## ***What is garbage collection ?***

- In computer science, garbage collection (GC) is a form of automatic memory management. it is the process of managing memory, automatically.

- Garbage collection was invented by American computer scientist John McCarthy around 1959 to simplify manual memory management.

- The garbage collector attempts to reclaim memory which was allocated by the program.

## ***How garbage collection works ?***

- garbage collection finds the unused objects that are no longer used by the program and delete or remove them to free up the memory.

- The garbage collection mechanism uses several GC algorithms. The most popular algorithm that is used is Mark and Sweep.

## ***What are the garbage collection Benefits ?***

- *The garbage collector provides the following benefits :*

  1. Frees developers from having to manually release memory.

  2. Allocates objects on the managed heap efficiently.

  3. Reclaims objects that are no longer being used, clears their memory, and keeps the memory available for future allocations. Managed objects automatically get clean content to start with, so their constructors don't have to initialize every data field.

  4. Provides memory safety by making sure that an object cannot use for itself the memory allocated for another object.

## ***Why we use garbage collection ?***

- To automatically determine what memory is no longer being used by a Java application and to recycle this memory for other uses.

## ***When to use garbage collection ?***

- *Garbage collection occurs when one of the following conditions is true :*

  1. The system has low physical memory. This is detected by either the low memory notification from the OS or low memory as indicated by the host.

  2. The memory that's used by allocated objects on the managed heap surpasses an acceptable threshold. This threshold is continuously adjusted as the process runs.

- In almost all cases, you don't have to call this method, because the garbage collector runs continuously. This method is primarily used for unique situations and testing.

## ***The managed heap***

- After the garbage collector is initialized by the CLR, it allocates a segment of memory to store and manage objects. This memory is called the managed heap, as opposed to a native heap in the operating system.

- There is a managed heap for each managed process. All threads in the process allocate memory for objects on the same heap.

- To reserve memory, the garbage collector calls the Windows VirtualAlloc function and reserves one segment of memory at a time for managed applications. The garbage collector also reserves segments, as needed, and releases segments back to the operating system (after clearing them of any objects) by calling the Windows VirtualFree function.

## ***What are the disadvantages in using Garbage Collection?***

- *The main disadvantages to using a garbage collector are :*

1. Non-deterministic cleanup of resources. Sometimes, it is handy to say "I'm done with this, and I want it cleaned NOW". With a GC, this typically means forcing the GC to cleanup everything, or just wait until it's ready - both of which take away some control from you as a developer.

2. Potential performance issues which arise from non-deterministic operation of the GC. When the GC collects, it's common to see (small) hangs, etc. This can be particularly problematic for things such as real-time simulations or games.