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MODULE      PAUDemo
TITLE      'Program Address Unit Unit Demo'


" Description:  This module is the top-level for the unit demos using the Unit
"               Demo Board.  It defines the switches (inputs) and displays
"               (outputs) for demonstrating each of the different units of the
"               CPU.  The Unit Demo Board has a total of 51 inputs and 35
"               outputs.  This version of the demo module is meant to be used
"               with the Program Memory Access Unit.
"
" Inputs:       DataOff[7..0]    - 8 bits of data or offset input
"               AddrData[12..0]  - 13 bits of address or data input
"               Control[29..0]   - 30 bits of control input
"               Reset            - system reset
"               Clock            - system clock
"
" Outputs:      AccumAddr[12..0] - 13 bits of address or accumulator output
"               XReg[7..0]       - 8 bits of X register output
"               SReg[7..0]       - 8 bits of S register output
"               Flags[7..0]      - 8 bits of flag output (active low)


" Revision History:
" 02/06/18   Glen George  Initial Revision
" 02/14/18   Glen George  Fixed some typos
" 02/14/18   Glen George  Specialized for Program Memory Access Unit
" 01/08/20   Glen George  Updated comments
" 01/04/21   Glen George  Updated comments
" 02/22/23   Steven Lei   Updated formatting
" 02/22/23   Steven Lei   Updated controls inputs
" 02/22/23   Steven Lei   Updated and tested ProgramAccess
" 02/24/23   Steven Lei   Fixed loading offset

" Pin/Signal Declarations

" Inputs

DataOff7..DataOff6  pin  80..81;            "input  8-bit data/offset input
DataOff5..DataOff0  pin  83..88;

AddrData12..AddrData9   pin  102..105;      "input  13-bit data or address input
AddrData8               pin  111;
AddrData7..AddrData2    pin  93..98;
AddrData1..AddrData0    pin  100..101;

Control29..Control26    pin  14..11;        "input  30 bits of control input
Control25..Control20    pin  9..4;
Control19..Control14    pin  143..138;
Control13..Control9     pin  135..131;
Control8..Control4      pin  124..120;
Control3..Control0      pin  116..113;

Reset                   pin  40;            "input  system reset

Clock                   pin  128;           "input  system clock
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" Outputs

AccumAddr12..AccumAddr8 pin  29..33;        "13 bits of accumulator/address
AccumAddr7              pin  16;
AccumAddr6..AccumAddr1  pin  21..26;
AccumAddr0              pin  28;

XReg7..XReg4            pin  68..71;        "8 bits of X register
XReg3..XReg0            pin  76..79;

SReg7..SReg2            pin  58..63;        "8 bits of S register
SReg1..SReg0            pin  66..67;

!Flags7..!Flags5        pin  42..44;        "the flags (8 bits, active low)
!Flags4..!Flags0        pin  48..52;



" Buses

DataOff    =  [DataOff7..DataOff0];         "8 bits of data or offset
AddrData   =  [AddrData12..AddrData0];      "13 bits of address or data
Control    =  [Control29..Control0];        "30 bits of control
AccumAddr  =  [AccumAddr12..AccumAddr0];    "accumulator or address (13 bits)
Flags      =  [Flags7..Flags0];             "the flags (8 bits)
XReg       =  [XReg7..XReg0];               "8 bit X-Register
SReg       =  [SReg7..SReg0];               "8 bit S-Register



" declare the unit to be tested

ProgramAccess INTERFACE  (Offset7..Offset0, Direct12..Direct0,
                          Load, Select2..Select0,
                          Reset, Clock
                          -> ProgAddr12..ProgAddr0, PC12..PC0);


" create an instance of the unit to be tested

PAUnit    FUNCTIONAL_BLOCK  ProgramAccess;



EQUATIONS


" connect up the unit to be tested

" Program Memory Access Unit Inputs

PAUnit.[Offset7..Offset0]   =  [DataOff7..DataOff0];
PAUnit.[Direct12..Direct0]  =  [AddrData12..AddrData0];
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" Program Memory Access Unit Control Inputs

" connect each Program Memory Access Unit control signal or bus to a subset of
"    Control29..Control0

PAUnit.[Load, Select2, Select1, Select0] = [Control3..Control0];

PAUnit.Reset  =  Reset;
PAUnit.Clock  =  Clock;

" Program Memory Access Unit Outputs

[AccumAddr12..AccumAddr0]  =  PAUnit.[ProgAddr12..ProgAddr0];


" unused outputs are 0

Flags[7..0] = 0;
XReg = [DataOff4..DataOff0, 0, 0, 0];
SReg = [DataOff7..DataOff0];


END  PAUDemo
```