

# Add a New System Call

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## Target

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1. Add a new system call into the linux kernel
2. Test the new system call in user model

## Tools

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### Install GCC Software Colletion

```
sudo apt-get install build-essential
```

### How to use GCC

- [gcc and make](#)

## How to do

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see the pdf document: newsyscall2020.pdf

### Step0

new customized kernel config: [config1](#), [config2](#)

### Step1 (Linux kernel 5.19)

include/linux/syscalls.h

在文件(No. 1279)

#endif /\* CONFIG\_ARCH\_HAS\_SYSCALL\_WRAPPER \*/之前, 添加一行:

```
asmlinkage long sys_schello(void);
```

### Step2 (Linux kernel 5.19)

kernel/sys.c

在文件SYSCALL\_DEFINE0(gettid)函数之后 (No. 949) , 添加如下行:

```
SYSCALL_DEFINE0(schello)
```

```
{
```

```
    printk("Hello new system call schello!Your ID\n");
```

```
    return 0;
```

```
}
```

### Step3 (Linux kernel 5.19)

针对64位OS

arch/x86/entry/syscalls/syscall\_64.tbl

在文件334 common memfd\_secret sys\_memfd\_secret 行之后, 添加如下行:

```
335 common schello sys_schello
```

## Step4

make clean

make -j5

sudo make modules\_install

sudo make install

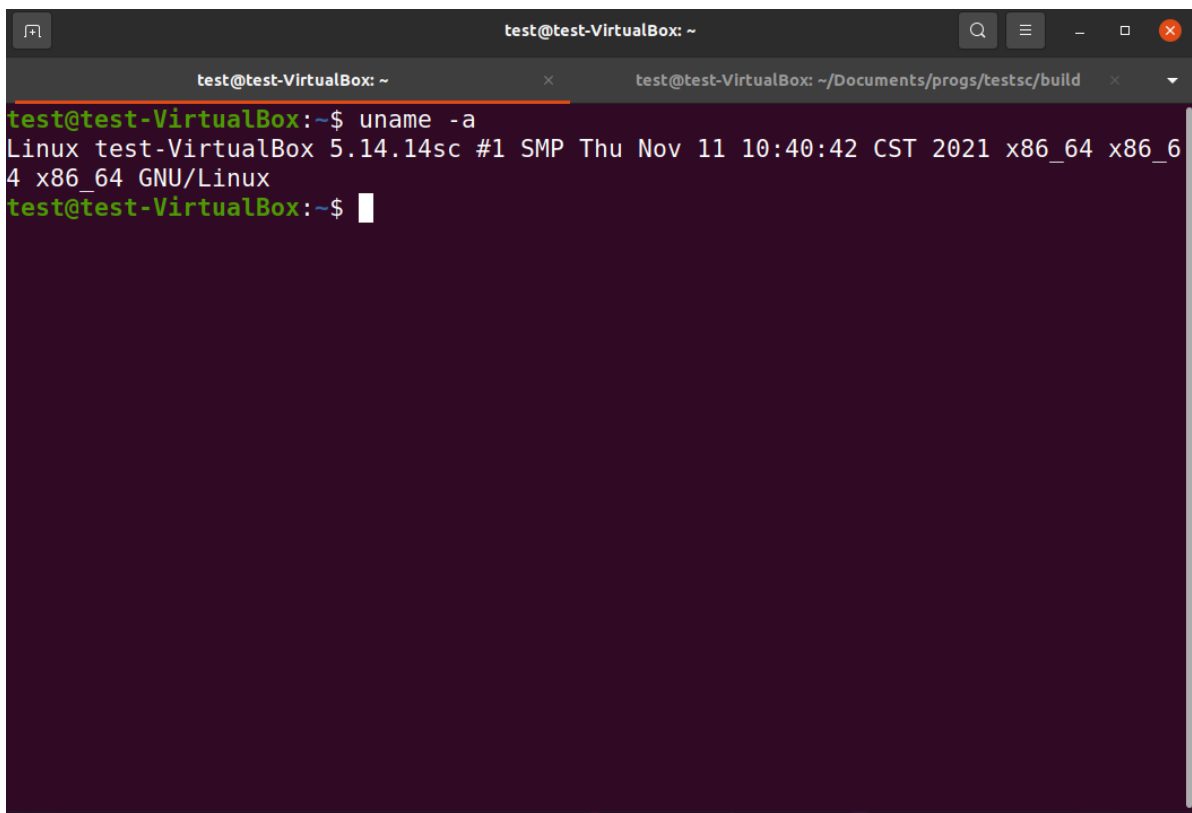
## Step 5

重新启动:

reboot

确认新内核是否成功运行:

```
uname -a
```



The screenshot shows a terminal window titled 'test@test-VirtualBox: ~'. The command 'uname -a' has been executed, and the output is displayed on the next line: 'Linux test-VirtualBox 5.14.14sc #1 SMP Thu Nov 11 10:40:42 CST 2021 x86\_64 x86\_64 x86\_64 GNU/Linux'. The prompt 'test@test-VirtualBox:~\$' is visible at the end of the line.

## Step 6

编写用户态测试程序testschello.c

```
#include <unistd.h>
#include <sys/syscall.h>
#include <sys/types.h>
#include <stdio.h>
#define __NR_schello 336
int main(int argc, char *argv[])
{
    syscall(__NR_schello);
    print("ok! run dmesg | grep hello in terminal!\n");
    return 0;
}
```

## Step 7

编译用户态测试程序testschello.c, 并执行

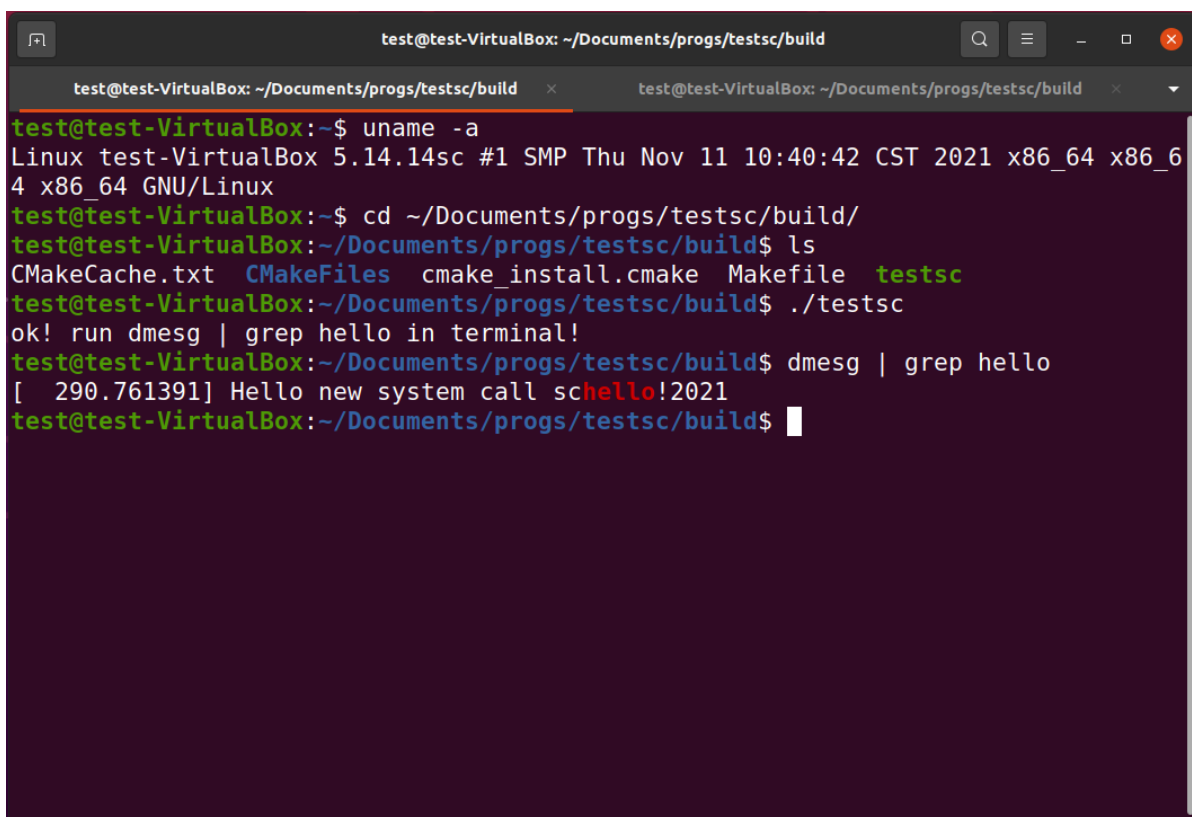
```
gcc -o testsc testschello.c

$ sudo dmesg -C

./testsc

$dmesg | grep schello

[ 1648.215250] Hello new system call schello!
```



```
test@test-VirtualBox: ~/Documents/progs/testsc/build
test@test-VirtualBox:~$ uname -a
Linux test-VirtualBox 5.14.14sc #1 SMP Thu Nov 11 10:40:42 CST 2021 x86_64 x86_64 x86_64 GNU/Linux
test@test-VirtualBox:~$ cd ~/Documents/progs/testsc/build/
test@test-VirtualBox:~/Documents/progs/testsc/build$ ls
CMakeCache.txt  CMakeFiles  cmake_install.cmake  Makefile  testsc
test@test-VirtualBox:~/Documents/progs/testsc/build$ ./testsc
ok! run dmesg | grep hello in terminal!
test@test-VirtualBox:~/Documents/progs/testsc/build$ dmesg | grep hello
[ 290.761391] Hello new system call schello!2021
test@test-VirtualBox:~/Documents/progs/testsc/build$
```

End.