: Mjølner BETA Low Level Primitives

Table of Contents

Copyright Notice

.

13. Mjølner BETA Low Level Primitives

Introduction

This document describes the semantics of the low-level primitives available in the Mjølner implementation of the BETA language. There are currently some syntactic inconveniences. These may be fixed with a grammar change in a future version.

Low Level Operations

Low level operations on bits, bytes and words are available as described below. Use of these operations may in general be platform dependent.

Syntax

The syntax is as follows

```
%op
```

i.e., the `%` indicates, that `op` is a special low-level operation.

In the following, `E`, `val`, and `inx` are assumed to be integer evaluations, `A` is an integer object, and `R` is a repetition object.

Addressing Conventions

The addressing conventions of bytes, words, longs and bitfields follow the big-endian (Motorola, SPARC etc.) conventions:

```
|------------------------------------------------------------|
|31                       long[0]                           0|
|----------------------------------|-------------------------|
|15         word[0]         0|15           word[1]          0|
|-------------|-------------|-------------|-----------------|
|7  byte[0]  0|7   byte[1]  0|7   byte[2]  0|7   byte[3]   0|
```

```
|-------------|-------------|-------------|--------------|
 0                                                    31
 BitOffset Big-endian -->
                               BitOffset Little-endian <--

 |             |             |             |
 BaseAddr      BaseAddr+1    BaseAddr+2    BaseAddr+3
```
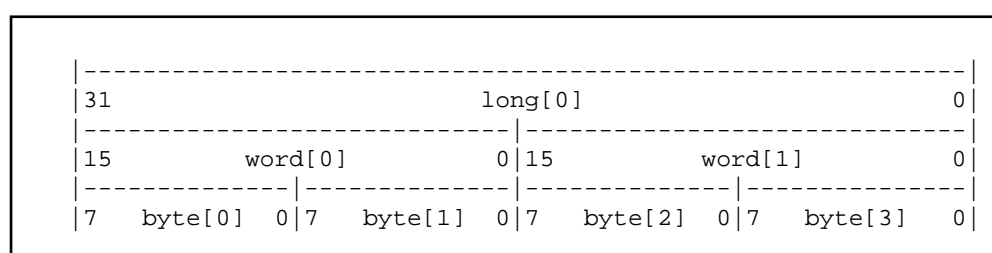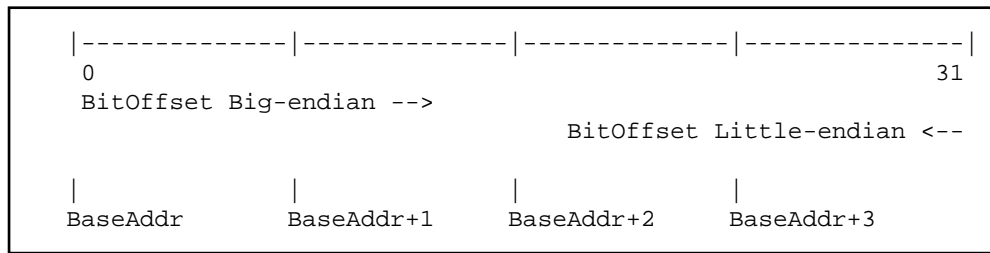
Notice that a BitOffset is addressed from the most significant bit on big-endian architectures, and from the the least significant bit on little-endian architectures (`nti`, `linux`).

Operations

The following operations are available.

Bitwise logical complement (one's complement)

```
OP:       %Bnot
usage:    %Bnot E
```

Bitwise logical and, or, exclusive or

```
OP:       %Band, %Bor, %Bxor
usage:    E1 OP E2
ex:       E1 %Band E2
```

Note the `B` in these operations - B stands for bitwise. A future version may use the syntax `%and`.

Shift of a long

```
OP:       %srl        shift right logical
          %sll        shift left logical
          %sra        shift right arithemetic
          %sla        shift left arithemetic
          %ror        rotate right
          %rol        rotate left
usage     E1 OP E2
ex:       E1 %sll E2
```

Get byte/short from a long

```
OP:       byteNo  -> A.%getByte
          shortNo -> A.%getShort
          longNo  -> A.%getLong
          byteNo  -> A.%getSignedByte
          shortNo -> A.%getSignedShort
```

where `byteNo` is an integer-evaluation in [0,3], `shortNo` in [0,1] and `longNo` in [0].

```
Usage:  E1 -> A1.%getByte -> A2
Ex:     1 -> A.%getByte -> B
```

Note: `byteNo -> A.%getLong` is the same as `A`.

Put byte/short into a long

```
OP:     (val,byteNo)  -> A.%putByte
        (val,shortNo) -> A.%putShort
        (val,longNo)  -> A.%putLong
```

The same restrictions for `byteNo` etc. as in [Get byte/short from a long](#) apply here.

```
usage:  (val,E) -> A.OP
ex.:    (val,3) -> A.%putByte
```

The same restrictions for `byteNo` etc. as in [Get byte/short from a long](#) apply here.

Note: `(val,E)->A.%putLong` is the same as `val->A`.

Get bits from a long

```
OP:     (pos,width) -> A.%getBits
        (pos,width) -> A.%getSignedBits
```

where `pos`, `width` in [0,31] are integer-evaluations.

```
usage: (pos,width) -> A.%getBits -> V
```

Put bits into a long

```
OP:     (val,pos,width) -> A.%putBits
```

where `pos`, `width` in [0,31] are integer-evaluations.

```
usage:  (V,12,4) -> A.%putBits
```

This object

Note: This operation is needed in some cases where `THIS(P)` cannot be used. E.g. inside singular objects in the do-part.
Notice that `THIS(Object)` will NOT work, you must use the operation below:

```
OP:     %thiss object
```

A reference to the current object is returned.

```
Usage:  %thiss object -> S[]
```

Get byte/short from a long   5

where s is declared as `S: ^Object`.

.

BETA Language Modifications

This object

BETA Language Modifications