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| **北 京 邮 电 大 学**  **实 验 报 告**  **课程名称\_\_\_\_\_\_\_\_\_\_\_计算机组成原理\_\_\_\_\_\_\_\_\_\_\_\_\_**  **实验名称\_\_\_\_\_\_\_\_\_CPU 组成与机器指令的执行\_\_\_\_\_\_\_\_\_\_\_**  **\_\_\_计算机\_\_\_学院\_\_\_314\_\_\_班 姓名\_\_\_王小龙\_\_\_**  **教师\_\_\_\_赵学达\_\_\_\_ 成绩\_\_\_\_\_\_**  **\_\_2022\_\_年\_\_6\_\_月\_\_1\_\_日** |

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| **一．实验目的**  **⑴用微程序控制器控制数据通路，将相应的信号线连接，构成一台能运行测试程序的CPU。**  **⑵执行一个简单的程序，掌握机器指令与微指令的关系。**  **⑶理解计算机如何取出指令、如何执行指令、如何在一条指令执行结束后自动取出下一条指令并执行，牢固建立的计算机整机概念。**  **二．实验步骤**  **⑴按如下图接线：**      **⑵通过写存储器操作将如下程序写入存储器。**    **⑶通过写寄存器操作设置寄存器R2为12H、R3为0FH，如下图：**    **⑷将单拍开关DP设置为1，按复位按钮CLR，复位程序计数器PC为00H。将模式开关设置为**  **SWC=0、SWB=0、SWA=0，准备运行程序；**  **⑸按一次QD按钮，进入程序运行。每按一次QD按钮，执行一条微指令，直到程序结束。**  **⑹在程序执行过程中，记录下列信号的值：PC7~PC0、AR7~AR0、µA5~µA0、IR7~IR0、A7~A0、B7~B0和D7~D0。**  **三．实验数据表格（每按一次QD记录一次）**   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | **指令** | **μA5～μA0** | **PC7～PC0** | **AR7～AR0** | **IR7～IR0** | **A7～A0** | **B7～B0** | **D7～D0** | | **LD R0，[R3]** | **100101** | **0000 0001** | **0000 0000** | **0101 0011** | **0000 0000** | **0000 1111** | **0000 1111** | | **LD R0，[R3]** | **001110** | **0000 0001** | **0000 1111** | **0101 0011** | **0000 0000** | **0000 1111** | **1000 0101** | | **LD R0，[R3]** | **000001** | **0000 0001** | **0000 1111** | **0101 0011** | **1000 0101** | **0000 1111** | **0000 0000** | | **INC R3** | **100100** | **0000 0010** | **0000 1111** | **0100 1100** | **0000 1111** | **1000 0101** | **0001 0000** | | **INC R3** | **000001** | **0000 0010** | **0000 1111** | **0100 1100** | **0001 0000** | **1000 0101** | **0000 0000** | | **LD R1,[R3]** | **100101** | **0000 0011** | **0000 1111** | **0101 0111** | **0000 0000** | **0001 0000** | **0001 0000** | | **LD R1,[R3]** | **001110** | **0000 0011** | **0001 0000** | **0101 0111** | **0000 0000** | **0001 0000** | **0010 0011** | | **LD R1,[R3]** | **000001** | **0000 0011** | **0001 0000** | **0101 0111** | **0010 0011** | **0001 0000** | **0000 0000** | | **SUB R0,R1** | **100010** | **0000 0100** | **0001 0000** | **0010 0001** | **1000 0101** | **0010 0011** | **0110 0010** | | **SUB R0,R1** | **000001** | **0000 0100** | **0001 0000** | **0010 0001** | **0110 0010** | **0010 0011** | **0000 0000** | | **JZ 0BH** | **101000** | **0000 0101** | **0001 0000** | **1000 0110** | **0010 0011** | **0001 0010** | **0000 0000** | | **JZ 0BH** | **010010** | **0000 0101** | **0001 0000** | **1000 0110** | **0010 0011** | **0001 0010** | **0000 0000** | | **JZ 0BH** | **000001** | **0000 0101** | **0001 0000** | **1000 0110** | **0010 0011** | **0001 0010** | **0000 0000** | | **ST R0,[R2]** | **100110** | **0000 0110** | **0001 0000** | **0110 1000** | **0001 0010** | **0110 0010** | **0001 0010** | | **ST R0,[R2]** | **010000** | **0000 0110** | **0001 0010** | **0110 1000** | **0001 0010** | **0110 0010** | **0110 0010** | | **ST R0,[R2]** | **000001** | **0000 0110** | **0001 0010** | **0110 1000** | **0001 0010** | **0110 0010** | **0000 0000** | | **INC R3** | **100100** | **0000 0111** | **0001 0010** | **0100 1100** | **0001 0000** | **0110 0010** | **0001 0001** | | **INC R3** | **000001** | **0000 0111** | **0001 0010** | **0100 1100** | **0001 0001** | **0110 0010** | **0000 0000** | | **LD R0，[R3]** | **100101** | **0000 1000** | **0001 0010** | **0101 0011** | **0110 0010** | **0001 0001** | **0001 0001** | | **LD R0，[R3]** | **001110** | **0000 1000** | **0001 0001** | **0101 0011** | **0110 0010** | **0001 0001** | **1110 1111** | | **LD R0，[R3]** | **000001** | **0000 1000** | **0001 0001** | **0101 0011** | **1110 1111** | **0001 0001** | **0000 0000** | | **ADD R0，R1** | **100001** | **0000 1001** | **0001 0001** | **0001 0001** | **1110 1111** | **0010 0011** | **0001 0010** | | **ADD R0，R1** | **000001** | **0000 1001** | **0001 0001** | **0001 0001** | **0001 0010** | **0010 0011** | **0000 0000** | | **JC 0CH** | **100111** | **0000 1010** | **0001 0001** | **0111 0010** | **0001 0010** | **0001 0010** | **0000 0000** | | **JC 0CH** | **010011** | **0000 1010** | **0001 0001** | **0111 0010** | **0001 0010** | **0001 0010** | **0000 0000** | | **JC 0CH** | **000001** | **0000 1100** | **0001 0001** | **0111 0010** | **0001 0010** | **0001 0010** | **0000 0000** | | **INC R2** | **未执行** |  |  |  |  |  |  | | **ST R2,[R2]** | **未执行** |  |  |  |  |  |  | | **AND R0,R1** | **100011** | **0000 1101** | **0001 0001** | **0011 0001** | **0001 0010** | **0010 0011** | **0000 0010** | | **AND R0,R1** | **000001** | **0000 1101** | **0001 0001** | **0011 0001** | **0000 0010** | **0010 0011** | **0000 0000** | | **OUT R2** | **101010** | **0000 1110** | **0001 0001** | **1010 0010** | **0000 0010** | **0001 0010** | **0001 0010** | | **OUT R2** | **000 001** | **0000 1110** | **0001 0001** | **1010 0010** | **0000 0010** | **0001 0010** | **0000 0000** | | **STP** | **101110** | **0000 1111** | **0001 0001** | **1110 0000** | **0000 0010** | **0000 0010** | **0000 0000** | | **STP** | **000 001** | **0000 1111** | **0001 0001** | **1110 0000** | **0000 0010** | **0000 0010** | **0000 0000** |   **四．实验中的异常情况**  **有时会出现按完几次QD后，不知道程序为什么就跑错了，这时可以通过回放来查询错误。**  **五．总结提升**  **理解了程序的顺序执行、管理控制操作、操作和执行定时、数据加工等；**  **对运算器有了更深的理解；**  **对条件转移指令有了很好的理解。** |
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