South China University of Technology

《Computer Organization and Architecture》Experiment Report

Experiment Title： **Bus & Register**

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| **Description** |
| 【Objective and Requirement】  Objective：  (1) Draw the bus and set the dial switcher, achieve the goal of passing the data from switcher to bus.  (2) Using 74LS374 achieve the common register R0, using 74LS273 and L4LS744 achieve the function of data latch, and comparing the difference between them.  (3) Using 74LS194 to achieve the function of shift register, including the operation of translation between parallel and serial and the operation of logic shifting and mathematic shifting.  【Environment】  Operating System：Windows XP |
| **Content** |
| 【Procedure】   1. Step：   **Section 1: Bus & Buffer Experiment:**  Draw the bus and set the dial switcher, achieve the goal of passing the data from switcher to bus.  part of circuit diagram  C:\Users\Administrator\AppData\Roaming\Tencent\Users\68046508\QQ\WinTemp\RichOle\E`CU{}ES2(JC}__FPI2O)L7.png  1.Place the needed components into the diagram.  2.Use BUS to connect them.  3.Set the data 0x55 (0101 0101) on the 8-bit switcher connecting to the bus, and check the results in 7SEG-BCD（led light）  **Section 2: Register Experiment:**  Using 74LS374 achieve the common register R0, using 74LS273 and L4LS744 achieve the function of data latch, and comparing the difference between them.  part of circuit diagram    Register 74LS244:    Register R0(74LS374)  C:\Users\Administrator\AppData\Roaming\Tencent\Users\68046508\QQ\WinTemp\RichOle\I_{YB~6`1C$T75M$QSL@E~4.png  Data Buffer Register DR(74LS273)  C:\Users\Administrator\AppData\Roaming\Tencent\Users\68046508\QQ\WinTemp\RichOle\4(P[Y`RT7SXVF9G%KDAZODA.png  **Section 3: Shift Register Experiment:**  Using 74LS194 to achieve the function of shift register, including the operation of translation between parallel and serial and the operation of logic shifting and mathematic shifting.  part of circuit diagram  C:\Users\Administrator\AppData\Roaming\Tencent\Users\68046508\QQ\WinTemp\RichOle\9SZESJYTF`O~BG}SNDM}NYH.png  74LS194  C:\Users\Administrator\AppData\Roaming\Tencent\Users\68046508\QQ\WinTemp\RichOle\$}T0C4YQ~E85@]8D%A`][FQ.png C:\Users\Administrator\AppData\Roaming\Tencent\Users\68046508\QQ\WinTemp\RichOle\UHI5V$YOY6_R_3SM][3I$EA.png  2. Data：   |  |  | | --- | --- | | Section1 | 0x55(01010101) | | Section2 | 0xAA(10101010) | | Section3 | 0x05(00000101) |   3. Major Procedure：  **Section1:**  **Set the data 0x55 (0101 0101) on the 8-bit switcher connecting to the bus, and check the results in 7SEG-BCD(led light)**  Switcher result    LED light result  **Explanation:** The switcher send the data to the bus of bus DIN at first and the data of DIN are transferred to the bus BUS through the latch 74LS244 which are enabled by the low level.  **Section2:**  **Set the data 0xAA (1010 1010) on the 8-bit switcher connecting to the bus DIN and compare the difference between the bus DIN and bus BUS.**  Switcher result and bus DIN and bus BUS    LED light result and bus BUS    **Write the data 0xAA (1010 1010) onto the register R0 by triggering the CLK, block the output of the R0, and observe the status of the bus BUS(Using Led light or prober).**  First write the data 0xAA (1010 1010) by switcher:      triggering the CLK of R0:  trigger：before  after：  before blocking the output of the R0:  after blocking the output of the R0:  **Explanation:** After thetrigger the CLK data of the bus are stored in the register R0. Then if we block the output of the R0, we can not see any data is stored in the R0 instead we should enable the output so that we can see the result.  **Block the 74LS244 and see what happen to the bus BUS.**  Block 74LS244 :  turn on R0\_BUS:      **Explanation:** Block the 74LS244, we can not see any data in the bus BUS and in the LED light. However if we enable the output of R0 we can see the data stored in the R0.  **Repeat the above operations with replacing 74LS273 to 74LS374, then compare the differences of result.**  **First**: Set the data 0xAA (1010 1010) on the 8-bit switcher connecting to the bus DIN and compare the difference between the bus DIN and bus BUS.    **Second**: Write the data 0xAA (1010 1010) onto the register DR by triggering the CLK, block the output of the DR, and observe the status of the bus BUS(Using Led light or prober).  Before the operation:  After triggering:  Before block the output(close the switcher):  Block the output(close the switcher):  Enable the output(close the switcher):  Third: Block the 74LS244 and see what happen to the bus BUS  Before blocking the 74LS244:  After blocking the 74LS244:  **Explanation:** After thetrigger the CLK data of the bus are stored in the register DR. However if we block the output of DR we see the data store in the DR from the bus unlike the R0. If we block in the 74LS244 there is nothing in the bus BUS. However if we enable the output of the DR we can output the data stored in the DR in the bus BUS and the LED light.  **Section3:**  **Set S1=1,S0=1, input the data 5H (00000101) to the register U1、U2.**  Trigger the SFT\_CLK to implement the input the data and Set S1=1,S0=1 by switch.    **Explanation:** Set S1=1,S0=1 is used for the operation of storing data into the U1 U2. Finally, we store the data into the U1 and U2 for the next calculation.  **Enable the register R0, output the data to the shift register U1. Set the SR to 0, trigger the CLK signal to make a double (\*2) operation.**  Initial:  Set  Set pins: SL and S0 to 0 SR and S1 to 1  Trigger the CLK signal:  **Explanation:** Enable the register R0 is used for setting the data to 5. Then set the S1=1, S0 =0and SR=0 to ask the shift register to shift right. SR=0 means we padding the 0 to the right when we shift right, Finally we get the result is equal to 0x0A =10 = 5\*2  **Enable the register DR, output the data to the shift register U2. Set the SL to 0, trigger the CLK signal to make a half division (/2) operation.**  Initial:  Set pins: SL and S0 to 1 SR and S1 to 0  Trigger the CLK signal:  **Explanation:** Enable the register DR is used for setting the data to 5. Then set the S1=0, S0=1and SL=0 to ask the shift register to shift left. SL=0 means we padding the 0 to the left when we shift left, Finally we get the result is equal to 0x02 =2 = 5//2 |
| **Conclusion** |
| From the experiment I have learned about the basic use of Proteus, such as using the chips and link the pins to each chip, and the function of bus. Then I learn how to input the data by switcher and output the data by LED. Using the 74LS244 for separating the input data and the output data. Using the switch to control the output and the Clock signal of the Chips. Learn the difference of Register R0 (74LS374) and Data Buffer Register DR (74LS273). Both can store the data and output the stored data. However, the Register cannot show the stored data when block the output instead DR can show the stored data when block the output. Finally, used the knowledge we learned before I also make the experiment of shift register. Learning how to control a complex chip with multiple functions which we need to modify the control pins like S1,S0=1, SL and SR to control what I want the chips do like shifting right of left which can make the data \*2 and //2 respectively |
| **Teacher’s Comments and Score** |
| Comment：  Score：           Signature：                                                 Date： |