

SCXTNUM_EL2, EL2 Read/Write Software Context Number

The SCXTNUM_EL2 characteristics are:

Purpose

Provides a number that can be used to separate out different context numbers with the EL2 exception level, for the purpose of protecting against side-channels using branch prediction and similar resources.

Configuration

This register is present only when FEAT_CSV2_2 is implemented or FEAT_CSV2_1p2 is implemented. Otherwise, direct accesses to SCXTNUM_EL2 are undefined.

If EL2 is not implemented, this register is res0 from EL3.

Attributes

SCXTNUM_EL2 is a 64-bit register.

Field descriptions

63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
Software Context Number																															
Software Context Number																															
31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Bits [63:0]

Software Context Number. A number to identify the context within the EL2 exception level.

The reset behavior of this field is:

- On a Warm reset, this field resets to an architecturally unknown value.

Accessing SCXTNUM_EL2

When [HCR_EL2.E2H](#) is 1, without explicit synchronization, access from EL2 using the mnemonic SCXTNUM_EL2 or SCXTNUM_EL1 are not guaranteed to be ordered with respect to accesses using the other mnemonic.

Accesses to this register use the following encodings in the System register encoding space:

MRS <Xt>, SCXTNUM_EL2

op0	op1	CRn	CRm	op2
0b11	0b100	0b1101	0b0000	0b111

```
if PSTATE.EL == EL0 then
    UNDEFINED;
elsif PSTATE.EL == EL1 then
    if EL2Enabled() && HCR_EL2.NV == '1' then
        AArch64.SystemAccessTrap(EL2, 0x18);
    else
        UNDEFINED;
elsif PSTATE.EL == EL2 then
    if Halted() && HaveEL(EL3) && EDSCR.SDD == '1'
    && boolean IMPLEMENTATION_DEFINED "EL3 trap priority
when SDD == '1'" && SCR_EL3.EnSCXT == '0' then
        UNDEFINED;
    elsif HaveEL(EL3) && SCR_EL3.EnSCXT == '0' then
        if Halted() && EDSCR.SDD == '1' then
            UNDEFINED;
        else
            AArch64.SystemAccessTrap(EL3, 0x18);
    else
        X[t, 64] = SCXTNUM_EL2;
elsif PSTATE.EL == EL3 then
    X[t, 64] = SCXTNUM_EL2;
```

MSR SCXTNUM_EL2, <Xt>

op0	op1	CRn	CRm	op2
0b11	0b100	0b1101	0b0000	0b111

```
if PSTATE.EL == EL0 then
    UNDEFINED;
elsif PSTATE.EL == EL1 then
    if EL2Enabled() && HCR_EL2.NV == '1' then
        AArch64.SystemAccessTrap(EL2, 0x18);
    else
        UNDEFINED;
elsif PSTATE.EL == EL2 then
    if Halted() && HaveEL(EL3) && EDSCR.SDD == '1'
    && boolean IMPLEMENTATION_DEFINED "EL3 trap priority
when SDD == '1'" && SCR_EL3.EnSCXT == '0' then
        UNDEFINED;
```

```

        elsif HaveEL(EL3) && SCR_EL3.EnSCXT == '0' then
            if Halted() && EDSCR.SDD == '1' then
                UNDEFINED;
            else
                AArch64.SystemAccessTrap(EL3, 0x18);
            end
        else
            SCXTNUM_EL2 = X[t, 64];
        elsif PSTATE.EL == EL3 then
            SCXTNUM_EL2 = X[t, 64];

```

MRS <Xt>, SCXTNUM_EL1

op0	op1	CRn	CRm	op2
0b11	0b000	0b1101	0b0000	0b111

```

if PSTATE.EL == EL0 then
    UNDEFINED;
elsif PSTATE.EL == EL1 then
    if Halted() && HaveEL(EL3) && EDSCR.SDD == '1'
    && boolean IMPLEMENTATION_DEFINED "EL3 trap priority
    when SDD == '1'" && SCR_EL3.EnSCXT == '0' then
        UNDEFINED;
    elsif EL2Enabled() && HCR_EL2.<NV2,NV1,NV> ==
    '011' then
        AArch64.SystemAccessTrap(EL2, 0x18);
    elsif EL2Enabled() && HCR_EL2.EnSCXT == '0' then
        AArch64.SystemAccessTrap(EL2, 0x18);
    elsif EL2Enabled() &&
    IsFeatureImplemented(FEAT_FGT) && (!HaveEL(EL3) ||
    SCR_EL3.FGTEn == '1') && HFGTR_EL2.SCXTNUM_EL1 ==
    '1' then
        AArch64.SystemAccessTrap(EL2, 0x18);
    elsif HaveEL(EL3) && SCR_EL3.EnSCXT == '0' then
        if Halted() && EDSCR.SDD == '1' then
            UNDEFINED;
        else
            AArch64.SystemAccessTrap(EL3, 0x18);
        end
    elsif EL2Enabled() && HCR_EL2.<NV2,NV1,NV> ==
    '111' then
        X[t, 64] = NVMem[0x188];
    else
        X[t, 64] = SCXTNUM_EL1;
    elsif PSTATE.EL == EL2 then
        if Halted() && HaveEL(EL3) && EDSCR.SDD == '1'
        && boolean IMPLEMENTATION_DEFINED "EL3 trap priority
        when SDD == '1'" && SCR_EL3.EnSCXT == '0' then
            UNDEFINED;
        elsif HaveEL(EL3) && SCR_EL3.EnSCXT == '0' then
            if Halted() && EDSCR.SDD == '1' then
                UNDEFINED;
            else
                AArch64.SystemAccessTrap(EL3, 0x18);
            end
        elsif HCR_EL2.E2H == '1' then

```

```

        X[t, 64] = SCXTNUM_EL2;
    else
        X[t, 64] = SCXTNUM_EL1;
    elsif PSTATE.EL == EL3 then
        X[t, 64] = SCXTNUM_EL1;

```

MSR SCXTNUM_EL1, <Xt>

op0	op1	CRn	CRm	op2
0b11	0b000	0b1101	0b0000	0b111

```

if PSTATE.EL == EL0 then
    UNDEFINED;
elsif PSTATE.EL == EL1 then
    if Halted() && HaveEL(EL3) && EDSCR.SDD == '1'
    && boolean IMPLEMENTATION_DEFINED "EL3 trap priority
    when SDD == '1'" && SCR_EL3.EnSCXT == '0' then
        UNDEFINED;
    elsif EL2Enabled() && HCR_EL2.<NV2,NV1,NV> ==
    '011' then
        AArch64.SystemAccessTrap(EL2, 0x18);
    elsif EL2Enabled() && HCR_EL2.EnSCXT == '0' then
        AArch64.SystemAccessTrap(EL2, 0x18);
    elsif EL2Enabled() &&
    IsFeatureImplemented(FEAT_FGT) && (!HaveEL(EL3) ||
    SCR_EL3.FGTEn == '1') && HFGWTR_EL2.SCXTNUM_EL1 ==
    '1' then
        AArch64.SystemAccessTrap(EL2, 0x18);
    elsif HaveEL(EL3) && SCR_EL3.EnSCXT == '0' then
        if Halted() && EDSCR.SDD == '1' then
            UNDEFINED;
        else
            AArch64.SystemAccessTrap(EL3, 0x18);
        elsif EL2Enabled() && HCR_EL2.<NV2,NV1,NV> ==
    '111' then
            NVMem[0x188] = X[t, 64];
        else
            SCXTNUM_EL1 = X[t, 64];
    elsif PSTATE.EL == EL2 then
        if Halted() && HaveEL(EL3) && EDSCR.SDD == '1'
        && boolean IMPLEMENTATION_DEFINED "EL3 trap priority
        when SDD == '1'" && SCR_EL3.EnSCXT == '0' then
            UNDEFINED;
        elsif HaveEL(EL3) && SCR_EL3.EnSCXT == '0' then
            if Halted() && EDSCR.SDD == '1' then
                UNDEFINED;
            else
                AArch64.SystemAccessTrap(EL3, 0x18);
            elsif HCR_EL2.E2H == '1' then
                SCXTNUM_EL2 = X[t, 64];
            else
                SCXTNUM_EL1 = X[t, 64];
    elsif PSTATE.EL == EL3 then

```

```
SCXTNUM_EL1 = X[t, 64];
```

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