Pages are 4 KB big, so the offset is . We ignore the last 12 bits and only need to worry about the initial 4 bits.

Initial Data Stream:

|  |  |  |
| --- | --- | --- |
| Address (Hex) | Address (Binary) | Result (H, M, PF) |
| 0x0FFF | 0b0000111111111111 | M |
| 0x7A28 | 0b0111101000101000 | H |
| 0x3DAD | 0b0011110110101101 |  |
| 0x3A98 | 0b0011101010011000 |  |
| 0x1C19 | 0b0001110000011001 |  |
| 0x1000 | 0b0001000000000000 |  |
| 0x22D0 | 0b0010001011010000 |  |

Initial TLB:

|  |  |  |  |
| --- | --- | --- | --- |
| Valid | Tag | Physical Page # | LRU |
| 1 | 11 | 12 | 2 |
| 1 | 7 | 4 | 3 |
| 1 | 3 | 6 | 4 |
| 0 | 4 | 9 | 1 |

Initial Page Table:

|  |  |  |
| --- | --- | --- |
| Index | Valid | Physical Page or On Disk |
| 0 | 1 | 5 |
| 1 | 0 | Disk |
| 2 | 0 | Disk |
| 3 | 1 | 6 |
| 4 | 1 | 9 |
| 5 | 1 | 11 |
| 6 | 0 | Disk |
| 7 | 1 | 4 |
| 8 | 0 | Disk |
| 9 | 0 | Disk |
| 10 | 1 | 3 |
| 11 | 1 | 12 |

Address 0x0FFF: M; Not in TLB but in Page Table. Update TLB, page table remains the same.

|  |  |  |  |
| --- | --- | --- | --- |
| Valid | Tag | Physical Page # | LRU |
| 1 | 11 | 12 | 1 |
| 1 | 7 | 4 | 2 |
| 1 | 3 | 6 | 3 |
| 1 | 0 | 5 | 4 |

Address 0x7A28: H, Found in TLB. Update TLB, page table remains the same.

|  |  |  |  |
| --- | --- | --- | --- |
| Valid | Tag | Physical Page # | LRU |
| 1 | 11 | 12 | 1 |
| 1 | 7 | 4 | 4 |
| 1 | 3 | 6 | 2 |
| 1 | 0 | 5 | 3 |

Address 0x3DAD: H, Found in TLB. Update TLB, page table remains the same.

|  |  |  |  |
| --- | --- | --- | --- |
| Valid | Tag | Physical Page # | LRU |
| 1 | 11 | 12 | 1 |
| 1 | 7 | 4 | 3 |
| 1 | 3 | 6 | 4 |
| 1 | 0 | 5 | 2 |

Address 0x3A98: H, Found in TLB. TLB and page table remains the same.

|  |  |  |  |
| --- | --- | --- | --- |
| Valid | Tag | Physical Page # | LRU |
| 1 | 11 | 12 | 1 |
| 1 | 7 | 4 | 3 |
| 1 | 3 | 6 | 4 |
| 1 | 0 | 5 | 2 |

Address 0x1C19: PF, Not in TLB or Page Table. Update TLB and page table.

|  |  |  |  |
| --- | --- | --- | --- |
| Valid | Tag | Physical Page # | LRU |
| 1 | 1 | 13 | 4 |
| 1 | 7 | 4 | 2 |
| 1 | 3 | 6 | 3 |
| 1 | 0 | 5 | 1 |

|  |  |  |
| --- | --- | --- |
| Index | Valid | Physical Page or On Disk |
| 0 | 1 | 5 |
| 1 | 1 | 13 |
| 2 | 0 | Disk |
| 3 | 1 | 6 |
| 4 | 1 | 9 |
| 5 | 1 | 11 |
| 6 | 0 | Disk |
| 7 | 1 | 4 |
| 8 | 0 | Disk |
| 9 | 0 | Disk |
| 10 | 1 | 3 |
| 11 | 1 | 12 |

Address 0x1000: H, Found in TLB. TLB and page table remains the same.

Address 0x22D0: PF, Not in TLB or Page Table. Update TLB and page table.

|  |  |  |  |
| --- | --- | --- | --- |
| Valid | Tag | Physical Page # | LRU |
| 1 | 1 | 13 | 3 |
| 1 | 7 | 4 | 1 |
| 1 | 3 | 6 | 2 |
| 1 | 2 | 14 | 4 |

|  |  |  |
| --- | --- | --- |
| Index | Valid | Physical Page or On Disk |
| 0 | 1 | 5 |
| 1 | 1 | 13 |
| 2 | 1 | 14 |
| 3 | 1 | 6 |
| 4 | 1 | 9 |
| 5 | 1 | 11 |
| 6 | 0 | Disk |
| 7 | 1 | 4 |
| 8 | 0 | Disk |
| 9 | 0 | Disk |
| 10 | 1 | 3 |
| 11 | 1 | 12 |

Result:

|  |  |  |
| --- | --- | --- |
| Address (Hex) | Address (Binary) | Result (H, M, PF) |
| 0x0FFF | 0b0000111111111111 | M |
| 0x7A28 | 0b0111101000101000 | H |
| 0x3DAD | 0b0011110110101101 | H |
| 0x3A98 | 0b0011101010011000 | H |
| 0x1C19 | 0b0001110000011001 | PF |
| 0x1000 | 0b0001000000000000 | H |
| 0x22D0 | 0b0010001011010000 | PF |

|  |  |  |  |
| --- | --- | --- | --- |
| Valid | Tag | Physical Page # | LRU |
| 1 | 1 | 13 | 3 |
| 1 | 7 | 4 | 1 |
| 1 | 3 | 6 | 2 |
| 1 | 2 | 14 | 4 |

|  |  |  |
| --- | --- | --- |
| Index | Valid | Physical Page or On Disk |
| 0 | 1 | 5 |
| 1 | 1 | 13 |
| 2 | 1 | 14 |
| 3 | 1 | 6 |
| 4 | 1 | 9 |
| 5 | 1 | 11 |
| 6 | 0 | Disk |
| 7 | 1 | 4 |
| 8 | 0 | Disk |
| 9 | 0 | Disk |
| 10 | 1 | 3 |
| 11 | 1 | 12 |