Create Simple Container

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Intro

The idea of the work is creating a container with isolated PID, MNT and NET using C++ script.

Features

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Links

This project on Github : https://github.com/ahmedXDR/tv_lab3

Tests

To test my container against other products and the host machine I have to measure CPU, FileIO, Memory access, Thread execution because it is listed in the assignment description point 3.
The benchmarking script is from https://t.me/dmfrpro.

commands

Metric	Sysbench command	Why this command	What is interesting in sysbench output
CPU total time [sec]	sysbench cpu --threads=100 --time=60 --cpu-max-prime=64000 run	This command stresses the CPU with a heavy load of prime number computation, pushing it to compute large prime numbers which is a complex task	Total time
threads	sysbench threads --threads=64 --thread-yields=100 --thread-locks=2 run	This command tests the efficiency and performance of thread synchronization mechanisms,	Total number of events, average events per thread, and the standard deviation of events.

		including mutexes, under a specific load.	
memory concurrent write test	sysbench memory --threads=100 --time=60 --memory-oper=write run	This command tests how the system handles concurrent memory writes, which is critical for applications that perform heavy writing operations.	Memory bandwidth usage.
memory stress test	sysbench memory --memory-block-size=1M --memory-total-size=10G run	This command tests how the system handles concurrent memory writes, which is critical for applications that perform heavy writing operations.	Memory bandwidth usage.
fileio write test	sysbench fileio --file-total-size=10G --file-test-mode=rndrw --time=120 --time=300 --max-requests=0 run	This command tests the file system's ability to handle random read and write operations on a large file, checking for I/O performance and reliability.	Operations per second (read, write, fsyncs), latency.

Table With Metrics

- Host: https://github.com/ahmedXDR/tv_lab3/blob/main/report_host.md
- Container: https://github.com/ahmedXDR/tv_lab3/blob/main/report_container.md

Explanation Why Metrics Didn't Differ

The script provided sets up a Linux container that shares the same kernel with the host system, which means metrics related to CPU usage, memory consumption, and I/O operations are managed at the kernel level and appear similar for both the host and the container. Additionally, the script does not impose any resource limitations or constraints on the container, such as CPU caps or memory limits, which further explains why the metrics observed from within the container didn't differ from those on the host. This results in the container essentially operating as an isolated namespace without distinct resource usage metrics from the host.

Sources

1. [SysBenchExample] - “How to Benchmark Your System (CPU, File IO, MySQL) with Sysbench” https://www.howtoforge.com/how-to-benchmark-your-system-cpu-file-io-mysql-with-sysbench
2. [NSIT-USA] NSIT of the United States description of algorithm sha https://csrc.nist.gov/csrc/media/publications/fips/180/4/final/documents/fips180-4-draft-aug2014.pdf
3. [Kim17] D.Kim et. al.“Existing Deduplication Techniques”- 2017
4. [DockStorage] docker - about storage drivers https://docs.docker.com/storage/storagedriver/