



Introduction

This MATLAB script generates a vector containing powers of 2, starting from 2^1 and continuing until the value reaches or exceeds 1000. The script iterates using a while loop to dynamically calculate and append powers of 2 to the vector.



Problem Statement

The objective is to create a script that dynamically generates a vector containing powers of 2 until the value surpasses or equals a specified threshold (1000 in this case).



Solution Steps

Initialize Variables:

- Declare an empty vector 'v'.
- Set initial values for 'k' (exponent) and 'value'.

While Loop Iteration:

- Utilize a while loop to iteratively calculate powers of 2 and append them to the vector 'v'.
- Update 'k' and calculate the next value using the formula 2k.



Pseudo Code

- 1. Clear the command window. Clear all variables from memory. Clear the current figure window.
- 2. Initialize an empty vector v.
- 3. Set the initial value of variable k to 1.
- 4. Set the initial value of variable value to 1.
- 5. While the value is less than 1000, repeat the following steps:
 - Append the current value to the vector v.
 - Increment the value of k by 1.
 - Update the value using the formula value = 2^k .
- 6. End the while loop.
- 7. Output the vector v.



MATLAB Code

clc;clf clear all

v=[]; % declaring empty vector

k=1; % initial value

value=1; % initial value

while value<1000

v=[v,value];

k=k+1; % update k

value=2^k; % next value

end

V



Code Explanation

- · clc; clear all; clf
 - Clears the command window and clears all variables from the MATLAB workspace also clears the current figure window.
- v = [];
 - Initializes an empty vector v.
- k=1;
 - Initializes a variable k to keep track of the exponent.
- value = 1;
 - Initializes a variable value with the initial value to be pushed into the vector.



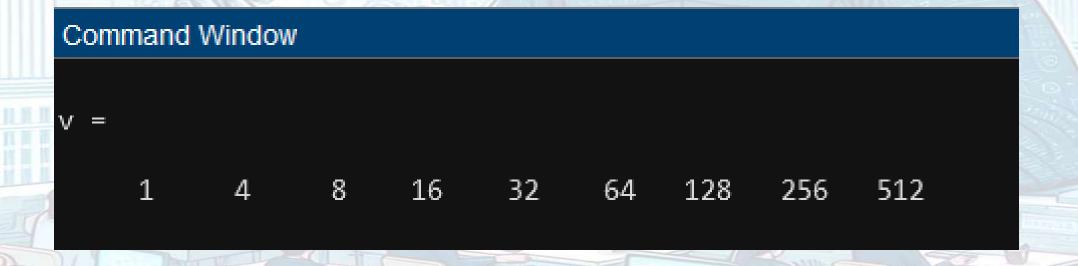
Code Explanation

- while value < 1000
 - Executes the loop while the value is less than 1000.
- $\mathbf{v} = [\mathbf{v}, \mathbf{value}];$
 - Appends the current value to the vector v.
- k = k + 1;
 - Updates the exponent k for the next iteration.
- value = 2^k ;
 - Calculates the next value based on the updated exponent.
- V
 - Displays the vector v containing powers of 2 until the value reaches or exceeds 1000.



Final Answer

The final output is the vector v containing powers of 2 up to the point where the value reaches or exceeds 1000.





Additional Comments/Tips

Users can modify the threshold value (1000) to generate powers of 2 until a different limit is reached.

Conclusion

The script demonstrates an effective approach to dynamically generate a vector containing powers of 2 until a specified threshold is met, showcasing MATLAB's flexibility in handling iterative tasks.