



SPECTRE: SPECTULATIVE EXECUTION

40

A

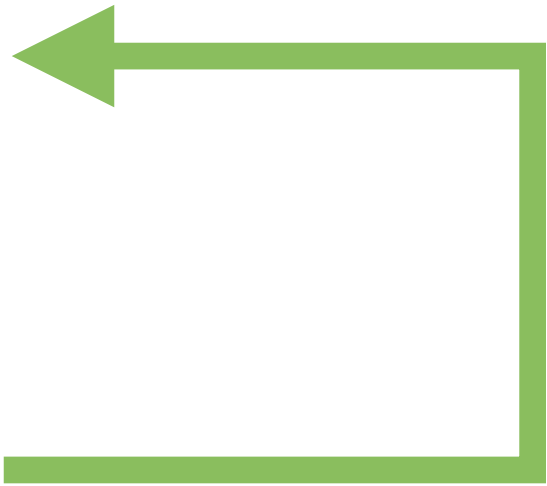
B



c

D

E



D

The CPU has learned that $\text{Counter} \neq 0$

Reading Counter from memory is very slow

The CPU *speculatively* executes to improve performance

3

counter

2

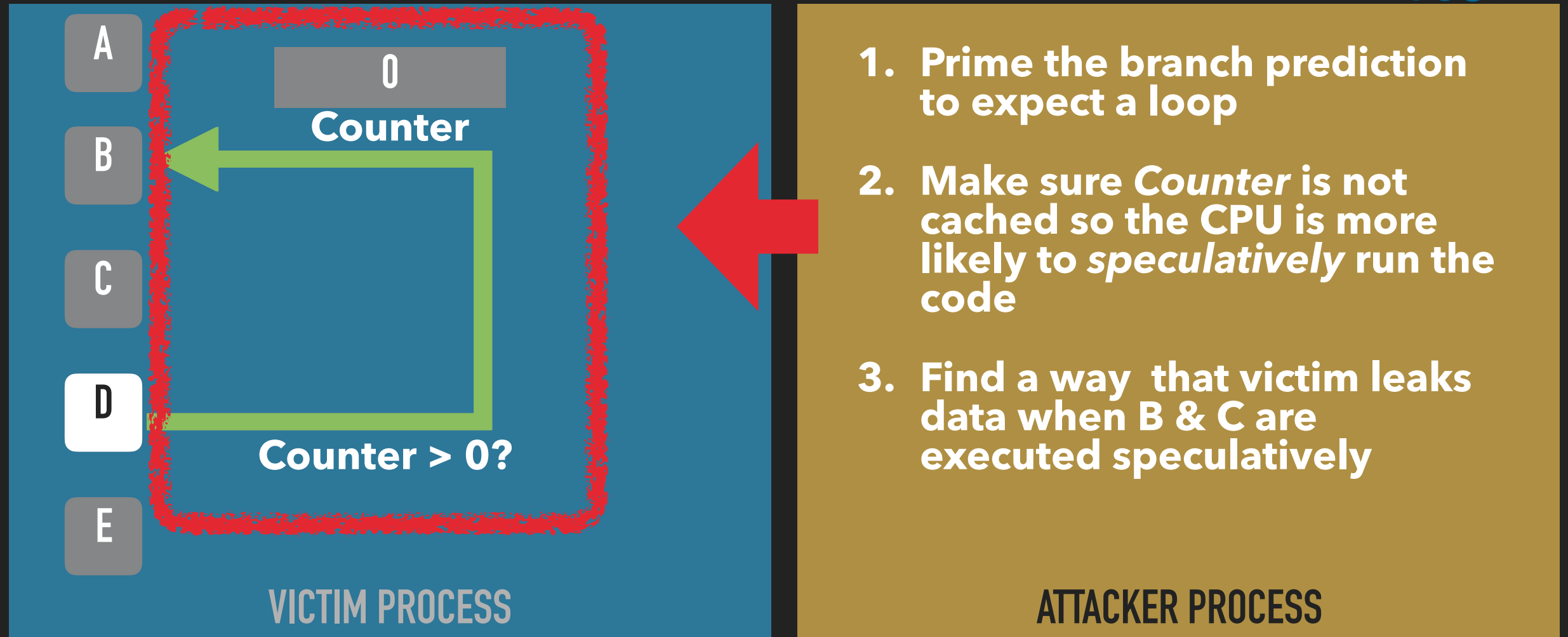
1

counter=0?

B

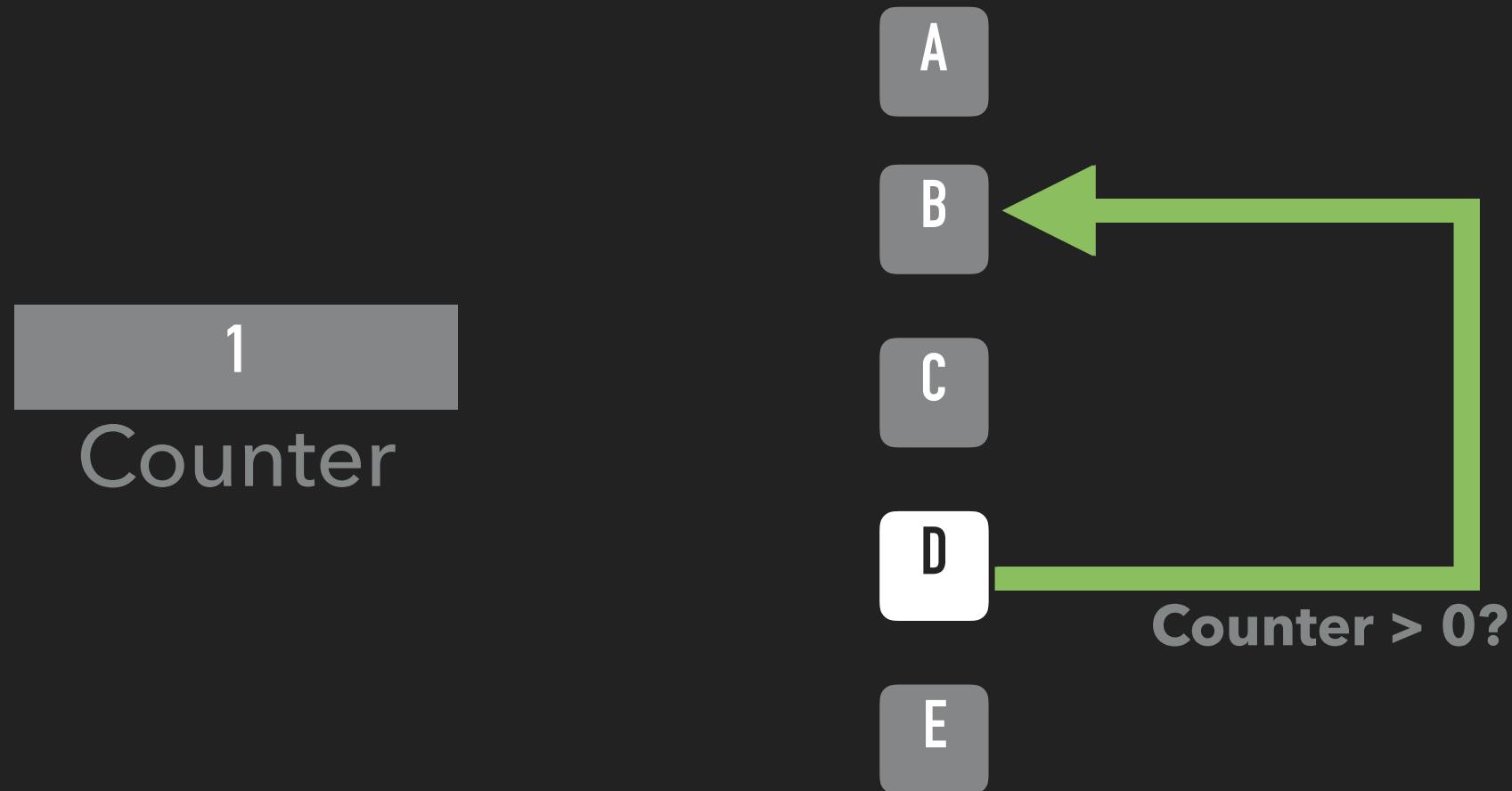
C

SPECTRE: SPECULATIVE EXECUTION



Attacker can influence the CPU's branch prediction of victim. Making the victim *speculatively* execute "wrong" code. E.g. loop even when Counter is == 0.

SPECTRE: SPECULATIVE EXECUTION



The CPU has learned that Counter *probably* is > 0

Reading Counter from memory is very slow

The CPU *speculatively* executes **B** **C** to improve performance