

Desktop Cloud Systems: Offering a Dependable Service

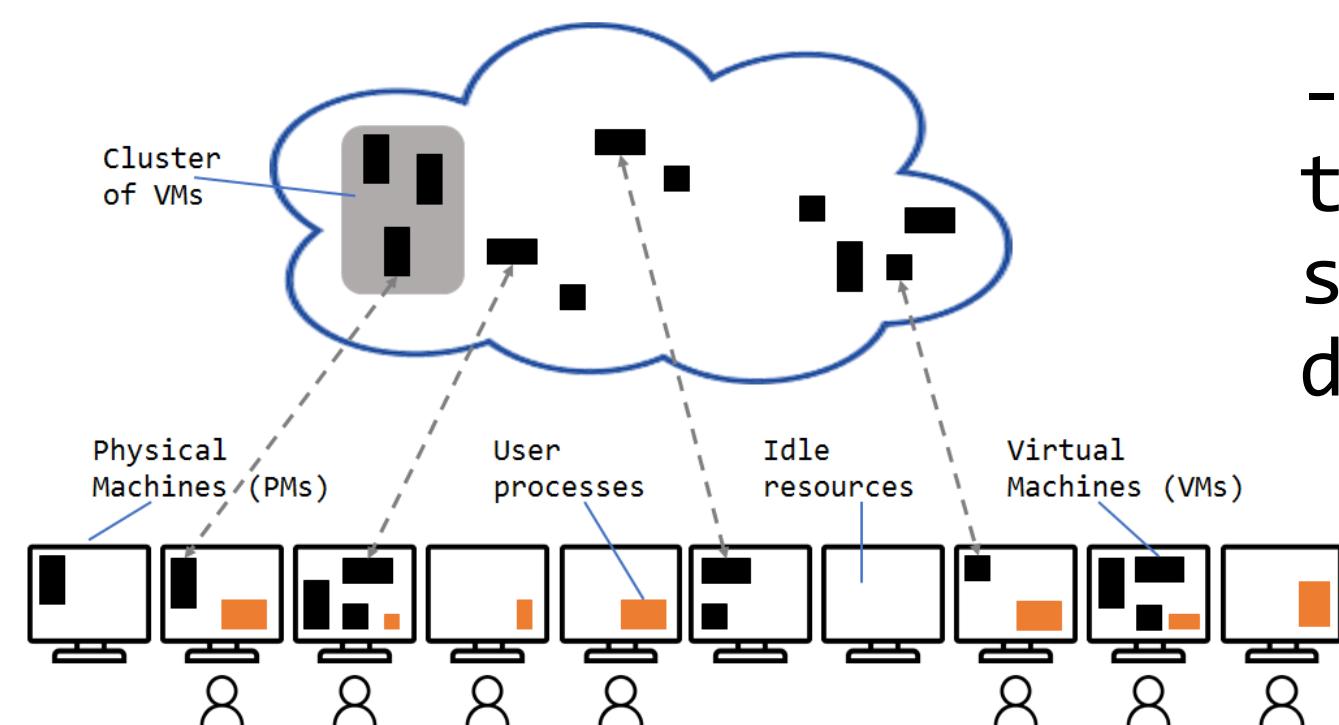
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Introduction

Desktop Cloud System (DC)



-It is a platform that offers cloud services running on desktops.

UnaCloud

-It is a DC implementation. It is our testbed.

Dependability

-There is no universally accepted definition.
-Everything about faults: Prasad, et al.

Offering a Dependable Service

-It is very attractive for any provider.
-UnaCloud is a best-effort DC.
-UnaCloud can extend its services.
-Applications with communications can finalize normally despite faulty infrastructure.

This Doctoral Thesis

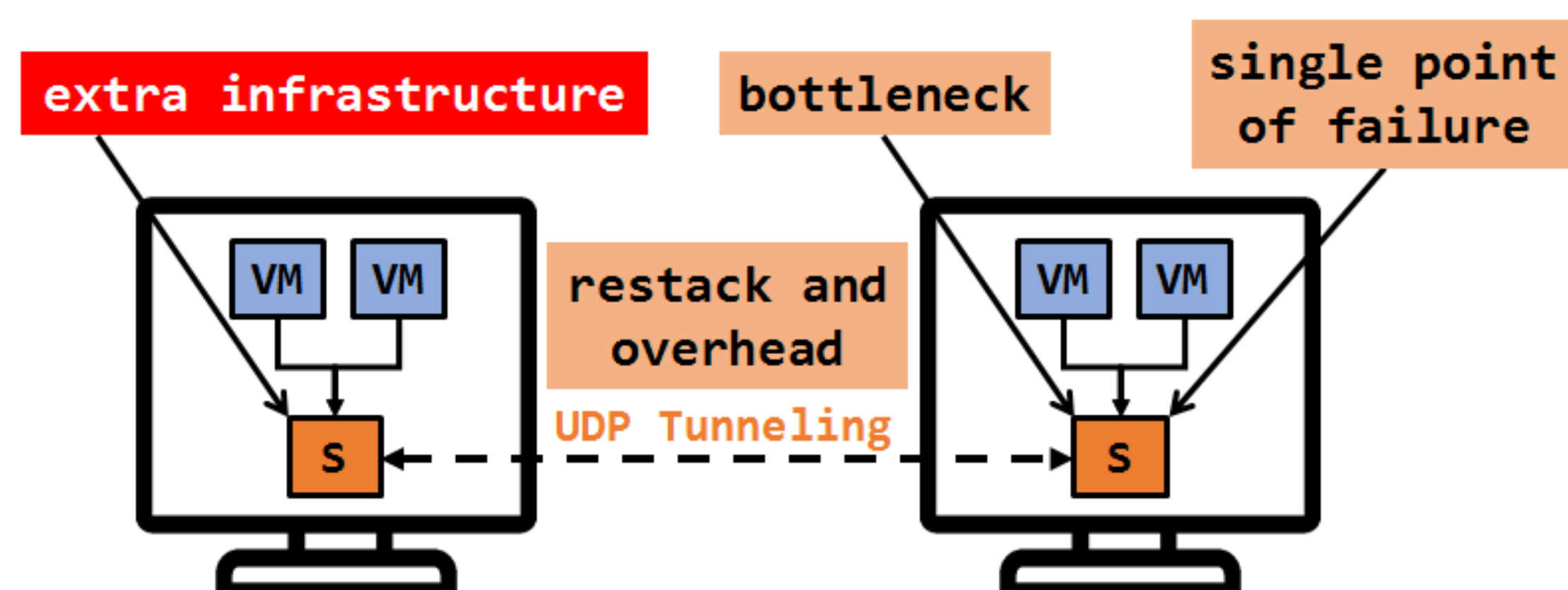
-Analyzes broadly the faults that may occur in the normal operation of a DC.
-Proposes a comprehensive mitigation strategy for improving the dependability of a DC.
-Implements one of the strategies identified - to save the state of a system formed by applications with communications: Global Snapshot Protocol as a Fault Tolerance mechanism.

Global Snapshot Protocol

The Problem

-Hypervisors provide snapshots for individual VMs, but not for distributed systems.
-There are not guarantees for taking local snapshots at the same time.
-Communications cannot be restored with guarantees: TCP reliability is not enough, UDP does not offer reliability.

Related Work: VNSnap - Reference and Source of Opportunities



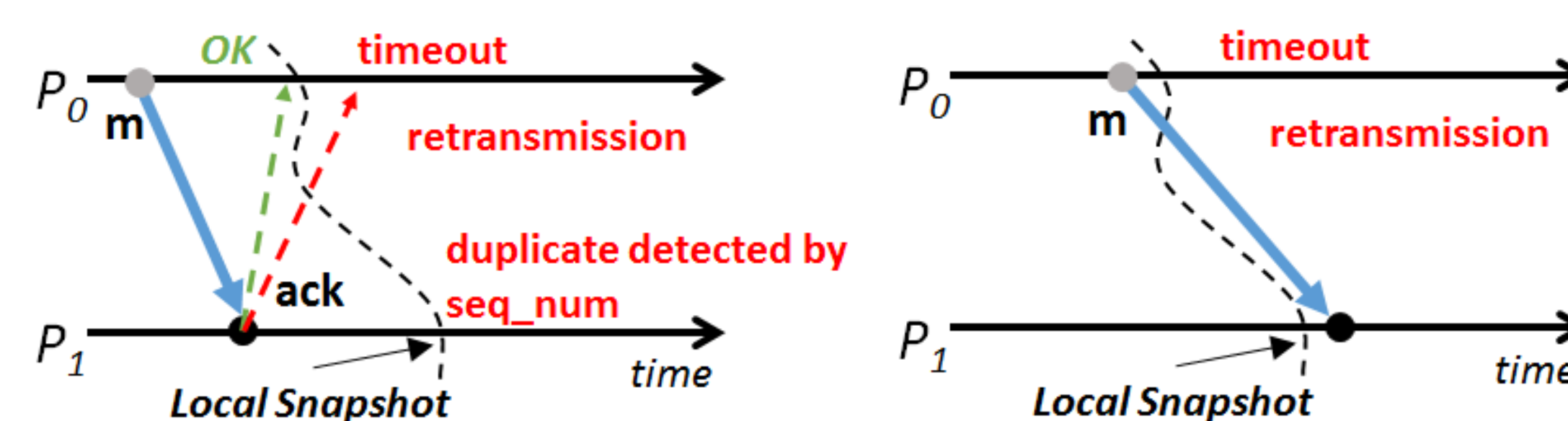
Principles of the solution

Desktop Clouds Limitations

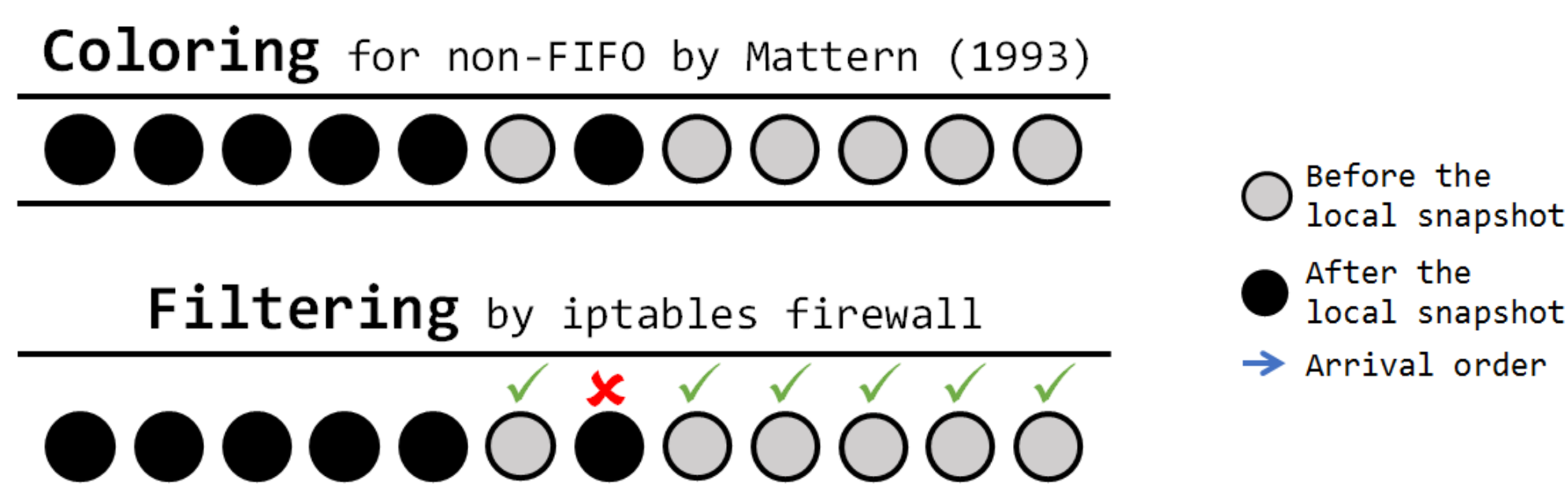
- No extra infrastructure.
- No single points of failure.
- Low impact on DC performance
- Lightweight.

Desktop Cloud Global Snapshot

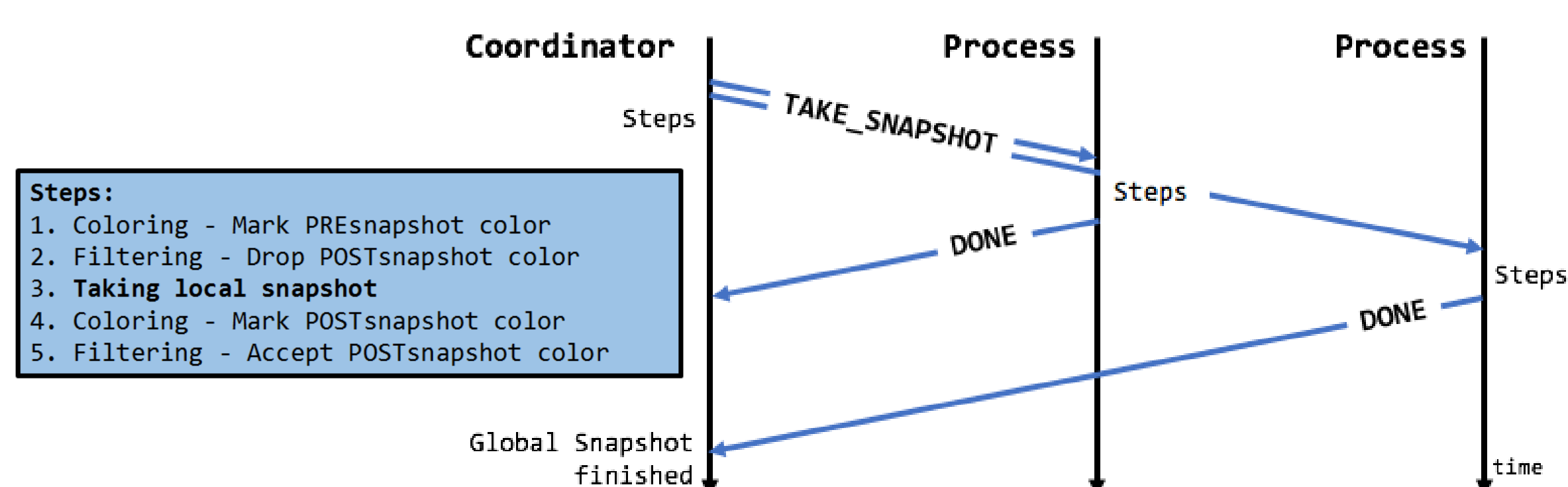
TCP Reliability mechanisms



Coloring in the Nodes and Network Filtering

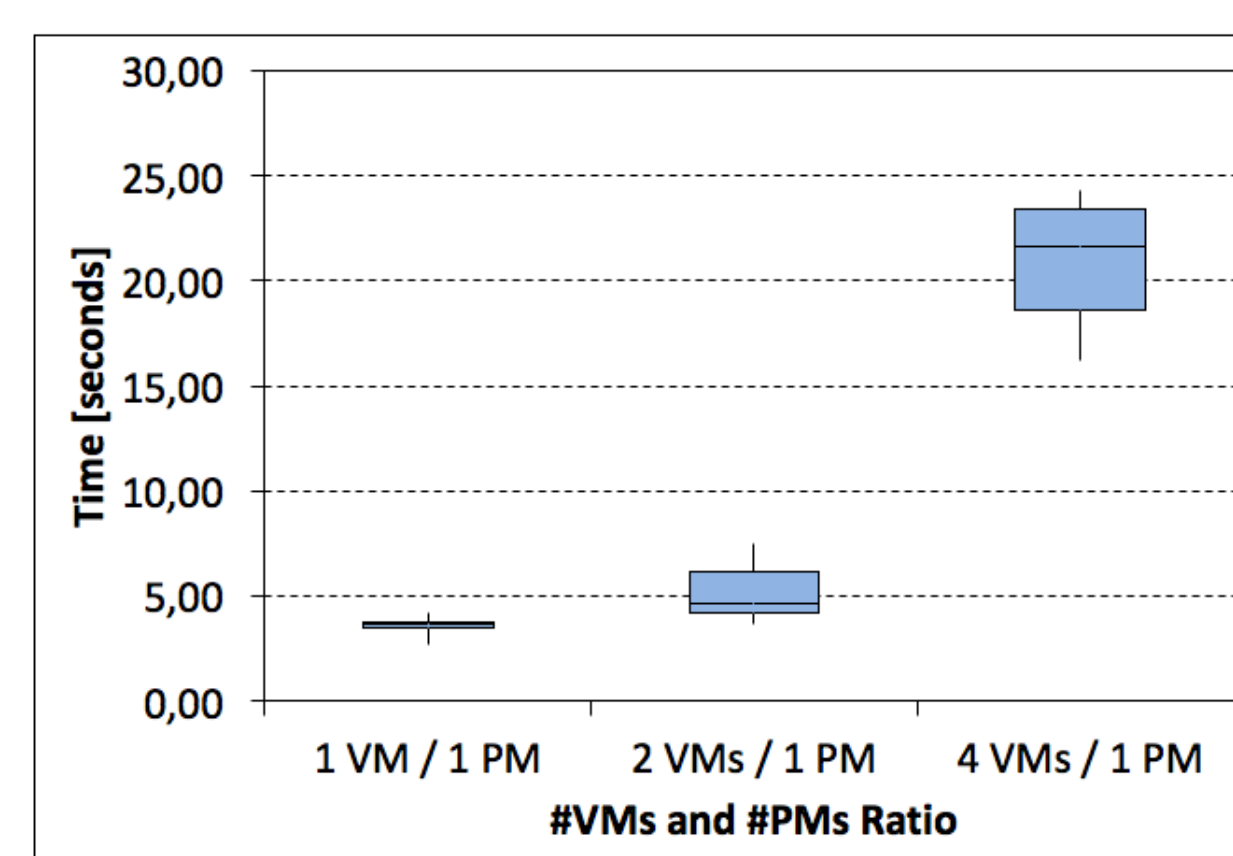


Coordination Protocol



Evaluation

Global Snapshot Time vs #VMs and #PMs Ratio



Results

- Low performance variance.
- The global snapshot time increases significantly for 4 VMs on the same host.

References

Gómez, C. E., Castro, H. E., & Varela, C. A. (2017). Global snapshot of a distributed system running on virtual machines. In 2017 29th International Symposium on Computer Architecture and High Performance Computing (SBAC-PAD) (pp. 169-176). IEEE.