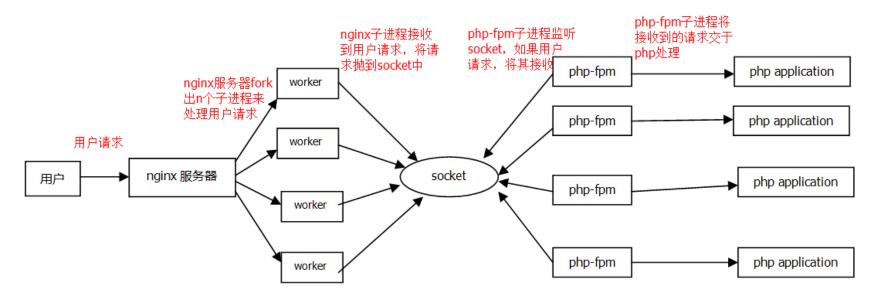
nginx+php-fpm模式php内存泄漏探究

之前遇到过一次服务器内存告警,查看后发现有个php-fpm进程占用了2G的内存。但我明明在php.ini文件里面,有配置 memory_limit = 256M, 那为什么会有占用2G内存的php-fpm进程呢?

这里先简单说一下nginx+php-fpm模式的工作原理。



- 1. nginx服务器fork出n个子进程(worker), php-fpm管理器fork出n个子进程。
- 2. 当有用户请求,nginx的一个worker接收请求,并将请求抛到socket中。
- 3. php-fpm空闲的子进程监听到socket中有请求,接收并处理请求。

这里要重点说一下第三步骤。第三步涉及到php-fpm进程生命周期的东西。一个php-fpm的生命周期大致是这样的:模块初始化(MINIT)->模块激活(RINIT)->请求处理 ->模块停用(RSHUTDOWN)->模块激活(RINIT)->请求处理 ->模块停用(RSHUTDOWN).......模块激活(RINIT)->请求处理 ->模块停用(RSHUTDOWN)->模块关闭(MSHUTDOWN)。在一个php-fpm进程的生命周期里,会有多次的模块激活(RINIT)->请求处理 ->模块停用(RSHUTDOWN)的过程。这个"请求处理"的大致过程是这样的:php读取相应的php文件,对其进行词法分析,生成opcode,zend虚拟机执行opcode。

回到一开始说的PHP配置文件里面的memory_limit 这个东西,其实,它限制的只是这个"请求处理"的内存。所以,这个参数跟php-fpm进程占用的

内存并没有什么关系。那为什么会有占用2G大小的php-fpm进程呢?原因是这样的:php是用c写的,所以,难免又会一些内存泄露。也就是说,在"请求处理"这个过程结束后,有些变量没有被销毁,然后就导致一个php-fpm进程占用的内存越来越大。

那么,有什么办法能阻止这个问题呢?方法一:写不泄漏内存的php程序;方法二:在php-fpm配置文件中,将pm.max_requests这个参数设置小一点。这个参数的含义是:一个php-fpm子进程最多处理pm.max_requests个用户请求后,就会被销毁。当一个php-fpm进程被销毁后,它所占用的所有内存都会被回收。

以下是我自己做的一次测试:

首先:将php-fpm.conf里面pm.max_chindren参数设为1。这意味着,php-fpm管理器只会fork出一个php-fpm子进程。这样一来,用户的每次请求,都会让这个进程来处理。然后随便请求我自己的网站,会看到有如下结果:

```
[root@linyu no-debug-non-zts-20121212]# ps -aux Warning: bad syntax, perhaps a bogus '-'? See /uroot 10687 0.0 0.1 160124 3564 ? sww 10688 8.4 0.8 170232 16060 ? sroot 10696 0.0 0.0 103248 820 pts/0
                                                                                                                                                      s -aux | grep php
| See /usr/share/doc/procps-3.2.8/FAQ
                                                                                                                                                                                           19:44
                                                                                                                                                                                                                         0:00 php-fpm: master proc
root 10696 0.0 0.0 103248 820 pts/0 5+ 19:45 (
[root@linyu no-debug-non-zts-20121212]# ps -aux | grep php
Warning: bad syntax, perhaps a bogus '-'? See /usr/share/doc/
root 10687 0.0 0.1 160124 3564 ? Ss 19:44 (
www 10688 6.0 1.6 185920 31548 ? S 19:44 (
                                                                                                                                                                                                                         0:03 php-fpm: pool www
                                                                                                                                                                                            19:44
                                                                                                                                                                                                                         0:00 grep php
                                                                                                                                                                                                                          /procps-3.2.8/FAQ
                                                                                                                                                                                                                         0:00 php-fpm: master proc
0:03 php-fpm: pool www
                                                                                                                           820 pts/0
                                                                           0.0 103248
                                 10702
                                                         0.0
                                                                                                                                                                                                                         0:00 grep php
 root 10/02 0.0 0.0 103240 020 piz/
[root@linyu no-debug-non-zts-20121212]# ps -aux | grep php
Washing: had syntax, perhaps a bogus '-'? See /usr/share/doc/procps-3.2.8/FAQ
 root
 Warning: bad syntax, perhaps a bogus
root 10687 0.0 0.1 160124 3564
www 10688 4.0 1.6 185920 31548
root 10705 0.0 0.0 103248 820
                                                                                                                                                                                                                         0:00 php-fpm: master proc
                                                                                                                  31548
                                                                                                                                                                                            19:44
                                                                                                                                                                                                                         0:03 php-fpm: pool www
 root 10705 0.0 0.0 103248 820 pts/0 5+ 19:46
[root@linyu no-debug-non-zts-20121212]# ps -aux | grep php
Warning: bad syntax, perhaps a bogus '-'? See /usr/share/d
                                                                                                                                                                                                                         0:00 grep php
Warning: bad syntax, perhaps a bogus
root 10687 0.0 0.1 160124 3564
www 10688 3.8 0.7 169208 15068
root 10707 0.0 0.0 103248 816
                                                                                                                                                      See /usr/share/doc/procps-3.2.8/FAQ
                                                                                                                                                                                            19:44
                                                                                                                                                                                                                         0:00 php-fpm: master prod
www 10688 3.8 0.7 169208 15068 ? S 19:44 0:04 php-fpm: poor root 10707 0.0 0.0 103248 816 pts/0 R+ 19:46 0:00 grep php [root@linyu no-debug-non-zts-20121212]# ps -aux | grep php warning: bad syntax, perhaps a bogus '-'? See /usr/share/doc/procps-3.2.8/FAQ root 10687 0.0 0.1 160124 3564 ? Ss 19:44 0:00 php-fpm: mast www 10688 3.8 0.8 169464 15328 ? S 19:44 0:04 php-fpm: poor 10709 0.0 0.0 103248 816 pts/0 S+ 19:46 0:00 grep php [root@linyu no-debug-non-zts-20121212]# ps -aux | grep php warning: bad syntax, perhaps a bogus '-'? See /usr/share/doc/procps-3.2.8/FAQ root 10687 0.0 0.1 160124 3564 ? Ss 19:44 0:00 php-fpm: mast www 10688 3.7 0.8 169464 15328 ? S 19:44 0:04 php-fpm: poor 10711 0.0 0.0 103248 820 pts/0 S+ 19:46 0:00 grep php [root@linyu no-debug-non-zts-20121212]# ps -aux | grep php
                                                                                                                                                                                            19:44
                                                                                                                                                                                                                         0:04 php-fpm: pool www
                                                                                                                                                                                                                         0:00 php-fpm: master prod
                                                                                                                                                                                                                         0:04 php-fpm: pool www
                                                                                                                                                                                                                         0:00 php-fpm: master proc
0:04 php-fpm: pool www
[root@linyu no-debug-non-zts-20121212]# ps -aux | grep php Warning: bad syntax, perhaps a bogus '-'? See /usr/share/d root 10687 0.0 0.1 160124 3564 ? Ss 19:44 www 10688 3.7 0.9 173048 18420 ? S 19:44 root 10717 0.0 0.0 103248 816 pts/0 5+ 19:47
                                                                                                                                                      See /usr/share/doc/procps-3.2.8/FAQ
                                                                                                                                                                                                                         0:00 php-fpm: master proc
                                                                                                                                                                                                                         0:04 php-fpm: pool www
0:00 grep php
 www 10717 0.0 0.0 103248 810 pc3/0
root 10717 0.0 0.0 103248 810 pc3/0
[root@linyu no-debug-non-zts-20121212]# ps -aux | grep php
[root@linyu no-debug-non-zts-20121212]# ps -aux | grep php
[root@linyu no-debug-non-zts-20121212]# ps -aux | grep php
[root@linyu no-debug-non-zts-20121212]# pc -aux | grep php
root 10687 0.0 0.1 160124 3564 ? See /us
www 10688 4.9 1.0 185084 20640 ? S
root 10719 0.0 0.0 103248 816 pts/0 R+
[root@linyu no-debug-non-zts-20121212]# ps -aux |
Warning: bad syntax, perhaps a bogus '-'? See /us
root 10687 0.0 0.1 160124 3564 ? Ss
www 10688 5.0 1 1 176376 20380 ?
 warning: bad syntax, perhaps a bogus
root 10687 0.0 0.1 160124 3564
                                                                                                                                                                                                                         0:00 php-fpm: master prod
                                                                                                                                                                                                                         0:07 php-fpm: pool www
                                                                                                                                                                                            19:44
                                                                                                                                                                                            19:47
                                                                                                                                                                                                                         0:00 grep php
                                                                                                                                                      See /usr/share/doc/procps-3.2.8/FAQ
Ss 19:44 0:00 php-fpm: mas
                                                                                                                                                                                                                         0:00 php-fpm: master proc
0:09 php-fpm: pool www
                                                                          1.1 176376 22280 ?
0.1 143980 3528 pts/1
 www
                                                                                                                                                                                            19:44
root 10728 0.0 0.0 103248 820 pts/0 5+ 19:47 0:00 vim php-fpm.conf
[root@linyu no-debug-non-zts-20121212]# ps -aux | grep php
Warning: bad syntax, perhaps a bogus '-'? See /usr/share/doc/procps-3.2.8/FAQ
root 10687 0.0 0.1 160124 3564 ? Ss 19:44 0:00 php-fpm: master proc
www 10688 4.7 1.2 177912 23604 ? S 19:44 0:09 php-fpm: pool www
root 10723 0.0 0.1 143980 3528 pts/1 S+ 19:47 0:00 vim php-fpm conf
www 10688 4./ 1.2 1...
root 10723 0.0 0.1 143980 3528 pts/1
root 10731 0.0 0.0 103248 820 pts/0 S+ 19:48 0.00 g. ...
root 10731 0.0 0.0 103248 820 pts/0 S+ 19:48 0.00 g. ...
[root@linyu no-debug-non-zts-20121212]# ps -aux | grep php
```

可以看到,那个php-fpm子进程占用的内存越来越大。

然后我将php-fpm重启一下:

最后我将pm.max_requests这个参数设为5,然后再随便请求几次我的网站,看一下结果:

```
Warning: bad syntax,
root 10829 0.0
www 10830 0.0
root 10832 0.0
                              perhaps a bogus
0.1 160124 3560
0.1 160124 3328
0.0 103248 820
                                                      '-'? See /usr/share/doc/procps-3.2.8/FAQ
                                                3560 ?
                                                                                        0:00 php-fpm: master pr
0:00 php-fpm: pool www
                                                                            20:00
                                                                            20:00
                                                                                        0:00 grep php
                                                  820 pts/1
[root@linyu etc]# ps
                              -aux | grep php
perhaps a bogus
                                                      '-'? See /usr/share/doc/procps-3.2.8/FAQ
Warning: bad syntax,
                              0.1 160124 3564 ?
0.8 169472 16004 ?
            10829 0.0
10830 0.5
10851 0.0
                                                                            20:00
                                                                                        0:00 php-fpm: master pr
                                                                                        0:00 php-fpm: pool www
WWW
                                                                            20:01
                                                                                        0:00 grep php
                              0.0 103248
                                                 820 pts/1
root
[root@linyu etc]# ps
Warning: bad syntax,
root 10829 0.0
www 10830 0.6
root 10863 0.0
                              -aux | grep php
perhaps a bogus -
0.1 160124 3564 ?
0.5 165684 10960 ?
                                                      '-'? See /usr/share/doc/procps-3.2.8/FAQ

? SS 20:00 0:00 php-fpm: master pr

)? S 20:00 0:01 php-fpm: pool www

8 pts/1 R+ 20:03 0:00 grep php
                                              10960 ?
                              0.0 103248
                                                  808 pts/1
[root@linyu etc]# ps -aux | grep php
Warning: bad syntax, perhaps a bogus
                                                     '-'? See /usr/share/doc/procps-3.2.8/FAQ
            10829 0.0
10864 1.5
10866 0.0
                              0.1 160124
0.3 161476
                                                3576 ?
7652 ?
                                                                            20:00
20:03
                                                                                        0:00 php-fpm: master pr
                                                                                        0:00 php-fpm: pool www
www
root
                              0.0 103248
                                                 808 pts/1
                                                                            20:03
                                                                                        0:00 grep php
[root@linyu etc]# ps -aux | grep php
Warning: bad syntax, perhaps a bogus '-'
root 10829 0.0 0.1 160124 3576 ?
www 10872 4.3 0.9 182924 17560 ?
                                                      '-'? See /usr/share/doc/procps-3.2.8/FAQ
           10829 0.0
10872 4.3
108/4 0.0
                                                                                        0:00 php-fpm: master pr
0:00 php-fpm: pool www
                                                                            20:00
                              0.0 103248
                                                 820 pts/1
                                                                            20:04
                                                                                        0:00 grep php
root
                              -aux | grep php
[root@linyu etc]# ps
                                                      '-'? See /usr/share/doc/procps-3.2.8/FAQ
Warning: bad syntax,
                              perhaps a bogus
                              0.1 160124 3576 ?
0.8 169604 16464 ?
0.0 103248 820 pt
           10829 0.0
10872 2.5
10880 0.0
                                                                            20:00 20:04
                                                                                       0:00 php-fpm: master pr
root
                                                                                        0:01 php-fpm: pool www
0:00 grep php
WWW
                                                                            20:05
root
                                                  820 pts/1
'-'? See /usr/share/doc/procps-3.2.8/FAQ
                                                                                        0:00 php-fpm: master pr
                                                                            20:00
           10872 2.5
10886 0.0
                                                                                        0:02 php-fpm: pool www
                                                                            20:04
                              0.0 103248
                                                  820 pts/1
                                                                            20:06
                                                                                        0:00 grep php
'-'? See /usr/share/doc/procps-3.2.8/FAQ
                                                                                       0:00 php-fpm: master pr
0:00 php-fpm: pool www
0:00 grep php
                                                                            20:00
                                                                            20:06
                                                 812 pts/1
                                                                            20:06
[root@linyu etc]# ps
Warning: bad syntax,
                              -aux | grep php
perhaps a bogus
                                                      '-'? See /usr/share/doc/procps-3.2.8/FAQ
                               0.1 160124
             10829 0.0
10887 0.7
root
                                                                            20:00
                                                                                        0:00 php-fpm: master pr
                              0.5 163952 10900 ?
                                                                            20:06
                                                                                        0:00 php-fpm: pool www
WWW
             10897
                              0.0 103248
                                                                            20:07
                                                  816 pts/1
                                                                                        0:00 grep php
root
```

可以看到,php-fpm子进程的进程id会自动变化。这说明,php-fpm子进程确实会自动被销毁,然后再产生新的php-fpm子进程,而且php-fpm子进程占用的内存也没有越来越大。