Reference Capabilities for Safe Parallel Array Programming

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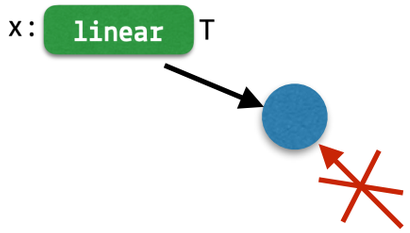
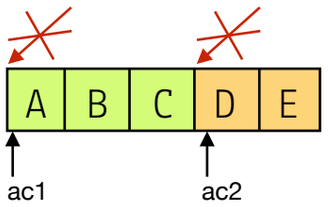
1. Reference Capability
(from previous work)



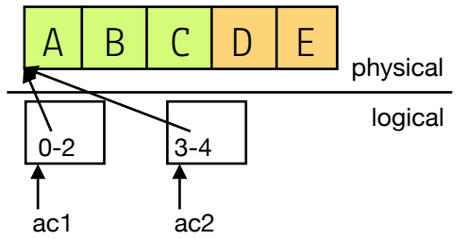
Two reference capabilities granting unsynchronised access to the same resource may never coexist. How this is achieved is controlled by the reference capabilitiy *mode.*

2. Array Capability



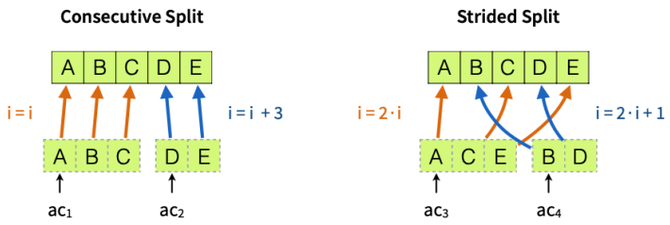
Two array capabilities granting unsynchronised access to the same *part* of a resource may never coexist. This is controlled by the array capability *mode* and *logical representation.*

3. Logical vs Physical



An array capability consists of an underlying array and an index translation function that keeps track of what part of the array "belongs" to this particular array capability.

4. Index Translation



In Article

In the article you will also find More examples, code examples, formalism and proofs for progress, preservation and array disjointness

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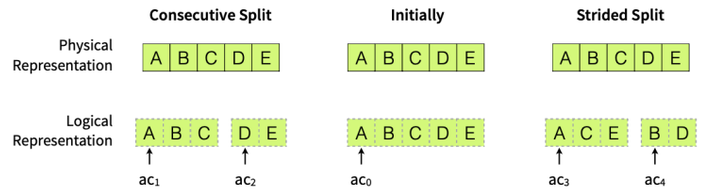
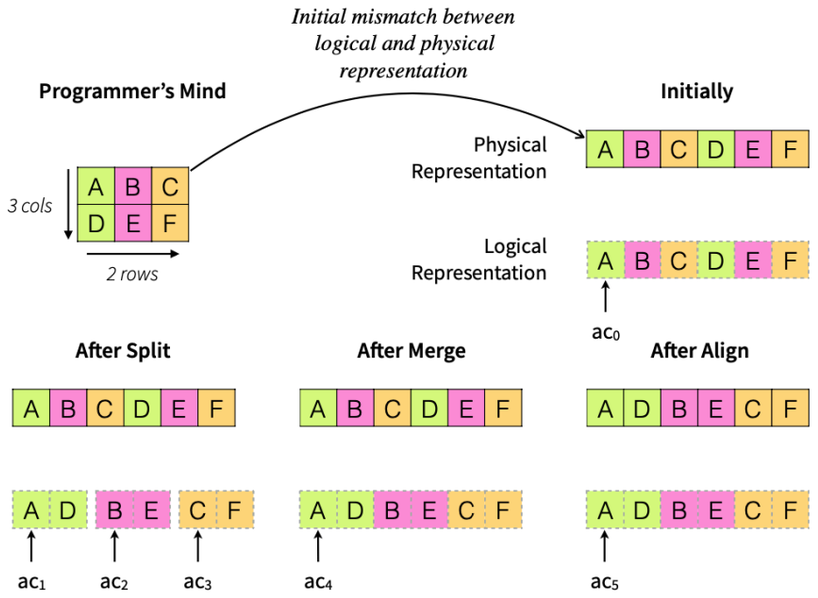
5. Splitting



Operations on array capabilities, like splitting and merging, are purely logical logical and do not affect the underlying storage array

6. Split, Merge, Align



This example shows how the array capability operations can be used individual steps of matrix rotation from column major mode to row major mode using splitting, merging and aligning.