tools \(pdf\)](#)

S. Marr, C. Torres Lopez, D. Aumayr, E. Gonzalez Boix, H. Mössenböck

Proceedings of the 13th ACM SIGPLAN International Symposium on Dynamic Languages, **DLS'17**, ACM, 2017.

doi: [10.1145/3133841.3133842](https://doi.org/10.1145/3133841.3133842)

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Kómpos: Platform for Debugging Complex Concurrent Applications

- Concurrent Debugger
 - Concept-agnostic
- Visualization, Breakpoints, Stepping, Tracing
- Replay, Snapshotting,...
- For Actors, CSP, Fork/Join, STM, Locks & Threads,...

