

编译内核

```
# 编译
make menuconfig
make -j8

# 如果需要更新当前操作系统的内核版本
make modules -j4
sudo make modules_install -j4
sudo make install -j4









# 设置内核版本
# CentOS/RHEL/Oracle/Scientific and Fedora Linux
sudo grub2-mkconfig -o /boot/grub2/grub.cfg
sudo grubby --set-default /boot/vmlinuz-3.16.82
sudo grubby --info=ALL | more
sudo grubby --default-index
sudo grubby --default-kernel

# Debian/Ubuntu Linux
sudo update-initramfs -c -k 3.16.82
sudo update-grub
```

```
linux-3.16.82 $ sudo grub2-mkconfig -o /boot/grub2/grub.cfg
Generating grub configuration file ...
Found linux image: /boot/vmlinuz-3.16.82
Found initrd image: /boot/initramfs-3.16.82.img
Found linux image: /boot/vmlinuz-3.10.0-1062.18.1.el7.x86_64
Found initrd image: /boot/initramfs-3.10.0-1062.18.1.el7.x86_64.img
Found linux image: /boot/vmlinuz-3.10.0-123.el7.x86_64
Found initrd image: /boot/initramfs-3.10.0-123.el7.x86_64.img
Found linux image: /boot/vmlinuz-0-rescue-f504d8a0827348ecb501d30e1ff9c035
Found initrd image: /boot/initramfs-0-rescue-f504d8a0827348ecb501d30e1ff9c035.img
done
linux-3.16.82 $ sudo grubby --default-kernel
/boot/vmlinuz-3.16.82
linux-3.16.82 $ _
```

VSCode插件





LOCAL - INSTALLED56

Activitus Bar0.0.2817K5

Save some real estate by recreating the activity bar b...
Gruntfuggly

Atom One Light Theme2.2.1260K5

One Light Theme based on Atom
Mahmoud Ali

SSH: DFXD_CENTOS7_52_12 - INSTALLED55

All Autocomplete0.0.23111K4.5

Create autocomplete items from open files in VSCode.
Atishay Jain

C/C++0.27.010.9M3.5

C/C++ IntelliSense, debugging, and code browsing.
Microsoft

C/C++ Compile Run1.0.8477K4

Compile & Run single c/c++ files easily
danielpinto8zz6

C/C++ Extension Pack0.3.033K5

Collection of extensions related to C/C++
LeoJhonSong

C/C++ GNU Global0.3.275K5

Intellisense for C/C++ using GNU Global
Lin Chieh

C++ Intellisense0.2.22M2.5

C/C++ Intellisense with the help of GNU Global tags
austin

Checkpoints1.3.024K5

Checkpoints used in between commits for keeping a l...
Michael Nilsson

CMake0.0.17566K5

CMake langage support for Visual Studio Code
twxs

CMake Tools1.5.25K4

Extended CMake support in Visual Studio Code
gocarlos

cmake-format0.6.1023K4



Format listfiles so they don't look like crap
cheshirekow



解决大文件工程无所扫描的问题

Visual Studio Code is unable to watch for file changes in this large workspace



Unable to watch for file changes in this large workspace.
Please follow the instructions link to resolve this issue.



Instructions

```
cat /proc/sys/fs/inotify/max_user_watches
sudo vim /etc/sysctl.conf
fs.inotify.max_user_watches=1600000
sudo sysctl -p
```

统计文件个数

#统计文件夹下文件个数，包括子文件

```
ls -lR | grep "^-" | wc -l
```

#统计文件夹下目录个数，包括子目录

```
ls -lR | grep "^d" | wc -l
```

.vscode/c_cpp_properties.json

```
{
  "configurations": [
    {
      "name": "Linux",
      "defines": [
        "__GNUC__",

```

```

        "__KERNEL__",
        "__LINUX_KCONFIG__",
        "CONFIG_AS_CFI=1",
        "CONFIG_AS_CFI_SIGNAL_FRAME=1",
        "CONFIG_AS_CFI_SECTIONS=1",
        "CONFIG_AS_SSSE3=1",
        "CONFIG_AS_AVX=1",
        "CONFIG_AS_AVX2=1",
        "CONFIG_AS_AVX512=1",
        "CONFIG_AS_SHA1_NI=1",
        "CONFIG_AS_SHA256_NI=1",
        "CONFIG_AS_ADX=1"
    ],
    "compilerPath": "/home/mygcc/bin/gcc",
    "includePath": [
        "${workspaceFolder}/include/",
        "${workspaceFolder}/include/uapi/",
        "${workspaceFolder}/include/generated/uapi/",
        "${workspaceFolder}/arch/x86/include/",
        "${workspaceFolder}/arch/x86/include/uapi/",
        "${workspaceFolder}/arch/x86/include/generated/",

        "${workspaceFolder}/arch/x86/include/generated/uapi",
        "/home/mygcc/lib/gcc/x86_64-redhat-
linux/9.2.0/include",
        "/usr/local/include",
        "/home/mygcc/include",
        "/home/mygcc/lib/gcc/x86_64-redhat-
linux/9.2.0/include-fixed",
        "/usr/include",
        "/home/mygcc/lib/gcc/x86_64-redhat-
linux/9.2.0/../../../../include/c++/9.2.0",
        "/home/mygcc/lib/gcc/x86_64-redhat-
linux/9.2.0/../../../../include/c++/9.2.0/x86_64-redhat-linux",
        "/home/mygcc/lib/gcc/x86_64-redhat-
linux/9.2.0/../../../../include/c++/9.2.0/backward",
        "/home/mygcc/lib/gcc/x86_64-redhat-
linux/9.2.0/include"
    ],
    "cStandard": "c11",
    "cppStandard": "c++17",
    "intelliSenseMode": "clang-x64",
    "forcedInclude": [
        "${workspaceFolder}/include/linux/kconfig.h",
        "${workspaceFolder}/include/linux/compiler-
clang.h",
        "${workspaceFolder}/include/linux/compiler-gcc.h",
        "${workspaceFolder}/include/linux/compiler.h",

```

```
        "${workspaceFolder}/include/linux/compiler-  
intel.h",  
        "${workspaceFolder}/include/linux/intel-iommu.h"  
    ],  
    "compileCommands": "/home/bowenerchen/linux-  
3.16.82/compile_commands.json"  
  }  
],  
  "version": 4  
}
```

查看编译器常用头文件搜索路径

```
gcc -v -x c -E -  
gcc -v -x c++ -E -
```

```
#include "..." search starts here:
#include <...> search starts here:
/home/mygcc/lib/gcc/x86_64-redhat-linux/9.2.0/include
/usr/local/include
/home/mygcc/include
/home/mygcc/lib/gcc/x86_64-redhat-linux/9.2.0/include-fixed
/usr/include
End of search list.
^C
```

```
"includePath": [
  "${workspaceFolder}/include/",
  "${workspaceFolder}/include/uapi/",
  "${workspaceFolder}/include/generated/uapi/",
  "${workspaceFolder}/arch/x86/include/",
  "${workspaceFolder}/arch/x86/include/uapi/",
  "${workspaceFolder}/arch/x86/include/generated/",
  "${workspaceFolder}/arch/x86/include/generated/uapi/",
  "/home/mygcc/lib/gcc/x86_64-redhat-linux/9.2.0/include",
  "/usr/local/include",
  "/home/mygcc/include",
  "/home/mygcc/lib/gcc/x86_64-redhat-linux/9.2.0/include-fixed",
  "/usr/include",
  "/home/mygcc/lib/gcc/x86_64-redhat-linux/9.2.0/../../../../include/c++/9.2.0",
  "/home/mygcc/lib/gcc/x86_64-redhat-linux/9.2.0/../../../../include/c++/9.2.0/x86_64-redhat-linux",
  "/home/mygcc/lib/gcc/x86_64-redhat-linux/9.2.0/../../../../include/c++/9.2.0/backward",
  "/home/mygcc/lib/gcc/x86_64-redhat-linux/9.2.0/include"
],
```

根据实际需要进行添加

```
"forcedInclude": [
  "${workspaceFolder}/include/linux/kconfig.h",
  "${workspaceFolder}/include/linux/compiler-clang.h",
  "${workspaceFolder}/include/linux/compiler-gcc.h",
  "${workspaceFolder}/include/linux/compiler.h",
  "${workspaceFolder}/include/linux/compiler-intel.h",
  "${workspaceFolder}/include/linux/intel-iommu.h"
],
```

.vscode/settings.json

```
{
  "search.exclude": {
    "**/.git": true,
    "**/.svn": true,
    "**/.DS_Store": true,
    "**/drivers": true,
    "**/sound": true,
    "**/tools": true,
    "**/arch/alpha": true,
    "**/arch/arc": true,
    "**/arch/c6x": true,
```

```
    "**/arch/h8300": true,
    "**/arch/hexagon": true,
    "**/arch/ia64": true,
    "**/arch/m32r": true,
    "**/arch/m68k": true,
    "**/arch/microblaze": true,
    "**/arch/mn10300": true,
    "**/arch/nds32": true,
    "**/arch/nios2": true,
    "**/arch/parisc": true,
    "**/arch/powerpc": true,
    "**/arch/s390": true,
    "**/arch/sparc": true,
    "**/arch/score": true,
    "**/arch/sh": true,
    "**/arch/um": true,
    "**/arch/unicore32": true,
    "**/arch/xtensa": true
},
"files.exclude": {
    "**/.git": true,
    "**/.svn": true,
    "**/.DS_Store": true,
    "**/drivers": true,
    "**/sound": true,
    "**/tools": true,
    "**/arch/alpha": true,
    "**/arch/arc": true,
    "**/arch/c6x": true,
    "**/arch/h8300": true,
    "**/arch/hexagon": true,
    "**/arch/ia64": true,
    "**/arch/m32r": true,
    "**/arch/m68k": true,
    "**/arch/microblaze": true,
    "**/arch/mn10300": true,
    "**/arch/nds32": true,
    "**/arch/nios2": true,
    "**/arch/parisc": true,
    "**/arch/powerpc": true,
    "**/arch/s390": true,
    "**/arch/sparc": true,
    "**/arch/score": true,
    "**/arch/sh": true,
    "**/arch/um": true,
    "**/arch/unicore32": true,
    "**/arch/xtensa": true,
    "**/*.cmd": true,
```

```

        "**/*.d": true,
        "**/*.o": true,
        "**/*.mod": true,
        "**/*.ko": true,
        "**/*.tmp": true,
        "**/.tmp_System.map": true,
        "**/.gitignore": true,
        "**/.version": true,
        "**/.config": true,
        "**/.config.old": true,
        "**/.mailmap": true,
        "**/.missing-syscalls.d": true,
        "**/.vmlinux.cmd": true,
        "**/signing_key.*": true,
        "**/x509.genkey": true
    },
    "files.associations": {}
}

```

.vscode/genegrate_compdb.py

```

from __future__ import print_function, division
import sys
import re
import os
import multiprocessing
import math
import json
import fnmatch

CMD_VAR_RE = re.compile(r'^\s*cmd_(\S+)\s*:=\s*(.+)\s*$',
re.MULTILINE)
SOURCE_VAR_RE = re.compile(r'^\s*source_(\S+)\s*:=\s*(.+)\s*$',
re.MULTILINE)

directory = os.path.abspath(os.getcwd())

def print_progress_bar(progress):
    progress_bar = '[' + '|' * \
        int(50 * progress) + '-' * int(50 * (1.0 - progress)) + ']'
    print('\r', progress_bar, "{0:.1%}".format(
        progress), end='\r', file=sys.stderr)

```



```

def parse_cmd_file(cmdfile_path):
    with open(cmdfile_path, 'r') as cmdfile:
        cmdfile_content = cmdfile.read()

        commands = {match.group(1): match.group(2)
                     for match in CMD_VAR_RE.finditer(cmdfile_content)}
        sources = {match.group(1): match.group(2)
                  for match in
SOURCE_VAR_RE.finditer(cmdfile_content)}

    return [{
        'directory': directory,
        'command': commands[o_file_name],
        'file': source,
        'output': o_file_name
    } for o_file_name, source in sources.items()]

def main():
    print("Building *.o.cmd file list...", file=sys.stderr)

    cmd_files = []
    for cur_dir, subdir, files in os.walk(directory):
        cmd_files.extend(os.path.join(cur_dir, cmdfile_name)
                        for cmdfile_name in fnmatch.filter(files,
'*.o.cmd'))

    print("Parsing *.o.cmd files...", file=sys.stderr)

    n_processed = 0
    print_progress_bar(0)

    compdb = []
    pool = multiprocessing.Pool()
    try:
        for compdb_chunk in pool.imap_unordered(parse_cmd_file,
cmd_files, chunksize=int(math.sqrt(len(cmd_files)))):
            compdb.extend(compdb_chunk)
            n_processed += 1
            print_progress_bar(n_processed / len(cmd_files))

    finally:
        pool.terminate()
        pool.join()

    print(file=sys.stderr)

```

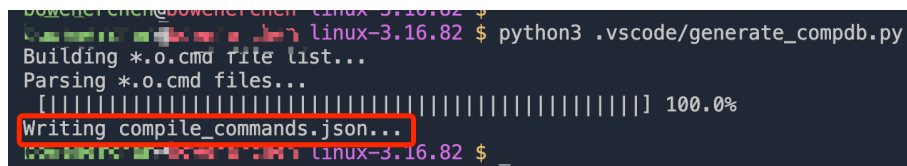
```

print("Writing compile_commands.json...", file=sys.stderr)
with open('compile_commands.json', 'w') as compdb_file:
    json.dump(compdb, compdb_file, indent=1)

if __name__ == '__main__':
    main()

```

编译完内核之后执行



```

powerhelen@powerhelen:linux-3.16.82 $
powerhelen@powerhelen:linux-3.16.82 $ python3 .vscode/generate_compdb.py
Building *.o.cmd file list...
Parsing *.o.cmd files...
[||||||||||||||||||||||||||||||||||||||||||||||||||||||||] 100.0%
Writing compile_commands.json...
powerhelen@powerhelen:linux-3.16.82 $ _

```

.vscode/task.json

```

{
    // See https://go.microsoft.com/fwlink/?LinkId=733558
    // for the documentation about the tasks.json format
    "version": "2.0.0",
    "tasks": [
        {
            "label": "Generate compile_commands.json",
            "type": "process",
            "command": "python",
            "args": [
                "${workspaceRoot}/.vscode/generate_compdb.py"
            ],
            "problemMatcher": []
        }
    ]
}

```

期望效果

```
net > ipv4 > C ip_input.c > ...
116 #define pr_fmt(fmt) "IPv4: " fmt
117
118 #include <linux/module.h>
119 #include <linux/> /*
120 #include <linux/> * Written by Mark Hemment, 1996 (markhe@nextdemon.co.uk).
121 #include <linux/> *
122 #include <linux/> * (C) SGI 2006, Christoph Lameter
123 #include <linux/slab.h>
124
125 #include <linux/net.h>
126 #include <linux/socket.h>
127 #include <linux/sockios.h>
128 #include <linux/in.h>
129 #include <linux/inet.h>
130 #include <linux/inetdevice.h>
131 #include <linux/netdevice.h>
132 #include <linux/etherdevice.h>
133
134 #include <net/snmp.h>
135 #include <net/ip.h>
136 #include <net/protocol.h>
137 #include <net/route.h>
138 #include <linux/skbuff.h>
139 #include <net/sock.h>
140 #include <net/arp.h>
141 #include <net/icmp.h>
142 #include <net/raw.h>
143 #include <net/checksum.h>
144 #include <net/inet_eh.h>
145 #include <linux/netfilter_ipv4.h>
146 #include <net/xfrm.h>
147 #include <linux/route.h>
148 #include <linux/netlink.h>
149
150 /*
151 * Process Router Attention IP option (RFC 2113)
152 */
153 bool ip_call_ra_chain(struct sk_buff *skb)
154 {
155     struct ip_ra_chain *ra;
156     u8 protocol = ip_hdr(skb)->protocol;
```

头文件可以正常查找

```
net > ipv4 > C ip_input.c > C ip_rcv(skb->dev, struct packet_type *net_device *)
404 /*
405 * Main IP Receive routine.
406 */
407 int ip_rcv(struct sk_buff *skb, struct net_device *dev, struct packet_type *pt, struct net_device *orig_dev)
408 {
409     struct sk_buff *p; /* These two members must be first. */
410     const struct iphdr *iph;
411     u32 len;
412     struct sk_buff *next;
413     struct sk_buff *prev;
414     union {
415         ktime_t timestamp;
416         struct sk_buff *skb;
417     };
418     /* When the in
419     * that it rec
420     */
421     if (skb->pkt_tstamp)
422         struct sk_buff *skb;
423     goto drop;
424
425     /* Loading...
426     * IP_UPD_PO_STATS(skb->dev, IPSTATS_MIB_INDISCARDS);
427     */
428     if ((skb = skb_share_check(skb, GFP_ATOMIC)) == NULL)
429     {
430         IP_INC_STATS_BH(dev->net, IPSTATS_MIB_INDISCARDS);
431         goto out;
432     }
433     if (!pskb_may_pull(skb, sizeof(struct iphdr)))
434         goto inhdr_error;
435     iph = ip_hdr(skb);
436
437     /*
438     * RFC1122: 3.2.1.2 MUST silently discard any IP frame that fails the checksum.
439     *
440     * Is the datagram acceptable?
441     *
442     * 1. Length at least the size of an ip header
443     * 2. Version of 4
444     * 3. Checksums correctly. [Speed optimisation for later, skip loopback checksums]
445     * 4. Doesn't have a bogus length
446     */
447     if (iph->ihl < 5 || iph->version != 4)
448         goto inhdr_error;
449
450     /* BUG ON (IPSTATS_MIB_INCTPKTS != IPSTATS_MIB_NOECTPKTS + INET_FCN ECT 1):
```

结构体可以正常解析

```
EXPLORER
LINUX-3.16.82 [SSH: DFKD_CENTOS7.92.12]
net > ipv4 > C ip_input.c > C ip_rcv(skb_buff, net_device, packet_type, net_device *)

404 /*
405  * Main IP Receive routine.
406  */
407 int ip_rcv(struct sk_buff *skb, struct net_device *dev, struct packet_type *pt, struct net_device *orig_dev)
408 {
409     const struct iphdr *iph;
410     u32 len;
411
412     /* When the interface is in promisc. mode, drop all the crap
413      * that it receives, do not try to analyse it.
414      */
415     if (skb->pkt_type == PACKET_OTHERHOST)
416         goto drop;
417
418     IP_UDP_PO_STATS_BH(struct net *dev_net(const struct net_device *dev)
419     {
420         if ((skb = skb_share) return read_pnet(dev->nd_net);
421     }
422     IP_INC_STATS_BH(dev_net(dev), IPSTATS_MIB_INDISCARDS);
423     goto out;
424 }
425
426 if (!pskb_may_pull(skb, sizeof(struct iphdr)))
427     goto inhdr_error;
428
429 iph = ip_hdr(skb);
430
431 /*
432  * RFC1122: 3.2.1.2 MUST silently discard any IP frame that fails the checksum.
433  *
434  * Is the datagram acceptable?
435  *
436  * 1. Length at least the size of an ip header
437  * 2. Version of 4
438  * 3. Checksums correctly. [Speed optimisation for later, skip loopback checksums]
439  * 4. Doesn't have a bogus length
440  */
441
442 if (iph->ihl < 5 || iph->version != 4)
443     goto inhdr_error;
444
445 BUILD_BUG_ON(IPSTATS_MIB_ECT1PKTS != IPSTATS_MIB_NOECTPKTS + INET_ECN_ECT_1);
```