

## WHILELS (predicate)

While incrementing unsigned scalar lower or same as scalar

Generate a predicate that starting from the lowest numbered element is true while the incrementing value of the first, unsigned scalar operand is lower or same as the second scalar operand and false thereafter up to the highest numbered element.

If the second scalar operand is equal to the maximum unsigned integer value then a condition which includes an equality test can never fail and the result will be an all-true predicate.

The full width of the scalar operands is significant for the purposes of comparison, and the full width first operand is incremented by one for each destination predicate element, irrespective of the predicate result element size. The first general-purpose source register is not itself updated.

The predicate result is placed in the predicate destination register. Sets the first (N), none (Z), !last (C) condition flags based on the predicate result, and the V flag to zero.

|    |    |    |    |    |    |    |    |      |    |      |    |    |    |    |    |    |    |    |    |    |    |   |   |   |   |   |    |   |   |   |    |
|----|----|----|----|----|----|----|----|------|----|------|----|----|----|----|----|----|----|----|----|----|----|---|---|---|---|---|----|---|---|---|----|
| 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  |
| 0  | 0  | 1  | 0  | 0  | 1  | 0  | 1  | size | 1  |      |    |    | Rm |    |    |    | 0  | 0  | 0  | sf | 1  | 1 |   |   |   |   | Rn |   | 1 |   | Pd |
|    |    |    |    |    |    |    |    |      |    | U lt |    |    |    |    |    |    |    |    |    | eq |    |   |   |   |   |   |    |   |   |   |    |

**WHILELS** <Pd>.<T>, <R><n>, <R><m>

```
if !HaveSVE() && !HaveSME() then UNDEFINED;
constant integer esize = 8 << UInt(size);
constant integer rsize = 32 << UInt(sf);
integer n = UInt(Rn);
integer m = UInt(Rm);
integer d = UInt(Pd);
boolean unsigned = TRUE;
SVEComp op = Comp_LE;
```

### Assembler Symbols

<Pd> Is the name of the destination scalable predicate register, encoded in the "Pd" field.

<T> Is the size specifier, encoded in "size":

| size | <T> |
|------|-----|
| 00   | B   |
| 01   | H   |
| 10   | S   |
| 11   | D   |

<R>

Is a width specifier, encoded in "sf":

| sf | <R> |
|----|-----|
| 0  | W   |
| 1  | X   |

<n>

Is the number [0-30] of the source general-purpose register or the name ZR (31), encoded in the "Rn" field.

<m>

Is the number [0-30] of the source general-purpose register or the name ZR (31), encoded in the "Rm" field.

## Operation

```
CheckSVEEnabled();
constant integer VL = CurrentVL;
constant integer PL = VL DIV 8;
constant integer elements = VL DIV esize;
bits(PL) mask = Ones(PL);
bits(rsize) operand1 = X[n, rsize];
bits(rsize) operand2 = X[m, rsize];
bits(PL) result;
boolean last = TRUE;
constant integer psize = esize DIV 8;

for e = 0 to elements-1
    boolean cond;
    case op of
        when Cmp_LT cond = (Int(operand1, unsigned) < Int(operand2, unsigned));
        when Cmp_LE cond = (Int(operand1, unsigned) <= Int(operand2, unsigned));

    last = last && cond;
    bit pbit = if last then '1' else '0';
    Elem[result, e, psize] = ZeroExtend(pbit, psize);
    operand1 = operand1 + 1;

PSTATE.<N,Z,C,V> = PredTest(mask, result, esize);
P[d, PL] = result;
```

## Operational information

If FEAT\_SVE2 is implemented or FEAT\_SME is implemented, then if PSTATE.DIT is 1:

- The execution time of this instruction is independent of:
  - The values of the data supplied in any of its registers.
  - The values of the NZCV flags.
- The response of this instruction to asynchronous exceptions does not vary based on:
  - The values of the data supplied in any of its registers.
  - The values of the NZCV flags.

Internal version only: isa v33.64, AdvSIMD v29.12, pseudocode  
no\_diffs\_2023\_09\_RC2, sve v2023-06\_rel ; Build timestamp: 2023-09-18T17:56

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