Value Broadcast

Start

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	...
7																...

Value Broadcast

End

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	⋯
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	⋯

Inefficient Value Broadcast

O(n) time
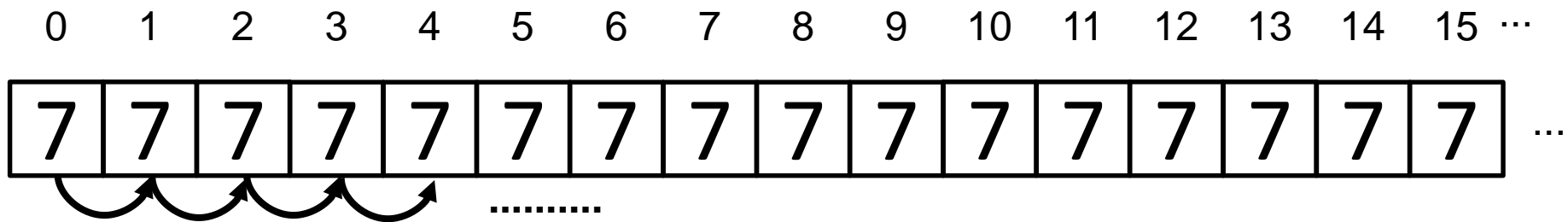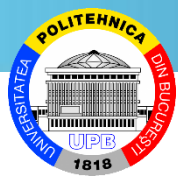
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	···
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	···

....

Efficient Value Broadcast

Every element that has the value
copies it to its current position + i

i = 1

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	...
7																...
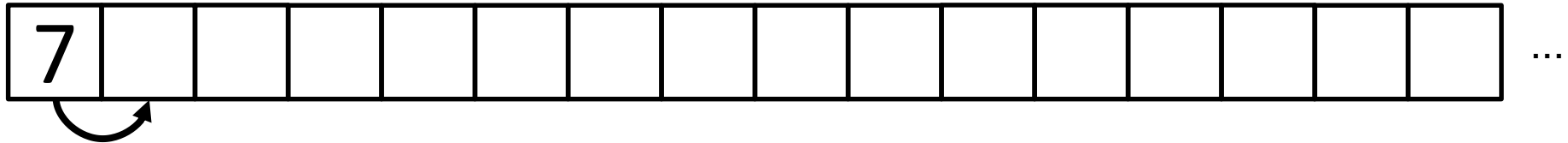
Efficient Value Broadcast

Every element that has the value
copies it to its current position + i

i = 2
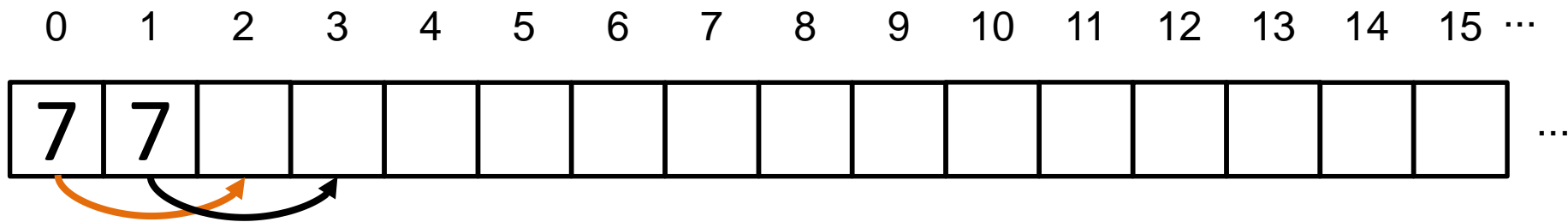
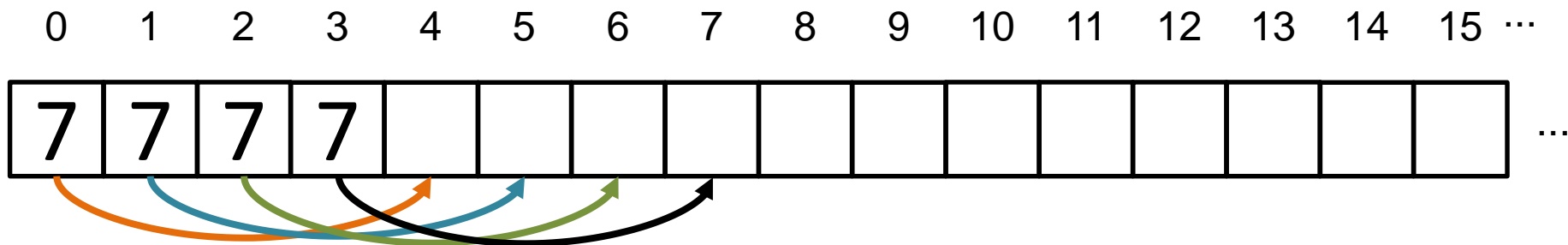| 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	...
7	7															...

These operations can be executed in parallel

Efficient Value Broadcast

Every element that has the value copies it to its current position + i

i = 4

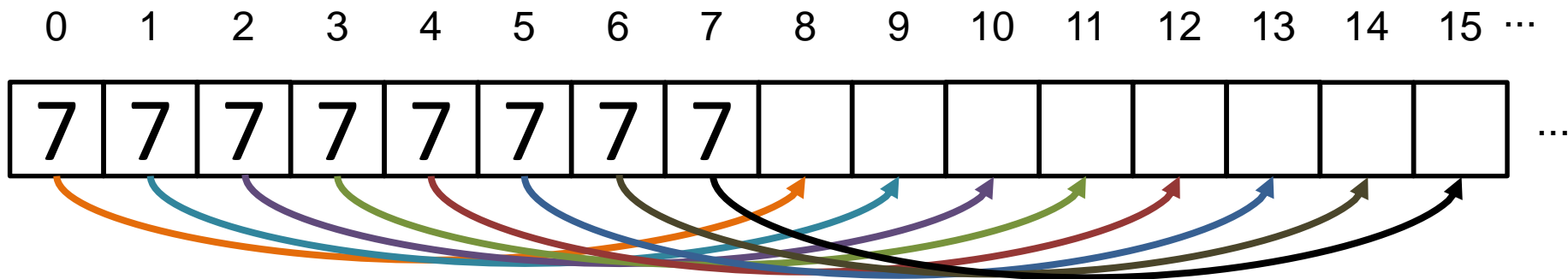| 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	⋯
7	7	7	7													⋯

These operations can be executed in parallel

Efficient Value Broadcast

Every element that has the value
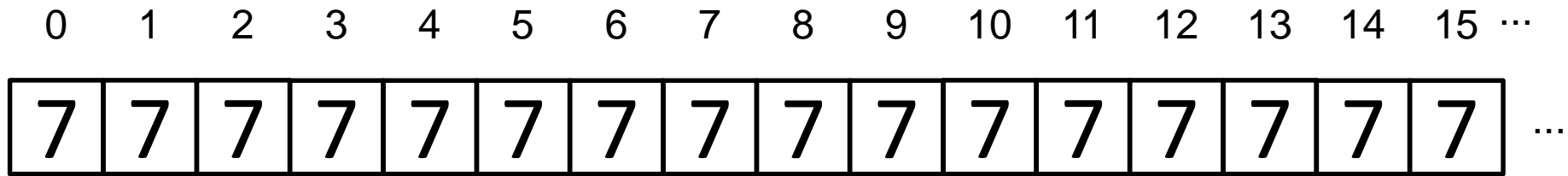copies it to its current position + i

i = 8

These operations can be executed in parallel

Efficient Value Broadcast

O(log2(n)) time with p = n/2 threads

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	···
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	···

Efficient Value Broadcast

i = 2

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | ... |

| 7 | 7 | | | | | | | | | | | | | | | ... |

These operations can**NOT** be executed in parallel

i = 4

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | ... |

| 7 | 7 | 7 | 7 | | | | | | | | | | | | | ... |

Efficient Value Broadcast

i = 2

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	...
7	7															...

i = 4

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	...
7	7	7	7													...