Program Example: sort.f95

- 程式範例檔：/home/teachers/weitingc/lecture_ex/sort.f95
- 程式資料檔：/home/teachers/weitingc/lecture_ex/rain.txt

- 功能：將輸入檔案rain.txt內的10個數值由小到大排序，輸出到rain_sorted.txt中
- 流程：
  - 讀取檔案內的數值，存在陣列rain中
  - 進行排序：從rain(1)開始，找出rain(1)…rain(n)當中最小的數值，將此最小值的元素與rain(1)交換
    接著找出rain(2) …rain(n)當中最小的數值，並進行交換…
    依此類推，直到rain(n-1)
  - 輸出：原來的十個數值，與按照大小排序好的結果

```fortran
PROGRAM sort
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
! Read in 10 numbers from the input file, sort it
! into ascending order.
! Write the original and sorted values into the
! the output file
! (Wei-Ting, 2013/10/07)
!
IMPLICIT NONE
INTEGER , PARAMETER :: n=10        ! size of data array
REAL, DIMENSION(1:n) :: rain       ! data array to sort
REAL , DIMENSION(1:n) :: sorted    ! sorted array
REAL :: minimum                    ! temporary variable for swapping
INTEGER :: i,j,k                   ! counter for do loops
```

```fortran
! Open input data file and read data
OPEN(unit=100,file='rain.txt')
READ(100,*) ! skip header
DO i=1,n
  READ (100,*) rain(i)
ENDDO
```

- rain.txt

rain (mm)
11.2
3.0
44.2
0.8
6.4
10.3
7.9
0.22
31.5
9.5

```fortran
!Sort the data
sorted=rain
DO i=1,n-1
  k=i
  minimum=sorted(i)
  ! find the minimum value in sorted(i) to sorted(n)
  ! and store it temporarily in minimum
  DO j=i+1,n
    IF (sorted(j) < minimum) THEN
      k=j
      minimum=sorted(k)
    ENDIF
  ENDDO
  ! swap the minimum value with sorted(i)
  sorted(k)=sorted(i)
  sorted(i)=minimum
ENDDO
```

```
sorted=rain
DO i=1,n-1

   k=i
   minimum=sorted(i)

   DO j=i+1,n

      IF (sorted(j) < minimum) THEN
         k=j
         minimum=sorted(k)
      ENDIF

   ENDDO

   sorted(k)=sorted(i)
   sorted(i)=minimum

ENDDO
```

11.2
3.0
44.2
0.8
6.4
10.3
7.9
0.22
31.5
9.5

```
(i=1)
k=1
minimum=sorted(1)=11.1

Do j=2,n
  (j=2)
  k=2
  minimum=sorted(2)=3.0
  (j=3)
  ….
  (j=8)
  k=8
  minimum=sorted(8)=0.22
  …
ENDDO
sorted(8)=sorted(1)
sorted(1)=minimum

(i=2)
k=2
minimum=sorted(2)=3.0
…
```

```fortran
! Output results
OPEN(unit=101,file='rain_sorted.txt')

! Write the original data
WRITE(101,*) ' original data is '
DO i=1,n
  WRITE(101,999) rain(i)
999 format(1x, f7.1)
ENDDO

! Write the sorted data
WRITE(101,*) ' Sorted data is '
DO i=1,n
  WRITE(101,999) sorted(i)
ENDDO

END PROGRAM sort
```

測試結果

- rain_sorted.txt

original data is
11.2
3.0
44.2
0.8
6.4
10.3
7.9
0.2
31.5
9.5
Sorted data is
0.2
0.8
3.0
6.4
7.9
9.5
10.3
11.2
31.5
44.2