```
yung@yung-MS-7816:~/Lab-8$ valgrind ./a.out crash_0.bmp ./out.bmp
==2293273== Memcheck, a memory error detector
==2293273== Copyright (C) 2002-2017, and GNU GPL'd, by Julian Seward et al.
==2293273== Using Valgrind-3.15.0 and LibVEX; rerun with -h for copyright info
==2293273== Command: ./a.out crash_0.bmp ./out.bmp
==2293273==
==2293273== Invalid write of size 1
==2293273==    at 0x4842B63: memmove (in /usr/lib/x86_64-linux-gnu/valgrind/vgpreload_memcheck-amd64-linux.so)
==2293273==    by 0x48F15DA: _IO_file_xsgetn (fileops.c:1296)
==2293273==    by 0x48E5062: fread (iofread.c:38)
==2293273==    by 0x109740: bmp_transform (bmp_lib.c:158)
==2293273==    by 0x10990E: main (bmpgrayscale.c:18)
==2293273==  Address 0x4a552a0 is 0 bytes after a block of size 0 alloc'd
==2293273==    at 0x483B7F3: malloc (in /usr/lib/x86_64-linux-gnu/valgrind/vgpreload_memcheck-amd64-linux.so)
==2293273==    by 0x109670: bmp_transform (bmp_lib.c:132)
==2293273==    by 0x10990E: main (bmpgrayscale.c:18)
==2293273==
--2293273-- VALGRIND INTERNAL ERROR: Valgrind received a signal 7 (SIGBUS) - exiting
--2293273-- si_code=128;  Faulting address: 0x0;  sp: 0x1002ca9e40

valgrind: the 'impossible' happened:
   Killed by fatal signal

host stacktrace:
==2293273==    at 0x5805160F: ??? (in /usr/lib/x86_64-linux-gnu/valgrind/memcheck-amd64-linux)
==2293273==    by 0x58005BF7: ??? (in /usr/lib/x86_64-linux-gnu/valgrind/memcheck-amd64-linux)
==2293273==    by 0x580A7204: ??? (in /usr/lib/x86_64-linux-gnu/valgrind/memcheck-amd64-linux)
==2293273==    by 0x580F5FD4: ??? (in /usr/lib/x86_64-linux-gnu/valgrind/memcheck-amd64-linux)

sched status:
  running_tid=1
```

```
151     // read all file to data until EOF
152     int idx = 0;
153     while (1)
154     {
155         if (feof(bmpfile))
156             break;
157
158         fread((char *)&img->data[idx], sizeof(char), sizeof(char), bmpfile);
159         idx++;
160     }
161
```

原因：由上兩張圖可看到，透過 valgrind 找出錯誤為 158 行。

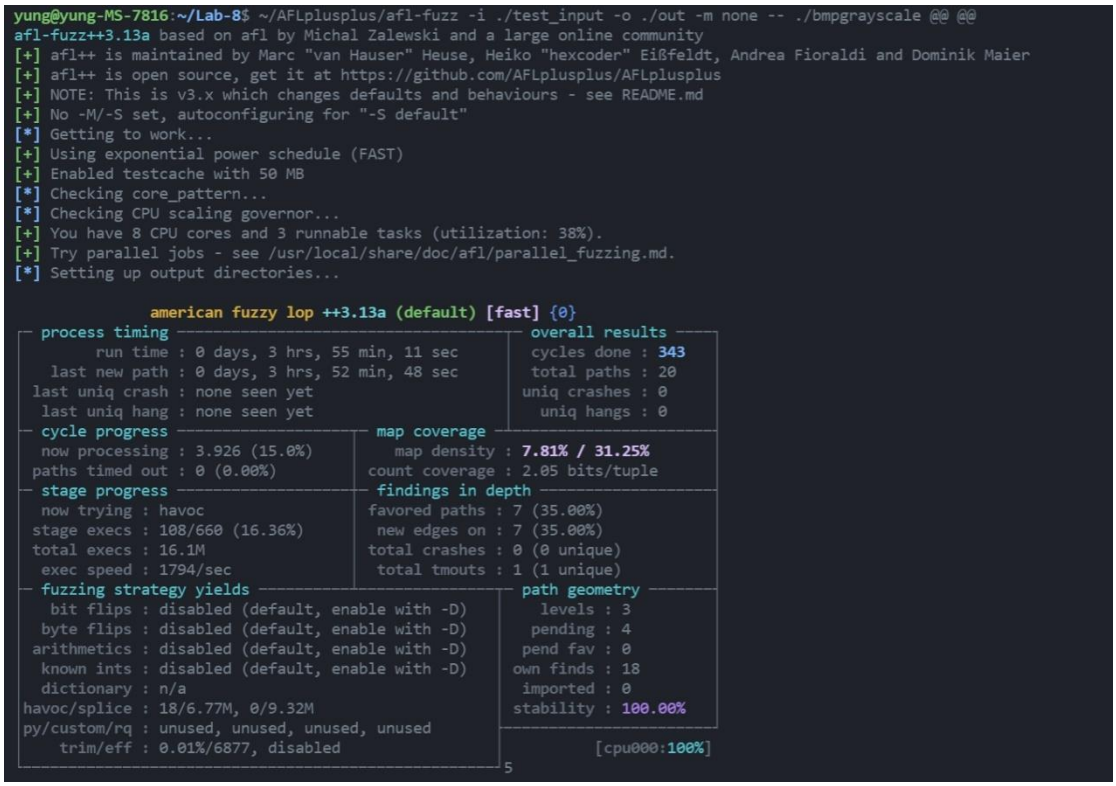
下面為解法:

```
151     // read all file to data until EOF
152     int idx = 0;
153     while (1)
154     {
155         // Fix
156         if (idx >= image_size) {
157             break;
158         }
159
160         if (feof(bmpfile))
161             break;
162
163         fread((char *)&img->data[idx], sizeof(char), sizeof(char), bmpfile);
164         idx++;
165     }
166
```

如上圖，加入 156~158 行即可解決錯誤。

推測根本原因應該是 fuzz 把 Input 檔案把 eof 字元改掉了，造成 160 行沒有正確讀到 EOF 產生 Crash

加入 156~158 行後成功 Fuzz 沒 Crash (截圖如下)



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