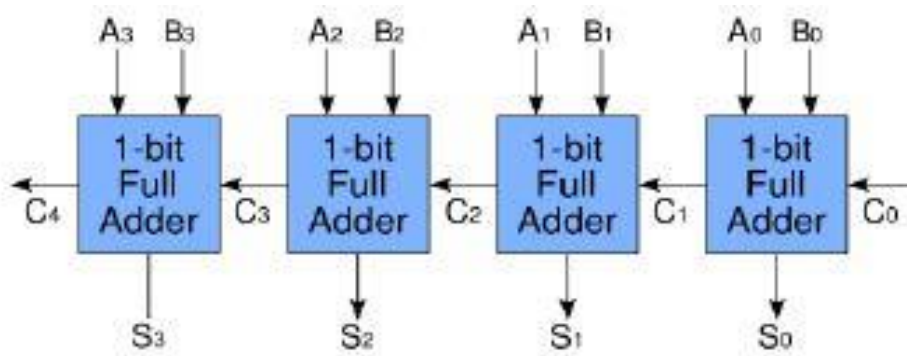


## 4-BIT RIPPLE CARRY ADDER

### EXPLANATION:

- It is used for the purpose of adding two n-bit binary numbers.
- It requires n full adders in its circuit for adding two n-bit binary numbers.
- It is also known as **n-bit parallel adder**



### APPLICATIONS:

The ripple-carry-adder applications include the following.

- These carry adders are used mostly in addition to n-bit input sequences.
- These carry adders are applicable in the digital signal processing and microprocessor

### RTL CODE:

```
module FA(input a,b,cin, output sum,cout);  
    assign sum = a^b^cin;  
    assign cout = (a&b) | (b&cin) | (cin&a);  
endmodule
```

```
module Ripple_Carry_Adder(input [3:0] a,b, input cin,  
                           output [3:0] sum, output cout);  
    wire [2:0] w;  
    FA f1(a[0],b[0],cin,sum[0],w[0]);  
    FA f2(a[1],b[1],w[0],sum[1],w[1]);  
    FA f3(a[2],b[2],w[1],sum[2],w[2]);  
    FA f4(a[3],b[3],w[2],sum[3],cout);  
  
endmodule
```

### TESTBENCH:

```
module testbench;  
    reg [3:0]a=0,b=0;  
    reg cin=0;  
    wire [3:0] sum;  
    wire cout;  
  
    Ripple_Carry_Adder RCA1(a,b,cin,sum,cout);  
    initial begin  
        #10 a=4'b0001;b=4'b1000;cin=1'b0;  
        #10 a=4'b0011;b=4'b1010;cin=1'b1;  
    end
```

```
initial begin
```

```
    $dumpfile("dump.vcd");
```

```
    $dumpvars(1);
```

```
end
```

```
initial #30 $finish();
```

```
endmodule
```

