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Clock Divider

Clock Divider is also known as frequency divider, which divides the input clock frequency and produce output clock. In our case let us take input frequency as 50MHz and divide the clock frequency to generate 1KHz output signal.

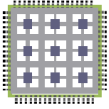
VHDL code consist of Clock and Reset input, divided clock as output. Count is a signal to generate delay, Tmp signal toggle itself when the count value reaches 25000. Output produce 1KHz clock frequency.

Reference count values to generate various clock frequency output

Count Value	Output Frequency
1	25MHz
25	1MHz
50	500KHz
1000	25KHz
25000000	1Hz

VHDL Code for Clock Divider

```
library IEEE;  
use IEEE.STD_LOGIC_1164.ALL;  
use IEEE.numeric_std.ALL;
```



```
entity Clock_Divider is
port ( clk,reset: in std_logic;
clock_out: out std_logic);
end Clock_Divider;

architecture bhv of Clock_Divider is

signal count: integer:=1;
signal tmp : std_logic := '0';

begin

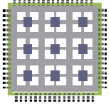
process(clk,reset)
begin
if(reset='1') then
count<=1;
tmp<='0';
elsif(clk'event and clk='1') then
count <=count+1;
if (count = 25000) then
tmp <= NOT tmp;
count <= 1;
end if;
end if;
clock_out <= tmp;
end process;

end bhv;
```

VHDL Testbench code for Clock Divider

```
LIBRARY ieee;
USE ieee.std_logic_1164.ALL;

ENTITY Tb_clock_divider IS
END Tb_clock_divider;
```



ARCHITECTURE behavior OF Tb_clock_divider IS

-- Component Declaration for the Unit Under Test (UUT)

```
COMPONENT Clock_Divider
PORT(
clk : IN std_logic;
reset : IN std_logic;
clock_out : OUT std_logic
);
END COMPONENT;
```

--Inputs

```
signal clk : std_logic := '0';
signal reset : std_logic := '0';
```

--Outputs

```
signal clock_out : std_logic;
```

-- Clock period definitions

```
constant clk_period : time := 20 ns;
```

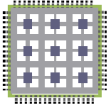
BEGIN

-- Instantiate the Unit Under Test (UUT)

```
 uut: Clock_Divider PORT MAP (
  clk => clk,
  reset => reset,
  clock_out => clock_out
 );
```

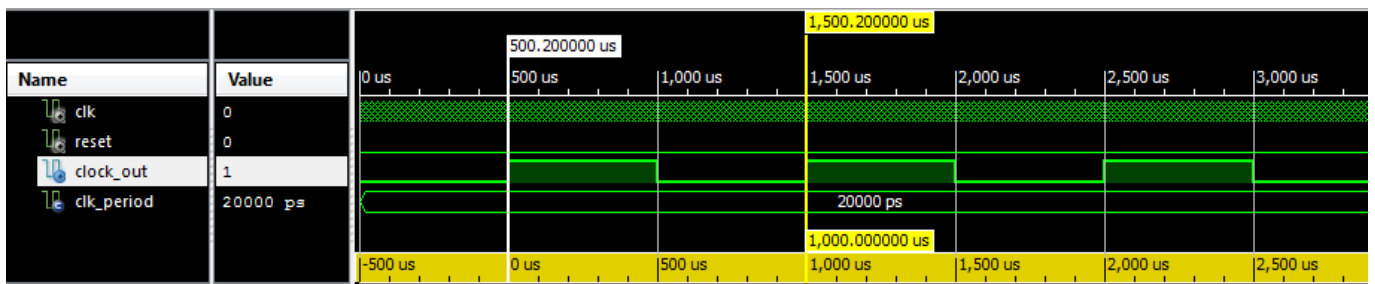
-- Clock process definitions

```
clk_process :process
begin
  clk <= '0';
  wait for clk_period/2;
  clk <= '1';
  wait for clk_period/2;
```



```
end process;  
  
-- Stimulus process  
stim_proc: process  
begin  
wait for 100 ns;  
reset <= '1';  
wait for 100 ns;  
reset <= '0';  
wait;  
end process;  
  
END;
```

Testbench Waveform for 1Khz Clock divider from 50MHz clock input



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