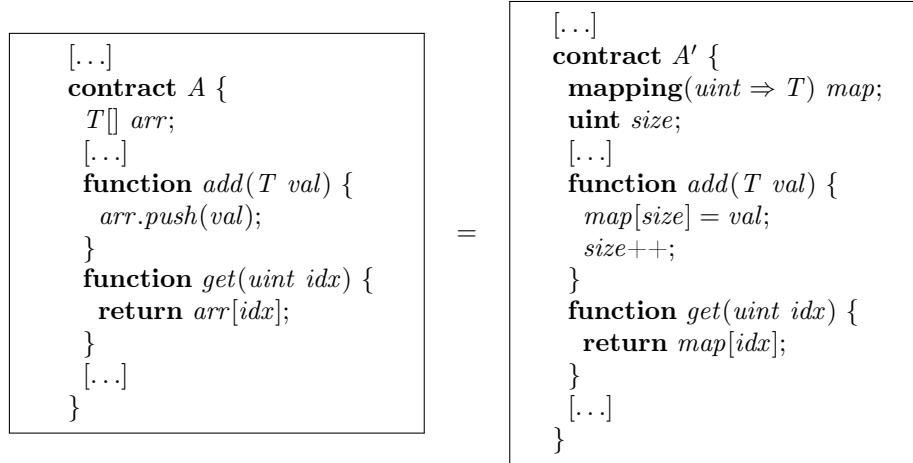

Rule 0.28 *(Use Mappings Instead of Arrays for Data Lists)*

**where**

arr is a dynamic array of type *T[]* in contract *A*;

map is a mapping from **uint** to *T* in contract *A'*;

size is a counter tracking the number of elements in the mapping;

T is the element type of the array and mapping values;

val is a value of type *T* being added;

idx is an index used to access elements.

provided

The contract does not require iterating over all elements frequently;

Element access is primarily done by index/key rather than sequential iteration;

The mapping provides sufficient functionality for the use case;

A separate *size* counter is maintained to track the number of elements;

Array operations like **push** are replaced with direct mapping assignments and size increments;

Bounds checking uses *size* instead of *arr.length*.

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

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