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-- Company:  
-- Engineer:  
--  
-- Create Date: 01.04.2024 21:42:49  
-- Design Name:  
-- Module Name: ALU_6 - Behavioral  
-- Project Name:  
-- Target Devices:  
-- Tool Versions:  
-- Description:  
--  
-- Dependencies:  
--  
-- Revision:  
-- Revision 0.01 - File Created  
-- Additional Comments:  
--  
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```

```
library IEEE;  
use IEEE.STD_LOGIC_1164.ALL;  
use IEEE.std_logic_unsigned.ALL;  
USE IEEE.numeric_std.ALL;  
-- Uncomment the following library declaration if using  
-- arithmetic functions with Signed or Unsigned values  
--use IEEE.NUMERIC_STD.ALL;  
  
-- Uncomment the following library declaration if instantiating  
-- any Xilinx leaf cells in this code.  
--library UNISIM;  
--use UNISIM.VComponents.all;  
  
entity ALU_6 is
```

```

generic( dw: integer:=4);
Port (a,b:in std_logic_vector(dw-1 downto 0);
      s: in std_logic_vector(dw downto 0);
      o:out std_logic_vector(dw-1 downto 0));
end ALU_6;

```

architecture Behavioral of ALU_6 is

```
begin
```

```
process (A,B,s)
```

```
begin
```

```
case s is
```

```
when"00000"=>o<=(others => '0');
```

```
when"00001"=>o<=A and B;
```

```
when"00010"=>o<=A or B;
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```
when"00011"=>o<=A nand B;
```

```
when"00100"=>o<=A nor B;
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```
when"00101"=>o<=A xor B;
```

```
when"00110"=>o<=A xnor B;
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```
when"00111"=>o<=A + B;
```

```
when"01000"=>o<=A - B;
```

```
when"01001"=>o<=
```

```
std_logic_vector(to_unsigned(to_integer(unsigned(a)) *
to_integer(unsigned(b)),dw));
```

```
when"01010"=> if(A > B) then o <= (others => '1'); else o <=
(others => '0');end if;
```

```
when"01011"=> if(A < B) then o <= (others => '1'); else o <=
(others => '0');end if;
```

```
when"01100"=> if(A = B) then o <= (others => '1'); else o <=
(others => '0');end if;
```

```
when"01101"=> if(A >= B) then o <= (others => '1'); else o <=
(others => '0');end if;
```

```
when"01110"=> if(A <= B) then o <= (others => '1'); else o <=
(others => '0');end if;
```

```
when"01111"=> if(A /= B) then o <= (others => '1'); else o <=
(others => '0');end if;
```

```
when "10000"=> o <= to_stdlogicvector(to_bitvector (a) sla
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```
TO_INTEGER(unsigned( b)));
when "10001" => o <= to_stdlogicvector(to_bitvector (a) sra
TO_INTEGER(unsigned( b)));
when "10010" => o <= to_stdlogicvector(to_bitvector (a) rol
TO_INTEGER(unsigned( b)));
when "10011" => o <= to_stdlogicvector(to_bitvector (a) ror
TO_INTEGER(unsigned( b)));
when "10100" => o <= to_stdlogicvector(to_bitvector (a) sll
TO_INTEGER(unsigned( b)));
when "10101" => o <= to_stdlogicvector(to_bitvector (a) srl
TO_INTEGER(unsigned( b)));
when "10110" => o <= a;
when "10111" => o <= b;
when others => o <= (others => '0');
end case;
end process;
end Behavioral;
```