
Rule 0.1 *⟨Replace Require with Custom Error⟩*

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

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