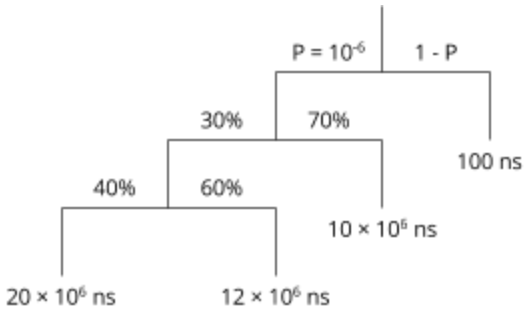
**1A.** 2 × 8192 = 16384 → 16384 + 1200 = **17584**
**1B.** 24 × 8192 = 196608 → 196608 + 800 = **197408**
**1C.** 57344 ÷ 8192 = 7 → **Process P1**, 57344 % 8192 = 0 → Logical Address **(0, 0)**
**1D.** 57343 ÷ 8192 = 6 → **Process P2**, 57343 % 8192 = 8191 → Logical Address **(1, 8191)**

**2.**




EAT = (1 - P) × 100 ns + (P × (0.3 × (0.4 × 20 ms + 0.6 × 12 ms) + 0.7 × 10 ms))
EAT = ((1 - $10^{-6}$) × 100 ns) + ($10^{-6}$ × ((0.3 × (0.4 × 20 × $10^6$ + 0.6 × 12 × $10^6$)) + 0.7 × 10 × $10^6$))
EAT = **111.56 ns**

**3.**

| **Frames** | **3** | **4** |
|---|---|---|
| **FIFO** | 3 | 12 |
| **Optimal** | 9 | 7 |
| **LRU** | 13 | 9 |

***FIFO - 3 Frames [14 Page Hits, 3 Page Faults]***

| **1** | **2** | **3** | **4** | **2** | **1** | **5** | **6** | **2** | **1** | **2** | **3** | **7** | **6** | **3** | **2** | **6** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 4 | 1 | 5 | 6 | 2 | 1 | 1 | 3 | 7 | 6 | 6 | 2 | 2 |
| – | 1 | 2 | 3 | 3 | 4 | 1 | 5 | 6 | 2 | 2 | 1 | 3 | 7 | 7 | 6 | 6 |
| – | – | 1 | 2 | 2 | 3 | 4 | 1 | 5 | 6 | 6 | 2 | 1 | 3 | 3 | 7 | 7 |
| PF | PF | PF | PF | PH | PF | PF | PF | PF | PF | PH | PF | PF | PF | PH | PF | PH |

***FIFO - 4 Frames [5 Page Hits, 12 Page Faults]***

| **1** | **2** | **3** | **4** | **2** | **1** | **5** | **6** | **2** | **1** | **2** | **3** | **7** | **6** | **3** | **2** | **6** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 4 | 4 | 5 | 6 | 2 | 1 | 1 | 3 | 7 | 6 | 6 | 2 | 2 |
| – | 1 | 2 | 3 | 3 | 3 | 4 | 5 | 6 | 2 | 2 | 1 | 3 | 7 | 7 | 6 | 6 |
| – | – | 1 | 2 | 2 | 2 | 3 | 4 | 5 | 6 | 6 | 2 | 1 | 3 | 3 | 7 | 7 |
| – | – | – | 1 | 1 | 1 | 2 | 3 | 4 | 5 | 5 | 6 | 2 | 1 | 1 | 3 | 3 |
| PF | PF | PF | PF | PH | PH | PF | PF | PF | PF | PH | PF | PF | PF | PH | PF | PH |

***Optimal - 3 Frames [8 Page Hits, 9 Page Faults]***

| **1** | **2** | **3** | **4** | **2** | **1** | **5** | **6** | **2** | **1** | **2** | **3** | **7** | **6** | **3** | **2** | **6** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 2 | 2 |
| – | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 7 | 7 | 6 | 7 | 7 |
| – | – | 3 | 4 | 4 | 4 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 7 | 6 | 6 |
| PF | PF | PF | PF | PH | PH | PF | PF | PH | PH | PH | PF | PF | PH | PH | PF | PH |

***Optimal - 4 Frames [10 Page Hits, 7 Page Faults]***

| **1** | **2** | **3** | **4** | **2** | **1** | **5** | **6** | **2** | **1** | **2** | **3** | **7** | **6** | **3** | **2** | **6** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 7 | 7 | 7 | 7 | 7 |
| – | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| – | – | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| – | – | – | 4 | 4 | 4 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| PF | PF | PF | PF | PH | PH | PF | PF | PH | PH | PH | PH | PF | PH | PH | HP | PH |

***LRU - 3 Frames [4 Page Hits, 13 Page Faults]***

| **1** | **2** | **3** | **4** | **2** | **1** | **5** | **6** | **2** | **1** | **2** | **3** | **7** | **6** | **3** | **2** | **6** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 2 | 1 | 5 | 6 | 2 | 1 | 2 | 3 | 7 | 6 | 3 | 2 | 6 |
| – | 1 | 2 | 3 | 4 | 2 | 1 | 5 | 6 | 2 | 1 | 2 | 3 | 7 | 6 | 3 | 2 |
| – | – | 1 | 2 | 3 | 4 | 2 | 1 | 5 | 6 | 6 | 1 | 2 | 3 | 7 | 6 | 3 |
| PF | PF | PF | PF | PH | PF | PF | PF | PF | PF | PH | PF | PF | PF | PH | PF | PH |

***LRU - 4 Frames [8 Page Hits, 9 Page Faults]***

| **1** | **2** | **3** | **4** | **2** | **1** | **5** | **6** | **2** | **1** | **2** | **3** | **7** | **6** | **3** | **2** | **6** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 2 | 1 | 5 | 6 | 2 | 1 | 2 | 3 | 7 | 6 | 3 | 2 | 6 |
| – | 1 | 2 | 3 | 4 | 2 | 1 | 5 | 6 | 2 | 1 | 2 | 3 | 7 | 6 | 3 | 2 |
| – | – | 1 | 2 | 3 | 4 | 2 | 1 | 5 | 6 | 6 | 1 | 2 | 3 | 7 | 6 | 3 |
| – | – | – | 1 | 1 | 3 | 4 | 2 | 1 | 5 | 5 | 6 | 1 | 2 | 2 | 7 | 7 |
| PF | PF | PF | PF | PH | PH | PF | PF | PH | PH | PH | PF | PF | PF | PH | PH | PH |