一种linux下检测内存泄露的方法

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1. 工具介绍

- linux下用户态程序，经常会遇到动态分配内存，调用malloc之类的分配函数

有时候程序嵌套比较深或者结构比较复制，往往忘记free申请的内存，这样就造成

了内存泄露，排查起来颇为吃力。

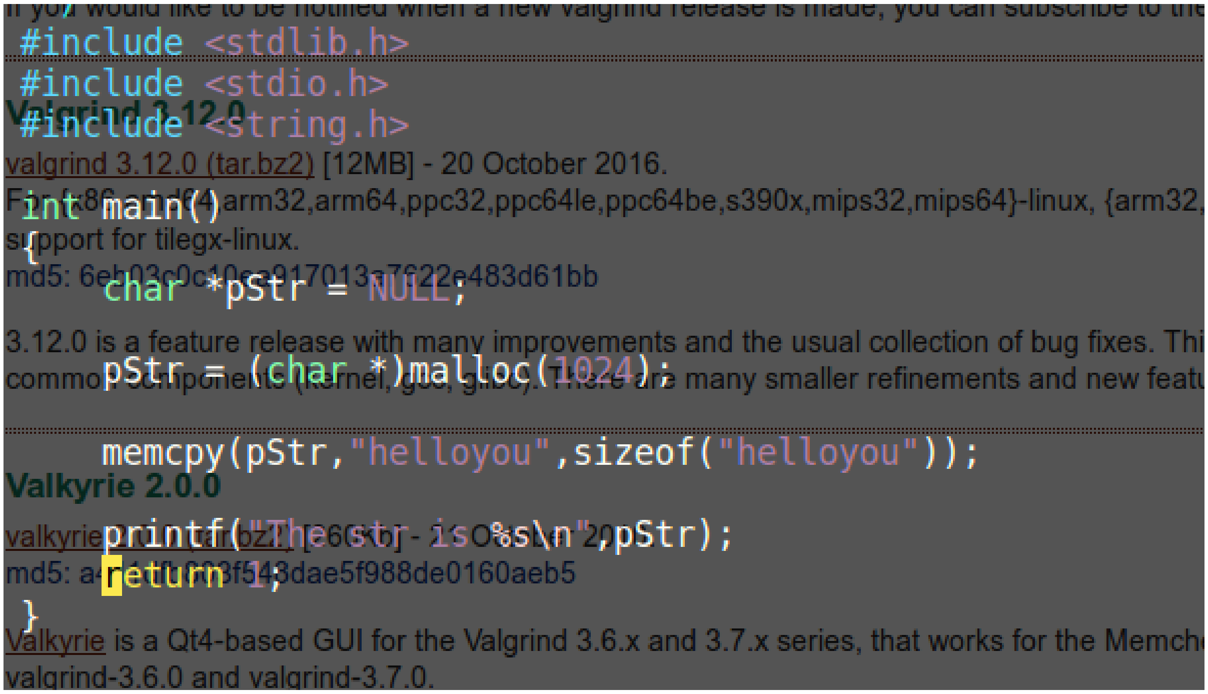
- 工具 valgrind 可以帮我们预先检查函数是否存在内存泄露的风险

1.1. valgring获取安装方法

- 获取工具
  - valgrind官网地址: valgrind官网
  - 最新版本下载链接: valgring最新版
    - 下载后存放linux机器下，为valgrind-3.12.0.tar.bz2
    - tar jxf valgrind-3.12.0.tar.bz2 解压
    - 进入软件，./autogen.sh;./configure;make;make install
    - 以上步骤安装在本机上，参照软件中的　README

1.2. 简单使用

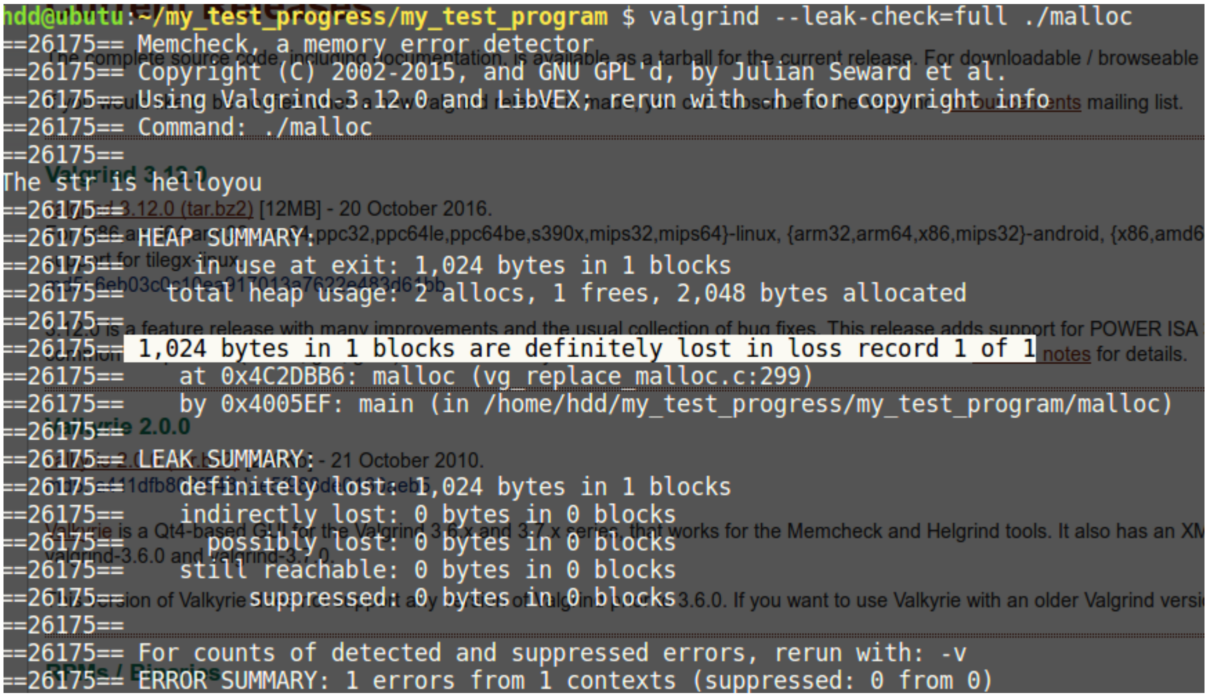
- 写一个内存泄露的代码，如下:



```
#include <stdlib.h>
#include <stdio.h>
#include <string.h>

int main()
{
    char *pStr = NULL;

    pStr = (char *)malloc(1024);

    memcpy(pStr,"helloyou",sizeof("helloyou"));

    printf("The str is %s\n",pStr);
    return 1;
}
```

- gcc -o malloc malloc.c 编译代码，生成malloc程序

- 执行检查 valgrind --leak-check=full ./malloc
- 看到结果如下:



```
hdd@ubutu:~/my_test_progress/my_test_program $ valgrind --leak-check=full ./malloc
==26175== Memcheck, a memory error detector
==26175== Copyright (C) 2002-2015, and GNU GPL'd, by Julian Seward et al.
==26175== Using Valgrind-3.12.0 and LibVEX; rerun with -h for copyright info
==26175== Command: ./malloc
==26175==
The str is helloyou
==26175==
==26175== HEAP SUMMARY:
==26175==     in use at exit: 1,024 bytes in 1 blocks
==26175==   total heap usage: 2 allocs, 1 frees, 2,048 bytes allocated
==26175==
==26175== 1,024 bytes in 1 blocks are definitely lost in loss record 1 of 1
==26175==    at 0x4C2DBB6: malloc (vg_replace_malloc.c:299)
==26175==    by 0x4005EF: main (in /home/hdd/my_test_progress/my_test_program/malloc)
==26175==
==26175== LEAK SUMMARY:
==26175==    definitely lost: 1,024 bytes in 1 blocks
==26175==    indirectly lost: 0 bytes in 0 blocks
==26175==      possibly lost: 0 bytes in 0 blocks
==26175==    still reachable: 0 bytes in 0 blocks
==26175==         suppressed: 0 bytes in 0 blocks
==26175==
==26175== For counts of detected and suppressed errors, rerun with: -v
==26175== ERROR SUMMARY: 1 errors from 1 contexts (suppressed: 0 from 0)
```

可以看到其中检查到一处内存泄露

2. 更多valgrind用法

- 参考 valgrind用法