

COMP 513 Project

Rolis

Presented by
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December 5th 2023

Project Description

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Introduction

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Experiments

Conclusion

Rolis: A software approach to efficiently replicating multi-core transactions

- Proposes a new consensus algorithm to improve throughput.
- Uses multiple threads per leader/follower to process transactions.
- Performs well upon failure recovery using *watermarks* to ensure synchronization when necessary.

Choice of Experiments

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- Throughput
 - vs Silo - Algorithm is built by modifying Silo.
 - vs Calvin - Existing state-of-the-art.
- Latency
 - On different batch sizes.
 - Measured for 10th, 50th, 95th percentiles.

Chosen Test Environment

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Comparison (right) with original system (left)

- | | |
|--|--|
| ■ Azure | ■ AWS EC2 |
| ■ 32vCPUs (Intel Xeon Platinum 8272CL) | ■ 32vCPUs (Intel Xeon Platinum 8259CL) |
| ■ 128GB RAM | ■ 128GB RAM |
| ■ 16,000Mbps Network | ■ 10,000Mbps Network |
| ■ Ubuntu 18.04 LTS | ■ Ubuntu Server 20.04 LTS |
| ■ Hypervisor: Hyper-V | ■ Hypervisor: KVM based |
| ■ Single Socket (assumed) | ■ Shared Instance |

Steps to Run

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- Virtual Private Cloud
- Security Groups
- Start EC2 instances.
- Setup SSH connections.
- Run `install.sh`.
- Setup IP addresses (guide given by the paper).
- Run `one-click.sh`.

Throughput: Rolis vs Silo (YCSB++)

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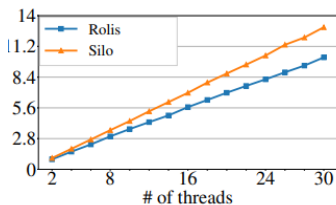
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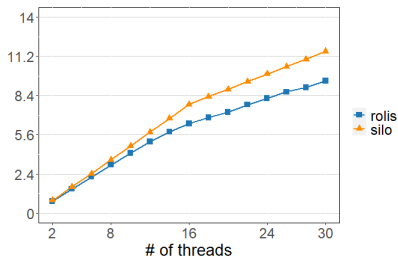
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(a) Original



(b) Observed

Throughput: Rolis vs Silo (TPC-C)

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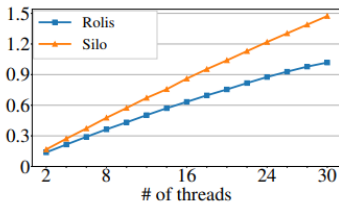
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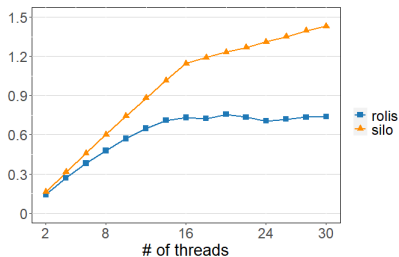
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(a) Original



(b) Observed

Discuss Observation

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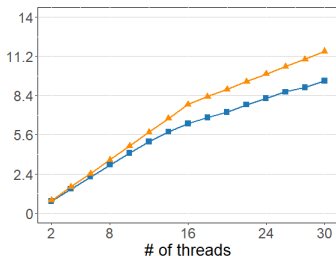
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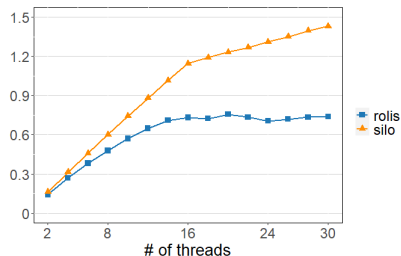
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(a) YCSB++



(b) TPC-C

- VM Resource Overcommitment vs Bare Metal Instance.
- CPU sockets.

Throughput: Rolis vs Calvin (YCSB++)

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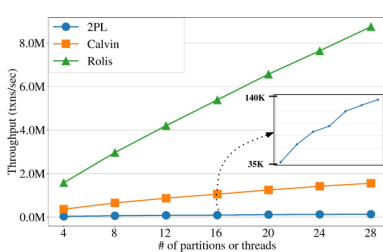
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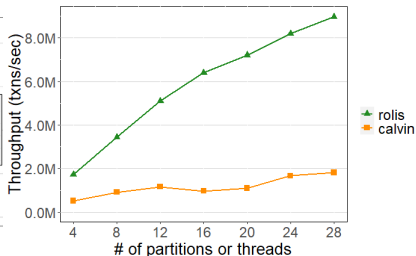
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(a) Original



(b) Observed

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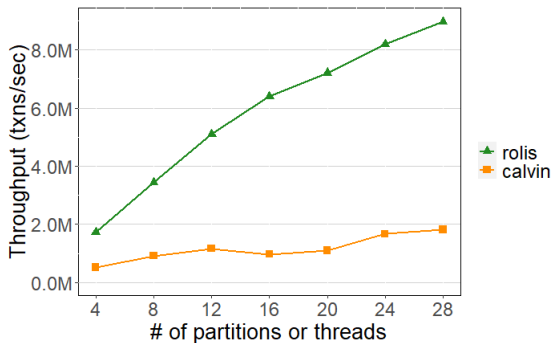


Figure: Observed Throughput of Rolis vs Calvin

- Calvin's thread-implementation vs Rolis.
- CPU Sockets (Calvin experiment needs just one Machine).

Latency: Batch-Size Take 1

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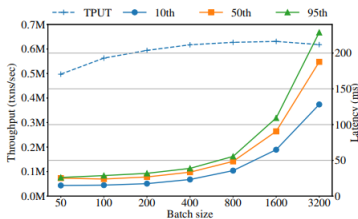
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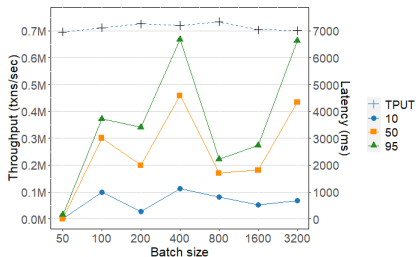
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(a) Original (16 threads)



(b) Observed (16 threads)

Latency: Batch-size Take 2

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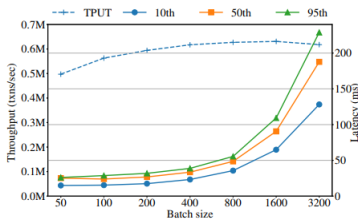
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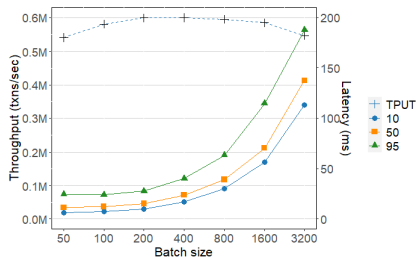
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(a) Original (16 threads)



(b) Observed (12 threads)

Discuss Observation

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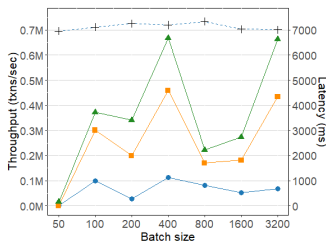
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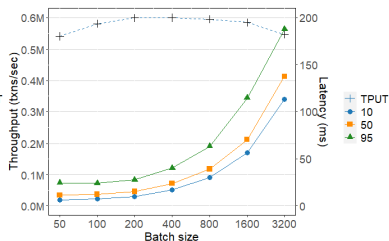
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(a) Original (16 threads)



(b) Observed (12 threads)

- Shared Instances - Network Bandwidth.
- Shared Instances - Congestion Control.

Thank you

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- Rolis: Paper
- Rolis: Experiments Repository

Questions?