Fortran 95

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Formats

- Format Items

w	total width of the field	m	least number of digits
d	number of digits	e	number of digits inexponent
c	repeat count		

cLw	logical (.TRUE. or .FALSE.)
cAw	character
cIw.m	integer
cBw.m	integer in binary
cOw.m	integer with octal base
cZw.m	integer with hexadecimal base
cEw.dEe	real
cENw.dEe	real -- exponent a multiple of 3
cESw.dEe	real -- first digit non zero
cFw.d	real -- no exponent printed
cGw.dEe	real -- auto format to F or E
cDw.d	real -- same as E (old double precision)

- Format control and control edit descriptors

BN	ignore non-leading blanks in numeric fields
BZ	treat non-leading blanks in numeric fields as zeros
S	printing of optional plus signs is implementation dependent
SP	print optional plus signs
SS	do not print optional plus signs
Tn	tab to column n
TLn	tab left n columns
TRn	tab right n columns
nX	tab right n columns

- Useing formats:

String Literal:	write (*,FMT='(E10.2)')	10.43
Character variable:	write (*,FMT=aStrVar)	10.43
Line number:	write (*,FMT=10) 10 format(xxx)	10.43

Operators

**	exponentiation		
*	multiplication	/	division
+	addition	-	subtraction
//	concatenation		
==	equality	.eq.	equality
/=	not equal	.ne.	not equal
<	less than	.lt.	less than
>	greater than	.gt.	greater than
<=	less than or equal	.le.	less than or equal
>=	greater than or equal	.ge.	greater than or equal
.not.	complement, negation		
.and.	logical and	.or.	logical or
.eqv.	logical equivalence	.neqv.	logical not equivalence

Array declaration and initialisation

- Declaration in two forms:
  - REAL :: scalar, vector(12345), matrix(3,4), array(2,3,4)
  - REAL, DIMENSION(2,3) :: matrix
- Index extents can be non-one based
  - REAL :: X(-1:2,3,4)
  - REAL :: CstyleArr(0:9)
- Initalization
  - INTEGER   :: vec(3) = (/ 1, 2, 3 /)
  - CHARACTER(LEN=3) :: workday(0:6) = (/'Mon','Tue','Wed','Thu','Fri'/)
- Arrays and array sections may be assigned to
- Array sections:
  - Range: a(2:10)
  - Range with stride: b(1:10:2) ! elements: 1, 3, 5, 7, 9
  - Vector indexing: a=(/1,2,4/); b(a) = (/9,8,7/)

Some Array Functions

ALL(MASK, dim)	.TRUE. iff all elements of MASK are .TRUE.
ANY(MASK, dim)	.TRUE. iff any elements of MASK are .TRUE.
COUNT(MASK, dim)	Number of elements in MASK that are .TRUE.
MAXVAL(ARRAY, dim, mask)	Largest value in ARRAY
MINVAL(ARRAY, dim, mask)	Smallest value in ARRAY
PRODUCT(ARRAY, dim, mask)	Product of elements in ARRAY
SUM (ARRAY, dim, mask)	Sum of elements in ARRAY

MATMUL(matrixA, matrixB)	Matrix/vector multiplication
TRANSPOSE(matrix)	Transpose of matrix
CSHIFT(array, shift, dim)	Circular shift of elements
EOSHIFT(array, shift, dim)	End-off shift of elements
PACK(array, mask, pad)	Pack values of array
MERGE(tsrc, fsrc, mask)	Use tsrc if mask is true, else fsrc
MAXLOC(array, mask)	Location of maximum element
MINLOC(array, mask)	Location of minimum element

Bit Manipulation Functions

BIT_SIZE(I)	Return number of bits in I
BTEST(I, POS)	.TRUE. if bit POS is 1
IBCLR(I, POS)	Set bit POS to 0
IBSET(I, POS)	Set bit POS to 1
IAND(I, J)	Bitwise AND
IEOR(I, J)	Bitwise XOR
IOR(I, J)	Bitwise OR
NOT(I)	Bitwise NOT
IBITS(I, POS, LEN)	Extract LEN bits starting at POS
ISHIFT(I, SHIFT)	Shift bits (left for SHIFT>0, right for SHIFT<0
ISHIFTC(I, SHIFT, SIZE)	Circular bit SHIFT bits. Only do SIZE right most bits if SIZE given.
TRANSFER(SOR, DST, SIZE)	Transfer SIZE bits of SRC to DST.

String Functions

ACHAR(I)	ASCII character with number I
IACHAR(C)	ASCII number of the character C
CHAR(I, kind)	Character with number I
ICHAR(C)	number of character C
ADJUSTL(STR)	Adjusts to the left
ADJUSTR(STR)	Adjusts to the right
LEN_TRIM(STR)	String length ignoreing trailing blanks
LEN(STR)	String length
LGE(STR_A, STR_B)	ASCII string .GE.
LGT(STR-A, STR_B)	ASCII string .GT.
LLE(STR_A, STR_B)	ASCII string .LE.
LLT(STR_A, STR_B)	ASCII string .LT.
INDEX(STR, SUBSTR, BACK)	Return starting position of SUBSTR in STR. First one with BACK missing or .FALSE., else last one.
REPEAT(STR, NCOPIES)	Concatenate NCOPIES of STR
SCAN(STR, SET, BACK)	Returns position of the first of any character in string SET. If BACK .FALSE. or missing, first one, else right most character.
TRIM(STRING)	Return string minus trailing blanks.
VERIFY(STR, SET, BACK)	Returns position of the first character in STR not in SET. If BACK missing or .FALSE. return first, else last. Return 0 if all chars included

Real Variable Functions

EXPONENT(X)	Exponent of the X
FRACTION(X)	Fractional part X
NEAREST(X, S)	Nearest value in direction of sign of S
RRSPACING(X)	Reciprocal of relative spacing of model numbers near X
SCALE(X, I)	Multiply X by the base to the power I
SET_EXPONENT(X, I)	The number fraction=X and exponent=I
SPACING(X)	Spacing of model numbers near X

Real Type Query Functions

DIGITS(X)	Number of significant digits
EPSILON(X)	Least positive number E such that E+1>1
HUGE(X)	Largest positive number
MAXEXPONENT(X)	Largest exponent
MINEXPONENT	Smallest exponent
PRECISION(X)	Decimal precision
RADIX(X)	Base in the model
RANGE(X)	Decimal exponent
TINY(X)	Smallest positive number