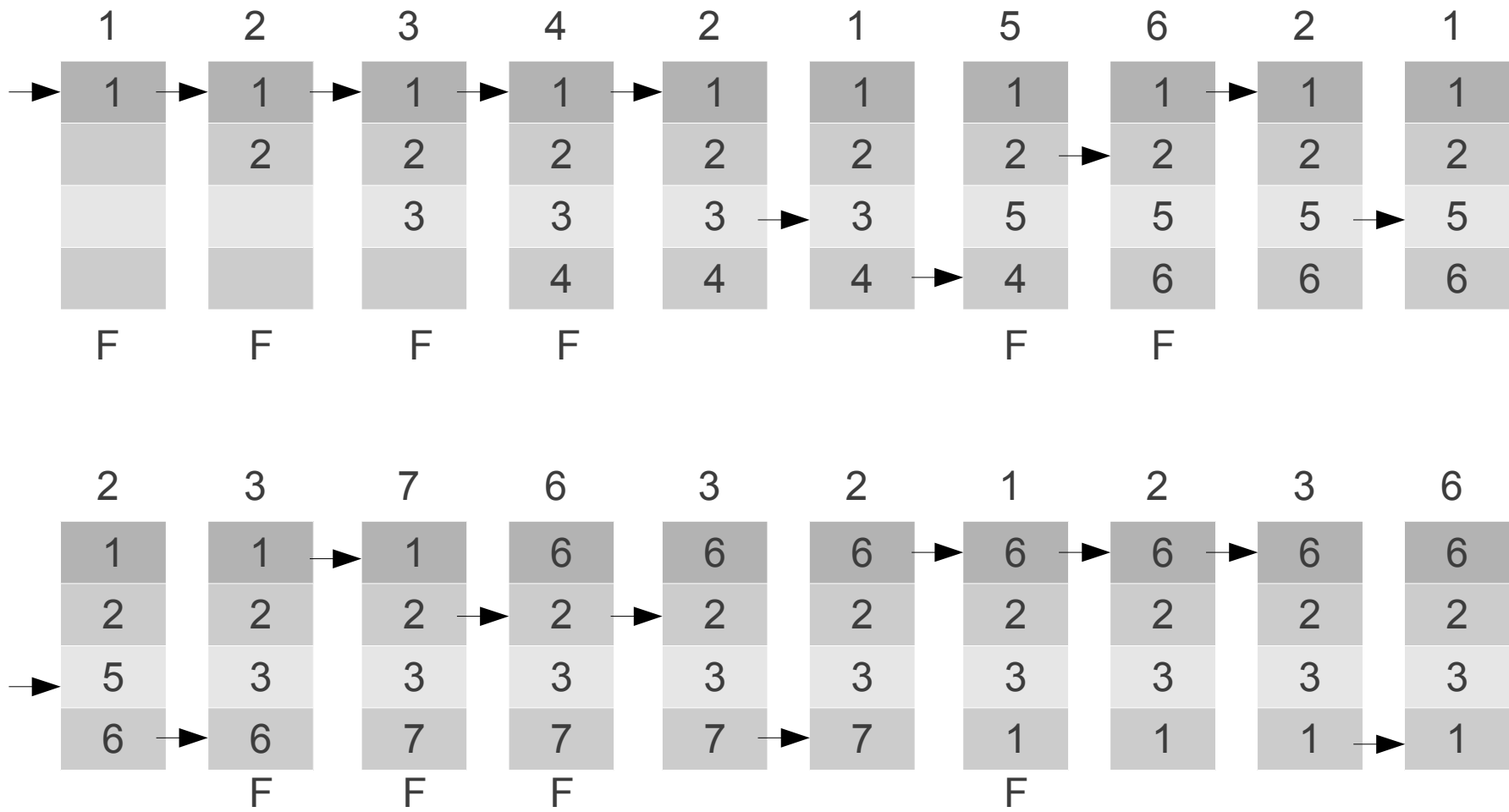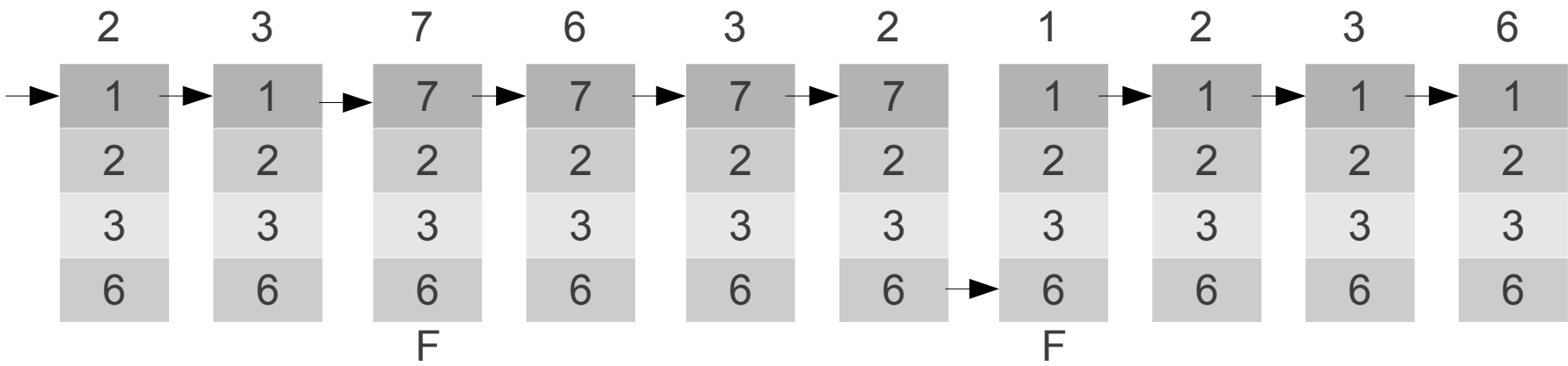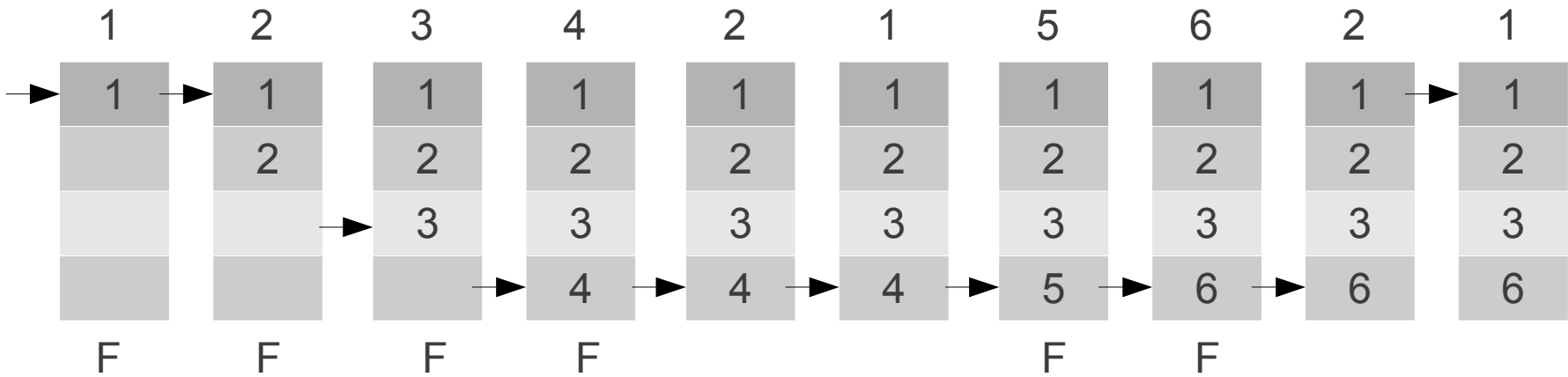# Question – Page replacement algorithm

- Given page reference string:
  - 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6
- Compare the number of page faults for LRU, FIFO and Optimal page replacement algorithm

# Question  : 4 Frames, LRU

|   | 1 | 2 | 3 | 4 | 2 | 1 | 5 | 6 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|
|   | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
|   |   | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
|   |   |   | 3 | 3 | 3 | 3 | 5 | 5 | 5 | 5 |
|   |   |   |   | 4 | 4 | 4 | 4 | 6 | 6 | 6 |
|   | F | F | F | F |   |   | F | F |   |   |

|   | 2 | 3 | 7 | 6 | 3 | 2 | 1 | 2 | 3 | 6 |
|---|---|---|---|---|---|---|---|---|---|---|
|   | 1 | 1 | 1 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
|   | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
|   | 5 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
|   | 6 | 6 | 7 | 7 | 7 | 7 | 1 | 1 | 1 | 1 |
|   |   | F | F | F |   |   | F |   |   |   |

# Question : 4 Frames, OPT



| 1 | 2 | 3 | 4 | 2 | 1 | 5 | 6 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
|   | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
|   |   | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
|   |   |   | 4 | 4 | 4 | 5 | 6 | 6 | 6 |
| F | F | F | F |   |   | F | F |   |   |

| 2 | 3 | 7 | 6 | 3 | 2 | 1 | 2 | 3 | 6 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 7 | 7 | 7 | 7 | 1 | 1 | 1 | 1 |
| 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
|   |   | F |   |   |   | F |   |   |   |

# Question : 4 Frames, FIFO

| 1 | 2 | 3 | 4 | 2 | 1 | 5 | 6 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 1 | 1 | 5 | 5 | 5 | 5 |
|   | 2 | 2 | 2 | 2 | 2 | 2 | 6 | 6 | 6 |
|   |   | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 |
|   |   |   | 4 | 4 | 4 | 4 | 4 | 4 | 1 |
| F | F | F | F |   |   | F | F | F | F |

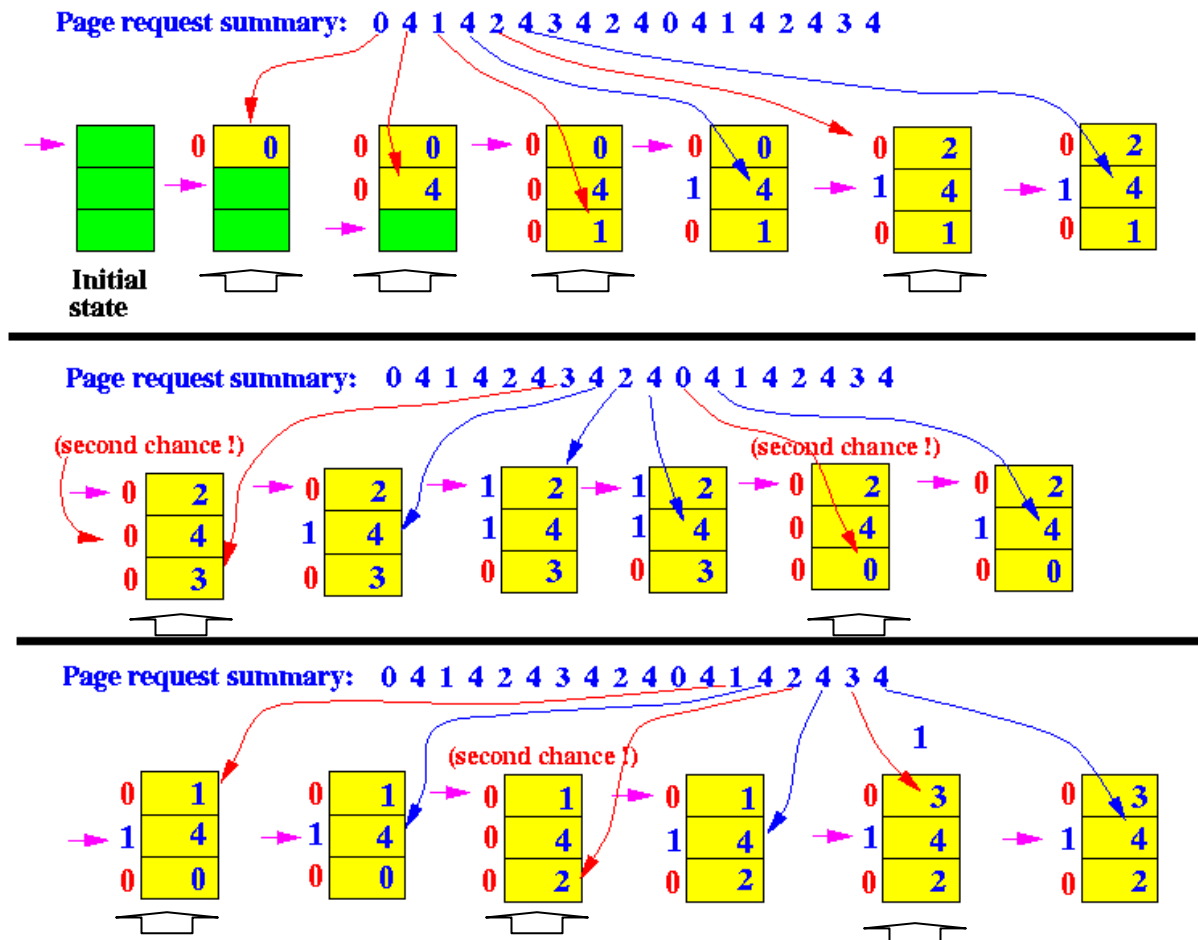| 2 | 3 | 7 | 6 | 3 | 2 | 1 | 2 | 3 | 6 |
|---|---|---|---|---|---|---|---|---|---|
| 5 | 3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 |
| 6 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 3 | 3 |
| 2 | 2 | 2 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 |
|   | F | F | F |   | F | F |   | F |   |
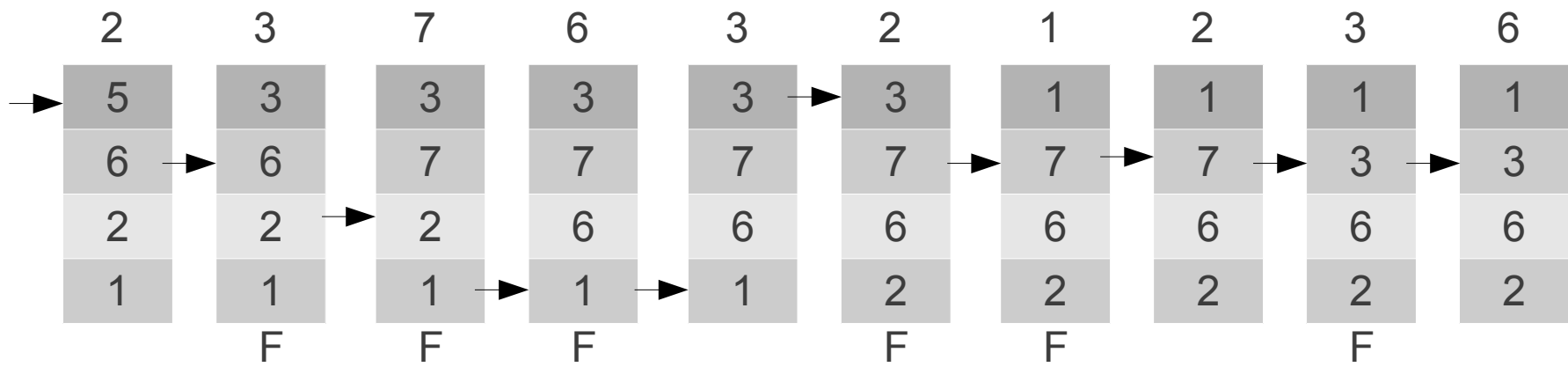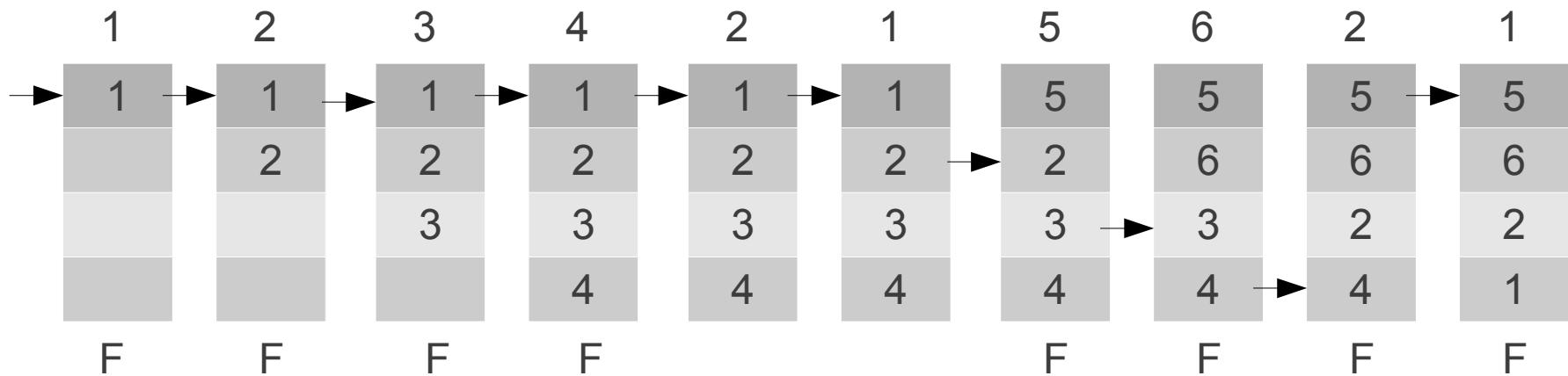
## Second Chance page Replacement Algorithm:

The following figure shows the behavior of the program in paging using the Second Chance page replacement policy:



Total Page fault=9

Fault rate/ratio= 9\18=0.50