South China University of Technology

《Computer Organization and Architecture》Experiment Report

Experiment Title： RAM&ROM

Name： 谭演锋 Student ID： 202130100456

Class： 21计联 Group： /

Collaborator： /

Teacher： 毛爱华

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| **Description** |
| 【Objective and Requirement】  Objective：  (1) Know the read/write operation and feature of RAM and ROM.  (2) Understand the principle of  ①Connection between storage and bus;  ②Address space mapping of memory;  Requirement：  Design an 8-bit data path to be used in the address-independent ROM and RAM. Implement the function of memory data read and write operations and batch importing in RAM and ROM.  【Environment】  Operating System：Windows 11 |
| **Content** |
| 【Procedure】  Step：   1. According to the “Appendix: How to batch import data to ROM”, load the hex file from compiled project.asm to storage and check the correctness. 2. Before start simulation, make = = When simulation, make , switch the switchers to input 024H to address bus ABUS\_[0..11](green led will show the result.). 3. Make ROM\_CLK jump as 0->1. Transfer 024H to ROM from ROM\_AR; make = 0, and the ROM module 2764 enables read function and will output the 8-bit data to DBUS\_[0..7](red led will show the result), observe the result and record it. 4. Then input F80H to RAM from RAM\_AR; Make =0 , and the RAM module 6116 enables write function, write the ROM memory unit [024H]’s data into RAM memory unit[F80H]. 5. Make and observe the led’s result to check the integrity of writing data. 6. According the operations above, repeat the experiment with superlatively writing the data of ROM memory unit [024H],[028H],[02CH],[030H] to RAM memory unit [F80H],[F81H],[F82H],[F83H].   2. Data：  The data in the ROM:    Program.asm  After batching import data to ROM, we can get the result in the proteus    The data in ROM from 0000H to 0007H are 55. And from 0024H to 002BH are AA, which are from the data we load. The other data in the ROM are FF.  3. Major Procedure：  Before start simulation, make = = When simulation, make , switch the switchers to input 024H to address bus ABUS\_[0..11](green led will show the result.).    Explanation: First we select the data in the ROM by switchers, which is 024H  Make ROM\_CLK jump as 0->1. Transfer 024H to ROM from ROM\_AR; make = 0, and the ROM module 2764 enables read function and will output the 8-bit data to DBUS\_[0..7](red led will show the result), observe the result and record it.    Explanation: Making ROM\_CLK jump as 0->1 enables the address 024H transfer to ROM. Then = 0 enables read function and will output the 8-bit data to DBUS\_[0..7]  Then input F80H to RAM from RAM\_AR; Make =0 , and the RAM module 6116 enables write function, write the RAM memory unit [024H]’s data into ROM memory unit[F80H].    Explanation: Making RAM\_CLK jump as 0->1 enables the address F80H transfer to RAM. Then = enables write function and will input the 8-bit data in ROM to RAM.  Make and observe the led’s result to check the integrity of writing data.      Explanation: We can see the data AA which is the data in ROM of address 024H has been written to the RAM in the address 080H instead of F80H since in our experiment the first 5 bit in high level(1) is used to represent the RAM.  According the operations above, repeat the experiment with superlatively writing the data of ROM memory unit [024H],[028H],[02CH],[030H] to RAM memory unit [F80H], [F81H], [F82H], [F83H].    Explanation: [024H]= AA,[028H] =AA,[02CH] =FF,[030H]=FF to ROM and are written to RAM respectively.  Bonus question:  Consider changing the ORG statement to "ORG 0224h", could the data segments that ORG defines be accessed? If not, is the error occurred in data batch importing? Please modify the ROM address selection circuit to ensure "ORG 0224h" segment can access to data.  No it could not. It is also not the error occurred in the data batch importing. However, this is because ROM can not get the bit in ABUS\_9. We need to connect the A10 pin in ROM to Q1 pin in U4.    Finally we can get the result. |
| **Conclusion** |
| From the experiment we have a better known about the difference of ROM and RAM. ROM can only read so it only has the OE signal for reading unlike the RAM has both OE signal and WE signal for writing. I also learn how to store the data first to the ROM and read it according the address as well as RAM learn how to write it by address and read it. Additionally, I learned the combination work between ROM and RAM and know how to look the data in ROM and RAM. Finally, I learn that the capacitor of the memory is determined by the address bits of the memory. |
| **Teacher’s Comments and Score** |
| Comment：  Score：           Signature：                                                 Date： |