# Dynamic Arrays

SystemVeriiog provides a dynamic array that can be allocated and resized during simulation and so your simulation consumes a minimal amount of memory.

A dynamic array is declared with empty word subscripts []. This means that you do not specity the array size at compile time; instead, you give it at run-time. The array is initially empty, and so you must call the new [] constructor to allocate space, passing in the number of entries in the square brackets.

If you pass the name of an array to the new [] constructor, the values are copied into the new elements.

## CODE-1 Using a dynamic array for an uncounted list.

```
module dynamic_array;
int array[];
initial begin
            array = new[10];
           array[2] = 5;

            foreach(array[i]) begin
   end
    $display("array=%p",array);

end
endmodule
```

```
#
# Top level modules:
#       tb
# End time: 00:03:29 on Aug 30,2023, Elapsed time: 0:00:00
# Errors: 0, Warnings: 0
# End time: 00:03:30 on Aug 30,2023, Elapsed time: 0:01:26
# Errors: 0, Warnings: 0
# vsim tb
# Start time: 00:03:30 on Aug 30,2023
# ** Note: (vsim-3813) Design is being optimized due to module recompilation...
# Loading sv_std.std
# Loading work.tb(fast)
# array[0]=0
# array[1]=0
# array[2]=5
# array[3]=0
# array[4]=0
# array[5]=0
# array[6]=0
# array[7]=0
# array[8]=0
# array[9]=0
#
# array='{0, 0, 5, 0, 0, 0, 0, 0, 0, 0}
```

**CODE-2** **Declare of dynamic array of int data type and also display in packed formate.**

```
module dynamic_array;
int D_array[];

initial begin
            D_array = new[10];
             D_array = '{1,2,4,5,7,6,8,9,3,4};
            foreach(D_array[i])
      begin
       $display("Value of dynamic
array[%0d]=[%0d]",i,D_array[i]);
      end
       $display("\nValue of dynamic
array=%p",D_array);

   end
endmodule
```

```
# Top level modules:
#       dynamic_array
# End time: 00:25:38 on Aug 30,2023, Elapsed time: 0:00:00
# Errors: 0, Warnings: 0
# End time: 00:25:39 on Aug 30,2023, Elapsed time: 0:00:24
# Errors: 0, Warnings: 0
# vsim dynamic_array
# Start time: 00:25:39 on Aug 30,2023
# ** Note: (vsim-3813) Design is being optimized due to module recompilation...
# Loading sv_std.std
# Loading work.dynamic_array(fast)
# Value of dynamic array[0]=[1]
# Value of dynamic array[1]=[2]
# Value of dynamic array[2]=[4]
# Value of dynamic array[3]=[5]
# Value of dynamic array[4]=[7]
# Value of dynamic array[5]=[6]
# Value of dynamic array[6]=[8]
# Value of dynamic array[7]=[9]
# Value of dynamic array[8]=[3]
# Value of dynamic array[9]=[4]
#
# Value of dynamic array='{1, 2, 4, 5, 7, 6, 8, 9, 3, 4}
```

## CODE-3

**Resize the first array to 10 elements, while retaining the existing 5 elements.**

The size of an array can be specified during run-time by using **new[ ].**

```
module d_array;
bit[4:0] d_array[];

initial begin
        d_array = new[5];
        foreach(d_array[i])begin
        d_array[i] = $urandom_range(10,15);
        end
                $display("\ndynamic array while retaining the existing 5
elements is =%p",d_array);
                 $display("\nInceasing the size of array old value ");
                d_array = new[10];
                foreach(d_array[i])begin
        d_array[i] = $urandom_range(20,30);
        end
                $display("\ndynamic array value after resize array is
=%p",d_array);

end
endmodule
```

```
# Top level modules:
#       d_array
# End time: 07:52:42 on Aug 30,2023, Elapsed time: 0:00:00
# Errors: 0, Warnings: 0
# End time: 07:52:43 on Aug 30,2023, Elapsed time: 0:00:40
# Errors: 0, Warnings: 0
# vsim d_array
# Start time: 07:52:43 on Aug 30,2023
# ** Note: (vsim-3813) Design is being optimized due to module recompilation...
# Loading sv_std.std
# Loading work.d_array(fast)
#
# dynamic array while retaining the existing 5 elements is ='{10, 14, 14, 12, 14}
#
# Inceasing the size of array old value
#
# dynamic array value after resize array is ='{29, 23, 30, 26, 23, 29, 23, 24, 22, 30}
```

## CODE-4 Dynamic Array Method: new,size and delete

**new method:** To create a memory , it can also be used to resize or copy a dynamic array.

**Syntax :**

Array_name = new[size]

**size method:** Return the current size of dynamic array

**Syntax:**

Array_name.size()

**delete method:** in dynamic array method delet all array contents

Array_name.delete();

```
//code-4 dynamic arrays methods example

module d_Array;
int Array[];
//int array1[];
initial begin
        Array = new[10];
        Array = '{5,10,15,25,30,42,56,87,23,43};
        foreach(Array[i]) begin

        $display("array[%0d]=%0d",i,Array[i]);
        end
                $display("\nsize of
array=%0d",Array.size());

    Array = new[10];
                Array.delete(10);
                foreach(Array[i])begin
                end
                        $display("\nvalue of array
after delete=%0p",Array.size());

end
endmodule
```

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