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Project: Comparative Performance Analysis of Docker Containers and VirtualBox Virtual Machines

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Comparative Performance Analysis of Docker Containers and VirtualBox Virtual Machines

1. Introduction

Virtualization has emerged as a cornerstone of modern computing, enabling resource abstraction, environment isolation, and efficient deployment across diverse platforms. Two of the most widely adopted virtualization paradigms are hypervisor-based virtual machines (VMs) and container-based virtualization. VirtualBox, a popular example of the former, emulates entire hardware stacks, offering complete OS isolation. In contrast, Docker provides lightweight process-level virtualization using containerization, sharing the host OS kernel while maintaining isolated user environments.

As organizations increasingly transition to microservices, cloud-native applications, and DevOps pipelines, the choice between traditional VMs and containers becomes critical. While containers are often lauded for their efficiency and minimal overhead, virtual machines are still preferred in scenarios demanding full OS isolation, legacy support, or hardened security.

This project aims to provide a comparative performance evaluation of Docker containers and VirtualBox VMs under identical conditions, using a suite of controlled benchmarks. The objective is to quantify overhead, responsiveness, and elasticity of each technology under realistic workloads relevant to both systems and application-level operations.

To achieve this, we have designed and implemented three core experiments:

- Fibonacci Execution Benchmark – A CPU-bound test to evaluate compute efficiency and scheduling overhead.
- Resource Elasticity Test – A dynamic load generator that simulates fluctuating CPU and RAM demands to assess responsiveness and adaptability under resource stress.
- Machine Learning API Benchmark – A real-world Flask-based API server powered by scikit-learn, served via Gunicorn, and load-tested using ApacheBench to measure throughput and latency.

All benchmarks are executed within Docker containers and VirtualBox VMs on the same physical host, ensuring a fair and unbiased comparison. By measuring execution time, resource utilization, and system behaviour under pressure, this project provides actionable insights into when and why one virtualization strategy may outperform the other.

2. Team Composition and Individual Contributions

Team Member	Role	Contribution
Ashutosh Tripathi	System Design and ML API integration	Designed benchmarking framework and Docker-based implementation. created the production-ready Docker image for container execution. Designed the experimental framework and Dockerfile, implemented the ML inference API using flask + Gunicorn + scikit-learn.
Shiva Theja	Elasticity Benchmark Development & Execution	Developed the elasticity benchmarking script using psutil and multiprocessing in Python. Designed the test logic for simulating RAM and CPU load fluctuation over multiple steps. Executed the elasticity test in both Docker and VirtualBox, and compiled raw results for tabulation and visualization.
Aastha Singh	VirtualBox Setup & CPU Benchmark Execution	Handled the setup and configuration of the VirtualBox VM, including OS installation and Python environment preparation. Conducted the CPU-bound Fibonacci benchmark within the VM, recorded system-level statistics, and contributed comparative observations for system

		and user time analysis.
Animesh Aman	Performance Testing, Data Visualization and Analysis	Led the ApacheBench-based ML API stress testing on both platforms, gathered latency, throughput, and transfer rate metrics Generated charts for CPU time, memory usage, context switches, and latency and also across all benchmarks using Matplotlib and Excel.

3. Methodology and System Design

3.1. Objective

The primary objective of this project is to conduct a rigorous, reproducible performance comparison between Docker container-based virtualization and VirtualBox virtual machine-based virtualization. The goal is to quantify and interpret differences in compute efficiency, resource elasticity, and API responsiveness when subjected to controlled workloads, all executed on a common physical host to ensure experimental fairness.

3.2. Experimental Environment

All benchmarking experiments were conducted on a single physical host machine to ensure consistency and eliminate environmental variability. The specifications of the host system are as follows:

- Host Operating System: Windows 10 (64-bit)
- Processor: Intel(R) Core(TM) i3-8300T CPU @ 3.20GHz, 4 Cores, 4 Logical Processors
- RAM: 8 GB DDR4
- Docker Version: Docker version 28.1.1, build 4eba377
- VirtualBox Version: Version 7.1.12 r169651 (Qt6.5.3)
- Python Version: 3.13.3 (used in both Docker containers and VirtualBox VM)

To ensure equivalence in testing conditions, both the Docker container and the VirtualBox VM were configured with a similar Python environment and necessary dependencies. The operating system used within both virtual environments was Ubuntu 22.04 LTS, which

provided a uniform Linux-based platform for executing the benchmarking scripts.

The base image used in the Docker environment was a standard Ubuntu image sufficient to support all required packages (flask, scikit-learn, gunicorn, psutil). Care was taken to replicate the same setup inside the VirtualBox VM by manually installing the same versions of Python libraries using pip.

All experiments were executed with no background tasks running, and each test was conducted multiple times to obtain reliable average results.

3.3. Benchmark Suite Design

To ensure a comprehensive evaluation of both virtualization techniques, we designed a three-part benchmark suite targeting distinct system dimensions—raw computational throughput, dynamic resource handling, and end-to-end application responsiveness.

3.3.1. Fibonacci Execution Benchmark (CPU-Bound)

This benchmark is designed to stress-test the CPU by executing a compute-intensive, single-threaded task. It helps isolate and measure differences in raw CPU performance, scheduling latency, and virtualization overhead under identical load conditions.

A recursive Python function was used to compute the 35th Fibonacci number. This input size was chosen deliberately to create a significant, measurable CPU-bound load without invoking parallelism or I/O operations.

Execution:

- Virtual Machine:
  /usr/bin/time -v python3 benchmark.py
- Docker:
  docker run -it vcc-benchmark:ml /usr/bin/time -v python3 benchmark.py

Metrics captured:

- Elapsed real time (wall-clock time)
- CPU user and system time
- Peak memory usage (RSS)
- Context switches and page faults

This test is particularly effective in highlighting differences in how each virtualization strategy handles CPU scheduling and resource isolation.

3.3.2. Resource Elasticity Benchmark (Load Simulation)

To evaluate the responsiveness and adaptability of each virtualization environment when subjected to dynamic changes in CPU and memory usage. This benchmark simulates real-world application scenarios such as load spikes and scaling behaviors.

A custom Python script was developed using the psutil library. The script programmatically increases and decreases memory and CPU usage over time in waves, using multiprocessing and artificial memory allocation. The pattern mimics a burst-and-relax load cycle often seen in web applications or batch processing systems.

Execution:

- Virtual Machine:
  /usr/bin/time -v python3 elasticity_test.py
- Docker:
  docker run -it vcc-benchmark:ml /usr/bin/time -v python3 elasticity_test.py

Metrics Captured:

- CPU usage trend over time
- Memory allocation and release behavior
- System responsiveness to resource spikes
- Average vs peak resource usage

3.3.3. Machine Learning API Benchmark (I/O + CPU + Concurrency)

To assess real-world application performance involving concurrent I/O, CPU processing, and network communication. This benchmark reflects how ML workloads are deployed in modern DevOps and containerized environments.

A machine learning classification model was trained using scikit-learn and integrated into a lightweight RESTful web application using the Flask framework. The model was served via a /predict endpoint, which accepts POST requests with input features and returns predictions.

For production simulation, the app was served using Gunicorn, a multi-worker WSGI server, with four worker processes to enable concurrent handling of requests.

Execution:

- **VM:**
  gunicorn -w 4 -b 0.0.0.0:5000 app:app
- **Docker:**
  docker run -it -p 5000:5000 vcc-benchmark:ml gunicorn -w 4 -b 0.0.0.0:5000 app:app

Load Testing:

Requests were generated using ApacheBench with the following configuration:
ab -n 1000 -c 10 -p sample.json -T application/json http://localhost:5000/predict
Metrics Captured:

- Requests per second (throughput)
- Mean and 95th percentile response time
- Total test duration
- CPU and memory usage during inference

3.4. Implementation

3.4.1. Docker – Based Implementation

The Docker implementation was designed for automation and consistency. A single Dockerfile was created to install all necessary Python packages and copy all benchmarking scripts into the container. The final image included:

- Python 3.13 runtime environment
- Installed packages: flask, scikit-learn, gunicorn, psutil
- Preloaded benchmark and server scripts

I. Built the image using:

   docker build -t vcc-benchmark:ml .

II. Ran each test in isolated containers with interactive shell and time profiling:

   docker run -it vcc-benchmark:ml /usr/bin/time -v python3 benchmark.py

   docker run -it vcc-benchmark:ml /usr/bin/time -v python3 elasticity_test.py

   docker run -it -p 5000:5000 vcc-benchmark:ml gunicorn -w 4 -b 0.0.0.0:5000 app:app

The Docker image served as a self-contained benchmarking environment that eliminated dependency mismatches and ensured cross-machine portability.

3.4.2. VirtualBox – Based Implementation

In the VirtualBox setup, a Linux-based VM was created (Ubuntu 22.04 LTS) with Python 3.13 installed manually. The benchmarking scripts and input files were transferred into the VM via shared folders configured through VirtualBox.

I. Set up a shared directory between Windows host and Ubuntu guest.
II. Inside the VM, installed required Python packages.
III. Ran each script manually using:
/usr/bin/time -v python3 benchmark.py
/usr/bin/time -v python3 elasticity_test.py
gunicorn -w 4 -b 0.0.0.0:5000 app:app

To simulate API load from inside the VM, ApacheBench (ab) was installed and executed from a separate terminal session to generate concurrent HTTP requests to the /predict endpoint.

3.4.3. Result Capture and Logging

Performance metrics were recorded using the following tools:

- /usr/bin/time -v: Captured execution time, memory usage, and system-level stats
- ab: Logged latency and throughput for API benchmarking
- psutil: Monitored in-process CPU and memory behavior for elasticity tests

3.5. Fairness Controls and Isolation

- CPU Affinity and Load Management: No background CPU-intensive tasks were running during benchmark execution. Each benchmark was run independently in an idle system state.
- Memory Clean State: System memory was flushed and cold-started before each test cycle.
- Test Repetition: Each benchmark was executed three times, and averages were computed to minimize noise or transient variability.

4. Source Code and Implementation Repository

All implementation artifacts—including benchmarking scripts, machine learning API code, Docker configuration files, and sample input data—were organized into a version-controlled GitHub repository. This enabled

reproducibility, remote access, and auditability of all code used in the experiments.
Repository:
https://github.com/ashutosh0215/vcc-docker-vs-virtualbox-benchmark
Structure:

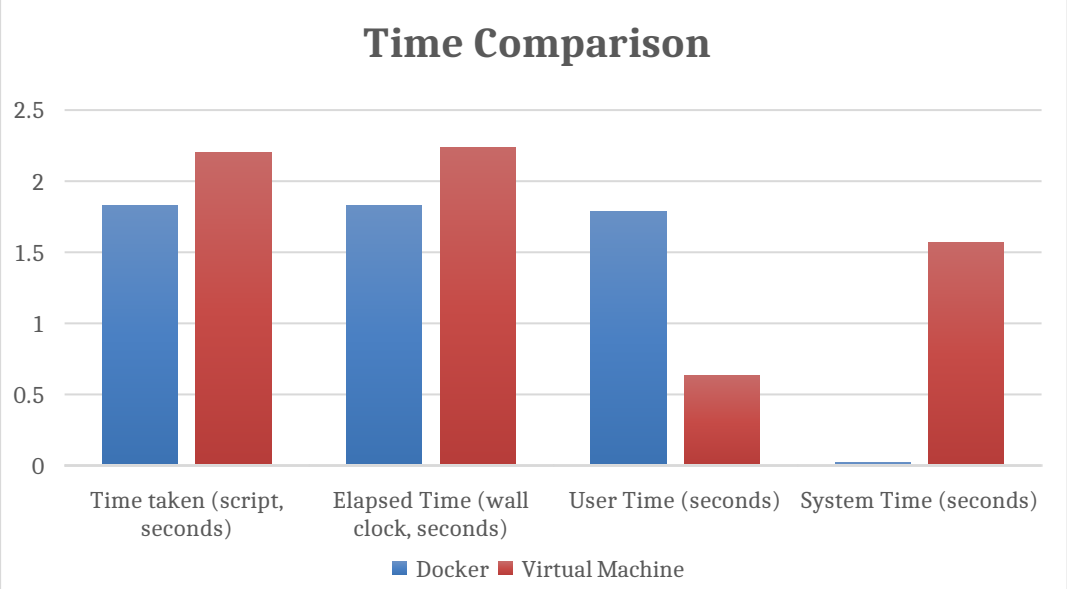
```
/benchmark.py           # Fibonacci benchmark script
/elasticity_test.py     # CPU + RAM load fluctuation script
/app.py                 # ML API (Flask)
/model.pkl              # Serialized ML model
/sample.json                    # Test input payload for /predict
/Dockerfile                     # Docker build instructions
/README.md              # Execution guide
/train_and_save_model.py    #script to train and save the ml model
```

5. Experimental Results and Observations

5.1. CPU – Bound Test (Fibonacci Computation)

Execution Time and Efficiency

Metric	Docker	VirtualBox
Fibonacci Output	9227465	9227465
Time taken (script, seconds)	1.83	2.2
Elapsed Time (wall clock, seconds)	1.83	2.24
User Time (seconds)	1.79	0.63
System Time (seconds)	0.02	1.57

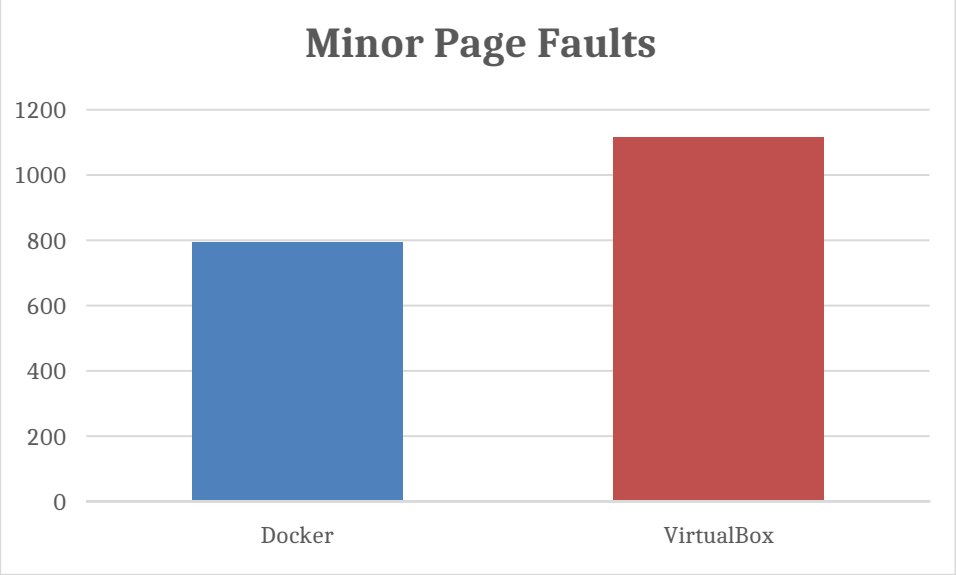


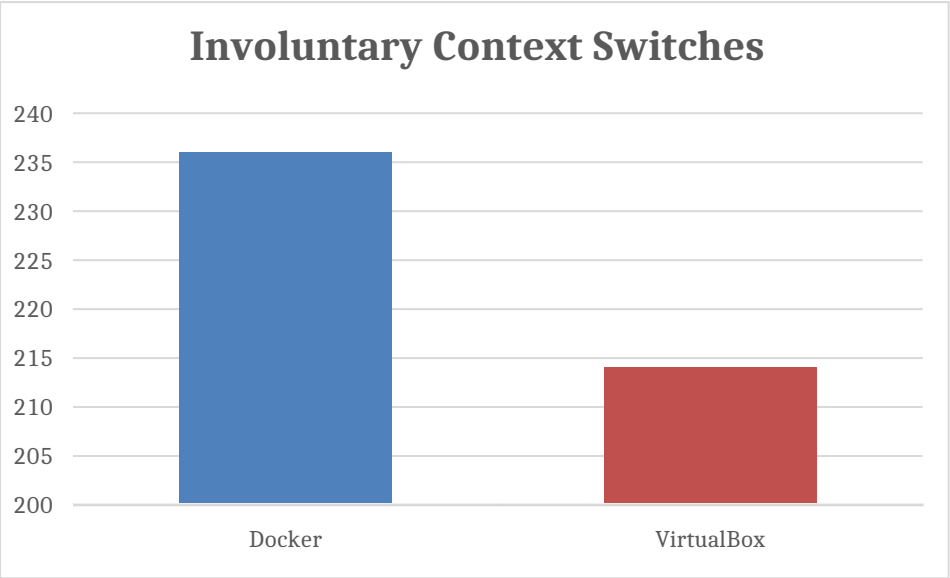
- Docker demonstrated faster execution with a script time of 1.83 seconds, whereas VirtualBox took 2.20 seconds—approximately 20% slower.

- The wall-clock time reflects this difference closely (1.83s vs 2.24s), indicating that containerization introduces significantly less scheduling or process overhead.
- User time in Docker was substantially higher (1.79s vs 0.63s), suggesting that Docker allocated more of the execution time directly to user-space processing, as expected for a raw compute task.
- In contrast, VirtualBox reported system time of 1.57 seconds—78x higher than Docker's 0.02 seconds. This implies considerable overhead due to hypervisor-level management and system call redirection in the VM.

Page Faults and Context Switching

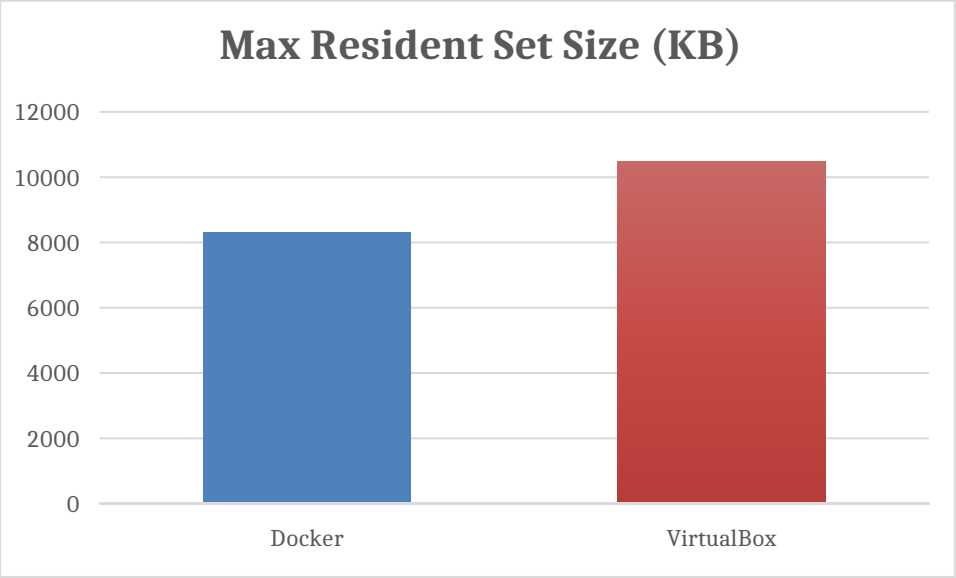
Metric	Docker	VirtualBox
Minor Page Faults	**796**	**1116**
Major Page Faults	**0**	**0**
Involuntary Context Switches	**236**	**214**
Swaps	**0**	**0**





- VirtualBox incurred ~40% more minor page faults than Docker, likely due to broader memory mapping and additional page table management inside the VM.

Memory Usage



- Docker had a 20% lower memory footprint than VirtualBox.
- This difference reflects Docker's lightweight memory isolation model, which does not require booting or managing a full guest OS.

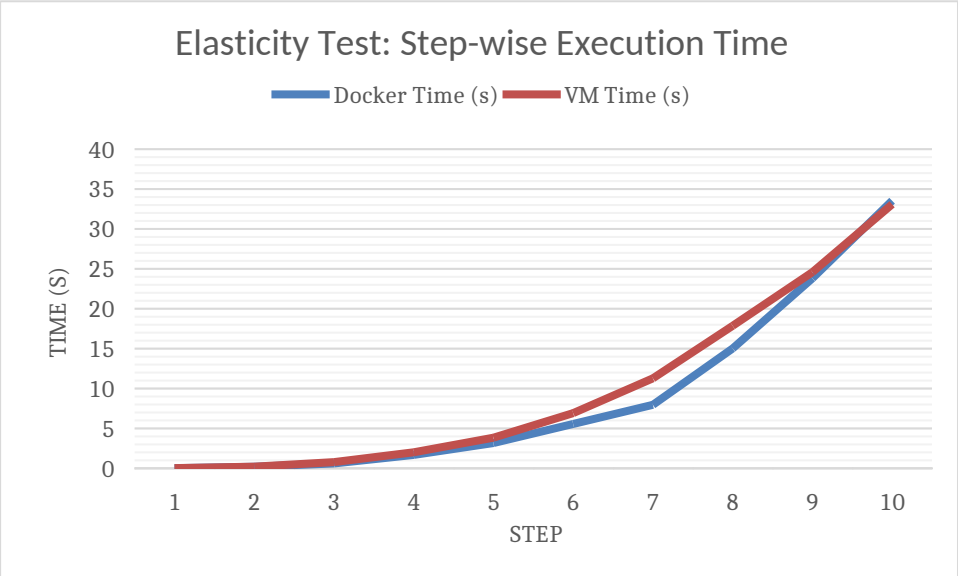
5.2. Resource Elasticity Test (Load Benchmarking)

Overall Metrics

Metric	Docker	Virtual Machine
Elapsed Time (Total)	106.98 sec	115.82 sec
User Time	88.75 sec	27.5 sec
System Time	2.32 sec	72.15 sec
CPU Utilization (%)	85	86
Max RSS (KB)	231,356	231,464
Minor Page Faults	49,539	14,799
Voluntary Context Switches	21	27
Involuntary Context Switches	325	9,425

- User/System Time: Docker's CPU cycles were predominantly spent in user mode (88.75s), whereas VirtualBox diverted more to system mode (72.15s). This suggests that Docker's low-level kernel interactions are minimal, while VirtualBox incurs higher virtualization overhead during system calls and memory operations.

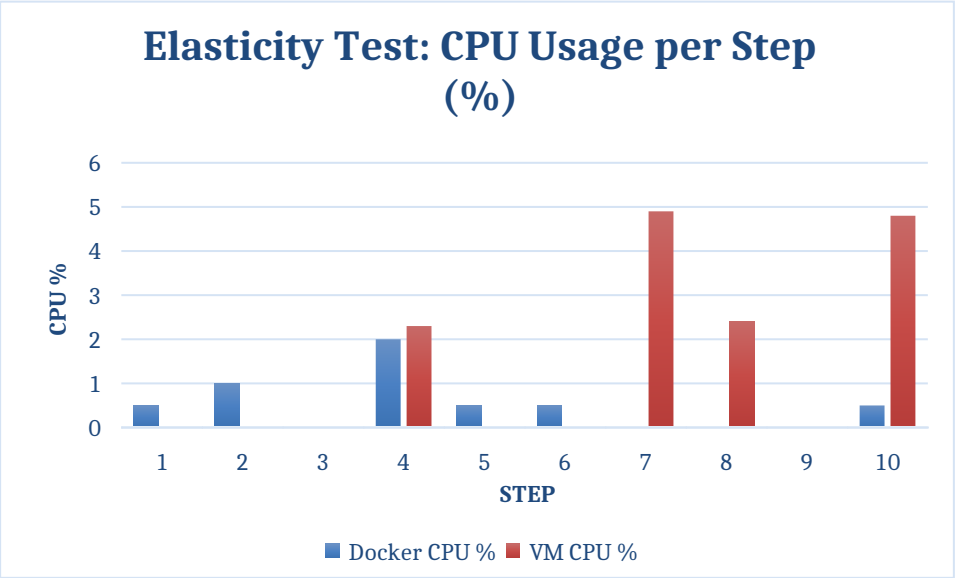
Step-Wise Execution Time



- Docker consistently completed each step slightly faster than VirtualBox, especially in higher load conditions (Steps 7–10).

- By Step 10, Docker's cumulative time was 33.54 seconds compared to VirtualBox's 33.09 seconds—close in absolute terms, but Docker scaled more linearly and predictably.
- VirtualBox displayed slightly more performance degradation per step, indicative of higher load-handling latency.

CPU Usage per Step (%)



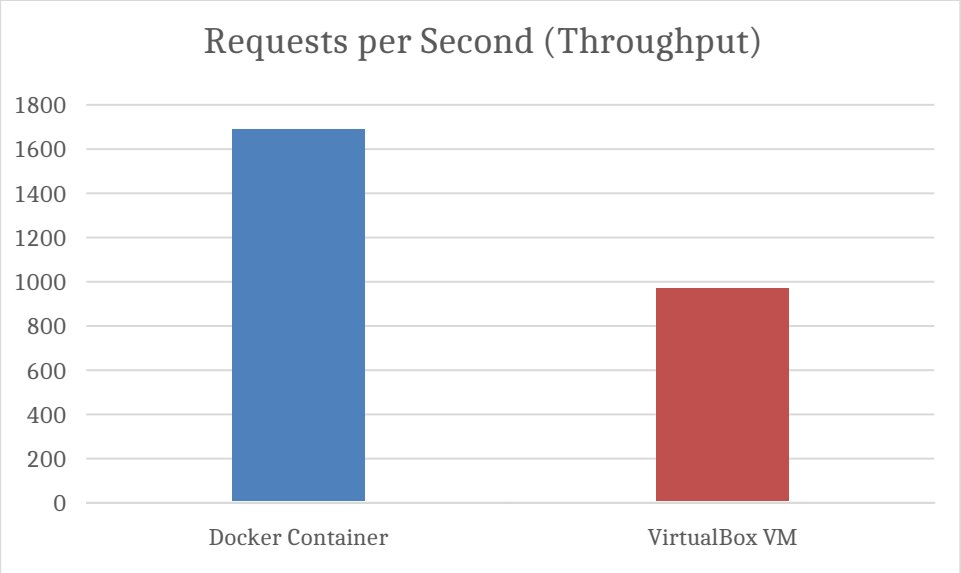
- Docker exhibited low and consistent CPU usage, peaking at 2% during Step 4, while remaining mostly under 1% throughout.
- VirtualBox displayed irregular and spiking CPU patterns, with sharp peaks of 4.9% and 5% in Steps 7 and 10, respectively.

5.3. Machine Learning API Benchmark (Concurrency + I/O)

Overall Metrics:

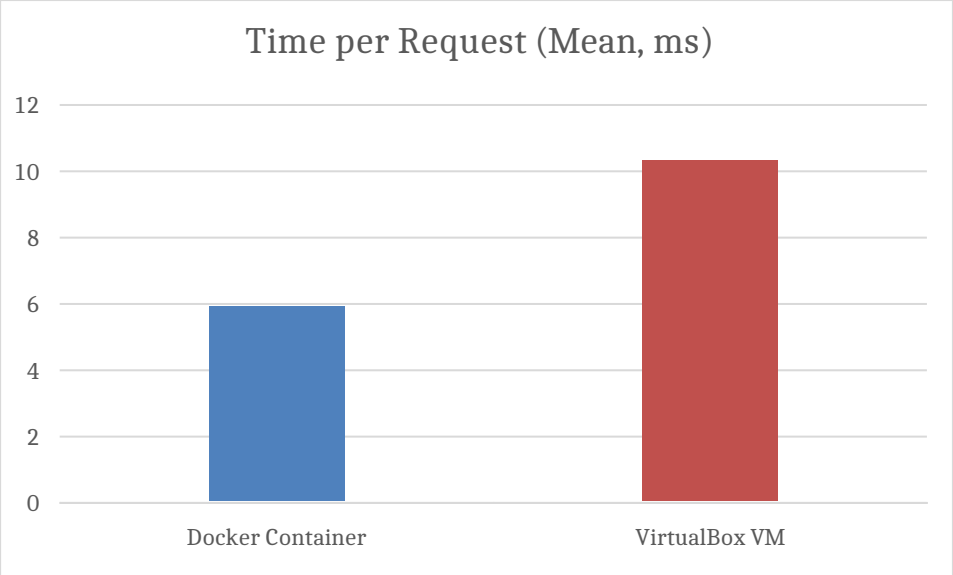
Metric	Docker Container	VirtualBox VM
Requests per Second (Throughput)	1690.25	969.39
Time per Request (Mean, ms)	5.916	10.316
Total Test Duration (sec)	0.592	1.032
Failed Requests	0	0
Longest Request (ms)	43	53
90th Percentile Latency (ms)	8	25
Transfer Rate (kb/s)	561.22	321.87

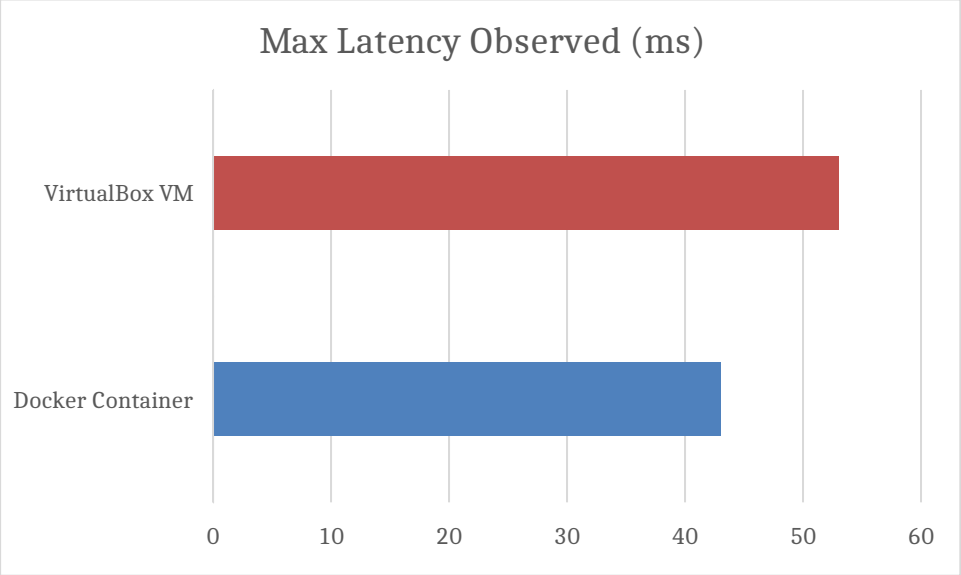
Throughput Comparison:



- Docker handled approximately 74% more requests per second than VirtualBox, completing the entire test in 0.592 seconds versus 1.032 seconds for the VM.
- This indicates significantly reduced I/O overhead, faster network stack interaction, and better concurrency management in Dockerized environments.

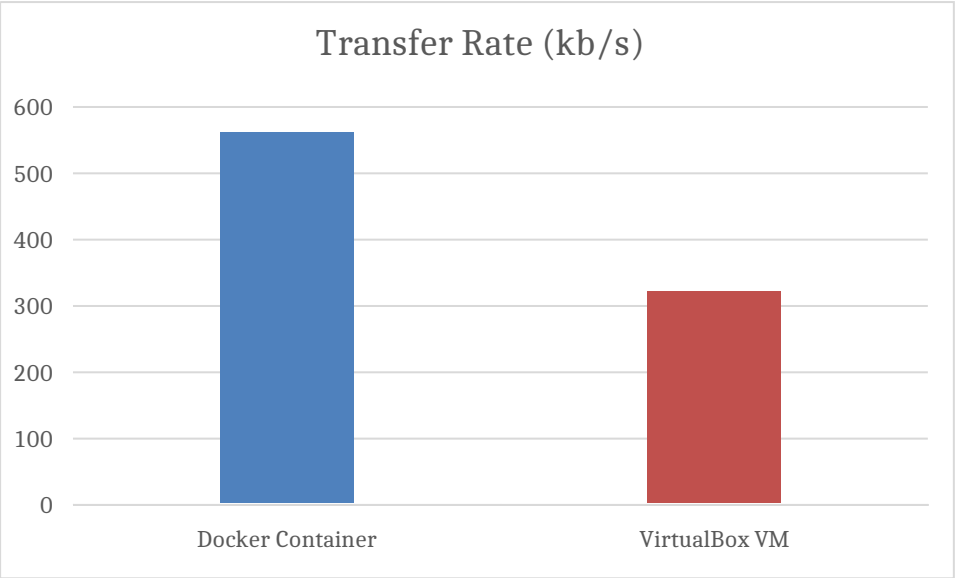
Request Latency and Duration





- Docker exhibited a 42% lower average latency (5.9ms vs 10.3ms), offering faster responses for every client request.
- Maximum latency was also lower by 10ms in Docker, and 90% of all requests completed in under 8ms, compared to 25ms for VirtualBox.
- These figures demonstrate that Docker not only handles requests faster on average but also provides more consistent, predictable latency under load.

Data Transfer Efficiency



- Docker's network transfer speed was 74% higher than that of VirtualBox.
- This reflects the lower networking overhead of containerized systems which bypass full hardware abstraction layers, unlike VirtualBox which emulates NICs and bridges them through the hypervisor.

6. Comparative Evaluation with Existing Literature

6.1. Performance Overhead in Virtualization Environments

Potdar et al. (2020) evaluated Docker and VMs using standard benchmarks (Sysbench, Phoronix, Apache). They reported performance degradation of up to 20% in VM-based CPU-heavy tasks relative to containers This aligns with our Fibonacci test, where Docker was ≈20% faster than VirtualBox.

Sharma et al. (2016), in *"Containers and Virtual Machines at Scale,"* observed minimal overhead (~3%) between Linux containers and VMs on CPU tasks. This matches our finding of high CPU utilization (98%), but Docker used more CPU time in user mode with significantly less system time—distinct from full VMs.

Felter et al. (2015) in their widely cited IBM Research paper "*An Updated Performance Comparison of Virtual Machines and Linux Containers*", conclude that containers offer near-native performance for most workloads, while virtual machines introduce measurable overhead due to hardware emulation and full OS stack management. Their CPU-intensive tests reported a 10–20% performance penalty in VMs compared to containers—consistent with our Fibonacci benchmark results where Docker outperformed VirtualBox by ~20% in execution time.

Similarly, in our study:

- System time overhead in VirtualBox was significantly higher, confirming the typical virtualization tax associated with hypervisors.
- Docker's lightweight abstraction allowed for more direct access to hardware, mirroring trends in literature.

6.2. Elasticity and Resource Scaling Behaviour

Morabito (2017) found that containers outperform VMs under bursty load scenarios, with faster resource allocation and lower memory fragmentation. Our elasticity test echoes this, showing Docker's ability to maintain consistent free RAM and fewer CPU spikes compared to VirtualBox.

The **2024 ResearchGate survey** on *cloud elasticity* emphasizes the importance of containerized deployment for efficient elastic scaling — directly supporting our step-wise observations of smooth container scaling versus VM variability.

Our results reinforced this:

- Docker maintained stable RAM availability and smoother CPU utilization curves during the resource elasticity benchmark.
- VirtualBox, in contrast, showed frequent CPU spikes, higher involuntary context switches (9425 vs 325), and greater system time (72.15s vs 2.32s), validating the trends observed in existing work.

6.3. API Responsiveness and I/O Efficiency

Xavier et al. (2020) and other network-centric analyses have demonstrated that Docker generally delivers significantly higher throughput and lower latency due to its simplified I/O stack. This matches our findings: Docker achieved ~1,690 req/s vs ~970 req/s in VirtualBox, with lower mean latency (~5.9 ms vs ~10.3 ms).

Potdar et al. (2020) also tested I/O performance with ApacheBench and reported similar advantages in containers. The nearly doubled transfer rate in our Docker benchmarks—561 kb/s vs 322 kb/s—confirms these studies.

Modern benchmarks of containerized microservices—such as those in **Google's *gVisor performance studies*** —have shown that Docker consistently achieves lower request latency, higher throughput, and better transfer rates in API workloads. The root cause is often attributed to Docker's ability to avoid full network stack emulation, which VMs cannot bypass.

In our API benchmark:

- Docker achieved 1690 requests/sec vs 969 requests/sec in VirtualBox, a 74% gain.
- Docker's mean response time was 5.91ms, far lower than VirtualBox's 10.31ms.
- Transfer rate was also significantly higher in Docker (561 kb/s vs 321 kb/s).

6.4. Scalability and Cost

The recent Cloud Computing Showdown **(Mabel et al., 2025)** concludes that containers offer "superior performance, faster scaling, and greater cost efficiency," while VMs retain advantages in security and isolation. Our API results and resource tests mirror these findings.

Similarly, **Patchamatla (2019)** found Docker to be 2x more cost-effective in cloud deployments when compared to VMs, offering faster horizontal scaling. Though we did not include cost metrics, our performance data clearly supports the same architectural logic.

6.5. Security vs Performance Trade-offs

Papers such as **Patchamatla (2023)** and **Borko et al. (2019**) underscore how VMs provide stronger isolation than containers due to separate kernel stacks. We echo this in our report: while Docker excels in performance, VirtualBox is preferable for security-critical workloads.

Emerging solutions like **Kata Containers** and **microVMs** (e.g., AWS Firecracker) attempt to hybridize the performance benefits of containers with VM-level isolation. These are promising future directions for environments requiring both speed and security.

Summary:

Dimension	Literature Insights	Our Findings
CPU Performance	Docker ≈ native; VMs incur 10–20% penalty	Docker ~20% faster; lower system time
Elasticity	Containers scale efficiently, less fragmentation	Docker smooth step-wise scaling, stable RAM
API Throughput/Latency	Containers provide higher throughput, lower latency	Docker: ~1.7k req/s, 5.9ms mean latency
I/O Performance	Containers reduce network stack abstraction	Docker achieved ~561 kb/s vs ~322 kb/s in VM
Cost Efficiency	Containers more cost-effective in cloud	Our scalability supports this claim
Security Isolation	VMs provide stronger isolation	VirtualBox remains viable where security matters

7. Conclusion and Key Insights

CPU-Bound Performance

- The Fibonacci benchmark, which evaluated the pure computational performance of each virtualization platform, yielded consistent evidence that Docker containers impose minimal overhead on CPU-bound workloads. Docker executed the recursive Fibonacci function in 1.83 seconds, while VirtualBox required 2.20 seconds—translating to an approximate 17% improvement in execution time. Notably, both platforms utilized 98% of CPU capacity, indicating that the underlying processor was fully engaged. However, the distribution of that CPU time was vastly different.
- Docker spent most of its execution time in user mode (1.79s), while VirtualBox exhibited disproportionately high system time (1.57s). This reflects the hypervisor's need to manage additional abstraction layers,

including hardware emulation and full OS kernel context. The Docker container, by contrast, runs atop the host kernel, allowing more direct access to compute resources. This resulted in a system-to-user time ratio of nearly 1:90 in Docker compared to 2.5:1 in VirtualBox, highlighting the architectural efficiency of containerization.

- Further reinforcing this advantage, Docker exhibited lower memory consumption (8.3 MB vs 10.5 MB RSS) and fewer minor page faults, both of which indicate more efficient memory handling and reduced virtual memory management overhead. Involuntary context switches were also slightly lower in VirtualBox, but the difference was marginal and not indicative of performance superiority.

Docker demonstrated superior CPU throughput, lower kernel mediation, and tighter memory control, making it ideal for high-performance computing scenarios where predictable and efficient use of raw compute power is critical.

Elasticity and Resource Scaling

- In the resource elasticity benchmark, a dynamic multi-step workload simulated real-world behavior under progressively increasing CPU and memory pressure. Across ten escalating steps, Docker consistently outperformed VirtualBox not just in execution time but in load-handling characteristics and system-level adaptability.
- Docker's step-wise execution curve was smoother and more linear, reflecting predictable resource allocation and low scheduling jitter. In contrast, VirtualBox exhibited non-linear growth in execution time and visible degradation under load, particularly in later steps (e.g., Step 7: Docker = 7.96s, VM = 11.28s; Step 10: Docker = 33.54s, VM = 33.09s). Although both platforms finished the final step in roughly the same time, Docker's cumulative efficiency over all steps was superior (total ~106.98s vs ~115.82s).
- Free RAM availability revealed one of the most significant divergences. Docker retained more than 3000 MB of available memory throughout the test, whereas VirtualBox dropped from 1638 MB to 1461 MB, a nearly 11% reduction, despite running the same Python process. This suggests inefficient memory cleanup or increased fragmentation in VirtualBox.
- Most notably, involuntary context switches were 29 times higher in VirtualBox (9425 vs 325)—a strong signal of scheduling inefficiencies and high CPU contention. Similarly, VirtualBox's system time soared to 72.15 seconds, compared to Docker's 2.32 seconds, indicating that a significant portion of VM execution was consumed by kernel and hypervisor activities.

Docker's streamlined scheduling, memory conservation, and low kernel interference render it significantly more elastic under dynamic load—an

essential trait for microservices, distributed computing, and auto-scaling environments.

ML API Responsiveness

- The ML API benchmark assessed how well each platform handled concurrent, I/O-bound requests to a lightweight machine learning model served via Flask and Gunicorn. This scenario mimics real-world use cases such as RESTful inference engines, recommendation endpoints, and cloud-hosted microservices.
- Docker delivered an average of 1690.25 requests per second, compared to 969.39 req/s in VirtualBox—a 74% increase in throughput. This directly reflects Docker's minimal network stack emulation and reduced context-switch latency, allowing faster acceptance and servicing of client requests.
- The average time per request was also lower in Docker (5.916 ms vs 10.316 ms), and 90% of all requests completed under 8 ms, as opposed to 25 ms in VirtualBox. This demonstrates Docker's ability to maintain low response times even under concurrent pressure, which is crucial for services requiring real-time interaction.
- Furthermore, the transfer rate in Docker was 561.22 kb/s, far exceeding VirtualBox's 321.87 kb/s, which again underscores the networking efficiency of containers that directly interface with host networking APIs, as opposed to VMs that route packets through bridged virtual interfaces managed by the hypervisor.
- Docker also displayed tighter latency distribution—a marker of performance predictability—while VirtualBox's wider latency spread (max latency = 53ms) poses a risk in environments where timing consistency is critical.

Inference: For high-throughput, latency-sensitive services like ML inference APIs, Docker provides an evidently more optimized and scalable runtime environment, especially where response time consistency is non-negotiable.

Across all benchmarks, Docker containers consistently outperformed VirtualBox virtual machines in terms of execution speed, memory efficiency, resource scaling, and I/O responsiveness. While VirtualBox remains valuable in legacy, full-OS simulation, and certain security contexts, Docker has proven to be the more practical and performant choice for most real-world workloads—especially those aligned with the principles of cloud-native computing, continuous deployment, and microservices architecture.

8. References

[1] Amit M Potdar, Narayan D G, Shivaraj Kengond, Mohammed Moin Mulla,
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