

## ◆ Data Structure



### The Array Abstract Data Type

• **ADT** *Array* is

**objects:** A set of pairs  $\langle index, value \rangle$  where for each value of *index*

there is a value from the set *item*. *Index* is a finite ordered set of one or more dimensions, for example,  $\{0, \dots, n-1\}$  for one dimension,  $\{(0,0),(0,1), (0,2),(1,0),(1,1),(1,2),(2,0),(2,1),(2,2)\}$  for two dimensions, etc.

#### **Functions:**

for all  $A \in \text{Array}, i \in index, x \in item, j, size \in \text{integer}$

*Array Create*( $j, list$ ) ::= **return** an array of  $j$  dimensions where *list* is a  $j$ -tuple whose  $i$ th element is the size of the  $i$ th dimension. *Items* are undefined.

*Item Retrieve*( $A, i$ ) ::= **if** ( $i \in index$ ) **return** the item associated with index value  $i$  in array  $A$  **else return** error

*Array Store*( $A, i, x$ ) ::= **if** ( $i$  in *index*) **return** an array that is identical to array  $A$  except the new pair  $\langle i, x \rangle$  has been inserted

**else return** error **end** array