**Exercício 3:** Comente o código e mostre como mudam os registradores e o stack ao executar este programa. Otimize o programa usando PUSH e POP.

| Endereço | Instruções | Descrição | PC | LR | R0 | R1 | R2 |  Stack (32 Bits) SP  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 100 | MAIN: | LDR R13,=0xFF8 |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FEC |  |  |  |  |  |
| FF0 |  |  |  |  |  |
| FF4 |  |  |  |  |  |
| FF8 |  |  |  |  |  |

 |
| 104 |  | LDR R0,=0x125 |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FEC |  |  |  |  |  |
| FF0 |  |  |  |  |  |
| FF4 |  |  |  |  |  |
| FF8 |  |  |  |  |  |

 |
| 108 |  | LDR R1,=0x144 |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FEC |  |  |  |  |  |
| FF0 |  |  |  |  |  |
| FF4 |  |  |  |  |  |
| FF8 |  |  |  |  |  |

 |
| 10C |  | MOV R2,#0x56 |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FEC |  |  |  |  |  |
| FF0 |  |  |  |  |  |
| FF4 |  |  |  |  |  |
| FF8 |  |  |  |  |  |

 |
| 110 |  | BL FUNC |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FEC |  |  |  |  |  |
| FF0 |  |  |  |  |  |
| FF4 |  |  |  |  |  |
| FF8 |  |  |  |  |  |

 |
| 114 |  | ADD R3,R0,R1 |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FEC |  |  |  |  |  |
| FF0 |  |  |  |  |  |
| FF4 |  |  |  |  |  |
| FF8 |  |  |  |  |  |

 |
| 118 |  | ADD R3,R3,R2 |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FEC |  |  |  |  |  |
| FF0 |  |  |  |  |  |
| FF4 |  |  |  |  |  |
| FF8 |  |  |  |  |  |

 |
| 11C | LOOP: | B LOOP |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FEC |  |  |  |  |  |
| FF0 |  |  |  |  |  |
| FF4 |  |  |  |  |  |
| FF8 |  |  |  |  |  |

 |
| 120 | FUNC: | STR R0,[R13] |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FEC |  |  |  |  |  |
| FF0 |  |  |  |  |  |
| FF4 |  |  |  |  |  |
| FF8 |  |  |  |  |  |

 |
| 124 |  | SUB R13,R13,#4 |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FEC |  |  |  |  |  |
| FF0 |  |  |  |  |  |
| FF4 |  |  |  |  |  |
| FF8 |  |  |  |  |  |

 |
| 128 |  | STR R1,[R13] |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FEC |  |  |  |  |  |
| FF0 |  |  |  |  |  |
| FF4 |  |  |  |  |  |
| FF8 |  |  |  |  |  |

 |
| 12C |  | SUB R13,R13,#4 |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FEC |  |  |  |  |  |
| FF0 |  |  |  |  |  |
| FF4 |  |  |  |  |  |
| FF8 |  |  |  |  |  |

 |
| 130 |  | STR R2,[R13] |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FEC |  |  |  |  |  |
| FF0 |  |  |  |  |  |
| FF4 |  |  |  |  |  |
| FF8 |  |  |  |  |  |

 |
| 134 |  | SUB R13,R13,#4 |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FEC |  |  |  |  |  |
| FF0 |  |  |  |  |  |
| FF4 |  |  |  |  |  |
| FF8 |  |  |  |  |  |

 |
| 138 |  | MOV R0,#0 |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FEC |  |  |  |  |  |
| FF0 |  |  |  |  |  |
| FF4 |  |  |  |  |  |
| FF8 |  |  |  |  |  |

 |
| 13C |  | MOV R1,#0 |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FEC |  |  |  |  |  |
| FF0 |  |  |  |  |  |
| FF4 |  |  |  |  |  |
| FF8 |  |  |  |  |  |

 |
| 140 |  | MOV R2,#0 |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FEC |  |  |  |  |  |
| FF0 |  |  |  |  |  |
| FF4 |  |  |  |  |  |
| FF8 |  |  |  |  |  |

 |
| 144 |  | ADD R13,R13,#4 |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FEC |  |  |  |  |  |
| FF0 |  |  |  |  |  |
| FF4 |  |  |  |  |  |
| FF8 |  |  |  |  |  |

 |
| 148 |  | LDR R2,[R13] |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FEC |  |  |  |  |  |
| FF0 |  |  |  |  |  |
| FF4 |  |  |  |  |  |
| FF8 |  |  |  |  |  |

 |
| 14C |  | ADD R13,R13,#4 |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FEC |  |  |  |  |  |
| FF0 |  |  |  |  |  |
| FF4 |  |  |  |  |  |
| FF8 |  |  |  |  |  |

 |
| 150 |  | LDR R1,[R13] |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FEC |  |  |  |  |  |
| FF0 |  |  |  |  |  |
| FF4 |  |  |  |  |  |
| FF8 |  |  |  |  |  |

 |
| 154 |  | ADD R13,R13,#4 |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FEC |  |  |  |  |  |
| FF0 |  |  |  |  |  |
| FF4 |  |  |  |  |  |
| FF8 |  |  |  |  |  |

 |
| 158 |  | LDR R0,[R13] |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FEC |  |  |  |  |  |
| FF0 |  |  |  |  |  |
| FF4 |  |  |  |  |  |
| FF8 |  |  |  |  |  |

 |
| 15C |  | BX LR |  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FEC |  |  |  |  |  |
| FF0 |  |  |  |  |  |
| FF4 |  |  |  |  |  |
| FF8 |  |  |  |  |  |

 |