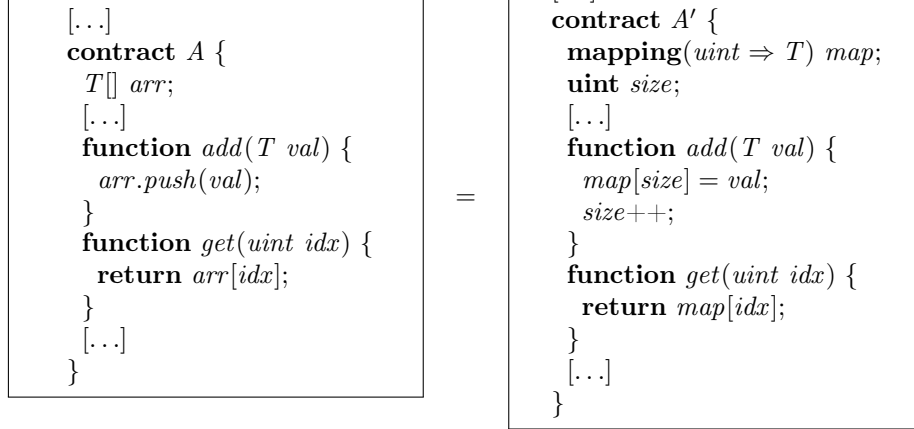


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**Rule 0.28** *⟨Use Mappings Instead of Arrays for Data Lists⟩*


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**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

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


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