Parallel Test Case Prioritization for Distributed System Using Search Algorithms

Team 6
Seyoung Song, Subeom Park, Yoonho Nam, Azret Kenzhaliev

Abstract

TODO

1. Introduction

- Regression Test Case Prioritization
- Parallel Test Prioritization
- Parallel Test Prioritization, but different CPU

2. Parallel Test Prioritization

- Problem Description
- Problem Definition
- Effectiveness Measure

3. Algorithms

3.1. Greedy Algorithms

TODO

3.2. Simulated Annealing

TODO

3.3. Genetic Algorithms

TODO

4. Empirical Study

4.1. Research Questions

- RQ1: Which algorithm is most effective in solving the parallel test prioritization problem?

- RQ2: How do the number of computing resources and the relative performance between them influence the performance of the parallel test prioritization techniques?

4.2. Experimental Design

1. Sequential Test Prioritization
   - $c = \{1\}$
2. Parallel Test Prioritization
   - $c = \{2, 4, 8, 16\}$
3. Asymmetric Test Prioritization
   - $1 : 2$
   - $1 : 3$
   - $1 : 4$
   - $1 : 1 : 1 : 1 : 4 : 4 : 4 : 4$

Table 1: An example of computing scenarios

Computing Scenario	Relative Performances
Sequential Test Prioritization	[1]
Parallel Test Prioritization ($c = 2$)	[1, 1]
Parallel Test Prioritization ($c = 4$)	[1, 1, 1, 1]
Parallel Test Prioritization ($c = 8$)	[1, 1, 1, 1, 1, 1, 1, 1]
Parallel Test Prioritization ($c = 16$)	[1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1]
Asymmetric Test Prioritization ($1 : 2$)	[1, 2]
Asymmetric Test Prioritization ($1 : 3$)	[1, 3]
Asymmetric Test Prioritization ($1 : 4$)	[1, 4]
Asymmetric Test Prioritization ($1 : 1 : 1 : 1 : 4 : 4 : 4 : 4$)	[1, 1, 1, 1, 4, 4, 4, 4]

4.3. Subjects

TODO: Seyoung

Table 2: Open-source subjects from GitHub

ID	Subjects	SLOC	#Test	Time (s)
1	commons-cli	9053	192	3.064
2	dictomaton	4318	53	14.067
3	disklrucache	1921	61	2.364
4	efflux	5633	40	0.581
5	exp4j	5699	311	11.350
6	gdx-artemis	3607	35	0.483
7	geojson-jackson	1569	60	1.284
8	gson-fire	3566	91	3.249
9	jactor	6984	60	11.628
10	jadventure	5276	74	2.311
11	jarchivelib	2256	33	0.217
12	java-faker	8541	571	34.154
13	java-uuid-generator	4321	46	0.937
14	javapoet	9874	346	15.323
15	jsonassert	3476	150	1.641
16	jumblr	2970	103	0.905
17	lastcalc	7271	34	13.672
18	low-gc-membuffers	13099	51	1.784
19	metrics	6493	76	43.964
20	mp3agic	10037	495	4.815
21	nv-websocket-client	8617	73	1.014
22	protoparser	5545	171	4.752
23	restfixture	8243	290	6.716
24	skype-java-api	9749	24	15.720
25	stateless4j	2728	88	2.146
26	stream-lib	8756	142	443.206
27	xembly	3030	63	6.834

4.4. Results and Analysis

TODO

5. Conclusion

- Discussion
  - Comparison With Sequential Test Prioritization
  - Practical Concerns
  - Generalizability
- Comments from Professor
  - How long should the entire test take for there to be real gains in prioritization?
  - The time gain from prioritization becomes smaller as the number of compute resources increases, so it may not be meaningful if you already have a lot of compute resources.

References

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