

# WoLF

Word-List-Filter

Filter

# Simple-Vector-Filter: Filter

unfiltered:  
vector<string>



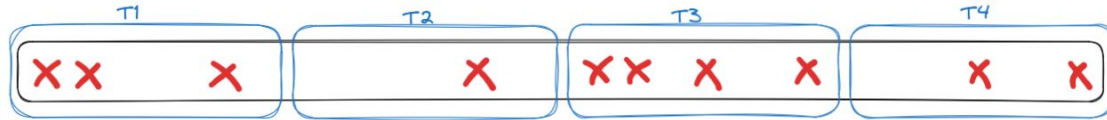
create\_session (...)

filtered:  
vector<string\*>



push ("A")

filtered:  
vector<string\*>



collect (...)

filtered:  
vector<string\*>



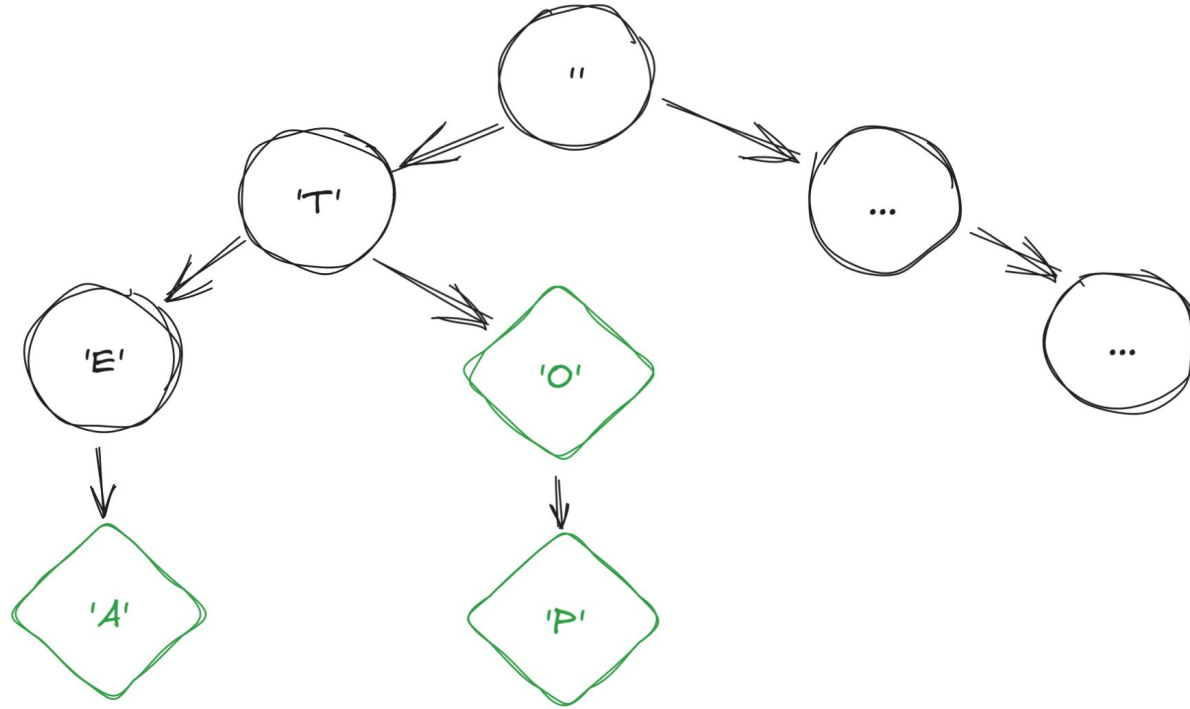
# Simple-Vector-Filter: Benchmark (width 4)

	File: bench/01_svf_mtf_w4.txt																	
1	Benchmark (2023-11-20 22:01:24)																	
2	Input: 456976 words																	
3	Iterations: 100																	
4	Threads: 1 2 4 8 12 16 32 48 64																	
5																		
6	Simple-Vector-Filter:																	
7	Pre:	A	Thr:	1	All:	1762	Con:	10	Ses:	530	Ins:	0	Fil:	1051	Col:	161	Des:	10
8	Pre:	A	Thr:	2	All:	1256	Con:	18	Ses:	520	Ins:	0	Fil:	539	Col:	169	Des:	10
9	Pre:	A	Thr:	4	All:	832	Con:	33	Ses:	337	Ins:	0	Fil:	272	Col:	173	Des:	17
10	Pre:	A	Thr:	8	All:	560	Con:	73	Ses:	170	Ins:	0	Fil:	133	Col:	155	Des:	29
11	Pre:	A	Thr:	12	All:	676	Con:	137	Ses:	208	Ins:	0	Fil:	122	Col:	148	Des:	61
12	Pre:	A	Thr:	16	All:	753	Con:	216	Ses:	171	Ins:	0	Fil:	100	Col:	149	Des:	117
13	Pre:	A	Thr:	32	All:	1243	Con:	551	Ses:	198	Ins:	0	Fil:	131	Col:	153	Des:	210
14	Pre:	A	Thr:	48	All:	1573	Con:	808	Ses:	174	Ins:	0	Fil:	154	Col:	155	Des:	282
15	Pre:	A	Thr:	64	All:	2066	Con:	1091	Ses:	235	Ins:	0	Fil:	181	Col:	156	Des:	403
16	Pre:	BC	Thr:	1	All:	1154	Con:	9	Ses:	169	Ins:	0	Fil:	877	Col:	89	Des:	10
17	Pre:	BC	Thr:	2	All:	1209	Con:	19	Ses:	545	Ins:	0	Fil:	535	Col:	99	Des:	11
18	Pre:	BC	Thr:	4	All:	583	Con:	34	Ses:	170	Ins:	0	Fil:	278	Col:	87	Des:	14
19	Pre:	BC	Thr:	8	All:	627	Con:	90	Ses:	268	Ins:	0	Fil:	144	Col:	90	Des:	35
20	Pre:	BC	Thr:	12	All:	616	Con:	142	Ses:	204	Ins:	0	Fil:	123	Col:	89	Des:	58
21	Pre:	BC	Thr:	16	All:	763	Con:	233	Ses:	222	Ins:	0	Fil:	101	Col:	89	Des:	118
22	Pre:	BC	Thr:	32	All:	1197	Con:	536	Ses:	225	Ins:	0	Fil:	135	Col:	89	Des:	212
23	Pre:	BC	Thr:	48	All:	1599	Con:	838	Ses:	222	Ins:	0	Fil:	161	Col:	89	Des:	289
24	Pre:	BC	Thr:	64	All:	2044	Con:	1114	Ses:	237	Ins:	0	Fil:	194	Col:	90	Des:	409
25	Pre:	CAB	Thr:	1	All:	1152	Con:	8	Ses:	171	Ins:	0	Fil:	881	Col:	84	Des:	8
26	Pre:	CAB	Thr:	2	All:	1224	Con:	20	Ses:	555	Ins:	0	Fil:	538	Col:	99	Des:	12
27	Pre:	CAB	Thr:	4	All:	782	Con:	36	Ses:	365	Ins:	0	Fil:	275	Col:	91	Des:	15
28	Pre:	CAB	Thr:	8	All:	630	Con:	91	Ses:	270	Ins:	0	Fil:	145	Col:	87	Des:	37
29	Pre:	CAB	Thr:	12	All:	658	Con:	146	Ses:	241	Ins:	0	Fil:	126	Col:	86	Des:	59
30	Pre:	CAB	Thr:	16	All:	723	Con:	238	Ses:	175	Ins:	0	Fil:	105	Col:	85	Des:	120
31	Pre:	CAB	Thr:	32	All:	1221	Con:	562	Ses:	226	Ins:	0	Fil:	133	Col:	85	Des:	215
32	Pre:	CAB	Thr:	48	All:	1475	Con:	786	Ses:	172	Ins:	0	Fil:	150	Col:	83	Des:	284
33	Pre:	CAB	Thr:	64	All:	1886	Con:	1074	Ses:	175	Ins:	0	Fil:	177	Col:	83	Des:	377

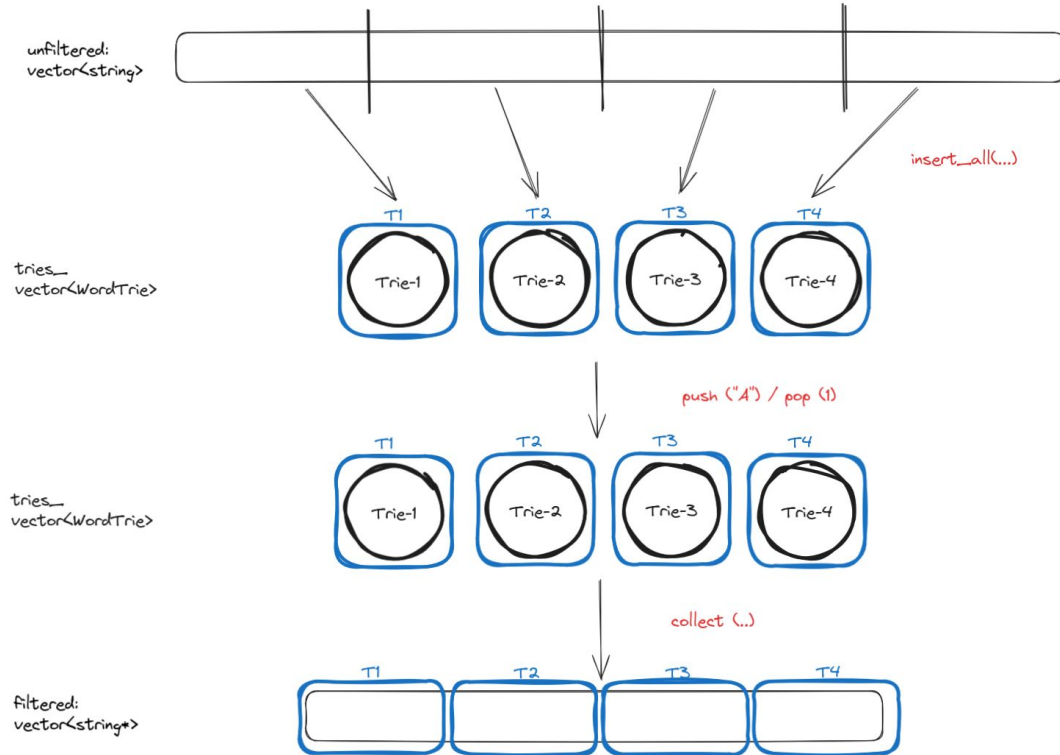
# Simple-Vector-Filter: Benchmark (width 5)

	File: bench/02_svfilter_w5.txt														
1	Benchmark (2023-11-20 22:17:52)														
2	Input: 11881376 words														
3	Iterations: 3														
4	Threads: 1 2 4 8 12 16 32 48 64														
5															
6	Simple-Vector-Filter:														
7	Pre:	A	Thr:	1	All:	39025	Con:	26	Ses:	9211	Ins:	0	Fil:	24850	Des: 423
8	Pre:	A	Thr:	2	All:	28021	Con:	47	Ses:	9717	Ins:	0	Fil:	13428	Des: 438
9	Pre:	A	Thr:	4	All:	25863	Con:	69	Ses:	9719	Ins:	0	Fil:	11218	Des: 494
10	Pre:	A	Thr:	8	All:	25778	Con:	144	Ses:	9185	Ins:	0	Fil:	11516	Des: 339
11	Pre:	A	Thr:	12	All:	26123	Con:	207	Ses:	9319	Ins:	0	Fil:	11642	Des: 556
12	Pre:	A	Thr:	16	All:	25865	Con:	254	Ses:	9321	Ins:	0	Fil:	11503	Des: 383
13	Pre:	A	Thr:	32	All:	26736	Con:	593	Ses:	9190	Ins:	0	Fil:	11860	Des: 691
14	Pre:	A	Thr:	48	All:	26913	Con:	912	Ses:	9193	Ins:	0	Fil:	11814	Des: 645
15	Pre:	A	Thr:	64	All:	27514	Con:	1221	Ses:	9218	Ins:	0	Fil:	11912	Des: 791
16	Pre:	BC	Thr:	1	All:	38982	Con:	22	Ses:	9442	Ins:	0	Fil:	26428	Des: 390
17	Pre:	BC	Thr:	2	All:	25892	Con:	50	Ses:	9348	Ins:	0	Fil:	13607	Des: 390
18	Pre:	BC	Thr:	4	All:	23768	Con:	70	Ses:	9442	Ins:	0	Fil:	11185	Des: 431
19	Pre:	BC	Thr:	8	All:	23823	Con:	150	Ses:	9007	Ins:	0	Fil:	11599	Des: 345
20	Pre:	BC	Thr:	12	All:	23806	Con:	192	Ses:	9119	Ins:	0	Fil:	11511	Des: 340
21	Pre:	BC	Thr:	16	All:	23819	Con:	245	Ses:	9088	Ins:	0	Fil:	11463	Des: 367
22	Pre:	BC	Thr:	32	All:	24325	Con:	595	Ses:	9015	Ins:	0	Fil:	11540	Des: 565
23	Pre:	BC	Thr:	48	All:	25156	Con:	891	Ses:	9189	Ins:	0	Fil:	11780	Des: 654
24	Pre:	BC	Thr:	64	All:	25861	Con:	1180	Ses:	9283	Ins:	0	Fil:	11739	Des: 1042
25	Pre:	CAB	Thr:	1	All:	37348	Con:	22	Ses:	9190	Ins:	0	Fil:	25164	Des: 407
26	Pre:	CAB	Thr:	2	All:	26261	Con:	50	Ses:	9750	Ins:	0	Fil:	13402	Des: 441
27	Pre:	CAB	Thr:	4	All:	24051	Con:	71	Ses:	9715	Ins:	0	Fil:	11252	Des: 440
28	Pre:	CAB	Thr:	8	All:	23901	Con:	147	Ses:	9296	Ins:	0	Fil:	11519	Des: 349
29	Pre:	CAB	Thr:	12	All:	23920	Con:	198	Ses:	9160	Ins:	0	Fil:	11568	Des: 373
30	Pre:	CAB	Thr:	16	All:	24000	Con:	257	Ses:	9282	Ins:	0	Fil:	11507	Des: 368
31	Pre:	CAB	Thr:	32	All:	24765	Con:	560	Ses:	9145	Ins:	0	Fil:	11855	Des: 595
32	Pre:	CAB	Thr:	48	All:	25004	Con:	877	Ses:	9203	Ins:	0	Fil:	11639	Des: 656
33	Pre:	CAB	Thr:	64	All:	25841	Con:	1221	Ses:	9524	Ins:	0	Fil:	11717	Des: 785

# Multi-Trie-Filter: Trie



# Multi-Trie-Filter: Filter



# Multi-Trie-Filter: Benchmark (width 4)

	File: bench/01_svf_mtf_w4.txt																	
1	Benchmark (2023-11-20 22:01:24)																	
2	Input: 456976 words																	
3	Iterations: 100																	
4 ~	Threads: 1 2 4 8 12 16 32 48 64																	
5																		
	Multi-Trie-Filter:																	
7 ~	Pre:	A	Thr:	1	All:	155437	Con:	12	Ses:	0	Ins:	102566	Fil:	13	Col:	857	Des:	51989
8	Pre:	A	Thr:	2	All:	112079	Con:	40	Ses:	0	Ins:	55338	Fil:	14	Col:	314	Des:	56373
9 ~	Pre:	A	Thr:	4	All:	89980	Con:	71	Ses:	0	Ins:	35493	Fil:	16	Col:	292	Des:	54108
10 ~	Pre:	A	Thr:	8	All:	87799	Con:	142	Ses:	0	Ins:	23951	Fil:	18	Col:	201	Des:	63487
11 ~	Pre:	A	Thr:	12	All:	93771	Con:	202	Ses:	0	Ins:	19525	Fil:	23	Col:	174	Des:	73847
12	Pre:	A	Thr:	16	All:	101300	Con:	356	Ses:	0	Ins:	17471	Fil:	26	Col:	185	Des:	83262
13 ~	Pre:	A	Thr:	32	All:	106220	Con:	661	Ses:	0	Ins:	13975	Fil:	44	Col:	165	Des:	91375
14 ~	Pre:	A	Thr:	48	All:	122948	Con:	970	Ses:	0	Ins:	13818	Fil:	71	Col:	187	Des:	107902
15	Pre:	A	Thr:	64	All:	133059	Con:	1250	Ses:	0	Ins:	13969	Fil:	92	Col:	206	Des:	117542
16 ~	Pre:	BC	Thr:	1	All:	158101	Con:	18	Ses:	0	Ins:	105832	Fil:	13	Col:	42	Des:	52196
17 ~	Pre:	BC	Thr:	2	All:	105323	Con:	47	Ses:	0	Ins:	55544	Fil:	15	Col:	23	Des:	49694
18	Pre:	BC	Thr:	4	All:	88353	Con:	68	Ses:	0	Ins:	33604	Fil:	15	Col:	25	Des:	54641
19 ~	Pre:	BC	Thr:	8	All:	91553	Con:	139	Ses:	0	Ins:	23710	Fil:	18	Col:	23	Des:	67663
20 ~	Pre:	BC	Thr:	12	All:	96048	Con:	194	Ses:	0	Ins:	19838	Fil:	23	Col:	27	Des:	75966
21 ~	Pre:	BC	Thr:	16	All:	103990	Con:	352	Ses:	0	Ins:	17466	Fil:	27	Col:	30	Des:	86115
22	Pre:	BC	Thr:	32	All:	122791	Con:	743	Ses:	0	Ins:	14408	Fil:	53	Col:	42	Des:	107545
23 ~	Pre:	BC	Thr:	48	All:	145477	Con:	1027	Ses:	3	Ins:	15150	Fil:	87	Col:	56	Des:	129154
24 ~	Pre:	BC	Thr:	64	All:	160028	Con:	1264	Ses:	0	Ins:	15069	Fil:	104	Col:	72	Des:	143519
25	Pre:	CAB	Thr:	1	All:	160666	Con:	24	Ses:	0	Ins:	101791	Fil:	13	Col:	12	Des:	58826
26 ~	Pre:	CAB	Thr:	2	All:	105996	Con:	49	Ses:	0	Ins:	54764	Fil:	14	Col:	9	Des:	51160
27 ~	Pre:	CAB	Thr:	4	All:	94182	Con:	65	Ses:	0	Ins:	35338	Fil:	16	Col:	11	Des:	58752
28	Pre:	CAB	Thr:	8	All:	96654	Con:	140	Ses:	0	Ins:	25059	Fil:	20	Col:	11	Des:	71424
29 ~	Pre:	CAB	Thr:	12	All:	104136	Con:	197	Ses:	0	Ins:	19916	Fil:	24	Col:	15	Des:	83984
30 ~	Pre:	CAB	Thr:	16	All:	113570	Con:	357	Ses:	0	Ins:	18752	Fil:	28	Col:	21	Des:	94412
31 ~	Pre:	CAB	Thr:	32	All:	129564	Con:	743	Ses:	3	Ins:	14925	Fil:	42	Col:	19	Des:	113832
32	Pre:	CAB	Thr:	48	All:	152436	Con:	1045	Ses:	3	Ins:	16272	Fil:	84	Col:	14	Des:	135018
33 ~	Pre:	CAB	Thr:	64	All:	166842	Con:	1271	Ses:	5	Ins:	15399	Fil:	94	Col:	17	Des:	150056



# Multi-Trie-Filter: Benchmark (width 5)

	File: bench/02_svf_mtf_w5.txt												
1	Benchmark (2023-11-20 22:17:52)												
2	Input: 11881376 words												
3	Iterations: 3												
4 ~	Threads: 1 2 4 8 12 16 32 48 64												
5													
6	Multi-Trie-Filter:												
7 ~	Pre:	A	Thr:	1	ALL:	900608	Con:	21	Ses:	0	Ins:	7354559	Fil: 11 Col: 38204 Des: 1607813
8 ~	Pre:	A	Thr:	2	ALL:	6401137	Con:	46	Ses:	0	Ins:	4719678	Fil: 17 Col: 20708 Des: 1660688
9 ~	Pre:	A	Thr:	4	ALL:	4223853	Con:	70	Ses:	0	Ins:	2325657	Fil: 18 Col: 10244 Des: 1887864
10 ~	Pre:	A	Thr:	8	ALL:	3918681	Con:	235	Ses:	0	Ins:	1348815	Fil: 36 Col: 6157 Des: 2563438
11 ~	Pre:	A	Thr:	12	ALL:	3898549	Con:	292	Ses:	0	Ins:	1079125	Fil: 33 Col: 5023 Des: 2814076
12 ~	Pre:	A	Thr:	16	ALL:	4100348	Con:	409	Ses:	0	Ins:	1010676	Fil: 36 Col: 4462 Des: 3084765
13 ~	Pre:	A	Thr:	32	ALL:	3999800	Con:	740	Ses:	1	Ins:	691094	Fil: 61 Col: 4263 Des: 3303641
14 ~	Pre:	A	Thr:	48	ALL:	4733426	Con:	1218	Ses:	1	Ins:	760096	Fil: 102 Col: 4854 Des: 3967155
15 ~	Pre:	A	Thr:	64	ALL:	4647463	Con:	1608	Ses:	0	Ins:	679001	Fil: 157 Col: 5336 Des: 3961361
16 ~	Pre:	BC	Thr:	1	ALL:	10067144	Con:	25	Ses:	0	Ins:	8401857	Fil: 17 Col: 1652 Des: 1663593
17 ~	Pre:	BC	Thr:	2	ALL:	6547366	Con:	55	Ses:	0	Ins:	4760951	Fil: 16 Col: 838 Des: 1785506
18 ~	Pre:	BC	Thr:	4	ALL:	4430072	Con:	72	Ses:	0	Ins:	2372405	Fil: 19 Col: 756 Des: 2056820
19 ~	Pre:	BC	Thr:	8	ALL:	4048376	Con:	263	Ses:	0	Ins:	1404122	Fil: 30 Col: 539 Des: 2643422
20 ~	Pre:	BC	Thr:	12	ALL:	4412397	Con:	302	Ses:	0	Ins:	1152350	Fil: 38 Col: 510 Des: 3259197
21 ~	Pre:	BC	Thr:	16	ALL:	4584262	Con:	431	Ses:	0	Ins:	1046160	Fil: 38 Col: 516 Des: 3537117
22 ~	Pre:	BC	Thr:	32	ALL:	4788474	Con:	760	Ses:	1	Ins:	725991	Fil: 58 Col: 439 Des: 4061225
23 ~	Pre:	BC	Thr:	48	ALL:	5183922	Con:	1177	Ses:	3	Ins:	793738	Fil: 98 Col: 557 Des: 4388349
24 ~	Pre:	BC	Thr:	64	ALL:	5354458	Con:	1586	Ses:	0	Ins:	753607	Fil: 107 Col: 454 Des: 4598704
25 ~	Pre:	CAB	Thr:	1	ALL:	10372451	Con:	27	Ses:	0	Ins:	8713604	Fil: 17 Col: 92 Des: 1658711
26 ~	Pre:	CAB	Thr:	2	ALL:	6572883	Con:	49	Ses:	0	Ins:	4688564	Fil: 18 Col: 55 Des: 1884197
27 ~	Pre:	CAB	Thr:	4	ALL:	4312908	Con:	65	Ses:	0	Ins:	2360150	Fil: 25 Col: 137 Des: 1952531
28 ~	Pre:	CAB	Thr:	8	ALL:	4196793	Con:	245	Ses:	0	Ins:	1466600	Fil: 32 Col: 214 Des: 2729702
29 ~	Pre:	CAB	Thr:	12	ALL:	4220756	Con:	322	Ses:	0	Ins:	1185709	Fil: 38 Col: 256 Des: 3034431
30 ~	Pre:	CAB	Thr:	16	ALL:	4475163	Con:	424	Ses:	0	Ins:	977471	Fil: 48 Col: 245 Des: 3496975
31 ~	Pre:	CAB	Thr:	32	ALL:	4701510	Con:	848	Ses:	2	Ins:	740593	Fil: 66 Col: 258 Des: 3959743
32 ~	Pre:	CAB	Thr:	48	ALL:	5208228	Con:	1160	Ses:	3	Ins:	789574	Fil: 100 Col: 276 Des: 4417115
33 ~	Pre:	CAB	Thr:	64	ALL:	5443743	Con:	1595	Ses:	6	Ins:	770577	Fil: 156 Col: 262 Des: 4671147

# Sorted-Vector-Filter: Todo

- Initialization:
  - Create a reference vector
  - Sort the vector, using quicksort or mergesort
    - Can be performed on multiple threads
- Search:
  - Find the first, and last
    - Can be performed on up to 2 threads
  - Copy the found range in to the result vector

**Misc.**

# Misc.: Benchmarks

- AMD Ryzen 9 7950X (32) @ 5.88 GHz
- 2x16GB DDR5-6000 DIMM CL30-38-38-96

```
2   ... for (const auto &p : prefixes_) {  
3       ... for (auto tc : thread_count_) {  
4   ↵  
5       ... i64 best_construct_time = std::numeric_limits<i64>::max();  
6       ... // ...  
7   ↵  
8       ... for (usize i = 0; i < iterations_; ++i) {  
9       ... const auto result = fn(input_, p, tc);  
10      ... best_construct_time = std::min(best_construct_time, -  
11      ... result.construct_time);  
12      ... // ...  
13      ... }  
14      ... }  
15      ... }
```

# Misc.: Runner

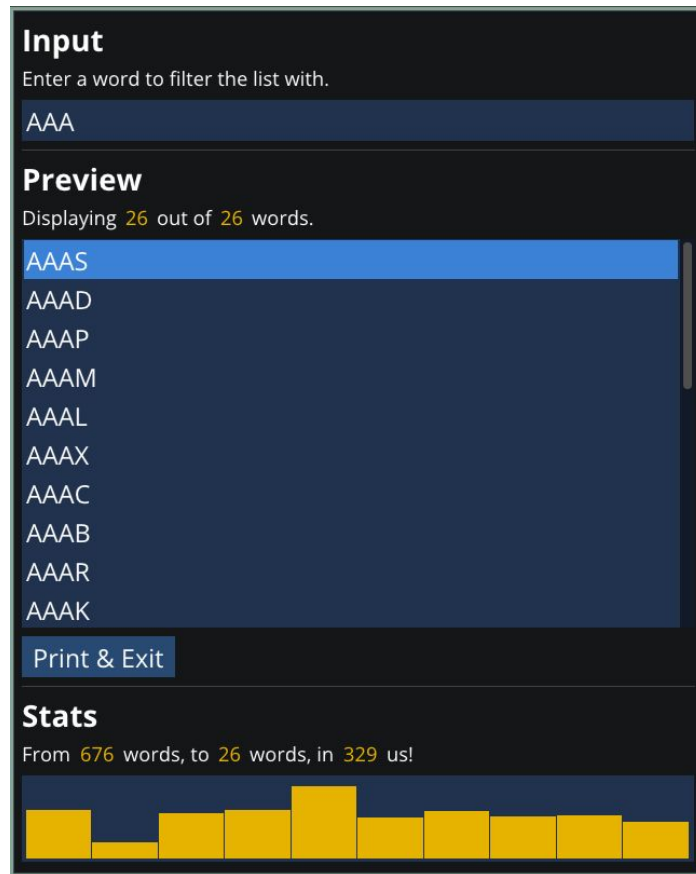
- Test-Generator (-m gen)
  - Generates all combinations of letters A-Z, for a given width
  - E.g.: width = 4 -> Generates all combinations from AAAA to ZZZZ
- One-Shot-Filter (-m fos)
  - Uses the: **Simple-Vector-Filter**
  - Creates a filter -> filters based on a given prefix -> exists
- Interactive-Fiter (-m fin)
  - Uses the: **Multi-Trie-Filter**
  - Lets the user interactively filter and print the list using a gui interface
- Benchmark (-m bench)
  - Benchmarks both filters with different combinations of prefixes and threads

# Misc.: IO

- Reader
  - **ConsoleWriter** - Read from stdout
  - **FileWriter** - Read to file
- Writer
  - **ConsoleWriter** - Write to stdout
  - **FileWriter** - Write to file

# Misc.: GUI

- Used for interactive-mode
- Based on the **Dear ImGui** project (<https://github.com/ocornut/imgui>)
- Backend: **OpenGL** + **GLFW**



# Misc.

- Config
  - Default Configuration
  - Can be changed via command line arguments
- ThreadPool
  - Create a pool of threads, which can be reused for multiple task
- Timer
  - Simple time measuring



## Misc.: Repo

- <https://gitlab.com/helloki/wolf>
- <https://github.com/MullerLucas/wolf>