## Case-1

1 LS 5

1 LM 8

2 LS 12

1 ADD 5 #10

2 ADD 8 #5

1 LM 15

2 LS 20

1 IN 3

1 IN 12

2 LM 4

2 IN 15

1 LM 17

1 LM 19

2 ADD 10 #5

2 LS 22

1 LS 25

2 LM 30

2 IN 8

1 ADD 13 #7

1 LS 2

### **Output :**

PS C:\Users\krish\Desktop\College\Mobile Computing\CA\_Group\_31> & "C:/Python 3.9/python.exe" "c:/Users/krish/Desktop/College/Mobile Computing/CA\_Group\_31/main.py"

{0: '10000', 1: '10000', 2: '10000', 3: '10000', 4: '10000', 5: '10000', 6: '10000', 7: '10000', 8: '10000', 9: '10000', 10: '10000', 11: '10000', 12: '10000', 13: '10000', 14: '10000', 15: '10000', 16: '10000', 17: '10000', 18: '10000', 19: '10000', 20: '10000', 21: '10000', 22: '10000', 23: '10000', 24: '10000', 25: '10000', 26: '10000', 27: '10000', 28: '10000', 29: '10000', 30: '10000', 31: '10000'}

Cache Memory Dump for Core 1 after Instruction 0: {'5': ['S', 0]}

Cache Memory Dump for Core 1 after Instruction 1: {'5': ['S', 0], '8': ['M', 0]}

Invalid instruction

Cache Memory Dump for Core 1 after Instruction 3: {'5': ['M', 0], '8': ['M', 0]}

Invalid instruction

Cache Memory Dump for Core 1 after Instruction 5: {'5': ['M', 0], '8': ['M', 0], '15': ['M', 0]}

Invalid instruction

Cache Memory Dump for Core 1 after Instruction 7: {'5': ['M', 0], '8': ['M', 0], '15': ['M', 0]}

Cache Memory Dump for Core 1 after Instruction 8: {'5': ['M', 0], '8': ['M', 0], '15': ['M', 0]}

Invalid instruction

Invalid instruction

Cache Memory Dump for Core 1 after Instruction 11: {'5': ['M', 0], '8': ['M', 0], '15': ['M', 0], '17': ['M', 0]}

Cache Memory Dump for Core 1 after Instruction 12: {'5': ['M', 0], '8': ['M', 0], '15': ['M', 0], '17': ['M', 0], '19': ['M', 0]}

Invalid instruction

Invalid instruction

Cache Memory Dump for Core 1 after Instruction 15: {'5': ['M', 0], '15': ['M', 0], '17': ['M', 0], '19': ['M', 0], '25': ['S', 0]}

Invalid instruction

Invalid instruction

Cache Memory Dump for Core 1 after Instruction 18: {'5': ['M', 0], '15': ['M', 0], '17': ['M', 0], '19': ['M', 0], '25': ['S', 0], '13':

['M', 0]}

Cache Memory Dump for Core 1 after Instruction 19: {'5': ['M', 0], '15': ['M', 0], '17': ['M', 0], '19': ['M', 0], '25': ['S', 0], '2': ['S', 0]}

[['1', 'LS', '5'], ['1', 'LM', '8'], ['2', 'LS', '12'], ['1', 'ADD', '5', '#10'], ['2', 'ADD', '8', '#5'], ['1', 'LM', '15'], ['2', 'LS', '20'], ['1', 'IN', '3'], ['1', 'IN', '12'], ['2', 'LM', '4'], ['2', 'IN', '15'], ['1', 'LM', '17'], ['1', 'LM', '19'], ['2', 'ADD', '10', '#5'], ['2', 'LS', '22'], ['1', 'LS', '25'], ['2', 'LM', '30'], ['2', 'IN', '8'], ['1', 'ADD', '13', '#7'], ['1', 'LS', '2']]

Directory: 0 - 10000

Directory: 1 - 10000

Directory: 2 - 10000

Directory: 3 - 10000

Directory: 4 - 10000

Directory: 5 - 10000

Directory: 6 - 10000

Directory: 7 - 10000

Directory: 8 - 10000

Directory: 9 - 10000

Directory: 10 - 10000

Directory: 11 - 10000

Directory: 12 - 10000

Directory: 13 - 10000

Directory: 14 - 10000

Directory: 15 - 10000

Directory: 16 - 10000

Directory: 17 - 10000

Directory: 18 - 10000

Directory: 19 - 10000

Directory: 20 - 10000

Directory: 21 - 10000

Directory: 22 - 10000

Directory: 23 - 10000

Directory: 24 - 10000

Directory: 25 - 10000

Directory: 26 - 10000

Directory: 27 - 10000

Directory: 28 - 10000

Directory: 29 - 10000

Directory: 30 - 10000

Directory: 31 - 10000

Directory: 5 - 00101

Directory: 8 - 00101

Directory: 15 - 00101

Directory: 3 - 10100

Directory: 12 - 10100

Directory: 17 - 00101

Directory: 19 - 00101

Directory: 25 - 01101

Directory: 13 - 00101

Directory: 2 - 01101

{0: '10000', 1: '10000', 2: '10000', 3: '10000', 4: '10000', 5: '10000', 6: '10000', 7: '10000', 8: '10000', 9: '10000', 10: '10000', 11: '10000', 12: '10000', 13: '10000', 14: '10000', 15: '10000', 16: '10000', 17: '10000', 18: '10000', 19: '10000', 20: '10000', 21: '10000', 22: '10000', 23: '10000', 24: '10000', 25: '10000', 26: '10000', 27: '10000', 28: '10000', 29: '10000', 30: '10000', 31: '10000', '5': '00101', '8': '00101', '15': '00101', '3': '10100', '12': '10100', '17': '00101', '19': '00101', '25': '01101', '13': '00101', '2': '01101'}

## Case-2

1 LS 0

**2 IN 11 //Check for invalid**

1 LS 14

2 LS 23

1 ADD 24 #6

2 ADD 31 #12

1 LM 27

**Output:**  
{0: '10000', 1: '10000', 2: '10000', 3: '10000', 4: '10000', 5: '10000', 6: '10000', 7: '10000', 8: '10000', 9: '10000', 10: '10000', 11: '10000', 12: '10000', 13: '10000', 14: '10000', 15: '10000', 16: '10000', 17: '10000', 18: '10000', 19: '10000', 20: '10000', 21: '10000', 22: '10000', 23: '10000', 24: '10000', 25: '10000', 26: '10000', 27: '10000', 28: '10000', 29: '10000', 30: '10000', 31: '10000'}

Cache Memory Dump for Core 1 after Instruction 0: {'0': ['S', 0]}

Invalid instruction

Cache Memory Dump for Core 1 after Instruction 2: {'0': ['S', 0], '14': ['S', 0]}

Invalid instruction

Cache Memory Dump for Core 1 after Instruction 4: {'0': ['S', 0], '14': ['S', 0], '24': ['M', 0]}

Invalid instruction

Cache Memory Dump for Core 1 after Instruction 6: {'0': ['S', 0], '14': ['S', 0], '24': ['M', 0], '27': ['M', 0]}

[['1', 'LS', '0'], ['2', 'IN', '11'], ['1', 'LS', '14'], ['2', 'LS', '23'], ['1', 'ADD', '24', '#6'], ['2', 'ADD', '31', '#12'], ['1', 'LM', '27']]

Directory: 0 - 10000

Directory: 1 - 10000

Directory: 2 - 10000

Directory: 3 - 10000

Directory: 4 - 10000

Directory: 5 - 10000

Directory: 6 - 10000

Directory: 7 - 10000

Directory: 8 - 10000

Directory: 9 - 10000

Directory: 10 - 10000

Directory: 11 - 10000

Directory: 12 - 10000

Directory: 13 - 10000

Directory: 14 - 10000

Directory: 15 - 10000

Directory: 16 - 10000

Directory: 17 - 10000

Directory: 18 - 10000

Directory: 19 - 10000

Directory: 20 - 10000

Directory: 21 - 10000

Directory: 22 - 10000

Directory: 23 - 10000

Directory: 24 - 10000

Directory: 25 - 10000

Directory: 26 - 10000

Directory: 27 - 10000

Directory: 28 - 10000

Directory: 29 - 10000

Directory: 30 - 10000

Directory: 31 - 10000

Directory: 0 - 01101

Directory: 14 - 01101

Directory: 24 - 00101

Directory: 27 - 00101

{0: '10000', 1: '10000', 2: '10000', 3: '10000', 4: '10000', 5: '10000', 6: '10000', 7: '10000', 8: '10000', 9: '10000', 10: '10000', 11: '10000', 12: '10000', 13: '10000', 14: '10000', 15: '10000', 16: '10000', 17: '10000', 18: '10000', 19: '10000', 20: '10000', 21: '10000', 22: '10000', 23: '10000', 24: '10000', 25: '10000', 26: '10000', 27: '10000', 28: '10000', 29: '10000', 30: '10000', 31: '10000', '0': '01101', '14': '01101', '24': '00101', '27': '00101'}

## Case-3

1 LS 0

2 IN 11

1 LS 14

2 LS 23

1 ADD 24 #6

1 IN 17

1 IN 21

2 ADD 31 #12

2 IN 2

1 LM 27

**Output :**

PS C:\Users\krish\Desktop\College\Mobile Computing\CA\_Group\_31> & "C:/Python 3.9/python.exe" "c:/Users/krish/Desktop/College/Mobile Computing/CA\_Group\_31/main.py"

{0: '10000', 1: '10000', 2: '10000', 3: '10000', 4: '10000', 5: '10000', 6: '10000', 7: '10000', 8: '10000', 9: '10000', 10: '10000', 11: '10000', 12: '10000', 13: '10000', 14: '10000', 15: '10000', 16: '10000', 17: '10000', 18: '10000', 19: '10000', 20: '10000', 21: '10000', 22: '10000', 23: '10000', 24: '10000', 25: '10000', 26: '10000', 27: '10000', 28: '10000', 29: '10000', 30: '10000', 31: '10000'}

Cache Memory Dump for Core 1 after Instruction 0: {'0': ['S', 0]}

Invalid instruction

Cache Memory Dump for Core 1 after Instruction 2: {'0': ['S', 0], '14': ['S', 0]}

Invalid instruction

Cache Memory Dump for Core 1 after Instruction 4: {'0': ['S', 0], '14': ['S', 0], '24': ['M', 0]}

Cache Memory Dump for Core 1 after Instruction 5: {'0': ['S', 0], '14': ['S', 0], '24': ['M', 0]}

Cache Memory Dump for Core 1 after Instruction 6: {'0': ['S', 0], '14': ['S', 0], '24': ['M', 0]}

Invalid instruction

Invalid instruction

Cache Memory Dump for Core 1 after Instruction 9: {'0': ['S', 0], '14': ['S', 0], '24': ['M', 0], '27': ['M', 0]}

[['1', 'LS', '0'], ['2', 'IN', '11'], ['1', 'LS', '14'], ['2', 'LS', '23'], ['1', 'ADD', '24', '#6'], ['1', 'IN', '17'], ['1', 'IN', '21'], ['2', 'ADD', '31', '#12'], ['2', 'IN', '2'], ['1', 'LM', '27']]

Directory: 0 - 10000

Directory: 1 - 10000

Directory: 2 - 10000

Directory: 3 - 10000

Directory: 4 - 10000

Directory: 5 - 10000

Directory: 6 - 10000

Directory: 7 - 10000

Directory: 8 - 10000

Directory: 9 - 10000

Directory: 10 - 10000

Directory: 11 - 10000

Directory: 12 - 10000

Directory: 13 - 10000

Directory: 14 - 10000

Directory: 15 - 10000

Directory: 16 - 10000

Directory: 17 - 10000

Directory: 18 - 10000

Directory: 19 - 10000

Directory: 20 - 10000

Directory: 21 - 10000

Directory: 22 - 10000

Directory: 23 - 10000

Directory: 24 - 10000

Directory: 25 - 10000

Directory: 26 - 10000

Directory: 27 - 10000

Directory: 28 - 10000

Directory: 29 - 10000

Directory: 30 - 10000

Directory: 31 - 10000

Directory: 0 - 01101

Directory: 14 - 01101

Directory: 24 - 00101

Directory: 17 - 10100

Directory: 21 - 10100

Directory: 27 - 00101

{0: '10000', 1: '10000', 2: '10000', 3: '10000', 4: '10000', 5: '10000', 6: '10000', 7: '10000', 8: '10000', 9: '10000', 10: '10000', 11: '10000', 12: '10000', 13: '10000', 14: '10000', 15: '10000', 16: '10000', 17: '10000', 18: '10000', 19: '10000', 20: '10000', 21: '10000', 22: '10000', 23: '10000', 24: '10000', 25: '10000', 26: '10000', 27: '10000', 28: '10000', 29: '10000', 30: '10000', 31: '10000', '0': '01101', '14': '01101', '24': '00101', '17': '10100', '21': '10100', '27': '00101'}

## Case-4

1 IN 24

1 LS 26

1 IN 28

2 IN 29

1 ADD 30 #5

**Output :**

{0: '10000', 1: '10000', 2: '10000', 3: '10000', 4: '10000', 5: '10000', 6: '10000', 7: '10000', 8: '10000', 9: '10000', 10: '10000', 11: '10000', 12: '10000', 13: '10000', 14: '10000', 15: '10000', 16: '10000', 17: '10000', 18: '10000', 19: '10000', 20: '10000', 21: '10000', 22: '10000', 23: '10000', 24: '10000', 25: '10000', 26: '10000', 27: '10000', 28: '10000', 29: '10000', 30: '10000', 31: '10000'}

Cache Memory Dump for Core 1 after Instruction 0: {}

Cache Memory Dump for Core 1 after Instruction 1: {'26': ['S', 0]}

Cache Memory Dump for Core 1 after Instruction 2: {'26': ['S', 0]}

Invalid instruction

Cache Memory Dump for Core 1 after Instruction 4: {'26': ['S', 0], '30': ['M', 0]}

[['1', 'IN', '24'], ['1', 'LS', '26'], ['1', 'IN', '28'], ['2', 'IN', '29'], ['1', 'ADD', '30', '#5']]

Directory: 0 - 10000

Directory: 1 - 10000

Directory: 2 - 10000

Directory: 3 - 10000

Directory: 4 - 10000

Directory: 5 - 10000

Directory: 6 - 10000

Directory: 7 - 10000

Directory: 8 - 10000

Directory: 9 - 10000

Directory: 10 - 10000

Directory: 11 - 10000

Directory: 12 - 10000

Directory: 13 - 10000

Directory: 14 - 10000

Directory: 15 - 10000

Directory: 16 - 10000

Directory: 17 - 10000

Directory: 18 - 10000

Directory: 19 - 10000

Directory: 20 - 10000

Directory: 21 - 10000

Directory: 22 - 10000

Directory: 23 - 10000

Directory: 24 - 10000

Directory: 25 - 10000

Directory: 26 - 10000

Directory: 27 - 10000

Directory: 28 - 10000

Directory: 29 - 10000

Directory: 30 - 10000

Directory: 31 - 10000

Directory: 24 - 10100

Directory: 26 - 01101

Directory: 28 - 10100

Directory: 30 - 00101

{0: '10000', 1: '10000', 2: '10000', 3: '10000', 4: '10000', 5: '10000', 6: '10000', 7: '10000', 8: '10000', 9: '10000', 10: '10000', 11: '10000', 12: '10000', 13: '10000', 14: '10000', 15: '10000', 16: '10000', 17: '10000', 18: '10000', 19: '10000', 20: '10000', 21: '10000', 22: '10000', 23: '10000', 24: '10000', 25: '10000', 26: '10000', 27: '10000', 28: '10000', 29: '10000', 30: '10000', 31: '10000', '24': '10100', '26': '01101', '28': '10100', '30': '00101'}

## Case-5

1 LM 16

2 LM 17

1 LS 18

2 ADD 19 #2

1 ADD 20 #1

2 LS 21

1 IN 22

2 IN 23

1 ADD 24 #3

2 LM 25

**Output :**

{0: '10000', 1: '10000', 2: '10000', 3: '10000', 4: '10000', 5: '10000', 6: '10000', 7: '10000', 8: '10000', 9: '10000', 10: '10000', 11: '10000', 12: '10000', 13: '10000', 14: '10000', 15: '10000', 16: '10000', 17: '10000', 18: '10000', 19: '10000', 20: '10000', 21: '10000', 22: '10000', 23: '10000', 24: '10000', 25: '10000', 26: '10000', 27: '10000', 28: '10000', 29: '10000', 30: '10000', 31: '10000'}

Cache Memory Dump for Core 1 after Instruction 0: {'16': ['M', 0]}

Invalid instruction

Cache Memory Dump for Core 1 after Instruction 2: {'16': ['M', 0], '18': ['S', 0]}

Invalid instruction

Cache Memory Dump for Core 1 after Instruction 4: {'16': ['M', 0], '18': ['S', 0], '20': ['M', 0]}

Invalid instruction

Cache Memory Dump for Core 1 after Instruction 6: {'16': ['M', 0], '18': ['S', 0], '20': ['M', 0]}

Invalid instruction

Cache Memory Dump for Core 1 after Instruction 8: {'16': ['M', 0], '18': ['S', 0], '20': ['M', 0], '24': ['M', 0]}

Invalid instruction

[['1', 'LM', '16'], ['2', 'LM', '17'], ['1', 'LS', '18'], ['2', 'ADD', '19', '#2'], ['1', 'ADD', '20', '#1'], ['2', 'LS', '21'], ['1', 'IN', '22'], ['2', 'IN', '23'], ['1', 'ADD', '24', '#3'], ['2', 'LM', '25']]

Directory: 0 - 10000

Directory: 1 - 10000

Directory: 2 - 10000

Directory: 3 - 10000

Directory: 4 - 10000

Directory: 5 - 10000

Directory: 6 - 10000

Directory: 7 - 10000

Directory: 8 - 10000

Directory: 9 - 10000

Directory: 10 - 10000

Directory: 11 - 10000

Directory: 12 - 10000

Directory: 13 - 10000

Directory: 14 - 10000

Directory: 15 - 10000

Directory: 16 - 10000

Directory: 17 - 10000

Directory: 18 - 10000

Directory: 19 - 10000

Directory: 20 - 10000

Directory: 21 - 10000

Directory: 22 - 10000

Directory: 23 - 10000

Directory: 24 - 10000

Directory: 25 - 10000

Directory: 26 - 10000

Directory: 27 - 10000

Directory: 28 - 10000

Directory: 29 - 10000

Directory: 30 - 10000

Directory: 31 - 10000

Directory: 16 - 00101

Directory: 18 - 01101

Directory: 20 - 00101

Directory: 22 - 10100

Directory: 24 - 00101

{0: '10000', 1: '10000', 2: '10000', 3: '10000', 4: '10000', 5: '10000', 6: '10000', 7: '10000', 8: '10000', 9: '10000', 10: '10000', 11: '10000', 12: '10000', 13: '10000', 14: '10000', 15: '10000', 16: '10000', 17: '10000', 18: '10000', 19: '10000', 20: '10000', 21: '10000', 22: '10000', 23: '10000', 24: '10000', 25: '10000', 26: '10000', 27: '10000', 28: '10000', 29: '10000', 30: '10000', 31: '10000', '16': '00101', '18': '01101', '20': '00101', '22': '10100', '24': '00101'}

## Case-6

1 LS 13

2 IN 14

1 ADD 15 #5

1 ADD 17 #8

2 IN 18

1 IN 19

2 ADD 20 #12

**Output :**

PS C:\Users\krish\Desktop\College\Mobile Computing\CA\_Group\_31> & "C:/Python 3.9/python.exe" "c:/Users/krish/Desktop/College/Mobile Computing/CA\_Group\_31/main.py"

{0: '10000', 1: '10000', 2: '10000', 3: '10000', 4: '10000', 5: '10000', 6: '10000', 7: '10000', 8: '10000', 9: '10000', 10: '10000', 11: '10000', 12: '10000', 13: '10000', 14: '10000', 15: '10000', 16: '10000', 17: '10000', 18: '10000', 19: '10000', 20: '10000', 21: '10000', 22: '10000', 23: '10000', 24: '10000', 25: '10000', 26: '10000', 27: '10000', 28: '10000', 29: '10000', 30: '10000', 31: '10000'}

Cache Memory Dump for Core 1 after Instruction 0: {'13': ['S', 0]}

Invalid instruction

Cache Memory Dump for Core 1 after Instruction 2: {'13': ['S', 0], '15': ['M', 0]}

Cache Memory Dump for Core 1 after Instruction 3: {'13': ['S', 0], '15': ['M', 0], '17': ['M', 0]}

Invalid instruction

Cache Memory Dump for Core 1 after Instruction 5: {'13': ['S', 0], '15': ['M', 0], '17': ['M', 0]}

Invalid instruction

[['1', 'LS', '13'], ['2', 'IN', '14'], ['1', 'ADD', '15', '#5'], ['1', 'ADD', '17', '#8'], ['2', 'IN', '18'], ['1', 'IN', '19'], ['2', 'ADD', '20', '#12']]

Directory: 0 - 10000

Directory: 1 - 10000

Directory: 2 - 10000

Directory: 3 - 10000

Directory: 4 - 10000

Directory: 5 - 10000

Directory: 6 - 10000

Directory: 7 - 10000

Directory: 8 - 10000

Directory: 9 - 10000

Directory: 10 - 10000

Directory: 11 - 10000

Directory: 12 - 10000

Directory: 13 - 10000

Directory: 14 - 10000

Directory: 15 - 10000

Directory: 16 - 10000

Directory: 17 - 10000

Directory: 18 - 10000

Directory: 19 - 10000

Directory: 20 - 10000

Directory: 21 - 10000

Directory: 22 - 10000

Directory: 23 - 10000

Directory: 24 - 10000

Directory: 25 - 10000

Directory: 26 - 10000

Directory: 27 - 10000

Directory: 28 - 10000

Directory: 29 - 10000

Directory: 30 - 10000

Directory: 31 - 10000

Directory: 13 - 01101

Directory: 15 - 00101

Directory: 17 - 00101

Directory: 19 - 10100

{0: '10000', 1: '10000', 2: '10000', 3: '10000', 4: '10000', 5: '10000', 6: '10000', 7: '10000', 8: '10000', 9: '10000', 10: '10000', 11: '10000', 12: '10000', 13: '10000', 14: '10000', 15: '10000', 16: '10000', 17: '10000', 18: '10000', 19: '10000', 20: '10000', 21: '10000', 22: '10000', 23: '10000', 24: '10000', 25: '10000', 26: '10000', 27: '10000', 28: '10000', 29: '10000', 30: '10000', 31: '10000', '13': '01101', '15': '00101', '17': '00101', '19': '10100'}