

Performance Analysis of Virtual Machine and Container for Cloud Based High Performance Computing Platform

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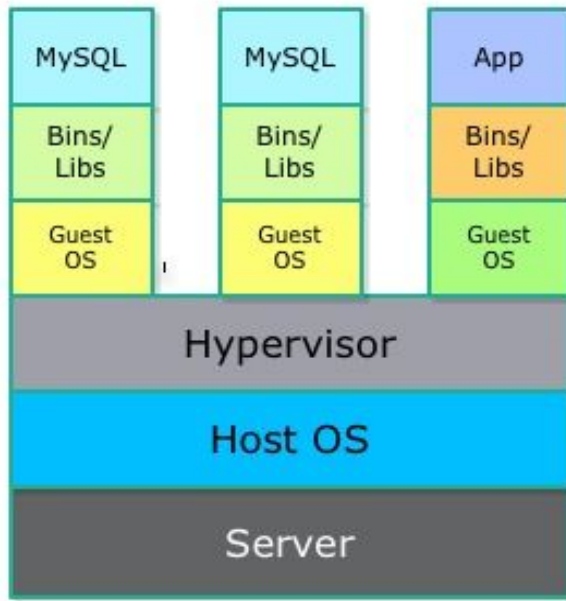


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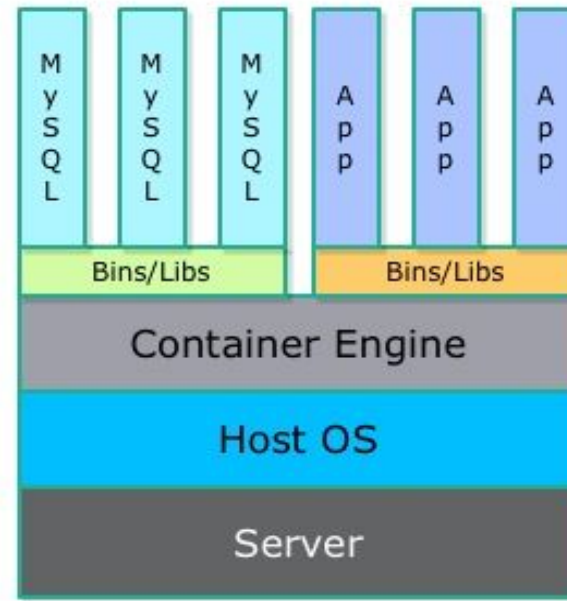


Cloud based ..

Virtual Machines



Containers



platform



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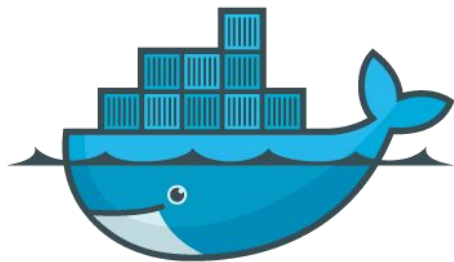
What is measured ..



VirtualBox



representing VM



docker



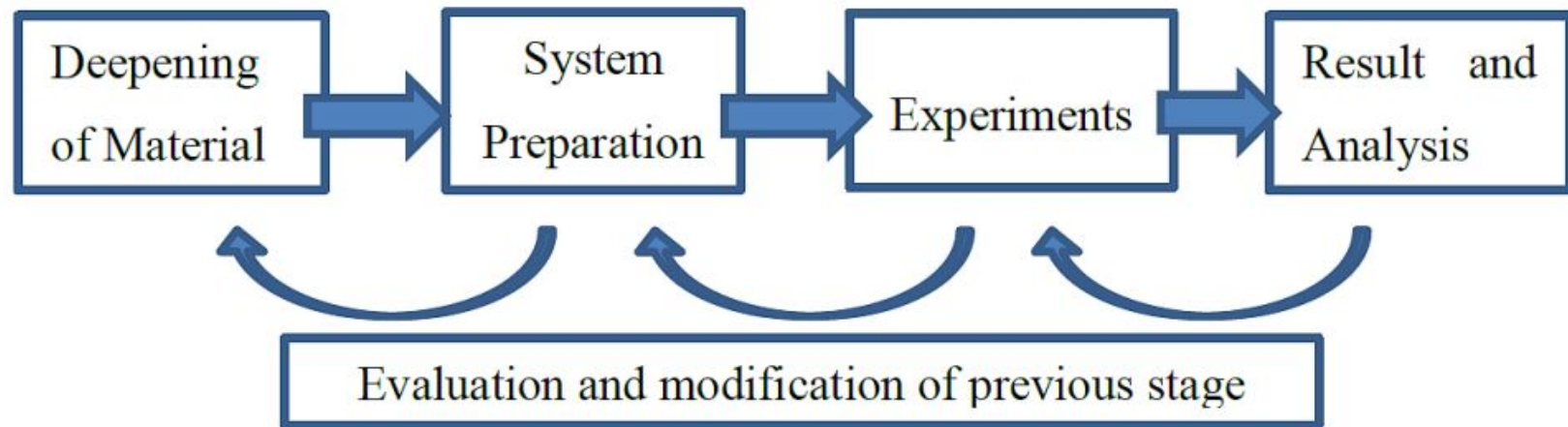
representing container



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Method ..



Measurement tool ..



The HPC Challenge (HPCC) Benchmark Suite

GROMACS FAST.
FLEXIBLE.
FREE.



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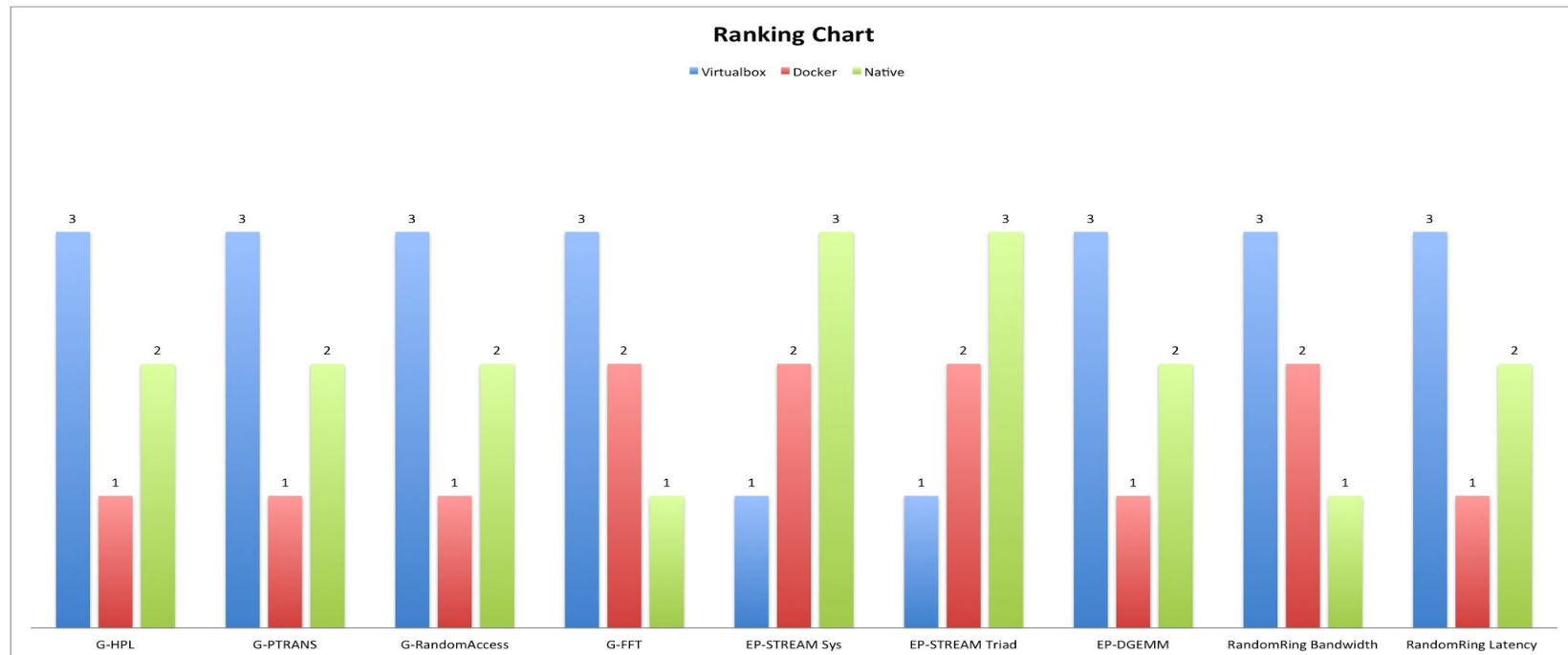
Results ..

Parameters	Virtualbox	Docker	Native	Unit
G-HPL	0.002071822	0.007141486	0.006491946	Tflop/s
G-PTRANS	0.463681	2.111484	1.6371222	TB/s
G-RandomAccess	0.00051426	0.04706152	0.04304766	Gup/s
G-FFT	0.7985354	4.407774	4.64654	Tflop/s
EP-STREAM Sys	113.26448	77.67208	66.254616	TB/s
EP-STREAM Triad	28.31612	19.41802	16.563654	GB/s
EP-DGEMM	0.7386786	2.634366	2.367652	Gflop/s
RandomRing Bandwidth	0.6829424	0.7474872	0.7494582	GB/s
RandomRing Latency	5.518806	0.5301448	0.5553748	usec

From HPCC Benchmark Suite, there are 9 parameters that been measured in this research. These parameters are commonly used in benchmarking a platform. Dependent variables that been used are Operating System, Kernel and RAM.



Results ..



The results from HPCC benchmark suite were mapped into rankings and the result shows that Docker is closely equivalent with native whereas Virtual Box consistently fall behind. Except for the STREAM test.



Results ..

	Time			Performance	
	Core t (s)	Wall t (s)	(%)	(ns/day)	(hour/ns)
Virtualbox	29473.294	29789.647	98.9	2.900	8.275
Docker	4247.023	5932.965	96.3	14.563	1.648
Native	4414.133	5941.477	98.0	14.542	1.650

From GROMACS, we were running a simulation to create lysozyme and grab its log to get the results. The log showed similar results where Docker performance came near to native.



Conclusion ..

