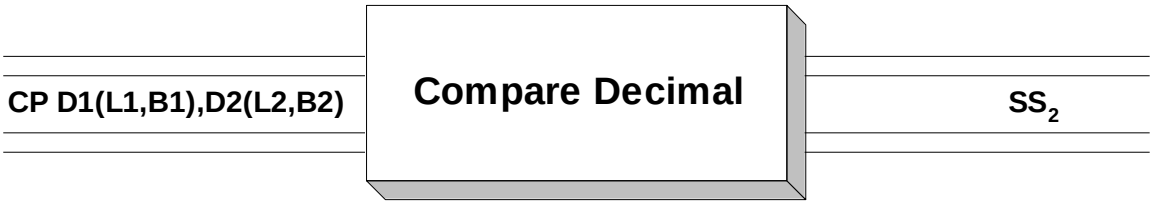
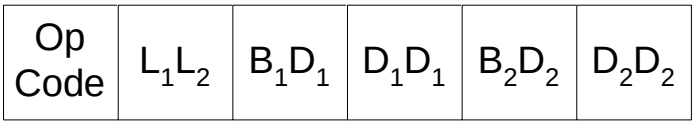
The CP Instruction
A Visible/Z Lesson





The Idea:

CP is a SS_2 instruction which is used to compare packed decimal fields. This instruction sets the condition code to "equal" (condition code = 0), "low" (condition code = 1) or "high" (condition code = 2) based on a comparison of the two fields as decimal numbers, and indicates how the first operand compares to the second operand. The fields may be of equal or different sizes. The only restrictions on the field lengths is that they must be a maximum of 16 bytes in length (the typical restriction for SS_2 fields). Consider the fields and instructions below.

```
APK     DC     P'123' = X'123C'
BPK     DC     PL3'100' = X'00100C
CHX     DC     X'123F'
        ...
        CP     APK,BPK      C.C.= HIGH
        CP     APK,CHX      C.C.= EQUAL
        CLC    APK,CHX      C.C.= LOW
```

In the first **CP**, the fields are compared arithmetically and it is found that +123 is greater than +100. In the second compare, the condition code is set to "equal" since +123 is equal to +123 (x'F' is a valid plus sign). The third compare is a logical compare rather than an arithmetic compare. Since x'3C' is lower than x'3F' in the EBCDIC collating sequence, the condition code is set to "low".

After setting the condition code with a **CP**, the condition code can be tested with a branch instruction. The typical branch instructions you might use are BE or BNE, BL or BNL, and BH or BNH.

Examples

Some unrelated CP's:

```
QPK     DC     P'12345'      = X'12345C'
RPK     DC     P'-32'        = X'032D'
```

```
 SZONED   DC      Z'11'          = X'F1C1'
          ...
                              Results:
          CP    QPK,=P'20'   C.C. = HIGH
          CP    RPK,=P'20'   C.C. = LOW
          CP    SZONED,=P'999'  ABEND - SZONED IS NOT PACKED
          CP    QPK,QPK      C.C. = EQUAL
          CP    QPK,RPK      C.C. = HIGH
          CP    RPK,QPK      C.C. = LOW
          CP    QPK,=X'324A' C.C. = HIGH  - LITERAL IS VALID PACKED
DATA
          CP    QPK+2(1),RPK   BAD IDEA, BUT IT DOES WORK C.C. = HIGH,
```

Trying It Out in VisibleZ:

1) Load the program **cp.obj** from the \Codes directory and single step through each instruction. Why does CP set the condition code to high (2)?

2) Load the program **cp1.obj** from the \Codes directory and single step through each instruction. Why does CP set the condition code to equal/zero (0) when the fields have different signs and different lengths?

3) Load the program **cp2.obj** from the \Codes directory and single step through each instruction. Does the condition code represent the relationship of operand 1 compared to operand 2, or the other way round?

4) Load the program **cp3.obj** from the \Codes directory and single step through each instruction. Why does execution fall through the first BCR and take the branch on the second BCR?