POR_EL1, Permission Overlay Register 1 (EL1)

The POR_EL1 characteristics are:

Purpose

Stage 1 Permission Overlay Register for privileged access of the EL1&0 translation regime.

Configuration

This register is present only when FEAT_S1POE is implemented. Otherwise, direct accesses to POR_EL1 are undefined.

Attributes

POR_EL1 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
Perm15	Perm14	Perm13	Perm12	Perm11	Perm10	Perm9	Perm8
Perm7	Perm6	Perm5	Perm4	Perm3	Perm2	Perm1	Perm0
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

Perm<m>, bits [4m+3:4m], for m = 15 to 0

Perm Represents Stage 1 Overlay Permissions.

Perm<m>	Meaning
0b0000	No access.
0b0001	Read.
0b0010	Execute.
0b0011	Read, Execute.
0b0100	Write.
0b0101	Write, Read.
0b0110	Write, Execute.
0b0111	Read, Write, Execute.
0b1xxx	Reserved - treated as No access

When VMSAv9-128 is not in use, fields Perm[8] to Perm[15] are not used.

This field is not permitted to be cached in a TLB.

When Stage 1 Overlay mechanism is disabled, this register is ignored.

The reset behavior of this field is:

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

Accessing POR_EL1

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

MRS <Xt>, POR_EL1

op0	op1	CRn	CRm	op2
0b11	0b000	0b1010	0b0010	0b100

```
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.PIEn == '0' then
        UNDEFINED;
    elsif EL2Enabled() && HCR_EL2.TRVM == '1' then
        AArch64.SystemAccessTrap(EL2, 0x18);
    elsif EL2Enabled() &&
IsFeatureImplemented(FEAT_FGT) && (!HaveEL(EL3) ||
SCR_EL3.FGTEn == '1') && HFGRTR_EL2.nPOR_EL1 == '0'
then
        AArch64.SystemAccessTrap(EL2, 0x18);
    elsif HaveEL(EL3) && SCR_EL3.PIEn == '0' then
        if Halted() && EDSCR.SDD == '1' then
            UNDEFINED;
        else
            AArch64.SystemAccessTrap(EL3, 0x18);
    elsif EL2Enabled() && HCR_EL2.<NV2,NV1,NV> ==
'111' then
        X[t, 64] = NVMem[0x2A8];
    else
        X[t, 64] = POR_EL1;
elsif PSTATE.EL == EL2 then
    if Halted() && HaveEL(EL3) && EDSCR.SDD == '1'
&& boolean IMPLEMENTATION_DEFINED "EL3 trap priority
when SDD == '1'" && SCR_EL3.PIEn == '0' then
        UNDEFINED;
    elsif HaveEL(EL3) && SCR_EL3.PIEn == '0' then
        if Halted() && EDSCR.SDD == '1' then
            UNDEFINED;
```

```
        else
            AArch64.SystemAccessTrap(EL3, 0x18);
    elsif HCR_EL2.E2H == '1' then
        X[t, 64] = POR_EL2;
    else
        X[t, 64] = POR_EL1;
elsif PSTATE.EL == EL3 then
    X[t, 64] = POR_EL1;
```

MSR POR_EL1, <Xt>

op0	op1	CRn	CRm	op2
0b11	0b000	0b1010	0b0010	0b100

```
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.PIEn == '0' then
        UNDEFINED;
    elsif EL2Enabled() && HCR_EL2.TVM == '1' then
        AArch64.SystemAccessTrap(EL2, 0x18);
    elsif EL2Enabled() &&
IsFeatureImplemented(FEAT_FGT) && (!HaveEL(EL3) ||
SCR_EL3.FGTEn == '1') && HFGWTR_EL2.nPOR_EL1 == '0'
then
        AArch64.SystemAccessTrap(EL2, 0x18);
    elsif HaveEL(EL3) && SCR_EL3.PIEn == '0' then
        if Halted() && EDSCR.SDD == '1' then
            UNDEFINED;
        else
            AArch64.SystemAccessTrap(EL3, 0x18);
    elsif EL2Enabled() && HCR_EL2.<NV2,NV1,NV> ==
'111' then
        NVMem[0x2A8] = X[t, 64];
    else
        POR_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.PIEn == '0' then
        UNDEFINED;
    elsif HaveEL(EL3) && SCR_EL3.PIEn == '0' then
        if Halted() && EDSCR.SDD == '1' then
            UNDEFINED;
        else
            AArch64.SystemAccessTrap(EL3, 0x18);
    elsif HCR_EL2.E2H == '1' then
        POR_EL2 = X[t, 64];
    else
        POR_EL1 = X[t, 64];
elsif PSTATE.EL == EL3 then
```

```
    POR_EL1 = X[t, 64];
```

MRS <Xt>, POR_EL12

op0	op1	CRn	CRm	op2
0b11	0b101	0b1010	0b0010	0b100

```
if PSTATE.EL == EL0 then
    UNDEFINED;
elsif PSTATE.EL == EL1 then
    if EL2Enabled() && HCR_EL2.<NV2,NV1,NV> == '101'
then
        X[t, 64] = NVMem[0x2A8];
    elsif EL2Enabled() && HCR_EL2.NV == '1' then
        AArch64.SystemAccessTrap(EL2, 0x18);
    else
        UNDEFINED;
elsif PSTATE.EL == EL2 then
    if HCR_EL2.E2H == '1' then
        if Halted() && HaveEL(EL3) && EDSCR.SDD ==
'1' && boolean IMPLEMENTATION_DEFINED "EL3 trap
priority when SDD == '1'" && SCR_EL3.PIEn == '0' then
            UNDEFINED;
        elsif HaveEL(EL3) && SCR_EL3.PIEn == '0' then
            if Halted() && EDSCR.SDD == '1' then
                UNDEFINED;
            else
                AArch64.SystemAccessTrap(EL3, 0x18);
        else
            X[t, 64] = POR_EL1;
    else
        UNDEFINED;
elsif PSTATE.EL == EL3 then
    if EL2Enabled() && !ELUsingAArch32(EL2) &&
HCR_EL2.E2H == '1' then
        X[t, 64] = POR_EL1;
    else
        UNDEFINED;
```

MSR POR_EL12, <Xt>

op0	op1	CRn	CRm	op2
0b11	0b101	0b1010	0b0010	0b100

```
if PSTATE.EL == EL0 then
    UNDEFINED;
```

```
elsif PSTATE.EL == EL1 then
    if EL2Enabled() && HCR_EL2.<NV2,NV1,NV> == '101'
then
        NVMem[0x2A8] = X[t, 64];
    elsif EL2Enabled() && HCR_EL2.NV == '1' then
        AArch64.SystemAccessTrap(EL2, 0x18);
    else
        UNDEFINED;
elsif PSTATE.EL == EL2 then
    if HCR_EL2.E2H == '1' then
        if Halted() && HaveEL(EL3) && EDSCR.SDD ==
'1' && boolean IMPLEMENTATION_DEFINED "EL3 trap
priority when SDD == '1'" && SCR_EL3.PIEn == '0' then
            UNDEFINED;
        elsif HaveEL(EL3) && SCR_EL3.PIEn == '0' then
            if Halted() && EDSCR.SDD == '1' then
                UNDEFINED;
            else
                AArch64.SystemAccessTrap(EL3, 0x18);
        else
            POR_EL1 = X[t, 64];
    else
        UNDEFINED;
elsif PSTATE.EL == EL3 then
    if EL2Enabled() && !ELUsingAArch32(EL2) &&
HCR_EL2.E2H == '1' then
        POR_EL1 = X[t, 64];
    else
        UNDEFINED;
```

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