Subject: WHERE function
From: Van Snyder
Reference: 04-195

1 Number

TBD

2 Title

WHERE function.

3 Submitted By

J3

4 Status

For consideration.

5 Basic Functionality

Provide a function whose result is the subscripts where a logical array is true.

6 Rationale

The WHERE construct and statement are useful, but sometimes one needs to remember the places where the mask is true for use in another computation that isn't ripe to be carried out within the WHERE construct or statement. In those cases, it would be useful to have a vector subscript to represent the places where the mask is true.

7 Estimated Impact

Minor both for standard and implementor: One intrinsic function.

8 Detailed Specification

In addition to the description of the function, a summary is needed in 13.5, perhaps in 13.5.14.

8.1 If 04-195 does not proceed

13.7.127 WHERE (A[, KIND])

Description. Return the subscripts where the elements of a logical array are true.

Class. Transformational function.

Arguments.

A	shall be a logical array of rank one.
KIND (optional)	shall be a scalar integer initialization expression.

Result Characteristics. Integer array of rank one and extent COUNT(A). If KIND is present, the kind type parameter value is that specified by the value of KIND; otherwise, the kind type parameter value is that of default integer type.

Result Value. The result of WHERE(A) is PACK([(I,I=1,SIZE(A))],A). This is such that every element of A(WHERE(A)) is true, and no other elements of A are true.

Example. The value of WHERE([.TRUE., .FALSE., .FALSE., .TRUE.]) is [1, 4].

8.2 If 04-195 proceeds

13.7.127 WHERE (A[, KIND])

Description. Return the subscripts where the elements of a logical array are true.

Class. Transformational function.

Arguments.

A shall be a logical array.

KIND (optional) shall be a scalar integer initialization expression.

Result Characteristics. The result is an integer array. If KIND is present, the kind type parameter value is that specified by the value of KIND; otherwise, the kind type parameter value is that of default integer type.

Case (i): If A is of rank one, the result is of rank one and extent COUNT(A).

Case (ii): If A is of rank $r > 1$, the result is of rank two and shape [r, COUNT(A)].

Result Value. The result of WHERE(A) is such that every element of A(WHERE(A)) is true, and no other elements of A are true.

Case (i): If the rank of the result is one the elements of the result are unique and in order.

Case (ii): If the rank of the result is two, and if $i < j$, the element of A for which the (:,i) section of the result is a subscript appears in array element order before the element of A for which the (:,j) section of the result is a subscript.

Examples.

Case (i): The value of WHERE([.TRUE., .FALSE., .FALSE., .TRUE.]) is [1, 4].

Case (ii): The value of WHERE ($\begin{bmatrix} \text{.TRUE.} & \text{.FALSE.} & \text{.TRUE.} \\ \text{.FALSE.} & \text{.TRUE.} & \text{.TRUE.} \end{bmatrix}$) is $\begin{bmatrix} 1 & 2 & 1 & 2 \\ 1 & 2 & 3 & 3 \end{bmatrix}$.

9 History