

Probabilistic Memory Consistency Specifications

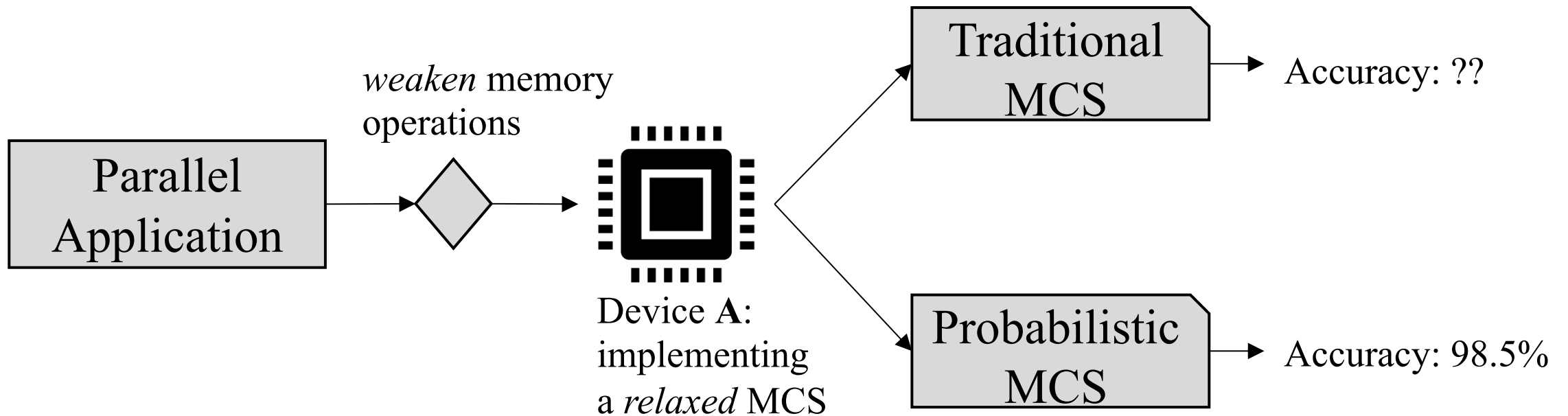
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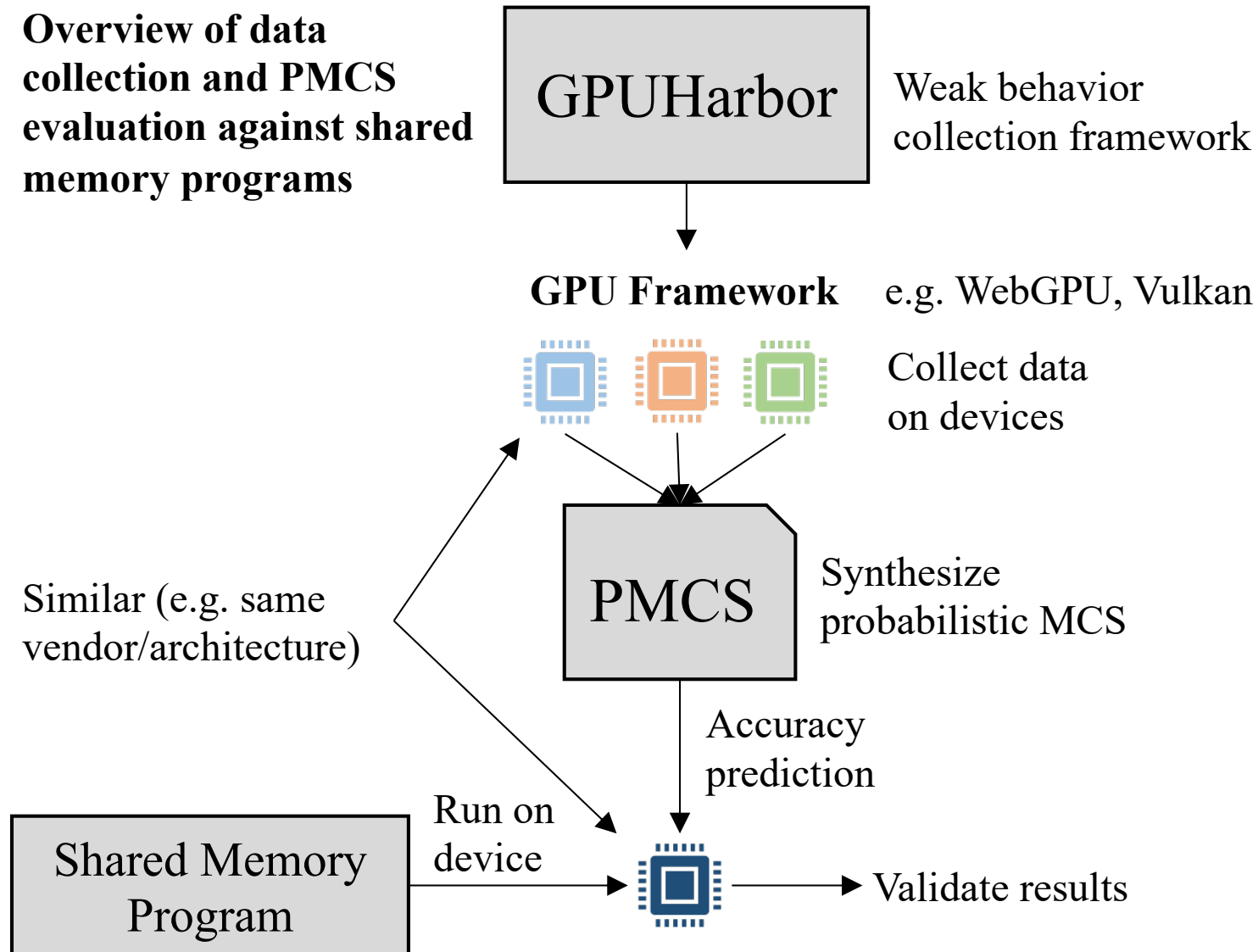
Motivation

Can we apply *approximate computing* techniques to *relaxed memory consistency specifications*?



Methodology

Overview of data collection and PMCS evaluation against shared memory programs



Initial Results

<https://gpuharbor.ucsc.edu/webgpu-mem-testing/>

Initial State: `*x = 0, *y = 0` Final State: `r0 == 1 && r1 == 0`

Workgroup 0 Thread 0

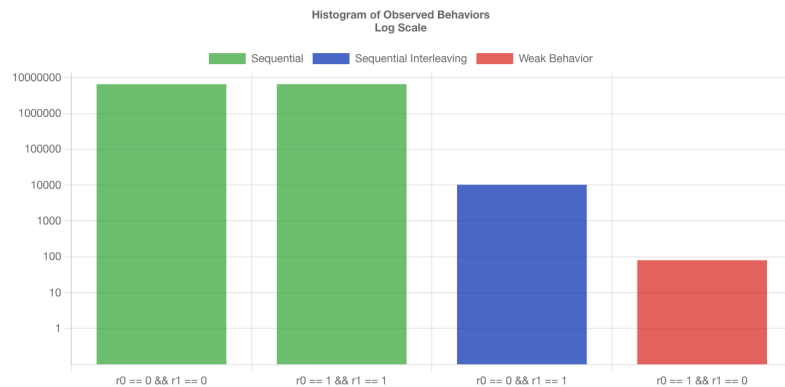
```
0.1: atomicStore(x, 1)
0.2: atomicStore(y, 1)
```

Workgroup 1 Thread 0

```
1.1: let r0 = atomicLoad(y)
1.2: let r1 = atomicLoad(x)
```

Explorer Mode

Tuning Mode



Test Parameters

Testing Workgroups:

Maximum Workgroups:

Workgroup Shuffle Percentage:

Barrier Percentage:

Scratch Memory Size:

Memory Stride:

Test Parameter Presets

Litmus Test

Device	MP	S	R	LB	SB	2+2W
ARM Mali - G71	0	0	0	0	0	0
ARM Mali - G78	0.23	0	0	0	0	0
Qualcomm Adreno 610	0	0	0	0	0	0
Qualcomm Adreno 640	0	0.13	0	0.09	0.13	0.17
Qualcomm Adreno 642L	0	0.22	0	0.15	0.2	0.27
Qualcomm Adreno 660	0.01	0.59	0	0.28	0.64	0.58
PowerVR GE8320	0	0	0	0	0	0
NVIDIA Tegra X1	0.0006	0.0007	0.0009	0.0009	0.001	0.001