E3	R_1X_2	B_2DL_2	DL_2DL_2	DH_2DH_2	58

LY R₁,D₂(X₂,B₂)

Load Fullword

RXY-a

LY (Load Fullword), like its sister instruction L, is used to copy the fullword stored in the memory location designated by operand 2 into the register specified by operand 1. Only the rightmost 32 bits (32-63) of the register are modified by this operation. Bits 0-31 are unchanged. RXY-a instructions provide a 20-bit signed displacement in the base/displacement address for operand 2, while RX instructions provide a 12-bit displacement. As a result, when using **LY**, the address of operand two can be from 0 to +524,287 bytes in front of base address for the corresponding base register, or from 1 to 524,288 bytes before that location. This is a much larger range than the $2^{12} = 4,096$ byte (strictly positive) range provided by L (Load Fullword).

LY has a two-byte opcode – E358.

Consider the following example,

```
L       R9,AFIELD
```

R9 (Before)

11	22	33	44	55	66	77	88

R9 (After)

11	22	33	44	FF	FF	FF	FF

AFIELD

Memory

00	FF	FF	FF	FF	00	00	00

...
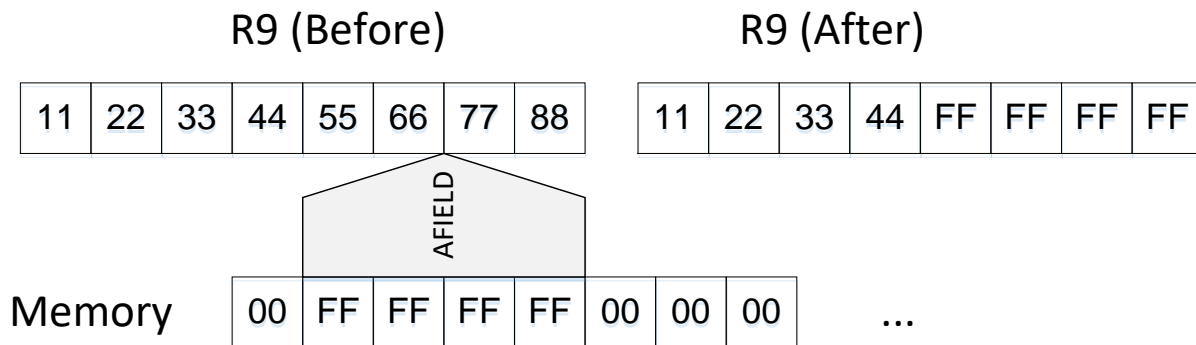
The contents of the fullword "AFIELD" are copied to the rightmost 32 bits of register 9, destroying the previous values in R9. The fullword is unchanged by this operation.

LY also provides for an index register to be coded as part of operand 2.
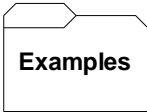
Some Unrelated Loads

```
          R4 =  X'AAAAAAAAAAAAAAAA'
          R5 =  X'0000000000000008'
          R6 =  X'0000000000000004'

 AFIELD   DC  F'4'       AFIELD = X'00000004'
 BFIELD   DC  F'-1'      BFIELD = X'FFFFFFFF'
 CFIELD   DC  F'0'       CFIELD = X'00000000'

          LY  R4,AFIELD     R4 = X'AAAAAAAA00000004'
          LY  R4,AFIELD(R6) R4 = X'AAAAAAAAFFFFFFFF'
          LY  R4,AFIELD(R5) R4 = X'AAAAAAAA00000000'

          LY  R6,AFIELD(R6) R6 = X'FFFFFFFF'

          CONSIDER THE NEXT TWO CONSECUTIVELY EXECUTED LOADS
          LY  R5,AFIELD     R5 = X'0000000000000004'
          LY  R6,AFIELD(R5) R6 = X'00000000FFFFFFFF'
```

👉 Tips

1. You might use **LY** instead of L in cases where you have maxed out the 4K range of a base register. Rather than adding another base register to fix an addressability error, consider using **LY** to help solve your problem.

2. Many RX instructions have companions in the RXY-a instruction class. RXY-a instructions all provide 20-bit displacements (range 0 - 1,048,575) instead of the 12-bit displacements (range 0 – 4095) found in RX instructions. For example, STY is the companion Store Fullword operation to ST.