Holes List $\xrightarrow{\text{search}}$ 10K, 4K, (20K) | 18K, 7K, $\xrightarrow{\text{search (Next)}}$ ①

19K, (12K) 15K;

Process — 12K, 10K, 9K
$\quad\quad\quad$ P1 $\quad$ P2 $\quad$ P3

Placement - First fit

$\quad\quad\quad\quad$ Best Fit

(last area hole, new 18K) Next R-t

$\quad$ 9K $\quad$ Worst fit

Compute IF, EF

First fit → P1 → 3rd hole
$\quad\quad\quad\quad\quad\quad$ +New hole 8K

Best fit → P1 → 5th hole

Next fit →

Variable

Use 12K
Creat Hole 8K

Fixed

Use 12K
IF = 8K

15K

10K → 4K    12K → 8K (Hole)

(10K)  4K    (20K)  18K    (2)
  P2              P1

7K  9K    12K  15K

first fit
    12K    10K | 9K
     11         |
           P2   | P3

Hole list
  →

[4K]→→[8K    ]→→[18K]→
                        (9K)  → [9K]

[15K]←—[12K]←—[5K]←—[7K]←
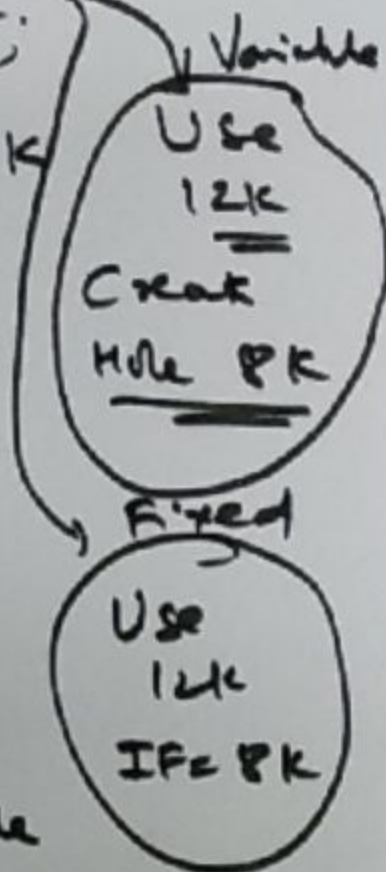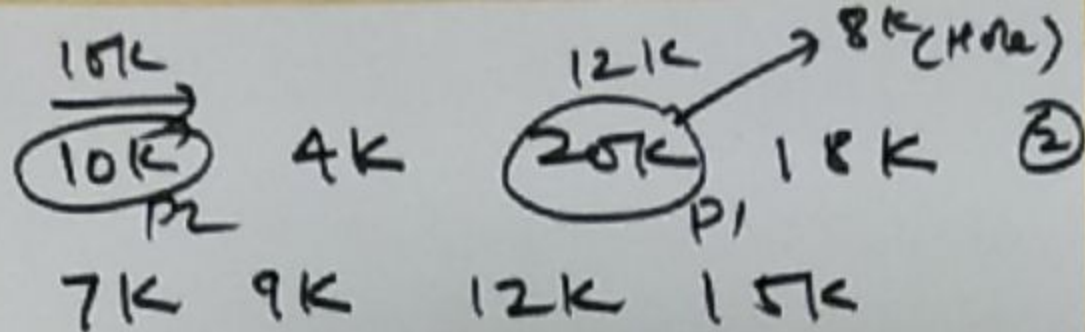
Hole list
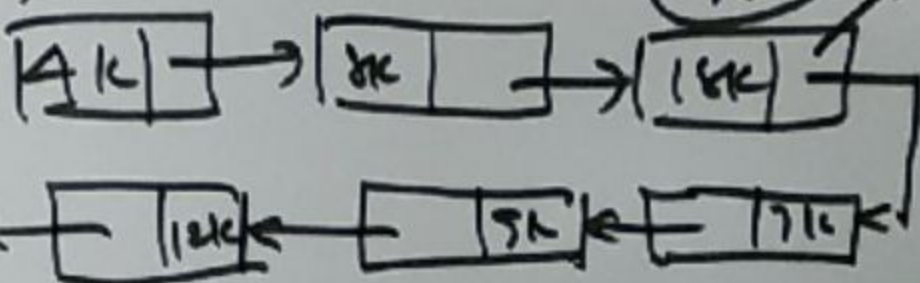
Best Fit

$$P1 \longrightarrow 2^{th} \text{ hole } 12k$$
$$P2 \longrightarrow 1^{st} \text{ hole } 10k$$
$$P3 \longrightarrow 6^{th} \text{ hole } 9k$$

No New
holes created

Worst fit

$$P1 \rightarrow 12k \rightarrow 3^{rd} \text{ hole } \rightarrow 20k$$
$$\rightarrow \text{Create New hole } 8k$$
$$P2 \rightarrow 10k \rightarrow 4^{th} \text{ hole } \rightarrow 18k$$
$$\rightarrow \text{Create New hole } - 8k$$

④



Memory

Free →

| 15k — H1 |
| A — 2k |
| 4K — H2 |
| B |
| 2nk - H3 |
| C |
| 18k - H4 |
| D |
| 7k - H5 |
| E |
| 9k - H6 |
| F |
| 12k - H7 |
| G |
| 15k - H8 |

HI | 15k

4k | H2

H3 | 2nk →

— At terminati
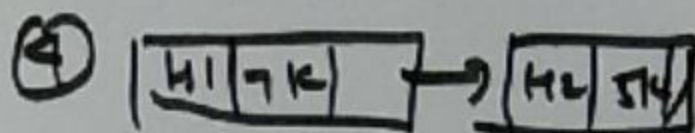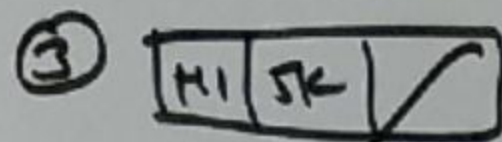y Proces A

old HI + A + old H2

HI | 16k | →
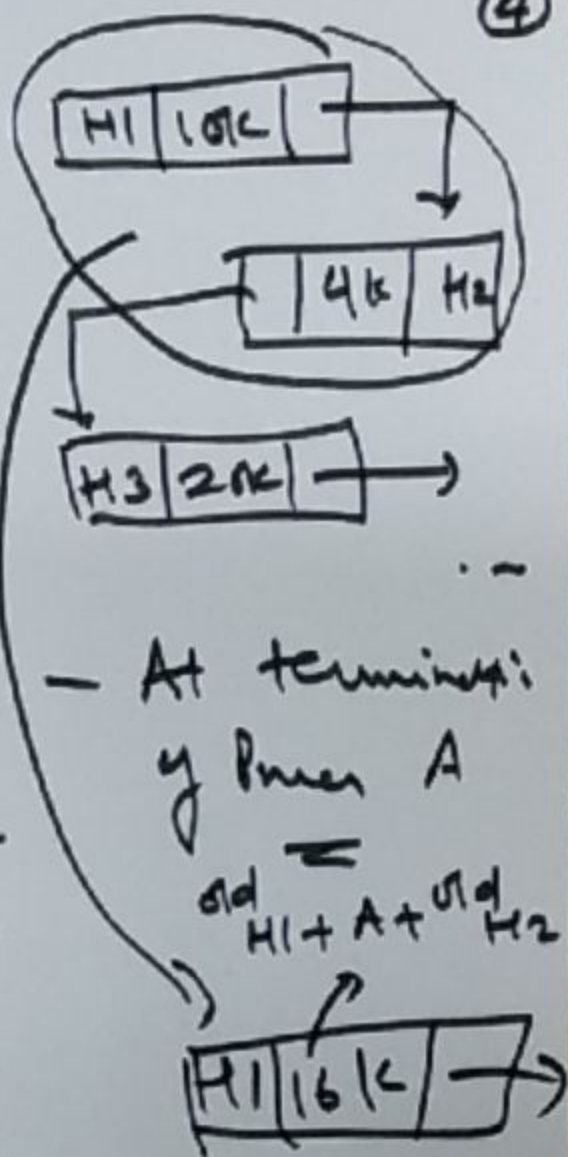
# Next fit
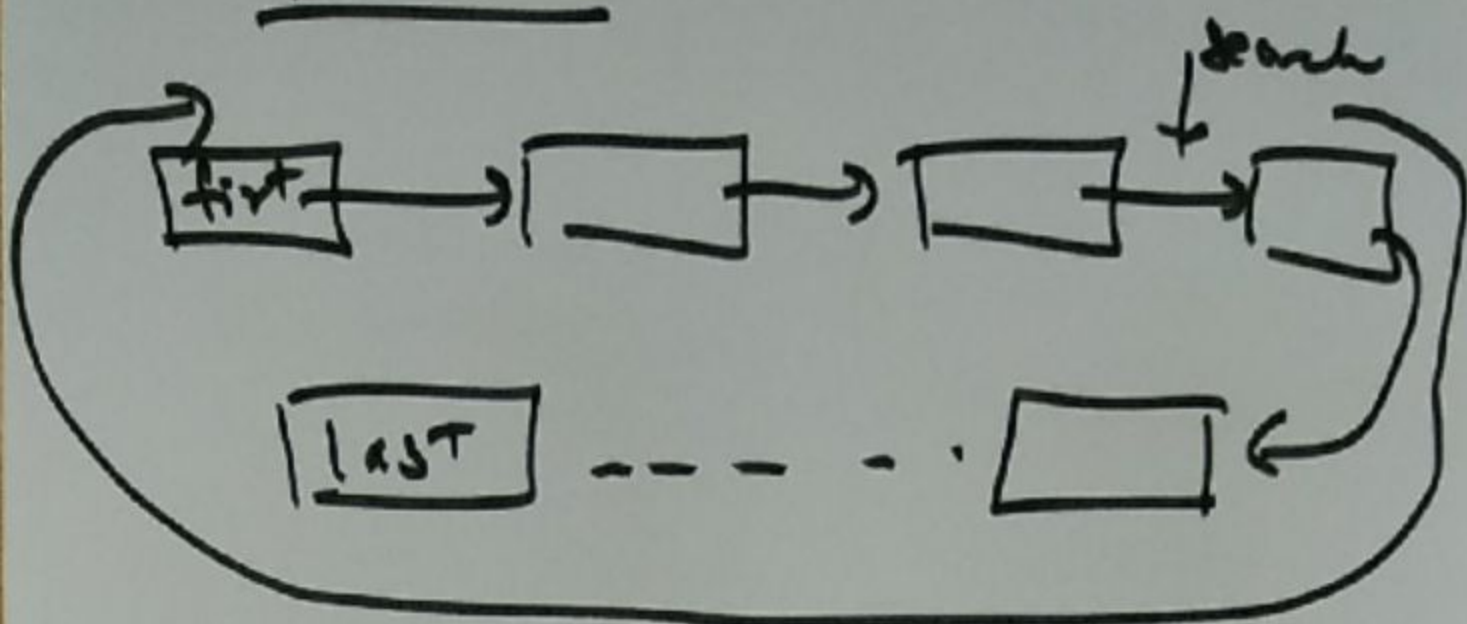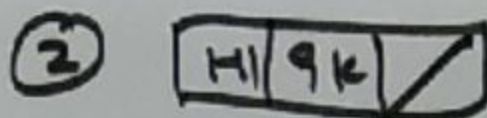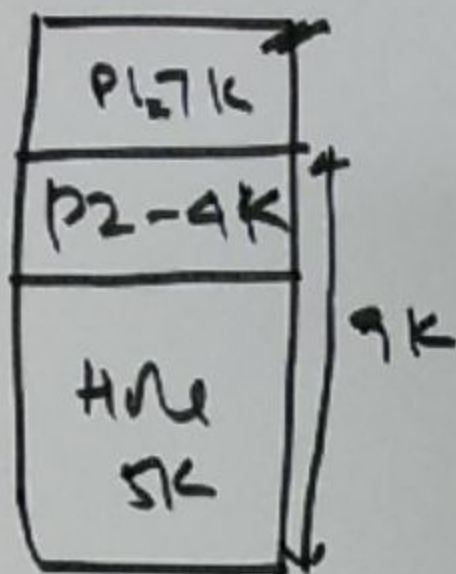


— Assign a hole as per the selected placement Algo.

— Update Hole list

→ Assign the next process the hole from the updated hole list

(6)

```
┌──────────┐
│  P1=7K   │
├──────────┤        ① ┌────┬──────┬──┐
│  P2-4K   │          │ H1 │ 16 K │ /│
├──────────┤          └────┴──────┴──┘
│          │  9K    ② ┌────┬────┬──┐
│   Hole   │          │ H1 │ 9K │ /│
│          │          └────┴────┴──┘
│    5K    │        ③ ┌────┬────┬──┐
│          │          │ H1 │ 5K │ /│
└──────────┘          └────┴────┴──┘
```
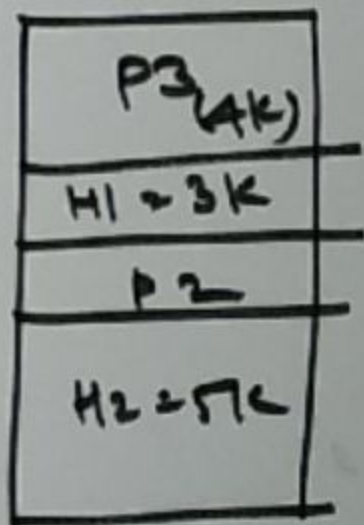
       16K

④ ┌────┬─────┐     ┌────┬─────┐
  │ H1 │ 7K  │ ──→ │ H2 │ 5K  │
  └────┴─────┘     └────┴─────┘

P1 →7K          - First fit ✓✓
P2 -4K          - Best fit
P1 - Terminate  - Paging

P3 →3K
P4 →6K

```
┌───────────┐       Solution
│   P3      │
│   (4K)    │      →① P4 wont
├───────────┤
│  H1 = 3K  │            or
├───────────┤
│    P2     │      ② Compaction
├───────────┤           H1 + H2
│  H2 = 5K  │           = 3K + 5K
└───────────┘           = 8K → Pg
```

⑦

H1 = 7K   ← first fit
          ← P3 - 3K
   ★ P2
H2 = 5K   ← Best fit   P9 = 6K

Best fit

|H1|7K| |→|H2|2K|/|

After P9

|H1|1K| |——→|H2|2K|/|
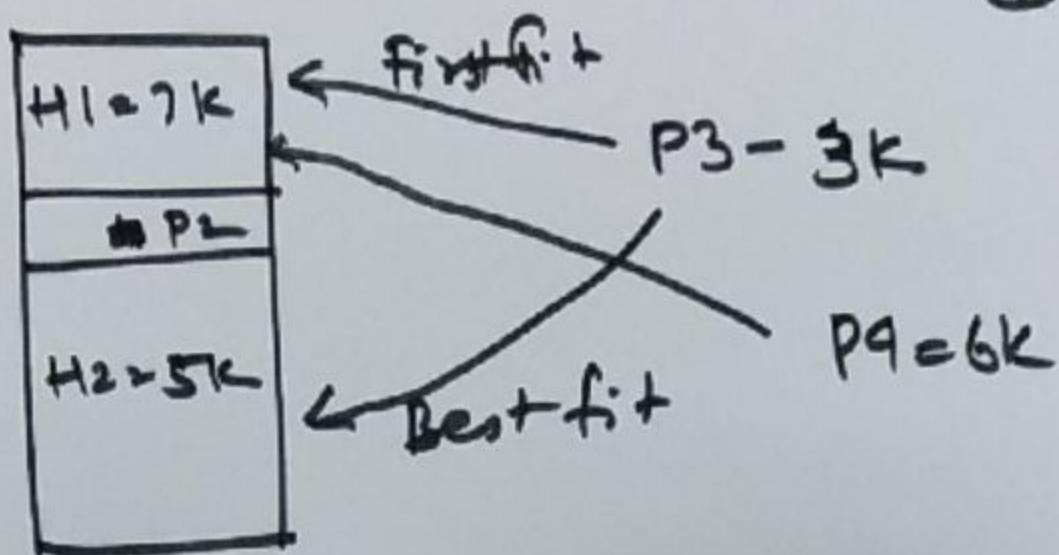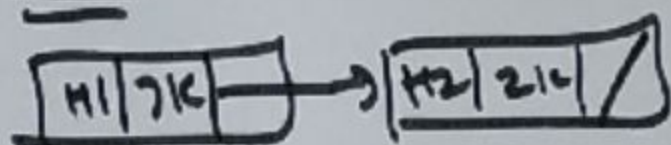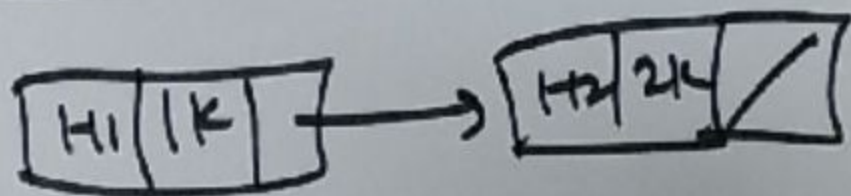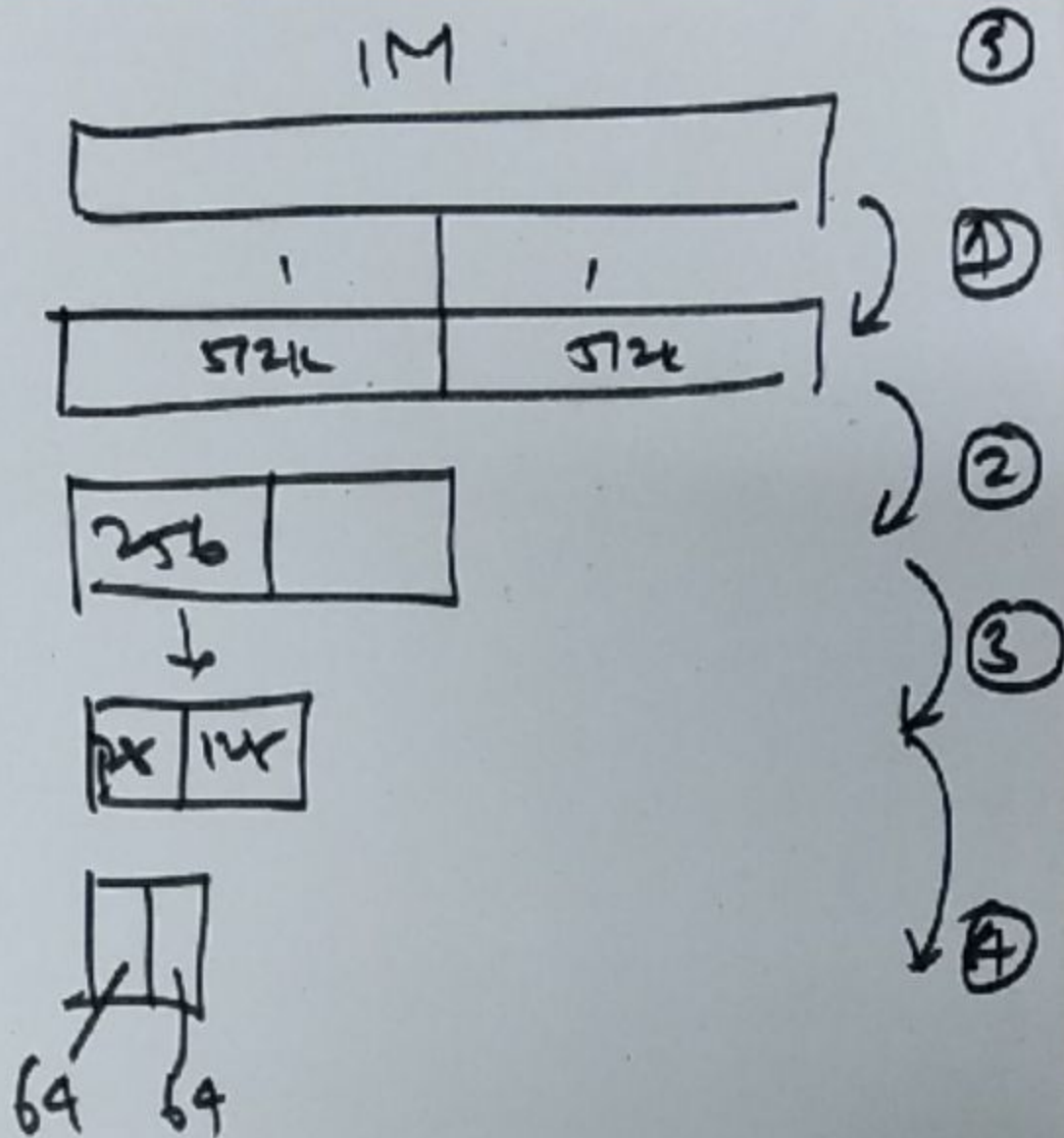
Buddy System

Order (4)

Paging



| | |
|---|---|
| 2k | → page 0 |
| 2k | |
| 2k | ⟹ P1 |
| 2k | |
| 2k | ⟹ P2 |
| 2k | |
| 2k | |
| 2k | → page 7 |

16K.
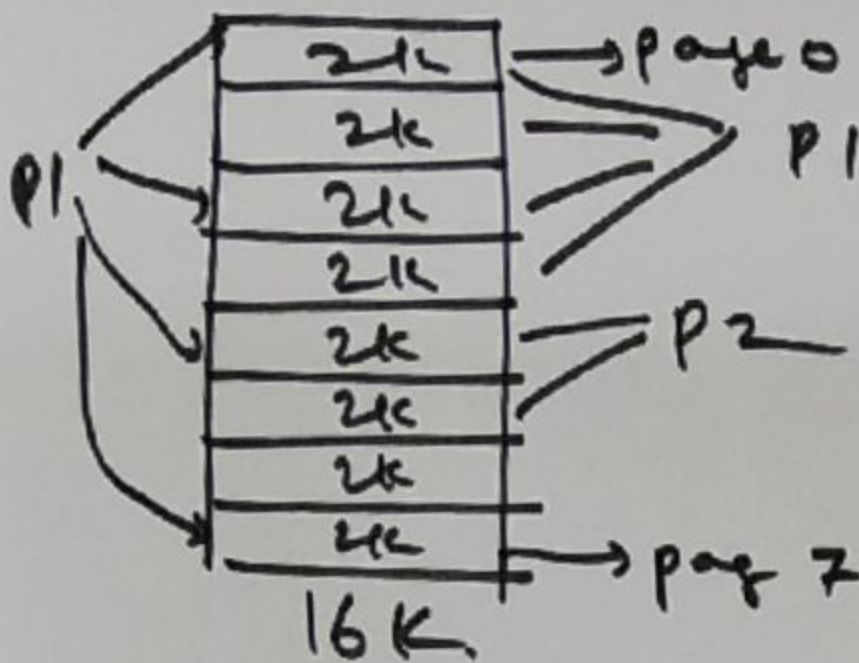
P1 ⟹ k ⟶ 4 pages

P2 ⟶ 9k ⟶ 2 pages

and P1 termination

P3 ⟶ 3k — 2 pages

P4 ⟶ 6k

| | |
|---|---|
| P3 | 0 |
| P3 | 1 |
| P4 | 2 |
| P4 | 3 |
| P2 | 4 |
| P2 | 5 |
| P4 | 6 |
| | 7 |

PT
P2

PT
P3

PT
P4

| | |
|---|---|
| 0 | 4 |
| 1 | 5 |

FFL

| | |
|---|---|
| 0 | 0 |
| 1 | 1 |

| | |
|---|---|
| 0 | 2 |
| 1 | 3 |
| 2 | 6 |

| 7 | |
|---|---|
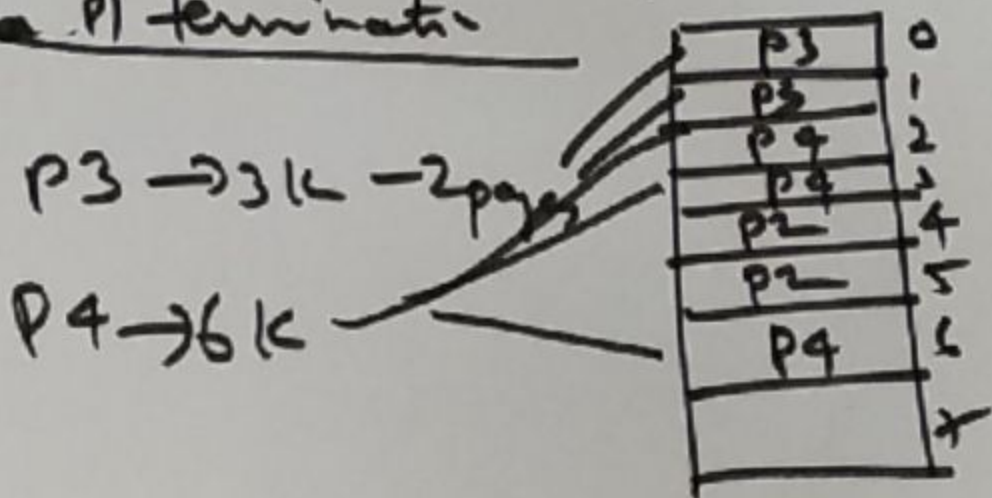
# Segmented-Paging

- TLB at level 2 in paging

- Segment table —— Hit $P_T$ $\overrightarrow{m_0}$

  ╲ Miss$_{PT}$ ⟩

$tV(2)$ ⤸ L2 PT

$\underset{\smile}{ma}$.

Program A
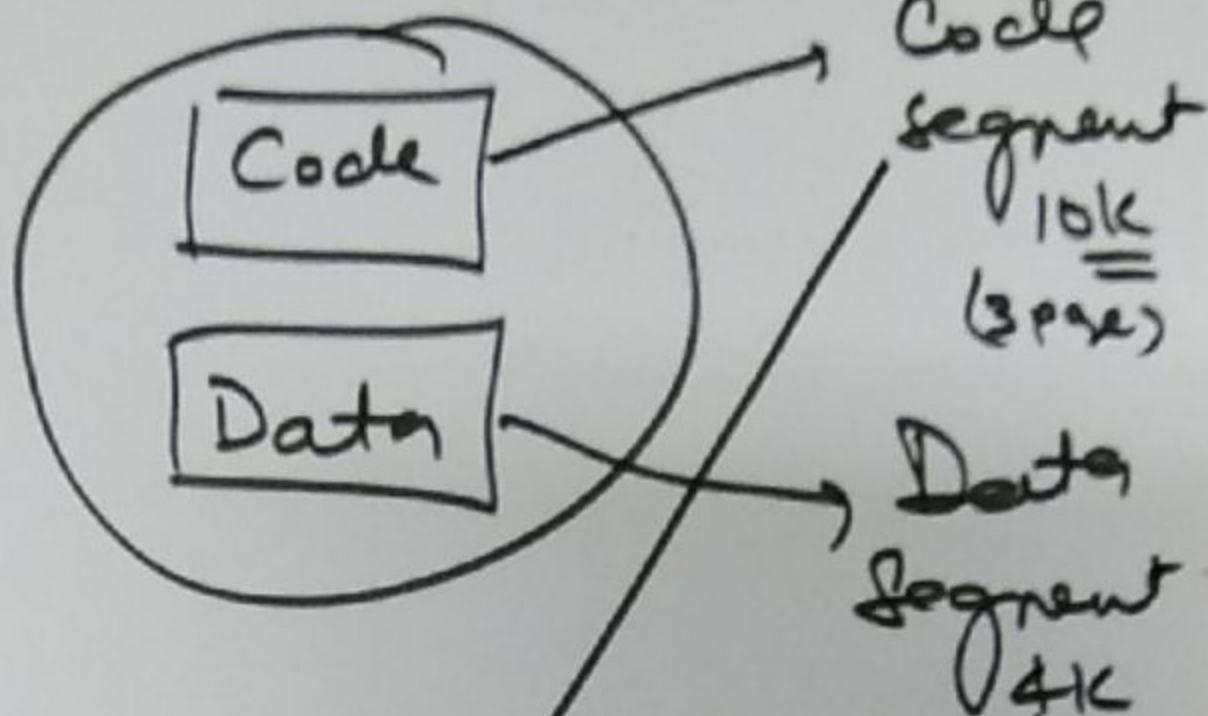
Code → Code segment 10k = (3 pages)

Data → Data segment 4k

Distributed across pages

page size 2k

— 5 pages 0, 1, 2, 3, 4

Process A

2 pages 0, 1

Segment 1

Pages

Page table

page size $4K = 2^{12}$ bytes 11

PA space $= 2^{24}$ bytes $\longrightarrow$ 12-bit

LA space $= 2^{32}$ bytes     $L_P$ . $P_P$

TLB size $= 2^6$ bytes. $= 64$ bytes

Logical page size = physical page size



20-bit | 12-bit

LA $\downarrow$     $\times$ Page table

12-bit | 12-bit

PA

page table  20 bit | 12-bit

$\underbrace{\qquad}_{32\text{-bit}}$
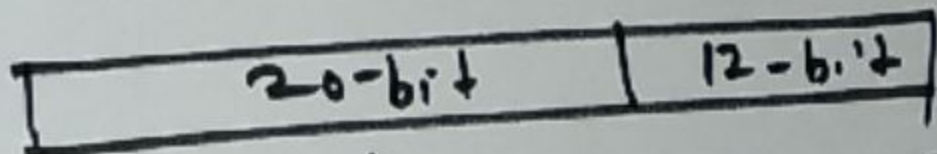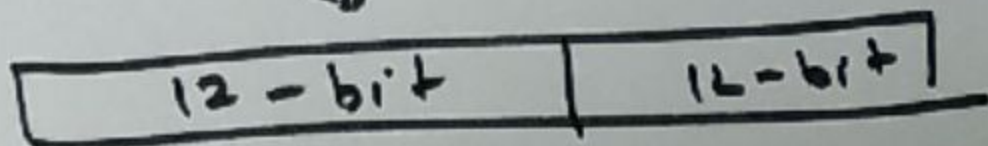
TLB ____ 4 bytes
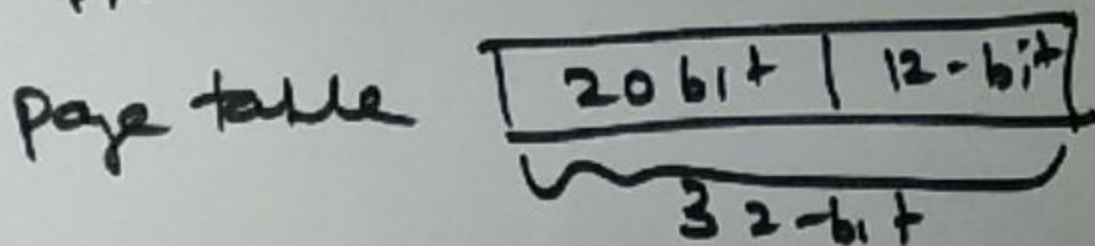entry                    4 bytes

capacity of TLB $= 64/4 = 16$ entries