

Linux Fedora Memory Management

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Outline

- 1.0 Introduction(Fedora , Memory Management).
- 1.1 memory management techniques used by Fedora.
- 1.2 Garbage collection(Pruning, Trashing, Deleting).
- 1.3 Swapping.
- 1.4 Virtual memory (Advantages , Disadvantages).
- 1.5 Conclusion.

1.0 Introduction

What is Fedora

- Fedora is an open source operating system built on the Linux kernel.
- The first release of Fedora was on 16th November 2003 as Fedora Core 1.
- Fedora is developed by a community of developers collectively known as the Fedora Project.



1.0 Memory Management :

A good memory management system must carry out the following tasks:

- Allocation of memory space blocks for different tasks
- Allow sharing of memory
- Memory space which is being used should be protected. This is required to prevent a user from changing a task carried out by another user.
- Optimization of available memory

1.1 Memory management techniques used by Fedora:

- Garbage collection
- Swapping
- Virtual Memory
- Memory hierarchy
- Overcommit accounting
- Out Of Memory (OOM)
- Drop caches

1.2 Garbage collection

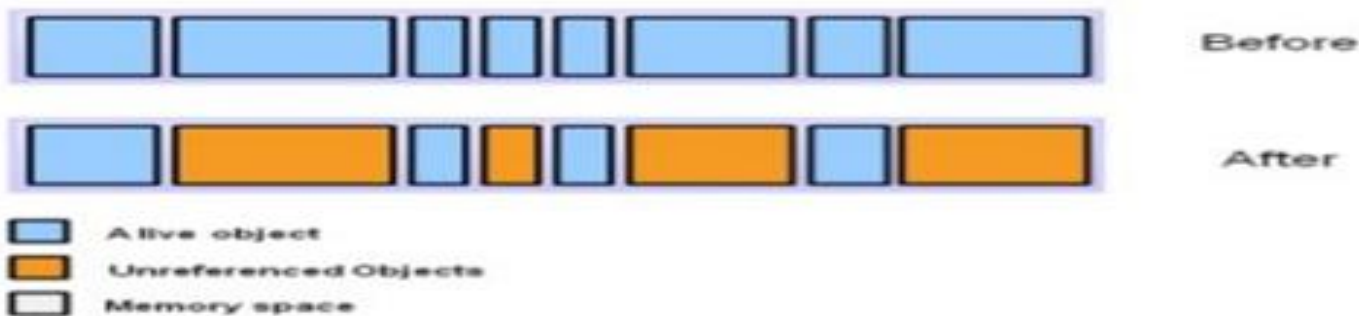
Garbage collection is a form of automated memory management technique in which the operating system removes objects, data or other regions of the memory which are no longer in use by the system or the program.

In Fedora, garbage collection is primarily broken down to three stages, they are:

- Pruning
- Trashing
- Deleting

➤ Pruning

In this stage, the operating system identifies unwanted objects, builds or data and they are detached from certain tags according to garbage collection policies set by Fedora. These policies allow rules based on tag, signature and package.

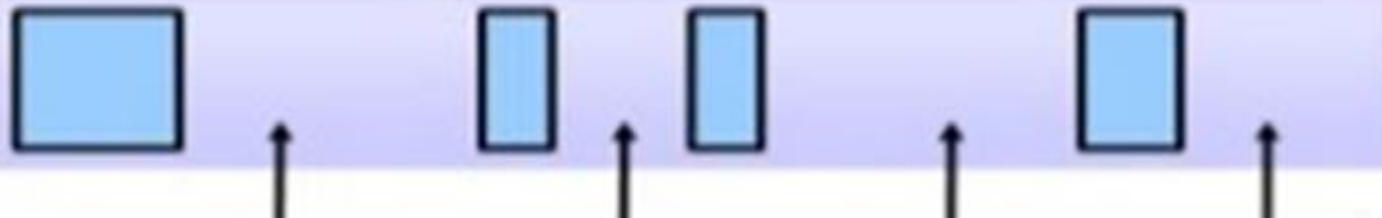


➤ Trashing

This is the stage in which, the system overlooks the objects, builds or data which was untagged in pruning stage. After this, these objects, builds or data are tagged with a trashcan tag which instructs the system to send these builds for deletion.

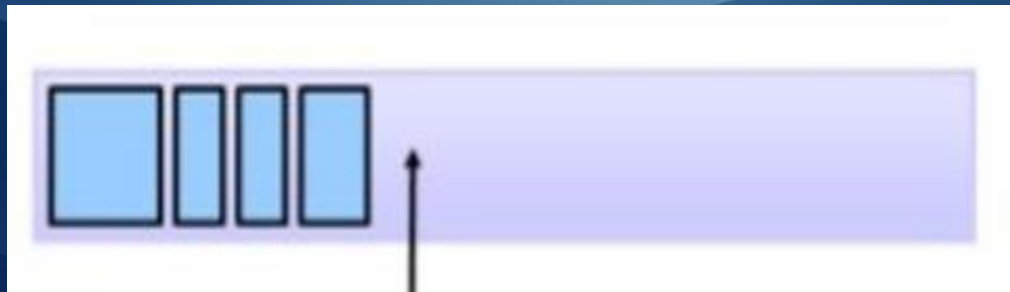
The garbage collector sends a certain objects, builds or data for deletion only if it meets the following requirement

1. The objects, builds or data is untagged for at least 5 days
2. There are not protection key signed on the objects, builds or data



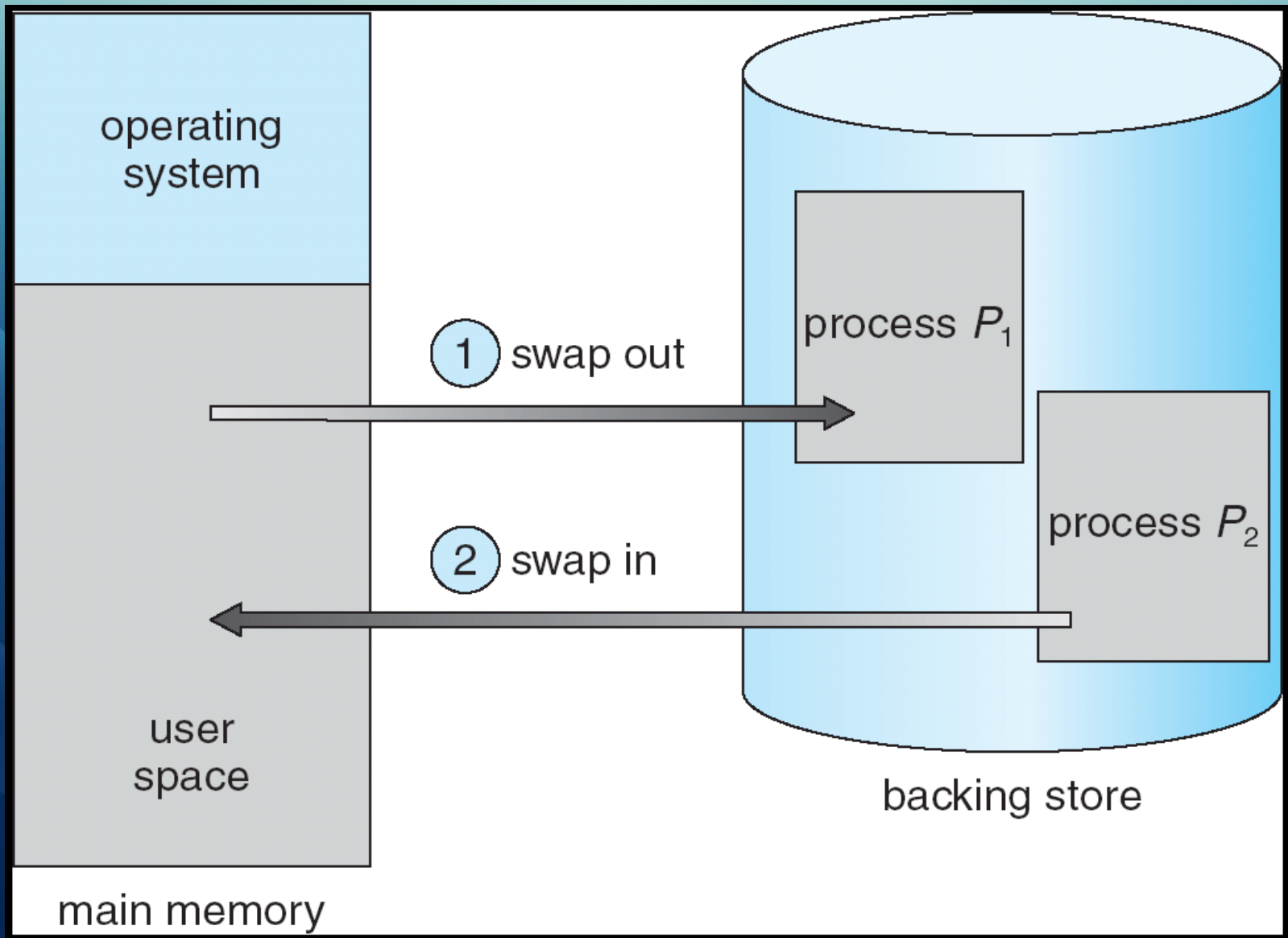
➤ Deleting

This is the final stage in garbage collection, in this stage, all the objects, builds or data are examined for the last time for any mistakes in their tags. The objects, builds or data is usually deleted after it has been tagged with the trashcan tag for more than the grace period (4 weeks by default).



1.3 Swapping :

in Linux fedora when the amount of physical memory (RAM) is full .if the system needs more memory and ram is full ,inactive ,blocks or timeouts process are swapped temporarily out of main memory to secondary storage (disk) and make that memory available to other processes. At some later time, the system swaps back the process from the secondary storage to main memory.



Virtual Memory



1.4 Virtual Memory

- Virtual memory is implemented in Fedora since it is a multitasking and multiuser operating system. These features require necessary protection and ability to execute different process simultaneously whose cumulated process size can be greater than the primary memory available in the system.
- Virtual memory basically extends the users primary memory by considering the hard disk as if it were an additional RAM
- Virtual memory allows the computer to look at areas of RAM which have not been used for a while and copies those areas onto the hard disk.

Advantages of Virtual Memory

- Virtual memory allows the system to function as if it has more RAM than it actually does.
- A program or process can run on a system even though there isn't enough primary memory required for the program or process to run.
- Since hard disk space is much cheaper than RAM space, users need not spend a lot of money upgrading their RAM.

Disadvantages of Virtual Memory

- There will be a significant loss of system performance if the system relies too much on the virtual memory.
- The implementation of virtual memory requires allocation of certain portion of hard disk space for its use.
- The system might be unstable because of the constant swap of information between hard disk and RAM.

1.5 Conclusion

- Memory management is a crucial section of any operating system. This is because a poor memory management can result in failure of operating system. If the operating system did not implement appropriate memory management technique, this result in crashed constantly.

Resources

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Thank you

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