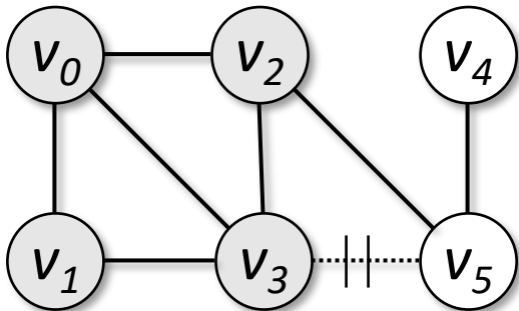
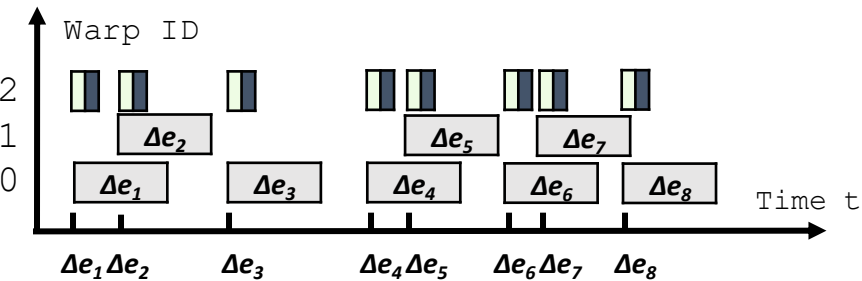
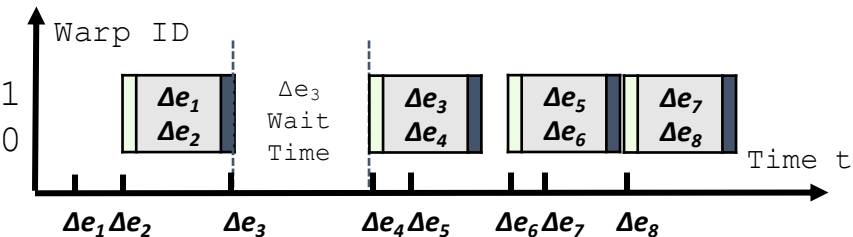
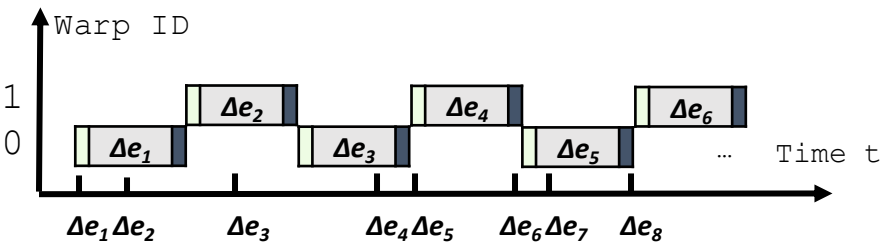
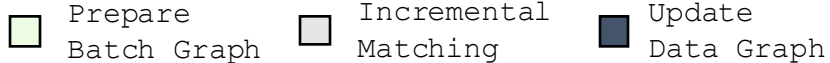
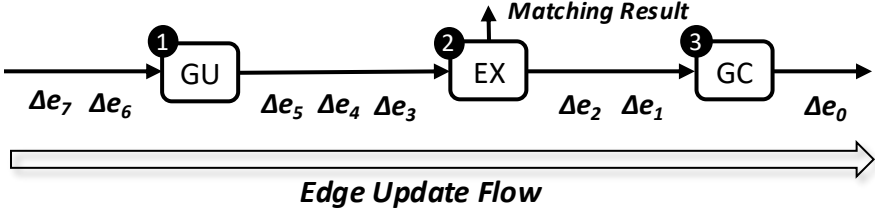


$+ (v_1, v_3)$

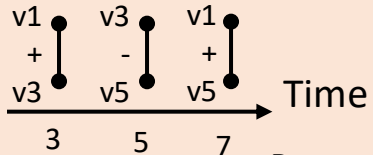


$$-(v_3, v_5)$$





A Batch of Updates

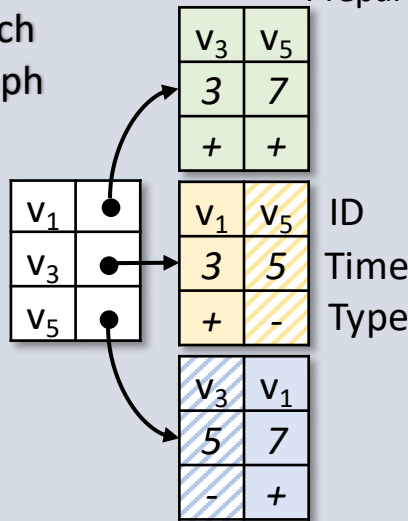


Time

Prepare

1

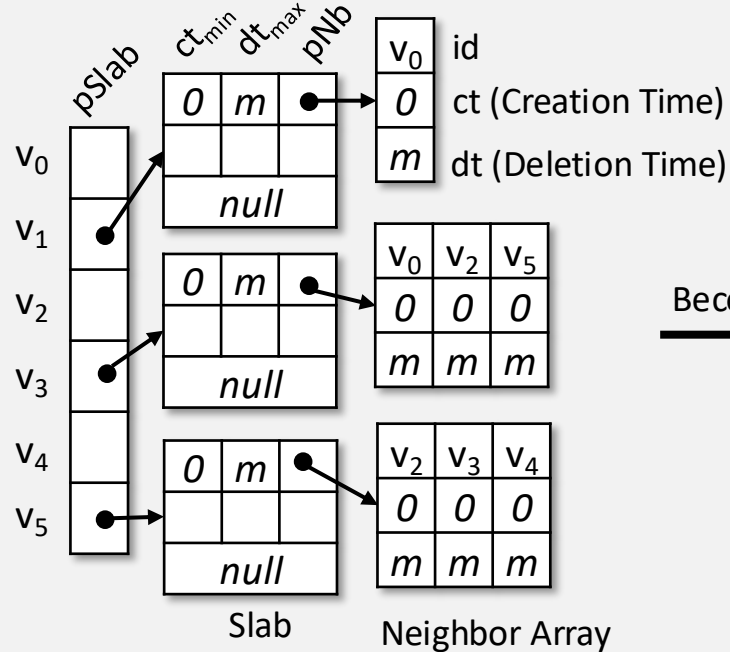
Batch Graph



Update

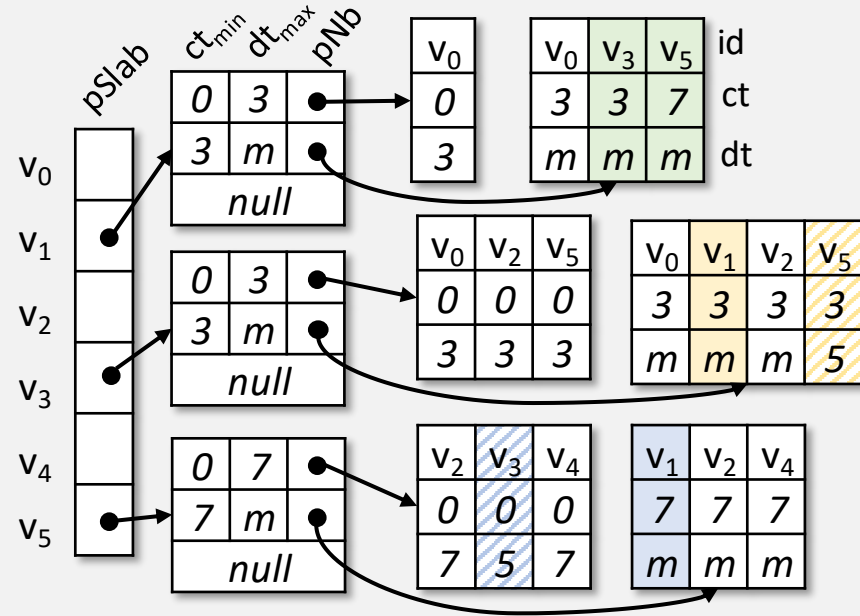
2

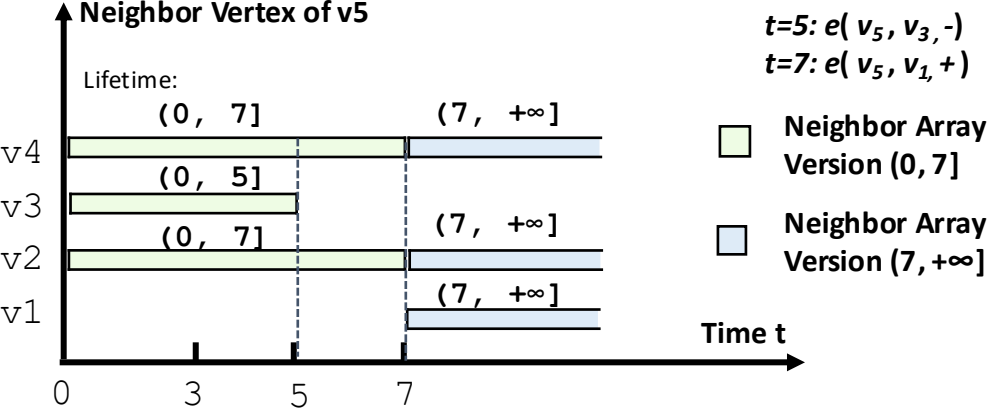
Multi-Version Graph Before Update



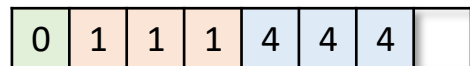
Become

Multi-Version Graph After Update



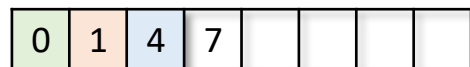


bps



ps

↑ ② Broadcast



size

↑ ① Prefix Sum

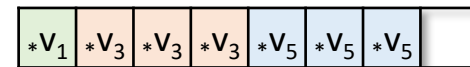


np



bnp

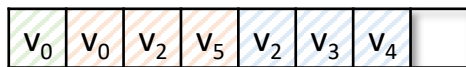
↓ ② Broadcast



↑	↑	↑	↑	↑	↑	↑	↑
0	1	2	3	4	5	6	7

thread id

dst



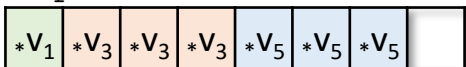
src

↑ ④ Async Copy



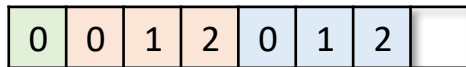
bnp

||



idx

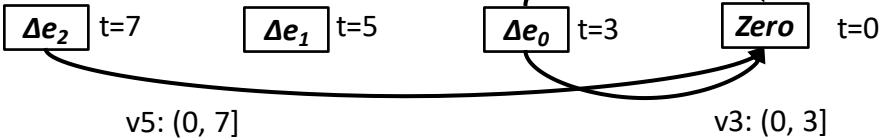
+ ③ Add

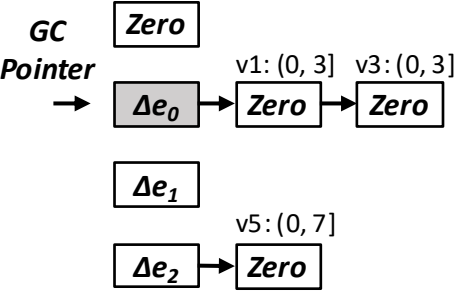


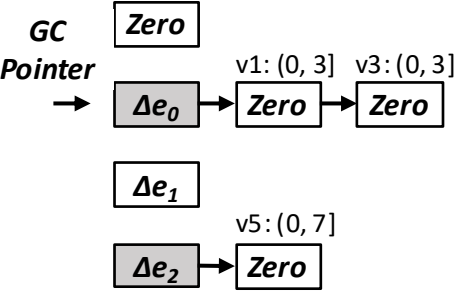
↑	↑	↑	↑	↑	↑	↑	↑
0	1	2	3	4	5	6	7

thread id

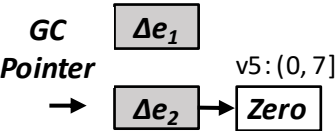
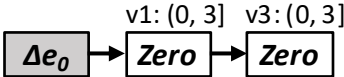
$$\Delta e_0 = (v1, v3 +), \quad T(\Delta e_0) = 3$$
$$\Delta e_1 = (v2, v5, -), \quad T(\Delta e_1) = 5$$
$$\Delta e_2 = (v1, v5, +), \quad T(\Delta e_2) = 7$$







Zero



Zero

Δe_0

$v1: (0, 3]$

$v3: (0, 3]$

Zero

Zero

GC

Δe_1

Pointer

$v5: (0, 7]$

Δe_2

Zero

$v4: (0, 9]$

$v1: (3, 9]$

Δe_3

Zero

Δe_0

