

tsp-ga

Traveling Salesman Problem with Genetic Algorithms

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Coding Train Demo

<https://editor.p5js.org/codingtrain/sketches/EGjTrkkf9>

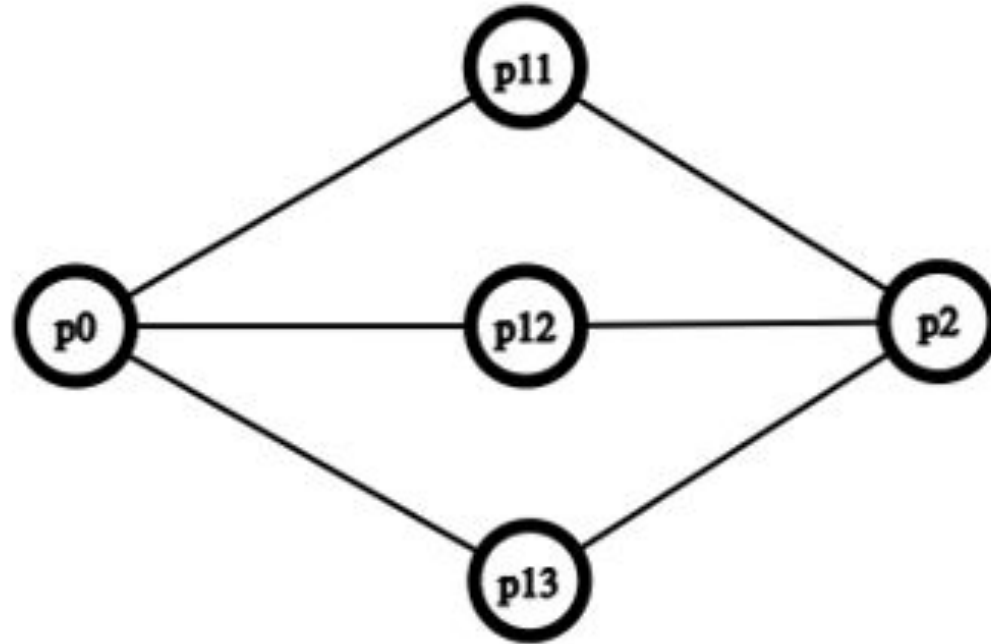
GA Pseudo-code

- 1) Create initial population of N random candidates
- 2) Calculate fitness for each candidate
- 3) If the candidate with the best fitness so far is good enough, return it
- 4) Create the next population as an evolution of the current population
- 5) Repeat steps 2 through 4 until step 3 eventually breaks out of the loop

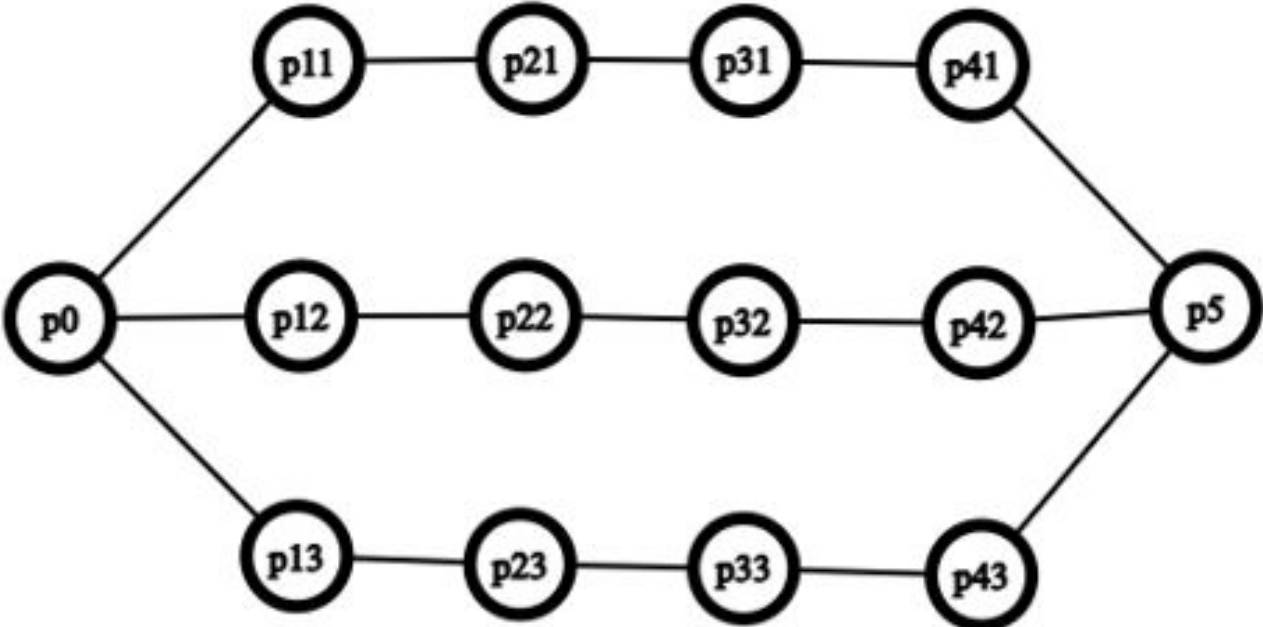
Parallelism Approach



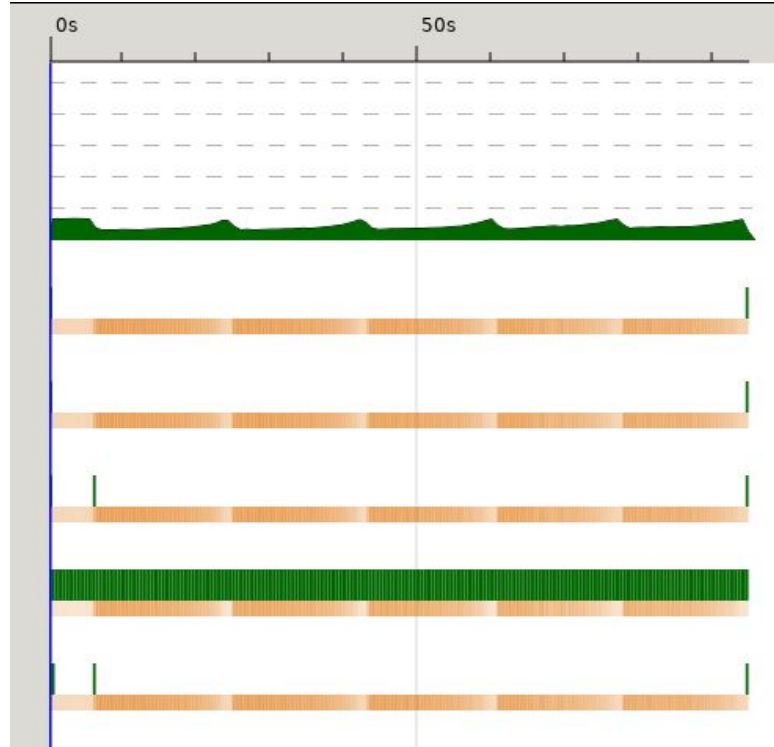
Parallelism Approach



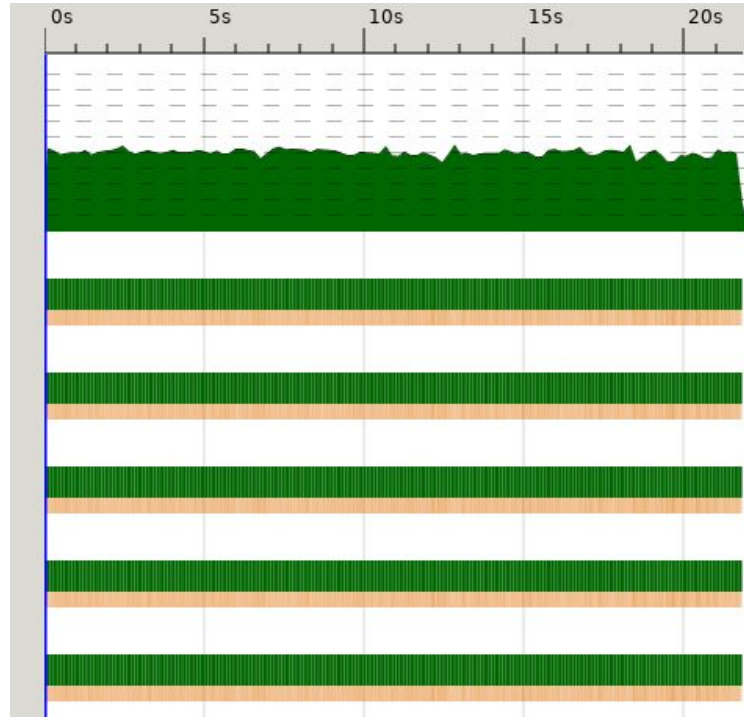
Parallelism Approach



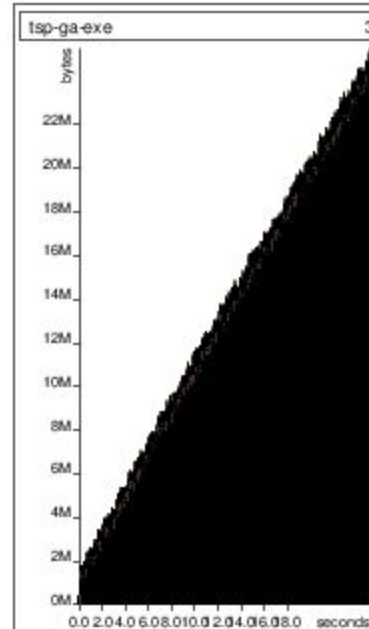
Achieving Parallelism – `parList rseq`



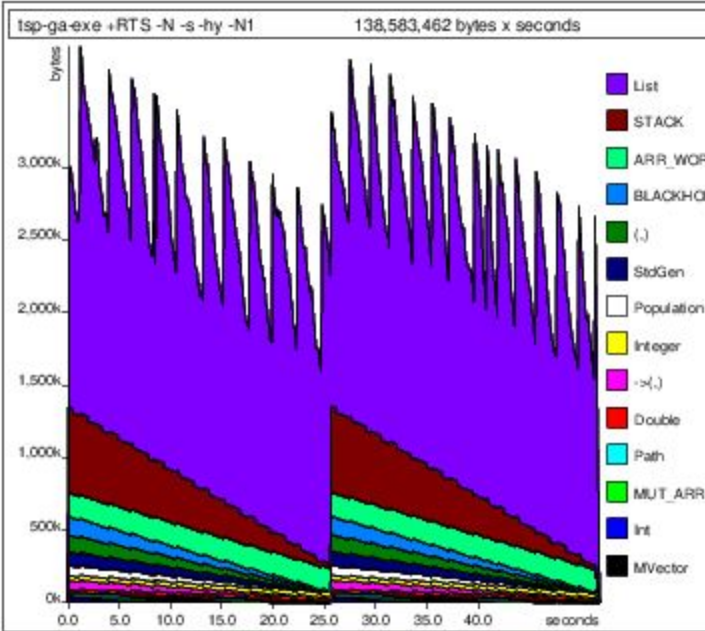
Achieving Parallelism – `parList` `rdeepseq`



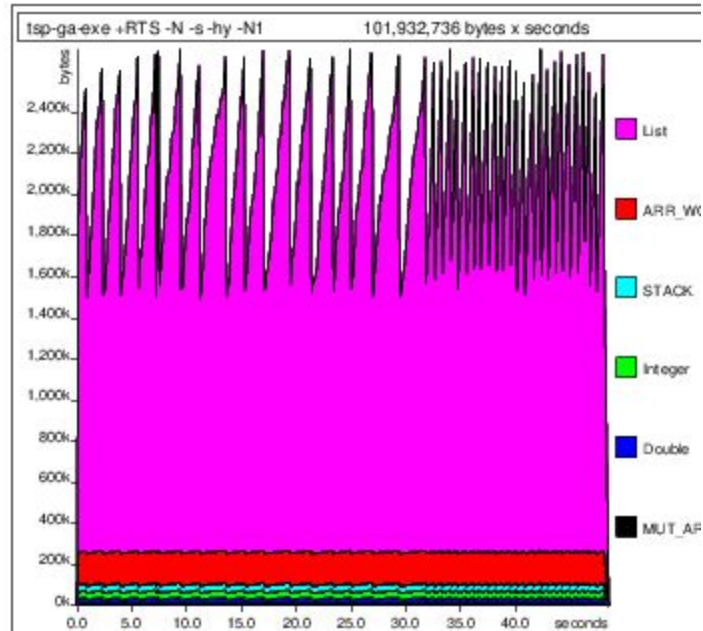
Memory Profiling – Memory Leak



Memory Profiling – Too Many Thunks



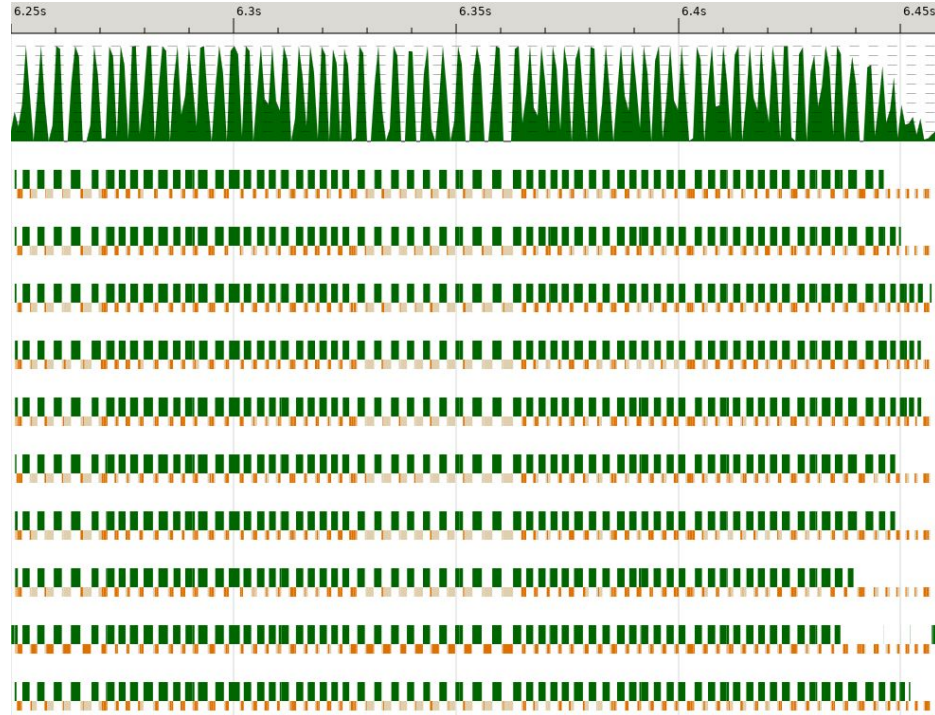
Memory Profiling – Flat + Spiky



Sparks

Time	Heap	GC	Spark stats	Spark sizes	Process info	Raw e
HEC	Total	Converted	Overflowed	Dud	GCed	Fizzled
Total	20000	19980	0	0	0	20
HEC 0	0	1892	0	0	0	0
HEC 1	0	2056	0	0	0	0
HEC 2	0	2066	0	0	0	0
HEC 3	1000	2041	0	0	0	1
HEC 4	0	1955	0	0	0	0
HEC 5	0	1980	0	0	0	0
HEC 6	4000	2002	0	0	0	4
HEC 7	0	1997	0	0	0	0
HEC 8	15000	1996	0	0	0	14
HEC 9	0	1995	0	0	0	1

Garbage Collection



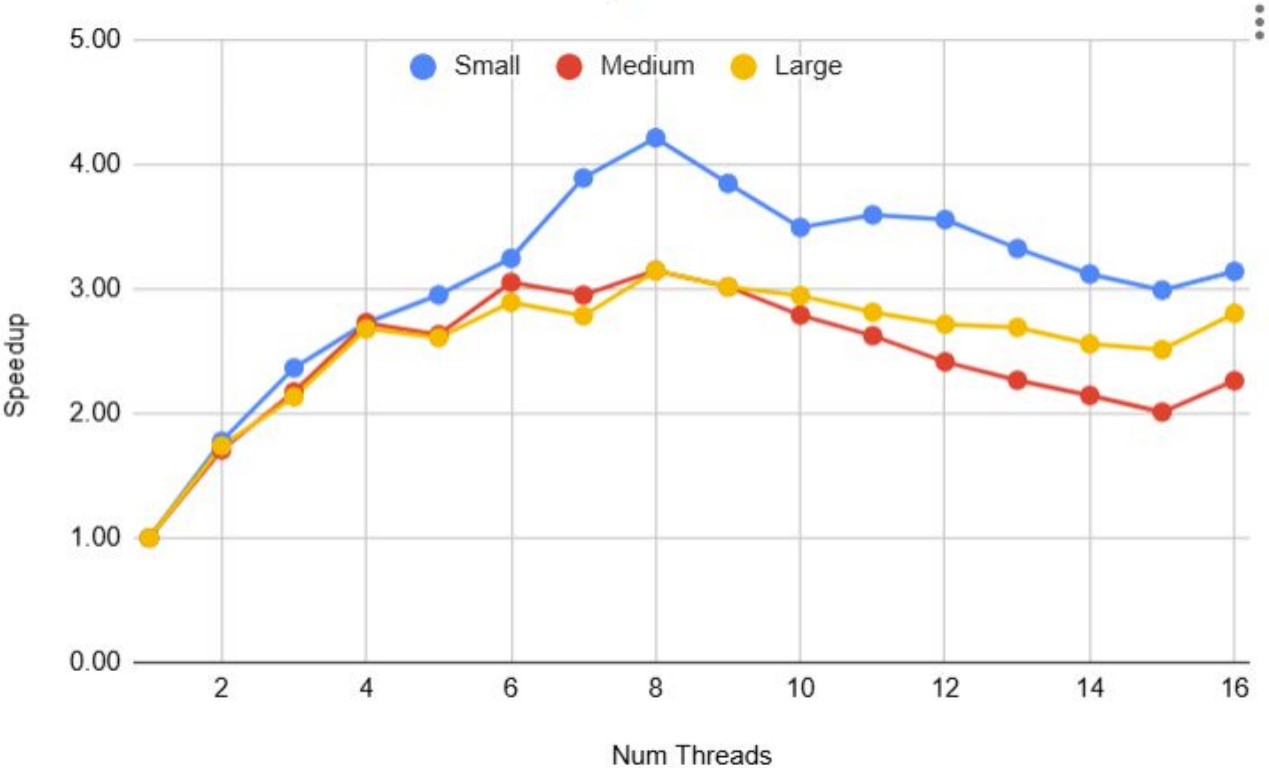
Garbage Collection

Time	Heap	GC	Spark stats	Spark sizes	Process info	Raw events
Copied during GC:		45.7 GiB	49,067,071,776 bytes			
Parallel GC work balance: 38.00% (serial 0%, perfect 100%)						
Generation	Collections	Par collections	Elapsed time	Avg pause	Max pause	
GC Total	10292	8014	11.20s	0.0011s	0.0445s	
Gen 0	7978	7978	7.90s	0.0010s	0.0032s	
Gen 1	36	36	0.69s	0.0192s	0.0445s	

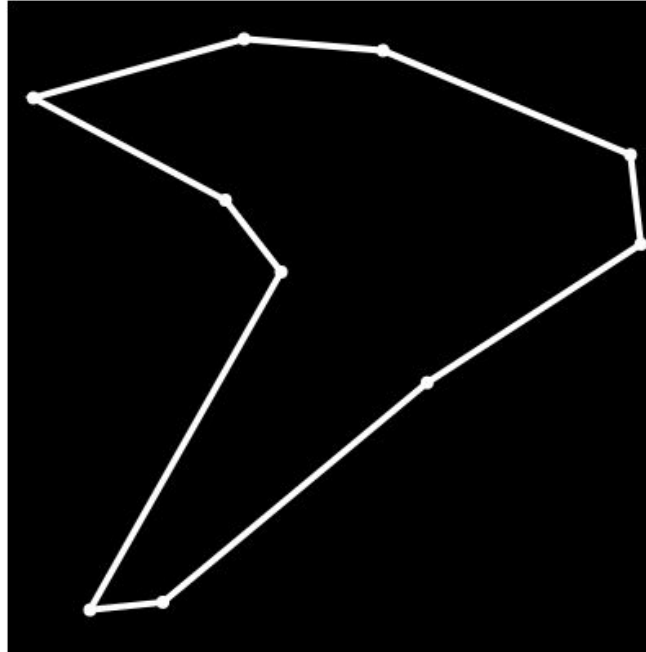
Amdahl

$$\begin{aligned} S &= \frac{1}{(1 - P) + \frac{P}{N}} \\ &= \frac{1}{(1 - 0.78) + \frac{0.78}{10}} \\ &= 3.36 \end{aligned}$$

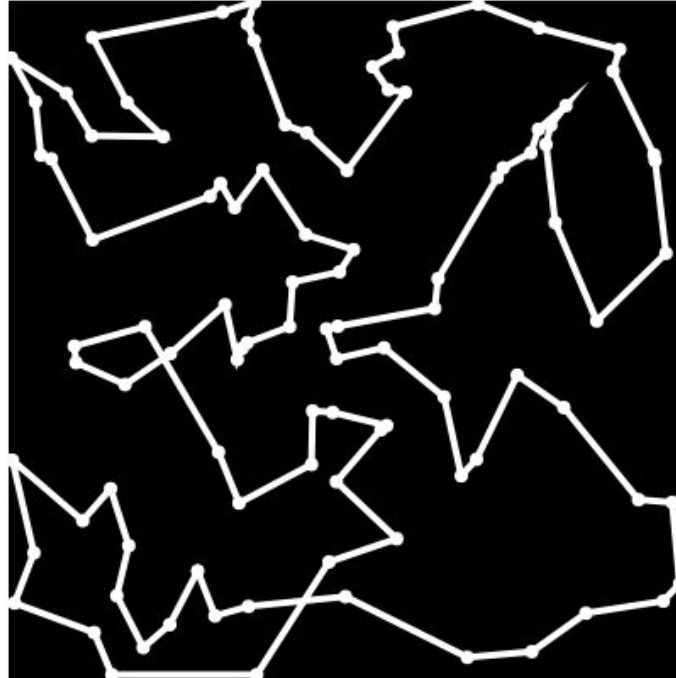
Results – Performance



Results – small



Results – medium



Results – large

