

## Proteus: A Change Impact Analysis Framework

To evaluate Proteus, we used the five C programs shown in the Table below. For each example, we created several versions, except for TCAS, which already had versions in its repository. We created test drivers to mark program variables of interest as symbolic and to invoke symbolic execution.

### Artifacts Used in the Evaluation

Artifact	SLOC	Func	Source	Description
TCAS	173	9	SIR repository <a href="#">[1]</a>	Aircraft collision avoidance system from Siemens Programs.
replace	564	21	SIR repository <a href="#">[1]</a>	Pattern matching and substitution program from Siemens Programs.
WBS	214	1	Rockwell Collins <a href="#">[2]</a>	Wheel Break System from automotive domain translated from Lustre.
kernel	133	6	Brigham Young Univ. <a href="#">[3]</a>	Thread library supporting POSIX signaling used to teach undergrad OS course.
cornell	302	12	Cornell University <a href="#">[4]</a>	Autonomous stability system for a co-axial helicopter.

[\[1\] http://sir.unl.edu](http://sir.unl.edu)

[\[2\] SAE-ARP4761. Guidelines and Methods for Conducting the Safety Assessment Process on Civil Airborne Systems and Equipment. SAE International, December 1996](#)

[\[3\] https://facwiki.cs.byu.edu/cs345/index.php/Main\\_Page](https://facwiki.cs.byu.edu/cs345/index.php/Main_Page)

[\[4\] https://instruct1.cit.cornell.edu/courses/ee476/FinalProjects/s2006/rq242/webpage/ece\\_476.htm](https://instruct1.cit.cornell.edu/courses/ee476/FinalProjects/s2006/rq242/webpage/ece_476.htm)

### Proteus Evaluation

The results of the evaluation, shown in the Table below, report for each pair of program versions, the number of paths explored by KLEE (full) and by Proteus (prot). We also list the number of constraints in the summaries generated by KLEE and by Proteus, and the analysis time in seconds for KLEE and for Proteus. The Proteus time includes the time for both the static analysis and symbolic execution. The cells marked with '-' indicate that the analysis did not finish within the time bound of one hour.

### Proteus Results

example	version	paths		constraints		time	
		full	prot	full	prot	full	prot
tcas1	v0v1	126	12	2844	307	1.697	0.797
	v1v2	126	26	2844	666	1.733	1.13
	v2v3	129	129	2912	2912	1.668	2.277
replace1	v0v1	18	8	98	68	0.305	0.254
	v1v2	18	10	98	98	0.308	0.319
	v2v3	18	2	98	8	0.309	1.180

wbs1	v0v1	336	190	13416	11478	1.183	1.63
	v1v2	336	336	13416	13416	1.251	1.42
	v2v3	336	190	13416	11478	1.189	1.341
wbs2	v0v1	336	134	13388	5601	1.183	0.832
cornell1	v0v1	10	8	62	48	0.096	0.108
cornell2	v0v1	18	10	1864	810	0.271	0.292
kernel1	v0v1	-	4	-	282	-	21.09
	v1v2	-	4	-	282	-	21.317
kernel2	v0v1	4	2	130	114	1.56	1.92
kernel3	v0v1	4	2	118	58	0.665	0.78