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**Rule 0.1** *⟨Replace Require with Custom Error⟩*

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<pre>[...] <b>contract</b> A {   [...]   <b>function</b> f(pds) {     [...]     <b>require</b>(cond, msg);     stmts   }   [...] }</pre>	=	<pre>[...] <b>contract</b> A' {   [...]   <b>error</b> CustomError();   [...]   <b>function</b> f(pds) {     [...]     <b>if</b> (¬cond)       <b>revert</b> CustomError();     stmts   }   [...] }</pre>
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**where**

*cond* is a boolean condition being validated;  
*msg* is the revert reason string used in the **require** statement;  
*CustomError* is a custom error type defined in contract *A'*;  
*stmts* represents the sequence of statements following the validation.

**provided**

The custom error *CustomError* is declared at the contract level in *A'*;  
The condition *cond* is side-effect free (does not modify state);  
The revert behavior is semantically equivalent in both versions.

**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

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

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