

TESTABILITY PATTERNS FOR JS

The JS testability patterns are listed and detailed for the community in our repository. 34 of these patterns resemble their PHP siblings, targeting basic language constructs and operators (OOP, functions and variables). All the others focus on JS peculiarities such as specific data structure handlers (e.g., Proxy, WeakSet) or web operations (e.g., Ajax requests). We classified each pattern instance according to the same dimensions for PHP: over 153 patterns instances, 40 are about *OOP*, 20 capture *negative test cases*, 22 are *security* related, and 22 refer to *internal API* (recall that these dimensions overlap between each other). For what concerns the *Static vs Dynamic features* dimension, 101 instances are static (*S*) and the rest are dynamic (17 belong to *D1*, 17 to *D2*, 10 to *D3* and 8 to *D4*). Table I presents a selection of the patterns, with an emphasis on those mentioned in the paper.

TABLE I: JS Patterns

ID	Pattern	#i	API	SEC	Dyn	OOP	Neg	Tools
1	unset_element_array	1			S		✓	L--XY
	unset_element_array	1			S			L--XY
2	uri	1			S			L-ZXY
	uri	1		✓	S		✓	--Z-Y
3	evaluated_call_time	1			S		✓	L--XY
	evaluated_call_time	1			S			L--XY
4	function_apply	1			S			---XY
5	variadic	1			S			---X-
6	callback_function	2			D1-D3			---Y
7	array_unshift	1			S			L--X-
8	send_unpack	1			S			---XY
9	late_static_binding	1			D2			L-ZXY
10	spread_properties	1			S			---XY
11	closure_scope_chain	1			S			L-ZX-
12	NaN	1			S			L-ZX-
13	function_declared_immediately_executed	1			S			-----
14	template_literals	1		✓	S			L-ZXY
15	reflect_delete	2			S-D4		✓	---XY
	reflect_delete	1			D4			---XY
16	nullish_coalescing_operator	1			S			L-Z--
17	call	2			S			L--XY
18	arguments	1			S			L--X-
19	nested_function	1			S			L-ZXY
20	too_function_calls	2			S			L-Z-Y
21	new_target	1			S			L-ZX-
22	reduce	1			S			---XY
23	forEach_in_nested	1			S			L-Z--
24	finite	1			S			L-ZXY
25	weak_map	1	✓		D2			L--XY
	weak_map	1	✓		D2		✓	L--XY
26	computed_properties	1			S			---XY
27	cast_string_array	1			S			L-ZXY
28	closures	2			D2			L-ZXY
	closures	1			D2			L----
29	recursion	2			D1			L-ZXY
30	generator_delegation	1			D2			---X-
	generator_delegation	1			D4			----Y
31	generatorfunction_constructor	1			D3			----Y
32	array_shift	1			S			L--XY
	array_shift	1			S		✓	L--XY
33	array_lenght	1			S		✓	L--XY
	array_lenght	1			S			L--XY
34	bind	1			D1			----Y
35	async_methods	1			D1			L----
36	returned_function	1			S			L-ZX-
37	generators	1			D3			---X-
	generators	1			D3			---Y
	generators	1			D3			---XY
	generators	1			D3		✓	---XY
38	while_break	1			S			L-ZXY
39	function_get_arguments	1			D1			L-ZXY
	function_get_arguments	1			D2			---X-
	function_get_arguments	1			D4			-----
40	function_name_conflict	1			S			L-ZXY

41	symbol	1	✓		S			---XY
42	anonymous_object	1			D1			L----
43	window_global	1			S			L-Z--
44	array_map	1			D2			L--XY
45	escape_unescape(deprecated)	1	✓	✓	S		✓	--ZXY
	escape_unescape(deprecated)	1	✓		S			--ZXY
46	continue	1			S			L-ZXY
47	check_type	1	✓		S			L-ZXY
48	compare_variables	1			S			---XY
49	arrow_function	1			D2			L-Z-Y
50	conditional_assign	1			S			L-ZXY
51	global_variable	1			S			L-Z-Y
52	super_property	1			D1	✓		-----
53	simple_set	1			S	✓		---XY
54	define_property	1			D1	✓		L-Z-Y
	define_property	1			D1	✓	✓	L-Z-Y
55	inheritance	1			S	✓		---Y
56	weak_ref	1	✓		D2	✓		---Y
57	object_seal	1			S	✓		---XY
58	object_freeze	1			S	✓		---XY
59	simple_object	1		✓	S	✓		L---Y
60	object_create	1			D1	✓		---XY
61	delete_properties	1			S	✓	✓	L---Y
	delete_properties	1			S1	✓		---Y
62	static_variable	1			S	✓		---Y
63	to_string	1	✓		S	✓		L-X-
64	assign_object	1			S	✓		--Z--
65	proto	1			D4	✓		---X-
66	static_methods_and_prop	1			S	✓		L---Y
67	symbol_to_string_tag	1	✓		D1	✓		---X-
68	promise	1			S	✓		L--XY
	promise	2			S	✓		L-ZXY
69	set_and_get	1			S	✓		L-ZXY
	set_and_get	1			S	✓		L--XY
70	reflect_get	1		✓	S	✓		---XY
	reflect_get	1		✓	S	✓		---Y
71	named_class	1			D1	✓		L----
	named_class	1			D1	✓		L-X-
	named_class	1			D1	✓	✓	L-X-
72	errors	7		✓	S	✓		L-X-
73	weak_set	1	✓		S	✓		---XY
74	object_argument	1			S	✓		--ZX-
75	functions_in_object	1			D1	✓		---Y
76	reference_argument	1			S	✓		--Z--
77	object_clone	1			S	✓		-----
78	asynchronous_event_handler	1	✓		D2			L-Z-Y
	asynchronous_event_handler	1	✓		D4			L-Z--
79	inline_function	1			D1			L-Z-Y
80	json	1	✓		S			L-ZXY
81	text_encoder	1	✓		S			---XY
82	location_assign_with_search	1	✓	✓	S			L-Z-Y
83	getAttribute	1	✓	✓	S			---Y
84	try_catch	1			S			L-Z-Y
	try_catch	1		✓	D2			L-Z-Y
	try_catch	1		✓	D2		✓	L-Z-Y
85	block_scope	1			S			L-ZX-
86	type_juggling	1			D3			-----
	type_juggling	2			D3			L--XY
	type_juggling	1			D3		✓	L--XY
87	modules	1			D2			---Y

88	with(deprecated)	1			S			L---XY
89	proxy	1	✓		S			L---XY
	proxy	1	✓		S		✓	L---XY
90	simple_array	1			S			L-ZXY
	simple_array	1			S		✓	L-ZXY
91	destructuring	1			S			L-ZXY
92	set_to_array	1			S		✓	----Y
	set_to_array	1			S			----Y
93	for_of	1			S			L---XY
94	matrix	1			S			--ZXY
	matrix	1			S			---XY
	matrix	1			S		✓	---XY
95	arithmetic_operation_array_index	1			S			L---Y
	arithmetic_operation_array_index	1			S		✓	L---Y
96	object_literals	1			S			L---XY
	object_literals	1			S			L-ZXY
	object_literals	1			S			L-Z-Y
97	vulnerable_key_dictionary	2			S-D4			-----
98	throw_exception	1		✓	D2			L-----
	throw_exception	1		✓	D4			-----
99	GET_ajax	1	✓	✓	D2			L-ZXY
100	replace_substring	1	✓		S			L-ZXY
101	innerHTML_outerHTML	2	✓	✓	S			L---Y
	Total	153	22	22		40	20	

Legenda for column Tools: LGTM (L), NodeJsScan (N), Comm_3 (Z), Comm_1 (X), Comm_2(Y)