
Rule 0.19 $\langle \text{Limit Number of Functions} \rangle$

<pre> [...] contract A { [...] function $f_1(pds_1)$ { $stmts_1$ } function $f_2(pds_2)$ { $stmts_2$ } ... function $f_n(pds_n)$ { $stmts_n$ } [...] }</pre>	=	<pre> [...] contract A' { [...] function $g(op, pds)$ { if ($op == op_1$) { $stmts_1$ } else if ($op == op_2$) { $stmts_2$ } ... else if ($op == op_n$) { $stmts_n$ } } [...] }</pre>
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where

- f_1, f_2, \dots, f_n are related functions in contract A with similar purposes;
- g is the consolidated function in contract A' that combines the functionality;
- op is an operation selector parameter (e.g., enum or integer) that determines which logic to execute;
- op_i represents the selector value corresponding to function f_i ;
- pds_i are the parameter declarations of function f_i ;
- pds are the unified parameter declarations in function g ;
- $stmts_i$ represents the statement sequence of function f_i .

provided

- Functions f_1, \dots, f_n are semantically related and operate on similar data;
- The consolidated function g maintains all functionality of the original functions;
- The operation selector op unambiguously identifies which logic path to execute;
- The consolidation reduces deployment costs without sacrificing security or readability;
- Access control and validation logic remain equivalent in the consolidated version;
- The number of external function selectors is reduced, lowering contract size.

Invariant:

- Let s_i and s'_i be the initial state of A and A' , respectively.
- Let s_f and s'_f be the state reached by A and A' , respectively, after $A.f_k()$ and $A'.g(op_k, \dots)$ are executed from s_i and s'_i , respectively.
- Then, the coupling invariant is

$$\forall s_i, s'_i, k \in \{1, \dots, n\} . (s_i = s'_i) \rightarrow (s_f = s'_f)$$
