

# **The Memory Bar in Telelogic® Focal Point™**

**Version 2**

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## Java Virtual Machine (JVM)

Every process run on a computer must be run in the primary memory (RAM) of the computer. Apart from the program code itself, data that is used by the process must be placed in the memory. Programs written in Java must be run in a so-called Java Virtual Machine (JVM). The JVM is a program that emulates a virtual computer on top of the physical computer. The memory that is available for programs run in the JVM, for example Focal Point, is also handled by the JVM. However, the JVM must in turn allocate that memory from the operating system (OS) on which it runs.

## Handling Memory in Java

The JVM has a limit for the amount of memory (maximum memory) that can be used by programs running inside it. We call this `max_mem`. This limit can be set when the JVM is started. In Focal Point, it is set by a parameter set at installation. The JVM does not allocate all memory instantly, but increases the amount of allocated memory little by little, when needed. `alloc_mem` is the amount of memory allocated for programs in the JVM .

Memory allocated by the JVM that is no longer used (i.e. it has been released by the JVM through a so-called garbage collection, briefly described below) does not have to be returned to the operating system. Depending on which implementation of the JVM that is used, such memory can be returned every now and then or not be returned at all. Consequently, there can be memory allocated by the JVM that is currently not used by programs in it. We call the part of the memory that is used by code running in the JVM `used_mem`.

Whenever a Java program needs more memory, it will first use the memory that has been allocated but that is not used at the moment. If that is not sufficient, the amount of allocated memory will be increased until it covers the need of the program. A Java program does not have to request memory from the JVM actively and then return it, but creates structures, so-called objects, in the memory as needed. When an object no longer is used by the program, the JVM is responsible for releasing the associated memory associated. This process is called garbage collection.

### ***Garbage collection***

When a Java program is running, memory is used for different types of objects. The object can be used by the programs during long periods of time. Some objects do not last very long, while others can live as long as the program is running. When an object no longer is used, it must be

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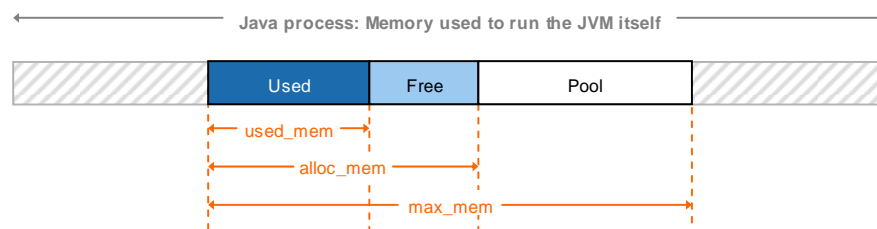
garbage collected so that the memory used by the object can be reused. Garbage collection is completely controlled by the JVM and can be executed in many different ways depending on the JVM implementation, the amount of allocated memory, the object turnover etc. This means that objects no longer used can be garbage collected directly or at a much later occasion.

## The Focal Point Memory Bar

### Components

The memory bar in Focal Point consists of three parts; used, free and pool.

- **Used** – is the equivalent to `used_mem` in the memory handling discussion above, i.e. the amount of memory used at the moment. This also includes objects that are no longer used, but not yet garbage collected.
- **Free** – displays the difference between `alloc_mem` and `used_mem`. “Free” represents the amount of memory the program can use without having to allocate more memory from the operating system to the JVM.
- **Pool** – displays the difference between `max_mem` and `alloc_mem`. “Pool” represents the amount of further memory the JVM can allocate from the operating system, should need arise.



Note that the memory bar displays information about the current node.

### Why does the memory bar change?

Every time Focal Point is started large amounts of data is read into the cache. This causes the `alloc_mem` and `used_mem` bars to increase significantly. One reason is that objects held by the cache cannot be garbage collected, and is thus kept in the memory permanently. Another reason is that many temporary objects are used during the start itself.

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During continuous usage, many operations that require a lot of memory can be performed during a short period of time. If the garbage collector does not have the time to do its job, or if it does not find any memory to release, the alloc\_mem bar will most likely increase. Depending on which JVM implementation that is used, the alloc\_mem bar can shorten again, when memory has been released by the garbage collector. However, it is possible that the JVM never returns memory to the operating system, but please note that this does not affect how memory is reused in the JVM itself.

### ***How do I interpret the bar?***

The memory bar in Focal Point is a useful tool for troubleshooting the application, but should not be over-interpreted. It is an on-the-spot account of the memory situation in the JVM. If used\_mem is close to 100% at one occasion, it might just be 50% at the next. To get a true picture of the memory usage situation, one must supervise the bar during a longer period of time to find peaks and valleys, and how closely together these peaks and valleys are.

## **More information**

### ***Contacting IBM Rational Software Support***

Support and information for Telelogic products is currently being transitioned from the Telelogic Support site to the IBM Rational Software Support site.

During this transition phase, your product support location depends on your customer history.

#### **Product support**

- If you are a heritage customer, meaning you were a Telelogic customer prior to November 1, 2008, please visit the [Focal Point Support Web site](#).

Telelogic customers will be redirected automatically to the IBM Rational Software Support site after the product information has been migrated.

- If you are a new Rational customer, meaning you did not have Telelogic-licensed products prior to November 1, 2008, please visit the [IBM Rational Software Support site](#).

Before you contact Support, gather the background information that you will need to describe your problem. When describing a problem to an IBM software support specialist, be as specific as possible and include all relevant background information so that the specialist can help you solve the problem efficiently. To save time, know the answers to these questions:

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- What software versions were you running when the problem occurred?
  - Do you have logs, traces, or messages that are related to the problem?
  - Can you reproduce the problem? If so, what steps do you take to reproduce it?
  - Is there a workaround for the problem? If so, be prepared to describe the workaround.

### **Other information**

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### **Trademarks**

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