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
```

<table>
<thead>
<tr>
<th>R9 (Before)</th>
<th>R9 (After)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 22 33 44 55 66 77 88</td>
<td>11 22 33 44 FF FF FF FF</td>
</tr>
</tbody>
</table>

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’AAAAAAAAAAAAAAAAAAAA’
R5 = ‘X’00000000000000008’
R6 = ‘X’0000000000000004’

<table>
<thead>
<tr>
<th>Field</th>
<th>DC</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFIELD</td>
<td>F’4’</td>
<td>‘X’00000004’</td>
</tr>
<tr>
<td>BFIELD</td>
<td>F’−1’</td>
<td>‘X’FFFFFFFF’</td>
</tr>
<tr>
<td>CFIELD</td>
<td>F’0’</td>
<td>‘X’00000000’</td>
</tr>
</tbody>
</table>

LY R4,AFIELD     R4 = ‘X’AAAAAAAAA00000004’
LY R4,AFIELD(R6) R4 = ‘X’AAAAAAAPFFFFFFF’
LY R4,AFIELD(R5) R4 = ‘X’AAAAAA00000000’

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’00000000FFFFFFF’

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.