

```
1 program higher                                     !higher-precision demo
2 implicit none                                     !enforce strong typing
3 integer, parameter :: k1 = selected_real_kind(p=precision(0.0)) !single precision kind
4 integer, parameter :: k2 = selected_real_kind(p=precision(0.0_k1)+1) !double precision kind
5 integer, parameter :: k3 = selected_real_kind(p=precision(0.0_k2)+1) !triple precision kind
6 integer, parameter :: k4 = selected_real_kind(p=precision(0.0_k3)+1) !quadruple precision kind
7 integer, parameter :: k4r = selected_real_kind(p=precision(0.0_k3)+1,r=range(0.0_k3)+1) !quad precision & range ki
8 integer, parameter :: k5 = selected_real_kind(p=precision(0.0_k4)+1) !quintuple precision kind
9
10
11 write(*,*)
12 write(*,*) "Welcome to Higher-Precision Demo"
13 write(*,*) "      R. Stull, Univ. of British Columbia, Canada, 15 Mar 2013. Free to share."
14 write(*,*)
15 write(*,*) "      The KIND specifier is an integer. (Negative if not exist on this computer)"
16 write(*,*) "Single precision real kind specifier is k1 =", k1, " the default REAL kind"
17 write(*,*) "Double precision real kind specifier is k2 =", k2
18 write(*,*) "Triple precision real kind specifier is k3 =", k3
19 write(*,*) "Quadruple precision real kind specifier is k4 =", k4
20 write(*,*)
21 write(*,*) "Quadruple range real kind specifier is k4r=", k4r
22 write(*,*) "Quintuple precision real kind specifier is k5 =", k5
23
24 write(*,*)
25 write(*,*) "      Precision Range"
26 write(*,*) "Single (k1) =", precision(0.0_k1), range(0.0_k1)
27 write(*,*) "Double (k2) =", precision(0.0_k2), range(0.0_k2)
28 write(*,*) "Triple (k3) =", precision(0.0_k3), range(0.0_k3)
29 write(*,*) "Quadruple (k4) =", precision(0.0_k4), range(0.0_k4)
30
31 write(*,*)
32 write(*,*) "      Epsilon, the smallest non-negligible number that can be resolved"
33 write(*,*) "Single (k1) =", epsilon(1.0_k1)
34 write(*,*) "Double (k2) =", epsilon(1.0_k2)
35 write(*,*) "Triple (k3) =", epsilon(1.0_k3)
36 write(*,*) "Quadruple (k4) =", epsilon(1.0_k4)
37
38 write(*,*)
39 write(*,*) "      The largest number possible."
40 write(*,*) "Single (k1) =", huge(1.0_k1)
41 write(*,*) "Double (k2) =", huge(1.0_k2)
42 write(*,*) "Triple (k3) =", huge(1.0_k3)
43 write(*,*) "Quadruple (k4) =", huge(1.0_k4)
44
45 write(*,*)
46 write(*,*) " Free format output sometimes shows an extra digit beyond the precision."
47 write(*,*) "x = 0.2 in single precision (k1)", 0.2_k1
48 write(*,*) "x = 0.2 in double precision (k2)", 0.2_k2
49 write(*,*) "x = 0.2 in triple precision (k3)", 0.2_k3
50 write(*,*) "x = 0.2 in quad precision (k4) ", 0.2_k4
51 write(*,*)
52
53 endprogram higher
54
55 ===== note, for code above, you will need to comment-out statements using k4 if it doesn't exist.
56
57
58 SAMPLE OUTPUT:
59 ===== run on mac mini:
60
61 Welcome to Higher-Precision Demo
62      R. Stull, Univ. of British Columbia, Canada, 15 Mar 2013. Free to share.
63
64      The KIND specifier is an integer. (Negative if not exist on this computer)
65 Single precision real kind specifier is k1 = 4 the default REAL kind
66 Double precision real kind specifier is k2 = 8
67 Triple precision real kind specifier is k3 = 10
68 Quadruple precision real kind specifier is k4 = 16
69
70 Quadruple range real kind specifier is k4r= -2
71 Quintuple precision real kind specifier is k5 = -1
72
73      Precision Range
74 Single (k1) = 6 37
75 Double (k2) = 15 307
76 Triple (k3) = 18 4931
77 Quadruple (k4) = 33 4931
78
79      Epsilon, the smallest non-negligible number that can be resolved
80 Single (k1) = 1.19209290E-07
81 Double (k2) = 2.2204460492503131E-016
```

```
82 Triple (k3) = 1.08420217248550443401E-0019
83 Quadruple (k4) = 1.92592994438723585305597794258492732E-0034
84
85 The largest number possible.
86 Single (k1) = 3.40282347E+38
87 Double (k2) = 1.7976931348623157E+308
88 Triple (k3) = 1.18973149535723176502E+4932
89 Quadruple (k4) = 1.18973149535723176508575932662800702E+4932
90
91 Free format output sometimes shows an extra digit beyond the precision.
92 x = 0.2 in single precision (k1) 0.200000003
93 x = 0.2 in double precision (k2) 0.200000000000000001
94 x = 0.2 in triple precision (k3) 0.20000000000000000003
95 x = 0.2 in quad precision (k4) 0.200000000000000000000000000000010
96
97
98
```

99 ===== run on old IBM server:

```
100
101 Welcome to Higher-Precision Demo
102 R. Stull, Univ. of British Columbia, Canada, 15 Mar 2013. Free to share.
103
```

```
104 The KIND specifier is an integer. (Negative if not exist on this computer)
105 Single precision real kind specifier is k1 = 4 the default REAL kind
106 Double precision real kind specifier is k2 = 8
107 Triple precision real kind specifier is k3 = 10
108 Quadruple precision real kind specifier is k4 = -1
109
```

```
110 Precision Range
111 Single (k1) = 6 37
112 Double (k2) = 15 307
113 Triple (k3) = 18 4931
114
```

```
115 Epsilon, the smallest non-negligible number that can be resolved
116 Single (k1) = 1.1920929E-07
117 Double (k2) = 2.220446049250313E-016
118 Triple (k3) = 1.0842021724855044340E-0019
119
```

```
120 The largest number possible.
121 Single (k1) = 3.4028235E+38
122 Double (k2) = 1.797693134862316E+308
123 Triple (k3) = 1.1897314953572317650E+4932
124
```

```
125 Free format output sometimes shows an extra digit beyond the precision.
126 x = 0.2 in single precision (k1) 0.2000000
127 x = 0.2 in double precision (k2) 0.2000000000000000
128 x = 0.2 in triple precision (k3) 0.200000000000000000
129
```

130 ==end==

131