Supplementary materials for

Khalid ALSUBHI, Zuhaib IMTIAZ, Ayesha RAANA, M. Usman ASHRAF, Babur HAYAT, 2020. MEACC: an energy-efficient framework for smart devices using cloud computing systems. *Front Inform Technol Electron Eng*, 21(6):917-930. <u>https://doi.org/10.1631/FITEE.1900198</u>

Files of different sizes are executed on three different mobile devices to compute the execution time by reading the inputted file and determining the total number of words in the file. After completing the file read, the execution time to complete this task is displayed on the dashboard (Figs. S1–S3).

	3:31pm		3:31pm
Words Counter		Words Counter	
sample i .txt	FROM STORAGE	sample3.bt	FROM STORAGE
START EXE	CUTION	START E	KECUTION
Execution Time: 0m: 28s		Execution Time: 0m: 57	s
Total Words: 230441		Total Words: 460681	
add = 970 or = 1700 detract = 972 the = 8493 world = 972 note = 972 note = 972 nor = 972 long = 1700 remember = 972 what = 1944 we = 8725 say = 972 here = 972 but = 1940		add = 1539 or = 3400 detract = 1944 the = 16986 world = '944 will = 1944 little = 1944 note = 1944 note = 1944 long = 3400 remember - 1944 what = 3888 we = 17450 say = 1944 here = 1944 but = 3880	

	3:31pm			
Words Counter		Words Co	unter	
sample5.txt	FROM STORAGE	sample7.txt		FROM STORAGE
START EXE	CUTION		START EX	ECUTION
Execution Time: 1m: 56s		Execution Tim	e: 2m: Sós	5
Total Words: 691 321		Total Words 9	21761	
or = 5100 detract = 2916 the - 25479 world = 2916 will = 2916 ittle = 2916 note - 2916 nore - 2916 long = 5100 remember = 2916 what = 5832 we = 26175 say = 2916 here = 2916 but = 5830 it = 14547 can = 5100		or = 6800 detract = 38 the = 3397 world = 388 will = 3888 nor = 3888 nor = 3888 nor = 3888 nor = 3888 nor = 6800 remember what = 777 we = 34900 say = 3888 here = 3888 but = 7760 it = 19396 can = 6800	2 8 = 3888	

Fig. S1 Total execution time on mobile device D1 (Galaxy Grand Prime)

	3:31pm		3:31pr
Words Counter		Words Counter	
sample1.txt	FROM STORAGE	sample3.txt	FROM STORAGE
START EXE	CUTION	START EX	KECUTION
Execution Time: Orn: 16s		Execution Time: 0m: 29	ŝ
Total Words: 230441		Total Words: 460881 add = 1939	
or - 970 detract = 1700 the = 8493 world = 972 will = 972 note = 972 nor - 972 long = 1700 remember = 972 what = 1944 we = 8725 say = 972 here = 972 but = 1940 it - 4849 can 1700 never - 972		or - 3400 detract - 1944 the =16985 world = 1944 will = 1944 note - 1944 note - 1944 note - 1944 long = 3400 remember = 1944 what - 3888 we - 17450 say = 1944 here = 1944 here = 1944 but = 3880 it = 9698 can = 3400 never = 1944	
	3:31pm		3:31p
Words Counter		Words Counter	
sample5.txt	FROM STORAGE	sample7.txt	FROM STORAGE
START E	XECUTION	START E	EXECUTION
Execution Time: 0m: 43 Total Words: 691321 add = 2908 or = 5100 detract - 2916 the = 25479 world - 2916 will - 2916 ittle - 2916 note = 2916 note = 2916 note = 2916 long - 5100 remember = 2916 what = 5832 we = 26175 say - 2916 here - 2916 but = 5820 it = 15547	is	Execution Time: 1m: 3 Total Words: 921761 add = 3877 or = 6800 detract = 3888 the = 33972 world = 3888 will = 3888 not = 3888 not = 3888 nor = 3888 long = 6300 remember = 3888 what = 7776 we = 34900 say = 3888 here = 3888 but = 7760	Os

Fig. S2 Total execution time on mobile device D2 (Google Pixel 2)

	2:21pm		3:31pm
Words Counter	3:31pm	Words Counter	cio ipin
sample1.txt	FROM STORAGE	sample3.txt	FROM STORAGE
START EXB	CUTION	START EXE	ECUTION
Execution Time: 0m: 11s		Execution Time: 0m: 24s	
Total Words: 230441		Total Words: 460881	
or = 970 detract = 1700 the = 8493 world = 972 will = 972 little = 972 nor = 972 long = 1700 remember = 972 what = 1944 we = 8725 say = 972 here = 972 but = 1940 it = 4849 can = 1700 never = 972		add = 1939 or = 3400 detract = 1944 the = 16986 world = 1944 little = 1944 not = 1944 nor = 1944 long = 3400 remember = 1944 what = 3888 we = 17450 say = 1944 here = 1944 but = 3880 it = 9698 can = 3400 never = 1944	
	3:31pm		3:31pm
Words Counter		Words Counter	
		Words Counter	
sample5.txt	FROM STORAGE	sample7.txt	FROM STORAGE
sample5.txt			

Fig. S3 Total execution time on mobile device D3 (Google Pixel 3)

To compute the execution time on the cloud side, files of the same size are run on the cloud simulator to calculate the time taken by each file to complete its execution remotely (Table S1).

Table S1 Total cloud execution costs (Hadoop simulator)

Hadoop job job_201709010755_0004 on history viewer User: zuha JobName: wordcount JobConf: hdfs://localhost:54310/app/hadoop/tmp/mapred/staging/zuhaibimtiaz/.staging/job_201709010755_0004/job.xml Job-ACLs: All users are allowed Submitted at: 1-Sep-2017 08:03:06(0sec) Launched at: 1-Sep-2017 08:03:21 (15sec) Status: Success Failure info: Analyse this job

Kind	Total tasks (success- ful+failed+killed)	Successful tasks	Failed tasks	Killed tasks	Start time	Finish time
Setup	1	1	0	0	1-Sep-2017	1-Sep-2017
Setup	1	1	0	0	08:03:07	08:03:08 (1 s)
Mon	1	1	0	0	1-Sep-2017	1-Sep-2017
Map	1	1	0	0	08:03:08	08:03:10 (2 s)
Daduaa	1	1	0	0	1-Sep-2017	1-Sep-2017
Reduce	duce 1 1 0		0	0	08:03:10	08:03:20 (9 s)
Cleanup	1 1	1	0	0	1-Sep-2017	1-Sep-2017
		0	0	08:03:20	08:03:21 (1 s)	

	Counter	Map	Reduce	Total
	Launched reduce tasks	0	0	1
	SLOTS_MILLIS_MAPS	0	0	4894
	Total time spent by all reduces waiting after reserving slots (ms)	0	0	0
Job counters	Total time spent by all maps waiting after reserving slots (ms)	0	0	0
	Launch map tasks	0	0	1
	Data-local map tasks	0	0	1
	SLOTS_MILLIS_REDUCES	0	0	9178
File output format counters	Bytes written	0	1609	1609
	FILE_BYTES_READ	0	2 551 107	2 551 10

Files of different sizes are executed on three different mobile devices to compute the resources consumed (battery and CPU consumption, which are currently available in the device) by the mobile device for each file (Figs. S4–S6).

Another Mon	itor 🧲		Another M	Ionitor			
Battery Level: 49 AVERAGE CPU USAGE:32.81701				Battery Level: 49 AVERAGE CPU USAGE:34.094326			
AVERAGE Memory USAGE: 394668			AVERAGE	AVERAGE Memory USAGE: 385504			
Processes	Remove All M	emory	Processes	Remove All	/lemory		
III Total CPU usage		55. 6%	Total CPU usag		66.5%		
Words Counter		9.8% 45.5%	Another I		9.5% 46.2%		
				rei reer			
Choose C	Other Process(es)		Choo	ose Other Process(es)			
Memory	1,366,620 kl	J Hide	Memory	1,366,620	cb Hide		
Mem Used	945,940 kb	69.2%	Mem Used	961,816 kb	70.4%		
Mem Available	420,680 kb	30.8%	Mem Available	404,804 kb	29.6%		
Mem Free	65,108 kb	4.8%	Mem Free	56,760 kb	4.2%		
Cached	355,572 kb	26.0%	Cached	348,044 kb	25.5%		
Threshold	147,456 kb	10.8%	Threshold	147,456 kb	10.8%		
MaxCPU CPU Usage	l_Usage 46.153847 ::		MaxCPU U	_CPU_Usage 48.18262 Jsage:	9		

Fig. S4 Resource consumption on mobile device D1 (Galaxy Grand Prime)

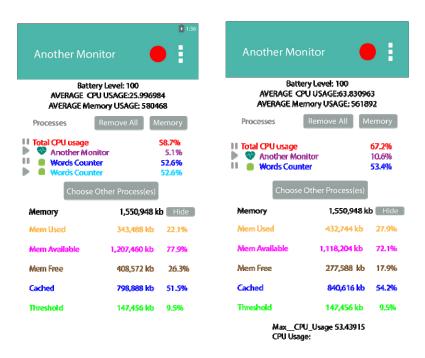


Fig. S5 Resource consumption on mobile device D2 (Google Pixel 2)

Another Mor	nitor	136	Another Mor	nitor			
Battery Level: 100 AVERAGE OPU USAGE27.596581 AVERAGE Memory USAGE 580468			AVERAGE OF	Battery Level: 100 AVERAGE OPU USAGE62.414013 AVERAGE Memory USAGE 64810			
Processes	Remove All M	lemory	Processes	Remove All	1emory		
Total CPU usage 55.6% Value 51.1% Words Counter 50.1% Words Counter 50.1%		II 🙍 Words Count	Another Monitor 6.8% Words Counter 51.8%				
	Other Process(es)			Other Process(es)			
Memory	1,252,958 kl	b Hide	Memory	1,620,978 k	b Hide		
Mem Used	343,488 kb	20.0%	Mem Used	510,124 kb	31.3%		
Mem Available	1,627,760 kb	75.6%	Mem Available	1,177,594 kb	76.3%		
Mem Free	501,502 kb	24.1%	Mem Free	271,218 kb	27.9%		
Cached	808,168 kb	51.0%	Cached	992,456 kb	55.7%		
Threshold	140,301 kb	10.3%	Threshold	122,126 kb	9.8%		
			MaxCP CPU Usag	U_Usage 63.83921 je:			

Fig. S6 Resource consumption on mobile device D3 (Google Pixel 3)