

Crossover in Parametric Fuzzing: Supplemental Figures and Tables

1 Heritability

Link	0.633	0.667	Link	0.643	0.689	Link	0.659	0.684	Link	0.584	0.616	Link	0.644	0.643	Link	0.624	0.639	Link	0.670	0.677
8.18 E-25	1PT	0.534	1.38 E-28	1PT	0.551	7.15 E-35	1PT	0.522	8.11 E-11	1PT	0.528	6.11 E-29	1PT	0.501	1.06 E-21	1PT	0.517	1.23 E-39	1PT	0.501
3.45 E-38	8.94 E-03	2PT	1.43 E-48	7.00 E-05	2PT	2.91 E-46	9.42 E-02	2PT	2.95 E-19	3.30 E-02	2PT	1.57 E-28	9.33 E-01	2PT	3.50 E-27	1.79 E-01	2PT	1.41 E-42	9.31 E-01	2PT
Ant			BCEL			Closure			Maven			Nashorn			Rhino			Tomcat		

(a) **Pairwise Inheritance Rates.** Mann-Whitney U test two-tailed p-values are placed in the entries below the main diagonal. Vargha-Delaney \hat{A}_{12} effect sizes are placed in the entries above the main diagonal.

Link	1.506	1.314	Link	4.918	7.850	Link	1.475	1.163	Link	1.188	1.213	Link	1.357	1.139	Link	1.051	1.147	Link	1.134	1.028
6.14 E-06	1PT	1.146	3.21 E-65	1PT	1.596	9.10 E-05	1PT	1.268	6.36 E-02	1PT	1.021	9.18 E-04	1PT	1.192	6.15 E-01	1PT	1.206	2.01 E-01	1PT	1.103
2.68 E-03	1.40 E-01	2PT	4.74 E-103	2.88 E-06	2PT	1.45 E-01	1.59 E-02	2PT	3.73 E-02	8.55 E-01	2PT	1.70 E-01	5.78 E-02	2PT	1.52 E-01	4.75 E-02	2PT	8.11 E-01	3.21 E-01	2PT
Ant			BCEL			Closure			Maven			Nashorn			Rhino			Tomcat		

(b) **Pairwise Hybrid Proportions.** Fisher's exact test two-tailed p-values are placed in the entries below the main diagonal. Odds ratios are placed in the entries above the main diagonal. Each reported odds ratio is the ratio of the higher odds to the lower odds for the compared pair.

Figure 1: Pairwise comparisons of heritability metrics of for one-point (1PT), two-point (2PT), and linked (Link) crossover. The main diagonal of each matrix consists of the crossover operators. Each matrix entry not on the main diagonal at some row r and column c compares the crossover operator in row r to the crossover operator in column c . Statistically significant p-values are colored blue. Larger effect sizes are colored darker shades of red.

2 Coverage

Table 1: **Pairwise Branch Coverage.** Pairwise comparisons of branch coverage per subject on long (three hour) and short (five minute) campaigns for BEDIV-SIMPLE (BD-SIMPLE), BEDIV-STRUCT (BD-STRUCT), RLCHECK, ZEST, ZEUGMA-X, ZEUGMA-1PT, ZEUGMA-2PT, and ZEUGMA-LINK. The main diagonal of each matrix consists of the fuzzers. Each matrix entry not on the main diagonal at some row r and column c compares the fuzzer in row r to the fuzzer in column c . Mann-Whitney U test two-tailed p-values are placed in the entries below the main diagonal. Vargha-Delaney \hat{A}_{12} effect sizes are placed in the entries above the main diagonal. Statistically significant p-values are colored blue. Larger effect sizes are colored darker shades of red.

Table 2: Ant After 5 Minutes.

BD-SIMPLE	0.718	0.627	0.909	0.927	0.914	0.965	0.949
1.93E-02 BD-STRUCT	0.900	0.858	0.863	0.869	0.907	0.896	
1.69E-01	1.43E-05	RLCHECK	1.000	1.000	1.000	1.000	1.000
1.02E-05	1.14E-04	5.60E-08	ZEST	0.559	0.550	0.756	0.698
3.96E-06	9.24E-05	5.68E-08	5.33E-01	ZEUGMA-1PT	0.530	0.748	0.656
8.04E-06	6.97E-05	5.68E-08	5.97E-01	7.56E-01	ZEUGMA-2PT	0.774	0.696
5.23E-07	1.10E-05	5.70E-08	5.75E-03	7.69E-03	3.18E-03	ZEUGMA-LINK	0.603
1.28E-06	1.91E-05	5.68E-08	3.36E-02	9.32E-02	3.47E-02	2.73E-01	ZEUGMA-X

Table 4: BCEL After 5 Minutes.

BD-SIMPLE	0.557	0.647	0.610	0.555	0.785	0.674
5.43E-01 BD-STRUCT	0.677	0.666	0.605	0.820	0.722	
1.14E-01	5.65E-02	ZEST	0.557	0.646	0.640	0.537
2.39E-01	7.42E-02	5.43E-01	ZEUGMA-1PT	0.626	0.732	0.500
5.61E-01	2.62E-01	1.17E-01	1.76E-01	ZEUGMA-2PT	0.904	0.583
2.14E-03	5.63E-04	1.33E-01	1.23E-02	1.33E-05	ZEUGMA-LINK	0.770
6.20E-02	1.67E-02	6.95E-01	1.00E+00	3.79E-01	3.63E-03	ZEUGMA-X

Table 6: Closure After 5 Minutes.

BD-SIMPLE	0.541	0.995	0.922	1.000	1.000	1.000	1.000
6.65E-01 BD-STRUCT	1.000	0.932	1.000	1.000	1.000	1.000	1.000
9.16E-08	6.79E-08	RLCHECK	1.000	1.000	1.000	1.000	1.000
5.17E-06	3.07E-06	6.79E-08	ZEST	0.965	0.948	0.985	0.968
6.79E-06	6.79E-06	6.78E-08	5.22E-07	ZEUGMA-1PT	0.552	0.804	0.560
6.78E-08	6.78E-08	6.77E-08	1.37E-06	5.79E-01	ZEUGMA-2PT	0.845	0.586
6.80E-08	6.80E-08	6.79E-08	1.66E-07	1.06E-03	1.99E-04	ZEUGMA-LINK	0.738
6.78E-08	6.78E-08	6.77E-08	4.53E-07	5.25E-01	3.58E-01	1.06E-02	ZEUGMA-X

Table 8: Maven After 5 Minutes.

BD-SIMPLE	0.724	0.938	1.000	1.000	1.000	1.000	1.000
1.60E-02 BD-STRUCT	0.502	1.000	1.000	1.000	1.000	1.000	1.000
1.71E-06	9.89E-01	RLCHECK	1.000	1.000	1.000	1.000	1.000
6.72E-08	6.77E-08	4.54E-08	ZEST	0.968	0.720	1.000	0.993
6.72E-08	6.77E-08	4.54E-08	4.53E-07	ZEUGMA-1PT	0.921	0.751	0.619
6.71E-08	6.76E-08	4.54E-08	1.79E-02	5.49E-06	ZEUGMA-2PT	0.968	0.948
6.72E-08	6.77E-08	4.54E-08	6.78E-08	6.82E-03	4.51E-07	ZEUGMA-LINK	0.694
6.68E-08	6.73E-08	4.52E-08	1.06E-07	2.03E-01	1.36E-06	3.72E-02	ZEUGMA-X

Table 10: Nashorn After 5 Minutes.

BD-SIMPLE	0.569	1.000	1.000	1.000	1.000	1.000	1.000
4.65E-01 BD-STRUCT	1.000	1.000	0.959	0.950	0.995	0.968	
8.01E-09	7.99E-09	RLCHECK	1.000	1.000	1.000	1.000	1.000
6.79E-08	6.78E-08	7.99E-09	ZEST	1.000	1.000	1.000	1.000
6.80E-08	7.40E-07	8.01E-09	6.79E-08	ZEUGMA-1PT	0.733	0.943	0.617
6.79E-08	1.20E-06	7.99E-09	6.78E-08	1.23E-02	ZEUGMA-2PT	0.973	0.805
6.80E-08	9.16E-08	8.01E-09	6.79E-08	1.80E-06	3.41E-07	ZEUGMA-LINK	0.907
6.79E-08	4.53E-07	7.99E-09	6.78E-08	2.08E-01	1.01E-03	1.10E-05	ZEUGMA-X

Table 12: Rhino After 5 Minutes.

BD-SIMPLE	0.738	1.000	0.935	0.995	0.950	1.000	0.990
1.06E-02 BD-STRUCT	1.000	0.975	1.000	0.986	1.000	1.000	1.000
4.89E-08	4.90E-08	RLCHECK	1.000	1.000	1.000	1.000	1.000
2.68E-06	2.94E-07	4.87E-08	ZEST	0.945	0.664	1.000	0.848
9.15E-08	6.79E-08	4.89E-08	1.57E-06	ZEUGMA-1PT	0.796	0.932	0.547
1.20E-06	1.53E-07	4.89E-08	7.86E-02	1.41E-03	ZEUGMA-2PT	0.980	0.716
6.77E-08	6.78E-08	4.89E-08	6.74E-08	3.05E-06	2.21E-07	ZEUGMA-LINK	0.945
1.23E-07	6.78E-08	4.89E-08	1.79E-04	6.17E-01	2.00E-02	1.57E-06	ZEUGMA-X

Table 14: Tomcat After 5 Minutes.

BD-SIMPLE	1.000	0.914	0.849	0.850	0.861	0.896	0.884
6.19E-08 BD-STRUCT	1.000	1.000	1.000	1.000	1.000	1.000	1.000
5.29E-06	3.81E-08	RLCHECK	0.666	0.627	0.650	0.589	0.552
1.67E-04	6.23E-08	6.73E-02	ZEST	0.517	0.557	0.559	0.561
1.57E-04	6.14E-08	1.62E-01	8.60E-01	ZEUGMA-1PT	0.530	0.569	0.580
9.66E-05	6.26E-08	1.02E-01	5.42E-01	7.55E-01	ZEUGMA-2PT	0.614	0.605
1.87E-05	6.14E-08	3.35E-01	5.33E-01	4.64E-01	2.23E-01	ZEUGMA-LINK	0.521
3.43E-05	6.26E-08	5.71E-01	5.16E-01	3.93E-01	2.61E-01	8.28E-01	ZEUGMA-X

Table 3: Ant After 3 Hours.

BD-SIMPLE	0.704	0.996	0.968	0.764	0.818	0.823	0.834
2.80E-02 BD-STRUCT	0.912	0.998	0.912	0.931	0.939	0.934	
6.11E-08	6.70E-06	RLCHECK	1.000	1.000	1.000	1.000	1.000
4.06E-07	7.04E-08	4.46E-08	ZEST	0.943	0.875	0.896	0.861
4.45E-03	8.28E-06	4.83E-08	1.65E-06	ZEUGMA-1PT	0.574	0.583	0.601
6.10E-04	3.17E-06	4.84E-08	4.95E-05	4.31E-01	ZEUGMA-2PT	0.525	0.536
4.97E-04	2.14E-06	4.85E-08	1.76E-05	3.78E-01	7.97E-01	ZEUGMA-LINK	0.565
3.17E-04	2.78E-06	4.85E-08	9.13E-05	2.78E-01	7.04E-01	4.89E-01	ZEUGMA-X

Table 5: BCEL After 3 Hours.

BD-SIMPLE	0.807	1.000	1.000	1.000	1.000	1.000
9.18E-04 BD-STRUCT	0.941	0.985	0.979	1.000	0.994	
6.74E-08	1.92E-06	ZEST	0.591	0.585	1.000	0.779
6.66E-08	1.63E-07	3.29E-01	ZEUGMA-1PT	0.537	0.999	0.764
6.73E-08	2.37E-07	3.64E-01	6.94E-01	ZEUGMA-2PT	1.000	0.776
6.62E-08	6.63E-08	6.62E-08	7.04E-08	6.61E-08	ZEUGMA-LINK	0.989
6.72E-08	9.79E-08	2.65E-03	4.47E-03	2.90E-03	1.29E-07	ZEUGMA-X

Table 7: Closure After 3 Hours.

BD-SIMPLE	0.575	1.000	1.000	0.887	0.789	1.000	0.953
4.25E-01 BD-STRUCT	1.000	0.995	0.871	0.816	1.000	0.938	
6.80E-08	6.80E-08	RLCHECK	1.000	1.000	1.000	1.000	1.000
6.79E-08	9.16E-08	6.79E-08	ZEST	0.946	0.988	0.892	0.874
2.92E-05	6.24E-05	6.80E-08	1.47E-06	ZEUGMA-1PT	0.718	1.000	0.701
1.86E-03	6.53E-04	6.79E-08	1.43E-07	1.93E-02	ZEUGMA-2PT	1.000	0.860
6.80E-08	6.80E-08	6.80E-08	2.30E-05	6.80E-08	6.79E-08	ZEUGMA-LINK	1.000
1.05E-06	2.36E-06	6.80E-08	5.56E-05	3.05E-02	1.04E-04	6.80E-08	ZEUGMA-X

Table 9: Maven After 3 Hours.

BD-SIMPLE	0.968	0.950	1.000	1.000	1.000	1.000	1.000
4.52E-07 BD-STRUCT	0.800	1.000	1.000	1.000	1.000	1.000	1.000
2.10E-07	5.49E-04	RLCHECK	1.000	1.000	1.000	1.000	1.000
6.76E-08	6.77E-08	7.98E-09	ZEST	1.000	0.988	1.000	1.000
3.78E-08	3.78E-08	3.73E-09	3.78E-08	ZEUGMA-1PT	0.906	0.604	0.627
6.65E-08	6.66E-08	7.82E-09	1.40E-07	6.57E-06	ZEUGMA-2PT	0.960	0.965
1.94E-08	1.94E-08	1.54E-09	1.94E-08	1.41E-01	1.81E-07	ZEUGMA-LINK	0.525
1.51E-08	1.51E-08	1.10E-09	1.51E-08	5.98E-02	1.05E-07	6.54E-01	ZEUGMA-X

Table 11: Nashorn After 3 Hours.

BD-SIMPLE	0.512	1.000	1.000	1.000	1.000	1.000	1.000
9.03E-01 BD-STRUCT	1.000	1.000	1.000	1.000	1.000	1.000	1.000
7.98E-09	8.01E-09	RLCHECK	1.000	1.000	1.000	1.000	1.000
6.77E-08	6.79E-08	7.99E-09	ZEST	1.000	1.000	1.000	1.000
6.77E-08	6.79E-08	7.99E-09	6.78E-08	ZEUGMA-1PT	0.715	0.953	0.705
6.78E-08	6.80E-08	8.01E-09	6.79E-08	2.07E-02	ZEUGMA-2PT	1.000	0.887
6.76E-08	6.78E-08	7.98E-09	6.77E-08	1.04E-06	6.78E-08	ZEUGMA-LINK	0.993
6.76E-08	6.78E-08	7.98E-09	6.77E-08	2.74E-02	2.92E-05	1.06E-07	ZEUGMA-X

Table 13: Rhino After 3 Hours.

BD-SIMPLE	0.575	1.000	1.000	1.000	1.000	1.000	1.000
4.24E-01 BD-STRUCT	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.50E-08	1.51E-08	RLCHECK	1.000	1.000	1.000	1.000	1.000
6.72E-08	6.76E-08	1.51E-08	ZEST	0.958	0.973	0.995	0.975
6.72E-08	6.76E-08	1.51E-08	7.93E-07	ZEUGMA-1PT	0.652	0.829	0.637
6.73E-08	6.77E-08	1.51E-08	3.41E-07	1.02E-01	ZEUGMA-2PT	0.890	0.546
6.72E-08	6.76E-08	1.51E-08	9.15E-08	3.94E-04	2.59E-05	ZEUGMA-LINK	0.895
6.73E-08	6.77E-08	1.51E-08	2.96E-07	1.40E-01	6.26E-01	2.04E-05	ZEUGMA-X

Table 15: Tomcat After 3 Hours.

BD-SIMPLE	1.000	0.824	0.501	0.752	0.512	0.782	0.805
6.48E-08 BD-STRUCT	1.000	1.000	1.000	1.000	1.000	1.000	1.000
3.21E-04	3.77E-08	RLCHECK	0.807	0.999	0.879	0.965	0.965
1.00E+00	6.62E-08	6.84E-04	ZEST	0.735	0.521	0.756	0.797
6.19E-03	6.50E-08	3.93E-08	1.09E-02	ZEUGMA-1PT	0.776	0.561	0.621
9.03E-01	6.58E-08	2.83E-05	8.28E-01	2.73E-03	ZEUGMA-2PT	0.806	0.838
2.12E-03	5.92E-08	2.78E-07	5.17E-03	5.09E-01	8.81E-04	ZEUGMA-LINK	0.585
9.19E-04	6.30E-08	2.95E-07	1.24E-03	1.89E-01	2.52E-04	3.54E-01	ZEUGMA-X

3 Defects

Table 16: **Pairwise Defect Detection Rates.** Pairwise comparisons of defect detection rates per defect on long (three hour) and short (five minute) campaigns for BDIV-SIMPLE (BD-SIMPLE), BDIV-STRUCT (BD-STRUCT), RLCHECK, ZEST, ZEUGMA-X, ZEUGMA-1PT, ZEUGMA-2PT, and ZEUGMA-LINK. The main diagonal of each matrix consists of the fuzzers. Each matrix entry not on the main diagonal at some row r and column c compares the fuzzer in row r to the fuzzer in column c . Fisher’s exact test two-tailed p-values are placed in the entries below the main diagonal. Odds ratios are placed in the entries above the main diagonal. Each reported odds ratio is the ratio of the higher odds to the lower odds for the compared pair. Statistically significant p-values are colored blue. Larger effect sizes are colored darker shades of red.

Table 17: B0 After 5 Minutes.

BD-SIMPLE	3.154	1.000	1.000	14.548	14.548	3.154
1.00E+00 BD-STRUCT	3.154	3.154	6.333	6.333	1.000	
1.00E+00 1.00E+00	ZEST	1.000	14.548	14.548	3.154	
1.00E+00 1.00E+00 1.00E+00	ZEUGMA-1PT		14.548	14.548	3.154	
4.71E-02 1.82E-01 4.71E-02	4.71E-02 ZEUGMA-2PT		1.000	6.333		
4.71E-02 1.82E-01 4.71E-02	4.71E-02 1.00E+00	ZEUGMA-LINK	6.333			
1.00E+00 1.00E+00 1.00E+00	1.00E+00 1.82E-01	ZEUGMA-X				

Table 19: B1 After 5 Minutes.

BD-SIMPLE	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 BD-STRUCT	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00	ZEST	1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00 1.00E+00	ZEUGMA-1PT		1.000	1.000	1.000	1.000
1.00E+00 1.00E+00 1.00E+00	1.00E+00 ZEUGMA-2PT		1.000	1.000	1.000	1.000
1.00E+00 1.00E+00 1.00E+00	1.00E+00 1.00E+00	ZEUGMA-LINK	1.000			
1.00E+00 1.00E+00 1.00E+00	1.00E+00 1.00E+00	1.00E+00 ZEUGMA-X				

Table 21: C0 After 5 Minutes.

BD-SIMPLE	1.000	1.000	1.000	1.000	1.000	1.000	3.154
1.00E+00 BD-STRUCT	1.000	1.000	1.000	1.000	1.000	1.000	3.154
1.00E+00 1.00E+00	RLCHECK	1.000	1.000	1.000	1.000	1.000	3.154
1.00E+00 1.00E+00 1.00E+00	ZEST	1.000	1.000	1.000	1.000	1.000	3.154
1.00E+00 1.00E+00 1.00E+00	1.00E+00 ZEUGMA-1PT		1.000	1.000	1.000	1.000	3.154
1.00E+00 1.00E+00 1.00E+00	1.00E+00 1.00E+00	ZEUGMA-2PT	1.000	1.000	1.000	1.000	3.154
1.00E+00 1.00E+00 1.00E+00	1.00E+00 1.00E+00	1.00E+00 ZEUGMA-LINK	3.154				
1.00E+00 1.00E+00 1.00E+00	1.00E+00 1.00E+00	1.00E+00 1.00E+00	1.00E+00 ZEUGMA-X				

Table 23: C1 After 5 Minutes.

BD-SIMPLE	8.200	1.417	1.588	5.667	22.667	8.500	8.500
2.31E-01 BD-STRUCT	11.182	5.541	41.000	150.333	60.294	60.294	
1.00E+00 1.06E-01	RLCHECK	2.250	4.000	16.000	6.000	6.000	
1.00E+00 4.87E-01	6.61E-01 ZEST		9.000	36.000	13.500	13.500	
4.07E-02 4.36E-04	9.58E-02 1.38E-02	ZEUGMA-1PT	4.000	1.500	1.500		
8.75E-05 1.54E-07	3.60E-04 1.66E-05	9.58E-02 ZEUGMA-2PT		2.667	2.667		
7.91E-03 4.51E-05	2.25E-02 2.20E-03	7.51E-01 3.01E-01	ZEUGMA-LINK	1.000			
7.91E-03 4.51E-05	2.25E-02 2.20E-03	7.51E-01 3.01E-01	1.00E+00 ZEUGMA-X				

Table 25: N0 After 5 Minutes.

BD-SIMPLE	1.000	1.000	1.000	1.000	1.000	3.154	1.000
1.00E+00 BD-STRUCT	1.000	1.000	1.000	1.000	1.000	3.154	1.000
1.00E+00 1.00E+00	RLCHECK	1.000	1.000	1.000	1.000	3.154	1.000
1.00E+00 1.00E+00 1.00E+00	ZEST	1.000	1.000	1.000	1.000	3.154	1.000
1.00E+00 1.00E+00 1.00E+00	1.00E+00 ZEUGMA-1PT		1.000	1.000	1.000	3.154	1.000
1.00E+00 1.00E+00 1.00E+00	1.00E+00 1.00E+00	ZEUGMA-2PT	3.154	1.000			
1.00E+00 1.00E+00 1.00E+00	1.00E+00 1.00E+00	1.00E+00 ZEUGMA-LINK	3.154				
1.00E+00 1.00E+00 1.00E+00	1.00E+00 1.00E+00	1.00E+00 1.00E+00	1.00E+00 ZEUGMA-X				

Table 27: N1 After 5 Minutes.

BD-SIMPLE	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 BD-STRUCT	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00	RLCHECK	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00 1.00E+00	ZEST	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00 1.00E+00	1.00E+00 ZEUGMA-1PT		1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00 1.00E+00	1.00E+00 1.00E+00	ZEUGMA-2PT	1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00 1.00E+00	1.00E+00 1.00E+00	1.00E+00 ZEUGMA-LINK	1.000				
1.00E+00 1.00E+00 1.00E+00	1.00E+00 1.00E+00	1.00E+00 1.00E+00	1.00E+00 ZEUGMA-X				

Table 29: N2 After 5 Minutes.

BD-SIMPLE	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 BD-STRUCT	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00	RLCHECK	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00 1.00E+00	ZEST	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00 1.00E+00	1.00E+00 ZEUGMA-1PT		1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00 1.00E+00	1.00E+00 1.00E+00	ZEUGMA-2PT	1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00 1.00E+00	1.00E+00 1.00E+00	1.00E+00 ZEUGMA-LINK	1.000				
1.00E+00 1.00E+00 1.00E+00	1.00E+00 1.00E+00	1.00E+00 1.00E+00	1.00E+00 ZEUGMA-X				

Table 18: B0 After 3 Hours.

BD-SIMPLE	1.256	22.778	22.778	22.778	22.778	22.778
1.00E+00 BD-STRUCT	18.379	18.379	18.379	18.379	18.379	18.379
8.32E-03 2.02E-02	ZEST	1.000	1.000	1.000	1.000	1.000
8.32E-03 2.02E-02 1.00E+00	ZEUGMA-1PT		1.000	1.000	1.000	1.000
8.32E-03 2.02E-02 1.00E+00	1.00E+00 ZEUGMA-2PT		1.000	1.000	1.000	1.000
8.32E-03 2.02E-02 1.00E+00	1.00E+00 1.00E+00	ZEUGMA-LINK	1.000			
8.32E-03 2.02E-02 1.00E+00	1.00E+00 1.00E+00	1.00E+00 ZEUGMA-X				

Table 20: B1 After 3 Hours.

BD-SIMPLE	1.000	1.000	5.541	5.541	1.000	1.000
1.00E+00 BD-STRUCT	1.000	5.541	5.541	5.541	1.000	1.000
1.00E+00 1.00E+00	ZEST	5.541	5.541	5.541	1.000	1.000
4.87E-01 4.87E-01	4.87E-01 ZEUGMA-1PT		1.000	5.541	5.541	
4.87E-01 4.87E-01	4.87E-01 1.00E+00	ZEUGMA-2PT		5.541	5.541	
1.00E+00 1.00E+00	1.00E+00 4.87E-01	4.87E-01 ZEUGMA-LINK		1.000		
1.00E+00 1.00E+00	1.00E+00 4.87E-01	4.87E-01 1.00E+00	ZEUGMA-X			

Table 22: C0 After 3 Hours.

BD-SIMPLE	3.353	2.111	12.667	12.667	12.667	35.286	6.333
6.05E-01 BD-STRUCT	1.588	3.778	3.778	3.778	3.778	10.524	1.839
1.00E+00 1.00E+00	RLCHECK	6.000	6.000	6.000	6.000	16.714	3.000
1.00E+00 1.00E+00	1.00E+00 6.48E-02	ZEST	1.000	1.000	1.000	2.786	2.000
1.97E-02 1.55E-01	6.48E-02 1.00E+00	ZEUGMA-1PT		1.000	1.000	2.786	2.000
1.97E-02 1.55E-01	6.48E-02 1.00E+00	1.00E+00 ZEUGMA-2PT		1.000	1.000	2.786	2.000
1.37E-04 3.06E-03	7.72E-04 2.05E-01	2.05E-01 2.05E-01	ZEUGMA-LINK			5.571	
1.82E-01 6.95E-01	4.07E-01 5.01E-01	5.01E-01 5.01E-01	5.01E-01 2.48E-02	ZEUGMA-X			

Table 24: C1 After 3 Hours.

BD-SIMPLE	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 BD-STRUCT	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00	RLCHECK	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00	1.00E+00 ZEST		1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00	1.00E+00 1.00E+00	ZEUGMA-1PT	1.000	1.000	1.000	1.000	1.000
1.00E+00 1.00E+00	1.00E+00 1.00E+00	1.00E+00 ZEUGMA-2PT		1.000	1.000	1.000	1.000
1.00E+00 1.00E+00	1.00E+00 1.00E+00	1.00E+00 ZEUGMA-LINK				1.000	
1.00E+00 1.00E+00	1.00E+00 1.00E+00	1.00E+00 1.00E+00	1.00E+00 ZEUGMA-X				

Table 26: N0 After 3 Hours.

BD-SIMPLE	1.000	1.000	1.000	18.379	33.870	1681.000	115.545
1.00E+00 BD-STRUCT	1.000	1.000	18.379	33.870	1681.000	115.545	
1.00E+00 1.00E+00	RLCHECK	1.000	18.379	33.870	1681.000	115.545	
1.00E+00 1.00E+00	1.00E+00 ZEST		18.379	33.870	1681.000	115.545	
2.02E-02 2.02E-02	2.02E-02 2.02E-02	ZEUGMA-1PT		1.909	91.462	7.000	
1.23E-03 1.23E-03	1.23E-03 1.23E-03	5.14E-01 ZEUGMA-2PT			49.632	3.667	
1.45E-11 1.45E-11	1.45E-11 1.45E-11	3.34E-06 1.45E-04	ZEUGMA-LINK			14.548	
7.71E-07 7.71E-07	7.71E-07 7.71E-07	1.04E-02 1.05E-01	4.71E-02 ZEUGMA-X				

Table 28: N1 After 3 Hours.

BD-SIMPLE	1.000	1.000	1.000	1.000	3.154	1.000	1.000
1.00E+00 BD-STRUCT	1.000	1.000	1.000	1.000	3.154	1.000	1.000
1.00E+00 1.00E+00	RLCHECK	1.000	1.000	1.000	3.154	1.000	1.000
1.00E+00 1.00E+00	1.00E+00 ZEST		1.000	1.000	3.154	1.000	1.000
1.00E+00 1.00E+00	1.00E+00 ZEUGMA-1PT		1.000	1.000	3.154	1.000	1.000
1.00E+00 1.00E+00	1.00E+00 1.00E+00	ZEUGMA-2PT		3.154	3.154	3.154	
1.00E+00 1.00E+00	1.00E+00 1.00E+00	1.00E+00 ZEUGMA-LINK					
1.00E+00 1.00E+00	1.00E+00 1.00E+00	1.00E+00 1.00E+00	1.00E+00 ZEUGMA-X				

Table 30: N2 After 3 Hours.

BD-SIMPLE	1.000	1.000	1.000	1.000	3.154	41.000	3.154
1.00E+00 BD-STRUCT	1.000	1.000	1.000	1.000	3.154	41.000	3.154
1.00E+00 1.00E+00	RLCHECK	1.000	1.000	1.000	3.154	41.000	3.154
1.00E+00 1.00E+00	1.00E+00 ZEST		1.000	1.000	3.154	41.000	3.154
1.00E+00 1.00E+00	1.00E+00 ZEUGMA-1PT		1.000	1.000	3.154	41.000	3.154
1.00E+00 1.00E+00	1.00E+00 1.00E+00	ZEUGMA-2PT		19.000		1.000	
4.36E-04 4.36E-04	4.36E-04 4.36E-04	4.36E-04 4.36E-04	3.34E-03 ZEUGMA-LINK			19.000	
1.00E+00 1.00E+00	1.00E+00 1.00E+00	1.00E+00 1.00E+00	3.34E-03 ZEUGMA-X				

Table 31: Pairwise Defect Detection Rates Continued.

Table 32: R0 After 5 Minutes.

BD-SIMPLE	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00	BD-STRUCT	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	RLCHECK	1.000	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	ZEST	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-1PT	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-2PT	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-LINK	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-X

Table 34: R1 After 5 Minutes.

BD-SIMPLE	4.750	3.154	1.000	2.111	2.111	2.111	3.353
3.42E-01	BD-STRUCT	11.182	4.750	2.250	2.250	2.250	1.417
1.00E+00	1.00E+00	RLCHECK	3.154	5.541	5.541	5.541	8.200
1.00E+00	3.42E-01	1.00E+00	ZEST	2.111	2.111	2.111	3.353
1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-1PT	1.000	1.000	1.588
1.00E+00	6.61E-01	4.87E-01	1.00E+00	1.00E+00	ZEUGMA-2PT	1.000	1.588
1.00E+00	6.61E-01	4.87E-01	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-LINK	1.588
6.05E-01	1.00E+00	2.31E-01	6.05E-01	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-X

Table 36: R2 After 5 Minutes.

BD-SIMPLE	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00	BD-STRUCT	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	RLCHECK	1.000	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	ZEST	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-1PT	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-2PT	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-LINK	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-X

Table 38: R3 After 5 Minutes.

BD-SIMPLE	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00	BD-STRUCT	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	RLCHECK	1.000	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	ZEST	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-1PT	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-2PT	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-LINK	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-X

Table 40: R4 After 5 Minutes.

BD-SIMPLE	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00	BD-STRUCT	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	RLCHECK	1.000	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	ZEST	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-1PT	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-2PT	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-LINK	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-X

Table 33: R0 After 3 Hours.

BD-SIMPLE	1.000	1.000	5.541	91.462	60.294	150.333	115.545
1.00E+00	BD-STRUCT	1.000	5.541	91.462	60.294	150.333	115.545
1.00E+00	1.00E+00	RLCHECK	5.541	91.462	60.294	150.333	115.545
4.87E-01	4.87E-01	4.87E-01	ZEST	21.000	13.500	36.000	27.000
3.34E-06	3.34E-06	3.34E-06	2.44E-04	ZEUGMA-1PT	1.556	1.714	1.286
4.51E-05	4.51E-05	4.51E-05	2.20E-03	7.41E-01	ZEUGMA-2PT	2.667	2.000
1.54E-07	1.54E-07	1.54E-07	1.66E-05	7.16E-01	3.01E-01	ZEUGMA-LINK	1.333
7.71E-07	7.71E-07	7.71E-07	6.86E-05	1.00E+00	5.01E-01	1.00E+00	ZEUGMA-X

Table 35: R1 After 3 Hours.

BD-SIMPLE	2.270	33.870	23.222	3.667	11.000	2.852	4.889
3.41E-01	BD-STRUCT	73.800	10.231	1.615	4.846	1.256	2.154
1.23E-03	1.29E-05	RLCHECK	533.000	115.545	303.400	91.462	150.333
1.25E-03	4.36E-02	3.05E-10	ZEST	6.333	2.111	8.143	4.750
1.05E-01	7.31E-01	7.71E-07	1.82E-01	ZEUGMA-1PT	3.000	1.286	1.333
5.74E-03	1.27E-01	3.35E-09	1.00E+00	4.07E-01	ZEUGMA-2PT	3.857	2.250
2.00E-01	1.00E+00	3.34E-06	9.15E-02	1.00E+00	2.35E-01	ZEUGMA-LINK	1.714
4.84E-02	4.80E-01	1.54E-07	3.42E-01	1.00E+00	6.61E-01	7.16E-01	ZEUGMA-X

Table 37: R2 After 3 Hours.

BD-SIMPLE	1.000	1.000	11.182	205.000	91.462	205.000	533.000
1.00E+00	BD-STRUCT	1.000	11.182	205.000	91.462	205.000	533.000
1.00E+00	1.00E+00	RLCHECK	11.182	205.000	91.462	205.000	533.000
1.06E-01	1.06E-01	1.06E-01	ZEST	22.667	9.333	22.667	76.000
2.57E-08	2.57E-08	2.57E-08	8.75E-05	ZEUGMA-1PT	2.429	1.000	3.353
3.34E-06	3.34E-06	3.34E-06	3.64E-03	4.51E-01	ZEUGMA-2PT	2.429	8.143
2.57E-08	2.57E-08	2.57E-08	8.75E-05	1.00E+00	4.51E-01	ZEUGMA-LINK	3.353
3.05E-10	3.05E-10	3.05E-10	2.21E-06	6.05E-01	9.15E-02	6.05E-01	ZEUGMA-X

Table 39: R3 After 3 Hours.

BD-SIMPLE	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00	BD-STRUCT	1.000	1.000	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	RLCHECK	1.000	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	ZEST	1.000	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-1PT	1.000	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-2PT	1.000	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-LINK	1.000
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-X

Table 41: R4 After 3 Hours.

BD-SIMPLE	1.000	1.000	3.154	205.000	205.000	533.000	303.400
1.00E+00	BD-STRUCT	1.000	3.154	205.000	205.000	533.000	303.400
1.00E+00	1.00E+00	RLCHECK	3.154	205.000	205.000	533.000	303.400
1.00E+00	1.00E+00	1.00E+00	ZEST	107.667	107.667	361.000	171.000
2.57E-08	2.57E-08	2.57E-08	4.06E-07	ZEUGMA-1PT	1.000	3.353	1.588
2.57E-08	2.57E-08	2.57E-08	4.06E-07	1.00E+00	ZEUGMA-2PT	3.353	1.588
3.05E-10	3.05E-10	3.05E-10	5.82E-09	6.05E-01	6.05E-01	ZEUGMA-LINK	2.111
3.35E-09	3.35E-09	3.35E-09	5.82E-08	1.00E+00	1.00E+00	1.00E+00	ZEUGMA-X