Linux debugging and tracing tools

Jugurtha BELKALEM

SMILE - Opensource solution

7 août 2018

Agenda

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Quotes

UNIX is very simple, it just needs a genius to understand its simplicity.

How difficult is Linux ?

```
jugbe@F-NAN-HIPPOPOTAME:~/Téléchargements$ perl cloc-1.74.pl linux-4.17.2.tar.xz
   61323 text files.
   60842 unique files.
   11918 files ignored.

github.com/AlDanial/cloc v 1.74  T=233.40 s (211.8 files/s, 100926.0 lines/s)
-------------------------------------------------------------------------------
Language                     files          blank        comment           code
-------------------------------------------------------------------------------
C                            25834        2563541        2482443       12789765
C/C++ Header                 19134         490812         921954        3651018
Assembly                      1309          46080         105856         229304
JSON                           188              0              0         100227
make                          2387           8713           9762          37881
Perl                            54           5373           3910          27170
Bourne Shell                   312           4624           4464          21036
Python                         100           2924           3257          16539
HTML                             5            669              0           5492
yacc                             9            694            379           4609
PO File                          5            791            918           3061
lex                              8            310            300           1931
C++                              7            287             77           1847
Bourne Again Shell              49            347            317           1695
awk                             11            171            155           1388
Markdown                         1            220              0           1077
TeX                              1            108              3            915
Glade                            1             58              0            603
NAnt script                      2            157              0            602
Cucumber                         1             28             49            161
Windows Module Definition        2             14              0            100
m4                               1             15              1             95
XSLT                             5             13             26             61
CSS                              1             18             27             44
vim script                       1              3             12             27
INI                              1              1              0              6
sed                              1              2              5              5
-------------------------------------------------------------------------------
SUM:                         49430        3125973        3533915       16896659
-------------------------------------------------------------------------------
jugbe@F-NAN-HIPPOPOTAME:~/Téléchargements$
```

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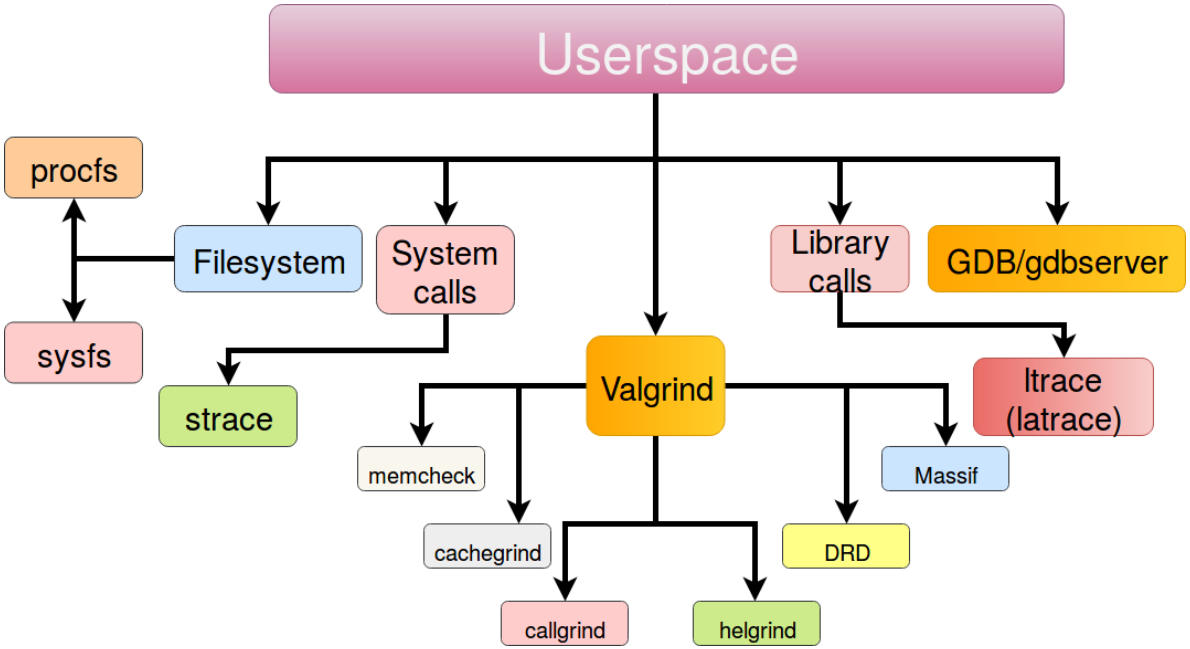

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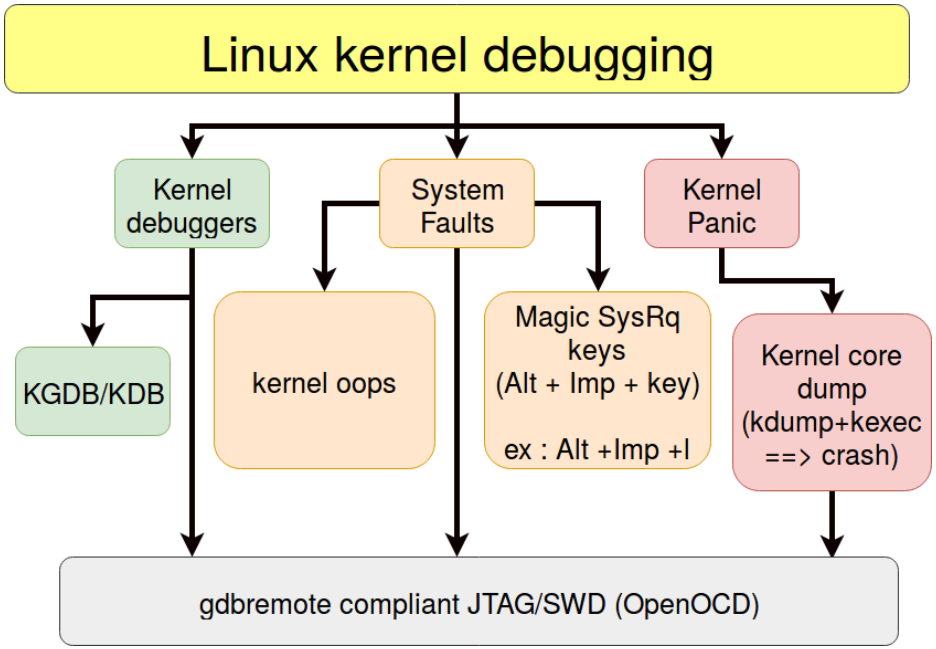

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Figure – Linux tracers

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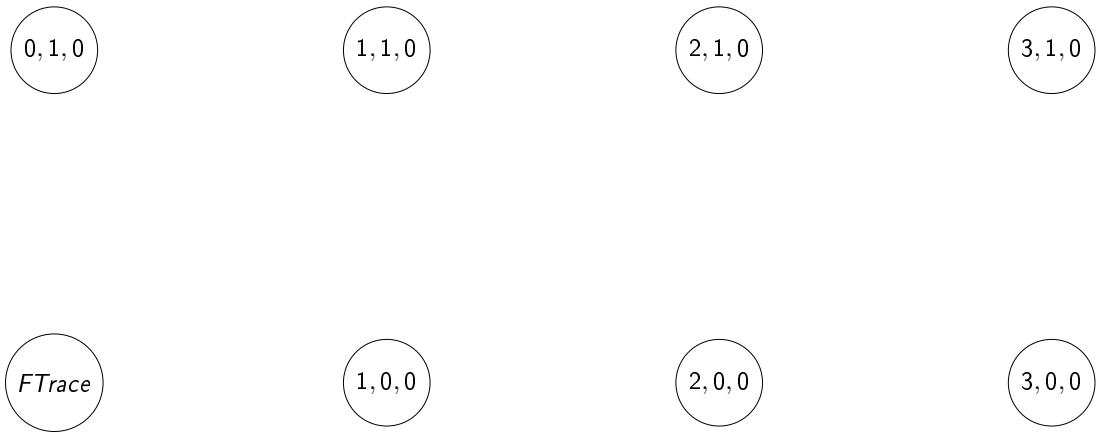

Figure – Linux tracers

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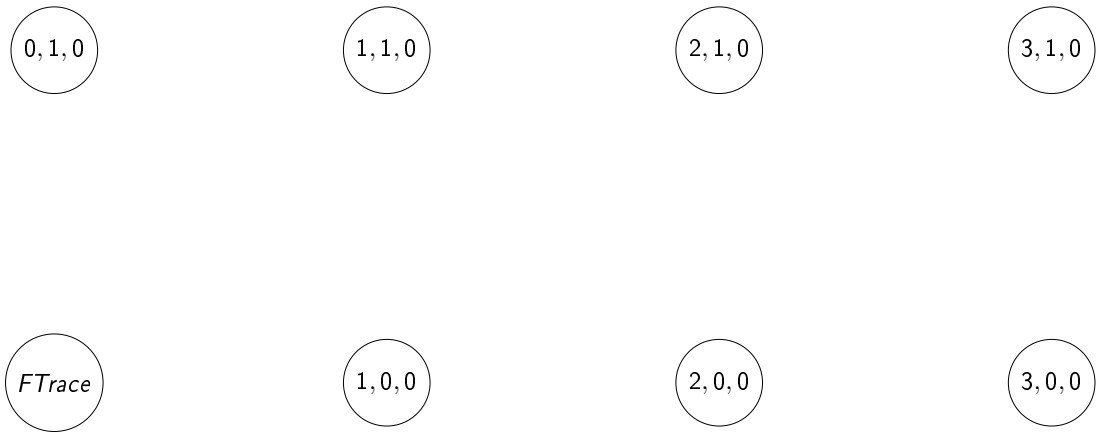

Figure – Linux tracers

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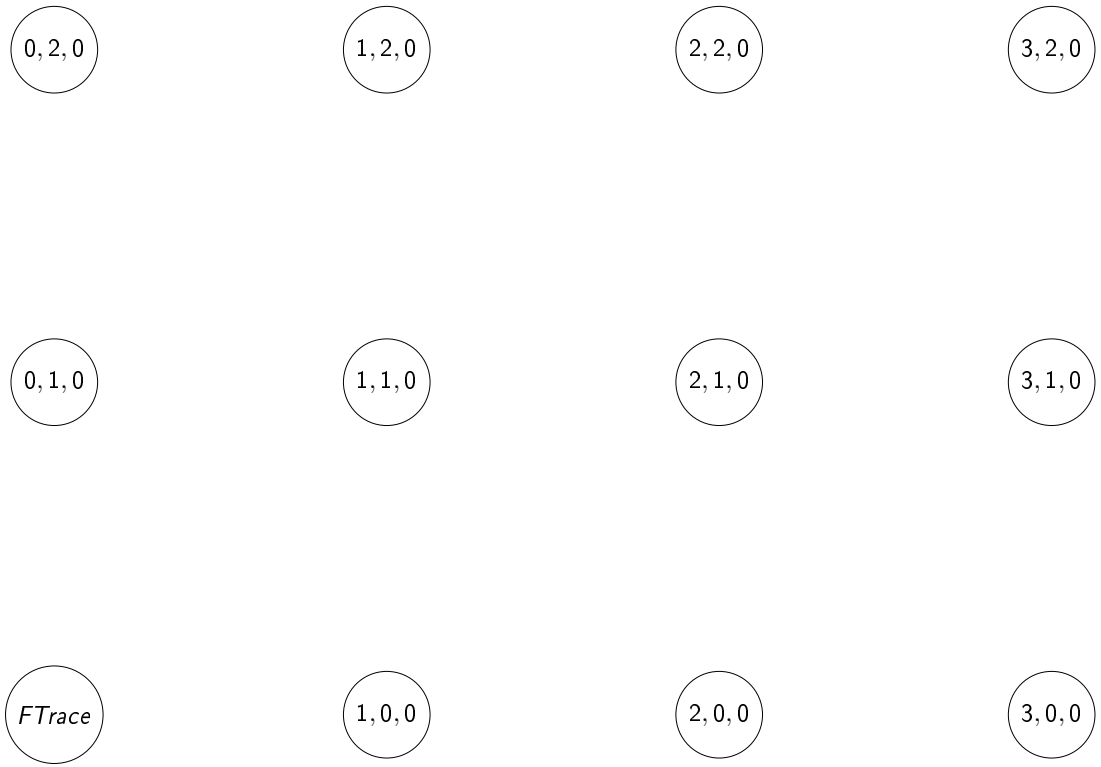

Figure – Linux tracers

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```
jugurtha@jugurtha-VirtualBox ~/antidebug $ sudo gdb attach `pidof ptrace-anti-debug` -q
[sudo] Mot de passe de jugurtha :
attach: Aucun fichier ou dossier de ce type.
Attaching to process 2986
Could not attach to process.  If your uid matches the uid of the target
process, check the setting of /proc/sys/kernel/yama/ptrace_scope, or try
again as the root user.  For more details, see /etc/sysctl.d/10-ptrace.conf
warning: process 2986 is already traced by process 2706
ptrace: Opération non permise.
/home/jugurtha/antidebug/2986: Aucun fichier ou dossier de ce type.
(gdb)
```

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Conclusion

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At the end of internship :

- Step by step debugging manual (over 200 pages) + sample codes at : https://github.com/jugurthab/Linux_kernel_debug
- 4 articles on SMILE's blog :
  - **OpenOCD from scratch :** http://www.linuxembedded.fr/2018/07/openocd-from-scratch/
  - **Linux debugging tools :** http://www.linuxembedded.fr/2018/07/openocd-from-scratch/
  - **Unmask kernel activity with tracers :** http://www.linuxembedded.fr/2018/07/openocd-from-scratch/
  - **Secrets of eBPF :** http://www.linuxembedded.fr/2018/07/openocd-from-scratch/
- OESdebug (Python3) : OpenOCD wrapper utility (https://github.com/jugurthab/Linux_kernel_debug/tree/master/DebugSoftware/OpenOCD-wrapper). It generates OpenOCD scripts, supports autoprobing feature and makes it easy to share scripts.