
Rule 0.12 *⟨Use Appropriate Function Visibility⟩*

<pre> [...] contract A { [...] function f(pds) vis₁ { stmts } [...] }</pre>	=	<pre> [...] contract A' { [...] function f(pds) vis₂ { stmts } [...] }</pre>
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where

- f is a function with visibility modifier vis_1 in contract A ;
- vis_1 is the original visibility modifier (e.g., **public**);
- vis_2 is the optimized visibility modifier (e.g., **external** or **internal**);
- pds are the parameter declarations of function f ;
- $stmts$ represents the function body statements.

provided

- If $vis_1 = \mathbf{public}$ and f is only called externally, then $vis_2 = \mathbf{external}$;
- If $vis_1 = \mathbf{public}$ and f is only called internally, then $vis_2 = \mathbf{internal}$;
- The visibility change does not break the contract's interface or functionality;
- All callers of f remain valid under the new visibility vis_2 ;
- The function f with visibility vis_2 provides the most restrictive appropriate access level.

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 $A.f()$ and $A'.f()$ are executed from s_i and s'_i , respectively.
- Then, the coupling invariant is

$$\forall s_i, s'_i . (s_i = s'_i) \rightarrow (s_f = s'_f)$$
