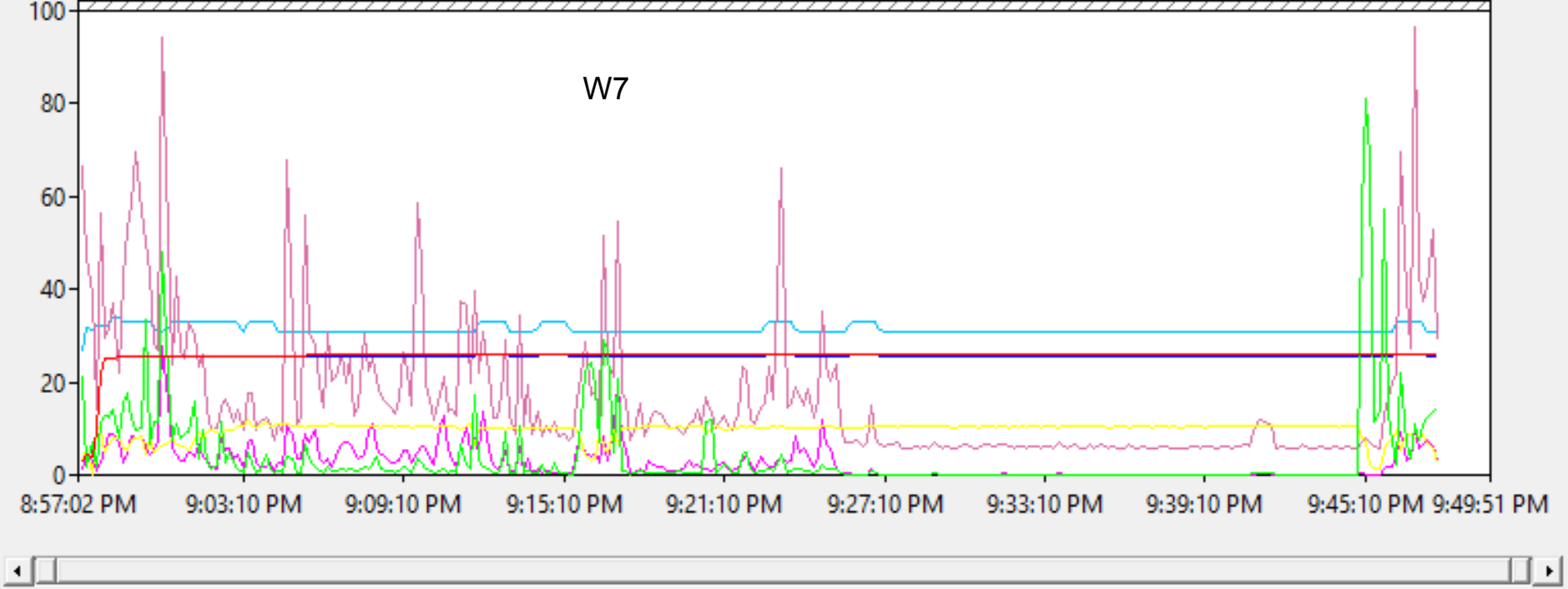
Theta Final Report

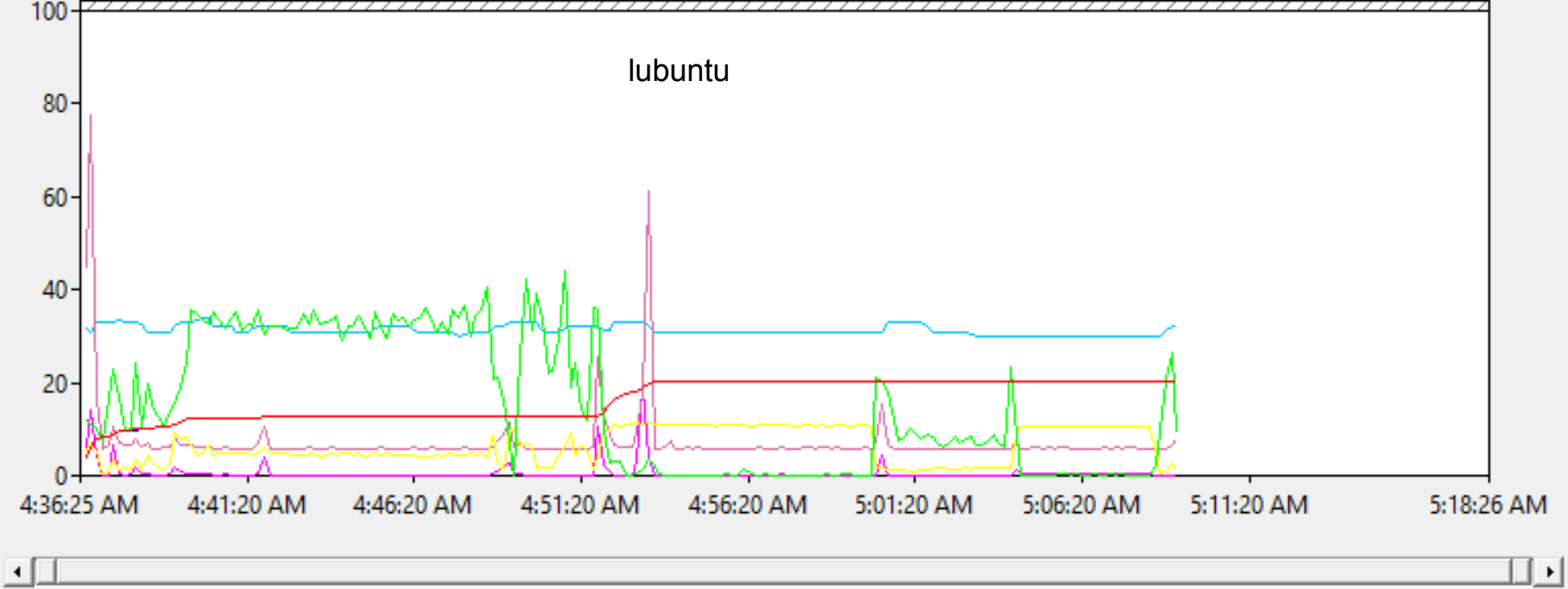
Operating system analysis: SUMMARY

- Usage of operating systems such as Windows, Ubuntu, Debian and Android
- Analysis of variables such as %Processor time, IO Data operations/second, Virtual Bytes, Thread Count,
- Creation of super variable that integrates variables to understand the overall behavior of an operating system
- Establish mean and standard deviation of all operating systems for all processes
- Covariance of different variables in operating system
- Comparison of different operating systems using these measures
- Joint distributions of these variables for different processes as well as different operating systems



Last	---------	Average	---------	Minimum	---------	Maximum	---------
						Duration	52:48

Show	Color	Scale	Counter	Instance	Parent	Object	Computer
✔		0.00000...	Virtual Bytes Peak	VirtualBox#1	---	Process	\\TAKUSHI
✔		0.0001	IO Other Bytes/sec	VirtualBox#1	---	Process	\\TAKUSHI
✔		0.00000...	Virtual Bytes	VirtualBox#1	---	Process	\\TAKUSHI
✔		0.1	% Processor Time	VirtualBox#1	---	Process	\\TAKUSHI
✔		0.1	IO Data Operations/sec	VirtualBox#1	---	Process	\\TAKUSHI



Last	---------	Average	---------	Minimum	---------	Maximum	---------
						Duration	41:59

Show	Color	Scale	Counter	Instance	Parent	Object	Computer
✓		0.00000...	Virtual Bytes Peak	VirtualBox#1	---	Process	\\TAKUSHI
✓		0.0001	IO Other Bytes/sec	VirtualBox#1	---	Process	\\TAKUSHI
✓		0.00000...	Virtual Bytes	VirtualBox#1	---	Process	\\TAKUSHI
✓		0.1	% Processor Time	VirtualBox#1	---	Process	\\TAKUSHI
✓		0.1	IO Data Operations/sec	VirtualBox#1	---	Process	\\TAKUSHI

Variable Analysis:

- % Processor time: Amount of time the CPU is actually performing tasks against sitting idle
- Virtual Bytes: Virtual Bytes is the current size, in bytes, of the virtual address space the process is using.
- Virtual Bytes (Peak): The largest amount of virtual address space a process is using at a certain time
- IO Data Operations/sec: counts all I/O activity generated by the process to include file, network and device I/Os.

Variable Analysis:

- IO Data Bytes/sec: counts all I/O bytes used by the process that include file, network and device I/Os.
- IO Other Bytes/sec: includes the bytes used by other processes except file, network and device I/Os.
- Thread Count: counts the number of executions of the smallest sequence of programmed instructions that can be managed independently by an operating system.

Resource Usage (Super Variable)

Resource Usage = % Processor time + Virtual Bytes + IO Data Operations/sec + IO Data bytes/sec

Reason for super variable

Resource Usage is the summation of the important criteria is a process. The summation of these variables allows to analyze deeply the performance of a process in an operating system. The integration of the number of processes running via the CPU while calculating the number of bytes used to perform these tasks as well as the number of operations and amount of data used by these operations in one variable establishes a substantial analysis of every aspect of the operating system and its processes.

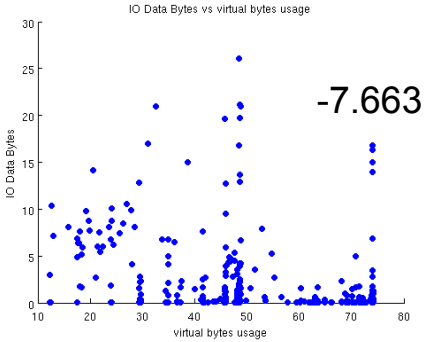
Reason for Variables and Super Variable

- % Processor time, Virtual Bytes, Virtual Bytes (Peak), IO Data Operations/sec, IO Data Bytes/sec, IO Other Bytes/sec, Thread Count and Resource Usage are essentially what were are analyzing for each process in an operating system and comparing them against each other.
- These variables correspond the the important aspects of each process in an operating system
- Comparing these criteria (variables) against each other indicates the amount of usage of each variable in a process
- The super variable indicates the performance of the entire operating system in respect to the vital aspects of it.

(contd....)

- Comparison of each process against each operating system explains which one has a slack and should do better.
- Comparison of the super variable against each operating system establishes clearly which one performs better against the other
- Mean and standard are used for easier analysis of these criteria
- Covariance with the super variable and other variables showcases how both these are related or not
- Joint distributions indicate whether both criteria are similar in their working and whether both processes are similar as well.

OS/process	Resource Usage	% Processor time	Virtual bytes	Virtual Bytes (peak)	IO Data Operations/sec	IO Data bytes/sec	IO Other bytes/sec	Thread count
Ubuntu 10 (all)	17.7357101	13.4056330	6.8747950	54.740058	1.6129911	1.2292945	6.8747950	89.9170837
system	20.9638424	39.9515038	33.0483856	34.4534416	5.5598063	6.5999131	6.2884321	92.4465408
browser	4.5767488	4.1035332e-06	14.7623606	14.6429939	4.4309464	2.4220750	0.0132553	58.8235359
media	0	0	0	0	0	0	0	0
Lubuntu (all)	22.7707367	31.3722630	61.3065414	61.3802681	1.3388183	0.6131573	6.2613959	89.2664032
system	24.6782379	36.8367386	46.2356758	46.1954117	5.9685307	7.0513053	6.6635447	91.8552322
browser		4.3136420e-06	11.0035133	10.9106054	3.1821275		0.0135669	46.9696884
media	16.8595467	5.8256633e-06	66.2941589	66.3770294	3.0213702	0.5093555	0.0114084	91.7297287
Debian (all)	23.0721245	34.2535667	61.5471497	61.6677818	1.3565636	0.4831741	4.5804529	91.5497055
system	18.5935516	50.2657204	18.4486847	18.8811798	5.5445690	1.9340768	2.7186303	91.6795044
browser	11.7637510	0.8565161	43.6383476	43.6550102	3.0633581	0.3160360	0.4394507	51.9858437
media	18.0520954	0.5899286	65.8949127	66.0288696	2.9795706	0.3160799	0.3036448	94.2975616
Android Port (all)	15.0816002	23.0365944	38.9590263	38.9967041	1.5460439	0.3918962	4.4593239	86.0811844
system	25.4657784	62.5147476	26.1510029	26.1154480	7.6481576	6.1696420	3.6854186	87.8316422
browser	4.7551265	3.9417541e-06	11.7456131	11.6502495	5.5446754	0.9563009	0.0059373	20.1754341
media	11.4027538	2.6739078e-06	42.3910751	42.4834480	2.6663246	0.0561856	0.0117058	86.2414932


IO Data Bytes vs virtual bytes usage
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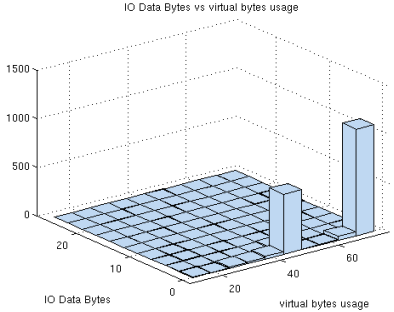
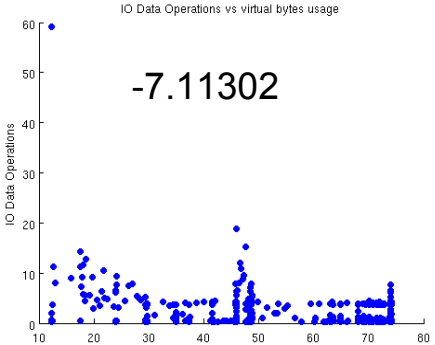
IO Data Bytes
virtual bytes usage


IO Data Bytes vs virtual bytes usage
IO Data Bytes
virtual bytes usage


IO Data Operations vs virtual bytes usage
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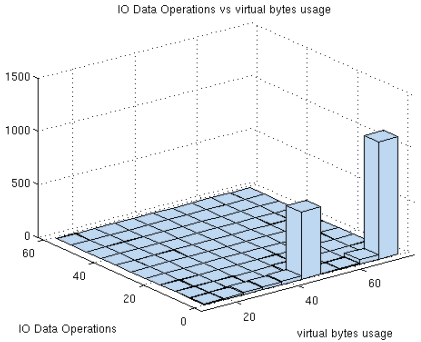
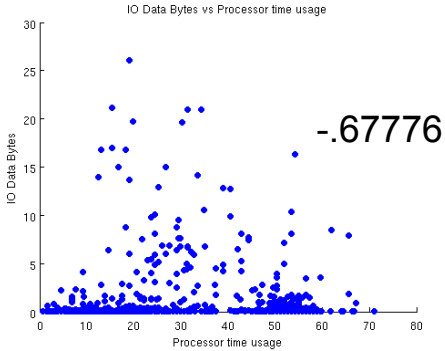
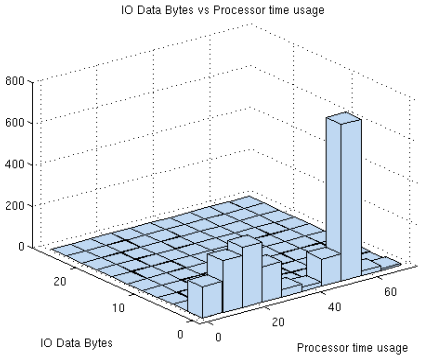
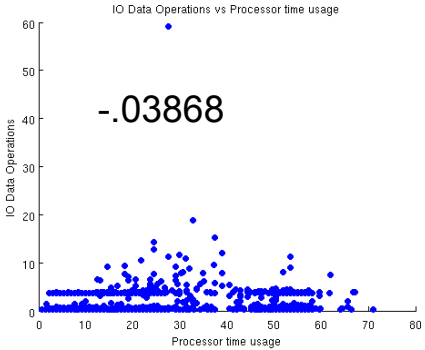
IO Data Operations


IO Data Operations vs virtual bytes usage
IO Data Operations
virtual bytes usage


IO Data Bytes vs Processor time usage
-.67776
IO Data Bytes
Processor time usage


IO Data Bytes vs Processor time usage
IO Data Bytes
Processor time usage


IO Data Operations vs Processor time usage
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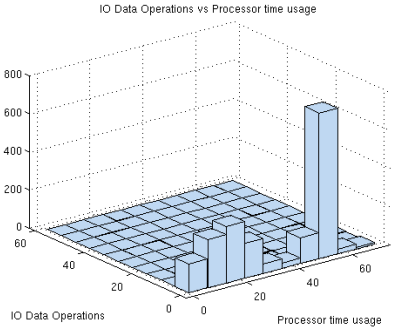
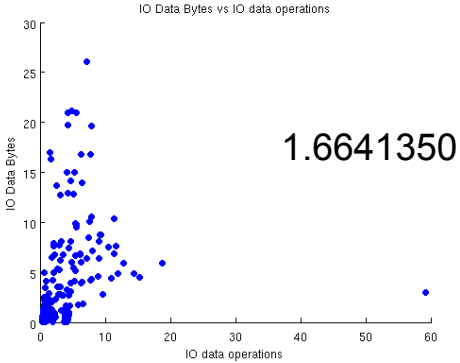
IO Data Operations
Processor time usage


IO Data Operations vs Processor time usage
IO Data Operations
Processor time usage


IO Data Bytes vs IO data operations
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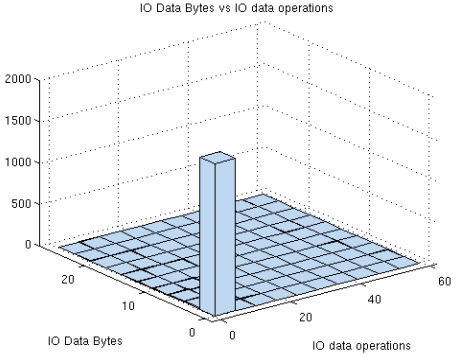
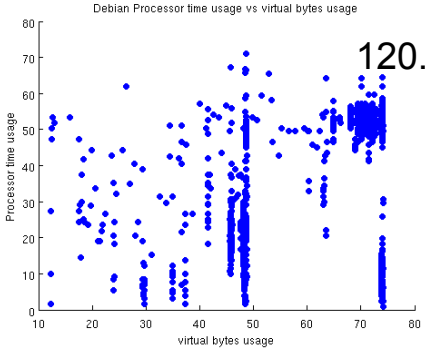
IO Data Bytes
IO data operations


IO Data Bytes vs IO data operations
IO Data Bytes
IO data operations


Debian Processor time usage vs virtual bytes usage
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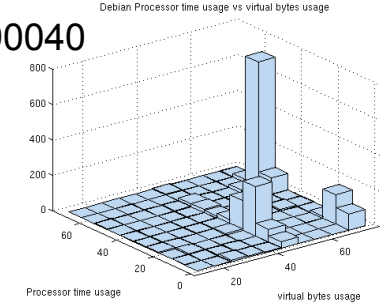
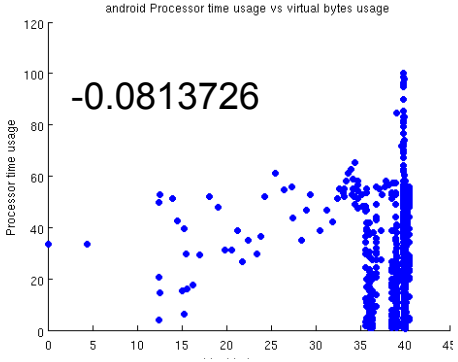
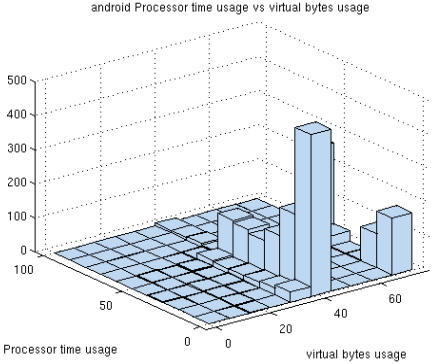
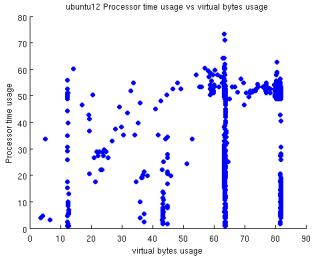
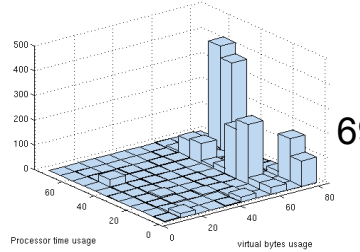
Processor time usage
virtual bytes usage


Debian Processor time usage vs virtual bytes usage
Processor time usage
virtual bytes usage









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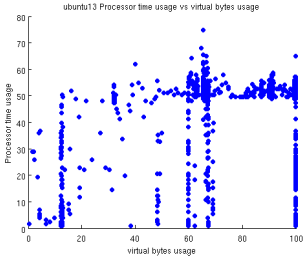

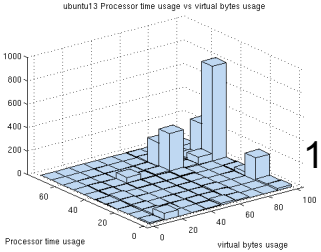

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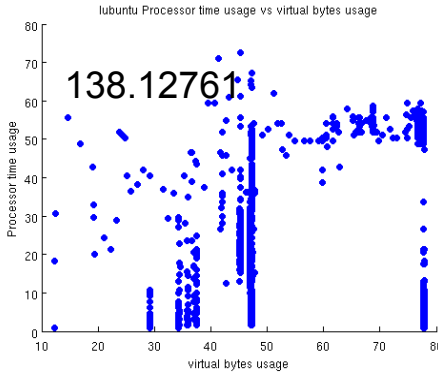

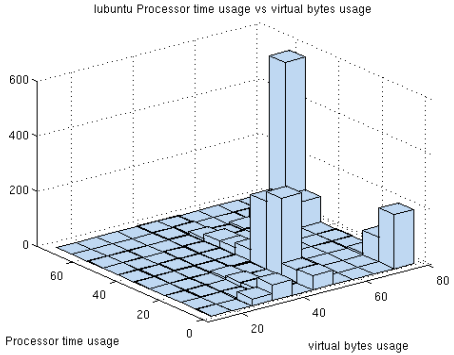

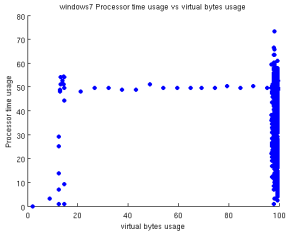

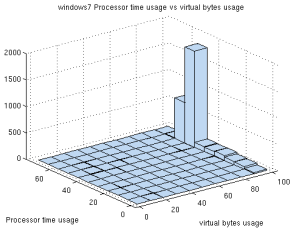

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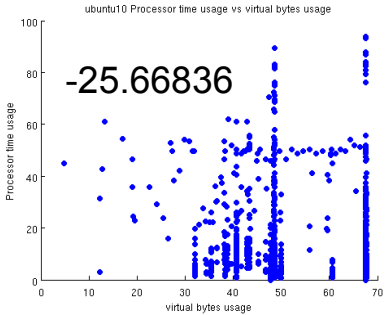

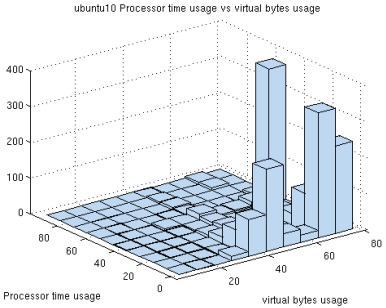

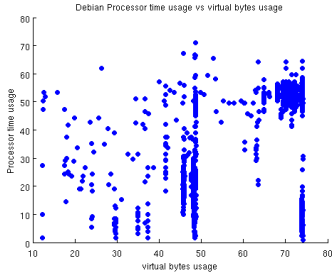

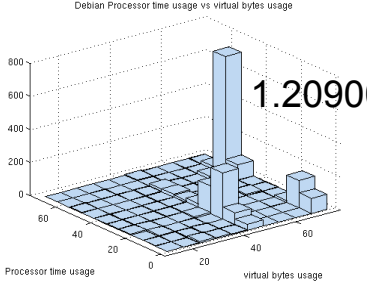

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Improvements

- Should have done a script that automates the method of analysis
- Use a better VM; running a 64bit OS on 2GB RAM was not efficient enough
- Sorted our Virtualbox boot glitch
- Higher sample rate