```vhdl
--------------------------------------------------------------------------------
--
--  Purpose:
--
--    utility package of cordic
--
--  Discussion:
--
--
--  Licensing:
--
--    This code is distributed under the GNU LGPL license.
--
--  Modified:
--
--    2012.03.15
--
--  Author:
--
--    Young W. Lim
--
--  Functions:
--  Conv2fixedPt (x : real; n : integer) return std_logic_vector;
--  Conv2real (s : std_logic_vector (31 downto 0) ) return real;
--
--
--------------------------------------------------------------------------------

library STD;
use STD.textio.all;

library IEEE;
use IEEE.std_logic_1164.all;
use IEEE.numeric_std.all;


package cordic_pkg is

  function Conv2fixedPt (x : real; n : integer) return std_logic_vector;
  function Conv2real (s : std_logic_vector (31 downto 0) ) return real;

  constant clk_period : time := 20 ns;
  constant half_period : time := clk_period / 2.0;
  constant pi : real := 3.141592653589793;

end cordic_pkg;



package body cordic_pkg is

  --------------------------------------------------------------------------------
  function Conv2fixedPt (x : real; n : integer) return std_logic_vector is
  --------------------------------------------------------------------------------
    constant shft : std_logic_vector (n-1 downto 0) := X"2000_0000";
    variable s : std_logic_vector (n-1 downto 0) ;
    variable z : real := 0.0;
  --------------------------------------------------------------------------------
  begin
      -- shft = 2^29 = 536870912
      -- bit 31 : msb - sign bit
      -- bit 30,29 : integer part
      -- bit 28 ~ 0 : fractional part
      -- for the value of 0.5
      -- first 4 msb bits [0, 0, 0, 1] --> X"1000_0000"
      --
      -- To obtain binary number representation of x,
      -- where the implicit decimal point between bit 29 and bit 28,
      -- multiply "integer converted shft"
      --
      z := x * real(to_integer(unsigned(shft)));

      s := std_logic_vector(to_signed(integer(z), n));

      return s;
```

```vhdl
  end Conv2fixedPt;
  ----------------------------------------------------------------------------


  ----------------------------------------------------------------------------
  function Conv2real (s : std_logic_vector (31 downto 0) ) return real is
  ----------------------------------------------------------------------------
    constant shft : std_logic_vector (31 downto 0) := X"2000_0000";
    variable z : real := 0.0;
  ----------------------------------------------------------------------------
  begin
    z := real(to_integer(signed(s))) / real(to_integer(unsigned(shft)));
    return z;
  end Conv2real;
  ----------------------------------------------------------------------------


end cordic_pkg;
```