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library IEEE;
use IEEE.STD_LOGIC_1164.ALL;
use work.MyTypes.all;
use IEEE.NUMERIC_STD.ALL;

entity Decoder is
    Port (
        instruction : in  word;
        instr_class : out instr_class_type;
        operation : out optype;
        DP_subclass : out DP_subclass_type;
        DP_operand_src : out DP_operand_src_type;
        load_store : out load_store_type;
        DT_offset_sign : out DT_offset_sign_type
    );
end Decoder;

architecture Behavioral of Decoder is
    type oparraytype is array (0 to 15) of optype;
    constant oparray : oparraytype :=
        (andop, eor, sub, rsb, add, adc, sbc, rsc,
         tst, teq, cmp, cmn, orr, mov, bic, mvn);
begin
    with instruction (27 downto 26) select
        instr_class <=
            DP when "00",
            DT when "01",
            BRN when "10",
            none when others;

    operation <= oparray (to_integer(unsigned (
        instruction (24 downto 21))));

    with instruction (24 downto 22) select
        DP_subclass <=
            arith when "001" | "010" | "011",
            logic when "000" | "110" | "111",
            comp when "101",
            test when others;

    DP_operand_src <= reg when instruction (25) = '0' else imm;
    load_store <= load when instruction (20) = '1' else store;
    DT_offset_sign <= plus when instruction (23) = '1' else
minus;
end Behavioral;

```