



CSCE 312 - Computer Organization

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Lab Project Report

Project 5: Computer Architecture

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OBJECTIVE

The objective of this project is to create a simple HACK computer using previously built components. By using these previous components to create the CPU and RAM, we can build a simple computer (after including the pre-built ROM32) that can compute simple operations.

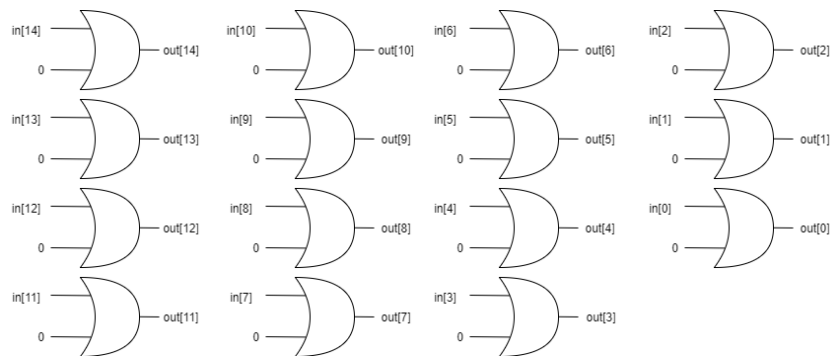
METHODOLOGY

Bus16toBus15

1. DESIGN HEURISTIC

To design this chip, we can use previously built OR gates. By passing the 16-bit input with a false input into each OR gate, we can output to the corresponding slot. Note that we skip in[15] because the point of this chip is to ignore the 15th bit.

2. LOGIC CIRCUIT DIAGRAM



Here, we have input bus in[16]. We pass in[0:14] through OR gates with false inputs and output to the corresponding output bus pins. This allows us to ignore the most significant bit.

3. HDL

```
// helper chip
CHIP Bus16toBus15 {
    IN in[16];
    OUT out[15];

    PARTS:
        Or(a=in[14], b=false, out=out[14]);
        Or(a=in[13], b=false, out=out[13]);
        Or(a=in[12], b=false, out=out[12]);
        Or(a=in[11], b=false, out=out[11]);
        Or(a=in[10], b=false, out=out[10]);
        Or(a=in[9], b=false, out=out[9]);
        Or(a=in[8], b=false, out=out[8]);
        Or(a=in[7], b=false, out=out[7]);
        Or(a=in[6], b=false, out=out[6]);
        Or(a=in[5], b=false, out=out[5]);
        Or(a=in[4], b=false, out=out[4]);
        Or(a=in[3], b=false, out=out[3]);
        Or(a=in[2], b=false, out=out[2]);
        Or(a=in[1], b=false, out=out[1]);
        Or(a=in[0], b=false, out=out[0]);
}
```