



POLYTECHNIQUE  
MONTRÉAL

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# Distributed model for Trace Compass

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# Agenda

01 Background & challenges

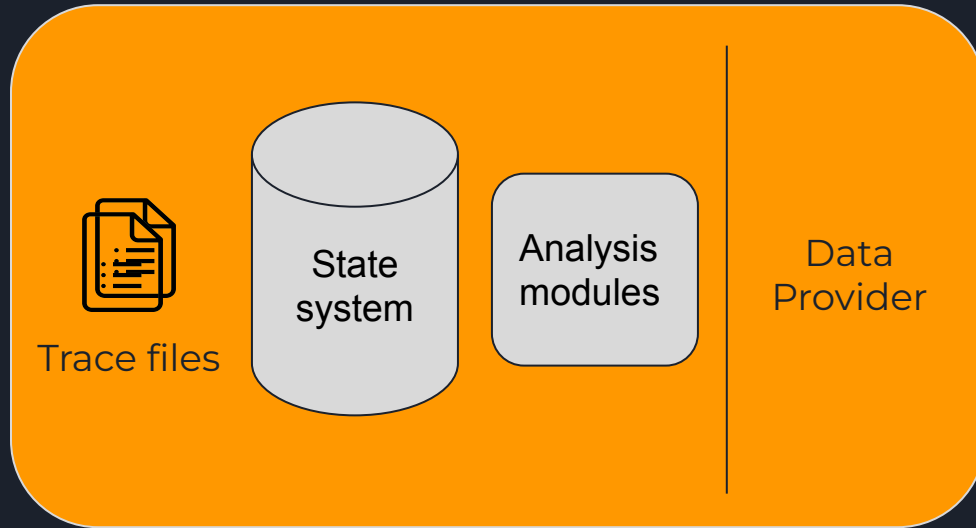
02 Proposed solution

03 Future work

04 Conclusion



# Trace Compass current architecture



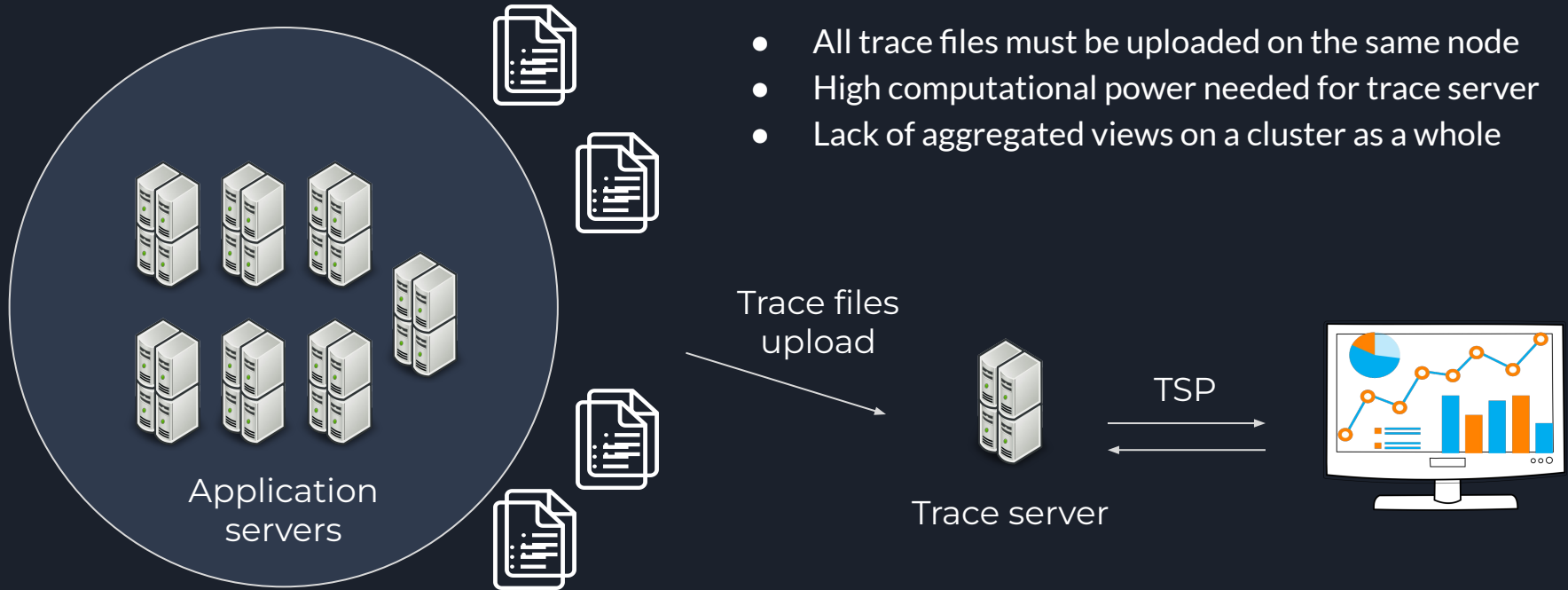
Trace server

Trace Server  
Protocol (TSP)



Client (Eclipse,  
Theia  
extension,...etc.)

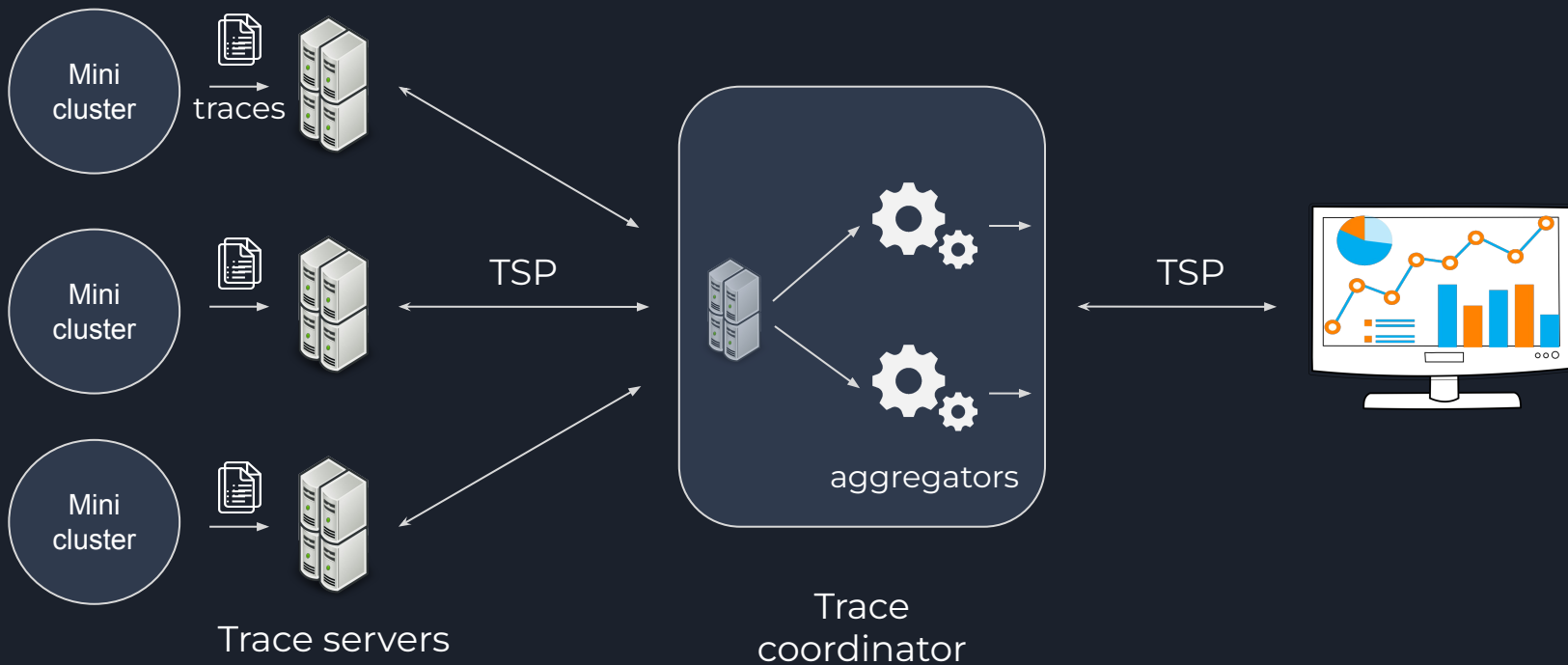
# Use case & current limitations



- All trace files must be uploaded on the same node
- High computational power needed for trace server
- Lack of aggregated views on a cluster as a whole

# Distributed model for Trace Compass

2

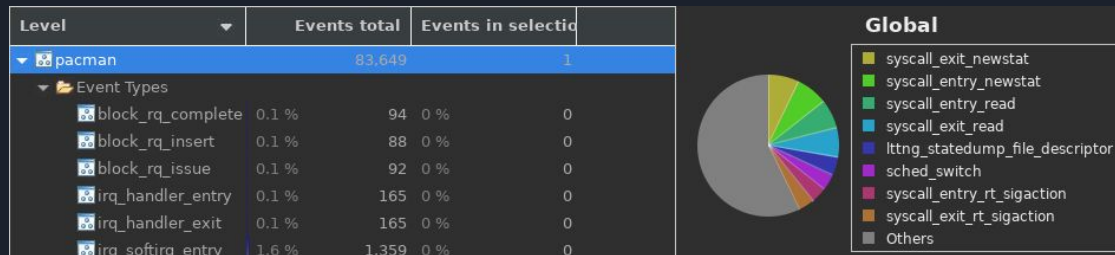


# Prototype with 2 views

2

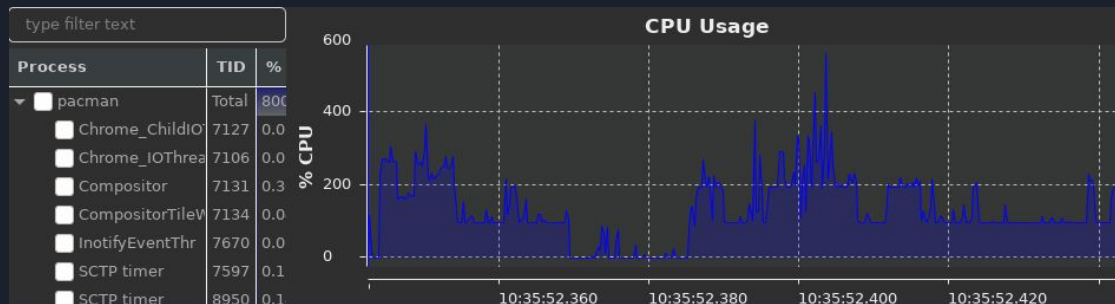
## 1/ Statistics

- Multi-pass
- Simple aggregator



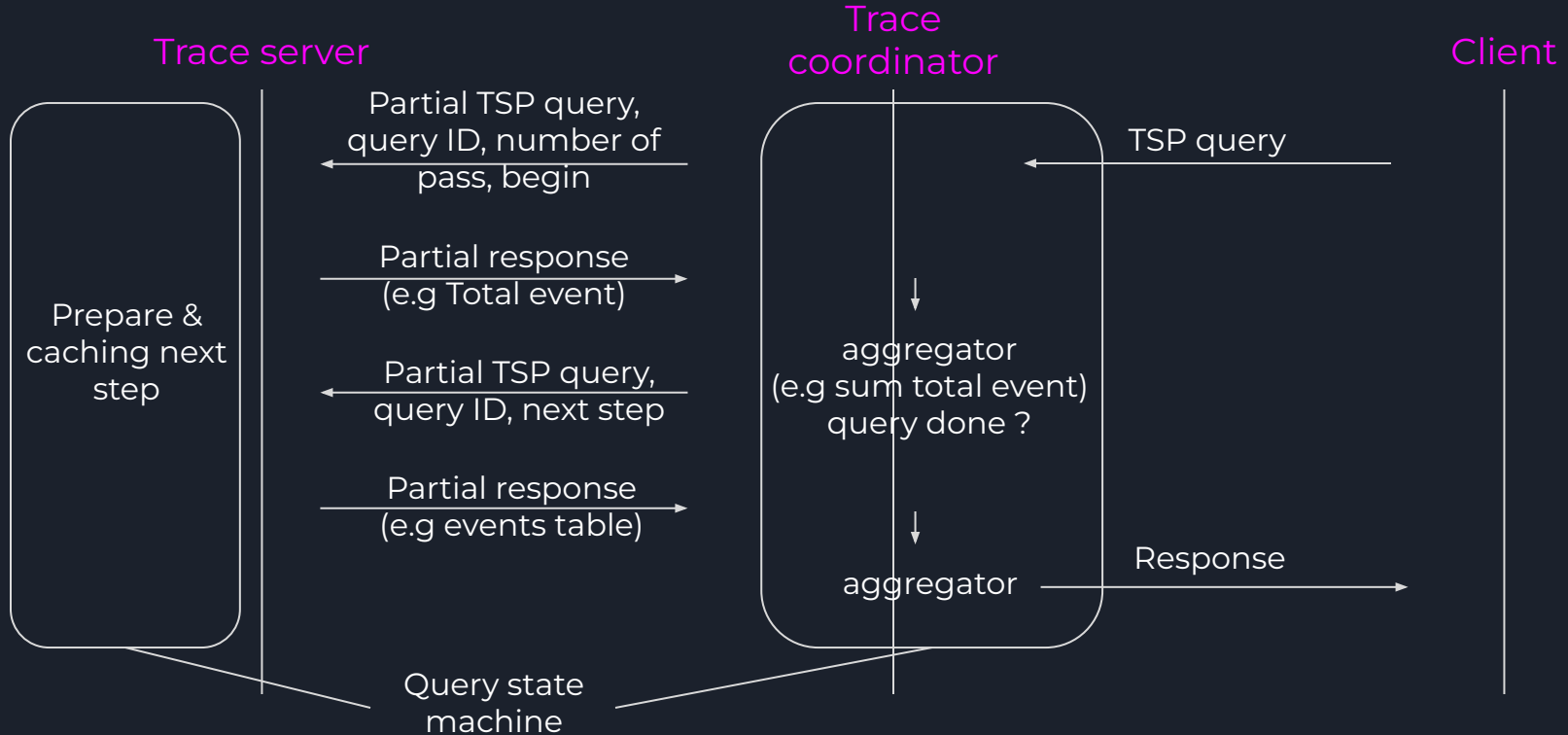
## 2/ CPU usage

- Single-pass
- Complex aggregator



# Query in details

2



# Aggregator example

2

For (entry, i) in list 1

  If isEqual(entry, list 2 [i]) { // best case

    Final list [i] = sum/average/min/max

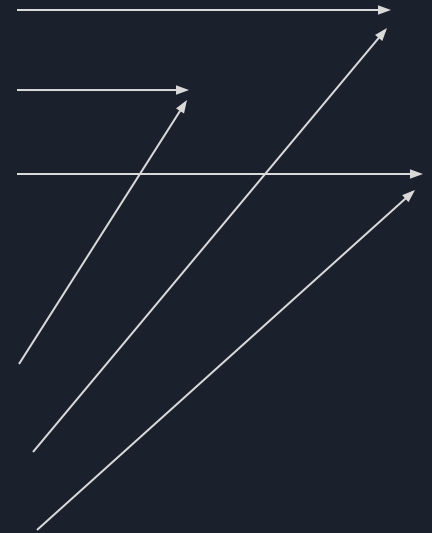
  } else // worst case

    Iterate list 2 until isEqual(entry, list 2 [j])

End for

event/process 1	1 unit
event/process 2	2 unit
event/process 3	3 unit

event/process 2	2 unit
event/process 1	1 unit
event/process 3	3 unit

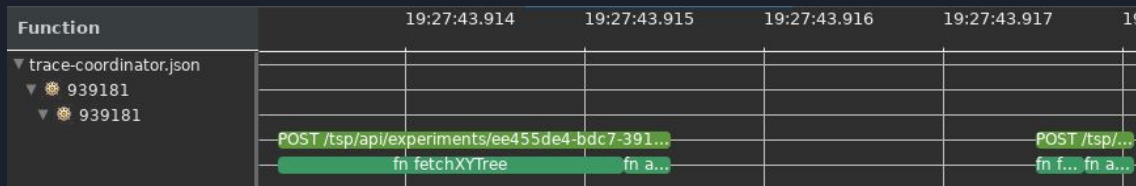




# Benchmarks (implemented in NodeJS)

2

- 2 trace server nodes (Intel Xeon E5640 16 cores, 192gb memory)
- 20 traces, each trace range 100mb ~ 1gb (10 traces each trace server)
- Best-case (cloned traces) vs worst-case (different traces)



Best-case

Type of analysis	Gain
Statistics	1.7x
CPU usage (XY)	1.57x

Worst-case

Type of analysis	Gain
Statistics	1.67x
CPU usage (XY)	1.33x

Gain = Parallel portion / nodes - network overhead - aggregator overhead



## Future work

- Define aggregators algorithm for other types of analyses using a suitable language
- Define use cases for query state machine
- Formulate network & aggregators overheads
- Measure memory footprint
- Implement the model using well-defined analysis frameworks (e.g Spark)
- To be tested on real-world target:
  - GPU cluster
  - MPI cluster



# Conclusion

- Pattern for parallel computation of Trace Compass
- Define communication pattern between trace servers and coordinator
- Mini-framework for implementing trace coordinator



Thank you for listening



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