
Coding Conventions and Best Practices followed in NeuronRain Architecture and Development

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There are no strict standard conventions or practices followed in NeuronRain commits but following are
some guiding principles:

1.NeuronRain repositories are spread across SourceForge(https://sourceforge.net/u/userid-769929/),GitHub(https://github.com/shrinivaasanka/) and GitLab(https://gitlab.com/shrinivaasanka/) - though they do not differ much at present, NeuronRain SourceForge focuses on Astronomical Datasets, NeuronRain GitHub is for Generic Datasets and Clouds and NeuronRain GitLab is intended for Drone Development. Every source file has copyleft header and attributions.

2.Presently there are no Continuous Integration/Unit testing framework. But every code change is tested manually
and logs are captured suffixing timestamps in separate testlogs/ folder within C/C++/Java/Python source directories.

3.Development model followed is somewhat similar to Agile (but only a Single person team - K.Srinivasan - https://sites.google.com/site/kuja27/ - Deleted and Mirrored at https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/tree/master/kuja27_website_mirrored) and small incremental changes are frequent compared to rare big feature additions/changes especially in Python/MachineLearning code.

4.Code documentation - comments are profusely littered wherever necessary. NeuronRain FAQ simulates an enduser and asks questions on h(is/er) behalf and answers them.

5.Architectural choices are more important than implementation - no complicated overengineering - Occam's Razor.

6.VIRGO32 and VIRGO64 linux kernel base mainline PPA versions are not frequently updated having reached minimum stability.

7.Benchmarks on Single/Multicore/Clusters are committed for salient Cloud implemented features (Factorization, Intrinsic Merit/Fitness, VIRGO system calls-drivers etc.,)

8.Code Reviews are Self-Reviews only based on QE/QA.

9.To err is human - erroneous commits are corrected as and when found. Bug Tracking is minimal and there are no strict timelines for resolution. Following are bug tracking pages for all Krishna iResearch - NeuronRain repositories:

SourceForge - NeuronRain Research - https://sourceforge.net/u/ka_shrinivaasan/tickets/

GitHub - NeuronRain Green - https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/issues

GitLab - NeuronRain Antariksh - https://gitlab.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/-/issues

(Deprecated) AsFer GitHub issues page - https://github.com/shrinivaasanka/asfer-github-code/issues?q=is%3Aissue+is%3Aclosed).

10.NeuronRain architecure and development has two worlds - userspace(AsFer) cloud/machine learning and kernelspace(VIRGO/KingCobra/USBmd) cloud/Embedded/IoT/Drones/Robotics - connected by kernel_analytics.conf and live reading of remote sockets for analytics variables from kernel_analytics module. AsFer has more activity compared to others.

11.No strict deadlines/releases but repositories are source-released periodically.

12.Bug Reports/Pull Requests are encouraged at Issues tracking pages (item 9) but resolution depends on feasibility and time availability.

13.Each NeuronRain repository has a design document updated periodically for commits and related technical notes.Though "git log" is sufficient, design document delves into theoretical aspects of the implementation which are related to publications and draft publications of the author. Commits for multiple dates are sometimes batched and dates of commits might be out of sync with dates of code commentaries in design documents. NeuronRain design documents have unified numbering for theory content because of

strongly connected conceptual graph aligned to the 32-bit and 64-bit codebases - AstroInfer(Machine Learning), USBmd(Software Analytics and Program Analyzer), VIRGO(IoT,Scheduler/Kernel Analytics and Program Analyzer), KingCobra(Kernelspace messaging and Algorithmic economics), GRAFIT(course materials overlap theory of NeuronRain), Krishna_iResearch_DoxygenDocs(NeuronRain FAQ), Acadpdrafts(publications and drafts for implementations in NeuronRain).

14.In essence any good software relies on the basic thumbrule: concept feature --- design/ algorithm for feature --- choice of software for implementation of the algorithm --- how much value this new feature adds to existing implementation .

15.Any software is the result of immense human effort. NeuronRain is an academic FOSS research and development product which includes implementations and later non-peer reviewed expansions of author's publications and contributed as charity - https://arxiv.org/user/698017/pwc_link, https://arxiv.org/user/626007/pwc_link, https://tac.nist.gov/publications/2010/participant.papers/CMI_IIT.proceedings.pdf (https://cs.paperswithcode.com/paper/decidability-of-existence-and-construction-of, https://paperswithcode.com/paper/few-algorithms-for-ascertaining-merit-of-a) - an alpha or beta version in state of flux - and integration of nightly build setup, QA/QE test suites and formal installation packages for OS platforms are pending. There is no mobile app for NeuronRain though it can be installed on Android which is a linux-forkoff just like any other OS. NeuronRain has not been tested on Production-grade Datasets/Cloud/Drones and largescale institutional-commercial-corporate deployments if any are cautioned against per FAQ,Licensing and Documentation URLs in 17 and 18 - especially VIRGO linux kernel system calls and drivers (kernelspace cloud RPC) are sensitive to hardware-architectural idiosyncracies and mainline linux kernel versions. Drone code has been tested only on JMAVSIM flight simulator. Algorithmic fairness of ML datasets is not vouchsafed. Neuro Cryptocurrency Rig has been implemented only for academic use. Dependency OSS licenses are strictly respected and periodically updated in Requirements.txt.

16.Copyrights for Images, Audios, Videos, Manual or Spider Crawled Websites, News articles and Social Network Profiles for testing purposes have been attributed to the respective source - Most of them are related to the author excluding oriental and western classical music clips.

17.NeuronRain Documentation - https://neuronrain-documentation.readthedocs.io/en/latest/

18.NeuronRain Documentation Repositories (updated more frequently):

18.1 GitHub - https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs

18.2 GitLab - https://gitlab.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs

18.3 SourceForge - https://sourceforge.net/u/userid-769929/Krishna_iResearch_DoxygenDocs/ci/master/tree/

19.OpenHub Source Code Analyzer Profile - https://www.openhub.net/accounts/ka_shrinivaasan, https://www.openhub.net/accounts/ka_shrinivaasan/positions

20.NeuronRain commits twitter handle - https://twitter.com/neuronrain_comm

21.Author's website - https://acadpdrafts.readthedocs.io/en/latest/ - Mirror of deleted https://sites.google.com/site/kuja27/ portal is at https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/tree/master/kuja27_website_mirrored

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Coccinelle Static Analysis of NEURONRAIN VIRGO Linux Kernel

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Analyzed on 25 July 2016:

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1. Coccinelle static analyzer is an ubuntu package installable from APT.

2. Report for Static Analysis of virgo_malloc and virgo_filesystem syscalls are generated by following commandlines:

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root@shrinivaasanka-Inspiron-1545:/media/shrinivaasanka/0fc4d8a2-1c74-42b8-8099-9ef78d8c8ea2/home/kashrinivaasan/linux-4.1.5# make coccicheck MODE=report M=virgo_filesystem/virgo_fs.c

Please check for false positives in the output before submitting a patch.
When using "patch" mode, carefully review the patch before submitting it.

virgo_filesystem/virgo_fs.c:470:12-16: WARNING: casting value returned by memory allocation function to (char *) is useless.
virgo_filesystem/virgo_fs.c:479:12-16: WARNING: casting value returned by memory allocation function to (char *) is useless.
root@shrinivaasanka-Inspiron-1545:/media/shrinivaasanka/0fc4d8a2-1c74-42b8-8099-9ef78d8c8ea2/home/kashrinivaasan/linux-4.1.5# make coccicheck MODE=report M=virgo_malloc/virgo_malloc.c

Please check for false positives in the output before submitting a patch.
When using "patch" mode, carefully review the patch before submitting it.

virgo_malloc/virgo_malloc.c:563:12-16: WARNING: casting value returned by memory allocation function to (char *) is useless.
virgo_malloc/virgo_malloc.c:554:12-16: WARNING: casting value returned by memory allocation function to (char *) is useless.

#--`

#ASFER - a ruleminer which gets rules specific to a query and executes them (component of iCloud Platform)

#This program is free software: you can redistribute it and/or modify

#it under the terms of the GNU General Public License as published by

#the Free Software Foundation, either version 3 of the License, or

#(at your option) any later version.

#This program is distributed in the hope that it will be useful,

#but WITHOUT ANY WARRANTY; without even the implied warranty of

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#along with this program. If not, see <http://www.gnu.org/licenses/>.

#

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#Copyright (C):

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#Ph: 9789346927, 9003082186, 9791165980

#Krishna iResearch Open Source Products Profiles:

#http://sourceforge.net/users/ka_shrinivaasan,

https://www.openhub.net/accounts/ka_shrinivaasan

#Personal website(research): https://sites.google.com/site/kuja27/

#ZODIAC DATASOFT: https://github.com/shrinivaasanka/ZodiacDatasoft

#emails: ka.shrinivaasan@gmail.com, shrinivas.kannan@gmail.com,

#kashrinivaasan@live.com

#---

2352 cd /tmp

2353 ls

2354 sudo rm -rf *

```
 2355  ls
 2356  cd -
 2357  ls
 2358  sudo rm -rf *
 2359  cd ..
 2360  ls
 2361  sudo bin/hdfs namenode -format
 2362  sudo sbin/start-dfs.sh
 2363  cd lib/native/
 2364  ls
 2365  man execstack
 2366  sudo apt-get install execstack
 2367  pwd
 2368  sudo execstack *
 2369  sudo execstack -c *
 2370  man execstack
 2371  cd ../..
 2372  sudo bin/hdfs dfs -mkdir /user
 2373  date
 2374  sudo bin/hdfs dfs -put etc/hadoop input
 2375  ls
 2376  sudo bin/hadoop jar share/hadoop/mapreduce/hadoop-mapreduce-examples-2.6.0.jar
grep input output 'dfs[a-z.]+'
 2377  sudo hdfs dfsadmin -safemode leave
 2378  sudo bin/hdfs dfsadmin -safemode leave
 2379  ls
 2380  sudo bin/hdfs dfs -mkdir /user
 2381  sudo bin/hdfs dfs -mkdir /user/root
```

```
 2382  sudo bin/hdfs dfs -put etc/hadoop input
 2383  sudo bin/hadoop jar share/hadoop/mapreduce/hadoop-mapreduce-examples-2.6.0.jar grep input output 'dfs[a-z.]+'
 2384  sudo bin/hdfs dfs -get output output
 2385  sudo cat output/*
 2386  sudo bin/hdfs dfs -cat output/*
 2387  cd etc/hadoop/
 2388  sudo vi mapred-site.xml
 2389  sudo vi yarn-site.xml
 2390  sudo sbin/stop-dfs.sh
 2391  cd ../..
 2392  sudo sbin/stop-dfs.sh
 2393  sudo sbin/start-yarn.sh
 2394  sudo bin/hadoop jar share/hadoop/mapreduce/hadoop-mapreduce-examples-2.6.0.jar grep input output 'dfs[a-z.]+'
 2395  sudo sbin/stop-yarn.sh
 2396  sudo ps -eaf|grep hadoop|awk '{print $2}'|xargs kill -9
 2397  sudo ps -eaf|grep hadoop
 2398  sudo kill -9 28437 28841
 2399  sudo ps -eaf|grep hadoop
 2400  sudo ps -eaf|grep hadoop|awk '{print $2}'|xargs kill -9
 2401  ls
 2402  sudo sbin/start-yarn.sh
 2403  sudo bin/hadoop jar share/hadoop/mapreduce/hadoop-mapreduce-examples-2.6.0.jar grep input output 'dfs[a-z.]+'
 2404  sudo sbin/start-dfs.sh
 2405  sudo bin/hadoop jar share/hadoop/mapreduce/hadoop-mapreduce-examples-2.6.0.jar grep input output 'dfs[a-z.]+'
```

```
2406  sudo bin/hdfs namenode -format
2407  cd /tmp/
2408  ls
2409  sudo rm -rf *
2410  cd -
2411  cd logs
2412  ls
2413  cd ..
2414  ls
2415  sudo bin/hdfs namenode -format
2416  sudo sbin/start-dfs.sh
2417  sudo ps -eaf|grep hadoop|awk '{print $2}'
2418  sudo ps -eaf|grep hadoop|awk '{print $2}'|xargs kill -9
2419  sudo ps -eaf|grep hadoop|awk '{print $2}'
2420  sudo kill -9 `ps -eaf|grep hadoop|awk '{print $2}'`
2421  sudo ps -eaf|grep hadoop|awk '{print $2}'
2422  cd /tmp
2423  ls
2424  sudo rm -rf *
2425  cd -
2426  cd logs
2427  ls
2428  sudo rm -rf *
2429  cd ..
2430  ls
2431  sudo bin/hdfs namenode -format
2432  sudo sbin/start-dfs.sh
2433  sudo bin/hdfs dfs -mkdir /user/
```

```
 2434  sudo bin/hdfs dfs -mkdir /user/root
 2435  sudo sbin/start-yarn.sh
 2436  sudo bin/hadoop jar share/hadoop/mapreduce/hadoop-mapreduce-examples-2.6.0.jar grep input output 'dfs[a-z.]+'
 2437  sudo bin/hdfs dfs -put etc/hadoop input
 2438  sudo bin/hadoop jar share/hadoop/mapreduce/hadoop-mapreduce-examples-2.6.0.jar grep input output 'dfs[a-z.]+'
 2439  sudo sbin/stop-yarn.sh

kashrinivaasan@kashrinivaasan-Inspiron-1545:~/linux-3.7.8$ ls
arch       crypto                firmware  ipc       lib           modules.builtin       net
scripts           sound       virt
block      Documentation         fs        Kbuild    MAINTAINERS   modules.order
README            security          System.map  vmlinux
COPYING    drivers               include   Kconfig   Makefile      Module.symvers
REPORTING-BUGS  signing_key.priv  tools       vmlinux.o
CREDITS    extra_certificates    init      kernel    mm            Module.symvers.orig
samples           signing_key.x509  usr           x509.genkey
kashrinivaasan@kashrinivaasan-Inspiron-1545:~/linux-3.7.8$ make
make[1]: Nothing to be done for `all'.
make[1]: Nothing to be done for `relocs'.
  CHK     include/generated/uapi/linux/version.h
  CHK     include/generated/utsrelease.h
  CALL    scripts/checksyscalls.sh
  CHK     include/generated/compile.h
  PASYMS  arch/x86/realmode/rm/pasyms.h
  LDS     arch/x86/realmode/rm/realmode.lds
  LD      arch/x86/realmode/rm/realmode.elf
```

```
  RELOCS   arch/x86/realmode/rm/realmode.relocs
  OBJCOPY  arch/x86/realmode/rm/realmode.bin
  AS       arch/x86/realmode/rmpiggy.o
  LD       arch/x86/realmode/built-in.o
  VDSOSYM  arch/x86/vdso/vdso32-int80-syms.lds
  VDSOSYM  arch/x86/vdso/vdso32-sysenter-syms.lds
  VDSOSYM  arch/x86/vdso/vdso32-syms.lds
  LD       arch/x86/vdso/built-in.o
  LD       arch/x86/built-in.o
  LINK     vmlinux
  LD       vmlinux.o
  MODPOST  vmlinux.o
WARNING: modpost: Found 2 section mismatch(es).
To see full details build your kernel with:
'make CONFIG_DEBUG_SECTION_MISMATCH=y'
  GEN      .version
  CHK      include/generated/compile.h
  UPD      include/generated/compile.h
  CC       init/version.o
  LD       init/built-in.o
  KSYM     .tmp_kallsyms1.o
  KSYM     .tmp_kallsyms2.o
  LD       vmlinux
  SORTEX   vmlinux
sort done marker at 9333c4
  SYSMAP   System.map
  VOFFSET  arch/x86/boot/voffset.h
  OBJCOPY  arch/x86/boot/compressed/vmlinux.bin
```

```
  RELOCS  arch/x86/boot/compressed/vmlinux.relocs
  GZIP    arch/x86/boot/compressed/vmlinux.bin.gz
  MKPIGGY arch/x86/boot/compressed/piggy.S
  AS      arch/x86/boot/compressed/piggy.o
  CC      arch/x86/boot/compressed/eboot.o
  AS      arch/x86/boot/compressed/efi_stub_32.o
  LD      arch/x86/boot/compressed/vmlinux
  ZOFFSET arch/x86/boot/zoffset.h
  AS      arch/x86/boot/header.o
  CC      arch/x86/boot/version.o
  LD      arch/x86/boot/setup.elf
  OBJCOPY arch/x86/boot/setup.bin
  OBJCOPY arch/x86/boot/vmlinux.bin
  BUILD   arch/x86/boot/bzImage
Setup is 16844 bytes (padded to 16896 bytes).
System is 5147 kB
CRC 51a4c3e5
Kernel: arch/x86/boot/bzImage is ready  (#2)
  Building modules, stage 2.
  MODPOST 3834 modules
WARNING: modpost: Found 13 section mismatch(es).
To see full details build your kernel with:
'make CONFIG_DEBUG_SECTION_MISMATCH=y'
kashrinivaasan@kashrinivaasan-Inspiron-1545:~/linux-3.7.8$

kashrinivaasan@kashrinivaasan-Inspiron-1545:~/linux-3.7.8/drivers/usb/usb-md$ sudo make
-C /lib/modules/`uname -r`/build/ M=`pwd`
[sudo] password for kashrinivaasan:
```

kashrinivaasan@kashrinivaasan-Inspiron-1545:~/linux-3.7.8/drivers/usb/usb-md$ sudo make -C /lib/modules/`uname -r`/build/ M=`pwd`

[sudo] password for kashrinivaasan:

make: Entering directory `/usr/src/linux-headers-3.7.8-030708-generic'

  CC [M] /home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.o

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c:78: warning: initialization from incompatible pointer type

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c: In function ‘umb_write_bulk_callback’:

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c:139: warning: format ‘%s’ expects type ‘char *’, but argument 2 has type ‘int’

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c:139: warning: too few arguments for format

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c: In function ‘umb_write’:

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c:162: warning: passing argument 6 of ‘usb_fill_bulk_urb’ from incompatible pointer type

include/linux/usb.h:1442: note: expected ‘usb_complete_t’ but argument is of type ‘void (*)(struct urb *, struct pt_regs *)’

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c: In function ‘umb_exit’:

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c:186: warning: ‘return’ with a value, in function returning void

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c: In function ‘umb_probe’:

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c:230: warning: ‘return’ with a value, in function returning void

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c:196: warning: unused variable ‘retval’

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c: In function ‘umb_disconnect’:

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c:236: warning: unused variable

‘minor’

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c: In function ‘umb_release’:

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c:271: warning: no return statement in function returning non-void

  Building modules, stage 2.

  MODPOST 1 modules

  LD [M] /home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.ko

make: Leaving directory `/usr/src/linux-headers-3.7.8-030708-generic'

kashrinivaasan@kashrinivaasan-Inspiron-1545:~/linux-3.7.8/drivers/usb/usb-md$ sudo make -C /lib/modules/`uname -r`/build/ M=`pwd` clean

make: Entering directory `/usr/src/linux-headers-3.7.8-030708-generic'

  CLEAN   /home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/.tmp_versions

  CLEAN   /home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/Module.symvers

make: Leaving directory `/usr/src/linux-headers-3.7.8-030708-generic'

kashrinivaasan@kashrinivaasan-Inspiron-1545:~/linux-3.7.8/drivers/usb/usb-md$ sudo make -C /lib/modules/`uname -r`/build/ M=`pwd`

make: Entering directory `/usr/src/linux-headers-3.7.8-030708-generic'

  LD   /home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/built-in.o

  CC [M] /home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.o

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c:78: warning: initialization from incompatible pointer type

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c: In function ‘umb_write_bulk_callback’:

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c:139: warning: format ‘%s’ expects type ‘char *’, but argument 2 has type ‘int’

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c:139: warning: too few arguments for format

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c: In function ‘umb_write’:

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c:162: warning: passing argument 6 of ‘usb_fill_bulk_urb’ from incompatible pointer type

include/linux/usb.h:1442: note: expected ‘usb_complete_t’ but argument is of type ‘void (*)(struct urb *, struct pt_regs *)’

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c: In function ‘umb_exit’:

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c:186: warning: ‘return’ with a value, in function returning void

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c: In function ‘umb_probe’:

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c:230: warning: ‘return’ with a value, in function returning void

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c:196: warning: unused variable ‘retval’

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c: In function ‘umb_disconnect’:

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c:236: warning: unused variable ‘minor’

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c: In function ‘umb_release’:

/home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.c:271: warning: no return statement in function returning non-void

  Building modules, stage 2.

  MODPOST 1 modules

  CC   /home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.mod.o

  LD [M] /home/kashrinivaasan/linux-3.7.8/drivers/usb/usb-md/umb.ko

make: Leaving directory `/usr/src/linux-headers-3.7.8-030708-generic'

kashrinivaasan@kashrinivaasan-Inspiron-1545:~/linux-3.7.8/drivers/usb/usb-md$ ls -lrt

total 132

-rwxr-xr-x 1 kashrinivaasan kashrinivaasan 117 Feb 17 18:24 Makefile

-rwxr-xr-x 1 kashrinivaasan kashrinivaasan 5763 Feb 17 18:24 Kconfig

-rw-rw-r-- 1 kashrinivaasan kashrinivaasan 7606 Feb 17 18:29 umb.c

```
-rw-r--r-- 1 root          root          5512 Apr  5 11:06 umb.o
-rw-r--r-- 1 root          root            66 Apr  5 11:06 modules.order
-rw-r--r-- 1 root          root             8 Apr  5 11:06 built-in.o
-rw-r--r-- 1 root          root          3368 Apr  5 11:06 umb.mod.o
-rw-r--r-- 1 root          root          1552 Apr  5 11:06 umb.mod.c
-rw-r--r-- 1 root          root          7472 Apr  5 11:06 umb.ko
-rw-r--r-- 1 root          root             0 Apr  5 11:06 Module.symvers
kashrinivaasan@kashrinivaasan-Inspiron-1545:~/linux-3.7.8/drivers/usb/usb-md$


  437  ls
  438  cd usb
  439  ls
  440  cd core
  441  ls
  442  sudo make -C /lib/modules/`uname -r`/build/ M=`pwd` modules
  443  ls
  444  strip --strip-debug usbcore.ko
  445  cd /lib
  446  ls
  447  find . -exec grep usbcore.ko
  448  find . -exec grep usbcore.ko /dev/null {} \;
  449  cd modules/3.2.0-29-generic-pae/modules.builtin:kernel/drivers/usb/core
  450  ls
  451  cd modules/3.2.0-29-generic-pae/kernel/drivers/
  452  ls
  453  cd usb
  454  ls
  455  cd wusbcore/
```

456 ls

457 pwd

458 cd

459 ls

460 pwd

461 cd /usr/src

462 ls

463 cd linux-source-3.2.0/

464 ls

465 cd linux-source-3.2.0/

466 ls

467 pwd

468 cd drivers

469 ls

470 cd usb

471 ls

472 cd core

473 ls

474 cd

475 sudo apt-get install build-essential bin86 kernel-package libqt3-headers libqt3-mt-dev wget libncurses5 libncurses5-dev

476 pwd

477 cd /usr/src

478 ls

479 cd linux-source-3.2.0/

480 ls

481 cd linux-source-3.2.0/

482 ls

```
483  cd drivers/
484  ls
485  cd usb
486  ls
487  cd core
488  ls
489  pwd
490  sudo make -C /lib/modules/`uname -r`/build/ M=`pwd` modules
491  cd /usr/src/linux-headers-3.2.0-32-generic-pae
492  ls
493  cd drivers
494  ls
495  cdusb
496  cd usb
497  ls
498  cd core
499  ls
500  make
501  pwd
502  cd ..
503  ls
504  cd ..
505  ls
506  pwd
507  cd ..
508  ls
509  sudo make -C /lib/modules/`uname -r`/build/ M=`pwd` modules
510  [wd
```

```
511  ;s
512  la
513  ls
514  cd drivers
515  s
516  ls
517  cd usb
518  ls
519  cd core
520  sudo make -v -C /lib/modules/`uname -r`/build/ M=`pwd` modules
521  sudo make  -C /lib/modules/`uname -r`/build/ M=`pwd` modules
522  cd /lib
523  ls
524  cd modules/
525  ls
526  cd 3.2.0-32-generic-pae/
527  ls
528  cd build
529  ls
530  cd drivers
531  ls
532  cd usb/
533  ls
534  cd core/
535  ls
536  pwd
537  cd ../../../..
538  ls
```

```
539  cd kernel/
540  ls
541  cd drivers/
542  ls
543  cd usb/
544  ls
545  pwd
546  cd ../../..
547  ls
548  cd build
549  ls
550  ls lib
551  ls
552  cd drivers
553  s
554  ls
555  cd usb
556  ls
557  cd core/
558  ls
559  cd ../../..
560  ls
561  cd sound
562  cd ..
563  ls
564  strip --strip-debug usbcore.ko
565  ls
566  make
```

```
567  cd
568  tcpdump
569  tcpdump -h
570  ifconfig
571  sudo wireshark
572  pwd
573  ls
574  cd /usr
575  ls
576  cd src
577  ls
578  cd modules/
579  ls
580  cd ..
581  ls
582  cd linux-
583  cd
584  locate bluez
585  cd /usr/share/doc
586  ls
587  cd bluez
588  ls
589  cd examples/
590  ls
591  ./monitor-bluetooth
592  cd
593  ls
594  cd /usr/src
```

```
595  ls
596  cd linux-source-3.2.0/
597  ls
598  cd linux-source-3.2.0/
599  ls
600  cd drivers
601  ls
602  cd usb
603  ls
604  cd core
605  ls
606  sudo perl -pi.bak -e 's/16384/131072/' devio.c
607  make -C /lib/modules/`uname -r`/build/ M=`pwd` modules
608  sudo make -C /lib/modules/`uname -r`/build/ M=`pwd` modules
609  cd /usr/src
610  ls
611  cd linux-source-3.2.0/
612  ls
613  cd linux-source-3.2.0/
614  ls
615  mv * ..
616  sudo mv * ..
617  ls
618  pwd
619  cd ..
620  ls
621  ls linux-source-3.2.0
622  rm -rf linux-source-3.2.0
```

```
623  sudo rm -rf linux-source-3.2.0
624  ls
625  cd drivers
626  ls
627  cd usb
628  ls
629  cd core
630  ls
631  sudo perl -pi.bak -e 's/16384/131072/' devio.c
632  sudo make -C /lib/modules/`uname -r`/build/ M=`pwd` modules
633  ls
634  pwd
635  ls ../..
636  ls
637  ls /lib/modules
638  sudo make -C /lib/modules/`uname -r`/build/ M=`pwd` modules
639  uname -r
640  sudo make -C /lib/modules/linux-source-3.2.0/build/ M=`pwd` modules
641  hostname:~/lkmpg-examples/02-HelloWorld# make
642  make -C /lib/modules/2.6.11/build M=/root/lkmpg-examples/02-HelloWorld modules
643  make[1]: Entering directory `/usr/src/linux-2.6.11'
644    CC [M]  /root/lkmpg-examples/02-HelloWorld/hello-1.o
645   Building modules, stage 2.
646    MODPOST
647    CC      /root/lkmpg-examples/02-HelloWorld/hello-1.mod.o
648    LD [M]  /root/lkmpg-examples/02-HelloWorld/hello-1.ko
649  make[1]: Leaving directory `/usr/src/linux-2.6.11'
650  hostname:~/lkmpg-examples/02-HelloWorld#
```

```
651
652  sudo apt-get build-dep linux-source-3.2.0-generic-pae
653  sudo apt-get build-dep linux-source-3.2.0-32-generic-pae
654  ls
655* sudo make -C /lib/modules/`uname -r`/build/ M=`pwd` modules
656  pwd
657  sudo apt-get build-dep linux-source-3.2.0-32
658  sudo apt-get build-dep linux-source-3.2.0
659  cd
660  ls
661  cd  italc-2.0.0/
662  ls
663  sudo aptitude install libitalc italc-client italc-master
664  sudo apt-get install libitalc italc-client italc-master
665  italc
666  git
667  sudo apt-get install git
668  uname -r
669  ls
670  pwd
671  cd /usr/src
672  ls
673  cd linux-source-3.2.0/
674  ls
675  pwd
676  cd ..
677  ls
678  mkdir modifiedUSBdriver
```

```
  679  sudo mkdir modifiedUSBdriver
  680  ls
  681  pwd
  682  cd modifiedUSBdriver/
  683  ls
  684  cp /boot/config-`uname-r` .config
  685  sudo cp /boot/config-`uname-r` .config
  686  sudo cp /boot/config-`uname -r` .config
  687  ls
  688  ls-al
  689  ls -al
  690  pwd
  691  uname -r
  692  cp /usr/src/linux-headers-3.2.0-32-generic-pae/Module.symvers .
  693  sudo cp /usr/src/linux-headers-3.2.0-32-generic-pae/Module.symvers .
  694  ls
  695  cd ..
  696  ls
  697  cd linux-source-3.2.0/
  698  ls
  699  pwd
  700  sudo make EXTRAVERSION=-32-generic O=/usr/src/modifiedUSBdriver oldconfig
  701  sudo make EXTRAVERSION=-32-generic O=/usr/src/modifiedUSBdriver oldconfigls
  702  pwd
  703  uname -r
  704  sudo make EXTRAVERSION=-32-generic-pae O=/usr/src/modifiedUSBdriver
oldconfig
  705  sudo apt-get build_dep --no-install-recommends linux-image-$(uname -r)
```

```
706  sudo apt-get build-dep --no-install-recommends linux-image-$(uname -r)
707  apt-get source linux-image-$(uname -r)
708  sudo apt-get source linux-image-$(uname -r)
709  ls
710  pwd
711  ls
712  cd /usr/src
713  ls
714  cd modifiedUSBdriver/
715  ls
716  uname -r
717  cp /usr/src/linux-headers-3.2.0-32-generic-pae/Module.symvers .
718  sudo cp /usr/src/linux-headers-3.2.0-32-generic-pae/Module.symvers .
719  cp /boot/config-`uname -r` .config
720  sudo cp /boot/config-`uname -r` .config
721  pwd
722  ls
723  cd ..
724  ls
725  ls -lrt
726  cd linux-source-3.2.0/
727  ls
728  ls -lrt
729  make EXTRAVERSION=-32-generic-pae O=/usr/src/modifiedUSBdriver oldconfig
730  ls
731  pwd
732  cd
733  ls
```

```
734  cd modifiedUSBdriver/
735  ls
736  ls -l
737  pwd
738  rm -rf  *
739  sudo rm -rf  *
740  ls
741  pwd
742  sudo cp /usr/src/linux-headers-3.2.0-32-generic-pae/Module.symvers .
743  sudo cp /boot/config-`uname -r` .config
744  ls-l
745  ls -l
746  vi Module.symvers
747  ls
748  vi .config
749  ls
750  cd
751  ls
752  cd linux-3.2.0/
753  ls
754  make mrproper
755  sudo make mrproper
756  ls
757  ls -a
758  zcat /proc/config.gz > .config
759  sudo zcat /proc/config.gz > .config
760  ls
761  ls -al
```

762 ls

763 pwd

764 lsmod

765 ls

766 cd ..

767 ls

768 mv modifiedUSBdriver/ ~

769 sudo mv modifiedUSBdriver/ ~

770 cd

771 ls

772 cd modifiedUSBdriver/

773 ls

774 cd ..

775 ls

776 rm -rf modifiedUSBdriver/

777 cd /usr/src

778 ls

779 sudo mv modifiedUSBdriver/ ~

780 cd ~/linux-3.2.0/

781 ls

782 sudo make EXTRAVERSION=-32-generic-pae
O=/home/kashrinivaasan/modifiedUSBdriver oldconfig

783 gcc

784 gcc -v

785 apt-get install gcc

786 sudo apt-get install gcc

787 sudo apt-get upgrade gcc

788 sudo make EXTRAVERSION=-32-generic-pae

O=/home/kashrinivaasan/modifiedUSBdriver oldconfig

789 sudo make EXTRAVERSION=-32-generic-pae

O=/home/kashrinivaasan/modifiedUSBdriver oldconfig|more

790 locate config.gz

791 pwd

792 ls

793 cd /usr/src

794 ls

795 ls -lrt

796 cd

797 ls

798 ls -lrt

799 cd linux-3.2.0/

800 ls

801 pwd

802 make O=/home/kashrinivaasan/modifiedUSBdriver menuconfig

803 sudo make O=/home/kashrinivaasan/modifiedUSBdriver menuconfig

804 pwd

805 cd

806 cd /usr/src

807 ls

808 cd linux-source-3.2.0/

809 ls

810 ls -lrt

811 sudo make O=/home/kashrinivaasan/modifiedUSBdriver menuconfig

812 ls

813 pwd

814 cd

```
  815  ls
  816  cd linux-3.2.0/
  817  ls
  818  sudo make O=/home/kashrinivaasan/modifiedUSBdriver menuconfig
  819  make mrproper
  820  ls
  821  sudo make mrproper
  822  ls
  823  sudo make O=/home/kashrinivaasan/modifiedUSBdriver menuconfig
  824  sudo make O=/home/kashrinivaasan/modifiedUSBdriver menuconfig 2>&1 >
brokenbuild.txt
  825  sudo make O=/home/kashrinivaasan/modifiedUSBdriver menuconfig 2>&1 >
~/brokenbuild.txt
  826  ls
  827  cd
  828  ls
  829  vi brokenbuild.txt
  830  cd linux-3.2.0/
  831  sudo make O=/home/kashrinivaasan/modifiedUSBdriver menuconfig 2>
~/brokenbuild.txt
  832  cd ..
  833  vi brokenbuild.txt
  834  locate sys
  835  locate types.h
  836  ls
  837  cd /usr/include/
  838  ls
  839  cd
```

```
840  ls
841  cd linux-3.2.0/
842  ls
843  cd include/
844  ls
845  pwd
846  cd ..
847  ls
848  find . -name types.h
849  ls
850  pwd
851  apt-get install libc6-dev
852  sudo apt-get install libc6-dev
853  dpkg -L libc6-dev
854  dpkg -L libc6-dev|grep tpes.h
855  dpkg -L libc6-dev|grep types.h
856  dpkg -L libc6-dev|grep mman.h
857  dpkg -L libc6-dev|grep stat.h
858  cd
859  ls
860  cd modifiedUSBdriver/
861  ls
862  cd scripts/
863  ls
864  cd basic/
865  ls
866  ls -al
867  pwd
```

```
868  cd ../..
869  ls
870  vi .config
871  ls
872  pwd
873  cd
874  ls
875  pwd
876  cd linux-3.2.0/
877  ls
878  cd include/
879  ls
880  cd
881  ls
882  pwd
883  sudo apt-get build-dep --no-install-recommends linux-image-$(uname -r)
884  apt-get source linux-image-$(uname -r)
885  ls
886  ls -lrt
887  ls
888  mv modifiedUSBdriver/ linuxbuild
889  ls
890  cd linux
891  cd linuxbuild/
892  ls
893  sudo cp /usr/src/linux-headers-3.2.0-32-generic-pae/Module.symvers .
894  sudo cp /boot/config-`uname -r` .config
895  pwd
```

```
  896  ls
  897  cd ~/linux-3.2.0/
  898  ls
  899  sudo make EXTRAVERSION=-32-generic-pae O=/home/kashrinivaasan/linuxbuild
oldconfig
  900  pwd
  901  ls
  902  locate i386
  903  locate i386|grep sys
  904  ls
  905  pwd
  906  make menuconfig
  907  ls
  908  pwd
  909  ls
  910  cd
  911  ls
  912  vi brokenbuild.txt
  913  cd linux-3.2.0/
  914  ls
  915  make O=/home/kashrinivaasan/linuxbuild menuconfig
  916  sudo make O=/home/kashrinivaasan/linuxbuild menuconfig
  917  sudo make -v O=/home/kashrinivaasan/linuxbuild menuconfig
  918  sudo make -verbose O=/home/kashrinivaasan/linuxbuild menuconfig
  919  sudo make -g O=/home/kashrinivaasan/linuxbuild menuconfig
  920  sudo make -d O=/home/kashrinivaasan/linuxbuild menuconfig
  921  sudo make -d O=/home/kashrinivaasan/linuxbuild menuconfig 2> ~/brokenbuild.txt
  922  ls
```

```
923  pwd
924  cd
925  ls
926  vi brokenbuild.txt
927  pwd
928  ls
929  cd linuxbuild/
930  ls
931  cd ..
932  ls
933  pwd
934  cd linux-3.2.0/
935  ls
936  sudo make -d O=/home/kashrinivaasan/linuxbuild menuconfig
937  sudo make  O=/home/kashrinivaasan/linuxbuild menuconfig
938  pwd
939  cd
940  cd linuxbuild/
941  ls
942  cp /usr/src/linux-headers-3.2.0-35-generic-pae/Module.symvers .
943  sudo cp /usr/src/linux-headers-3.2.0-35-generic-pae/Module.symvers .
944  sudo cp /boot/config-`uname -r` .config
945  pwd
946  cd ~/linux-3.2.0/
947  ls
948  make EXTRAVERSION=-35-generic O=~/linuxbuild oldconfig
949  sudo make EXTRAVERSION=-35-generic O=~/linuxbuild oldconfig
950  cd
```

```
951  ls
952  vi brokenbuild.txt
953  pwd
954  cd /usr/include/
955  ls
956  cd i386-linux-gnu/
957  ls
958  ls -lrt
959  pwd
960  cd
961  ls
962  cd linuxbuild/
963  ls
964  vi Module.symvers
965  ls
966  vi .config
967  ls
968  pwd
969  cd
970  ls
971  cd /usr/include
972  ls
973  pwd
974  ln -s sys i386-linux-gnu/sys
975  sudo ln -s sys i386-linux-gnu/sys
976  ls
977  sudo ln -s asm i386-linux-gnu/asm
978  ls
```

```
 979  ls-lrt
 980  ls -lrt
 981  cd sys
 982  ls
 983  cd i386-linux-gnu/
 984  ls
 985  cd sys
 986  pwd
 987  cd ../..
 988  ls
 989  ln
 990  ln -h
 991  ln --help
 992  man ln
 993  ls
 994  ln -s i386-linux-gnu/asm asm
 995  sudo ln -s i386-linux-gnu/asm asm
 996  ls asm
 997  sudo ln -s i386-linux-gnu/sys sys
 998  ls sys
 999  pwd
1000  ls -al
1001  ls -lrt
1002  ls i386-linux-gnu/
1003  sudo ln -s i386-linux-gnu/bits bits
1004  sudo ln -s i386-linux-gnu/gnu gnu
1005  ls
1006  pwd
```

```
1007  ls -lrt
1008  ls
1009  pwd
1010  cd
1011  ls
1012  cd linux-3.2.0/
1013  ls
1014  sudo make  O=/home/kashrinivaasan/linuxbuild menuconfig
1015  sudo make clean
1016  sudo make  O=/home/kashrinivaasan/linuxbuild menuconfig
1017  pwd
1018  cd -
1019  cd /usr/include/
1020  ls
1021  ls -lrt
1022  ls i386-linux-gnu/
1023  sudo ln -s i386-linux-gnu/fpu_control.h fpu_control.h
1024  ls -lrt
1025  pwd
1026  ls
1027  ls -lrt
1028  cd
1029  ls
1030  cd linux
1031  cd linux-3.2.0/
1032  ls
1033  sudo make  O=/home/kashrinivaasan/linuxbuild menuconfig
1034  locate crt1.o
```

```
1035  export LD_LIBRARY_PATH=/usr/lib/i386-linux-gnu/:$LD_LIBRARY_PATH
1036  sudo make  O=/home/kashrinivaasan/linuxbuild menuconfig
1037  sudo make -d O=/home/kashrinivaasan/linuxbuild menuconfig
1038  pwd
1039  cd
1040  locate crt1.o
1041  sudo ln -s /usr/lib/i386-linux-gnu/crt1.o /usr/lib/crt1.o
1042  ls -lrt /usr/lib
1043  pwd
1044  ls
1045  cd linux-3.2.0/
1046  ls
1047  sudo make -d O=/home/kashrinivaasan/linuxbuild menuconfig
1048  sudo make O=/home/kashrinivaasan/linuxbuild menuconfig
1049  export LD_LIBRARY_PATH=/usr/lib:/usr/lib/i386-linux-gnu/:$LD_LIBRARY_PATH
1050  sudo make O=/home/kashrinivaasan/linuxbuild menuconfig
1051  locate crti.o
1052  ls -lrt /usr/lib
1053  ls -lrt /usr/lib/i386-linux-gnu/
1054  ls -lrt /usr/lib/i386-linux-gnu/*crt*
1055  sudo ln -s /usr/lib/i386-linux-gnu/crti.o /usr/lib/crti.o
1056  sudo ln -s /usr/lib/i386-linux-gnu/crtn.o /usr/lib/crtn.o
1057  sudo ln -s /usr/lib/i386-linux-gnu/gcrt1.o /usr/lib/gcrt1.o
1058  sudo ln -s /usr/lib/i386-linux-gnu/Mcrt1.o /usr/lib/Mcrt1.o
1059  sudo ln -s /usr/lib/i386-linux-gnu/Scrt1.o /usr/lib/Scrt1.o
1060  ls -lrt /usr/lib
1061  sudo make O=/home/kashrinivaasan/linuxbuild menuconfig
1062  apt-get install ncurses
```

1063 sudo apt-get install ncurses

1064 sudo apt-get install ncurses-devel

1065 sudo apt-get install libncurses5-dev

1066 sudo make O=/home/kashrinivaasan/linuxbuild menuconfig

1067 make EXTRAVERSION=-35-generic O=~/linuxbuild oldconfig

1068 sudo make EXTRAVERSION=-35-generic O=~/linuxbuild oldconfig

1069 sudo make EXTRAVERSION=-35-generic O=~/linuxbuild prepare

1070 sudo make EXTRAVERSION=-35-generic O=~/linuxbuild outputmakefile

1071 sudo make EXTRAVERSION=-35-generic O=~/linuxbuild archprepare

1072 sudo make EXTRAVERSION=-35-generic O=~/linuxbuild modules SUBDIRS=scripts

1073 pwd

1074 ls

1075 sudo make EXTRAVERSION=-35-generic O=~/linuxbuild modules
SUBDIRS=drivers/usb/

1076 ls

1077 pwd

1078 cd ls

1079 ls

1080 cd drivers

1081 ls

1082 cd usb/core

1083 ls

1084 cd

1085 cd linuxbuild/

1086 ls

1087 cd drivers/

1088 ls

1089 cd usb

```
 1090  ls
 1091  cd core
 1092  ls
 1093  cd ..
 1094  ls
 1095  cd wusbcore/
 1096  ls
 1097  pwd
 1098  cd ..
 1099  ls
 1100  cd core
 1101  ls
 1102  cd ..
 1103  ls
 1104  pwd
 1105  cd
 1106  ls
 1107  cd linux-3.2.0/
 1108  sudo make EXTRAVERSION=-35-generic O=~/linuxbuild
 1109  ls
 1110  sudo make EXTRAVERSION=-35-generic O=~/linuxbuild
SUBDIRS=drivers/usb/core
 1111  vi drivers/usb/core/usb.c
 1112  ls
 1113  sudo make EXTRAVERSION=-35-generic O=~/linuxbuild
SUBDIRS=drivers/usb/core
 1114  sudo make EXTRAVERSION=-35-generic O=~/linuxbuild SUBDIRS=drivers/usb/
 1115  pwd
```

```
 1116  ls
 1117  pwd
 1118  cd /media/OS_
 1119  ls
 1120  find . -name *.jhd
 1121  pwd
 1122  ls
 1123  cd linux-3.2.0/
 1124  ls
 1125  sudo make EXTRAVERSION=-35-generic O=~/linuxbuild SUBDIRS=drivers/usb/
 1126  sudo make EXTRAVERSION=-35-generic O=~/linuxbuild
SUBDIRS=drivers/usb/core
 1127  sudo make -d EXTRAVERSION=-35-generic O=~/linuxbuild
SUBDIRS=drivers/usb/core
 1128  pwd
 1129  chmod -R 755 *
 1130  sudo chmod -R 755 *
 1131  sudo make -d EXTRAVERSION=-35-generic O=~/linuxbuild modules
SUBDIRS=drivers/usb/core
 1132  sudo make EXTRAVERSION=-35-generic O=~/linuxbuild modules
SUBDIRS=drivers/usb/core
 1133  vi drivers/usb/core/usb.c
 1134  ls -lrt
 1135  pwd
 1136  cd drivers/usb/core
 1137  ls
 1138  vi usb.c
 1139  ls
```

```
 1140  pwd
 1141  ls -lrt
 1142  id
 1143  sudo vi usb.c
 1144  pwd
 1145  cd ../..
 1146  ls
 1147  pwd
 1148  cd ..
 1149  ls
 1150  sudo make EXTRAVERSION=-35-generic O=~/linuxbuild modules
SUBDIRS=drivers/usb/core
 1151  sudo make EXTRAVERSION=-35-generic O=~/linuxbuild modules
SUBDIRS=drivers/usb/wusb
 1152  sudo make EXTRAVERSION=-35-generic O=~/linuxbuild modules
SUBDIRS=drivers/usb/wusbcore
 1153  sudo make EXTRAVERSION=-35-generic O=~/linuxbuild modules
SUBDIRS=drivers/usb/core
 1154  ls
 1155  pwd
 1156  cd drivers
 1157  ls
 1158  cd usb
 1159  ls
 1160  cd core
 1161  ls
 1162  pwd
 1163  sudo chmod -R 755 *
```

```
 1164  pwd
 1165  cd
 1166  cd linuxbuild/
 1167  ls
 1168  cd drivers/
 1169  ls
 1170  cd  usb
 1171  ls
 1172  cd core
 1173  ls
 1174  sudo vi modules.order
 1175  sudo vi modules.builtin
 1176  sudo vi modules.order
 1177  ls
 1178  pwd
 1179  cd ../..
 1180  ls
 1181  pwd
 1182  cd ..
 1183  ls
 1184  pwd
 1185  sudo make EXTRAVERSION=-35-generic O=~/linuxbuild modules
SUBDIRS=drivers/usb/core
 1186  vi drivers/usb/core/
 1187  vi drivers/usb/core/modules.order
 1188  pwd
 1189  chmod -R 755 drivers/usb/core/*
 1190  sudo chmod -R 755 drivers/usb/core/*
```

```
 1191  vi drivers/usb/core/modules.order
 1192  cd drivers/usb/core
 1193  lks
 1194  ls
 1195  ls -lrt
 1196  vi modules.builtin
 1197  vi modules.order
 1198  ls
 1199  sudo vi modules.order
 1200  cd ../../..
 1201  ls
 1202  sudo make EXTRAVERSION=-35-generic O=~/linuxbuild modules
SUBDIRS=drivers/usb/core
 1203  vi modules.order
 1204  vi modules.builtin
 1205  cd drivers/usb
 1206  ls
 1207  cd core
 1208  ls
 1209  ls -lrt
 1210  cd ..
 1211  ls
 1212  vi modules.order
 1213  ls
 1214  pwd
 1215  ls -lrt
 1216  pwd
 1217  cd ..
```

```
1218  ls
1219  vi modules.order
1220  ls
1221  cd ..
1222  ks
1223  ls
1224  vi modules.order
1225  grep modules.order *
1226  pwd
1227  vi Makefile
1228  ls
1229  ls /lib/modules/
1230  ls /lib/modules/3.2.0-35-generic-pae/
1231  ls /lib/modules/3.2.0-35-generic-pae/build
1232  ls /lib/modules/3.2.0-35-generic-pae/build/drivers
1233  ls /lib/modules/3.2.0-35-generic-pae/build/drivers/usb/core/
1234  ls /lib/modules/3.2.0-35-generic-pae/build/drivers/usb/wusbcore/
1235  ls
1236  vi Makefile
1237  ls
1238  pwd
1239  cd
1240  cd linux-3.2.0/
1241  ls
1242  cd drivers/
1243  ls
1244  cd usb/core/
1245  ls
```

```
1246  vi driver.c
1247  ls
1248  pwd
1249  vi Makefile
1250  ls
1251  pwd
1252  vi Kconfig
1253  pwd
1254  cd ../wusbcore/
1255  ls
1256  vi reservation.c
1257  ls
1258  vi Makefile
1259  pwd
1260  grep wusbcore.ko
1261  grep wusbcore.ko *
1262  pwd
1263  cd ..
1264  ls
1265  cd core
1266  ls
1267  grep usbcore.ko *
1268  vi devio.c
1269  ls
1270  vi quirks.c
1271  ls
1272  vi driver.c
1273  ls
```

```
1274  grep pr_info *
1275  vi usb.c
1276  ls
1277  vi hub.c
1278  pwd
1279  cd ..
1280  ls
1281  cd wusbcore/
1282  ls
1283  vi wa-xfer.c
1284  vi mmc.c
1285  ls
1286  vi wusbhc.c
1287  vi wa-nep.c
1288  pwd
1289  vi pal.c
1290  pwd
1291  cd ..
1292  ls
1293  vi README
1294  cd core
1295  ls
1296  cd ..
1297  ls
1298  cd ..
1299  ls
1300  cd ..
1301  ls
```

```
1302  cd Documentation/
1303  ls
1304  vi BUG-HUNTING
1305  vi parport-lowlevel.txt
1306  cd ..
1307  ls
1308  pwd
1309  cd usb
1310  ls
1311  cd Documentation/usb
1312  ls
1313  vi WUSB-Design-overview.txt
1314  ls
1315  pwd
1316  vi usb-help.txt
1317  vi usb-serial.txt
1318  ls
1319  vi ./drivers/usb/wusbcore/.wusbcore.ko.cmd
1320  cd drivers
1321  ls
1322  cd usb
1323  ls
1324  cd core
1325  ls
1326  sudo make EXTRAVERSION=-35-generic O=~/linuxbuild modules
1327  sudo make EXTRAVERSION=-35-generic O=~/linuxbuild
1328  cd
1329  cd drivers/usb/core
```

```
 1330  cd linux-3.2.0/usb/core
 1331  ls
 1332  cd linux-3.2.0/drivers/usb/core
 1333  ls
 1334  sudo make EXTRAVERSION=-35-generic O=~/linuxbuild
 1335  sudo make EXTRAVERSION=-35-generic O=~/linuxbuild modules
 1336  cd ../wusbcore/
 1337  ls
 1338  sudo make EXTRAVERSION=-35-generic O=~/linuxbuild modules
 1339  sudo make EXTRAVERSION=-35-generic O=~/linuxbuild
 1340  sudo make EXTRAVERSION=-35-generic O=~/linuxbuild M=`pwd`
 1341  cd ../../..
 1342  sudo make EXTRAVERSION=-35-generic O=~/linuxbuild modules
SUBDIRS=drivers/usb/core
 1343  sudo make -d EXTRAVERSION=-35-generic O=~/linuxbuild modules
SUBDIRS=drivers/usb/core
 1344  sudo make -d EXTRAVERSION=-35-generic O=~/linuxbuild modules
SUBDIRS=drivers/usb/wusbcore
 1345  sudo make -d EXTRAVERSION=-35-generic O=~/linuxbuild modules
 1346  sudo make -d EXTRAVERSION=-35-generic O=~/linuxbuild modules
SUBDIRS=drivers/usb/core
 1347  sudo make -d EXTRAVERSION=-35-generic O=~/linuxbuild modules
SUBDIRS=drivers/usb/wusbcore
 1348  sudo make -d EXTRAVERSION=-35-generic O=~/linuxbuild modules
SUBDIRS=drivers/usb/wusbcore 2> wusbcorebuild.txt
 1349  ls -lrt
 1350  sudo vi wusbcorebuild.txt
 1351  sudo make -d EXTRAVERSION=-35-generic O=~/linuxbuild modules
```

SUBDIRS=drivers/usb/wusbcore 2> wusbcorebuild.txt

1352 ls -l

1353 sudo chmod -R 755 wusbcorebuild.txt

1354 sudo make -d EXTRAVERSION=-35-generic O=~/linuxbuild modules

SUBDIRS=drivers/usb/wusbcore 2> wusbcorebuild.txt

1355 ls -lrt

1356 sudo make -d EXTRAVERSION=-35-generic O=~/linuxbuild modules

SUBDIRS=drivers/usb/wusbcore | more

1357 ls

1358 sudo make EXTRAVERSION=-35-generic O=~/linuxbuild modules

SUBDIRS=drivers/usb/wusbcore | more

1359 sudo make EXTRAVERSION=-35-generic O=~/linuxbuild modules

SUBDIRS=drivers/usb/wusbcore

1360 pwd

1361 vi Makefile

1362 cd /

1363 cd media/OS

1364 cd media/OS_

1365 ls

1366 find . -name Root

1367 cat /proc/bus/usb/devices

1368 lsmod

1369 lsmod}grep usb

1370 lsmod | grep usb

1371 dmesg

1372 dmesg|grep usbcore

1373 dmesg|grep wusbcore

1374 dmesg|grep usbcore

```
1375  cd linux-3.2.0/
1376  ls
1377  cd drivers/
1378  ls
1379  cd usb/core
1380  ls
1381  fc -l
1382  histor
1383  history
1384  history 2>&1 ~/linuxbuildcommandlines.txt
1385  history 2>&1 > ~/linuxbuildcommandlines.txt
1386  cd
1387  ls
1388  vi linuxbuildcommandlines.txt
1389  ls
1390  pwd
1391  cd linuxbuild/
1392  cd
1393  cd linux-3.2.0/
1394  ls
1395  cd drivers/
1396  ls
1397  cd usb
1398  ls
1399  pwd
1400  ls
1401  cd core
1402  ls
```

```
 1403  fc -l
 1404  man fc
 1405  fc -h
 1406  fc -lnr
 1407  ls
 1408  vi Makefile
 1409  sudo vi usb.c
 1410  sudo vi hub.c
 1411  grep printk *
 1412  vi hub.c
 1413  ls
 1414  grep ratelimit *.c
 1415  sudo wireshark &
 1416  grep init *.c
 1417  ls
 1418  grep main *.c
 1419  grep __init *.c
 1420  vi usb.c
 1421  ls
 1422  vi hub.c
 1423  ls
 1424  pwd
 1425  cd ../../..
 1426  sudo make EXTRAVERSION=-35-generic O=~/linuxbuild modules
SUBDIRS=drivers/usb/wusbcore clean
 1427  cd -
 1428  ls
 1429  sudo make -C /lib/modules/`uname -r`/build/ M=`pwd` modules clean
```

1430 sudo make -C /lib/modules/`uname -r`/build/ M=`pwd` clean

1431 ls

1432 sudo make -C /lib/modules/`uname -r`/build/ M=`pwd`

1433 ls

1434 fc -l

1435 history

1436 history 2>&1 > ~/linuxbuildcommandlines.txt

VIRGO cpupooling driver -------- 10000

VIRGO EventNet driver ---------- 20000

VIRGO memorypooling driver ----- 30000

VIRGO filesystems driver ------- 50000

VIRGO queueing driver ---------- 60000

and KingCobra

VIRGO64 streaming kernel analytics webservice port ----- 64000

KingCobra Neuro Currency (Message-as-Currency) Perfect Forwarding Cloud Move Server port ----- 55555

kernel_analytics

config

utils

virgo_queueing

kingcobra

cpupooling

memorypooling

cloudfs

eventnet

In pre-4.x.x Linux kernels these modules are boot time loaded from /etc/modules

In post-4.x.x Linux kernels due to systemd, the modules are boot time loaded from

/lib/modules-load.d/virgo_modules.conf

#----------

#NEURONRAIN ASFER - Software for Mining Large Datasets

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#----------

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#Srinivasan Kannan

#(also known as: Shrinivaasan Kannan, Shrinivas Kannan)

#Ph: 9791499106, 9003082186

#Krishna iResearch Open Source Products Profiles:

#http://sourceforge.net/users/ka_shrinivaasan,

#https://github.com/shrinivaasanka,

#https://www.openhub.net/accounts/ka_shrinivaasan

#Personal website(research): https://sites.google.com/site/kuja27/

#emails: ka.shrinivaasan@gmail.com, shrinivas.kannan@gmail.com,

#kashrinivaasan@live.com

#----------

(*) ./asfer - C++ binary and doClustering=true in asfer.conf - clusters the string encoded celestial configurations by KMeans and kNN clustering algorithms

(*) python AsferClassifierPreproc.py - #autogenerated words.txt and words-frequency.txt needed for NaiveBayesClassifier

(*) geonames.py - #Geolocation Service JSON Request and Response for timezone Offset #Copyright - https://gist.github.com/pamelafox/2288222/download# #Simplified and modified for AstroInfer

(*) python asfer_dataset_segregator.py - #Partitions the parsed datasets which contain date-time-long-lat data based on classifier output grepped #by the invoker shell script - asfer_dataset_segregator.sh - and writes the names of parsed dataset files into #text files with names of regular expression "EventClassDataSet_<class>.txt"

(*) python MaitreyaToEncHoroClassified.py - #Reads the segregated parsed dataset files generated by asfer_dataset_aggregator.sh and invokes maitreya_textclient #for all date-time-long-lat data within all parsed datasets for a particular event class - "EventClassDataset_<class>.txt"
#and also creates autogenerated asfer.enchoros.<class>.zodiacal and asfer.enchoros.<class>.ascrelative encoded files

(*) python SequenceMining,py - #This class Implements Sequence Mining for encoded strings - at present Apriori GSP algorithm has been #implemented - uses Downward Closure - superset is frequent only if subset is frequent #SourceForge version is specialized for Mining Astronomical Datasets - read from files with .enchoros suffix. #It predicts pattern in swiss ephermeris encoded astronomical datasets corresponding to weather phenomena. #GitHub version is generic to all string patterns.

Prerequisites - Dataset Classification and Preprocessing

- create/add articles on earthquakes and hurricanes as training dataset for NaiveBayesian Classifier

- tuples in python-src/autogen_classifier_dataset/AsferClassifierPreproc.py has to be updated to include new articles for creating updated NaiveBayesian training data

- training data for NaiveBayesian classifier - words.txt,word-frequency.txt,training-set.txt,topics.txt,test-set.txt - have to be re-created by executing python-src/autogen_classifier_dataset/AsferClassifierPreproc.py

- execute python asfer_dataset_segregator.sh - invokes NaiveBayesian classifier to classify datasets into files of names EventClassDataSet_<class>.txt

- execute python MaitreyaToEncHoroClassified.py - creates asfer.enchoros.<class>.zodiacal and asfer.enchoros.<class>.ascrelative encoded files read from "EventClassDataset_<class>.txt

- rename asfer.enchoros.<class>.zodiacal and asfer.enchoros.<class>.ascrelative to asfer.enchoros.* input file read by respective implementations

---

String encoded celestial datasets can be analyzed in multiple ways as below:

(*) Clustering - kMeans and kNN - Unsupervised

- by enabling clustering in asfer.conf config file and executing ./asfer C++ binary having suitable asfer.enchoros input files (input files have to be rewritten by respective string encoded outputs from ephemeris script mentioned above in autogen_classifier_dataset/ directory)

(*) NaiveBayesian and DecisionTree Classifiers - Supervised

- execute python AsferClassifierPreproc.py to create training data for weather/celestial events
- execute ./asfer C++ binary.
- This classifies the datasets in multiple categories

(*) BioPython and ClustalOmega sequence alignment mining - uses Third Party opensource packages to extract common subsequences in celestial string encoded data - corresponds to astronomical conjunctions.

(*) Needleman-Wunsch multiple sequence alignment mining - aligns the celestial data strings and extracts common subsequences which correspond to astronomical conjunctions in sky.

(*) Sequence Mining - Apriori GSP

- execute python SequenceMining.py - mines common subsequences in celestial string encoded data - correspond to astronomical conjunctions in sky

(*) Spark PrefixSpan Sequence Mining

- Spark Cloud implementation - PrefixSpan mining of encoded Astronomical datasets - https://github.com/shrinivaasanka/Grafit/blob/master/course_material/NeuronRain/LinuxKernelAndCloud/code/Spark_PrefixSpan.py (in SourceForge, GitLab Grafit repositories

as well)

#---

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#---

#K.Srinivasan

#NeuronRain Documentation and Licensing: http://neuronrain-documentation.readthedocs.io/en/latest/

#Personal website(research): https://sites.google.com/site/kuja27/

#---

Following are NeuronRain Usecases (some of which have been implemented in NeuronRain while others have dependencies):

1.Software Analytics - Scheduler Analytics - Psutil Deep Learning of Scheduler Classes and writing to /etc/kernel_analytics.conf or /etc/sysctl.conf (kernel.sched.*)

2.Software Analytics - Software Analytics - Psutil Deep Learning of Systemwide

Memory/IO/CPU load.

3.Software Analytics - Userspace and Kernelspace Program Analyzers

4.Software Analytics - Kernel Analytics - Analysis of kernel logs

5.Software Analytics - Wireless Network Traffic Analytics

6.Drones/Unmanned Aerial Vehicles - Deep Learning of GIS imagery by Video ImageNet-EventNet Tensor Products Algorithm for prominent features (convex hulls, bounding boxes etc.,) in terrestrial images and navigation accordingly - Drone Online Shopping Delivery example

7.Drones/Unmanned Aerial Vehicles - Kernel Analytics for Drone and Robotic OSes (https://github.com/Dronecode,https://github.com/Dronecode/DronecodeSDK,https://github.com/Dronecode/DronecodeSDK-Python) - Drone Online Shopping Delivery example

8.Streaming Analytics - Streams from various datasources

9.Advertisement Analytics - by Spark Structured Streaming, PageRank

10.Merit ranking and Analytics of Text,Audio/Music,Video,People

11.Histogram-Set Partition Analytics - Streams of business intelligence histograms, voting histograms, hashtables or dictionaries

12.Medical Imageing Analytics - find patterns in ECG,MRI,Scan medical images for diagnosis

13.Image Analytics - Webcam or retinal scan driver captures face or retinal scan image,compares them for match (face or retinal scan as password) in userspace deep learning analytics, exports match = True or False as kernel analytics variables which are read and exported by kernel_analytics VIRGO32 and VIRGO64 drivers and read by some other authentication driver in kernel and message is logged in /var/log/kern.log

14.Drones/Flights/UAVs - Change pxrc flight controller driver for reading analytics variables exported by kernel_analytics VIRGO32 and VIRGO64 drivers

NeuronRain Licensing is explained in FAQ: http://neuronrain-documentation.readthedocs.io/en/latest/

NeuronRain Depends on Following Opensource C,Python,Java and C++ packages -

Copyright/Copyleft licenses apply per respective codebases below:

1. Boost C++ and Python libraries (1.64.0)
2. g++
3. Python NLTK
4. NetworkX 2.5
5. Matplotlib
6. Scrapy
7. R-Python (rpy2)
8. Maitreya's Dreams 8 (for ephemeris and text client)
9. Hadoop
10. Spark 2.4.3, Spark 3.0.1 and pyspark client
11. Hive and Hive Client(thrift or pyhs2)
12. Cassandra and Cassandra Cluster client
13. HBase and HBase client (happybase)
14. Python-Linkedin
15. Python Twitter
16. Biopython
17. ClustalOmega
18. BeautifulSoup
19. Google Protocol Buffer libraries 3.5 / libprotobuf15
20. Pig
21. SVMLight (there is also a NeuronRain AsFer Support Vector Machines implementation alternative)
22. MySQLdb
23. Python Injector
24. R

25. Python Tornado
26. Linux Kernel Mainline 32 bit (4.1.5) - for VIRGO
27. MongoDB and pymongo
28. Cython
29. SATURN Program Analyzer
30. MemCached, pymemcache (Python 3.x) and Python-memcache (Python 2.x - https://github.com/linsomniac/python-memcached/)
31. Bidict
32. Java 1.8
33. Python Jellyfish
34. Python Enchant
35. Python ystockquote
36. Python geonames (Maitreya's Dreams - location-to-timezone lookup)
37. Python zlib
38. Neo4j Graph Database
39. py2neo python client for Neo4j
40. Python OAuth2
41. Redis and Python Redis
42. Passlib SHA256 encryption library
43. ZeroMQ
44. Kafka and Confluent Kafka Python client
45. Spark 2.3.0 + Hadoop 2.7 for Java Spark Streaming
46. Jsoup Java HTML parser
47. PILlow Python Imaging Library
48. ConceptNet 5.7
49. NumPy
50. SciPy 1.1.0
51. Linux Kernel Mainline 64 bit (4.13.3) - for VIRGO64

52. CvxPy

53. SymPy

54. Python transaction 2.1.2

55. OpenSSL development libraries for C++

56. DictDiffer - https://github.com/inveniosoftware/dictdiffer

57. Python 2.7.x, 3.4, 3.6, 3.7.5, 3.8.5, 3.9.0

58. Facebook SDK for Python 3.4

59. Empath (https://arxiv.org/pdf/1602.06979.pdf)

60. Scikit-Learn

61. Pandas

62. librosa - Python Audio Library

63. Psutils - Python process utility

64. FlameGraph - https://github.com/brendangregg/FlameGraph

65. Valgrind/Callgrind/KCachegrind

66. GraphFrames/GraphX Spark Package - https://graphframes.github.io/

67. Theano

68. Keras (Theano and TensorFlow backends)

69. OpenCV 3.4.3 - opencv-python - cv2

70. PyPDF2

71. FTrace (for kernel functions call graphs)

72. PyDictionary

73. Optional - Not tested - DronecodeSDK (Python - only for usecases in NeuronRainApps/Drones and Autonomous Drone Electronic Voting Machines)

74. Optional - Not tested - Helicamera Drones (Hardware e.g PX4 MAVLink Hexacopters - only for usecases in NeuronRainApps/Drones and Autonomous Drone Electronic Voting Machines)

75. AudioRead

76. Scikit-SPLearn - http://dev.pages.lis-lab.fr/scikit-splearn/index.html

77. Python SpeechRecognition

78. Python PocketSphinx

79. Swig

80. ALSA development library

81. PulseAudio development library

82. Kaggle Datasets - CreditCard Transactions and LinkedIn Profiles

83. googletrans

84. Goslate

85. PIPL.com Python API (requires API key)

86. Python Human Name Parser

87. PyHyphen - for syllables in strings

88. TensorLy - for Video EventNet Tensor Decomposition to Rank-x tensors

89. autopep8 - for PEP8 python coding convention - https://pypi.org/project/autopep8/

90. 2to3 - for upgrading python 2.x to 3.x - https://docs.python.org/2/library/2to3.html

91. CVXOPT - Convex Program for Market Equilibrium - KingCobra-AstroInfer Neuro cryptocurrency and transactional cloud move

92. Linux Kernel Mainline 64 bit (5.1.4) - for VIRGO64 PXRC Drone Telemetry

93. PX4 Firmware and ECL - installed by ubuntu_sim.sh - Drone Simulator

94. PX4 SITL - JMAVSIM - Drone Simulator

95. MAVSDK-Python

96. TensorFlow for Python

97. TensorFlow I/O for Python

98. CVXOPT GLPK for Integer Linear Programming

99. Python geopy (OpenStreetMap Nominatim Geocoding - for Drone address-to-longitude-latitude lookup)

100. Optional - QGroundControl - http://qgroundcontrol.com/ - QGC - for Drone code (MAVSDK-PX4-SITL-JMAVSIM simulation)

101. Robomongo3T and Studio3T - for MongoDB GIS imagery bulk upload to GridFS

102. Python OpenWeatherMap - PyOWM - Weather Forecast

103. CliMetLab - ECMWF Climate Dataset Library

104. Optional - MetView 5.0 - ECMWF datasets

105. Optional - MetView Python - ECMWF datasets - MARS Retrieve

106. Shapely - Computational Geometry python library

107. Dlib - Face landmark detection

108. Netrd - Graph Similarity

109. PyVis - Graph Visualization

110. GMSH - FEM - Trimesh and Quadmesh

==========

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Smatch Static Analysis of NEURONRAIN VIRGO Linux Source Tree

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Analyzed on 25 July 2016:

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1. Smatch (http://smatch.sourceforge.net/) finds bugs in linux kernel code statically.

2. Article by Dan Carpenter on Smatch - https://blogs.oracle.com/linuxkernel/entry/smatch_static_analysis_tool_overview

3. Smatch kchecker was run as an example on virgo_malloc system call with following logs (commandline: $/root/smatch/smatch/smatch_scripts/kchecker -spammy virgo_malloc/virgo_malloc.c)

```
  CHK     include/config/kernel.release
  CHK     include/generated/uapi/linux/version.h
  CHK     include/generated/utsrelease.h
  CHK     include/generated/bounds.h
  CHK     include/generated/asm-offsets.h
```

```
  CALL    scripts/checksyscalls.sh
  CHECK   scripts/mod/empty.c
  CHECK   virgo_malloc/virgo_malloc.c
include/linux/virgo_mempool.h:36:9: warning: preprocessor token LINUX_KERNEL_4_x_x
redefined
n:1:9: this was the original definition
virgo_malloc/virgo_malloc.c:72:9: warning: preprocessor token BUF_SIZE redefined
include/linux/virgo_mempool.h:97:9: this was the original definition
virgo_malloc/virgo_malloc.c:83:63: warning: non-ANSI function declaration of function
'get_least_loaded_hostport_from_cloud_mempool'
virgo_malloc/virgo_malloc.c:115:45: warning: non-ANSI function declaration of function
'get_host_from_cloud_Loadtrack_mempool'
virgo_malloc/virgo_malloc.c:124:39: warning: non-ANSI function declaration of function
'get_host_from_cloud_PRG_mempool'
virgo_malloc/virgo_malloc.c:164:9: warning: mixing declarations and code
virgo_malloc/virgo_malloc.c:168:9: warning: mixing declarations and code
virgo_malloc/virgo_malloc.c:175:9: warning: mixing declarations and code
virgo_malloc/virgo_malloc.c:242:9: warning: mixing declarations and code
virgo_malloc/virgo_malloc.c:244:9: warning: mixing declarations and code
virgo_malloc/virgo_malloc.c:258:9: warning: mixing declarations and code
virgo_malloc/virgo_malloc.c:264:9: warning: mixing declarations and code
virgo_malloc/virgo_malloc.c:390:25: warning: mixing declarations and code
virgo_malloc/virgo_malloc.c:476:9: warning: mixing declarations and code
virgo_malloc/virgo_malloc.c:503:9: warning: mixing declarations and code
virgo_malloc/virgo_malloc.c:509:9: warning: mixing declarations and code
virgo_malloc/virgo_malloc.c:659:50: warning: non-ANSI function declaration of function
'virgomemorypooling_read_virgo_config_client'
virgo_malloc/virgo_malloc.c:683:9: warning: mixing declarations and code
```

virgo_malloc/virgo_malloc.c:686:9: warning: mixing declarations and code

virgo_malloc/virgo_malloc.c:709:9: warning: mixing declarations and code

virgo_malloc/virgo_malloc.c:96 get_least_loaded_hostport_from_cloud_mempool() error: potential null dereference 'hopo'. (kmalloc returns null)

virgo_malloc/virgo_malloc.c:189 sys_virgo_get() warn: inconsistent indenting

virgo_malloc/virgo_malloc.c:289 sys_virgo_set() warn: inconsistent indenting

virgo_malloc/virgo_malloc.c:522 sys_virgo_free() warn: inconsistent indenting

  CC   virgo_malloc/virgo_malloc.o

 1969 svn checkout svn://svn.code.sf.net/p/usb-md/code-0/ usb-md

 1970 rm -rf usb-md

 1971 svn checkout svn+ssh://svn.code.sf.net/p/usb-md/code-0/ usb-md

 1972 svn checkout svn+ssh://ka_shrinivaasan@svn.code.sf.net/p/usb-md/code-0/ usb-md

 1973 ls

 1974 rm -rf usb-md

 1975 svn checkout --username=ka_shrinivaasan svn+ssh://ka_shrinivaasan@svn.code.sf.net/p/usb-md/code-0/trunk usb-md

 1976 svn checkout --username=ka_shrinivaasan svn+ssh://ka_shrinivaasan@svn.code.sf.net/p/usb-md/code-0/ usb-md

 1977 ls

 1978 cd usb-md/

 1979 ls

 1980 cp ~/linux-3.2.0/drivers/usb/usb-md/* .

 1981 ls

 1982 svn status

 1983 svn add

 1984 svn add *

 1985 svn ci -m"Makefile and source with build errors fixed and BKL removed along

with changes for usb_buffer_coherent"

1986 ls

1987 pwd

1988 cp ~/linux-3.2.0/drivers/usb/usb-md/* .

1989 svn diff

1990 svn ci -m"comment on devnode callback added"

1991 cd

1992 cd linux-3.2.0/drivers/usb/usb-md

1993 ls

1994 sudo make -C /lib/modules/`uname -r`/build/ M=`pwd`

1995 make -C /lib/modules/`uname -r`/build/ M=`pwd`

1996 pwd

1997 cd linux-3.2.0/

1998 ls

1999 cd drivers/

2000 ls

2001 cd usb

2002 ls

2003 cd usb-md

2004 make -C /lib/modules/`uname -r`/build/ M=`pwd` clean

2005 sudo make -C /lib/modules/`uname -r`/build/ M=`pwd`

2006 ls

2007 histor

2008 history

==========

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Updated:26 Feb 2014

For adding new driver umb.ko:

1. Either the usbfs id from tree output has to be obtained and unbind device file has to be written with vendor and product id(s)

(or)

2. After a modprobe, the vendor, product id(s) have to be echo-ed to new_id in usbfs (website reference added to repository)

VIRGO Linux Build Steps

---

1. Download and build 4.1.5 kernel from www.kernel.org mainline (build commandlines as in buildscript.sh)

2. Overlay the virgo-linux source tree (from linux-kernel-extensions subtree) on linux kernel src root.

3. Invoke the driver build scripts in each driver folder to build with path updates.

4. For USBmd and KingCobra drivers also above steps are sufficient.

5. Test cases in virgo_clone, virgo_malloc and virgo_filesystem can be invoked for syscall paths and for telnet path the ports listed in ModuleListenPorts.txt can be used.

---

6. Changes required for building overlayed 4.1.5 linux kernel - documented in github commit diffs of 12 August 2015 :

https://github.com/shrinivaasanka/virgo-linux-github-code/commit/6916585c04e4df51ca75384aacee18fa9c13de10

https://github.com/shrinivaasanka/virgo-linux-github-code/commit/6916585c04e4df51ca75384aacee18fa9c13de10

*) buildscript_4.1.5.sh (build script for 4.1.5)

*) linux-kernel-extensions/Makefile

*) linux-kernel-extensions/arch/x86/syscalls/Makefile

*) linux-kernel-extensions/arch/x86/syscalls/syscall_32.tbl

*) linux-kernel-extensions/drivers/Makefile

*) linux-kernel-extensions/include/linux/syscalls.h

Above minimum changes were enough to build an overlay-ed Linux Kernel with VIRGO codebase

---

7. Changes required for building overlayed 4.13.3 VIRGO 64-bit linux kernel:

- copy linux-kernel-extensions/virgo_<syscalls> to linux-4.13.3

- copy linux-kernel-extensions/drivers/virgo to linux-4.13.3/drivers

- copy linux-kernel-extensions/drivers/kingcobra to linux-4.13.3/drivers (for Module.symvers if use_as_kingcobra_service is enabled)

- copy VIRGO header files (virgo*.h,syscalls.h,init.h,kingcobra.h) in linux-kernel-extensions/include/linux to linux-4.13.3/include/linux

Example:

{

cp -r virgo_* /media/ka_shrinivaasan/6944b01d-ff0d-43eb-8699-cca469511742/home/shrinivaasanka/Krishna_iResearch_OpenSource/GitHub/virgo64-linux-github-code/linux-kernel-extensions/

cp -r drivers/virgo/ /media/ka_shrinivaasan/6944b01d-ff0d-43eb-8699-cca469511742/home/shrinivaasanka/Krishna_iResearch_OpenSource/GitHub/virgo64-linux-github-code/linux-kernel-extensions/drivers/

cp -r include/linux/virgo* /media/ka_shrinivaasan/6944b01d-ff0d-43eb-8699-cca469511742/home/shrinivaasanka/Krishna_iResearch_OpenSource/GitHub/virgo64-linux-github-code/linux-kernel-extensions/include/linux/

cp -r include/linux/kingcobra.h /media/ka_shrinivaasan/6944b01d-ff0d-43eb-8699-cca469511742/home/shrinivaasanka/Krishna_iResearch_OpenSource/GitHub/virgo64-

linux-github-code/linux-kernel-extensions/include/linux/

cp -r include/linux/init.h /media/ka_shrinivaasan/6944b01d-ff0d-43eb-8699-cca469511742/home/shrinivaasanka/Krishna_iResearch_OpenSource/GitHub/virgo64-linux-github-code/linux-kernel-extensions/include/linux/

cp -r include/linux/syscalls.h /media/ka_shrinivaasan/6944b01d-ff0d-43eb-8699-cca469511742/home/shrinivaasanka/Krishna_iResearch_OpenSource/GitHub/virgo64-linux-github-code/linux-kernel-extensions/include/linux/

}

- Build each driver in linux-4.13.3/drivers/virgo/<driver> with <drivername>_driver_build.sh

- Some drivers require Module.symvers to be copied from other exporting drivers e.g kingcobra, virgo/kernel_analytics

- Copy Module.symvers from exporting driver to importing driver

- Comment clean make target and compile with driver build script.

- This appends symbols to Module.symvers

- (NOT RELEVANT - ASIDE: sock_create_kern() compilation errors have been fixed by additional &init_net parameter to it (mainline added it in 2015))

- changes in linux-4.13.3/Makefile:

- core-y := usr/ virgo_clone/ virgo_malloc/ virgo_filesystem/

- changes in linux-4.13.3/arch/x86/entry/syscalls/syscall_64.tbl:

#VIRGO system calls

548 64 virgo_clone sys_virgo_clone

549 64 virgo_malloc sys_virgo_malloc

550 64 virgo_set sys_virgo_set

551 64 virgo_get sys_virgo_get

552 64 virgo_free sys_virgo_free

553 64 virgo_open sys_virgo_open

554 64 virgo_close sys_virgo_close

555 64 virgo_read sys_virgo_read

556 64 virgo_write sys_virgo_write

- changes in linux-4.13.3/include/linux/syscalls.h:

asmlinkage long sys_virgo_clone(char* func, void *child_stack, int flags, void *arg);

asmlinkage long sys_virgo_malloc(int size,unsigned long __user *vuid);

asmlinkage long sys_virgo_set(unsigned long vuid, const char __user *data_in);

asmlinkage long sys_virgo_get(unsigned long vuid, char __user *data_out);

asmlinkage long sys_virgo_free(unsigned long vuid);

asmlinkage long sys_virgo_open(char* filepath);

asmlinkage long sys_virgo_read(long vfsdesc, char __user *data_out, int size, int pos);

asmlinkage long sys_virgo_write(long vfsdesc, const char __user *data_in, int size, int pos);

asmlinkage long sys_virgo_close(long vfsdesc);

---

8. Additional information on linux build and grub issues have been updated in GRAFIT Open Learning Course Notes at:
https://github.com/shrinivaasanka/Grafit/blob/master/course_material/NeuronRain/LinuxKernelAndCloud/LinuxKernelAndCloud.txt

9. Presently VIRGO Linux Kernel is based on mainline 4.1.5 kernel (32-bit) and 4.13.3 kernel (64-bit). As newer kernel versions are
released , there are changes in kernel functions and data structures. This could cause a working VIRGO linux build in version v to
break in version v+delta . Certifying and Porting VIRGO linux code base on each and

every kernel version is beyond the scope of NeuronRain design goals - it is left to the end-user of NeuronRain. There is a possibility that VIRGO kernel completely becomes a self-sufficient kernel with no need for overlay build on linux mainline. Crucial reason for 64-bit of VIRGO on 4.10.3 and now on 4.13.3 is the randomly witnessed i915 related panics in 4.1.5 virgo system calls and drivers. Mainline 4.10.3 kernel has major updates to i915 intel graphics drivers. It has been verified upgrade to 4.10.3 and 64-bit addressing resolves these random virgo_<syscall> panics almost completely. Recent upgrade to 4.13.3 further strengthens the stability of VIRGO64 and has is more secure.

10. More information and FAQ on NeuronRain VIRGO architecture is at: http://neuronrain-documentation.readthedocs.io/en/latest/. 64-bit Linux kernel versions 4.10.3 and 4.13.3 have been found to be stabler in system calls-kernel module listeners end-to-end testing. Recent kernel mainline version 4.13 has in-built security for kernel sockets (KTLS) which integrates standalone af_ktls module into kernel tree at net/tls/. Because of its importance, base kernel version of VIRGO64 has been upgraded from 4.10.3 to 4.13.3 and all system calls and drivers code has been rebuilt inducting setsockopt(TX_TLS) encrypting all client-server kernel sockets traffic throughout.

/***

#---

#NEURONRAIN VIRGO - Cloud, Machine Learning and Queue augmented Linux Kernel Fork-off

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#https://github.com/shrinivaasanka,

#https://www.openhub.net/accounts/ka_shrinivaasan

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#kashrinivaasan@live.com

#----------

**********/

1. SATURN (http://saturn.stanford.edu/) is a Program Analysis Software for Verification of Large Scale Linux Software.

2. There are quite a few other softwares already available :

2.1 SLAM (Windows) and Yogi - Sriram Rajamani, Microsoft Research - http://research.microsoft.com/en-us/projects/slam/

2.2 BLAST - http://forge.ispras.ru/projects/blast/ which is part of Linux Driver Verification Project

(http://forge.ispras.ru/projects/ldv)

3. SATURN has been integrated into VIRGO Linux Kernel drivers/ pursuant to the

author's old PhD thesis proposal in 2011 (https://sites.google.com/site/kuja27/PhDThesisProposal.pdf) which was later dropped because of penchant for Complexity+MachineLearning and lack of feasibility. But now It finds relevance as a fundamental ingredient in Software Analytics subsystem of NeuronRain AsFer and VIRGO. SATURN error reports leveraged with AsFer Machine Learning makes a hitherto unusual combination - Formal Logic Verification + Data Analytics.

4. saturn_program_analysis has been added as a new VIRGO kernel module in drivers/ with an example driver implementation adapted from kernel_analytics. It can be overwritten with inline code or an exported function invocation from external driver and thus can do analysis of any arbitrary C subroutine.

5. SATURN installed from above url requires OCAML, libstr etc., for build to succeed with NATIVECAML unset in $CLPA_HOME/clpa/cil/Makefile.

6. Following changes are required in $CLPA_HOME/clpa/build-intercept/ - New file interceptor.config with following lines added for source files:
intercept_home=/media/shrinivaasanka/0fc4d8a2-1c74-42b8-8099-9ef78d8c8ea2/home/kashrinivaasan/linux-4.1.5/drivers/virgo/saturn_program_analysis
intercept_scripts=/home/shrinivaasanka/clpa/build-intercept/
intercept_library=/home/shrinivaasanka/clpa/build-intercept/libintercept.so

---

7. Program Analysis with SATURN - steps

SATURN intercepts the linux kernel driver build and creates analysis tree directory (saturn_program_analysis_trees). Intercepted build creates .db files in trees which are

extracted with clpa-extract to generate a report (errors.txt). It can then be analyzed for algorithms like null pointer detection, aliases etc., from calypso (.clp) files in analysis/. Following does null pointer analysis.

```
  $/home/shrinivaasanka/clpa/bin/clpa-intercept make -C /lib/modules/`uname -r`/build/
M=`pwd` clean
  $/home/shrinivaasanka/clpa/bin/clpa-intercept make -C /lib/modules/`uname -r`/build/
M=`pwd`
  $/home/shrinivaasanka/clpa/bin/clpa-intercept make -C /lib/modules/`uname -r`/build/
M=`pwd` modules_install
  $/home/shrinivaasanka/clpa/bin/clpa-extract ../saturn_program_analysis_trees/
virgo_saturn_program_analysis.ko
  $/home/shrinivaasanka/clpa/bin/clpa --no-fixpoint --timeout 60
/home/shrinivaasanka/clpa/analysis/null/null.clp
```

Following commandlines do memory, locking analysis and create Graphviz renderable DOT files:

```
 /home/shrinivaasanka/clpa/bin/clpa --no-fixpoint --timeout 60
/home/shrinivaasanka/clpa/analysis/memory/base01/run.clp
 /home/shrinivaasanka/clpa/bin/clpa  --stats memory_deltas --timeout 60
/home/shrinivaasanka/clpa/analysis/memory/base02/run.clp
 /home/shrinivaasanka/clpa/bin/clpa  --list-stats
 /home/shrinivaasanka/clpa/bin/clpa  --stats memory_deltas --stats sat_counts --timeout 60 /
home/shrinivaasanka/clpa/analysis/memory/base02/run.clp
 /home/shrinivaasanka/clpa/bin/clpa  --list-debug
 /home/shrinivaasanka/clpa/bin/clpa  --stats memory_deltas --stats sat_counts --timeout 60 /
home/shrinivaasanka/clpa/analysis/memory/ptdot.clp
 /home/shrinivaasanka/clpa/bin/clpa  --stats memory_deltas --stats sat_counts --timeout 60 /
```

home/shrinivaasanka/clpa/analysis/smemory/memory.clp

/home/shrinivaasanka/clpa/bin/clpa --stats memory_deltas --stats sat_counts --timeout 60 /home/shrinivaasanka/clpa/analysis/smemory/paths.clp

/home/shrinivaasanka/clpa/bin/clpa --stats memory_deltas --stats sat_counts --timeout 60 /home/shrinivaasanka/clpa/analysis/locking/locking.clp

Following does CFG and memory analysis and plots a DOT graph for dataflow:

/home/shrinivaasanka/clpa/bin/clpa /home/shrinivaasanka/clpa/analysis/virgosaturnmemory.clp

/home/shrinivaasanka/clpa/bin/clpa /home/shrinivaasanka/clpa/analysis/virgosaturncfg.clp

---

8. NULL pointer Error report from SATURN - from $VIRGO_LINUX_ROOT/linux-kernel-extensions/drivers/virgo/saturn_program_analysis/saturn_program_analysis_trees/error.txt

---

blue

925 blue __arg0 of function /media/shrinivaasanka/0fc4d8a2-1c74-42b8-8099-9ef78d8c8ea2/home/kashrinivaasan/linux-4.1.5/include/linux/mmzone.h:__section_mem_map_addr can evaluate to NULL

/media/shrinivaasanka/0fc4d8a2-1c74-42b8-8099-9ef78d8c8ea2/home/kashrinivaasan/linux-4.1.5/include/linux/mmzone.h:__section_mem_map_addr (925:/media/shrinivaasanka/0fc4d8a2-1c74-42b8-8099-9ef78d8c8ea2/home/kashrinivaasan/linux-4.1.5/include/linux/mm.h), final site of dereference is: (1151:/media/shrinivaasanka/0fc4d8a2-1c74-42b8-8099-9ef78d8c8ea2/home/kashrinivaasan/linux-4.1.5/include/linux/mmzone.h)

/media/shrinivaasanka/0fc4d8a2-1c74-42b8-8099-9ef78d8c8ea2/home/kashrinivaasan/linux-

4.1.5/include/linux/mm.h

Null pointer is passed to a function which dereferences it.

None

blue

205 blue __arg0 of function /media/shrinivaasanka/0fc4d8a2-1c74-42b8-8099-9ef78d8c8ea2/home/kashrinivaasan/linux-4.1.5/include/linux/mmzone.h:__section_mem_map_addr can evaluate to NULL /media/shrinivaasanka/0fc4d8a2-1c74-42b8-8099-9ef78d8c8ea2/home/kashrinivaasan/linux-4.1.5/include/linux/mmzone.h:__section_mem_map_addr (205:/media/shrinivaasanka/0fc4d8a2-1c74-42b8-8099-9ef78d8c8ea2/home/kashrinivaasan/linux-4.1.5/include/linux/scatterlist.h), final site of dereference is: (1151:/media/shrinivaasanka/0fc4d8a2-1c74-42b8-8099-9ef78d8c8ea2/home/kashrinivaasan/linux-4.1.5/include/linux/mmzone.h) /media/shrinivaasanka/0fc4d8a2-1c74-42b8-8099-9ef78d8c8ea2/home/kashrinivaasan/linux-4.1.5/include/linux/scatterlist.h

Null pointer is passed to a function which dereferences it.

None

orange

382 orange (INCONSISTENT USE) Possible null dereference of variable dst. This variable is checked for Null at lines: 386 /media/shrinivaasanka/0fc4d8a2-1c74-42b8-8099-9ef78d8c8ea2/home/kashrinivaasan/linux-4.1.5/include/net/dst.h

Inconsistency error

None

blue

1471 blue __arg0 of function /media/shrinivaasanka/0fc4d8a2-1c74-42b8-8099-9ef78d8c8ea2/home/kashrinivaasan/linux-4.1.5/include/linux/mmzone.h:__section_mem_map_addr can evaluate to NULL /media/shrinivaasanka/0fc4d8a2-1c74-42b8-8099-9ef78d8c8ea2/home/kashrinivaasan/linux-4.1.5/include/linux/mmzone.h:__section_mem_map_addr (1471:/media/shrinivaasanka/0fc4d8a2-1c74-42b8-8099-9ef78d8c8ea2/home/kashrinivaasan/linux-4.1.5/include/linux/mm.h), final site of dereference is: (1151:/media/shrinivaasanka/0fc4d8a2-1c74-42b8-8099-9ef78d8c8ea2/home/kashrinivaasan/linux-4.1.5/include/linux/mmzone.h) /media/shrinivaasanka/0fc4d8a2-1c74-42b8-8099-9ef78d8c8ea2/home/kashrinivaasan/linux-4.1.5/include/linux/mm.h

Null pointer is passed to a function which dereferences it.

None