

CIFellows 2020-2021

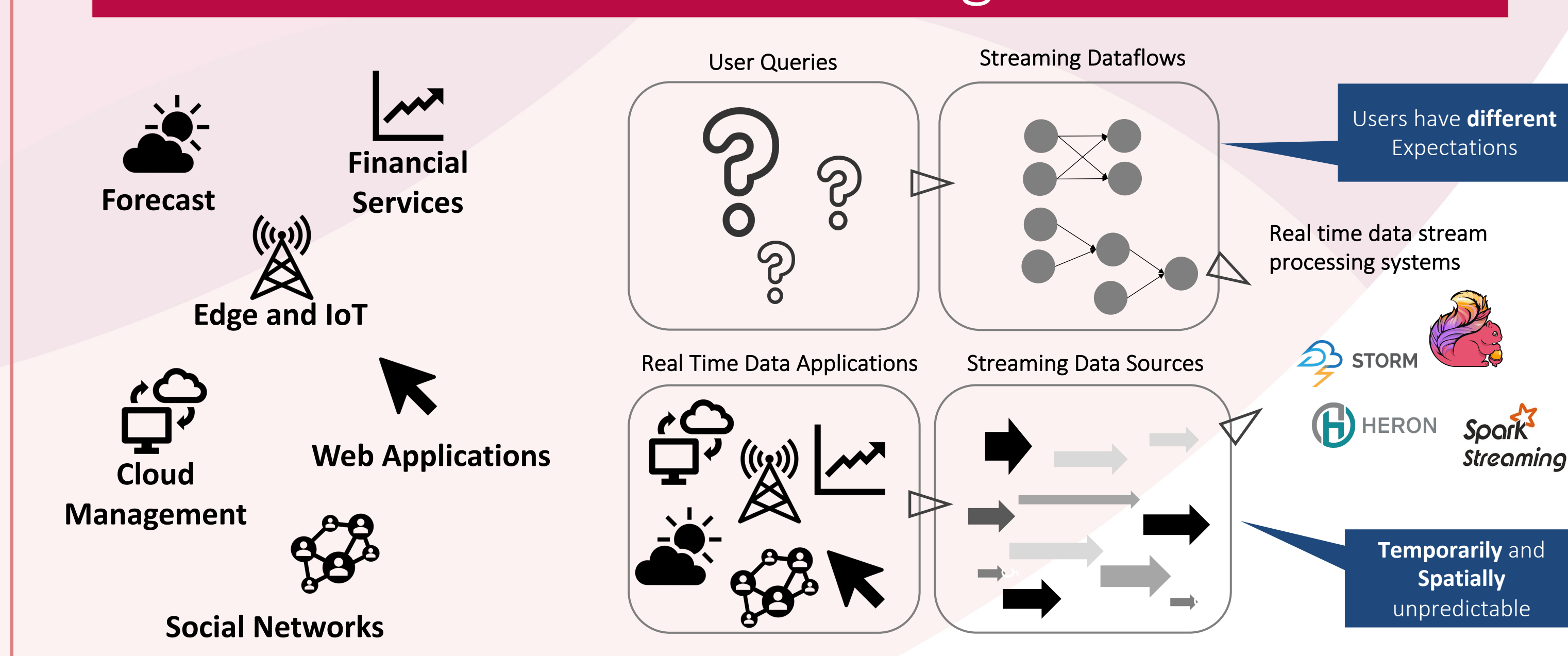
Computing Innovation Fellows

Dirigo: Self-scaling Stateful Actors For Serverless Real-time Data Processing

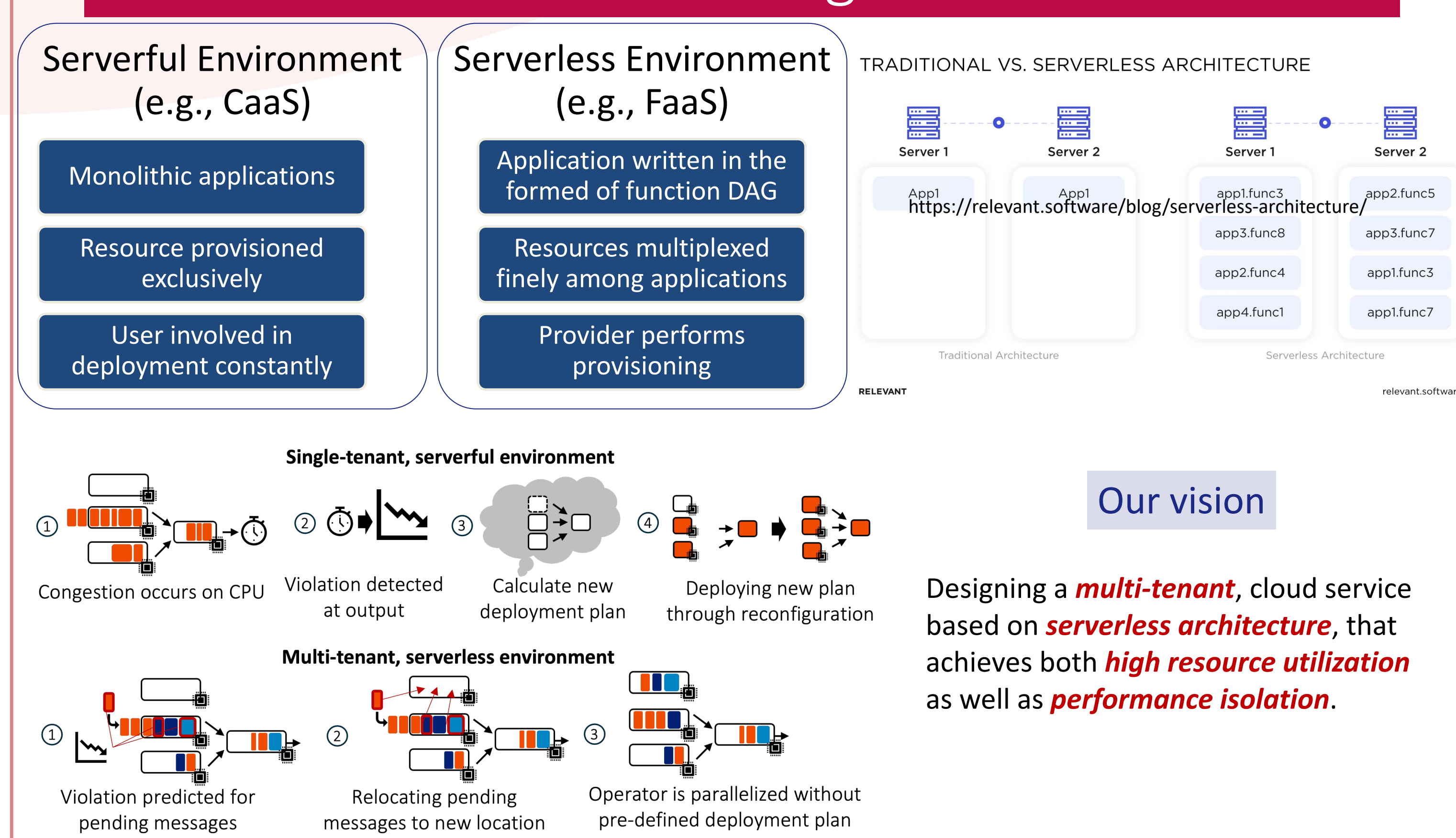
Le Xu

University of Texas at Austin

Real-time Data Processing Frameworks



Real-time Data Processing Meets Serverless

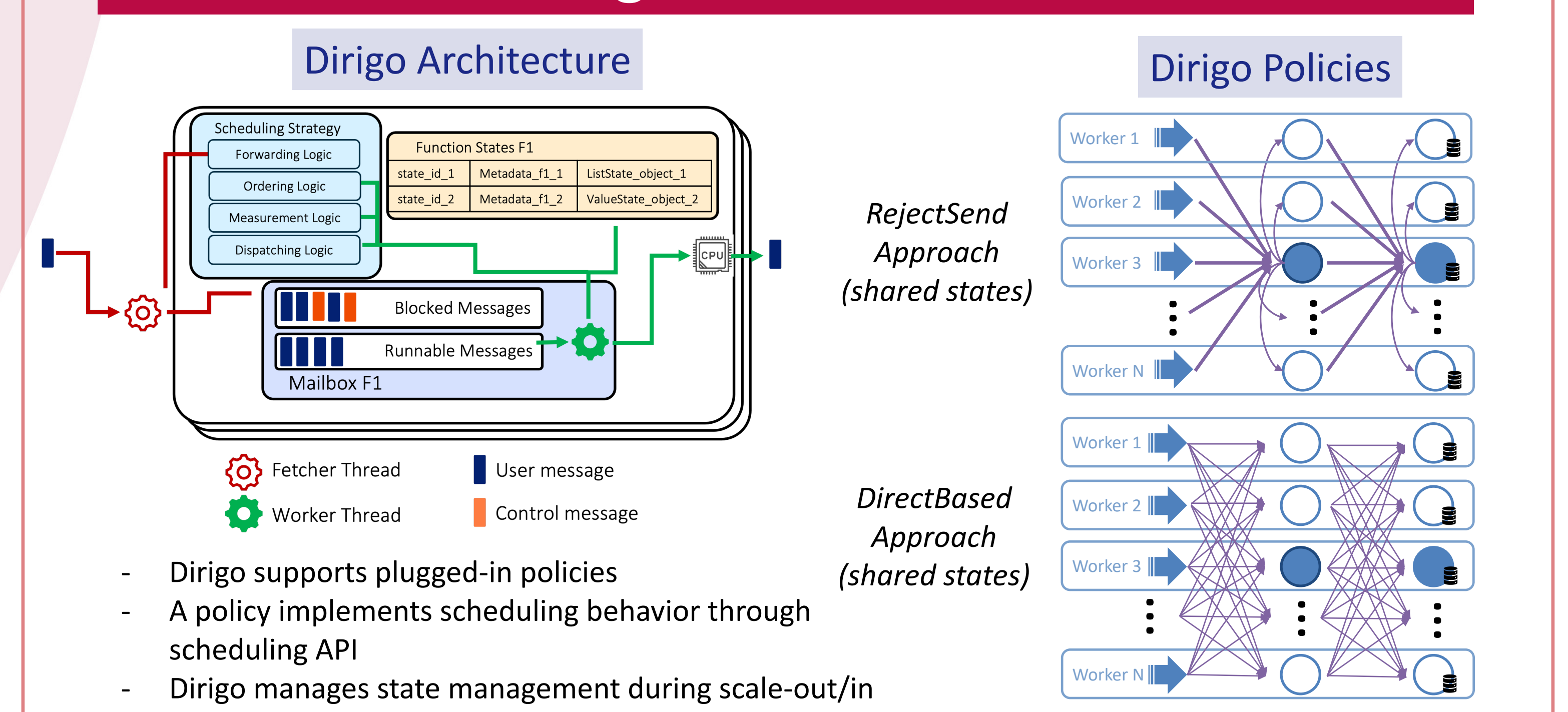


Dirigo: Comparing to Existing Systems

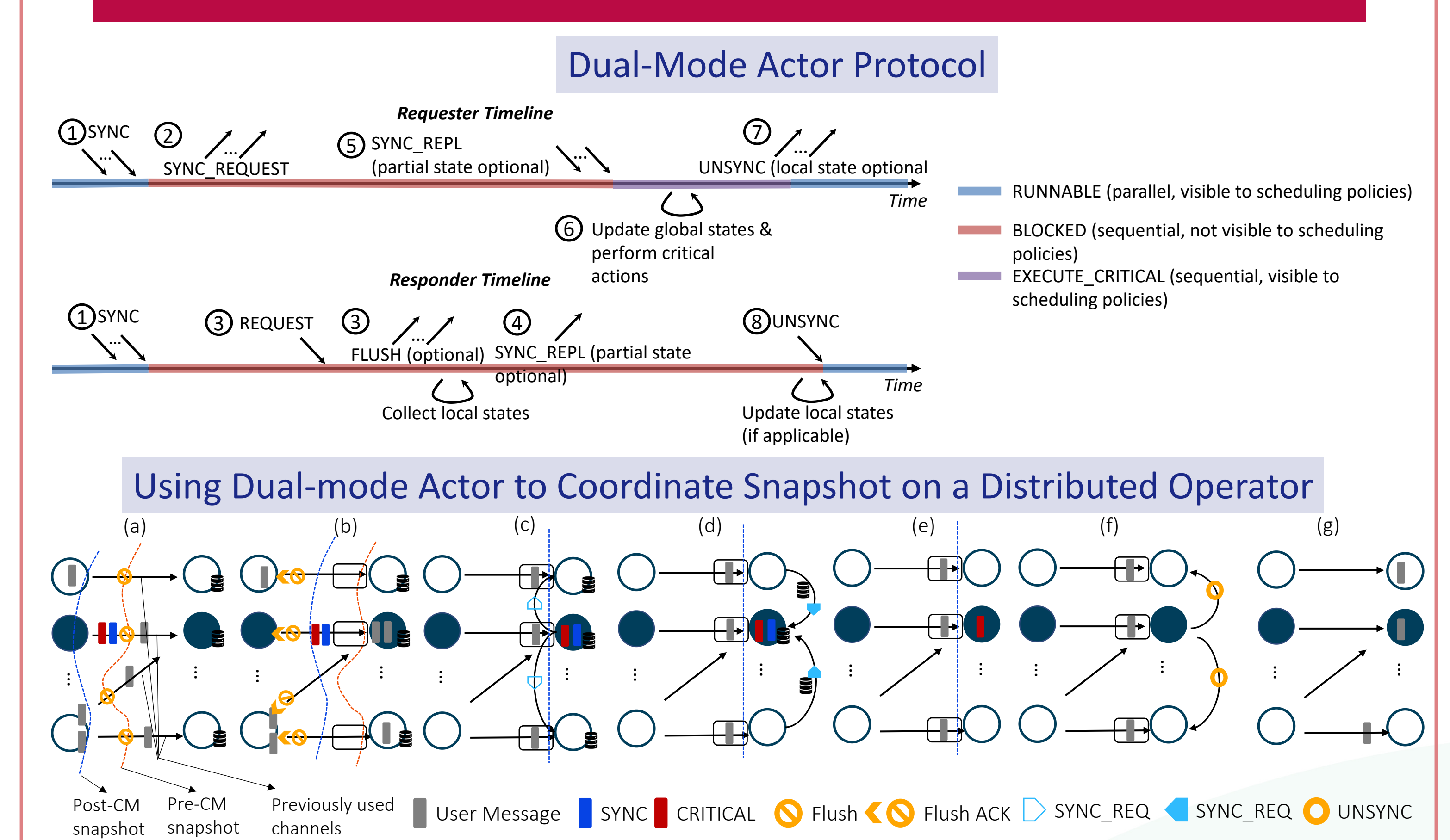
Challenge	Serverful Streaming Platform	Serverless Architecture	Dirigo
Resource Utilization	Low	High (multi-tenancy)	High (multi-tenancy)
Provisioning Granularity	Coarse Grained (per worker)	Fine Grained (per message)	Fine Grained (per message)
Provisioning Scope	Application scope	Platform scope	Platform scope
Native State Management	✓	✗	✓ (dual mode actor)
Performance-Driven	✓	✗	✓ (scheduling architecture with plugged in policies)

Dirigo's Contributions		
Fine-grained provisioning support	Ease of deployment	Processing semantics support
Support event-driven, fine-grained scheduling policy	State management API	Auto partitionable state
Decentralized scheduler design	Scheduling API	Support event ordering

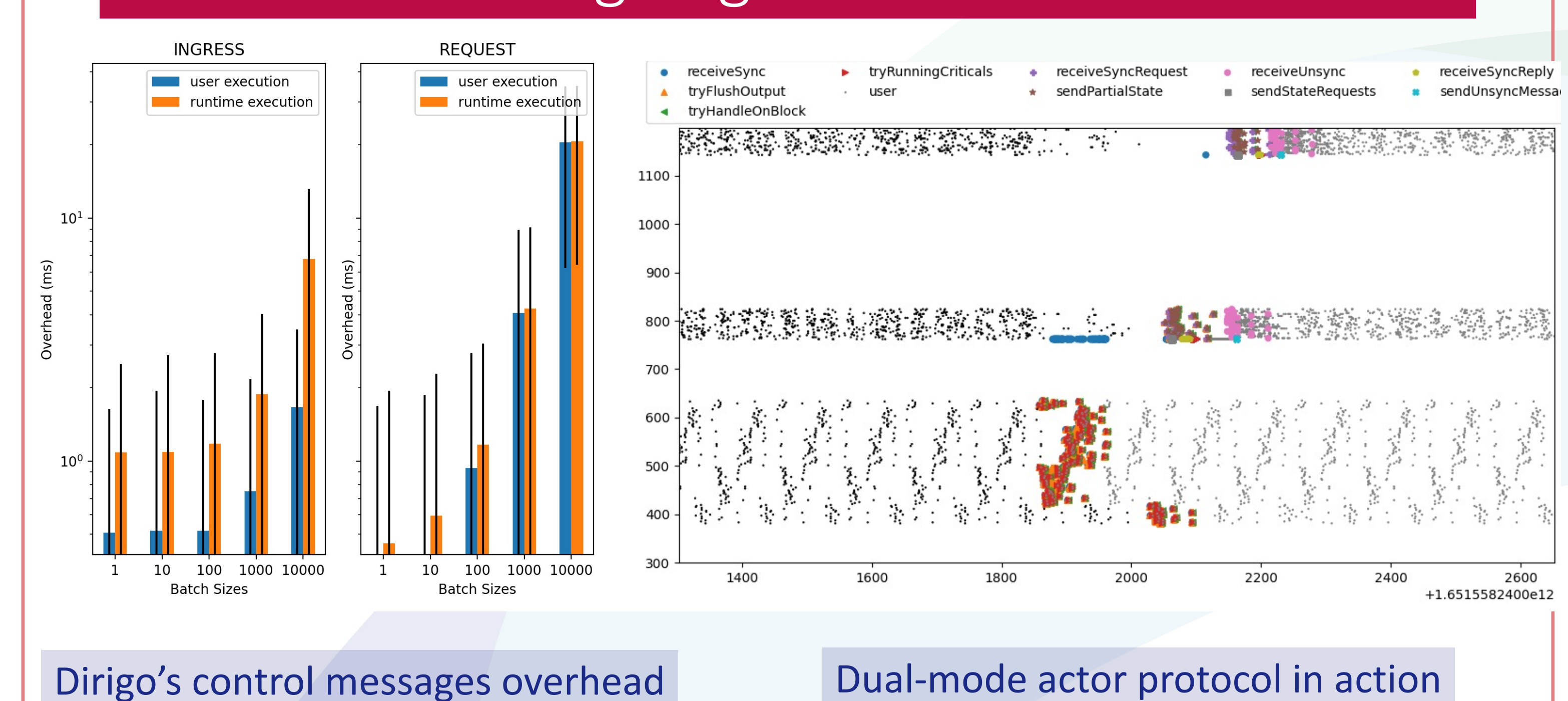
Dirigo Architecture



Dual-Mode Actors



Ongoing Evaluation



Dirigo's control messages overhead

Dual-mode actor protocol in action

