

Research on Memory Leak Problem and Related Processing Technology in Program Operation

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Abstract. With the advent of the information age, information expansion inevitable procedures to deal with the scale of the data is also increasing, based on C++ and Java program, there is a memory leak problem. When the data size is relatively small, these problems may be insignificant, but when processing large data, these defects will be highlighted, serious will cause the program to crash, system downtime and, ultimately, cannot do the expected goal. In large data processing program, the memory leak problem cannot be ignored, combined with multi threading technology and the self-healing technology to carry out the necessary processing, can make the program can be successfully executed to complete the intended target.

Keywords: Memory leak multi threading big data self-healing

1 Introduction

Any program in the process of running the risk of memory leaks, when the program size is very small, it may not harm is not serious, but the program size, such as hazard will into the geometric level increases, while the processing efficiency is lower, weight is system downtime. There are many effective methods to solve memory leaks, presented in this paper can be with the combination of multi thread technology and self-healing technology, to effectively solve the problem of memory leaks, so as to establish high stability of the runtime environment to meet the needs of large data processing.

2 The processing of memory leaks

2.1 Using virtualization platform monitoring memory leaks

The basic idea is that the first design of a virtual machine manager, and then through the virtual machine manager platform insert assembly instruction, to intercept

application for and release of memory resources and function call, can build the function call, the program runs after the use of dynamic memory resources list, if a memory leak, memory can't be used by other applications [1]. Memory use by the use of the list of memory monitoring, if the memory is not released for a long time is not to be released, then it is likely to be leaked memory, through technical means to its forced recovery, to achieve the purpose of eliminating memory leaks.

2.2 Using the page replacement monitoring, deal with memory leaks

The basic idea is to learn from the operating system page replacement in thought, if detected when the virtual machine heap memory is less than the threshold, it will be part of the object, from the heap memory written to the disk, and record the state of these objects, at the same time start the garbage collection mechanism spill recovery of memory, after will be written to disk object to loaded into memory [2].

2.3 Using static test method of monitoring the memory leaks

The basic idea is to establish a static detection model of memory leakage based on interval arithmetic, which is based on the syntax tree abstract and Control Flow Graph [3]. Through the experiment, this method can effectively detect the program that is running in the process of the memory leak problem.

3 Based on multi-threading memory management

3.1 Multithreading technology

Concurrent perform multiple tasks at the same time is multi-threaded Java language one of the main features. Under the condition of the previous hardware, really it is impossible to completely achieve concurrency. Today, however, an era of rapid development of computer software and hardware, Multi core CPU has been very common, cloud computing technology have begun to gradually popularization, in this case, in order to improve the efficiency of the program, can put the paragraph into a thread of execution at the same time, the distribution to different processor, let them in a different virtual machine implementation, parallel computing, to complete the task.

3.2 Memory management based on multi-threading technology

For multithreading technology, memory scheduling and management is a key and complex problems, According to the task, whether we can be divided into online and offline model, according to whether the task must be put into memory, it can be

divided into mandatory model and selection model. Currently using more memory scheduling model is Uniform model, Cost model, Fault model, Bit model, General model [4].

3.3 The memory scheduling based on multi-thread technology

Based on multi-threaded memory scheduling, there are several basic strategies and methods. Scheduling strategy based on approximation algorithm. Scheduling strategy based on mining. The strategy Based on heuristic .Scheduling strategy based on instruction type. Multi kernel thread scheduling based on thread pipelining.

4 Software self-healing mechanism

Real application software, in the actual use process, will encounter many unknown circumstances, these may be unexpected software designers before, if not ahead of some processing methods or techniques, may produce a lot of negative effects, and may even cause irreparable damage, which requires some software can have self-healing ability, is in the process of program execution, have some problems, to launch the corresponding function, without human intervention, dealing with problems, solve the problem, the final program can be carried out smoothly and realize the expected goal.

4.1 Computational reflection technique

Computational reflection technique is in the execution of a program's own, programs like data says program state of a processing capacity.

4.2 Computer bionic technology

Computer bionic technology, the computer software, as a kind of imitating nature biological model, of course, can also pass the day after tomorrow learning to enhance their ability of environmental adaptation, bionic software in the network environment the survival, competition and so on itself is also a process of continuous learning [5].

4.3 Self-healing by repairing software accuracy

According to with the development of software industry, quality, cost and schedule of software put forward more and more high demand, some areas, may be because the precision of the software can't meet the requirements, which leads to some serious problems, such as the shuttle exploded, missile launch failure, these problems, you can define the software to improve accuracy to solve problems.

4.4 Self-healing by data structure repairing

Error data structure is one of the main defect affecting the application of software reliability, can cause application software breakdown seriously affect the service availability of events. Data structure repair there are many related research and articles published, but as far as I know, the existing method of repair most take the form of separate tools, or is designed to assist developers, haven't updated dynamically repair data structure in the wrong way.

4.5 Self-healing through dynamic reconfiguration

Dynamic reconfiguration technology, one kind is based on the change of the program running in the process of running state, and changing the structure of the program itself, or configuration properties, has reached to improve software flexibility, the program has certain adaptability, the technology, need before the program is running, a lot of static model, the state one by one definition of possible solutions [6].

5 Summary

Multi threading technology, dynamic self-healing mechanism is a solution to solve the memory leak. The combination of dynamic reconfiguration technology and multi thread technology can realize the self-healing mechanism, which can solve the problem of memory leakage. The multi thread technology and dynamic self-healing technology combining can ensure stability of the large image data processing program, and avoid the emergence of system downtime and other serious problems.

References

1. Wang, X.: The use of virtual platform for memory leak detection. *Journal of computer science*. 464--471(2010.3)
2. Ke, P., Yunzhan, G., Yang, Z.: Static memory leak detection model. *Computer science*. 175--178(2009.4)
3. Lu, W., Yian, Z., Zhang, L., Wang, D., Chen, L., Ma: A solving memory leaks the self-healing mechanism. *Journal of Northwestern Polytechnical University*. 649--650(2011.8)
4. Xu, H.: multithreaded memory scheduling Zhejiang University PhD thesis: 11--18(2011.9)
5. Chen, P., Wang, Y.: Adaptive technology and software. *Computer engineering and design*. 25--30(2003.10)
6. He, B., Ma, B.: a support component for the deployment of dynamic reconfiguration framework. *Computer engineering and applications*. 82--84(2006.5)