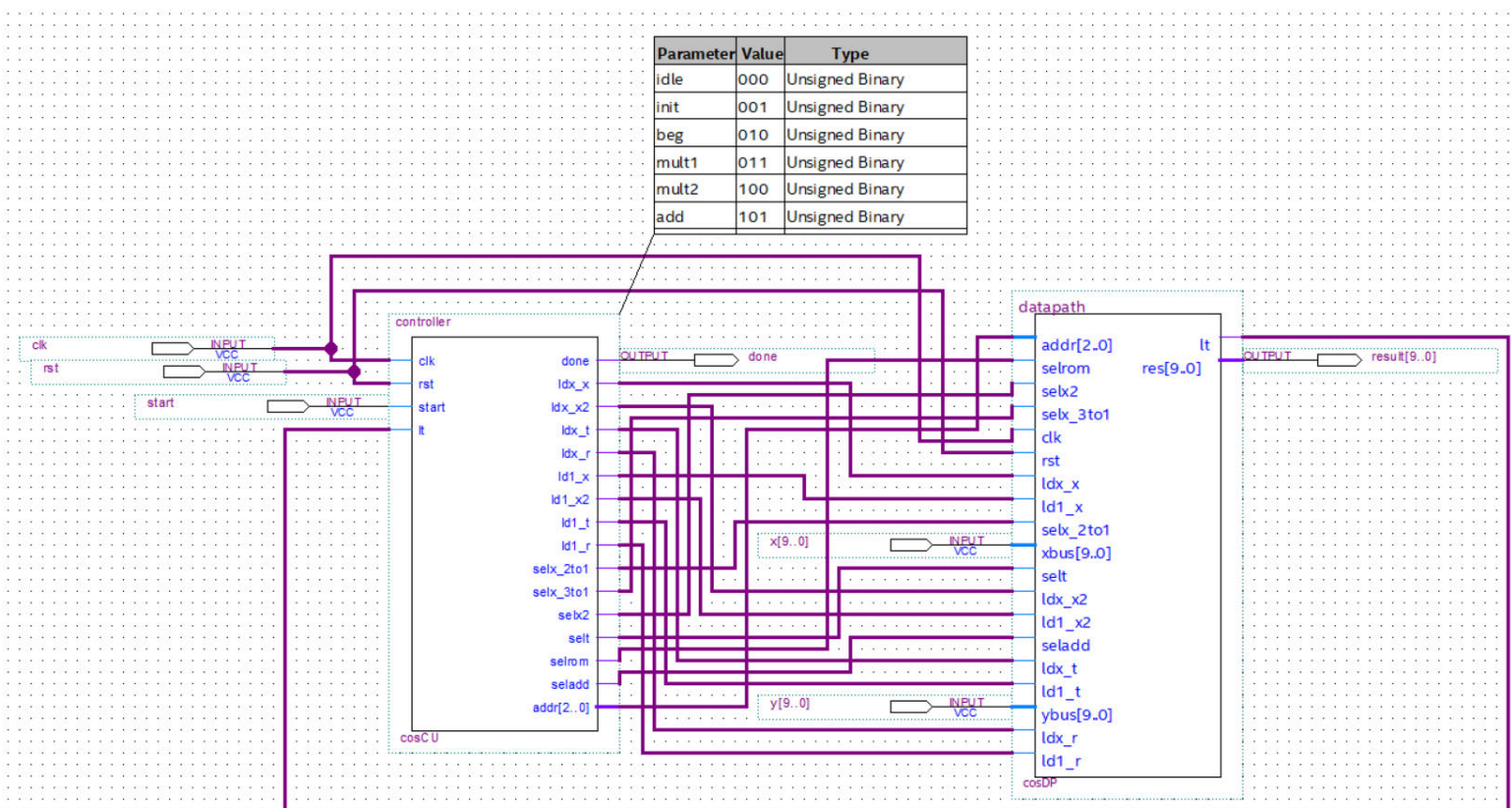


```

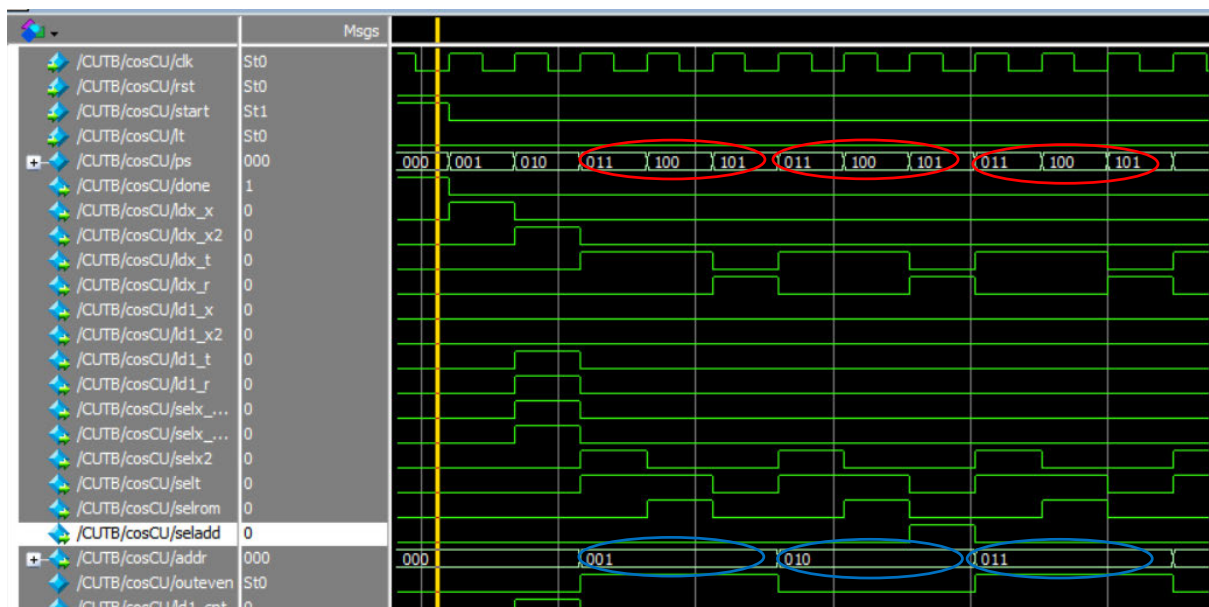
graph TD
    idle((idle)) -- "start = \phi" --> idle
    idle -- "start = 1" --> init((init))
    init -- "start = 1" --> init
    init -- "start = \phi" --> begin((begin))
    begin --> mult1((mult 1))
    mult1 --> mult2((mult 2))
    mult2 --> Add((Add))
    Add -- "qt = 1" --> idle
    Add -- "qt = \phi" --> mult1

```

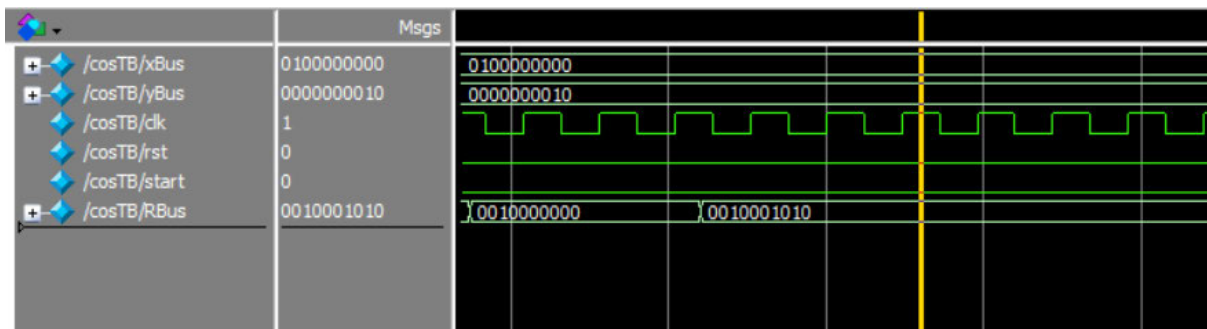
## 6. cosx circuit:



## Controller test bench:

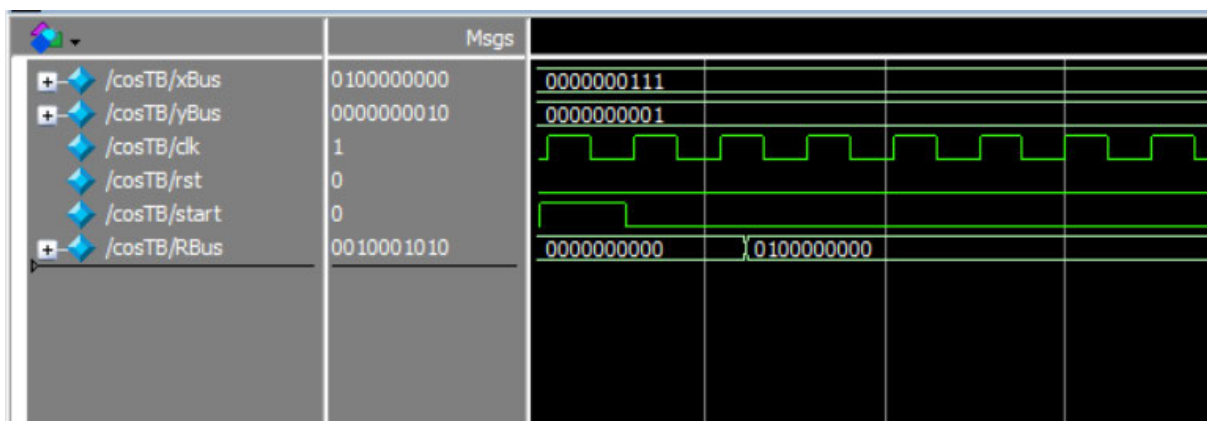


Cosx Test bench:



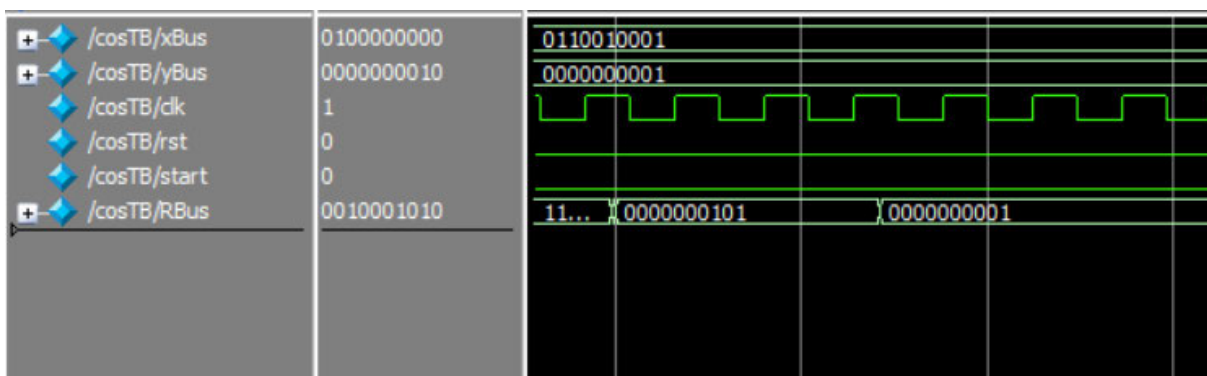
$X = 01\ 0000\ 0000 = 1 \Rightarrow \cos(1) = 0.54$

$R = 00\ 1000\ 1010 = 0.5390625 \text{ ☺}$



$X = 00\ 0000\ 0111 = 0.02734375 \Rightarrow \cos(0.02734375) = 0.99999988 = 1$

$R = 01\ 0000\ 0000 = 1 \text{ ☺}$



$X = 01\ 1001\ 0001 = 1.53515625 \Rightarrow \cos(1.53515625) = 0.0356$

$R = 00\ 0000\ 0001 = 0.0039625 \text{ ☺}$