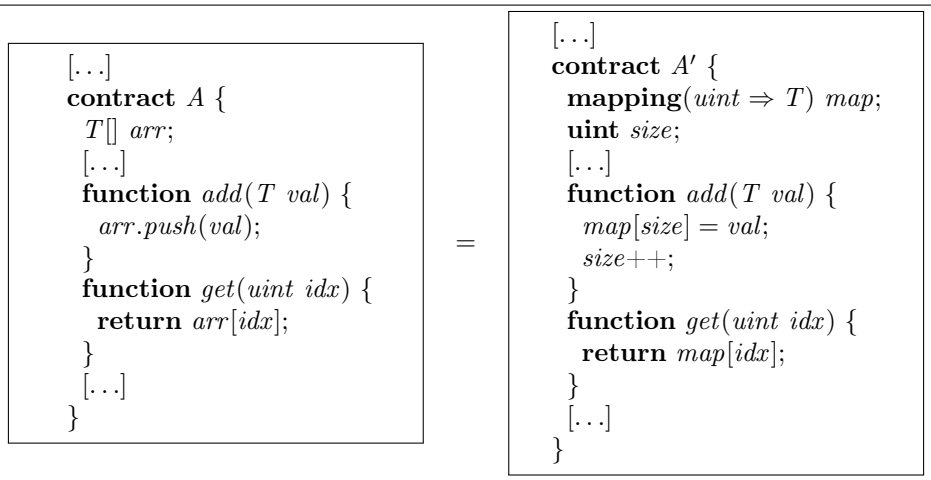
Rule 0.28 ⟨*Use Mappings Instead of Arrays for Data Lists*⟩



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

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