515:AL
549:AS unused_csr_mtip = csr_mtip_i;
515:BL
516:IF
!(csr_mfip_i[14])
csr_mfip_i[14]
517:BS mfip_id = 4'd14;
518:IF
csr_mfip_i[13]
!(csr_mfip_i[13])
519:BS mfip_id = 4'd13;
520:IF
csr_mfip_i[12]
!(csr_mfip_i[12])
521:BS mfip_id = 4'd12;
522:IF
!(csr_mfip_i[11])
csr_mfip_i[11]
523:BS mfip_id = 4'd11;
524:IF
!(csr_mfip_i[10])
csr_mfip_i[10]
525:BS mfip_id = 4'd10;
526:IF
csr_mfip_i[9]
!(csr_mfip_i[9])
527:BS mfip_id = 4'd9;
528:IF
csr_mfip_i[8]
!(csr_mfip_i[8])
529:BS mfip_id = 4'd8;
530:IF
csr_mfip_i[7]
!(csr_mfip_i[7])
531:BS mfip_id = 4'd7;
532:IF
!(csr_mfip_i[6])
csr_mfip_i[6]
533:BS mfip_id = 4'd6;
534:IF
!(csr_mfip_i[5])
csr_mfip_i[5]
535:BS mfip_id = 4'd5;
536:IF
!(csr_mfip_i[5])
csr_mfip_i[5]
537:BS mfip_id = 4'd5;
538:IF
csr_mfip_i[4]
!(csr_mfip_i[4])
539:BS mfip_id = 4'd4;
540:IF
!(csr_mfip_i[3])
csr_mfip_i[3]
541:BS mfip_id = 4'd3;
542:IF
csr_mfip_i[2]
!(csr_mfip_i[2])
543:BS mfip_id = 4'd2;
544:IF
!(csr_mfip_i[1])
csr_mfip_i[1]
547:BS mfip_id = 4'd0;
545:BS mfip_id = 4'd1;
Leaf_515:AL
499:AS ecall_insn = ecall_insn_i & instr_valid_i;
503:AS ebrk_insn = ebrk_insn_i & instr_valid_i;
505:AS instr_fetch_err = instr_fetch_err_i & instr_valid_i;
504:AS csr_pipe_flush = csr_pipe_flush_i & instr_valid_i;
761:AS stall = stall_lsu_i | stall_multdiv_i | stall_jump_i | stall_branch_i;
513:AS ebreak_into_debug = (priv_mode_i == PRIV_LVL_M)? debug_ebreakm_i : (priv_mode_i == PRIV_LVL_U)? debug_ebreaku_i : 1'b0;
501:AS dret_insn = dret_insn_i & instr_valid_i;
502:AS wfi_insn = wfi_insn_i & instr_valid_i;
500:AS mret_insn = mret_insn_i & instr_valid_i;
550:AL
507:AS illegal_umode = (priv_mode_i != PRIV_LVL_M) & (mret_insn | csr_mstatus_tw_i & wfi_insn);
550:BL
instr_req_o = 1'b1;
csr_save_if_o = 1'b0;
csr_save_id_o = 1'b0;
csr_restore_mret_id_o = 1'b0;
csr_restore_dret_id_o = 1'b0;
csr_save_cause_o = 1'b0;
csr_mtval_o = 1'sb0;
pc_mux_o = PC_BOOT;
pc_set_o = 1'b0;
exc_pc_mux_o = EXC_PC_IRQ;
exc_cause_o = EXC_CAUSE_INSN_ADDR_MISA;
ctrl_fsm_ns = ctrl_fsm_cs;
ctrl_busy_o = 1'b1;
halt_if = 1'b0;
flush_id = 1'b0;
debug_csr_save_o = 1'b0;
debug_cause_o = DBG_CAUSE_EBREAK;
debug_mode_d = debug_mode_q;
nmi_mode_d = nmi_mode_q;
perf_tbranch_o = 1'b0;
perf_jump_o = 1'b0;
572:CS
ctrl_fsm_cs
580:CA
586:CA
573:CA
694:CA
754:CA
641:CA
680:CA
593:CA
615:CA
663:CA
602:CA
694:BL halt_if = 1'b1; flush_id = 1'b1; ctrl_fsm_ns = DECODE;
573:BL instr_req_o = 1'b0; pc_mux_o = PC_BOOT; pc_set_o = 1'b1;
580:BL instr_req_o = 1'b1; pc_mux_o = PC_BOOT; pc_set_o = 1'b1; ctrl_fsm_ns = FIRST_FETCH;
586:BL ctrl_busy_o = 1'b0; instr_req_o = 1'b0; halt_if = 1'b1; flush_id = 1'b1; ctrl_fsm_ns = SLEEP;
577:IF
fetch_enable_i
578:BS ctrl_fsm_ns = BOOT_SET;
751:IF
enter_debug_mode
752:BS ctrl_fsm_ns = DBG_TAKEN_IF;
698:IF
(exc_req_q || store_err_q || load_err_q)
!((exc_req_q || store_err_q || load_err_q))
698:BL pc_set_o = 1'b1; pc_mux_o = PC_EXC; exc_pc_mux_o = (debug_mode_q)? EXC_PC_DBG_EXC : EXC_PC_EXC; csr_save_id_o = 1'b1; csr_save_cause_o = 1'b1;
704:IF
instr_fetch_err
!(instr_fetch_err)
704:BL exc_cause_o = EXC_CAUSE_INSTR_ACCESS_FAULT; csr_mtval_o = pc_id_i;
708:IF
illegal_insn_q
!(illegal_insn_q)
708:BL exc_cause_o = EXC_CAUSE_ILLEGAL_INSN; csr_mtval_o = (instr_is_compressed_i)? { 16'b0, instr_compressed_i } : instr_i;
712:IF
!(ecall_insn)
ecall_insn
713:BS exc_cause_o = (priv_mode_i == PRIV_LVL_M)? EXC_CAUSE_ECALL_MMODE : EXC_CAUSE_ECALL_UMODE;
714:IF
ebrk_insn
!(ebrk_insn)
714:BL
715:IF
!((debug_mode_q | ebreak_into_debug))
(debug_mode_q | ebreak_into_debug)
723:BS exc_cause_o = EXC_CAUSE_BREAKPOINT;
715:BL pc_set_o = 1'b0; csr_save_id_o = 1'b0; csr_save_cause_o = 1'b0; ctrl_fsm_ns = DBG_TAKEN_ID; flush_id = 1'b0;
725:IF
!(store_err_q)
store_err_q
729:BL exc_cause_o = EXC_CAUSE_LOAD_ACCESS_FAULT; csr_mtval_o = lsu_addr_last_i;
725:BL exc_cause_o = EXC_CAUSE_STORE_ACCESS_FAULT; csr_mtval_o = lsu_addr_last_i;
734:IF
!(mret_insn)
mret_insn
734:BL pc_mux_o = PC_ERET; pc_set_o = 1'b1; csr_restore_mret_id_o = 1'b1;
741:IF
!(dret_insn)
dret_insn
741:BL pc_mux_o = PC_DRET; pc_set_o = 1'b1; debug_mode_d = 1'b0; csr_restore_dret_id_o = 1'b1;
747:IF
!(wfi_insn)
wfi_insn
748:BS ctrl_fsm_ns = WAIT_SLEEP;
749:IF
(csr_pipe_flush && handle_irq)
750:BS ctrl_fsm_ns = IRQ_TAKEN;
738:IF
nmi_mode_q
739:BS nmi_mode_d = 1'b0;
602:BL
605:IF
handle_irq
605:BL ctrl_fsm_ns = IRQ_TAKEN; halt_if = 1'b1; flush_id = 1'b1;
603:IF
id_in_ready_o
604:BS ctrl_fsm_ns = DECODE;
610:IF
enter_debug_mode
610:BL ctrl_fsm_ns = DBG_TAKEN_IF; halt_if = 1'b1;
754:BL instr_req_o = 1'b0; ctrl_fsm_ns = 1'bX;
593:BL instr_req_o = 1'b0; halt_if = 1'b1; flush_id = 1'b1;
597:IF
(irq_nm_i || irq_pending_i || debug_req_i || debug_mode_q || debug_single_step_i)
!((irq_nm_i || irq_pending_i || debug_req_i || debug_mode_q || debug_single_step_i))
598:BS ctrl_fsm_ns = FIRST_FETCH;
600:BS ctrl_busy_o = 1'b0;
641:BL ctrl_fsm_ns = DECODE;
642:IF
handle_irq
642:BL pc_mux_o = PC_EXC; pc_set_o = 1'b1; exc_pc_mux_o = EXC_PC_IRQ; csr_save_if_o = 1'b1; csr_save_cause_o = 1'b1;
648:IF
!((irq_nm_i && !nmi_mode_q))
(irq_nm_i && !nmi_mode_q)
648:BL exc_cause_o = EXC_CAUSE_IRQ_NM; nmi_mode_d = 1'b1;
652:IF
!((csr_mfip_i != 15'b0))
(csr_mfip_i != 15'b0)
653:BS exc_cause_o = sv2v_cast_89EA8({ 2'b11, mfip_id });
654:IF
csr_meip_i
!(csr_meip_i)
655:BS exc_cause_o = EXC_CAUSE_IRQ_EXTERNAL_M;
656:IF
!(csr_msip_i)
csr_msip_i
659:BS exc_cause_o = EXC_CAUSE_IRQ_TIMER_M;
657:BS exc_cause_o = EXC_CAUSE_IRQ_SOFTWARE_M;
680:BL flush_id = 1'b1; pc_mux_o = PC_EXC; pc_set_o = 1'b1; exc_pc_mux_o = EXC_PC_DBD; debug_mode_d = 1'b1; ctrl_fsm_ns = DECODE;
685:IF
(ebreak_into_debug && !debug_mode_q)
685:BL csr_save_cause_o = 1'b1; csr_save_id_o = 1'b1; debug_csr_save_o = 1'b1; debug_cause_o = DBG_CAUSE_EBREAK;
663:BL ctrl_fsm_ns = DECODE;
664:IF
(debug_single_step_i || debug_req_i)
664:BL flush_id = 1'b1; pc_mux_o = PC_EXC; pc_set_o = 1'b1; exc_pc_mux_o = EXC_PC_DBD; csr_save_if_o = 1'b1; debug_csr_save_o = 1'b1; csr_save_cause_o = 1'b1; debug_mode_d = 1'b1;
672:IF
!(debug_single_step_i)
debug_single_step_i
675:BS debug_cause_o = DBG_CAUSE_HALTREQ;
673:BS debug_cause_o = DBG_CAUSE_STEP;
615:BL
616:IF
instr_valid_i
616:BL
627:IF
((enter_debug_mode || handle_irq) && stall)
628:BS halt_if = 1'b1;
617:IF
special_req
!(special_req)
617:BL ctrl_fsm_ns = FLUSH; halt_if = 1'b1;
621:IF
(branch_set_i || jump_set_i)
621:BL pc_mux_o = PC_JUMP; pc_set_o = 1'b1; perf_tbranch_o = branch_set_i; perf_jump_o = jump_set_i;
630:IF
(!stall && !special_req)
631:IF
!(enter_debug_mode)
enter_debug_mode
631:BL ctrl_fsm_ns = DBG_TAKEN_IF; halt_if = 1'b1;
635:IF
handle_irq
635:BL ctrl_fsm_ns = IRQ_TAKEN; halt_if = 1'b1; flush_id = 1'b1;
Leaf_550:AL
498:AS store_err_d = store_err_i;
497:AS load_err_d = load_err_i;
764:AL
763:AS instr_valid_clear_o = ~(stall | halt_if) | flush_id;
762:AS id_in_ready_o = ~stall & ~halt_if;
764:BL
765:IF
(!rst_ni)
!((!rst_ni))
765:BL ctrl_fsm_cs <= RESET; nmi_mode_q <= 1'b0; debug_mode_q <= 1'b0; load_err_q <= 1'b0; store_err_q <= 1'b0; exc_req_q <= 1'b0; illegal_insn_q <= 1'b0;
774:BL ctrl_fsm_cs <= ctrl_fsm_ns; nmi_mode_q <= nmi_mode_d; debug_mode_q <= debug_mode_d; load_err_q <= load_err_d; store_err_q <= store_err_d; exc_req_q <= exc_req_d; illegal_insn_q <= illegal_insn_d;
Leaf_764:AL
512:AS enter_debug_mode = (debug_req_i | debug_single_step_i & instr_valid_i) & ~debug_mode_q;
760:AS debug_mode_o = debug_mode_q;
514:AS handle_irq = ~debug_mode_q & (irq_nm_i & ~nmi_mode_q | irq_pending_i & csr_mstatus_mie_i);
506:AS illegal_dret = dret_insn & ~debug_mode_q;
508:AS illegal_insn_d = (illegal_insn_i | illegal_dret | illegal_umode) & (ctrl_fsm_cs != FLUSH);
509:AS exc_req_d = (ecall_insn | ebrk_insn | illegal_insn_d | instr_fetch_err) & (ctrl_fsm_cs != FLUSH);
510:AS exc_req_lsu = store_err_i | load_err_i;
511:AS special_req = mret_insn | dret_insn | wfi_insn | csr_pipe_flush | exc_req_d | exc_req_lsu;