LDFF1D (scalar plus vector)

Gather load first-fault doublewords to vector (vector index)

Gather load with first-faulting behavior of doublewords to active elements of a vector register from memory addresses generated by a 64-bit scalar base plus vector index. The index values are optionally first sign or zero-extended from 32 to 64 bits and then optionally multiplied by 8. Inactive elements will not cause a read from Device memory or signal faults, and are set to zero in the destination vector.

This instruction is illegal when executed in Streaming SVE mode, unless FEAT_SME_FA64 is implemented and enabled.

It has encodings from 4 classes: [32-bit unpacked scaled offset](#) , [32-bit unpacked unscaled offset](#) , [64-bit scaled offset](#) and [64-bit unscaled offset](#)

32-bit unpacked scaled offset

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
1	1	0	0	0	1	0	1	1	xs	1	Zm	0	1	1	Pg	Rn	Zt

U ff

```
        LDFF1D { <Zt>.D }, <Pg>/Z, [<Xn|SP>, <Zm>.D, <mod> #3]
```

```
if !HaveSVE() then UNDEFINED;
integer t = UInt(Zt);
integer n = UInt(Rn);
integer m = UInt(Zm);
integer g = UInt(Pg);
constant integer esize = 64;
constant integer msize = 64;
constant integer offs_size = 32;
boolean unsigned = TRUE;
boolean offs_unsigned = xs == '0';
integer scale = 3;
```

32-bit unpacked unscaled offset

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
1 1 0 0 0 1 0	1	1	xs	0	Zm	0	1 1	Pg	Rn	Zt

msz<1> msz<0>   U ff

```
        LDFF1D { <Zt>.D }, <Pg>/Z, [<Xn|SP>, <Zm>.D, <mod>]
```
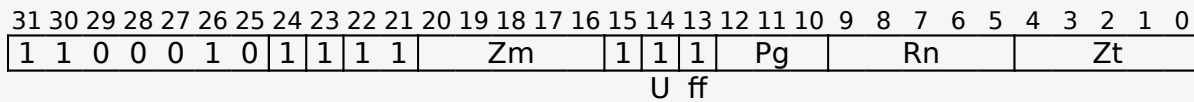
```
if !HaveSVE() then UNDEFINED;
integer t = UInt(Zt);
integer n = UInt(Rn);
integer m = UInt(Zm);
integer g = UInt(Pg);
constant integer esize = 64;
constant integer msize = 64;
constant integer offs_size = 32;
```

```
    boolean unsigned = TRUE;
    boolean offs_unsigned = xs == '0';
    integer scale = 0;
```
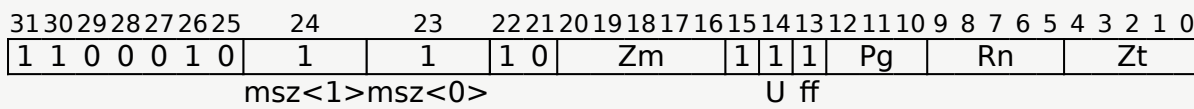
64-bit scaled offset

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
1 1 0 0 0 1 0	1	1	1 1 Zm	1 1 1	Pg	Rn	Zt

U ff

LDFF1D { <Zt>.D }, <Pg>/Z, [<Xn|SP>, <Zm>.D, LSL #3]

```
    if !HaveSVE() then UNDEFINED;
    integer t = UInt(Zt);
    integer n = UInt(Rn);
    integer m = UInt(Zm);
    integer g = UInt(Pg);
    constant integer esize = 64;
    constant integer msize = 64;
    constant integer offs_size = 64;
    boolean unsigned = TRUE;
    boolean offs_unsigned = TRUE;
    integer scale = 3;
```

64-bit unscaled offset

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
1 1 0 0 0 1 0	1	1	1 0	Zm	1 1 1	Pg	Rn	Zt

msz<1> msz<0>   U ff

LDFF1D { <Zt>.D }, <Pg>/Z, [<Xn|SP>, <Zm>.D]

```
    if !HaveSVE() then UNDEFINED;
    integer t = UInt(Zt);
    integer n = UInt(Rn);
    integer m = UInt(Zm);
    integer g = UInt(Pg);
    constant integer esize = 64;
    constant integer msize = 64;
    constant integer offs_size = 64;
    boolean unsigned = TRUE;
    boolean offs_unsigned = TRUE;
    integer scale = 0;
```

Assembler Symbols

<Zt>   Is the name of the scalable vector register to be
                transferred, encoded in the "Zt" field.

<Pg>   Is the name of the governing scalable predicate register P0-
                P7, encoded in the "Pg" field.

<Xn|SP>   Is the 64-bit name of the general-purpose base register or
                stack pointer, encoded in the "Rn" field.

<Zm>   Is the name of the offset scalable vector register, encoded in the "Zm" field.

<mod>   Is the index extend and shift specifier, encoded in "xs":

xs	<mod>
0	UXTW
1	SXTW

Operation

```
CheckNonStreamingSVEEnabled();
constant integer VL = CurrentVL;
constant integer PL = VL DIV 8;
constant integer elements = VL DIV esize;
bits(PL) mask = P[g, PL];
bits(64) base;
bits(VL) offset;
bits(VL) result;
bits(VL) orig = Z[t, VL];
bits(msize) data;
constant integer mbytes = msize DIV 8;
boolean fault = FALSE;
boolean faulted = FALSE;
boolean unknown = FALSE;
boolean contiguous = FALSE;
boolean tagchecked = TRUE;
AccessDescriptor accdesc = CreateAccDescSVEFF(contiguous, tagchecked);

if !AnyActiveElement(mask, esize) then
    if n == 31 && ConstrainUnpredictableBool(Unpredictable_CHECKSPNONEA
        CheckSPAlignment();
else
    if n == 31 then CheckSPAlignment();
    base = if n == 31 then SP[] else X[n, 64];
    offset = Z[m, VL];

assert accdesc.first;

for e = 0 to elements-1
    if ActivePredicateElement(mask, e, esize) then
        integer off = Int(Elem[offset, e, esize]<offs_size-1:0>, offs_unsig
        bits(64) addr = base + (off << scale);
        if accdesc.first then
            // Mem[] will not return if a fault is detected for the firs
            data = Mem[addr, mbytes, accdesc];
            accdesc.first = FALSE;
        else
            // MemNF[] will return fault=TRUE if access is not performe
            (data, fault) = MemNF[addr, mbytes, accdesc];
    else
        (data, fault) = (Zeros(msize), FALSE);

    // FFR elements set to FALSE following a supressed access/fault
    faulted = faulted || fault;
    if faulted then
```

```
            ElemFFR[e, esize] = '0';

    // Value becomes CONSTRAINED UNPREDICTABLE after an FFR element is
    unknown = unknown || ElemFFR[e, esize] == '0';
    if unknown then
        if !fault && ConstrainUnpredictableBool(Unpredictable_SVELDNFDA
            Elem[result, e, esize] = Extend(data, esize, unsigned);
        elsif ConstrainUnpredictableBool(Unpredictable_SVELDNFZERO) the
            Elem[result, e, esize] = Zeros(esize);
        else  // merge
            Elem[result, e, esize] = Elem[orig, e, esize];
    else
        Elem[result, e, esize] = Extend(data, esize, unsigned);

Z[t, VL] = result;
```

Base Instructions	SIMD&FP Instructions	SVE Instructions	SME Instructions	Index by Encoding	Sh Pseu