TFM-FernandoMartín

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1 Analysis of Results

Objectives to answer:

- How does it behave the $\mathsf{DP}_{\mathsf{ATM}}$. Is it worthy wrt to a sequential / non-multiple filter version?

1.1 Small GDB

Note: 1f is the equivalent sequential version... in these experiments.

1.1.1 For each stream size

1. How the different configurations behave -

Radial plots - for each stream - comparing among the different number of cores configurations

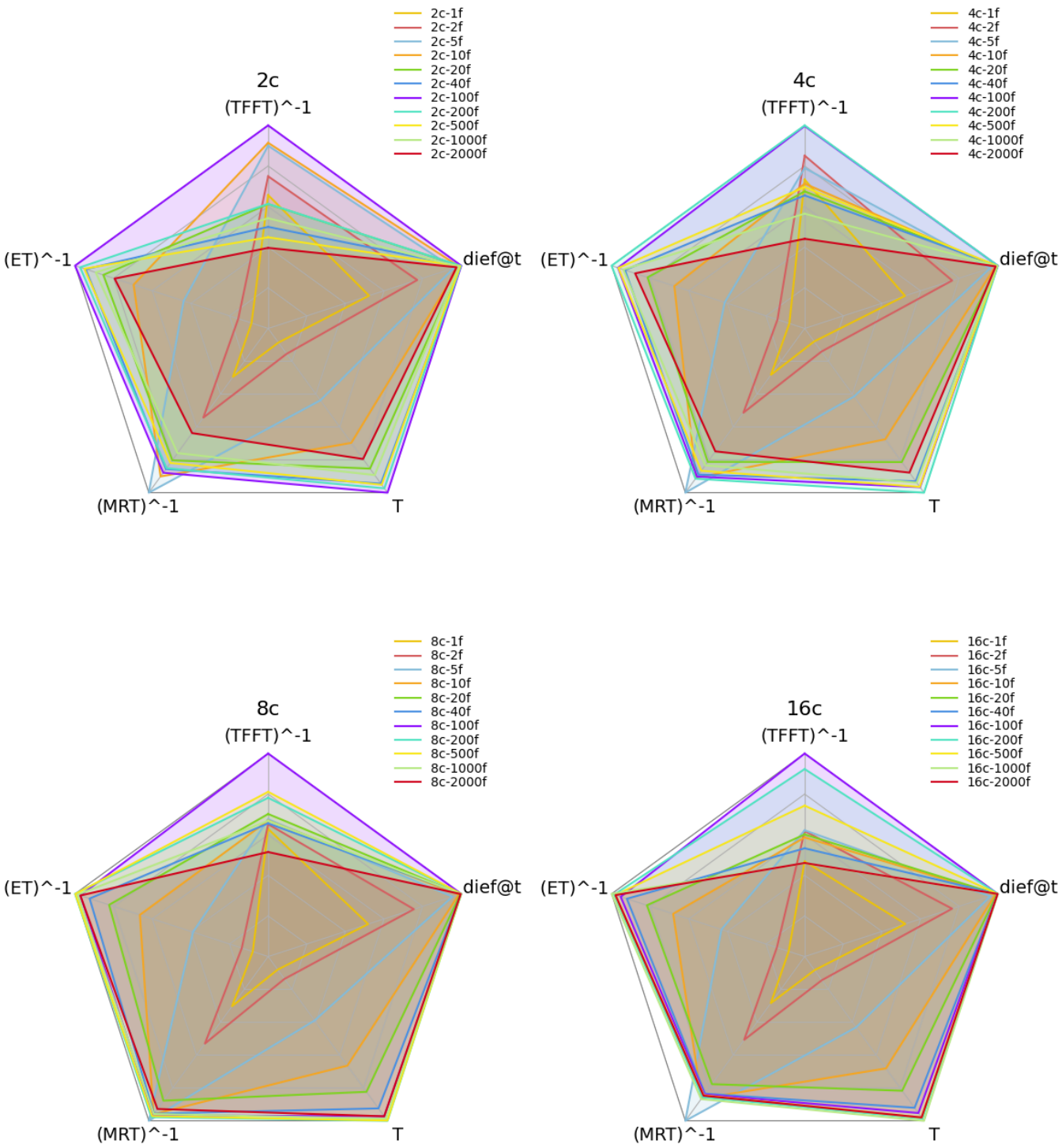


Figure 1: Radial Plots for small stream: 30-0.02

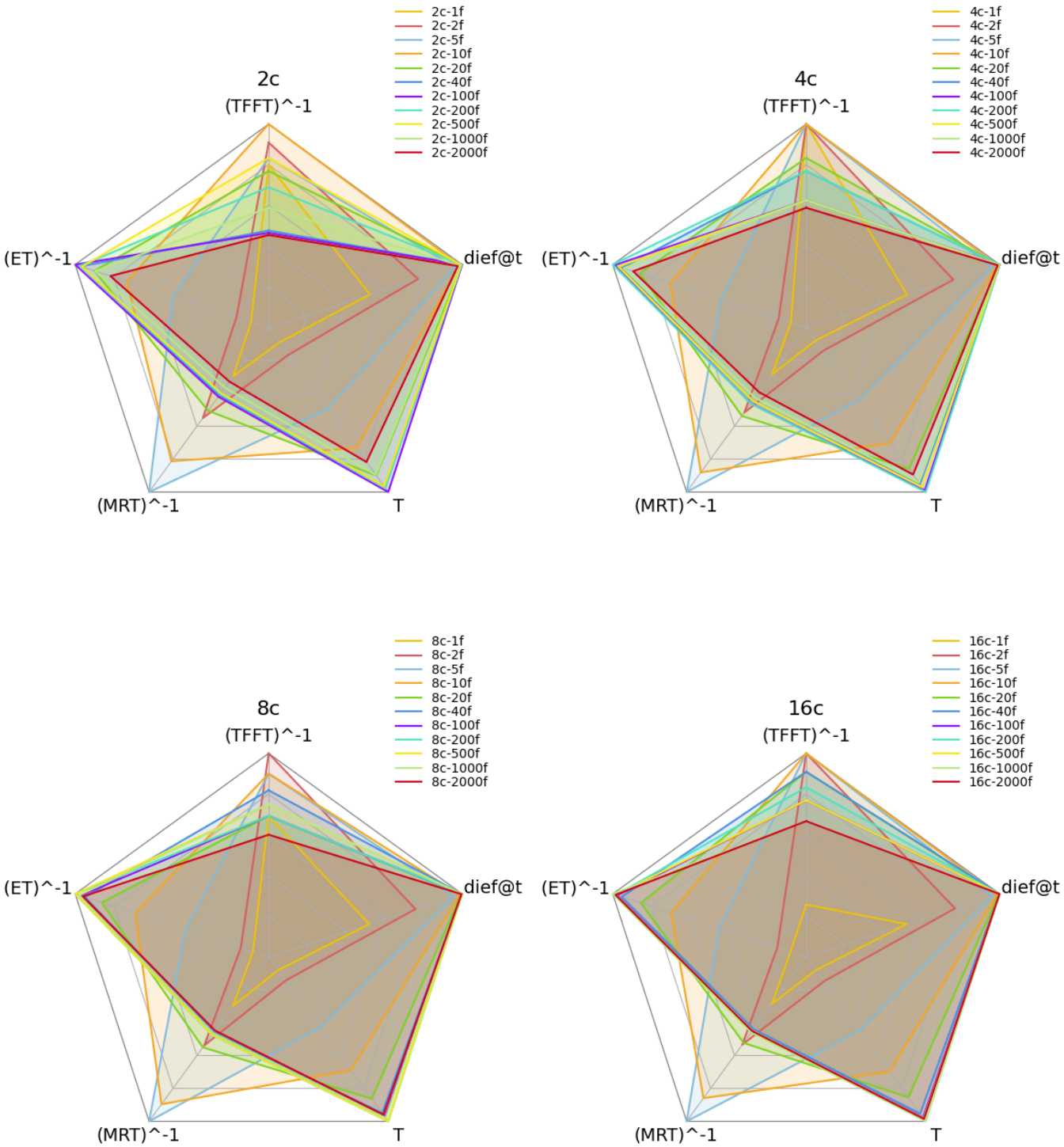


Figure 2: Radial Plots for medium stream: 60-0.02

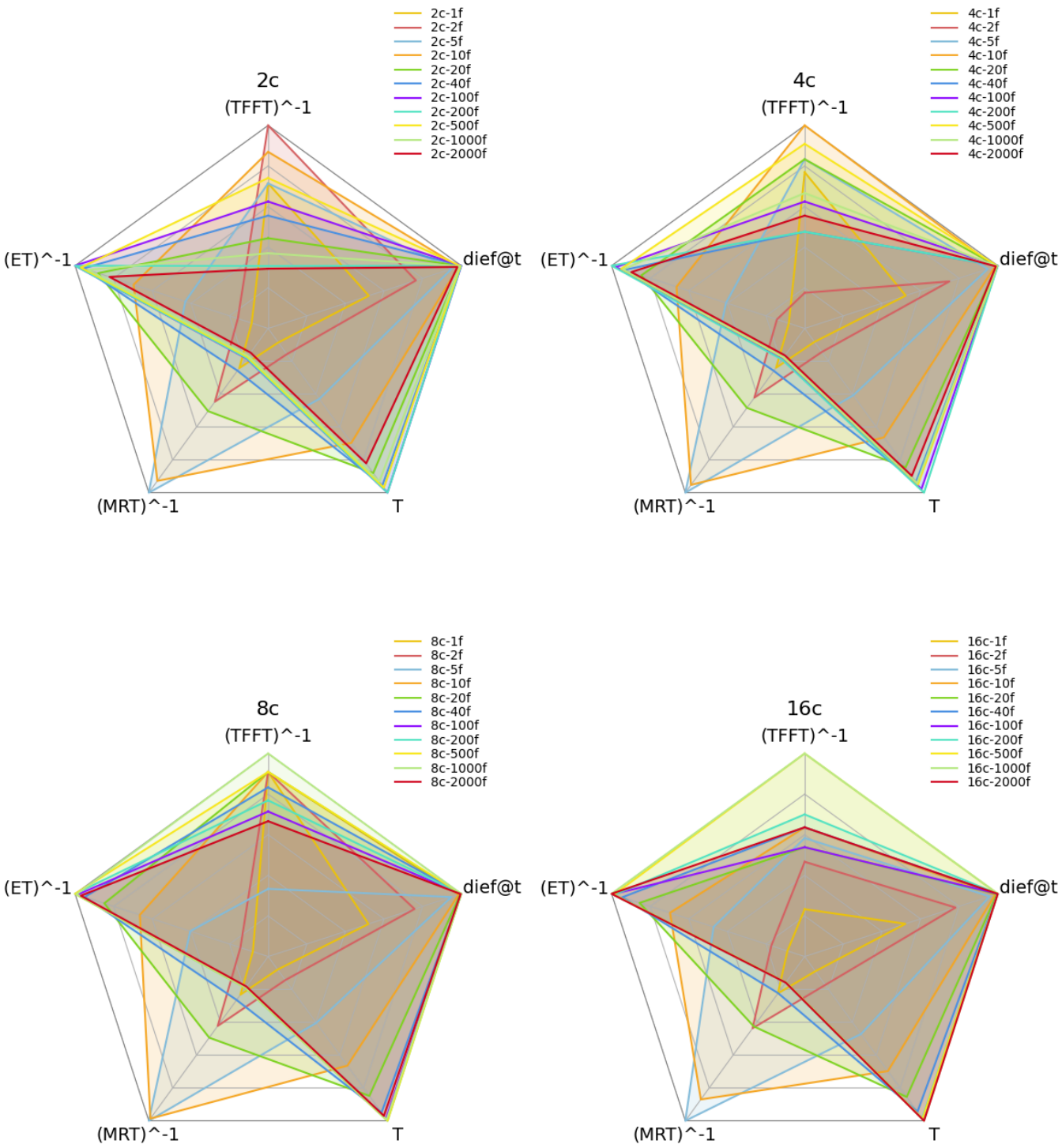
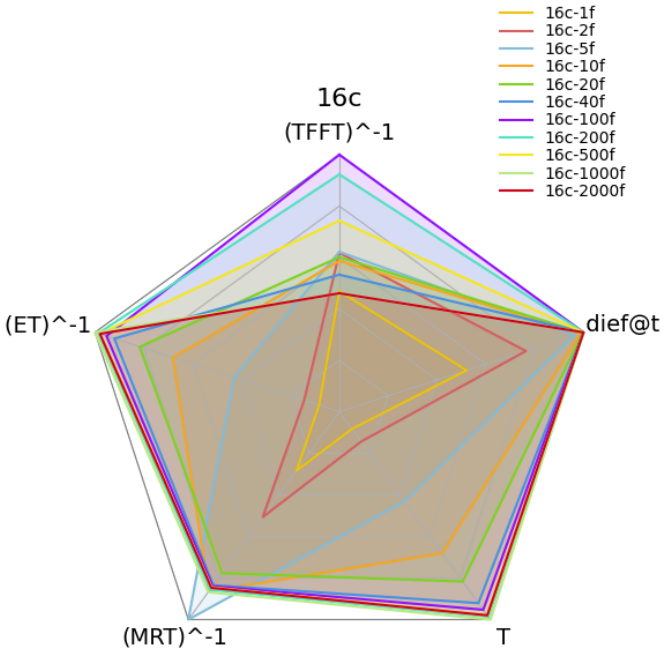
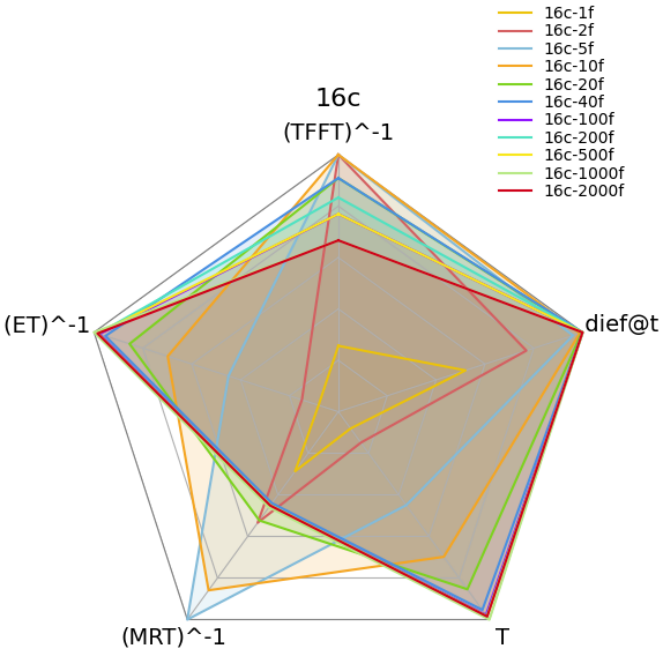


Figure 3: Radial Plots for big stream: 120-0.02

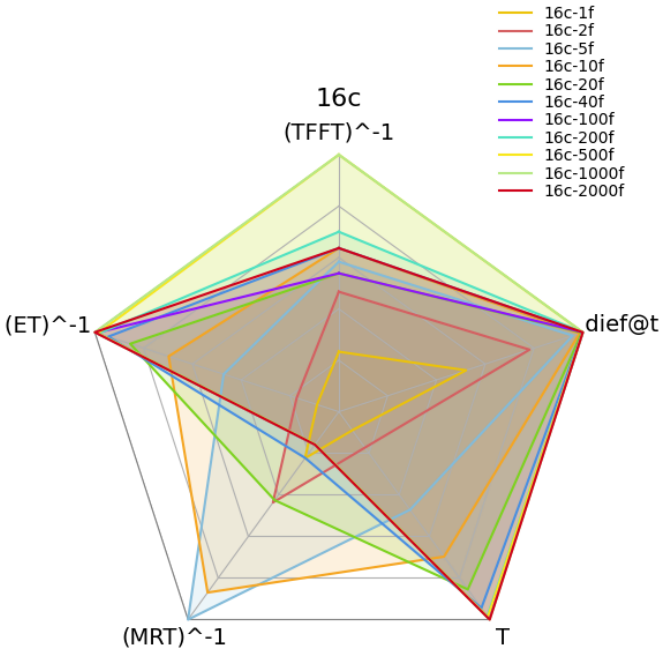
Radial plots - for a core number - different stream sizes



30-0.02



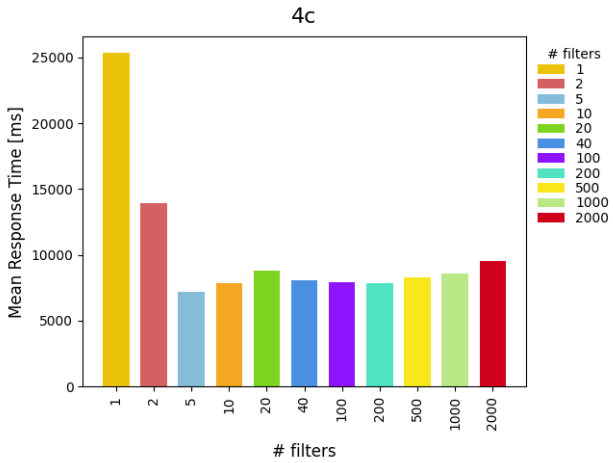
60-0.02



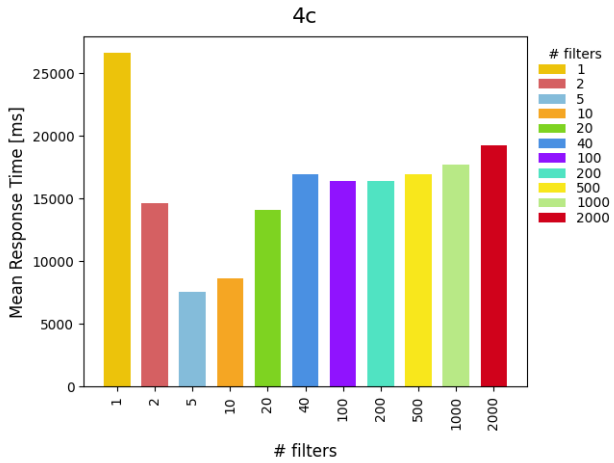
120-0.02

Figure 4: Radial Plots for 16c

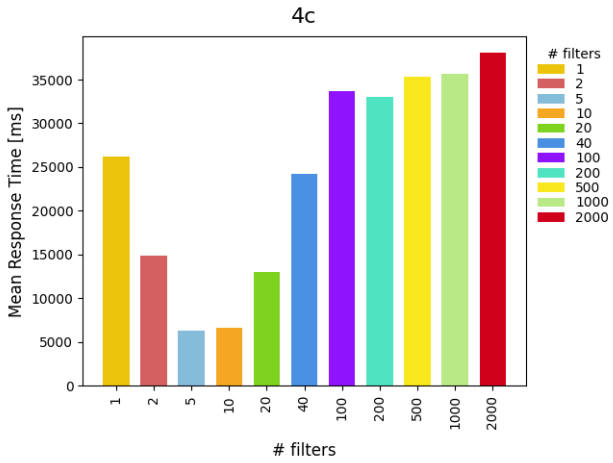
paragraphMRT plots - for a core number 4c - different stream sizes



30-0.02



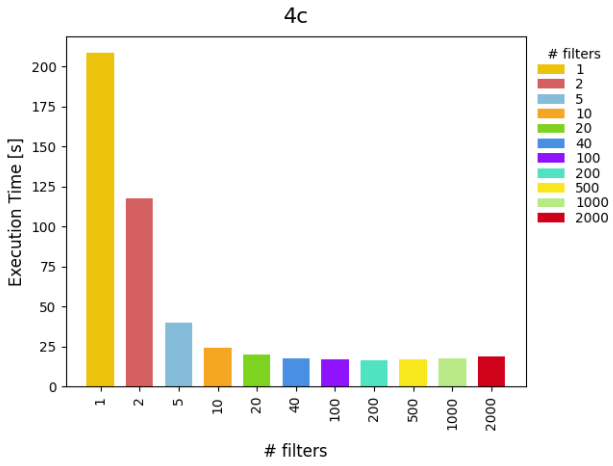
60-0.02



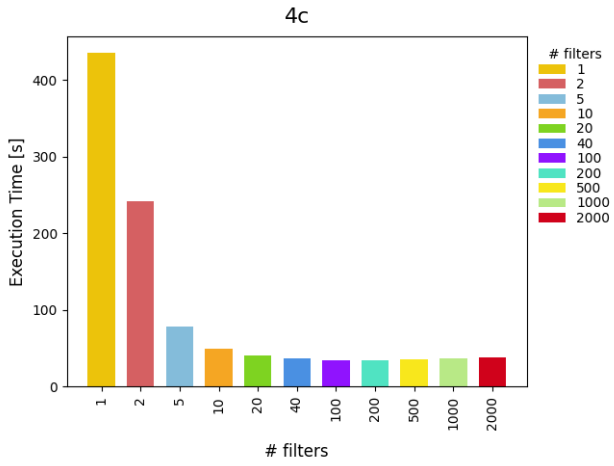
120-0.02

Figure 5: MRT Plots for 4c

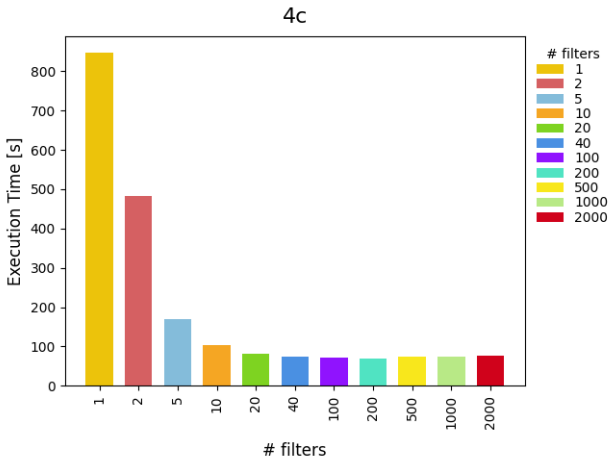
Exec time plots - for a core number - different stream sizes



30-0.02



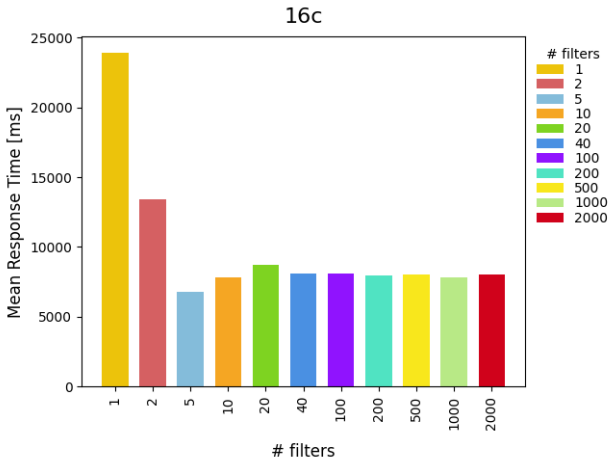
60-0.02



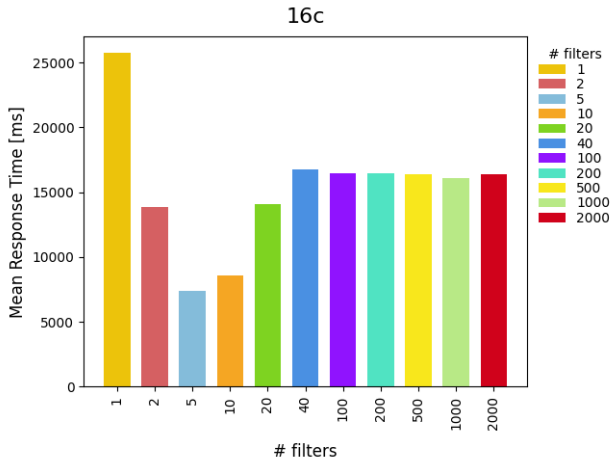
120-0.02

Figure 6: Execution Time Plots for 4c

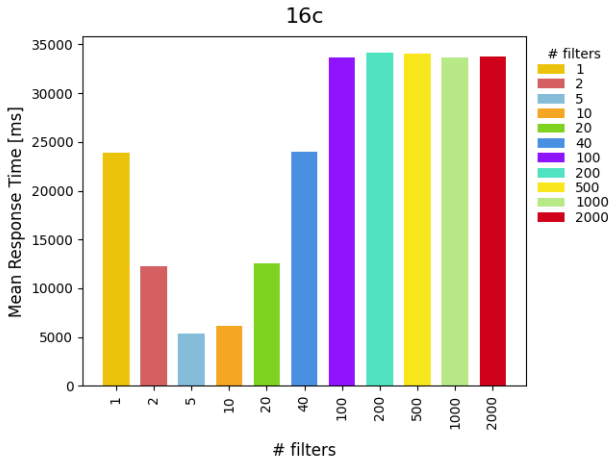
MRT plots - for a core number 16 - different stream sizes



30-0.02



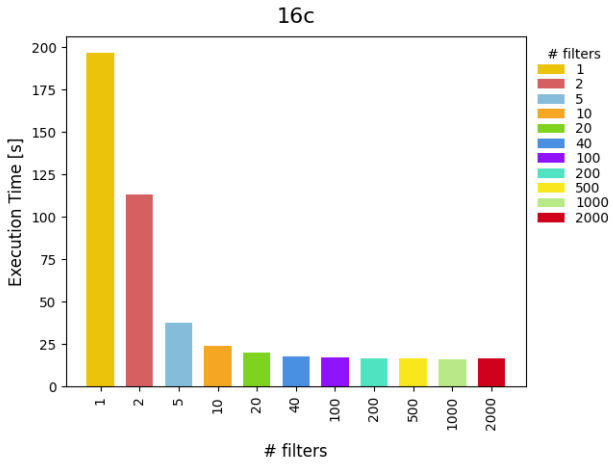
60-0.02



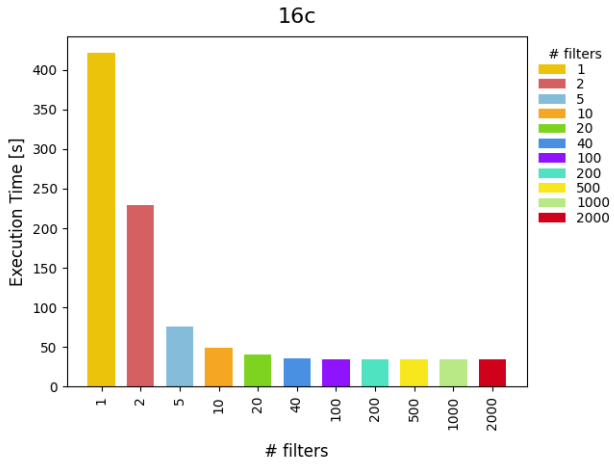
120-0.02

Figure 7: MRT Plots for 16c

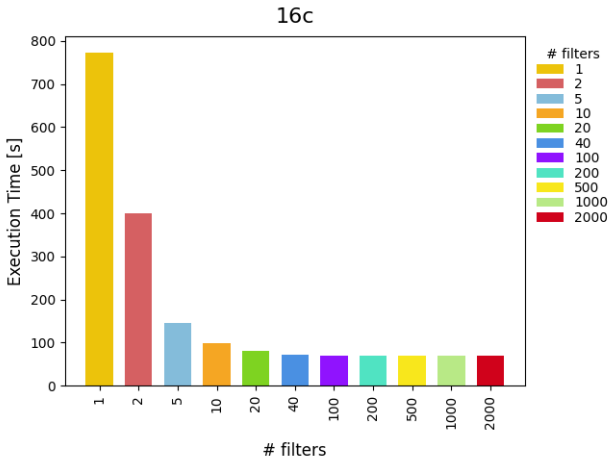
Exec time plots - for a core number - different stream sizes



30-0.02



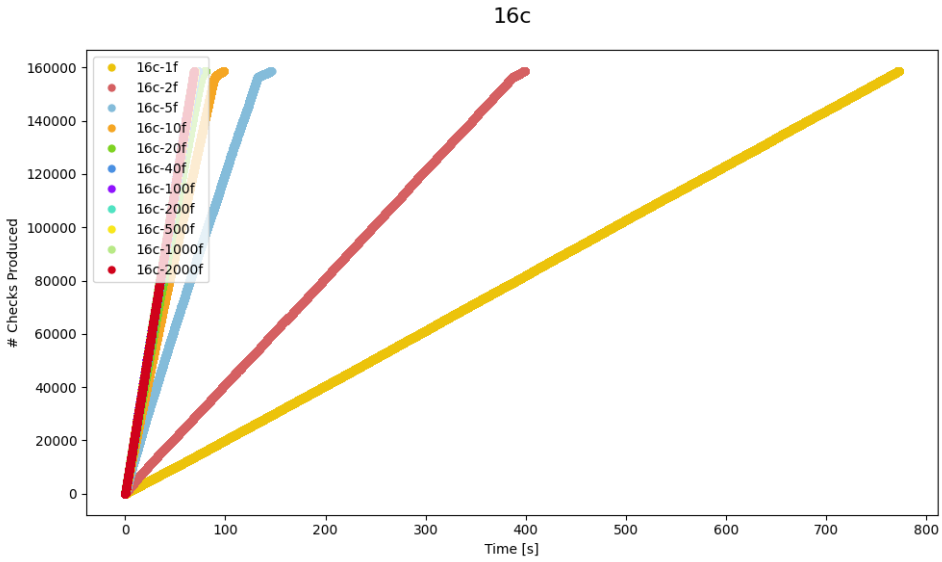
60-0.02



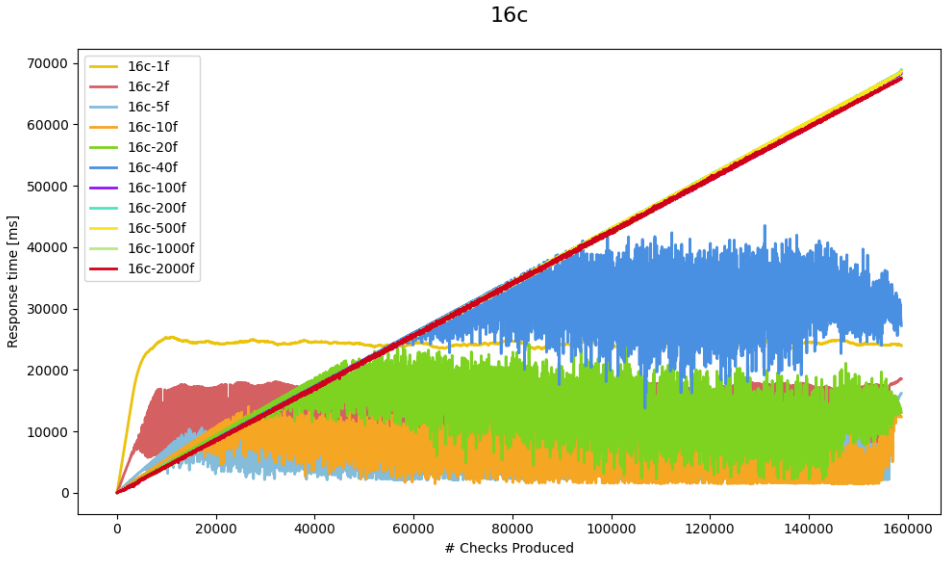
120-0.02

Figure 8: Execution Time Plots for 16c

Trace and response time trace for 16c and big stream



Trace



Trace Response Time reduced

2. Show how incrementing the resources (number of cores) help to improve the behavior

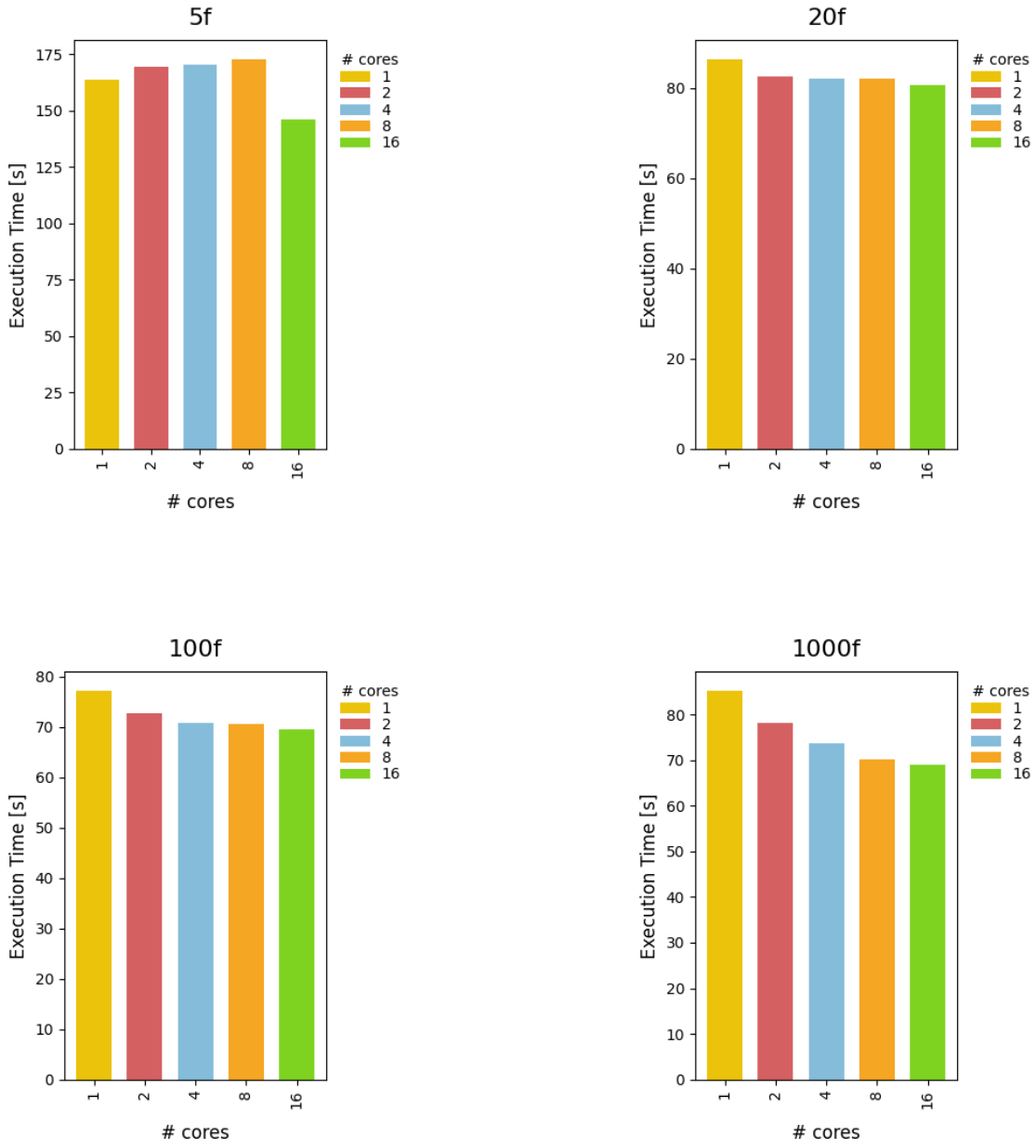


Figure 9: Radial Plots for big stream: 120-0.02

Ideas on the analysis so far:

- More cores help to improve the behavior, especially for the variants with large number of filters (expected).
- For a same core configuration (e.g. 16 cores), the total execution time (time to process all the stream input) is larger for the approaches with less cores, tending to decrease. However the continuous behavior is different: the best is observed for a number of filters in the range of 5-10 filters. From that point and on the continuous behavior tends to degrade when increasing the number

filters, especially for bigger stream sizes. Even larger than the lowest number of filters version (close to a sequential version) in these cases. This can be due to an overhead on the number of goroutines utilized and the overhead in the communication of the pipeline that this is causing.

These same conclusions are easily to observe in:

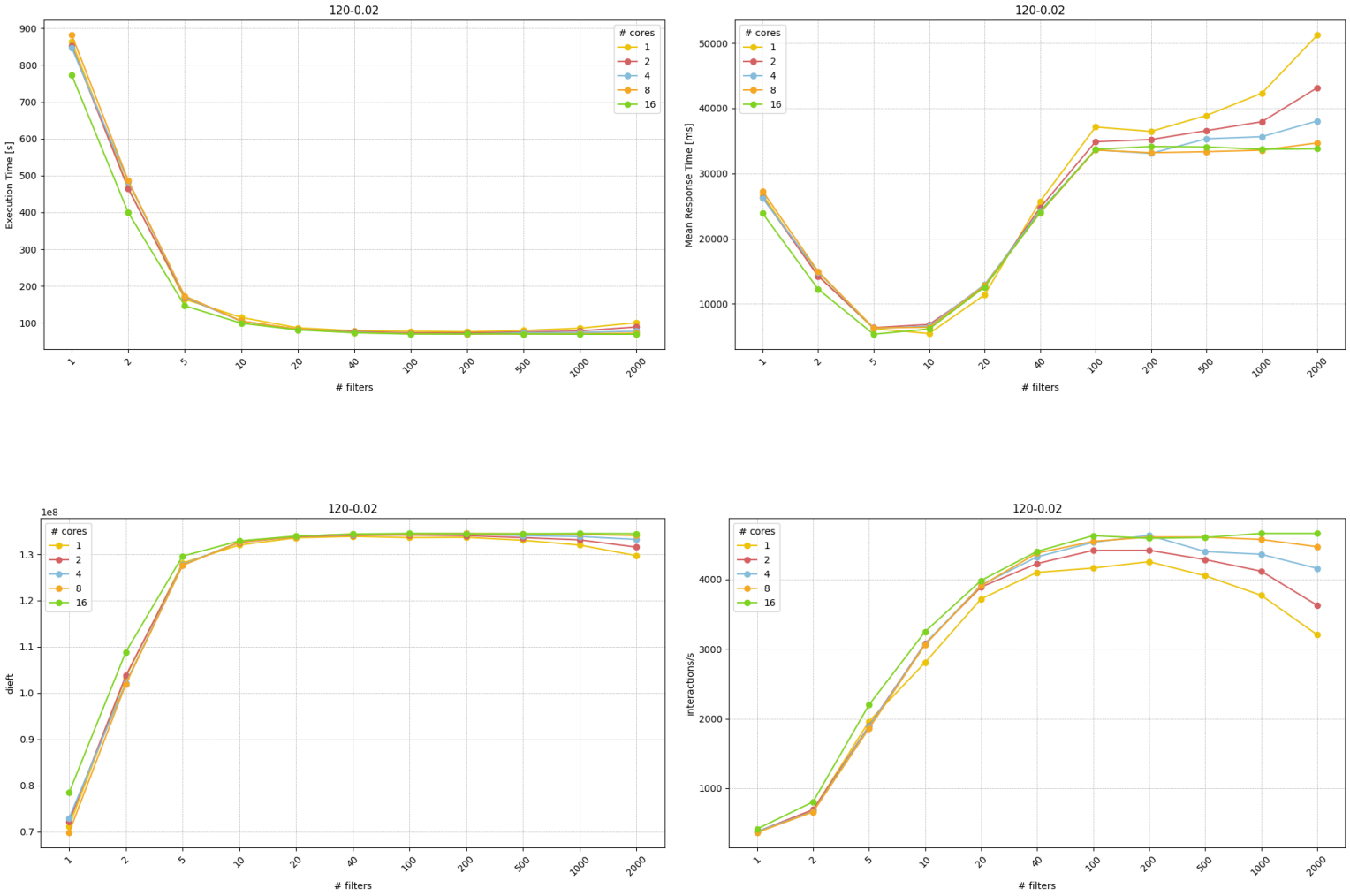


Figure 10: Radial Plots for big stream: 120-0.02

La pregunta es, por qué teniendo menor tiempo de ejecución, el mrt es superior? - Dar una explicación a esto...

1.1.2 Differences among the different stream sizes

2 Experiments Summary

2.1 E1 - NRT

ONLY CHECKS in these experiments

Bank Sizes:

- Small: $|Card| = 2000$, $|ATM| = 50$
- Medium: $|Card| = 500000$, $|ATM| = 1000$

Stream Sizes:

Bank Size	Num Days	Anomalous Ratio	Stream Size	Regular tx	Anomalous tx
Small	30	0.02 (2%)	39959	39508	451 1%
Small	60	0.02 (2%)	80744	79005	1739
Small	120	0.02 (2%)	160750	157756	2994
Medium	7	0.03 (3%)	2428286		
Medium	15	0.03 (3%)	4856573	4805920	50653
Medium					
Big					
Big					
Big					

For different core variations, we are going to try different combinations of the system in terms of the number of the maximum number of cards per filter, that consequently will produce an inverse variation in the number of filters of the system.

2.1.1 Small Bank Size

# cards per filter	# filters
2000	1
1000	2
400	5
200	10
100	20
50	40
20	100
10	200
4	500
2	1000
1	2000

- # of times / runs each job = 10.
- Maximum RAM limited to 16GB.
- Run for 1c, 2c, 4c, 8c and 16c.

2.1.2 Medium Bank Size

For these experiments, to generate the stream of tx, we needed to simplify this process in order to be able to generate a stream in a feasible amount of time. In particular we used the simplifed version of the `txGenerator.py`: `txGenerator-simplified.py` → with a random ATM-subset instead of a closest to client ATM-subset. Also variation on the transaction distribution times.
- Initial filter configuration setups:

# cards per filter	# filters
500000	1
100000	5
50000	10
5000	100
2000	250
1000	500
500	1000
250	2000
100	5000
50	10000
10	50000

Run with:

- 16GB RAM
- x1 run each job
- x: Run and plots done.
- " ": Not run.
- outMem: out of memory error.

Stream - 7 Days

#cores	1f	5f	10f	100f	250f	500f	1000f	2000f	5000f	10000f	50000f
1		x	x	x	x	x	x	x	x	x	
2		x	x	x	x	x	x	x	x	x	
4		x	x	x	x	x	x	x	x	x	
8		x	x	x	x	x	x	x	x	x	
16	x	x	x	x	x	x	x	x	x	x	outMem

Plots:

- FixedCores: OK
- FixedFilters: OK
- Combined: TODO, increase RAM memory to do it, higher than 64GB...

Stream - 15 Days

#cores	1f	5f	10f	100f	250f	500f	1000f	2000f	5000f	10000f	50000f
1		x	x	x	x	x	x	x	x	x	
2		x	x	x	x	x	x	x	x	x	
4		x	x	x	x	x	x	x	x	x	
8	x	x	x	x	x	x	x	x	x	x	
16	x	x	x	x	x	x	x	x	x	x	outMem

Plots: → Not done so far, only the reduced version explained next. Since for the 7D plots we could already observe that a large number of filters did not produce any advantage, we prefer to reduce the interval of filters in which to show the plots.

- FixedCores: TODO
- FixedFilters: TODO
- Combined: TODO

Based on the results seen (it seems that a really great number of filters is not beneficial), we want to see what happens with a combination of a lower number of filters (like in the experiments for the small bank database):

# cards per filter	# filters
2000	1
1000	2
400	5
200	10
100	20
50	40
20	100
10	200
4	500
2	1000
1	2000

#cores	20f	40f	200f
1			
2			
4			
8			
16			

#cores	2f	20f	40f	200f
1				
2				
4				
8				
16				

Stream - 7 Days
Results: DONE
Plots:

- FixedCores: Done
- FixedFilters: Done
- Combined: TODO, increase RAM memory to do it, higher than 64GB...

Stream - 15 Days
Results: Done
Plots:

- FixedCores: Obtaining
- FixedFilters: TODO → not for the moment
- Combined: TODO, increase RAM memory to do it, higher than 64GB... → not for the moment

2.2 NEW: Reduced comparison

Plots for the medium gdb, with a reduced number of filters (1f...200f) and including the baseline, to see better what happens.
Obtaining baselines run

- 7D: 1c, 2c, 4c, 8c, 16c
- 15D: 1c, 2c, 4c, 8c, 16c

Obtaining plots - only fixed cores plots

- 7D:
- 15D: