CIS 452 02 – Lab 10 – Gabrielle Munson and Gabe Baksa

Obtaining Memory Management

1. **What is the total amount of Physical Memory (KB) available on your system (In use + Available)?**
   15700000 KB
2. **Based on changes to the amount of Available memory, what is the apparent footprint (i.e., the full memory demand) of MS Edge with several web pages open?**
   Before opening Microsoft Edge:
   - In use: 8.6 GB
   - Available: 7.1 GB

   After opening several tabs in Microsoft Edge:
   - In use: 11.7 GB
   - Available: 4.0 GB

   Full Memory Demand of Microsoft Edge (difference):
   - Footprint: 3.1 GB

Memory Usage by Competing Programs

3. **One of the measured components of available memory on Windows is the Standby list. What memory management mechanism described in your textbook does the Windows Standby list implement?**
   The Standby list in Windows acts like a Least Frequently Used (LFU) page replacement. It keeps recently accessed pages in memory and discards less-used ones when space is needed. This approach ensures frequently accessed pages are readily available, similar to LFU's method of prioritizing pages with higher usage.
4. **Note the changes in the reported amount of available memory as graphed in the display. Why is the apparent memory footprint of two instances of MS Edge not exactly twice the memory usage of a single instance?**
   The memory footprint of two instances of Microsoft Edge isn't exactly double that of one instance because they share some core resources, such as code, libraries, and certain data structures. While each instance requires additional memory for unique tasks, like session data and open tabs, shared resources prevent the memory usage from doubling, making memory usage more efficient.

Virtual Memory Usage

5. **What are the amounts of Total Physical Memory and Total Virtual Memory available on your system? Explain the relationship between these two numbers and why Total Virtual Memory is bigger.**
   Total Physical Memory: 15.7 GB
   Total Virtual Memory: 37.7 GB

Total Physical Memory on my system is 15.7 GB, and Total Virtual Memory is 37.7 GB. Total Virtual Memory is larger because it includes both the physical RAM and additional disk space, known in Windows as the paging file.

6. **Under Virtual Memory, observe the size of the paging file**
    a. **How does this number correspond with the values observed in question 5?**
    The paging file size of 22,528 MB corresponds to the difference between Total Virtual Memory and Total Physical Memory, providing the extra memory capacity needed beyond physical RAM.
    b. **What is the purpose of the paging file in Windows (i.e. what Linux object has similar functionality)?**
    The paging file in Windows functions similarly to **swap** in Linux, providing additional memory by using disk space when physical RAM is full.
7. **How much virtual memory is File Explorer (explorer.exe) using?**
    379.3 MB

Page Faults

8. **Based on your understanding of the concepts discussed in class, what exactly is happening to produce the changes observed in the Performance graph? Quantify your answer.**
    Before interacting with the Notepad, there were almost no page faults at all. When typing, small increases in page faults occur as Notepad accesses additional memory for the new text, very slight faults sometimes. Changing font styles results in more significant spikes, as Notepad loads additional font resources and system libraries, leading to 400-700 page faults a second.

Programming Assignment

```
gbaks@gb_laptop MINGW64 ~/Downloads/cis452/labs/lab10 (main)
$ ./programmingAssignment.exe
Page size: 4096 bytes
Memory State after allocation: Committed
Memory State after deallocation: Free
```