PFLOCK Report

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Task analysis...

- Apache Spark divides the work into a number of Stages, each one is also divide into a number of Tasks.
- Each Task evaluates the data from a particular Partition and it is sent to an Executor for evaluation.
- Tracking the Tasks will give us a notion of the Partitions and Executors performance...

Task analysis...

- SparkListener class allows us to monitor Taks metrics. We can capture info about:
  - executor: The id of the executor where the Task was evaluated.
  - duration: Execution time of the task.
  - recordsRead/Written: Total number of records read or written.
  - bytesRead/Written: Total number of bytes read or written.
  - shuffleRead/Written: Total number of records read or written from the shuffle by this task.

Task analysis...

- Running experiments with Epsilon=30, Mu=3 and Delta=3.
- Collecting Task metrics. Focus on Time-by-time implementation...

timestamp	executor	duration	recordsRead	bytesRead	recordsWritten	bytesWritten	shuffleRead	shuffleWritten	taskId	index	stageId	jobId	phase	phaseTime	timeInstant	appId
2020-01-08 12:27:04,377	10.10.1.7:0	378.99	0	0	0	0	14037	0	97742	10	73588	736	3.Flocks reported	392.73	19	0146
2020-01-08 12:19:36,086	10.10.1.9:9	237.699	0	0	0	0	12127	0	92689	9	66336	699	3.Flocks reported	248.25	18	0146
2020-01-08 13:42:55,240	10.10.1.10:5	235.786	0	0	0	0	10223	0	244083	9	448326	1809	3.Flocks reported	251.44	48	0146
2020-01-08 13:52:17,960	10.10.1.2:8	177.572	0	0	0	0	13210	0	254205	10	485888	1883	3.Flocks reported	195.21	50	0146
2020-01-08 13:47:35,776	10.10.1.1:2	171.391	0	0	0	0	8826	0	249124	4	466918	1846	3.Flocks reported	191.37	49	0146
2020-01-08 12:18:29,040	10.10.1.5:7	170.653	0	0	0	0	12360	0	92692	12	66336	699	3.Flocks reported	248.25	18	0146
2020-01-08 12:23:35,851	10.10.1.6:4	170.463	0	0	0	0	12582	0	97740	8	73588	736	3.Flocks reported	392.73	19	0146
2020-01-08 12:23:33,030	10.10.1.4:3	167.643	0	0	0	0	11702	0	97743	11	73588	736	3.Flocks reported	392.73	19	0146
2020-01-08 12:18:15,858	10.10.1.10:5	157.472	0	0	0	0	10643	0	92691	11	66336	699	3.Flocks reported	248.25	18	0146
2020-01-08 12:14:47,144	10.10.1.5:7	154.757	0	0	0	0	10398	0	87630	10	59462	662	3.Flocks reported	166.08	17	0146
2020-01-08 12:30:29,388	10.10.1.3:1	141.001	0	0	0	0	11811	0	102773	9	81218	773	3.Flocks reported	154.8	20	0146
2020-01-08 12:59:24,048	10.10.1.2:8	140.66	0	0	0	0	8457	0	158051	11	190096	1180	3.Flocks reported	152.02	31	0146
2020-01-08 13:51:33,706	10.10.1.7:0	133.318	0	0	0	0	12423	0	254203	8	485888	1883	3.Flocks reported	195.21	50	0146
2020-01-08 12:48:35,329	10.10.1.6:4	132.943	0	0	0	0	9087	0	138003	9	145212	1032	3.Flocks reported	149.56	27	0146
2020-01-08 12:30:20,028	10.10.1.2:8	131.642	0	0	0	0	10302	0	102775	11	81218	773	3.Flocks reported	154.8	20	0146
2020-01-08 12:30:16,204	10.10.1.5:7	127.817	0	0	0	0	9260	0	102774	10	81218	773	3.Flocks reported	154.8	20	0146
2020-01-08 12:30:07,998	10.10.1.7:0	126.585	0	0	0	0	9495	0	102771	7	81218	773	3.Flocks reported	154.8	20	0146
2020-01-08 13:46:49,124	10.10.1.5:7	124.738	0	0	0	0	10508	0	249129	9	466918	1846	3.Flocks reported	191.37	49	0146
2020-01-08 12:33:36,213	10.10.1.6:4	119.825	0	0	0	0	8159	0	107825	11	89226	810	3.Flocks reported	135.32	21	0146
2020-01-08 12:14:11,183	10.10.1.8:6	118.796	0	0	0	0	8959	0	87631	11	59462	662	3.Flocks reported	166.08	17	0146
2020-01-08 13:46:39,349	10.10.1.6:4	118.423	0	0	0	0	8351	0	249123	3	466918	1846	3.Flocks reported	191.37	49	0146
2020-01-08 13:40:51,948	10.10.1.6:4	112.496	0	0	0	0	8718	0	244082	8	448326	1809	3.Flocks reported	251.44	48	0146
2020-01-08 13:40:51,883	10.10.1.3:1	112.428	0	0	0	0	9981	0	244085	11	448326	1809	3.Flocks reported	251.44	48	0146
2020-01-08 13:46:33,402	10.10.1.10:5	109.014	0	0	0	0	12698	0	249130	10	466918	1846	3.Flocks reported	191.37	49	0146
2020-01-08 12:13:59,913	10.10.1.10:5	107.525	0	0	0	0	10710	0	87633	13	59462	662	3.Flocks reported	166.08	17	0146
2020-01-08 12:09:04,546	10.10.1.3:1	107.16	0	0	0	0	8475	0	77485	8	46848	588	3.Flocks reported	117.55	15	0146
2020-01-08 12:29:54,401	10.10.1.8:6	106.013	0	0	0	0	11466	0	102776	12	81218	773	3.Flocks reported	154.8	20	0146
2020-01-08 12:22:29,870	10.10.1.9:9	104.483	0	0	0	0	15153	0	97739	7	73588	736	3.Flocks reported	392.73	19	0146
2020-01-08 13:51:01,278	10.10.1.10:5	100.891	0	0	0	0	10685	0	254204	9	485888	1883	3.Flocks reported	195.21	50	0146
2020-01-08 12:22:25,645	10.10.1.3:1	100.258	0	0	0	0	10954	0	97741	9	73588	736	3.Flocks reported	392.73	19	0146

Figure: Top 30 longest tasks

Task analysis...

- Running experiments with Epsilon=30, Mu=3 and Delta=3.
- Collecting Task metrics. Focus on Time by time implementation...

timestamp	executor	duration	recordsRead	bytesRead	recordsWritten	bytesWritten	shuffleRead	shuffleWritten	taskId	index	stageId	jobId	phase	phaseTime	timeInstant	appId
2020-01-08 12:27:04,377	10.10.1.7:0	378.99	0	0	0	0	14037	0	97742	10	73588	736	3.Flocks reported	392.73	19	0146
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Figure: Top 30 longest tasks

Stage analysis...

- SparkListener also provide info about each Stage. Some interesting metrics are:
  - numTasks: The number of tasks in which the Stage is divided.
  - name: The Spark function which invoke the Stage and its line of code.
  - details: The stack trace when the Stage was called.

phase	timeInstant	stageId	name	ntasks	duration	details
3.Flocks reported	19	73588	count at FF.scala:191	15	262306	FF$$anonfunrun1.apply$mcVI$sp(FF.scala:191) FF$$anonfunrun1.apply(FF.scala:73) FF$.run(FF.scala:73) FF$.main(FF.scala:483) FF.main(FF.scala)
3.Flocks reported	17	59462	count at FF.scala:191	14	254895	FF$$anonfunrun1.apply$mcVI$sp(FF.scala:191) FF$$anonfunrun1.apply(FF.scala:73) FF$.run(FF.scala:73) FF$.main(FF.scala:483) FF.main(FF.scala)
3.Flocks reported	18	66336	count at FF.scala:191	16	247619	FF$$anonfunrun1.apply$mcVI$sp(FF.scala:191) FF$$anonfunrun1.apply(FF.scala:73) FF$.run(FF.scala:73) FF$.main(FF.scala:483) FF.main(FF.scala)
3.Flocks reported	20	81218	count at FF.scala:191	15	200818	FF$$anonfunrun1.apply$mcVI$sp(FF.scala:191) FF$$anonfunrun1.apply(FF.scala:73) FF$.run(FF.scala:73) FF$.main(FF.scala:483) FF.main(FF.scala)
3.Flocks reported	21	89226	count at FF.scala:191	15	124389	FF$$anonfunrun1.apply$mcVI$sp(FF.scala:191) FF$$anonfunrun1.apply(FF.scala:73) FF$.run(FF.scala:73) FF$.main(FF.scala:483) FF.main(FF.scala)
3.Flocks reported	12	30762	count at FF.scala:191	16	92191	FF$$anonfunrun1.apply$mcVI$sp(FF.scala:191) FF$$anonfunrun1.apply(FF.scala:73) FF$.run(FF.scala:73) FF$.main(FF.scala:483) FF.main(FF.scala)
3.Flocks reported	16	52966	count at FF.scala:191	14	89954	FF$$anonfunrun1.apply$mcVI$sp(FF.scala:191) FF$$anonfunrun1.apply(FF.scala:73) FF$.run(FF.scala:73) FF$.main(FF.scala:483) FF.main(FF.scala)
3.Flocks reported	22	97612	count at FF.scala:191	14	89192	FF$$anonfunrun1.apply$mcVI$sp(FF.scala:191) FF$$anonfunrun1.apply(FF.scala:73) FF$.run(FF.scala:73) FF$.main(FF.scala:483) FF.main(FF.scala)
3.Flocks reported	23	106376	count at FF.scala:191	14	88634	FF$$anonfunrun1.apply$mcVI$sp(FF.scala:191) FF$$anonfunrun1.apply(FF.scala:73) FF$.run(FF.scala:73) FF$.main(FF.scala:483) FF.main(FF.scala)
3.Flocks reported	13	35746	count at FF.scala:191	15	82089	FF$$anonfunrun1.apply$mcVI$sp(FF.scala:191) FF$$anonfunrun1.apply(FF.scala:73) FF$.run(FF.scala:73) FF$.main(FF.scala:483) FF.main(FF.scala)
3.Flocks reported	24	115518	count at FF.scala:191	14	78201	FF$$anonfunrun1.apply$mcVI$sp(FF.scala:191) FF$$anonfunrun1.apply(FF.scala:73) FF$.run(FF.scala:73) FF$.main(FF.scala:483) FF.main(FF.scala)
3.Flocks reported	15	46848	count at FF.scala:191	16	74317	FF$$anonfunrun1.apply$mcVI$sp(FF.scala:191) FF$$anonfunrun1.apply(FF.scala:73) FF$.run(FF.scala:73) FF$.main(FF.scala:483) FF.main(FF.scala)
3.Flocks reported	25	125038	count at FF.scala:191	15	72252	FF$$anonfunrun1.apply$mcVI$sp(FF.scala:191) FF$$anonfunrun1.apply(FF.scala:73) FF$.run(FF.scala:73) FF$.main(FF.scala:483) FF.main(FF.scala)
3.Flocks reported	14	41108	count at FF.scala:191	17	71475	FF$$anonfunrun1.apply$mcVI$sp(FF.scala:191) FF$$anonfunrun1.apply(FF.scala:73) FF$.run(FF.scala:73) FF$.main(FF.scala:483) FF.main(FF.scala)
3.Flocks reported	7	11512	count at FF.scala:191	13	59794	FF$$anonfunrun1.apply$mcVI$sp(FF.scala:191) FF$$anonfunrun1.apply(FF.scala:73) FF$.run(FF.scala:73) FF$.main(FF.scala:483) FF.main(FF.scala)
3.Flocks reported	11	26156	count at FF.scala:191	15	59526	FF$$anonfunrun1.apply$mcVI$sp(FF.scala:191) FF$$anonfunrun1.apply(FF.scala:73) FF$.run(FF.scala:73) FF$.main(FF.scala:483) FF.main(FF.scala)
3.Flocks reported	10	21928	count at FF.scala:191	17	59316	FF$$anonfunrun1.apply$mcVI$sp(FF.scala:191) FF$$anonfunrun1.apply(FF.scala:73) FF$.run(FF.scala:73) FF$.main(FF.scala:483) FF.main(FF.scala)
3.Flocks reported	9	18078	count at FF.scala:191	14	48877	FF$$anonfunrun1.apply$mcVI$sp(FF.scala:191) FF$$anonfunrun1.apply(FF.scala:73) FF$.run(FF.scala:73) FF$.main(FF.scala:483) FF.main(FF.scala)
3.Flocks reported	8	14606	count at FF.scala:191	15	43682	FF$$anonfunrun1.apply$mcVI$sp(FF.scala:191) FF$$anonfunrun1.apply(FF.scala:73) FF$.run(FF.scala:73) FF$.main(FF.scala:483) FF.main(FF.scala)
3.Flocks reported	6	8796	count at FF.scala:191	14	27812	FF$$anonfunrun1.apply$mcVI$sp(FF.scala:191) FF$$anonfunrun1.apply(FF.scala:73) FF$.run(FF.scala:73) FF$.main(FF.scala:483) FF.main(FF.scala)

Figure: Top 20 longest stages

Stage analysis...

- FF.scala:191 makes a call to the redundant flocks pruning routine.
- Recently I modify this routine to be call during the join between time instants. I will double-check the code.
- Currently I have extracted some data for testing (time instant 19) and making some improvements.

What is next...

- Fixing the shuffling overheard during the prunning routine.
- Performing similar analysis for the Time-window implementation.