

# SimLess: SIMULATE SERVERLESS WORKFLOWS AND THEIR TWINS AND SIBLINGS IN FEDERATED FAAS



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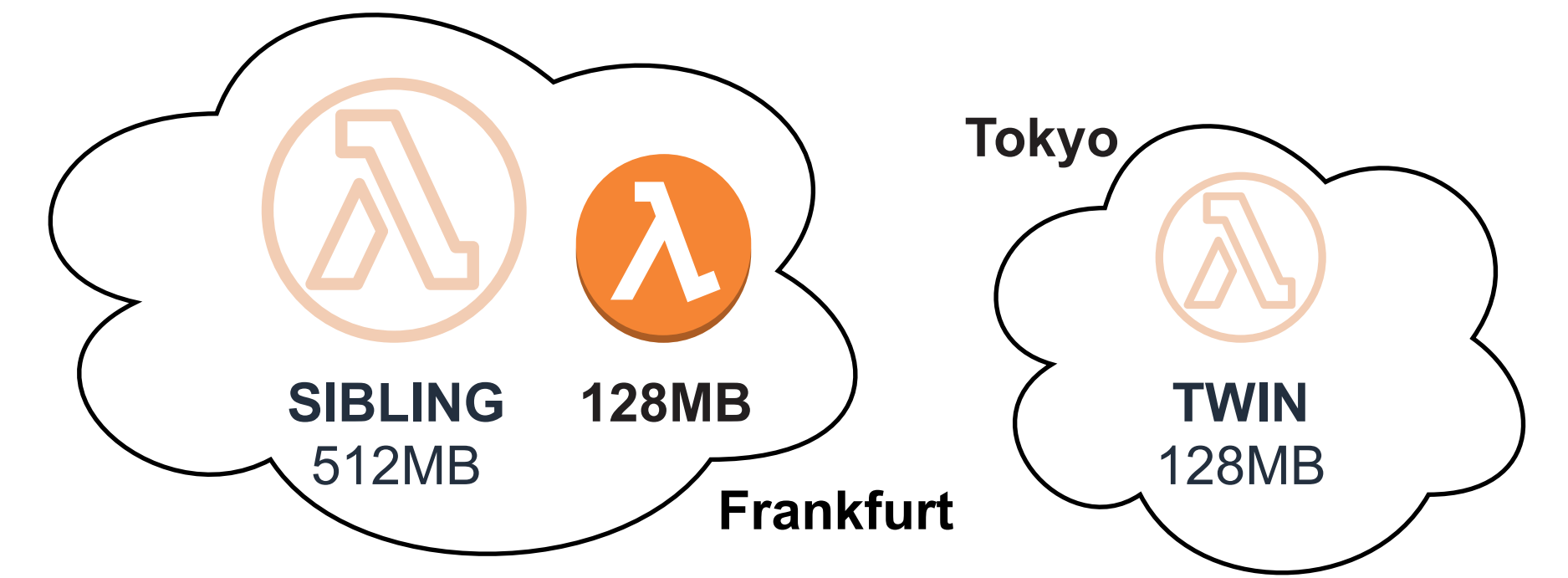
## RESEARCH PROBLEM

- Costly simulation parameter setup in federated Function-as-a-Service (FaaS)
- Lack of Function Choreography (FC) simulation models in federated FaaS
- Existing serverfull workflow simulation model not applicable to FCs

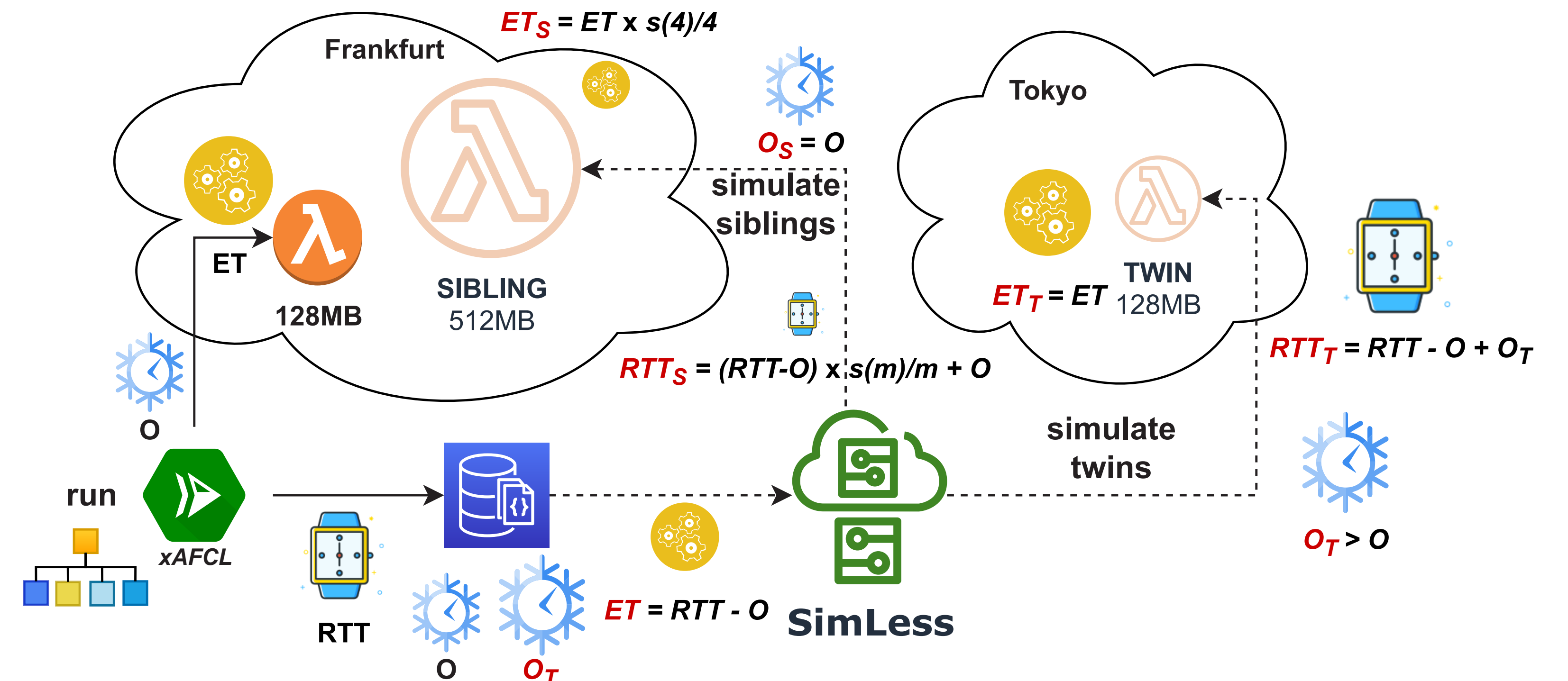
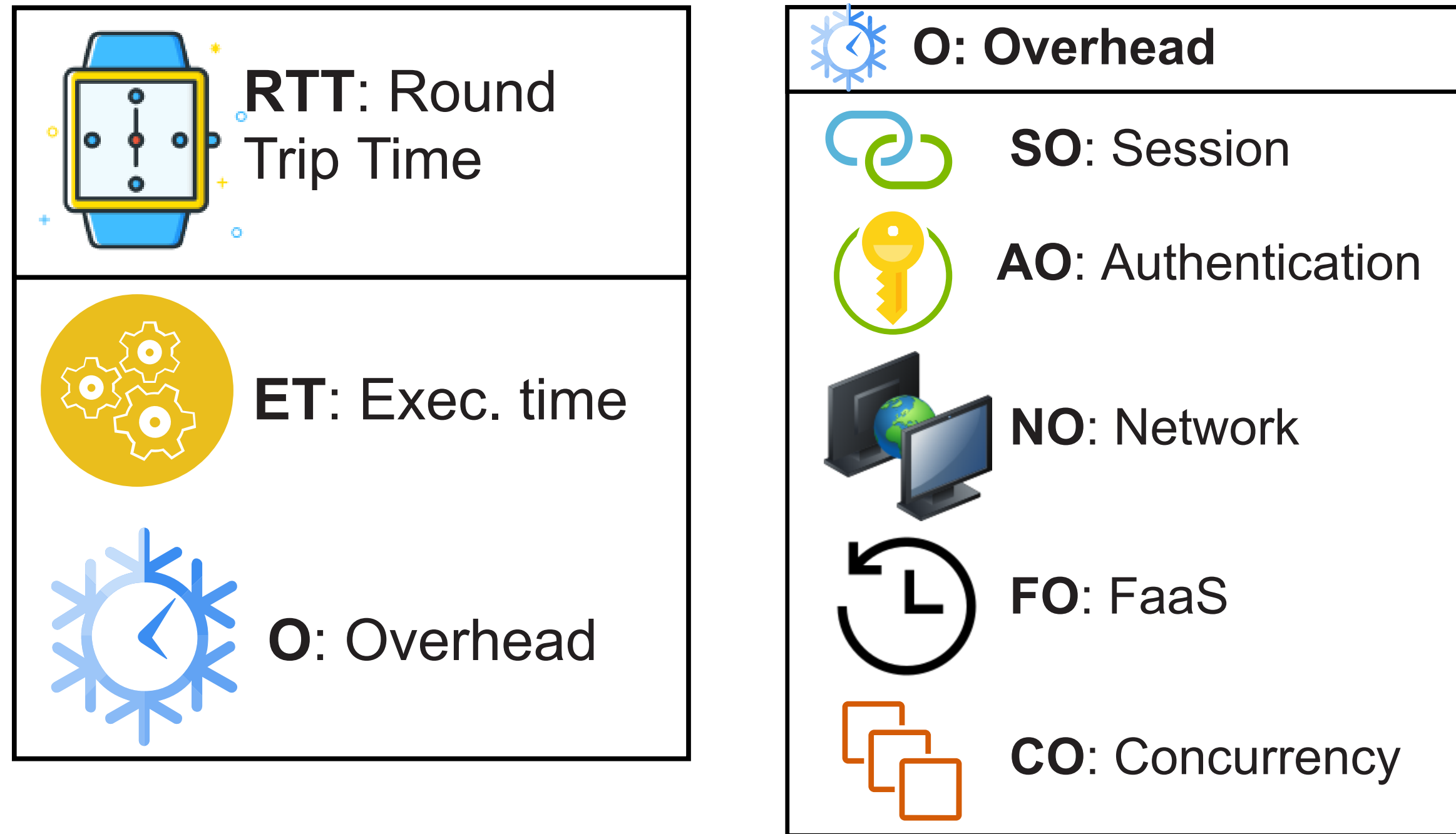
## SimLess CONTRIBUTIONS

- Semi self-configurable simulation of FCs in federated FaaS
- Novel FC-agnostic simulation model with 90.25% accuracy
- 77.23% lower costs for simulation parameter setup

## SimLess METHOD

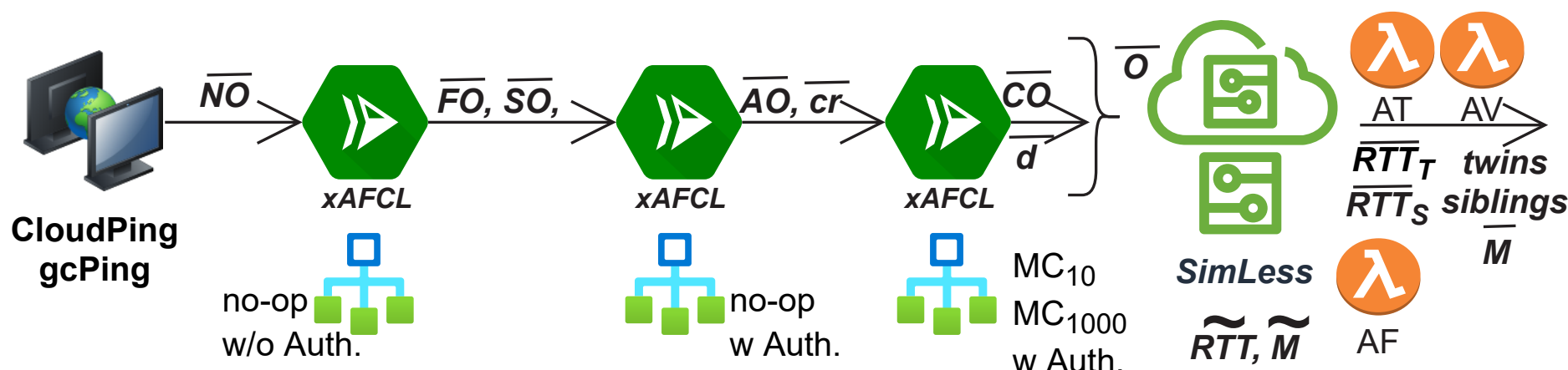


## SimLess FC SIMULATION MODEL

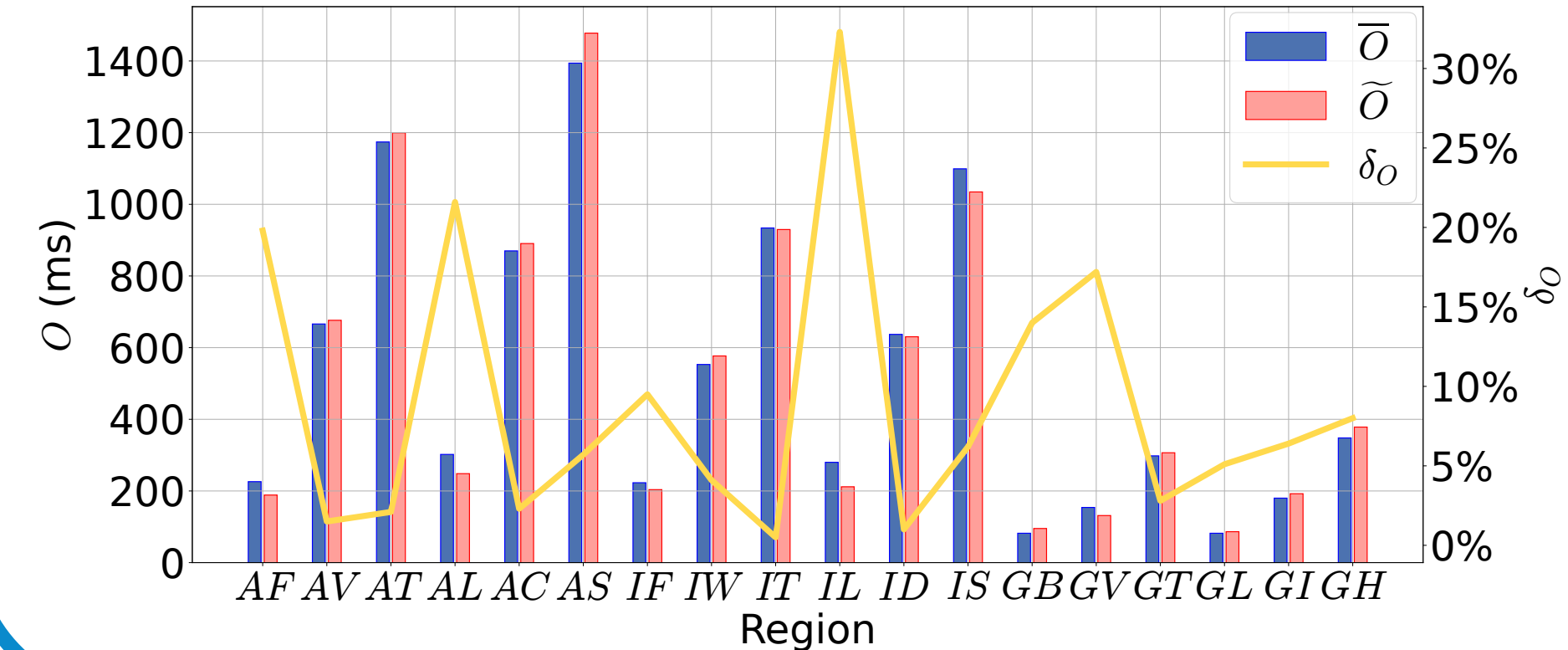


## SimLess PARAMETER SETUP

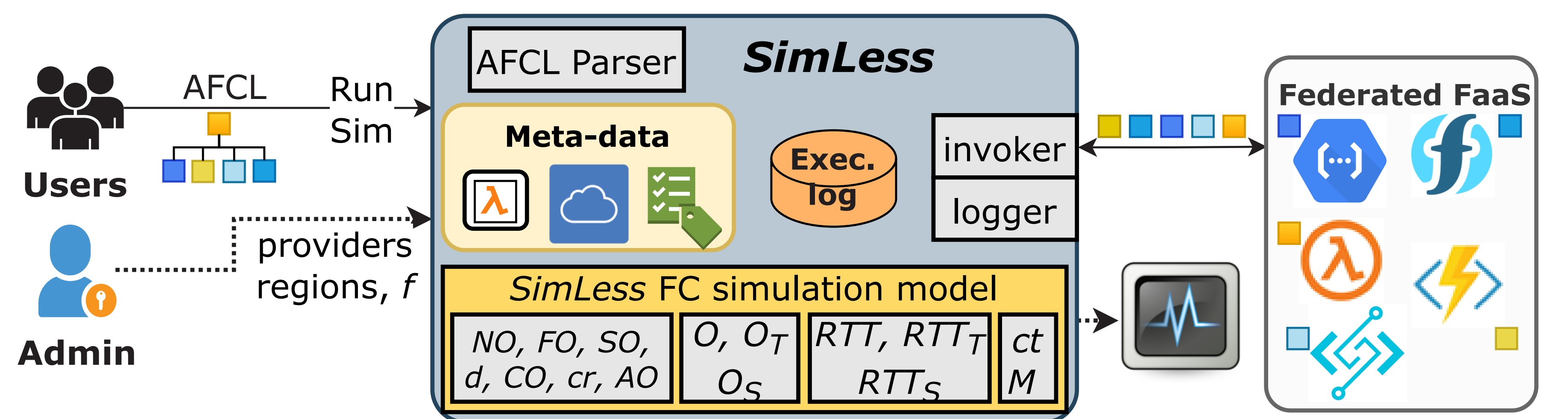
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Learn	EU <sub>1</sub>	AF	IF	GB
	US <sub>1</sub>	AV	IW	GV
	AP <sub>1</sub>	AT	IT	GT
Validate	EU <sub>2</sub>	AL	IL	GL
	US <sub>2</sub>	AC	ID	GI
	AP <sub>2</sub>	AS	IS	GH



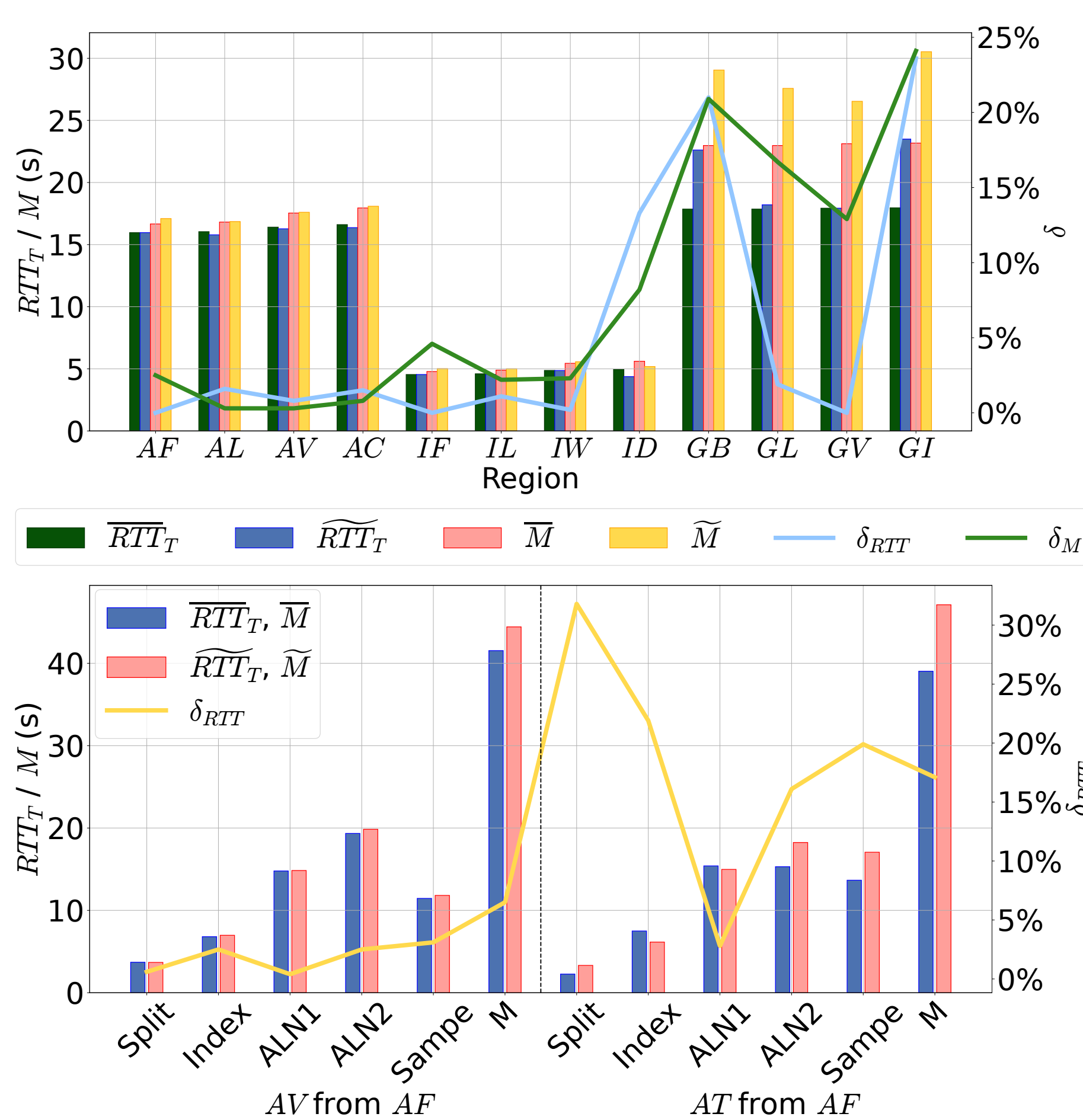
R.	SO	NO	AO	FO	O	δ <sub>O</sub> [%]
AF		30	166		226	19.6
AV	550	140	496	30	666	1.48
AT		267	877		1174	2.17
IF		30	136		223	9.31
IW	152	140	356	57	553	4.16
IT		267	610		934	0.43
GB		59			82	13.7
GV	112	131	—	23	154	17.6
GT		275			298	2.93



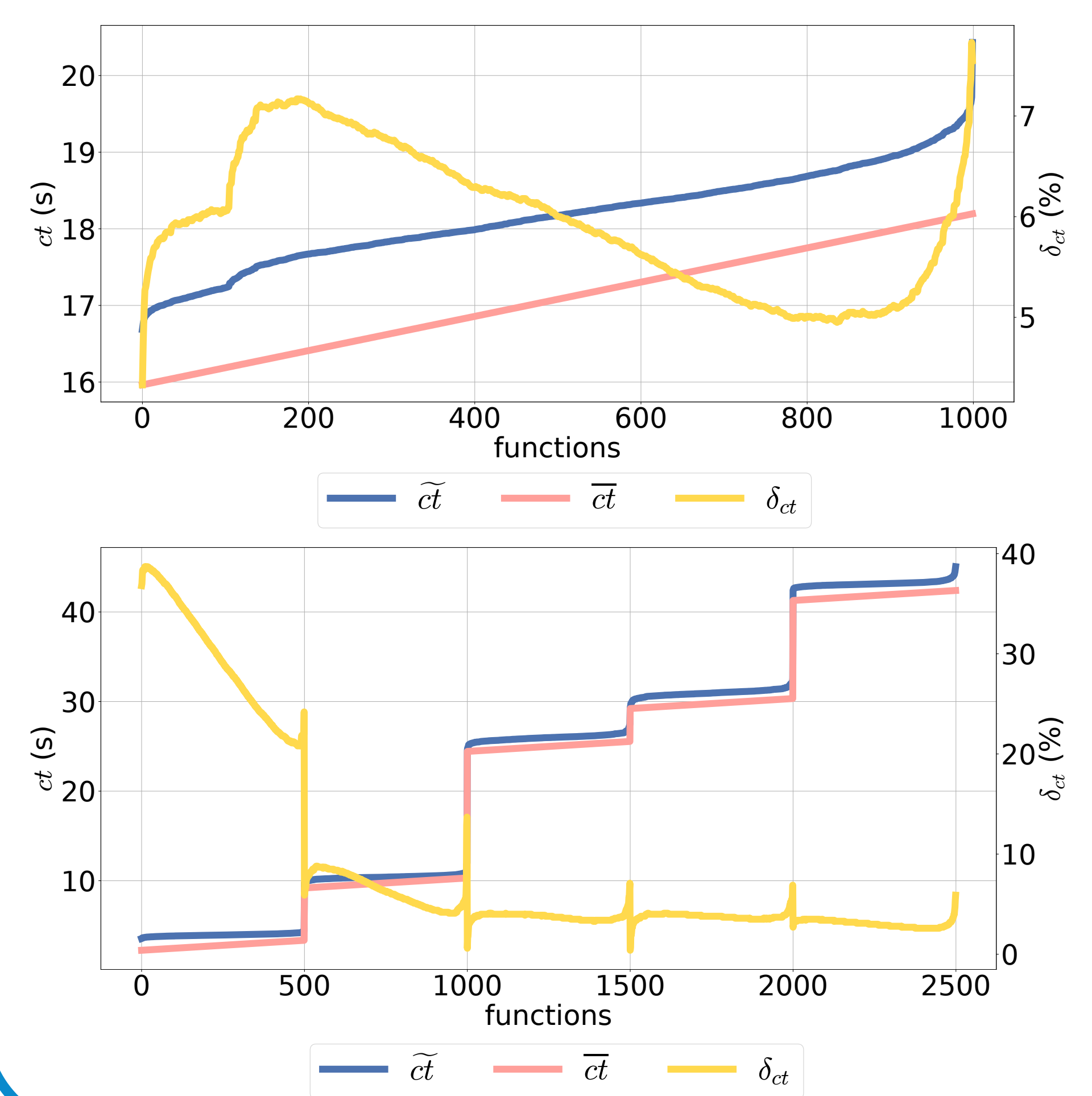
## SimLess SYSTEM ARCHITECTURE



## LOW CONCURRENCY RESULTS



## HIGH CONCURRENCY RESULTS



## ACKNOWLEDGMENTS

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## CONCLUSION AND FUTURE WORK

**Validation** Self-configurable parameters defined by the *SimLess* FC simulation model are provider-dependent and FC-agnostic.

**Novelty** *SimLess* is the first FC simulation framework that models important overheads, including *provider-specific* (i.e.,  $\overline{SO}$ ,  $\overline{FO}$ ) and *region-specific* (i.e.,  $\overline{NO}$ ,  $\overline{AO}$ ).

**Evaluation** Running FCs with a low concurrency of 20 functions in a single region is sufficient to simulate a highly concurrent FC with 2,500 functions with 77.23% lower costs.

**Future work** Model *ET* as sum of *download*, *compute*, and *upload* time; Model *deployment* time. Multi objective FC scheduling with dynamic storage selection and deployment;