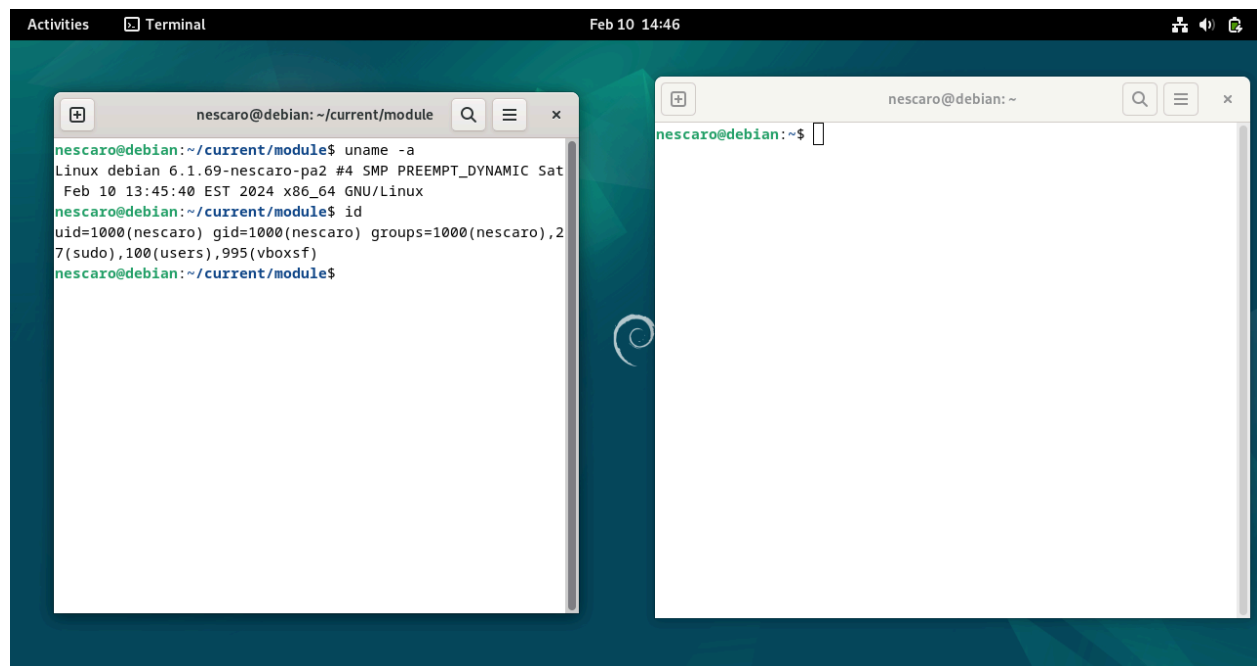


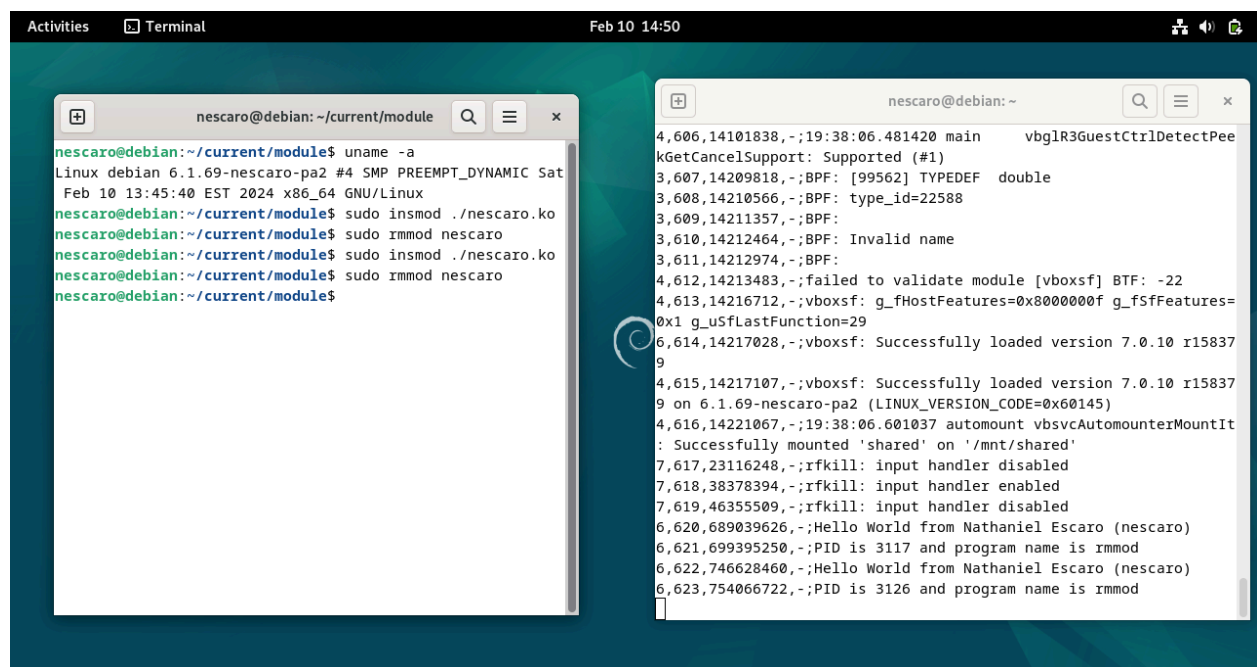
Nathaniel Escaro

I pledge my honor that I have abided by the Stevens Honor System



The screenshot shows a terminal window titled 'nescaro@debian: ~/current/module'. The user has entered the command 'uname -a', which outputs: 'Linux debian 6.1.69-nescaro-pa2 #4 SMP PREEMPT_DYNAMIC Sat Feb 10 13:45:40 EST 2024 x86_64 GNU/Linux'. Then, the user enters 'id', which outputs: 'uid=1000(nescaro) gid=1000(nescaro) groups=1000(nescaro),27(sudo),100(users),995(vboxsf)'. The prompt is now 'nescaro@debian:~/current/module\$'.

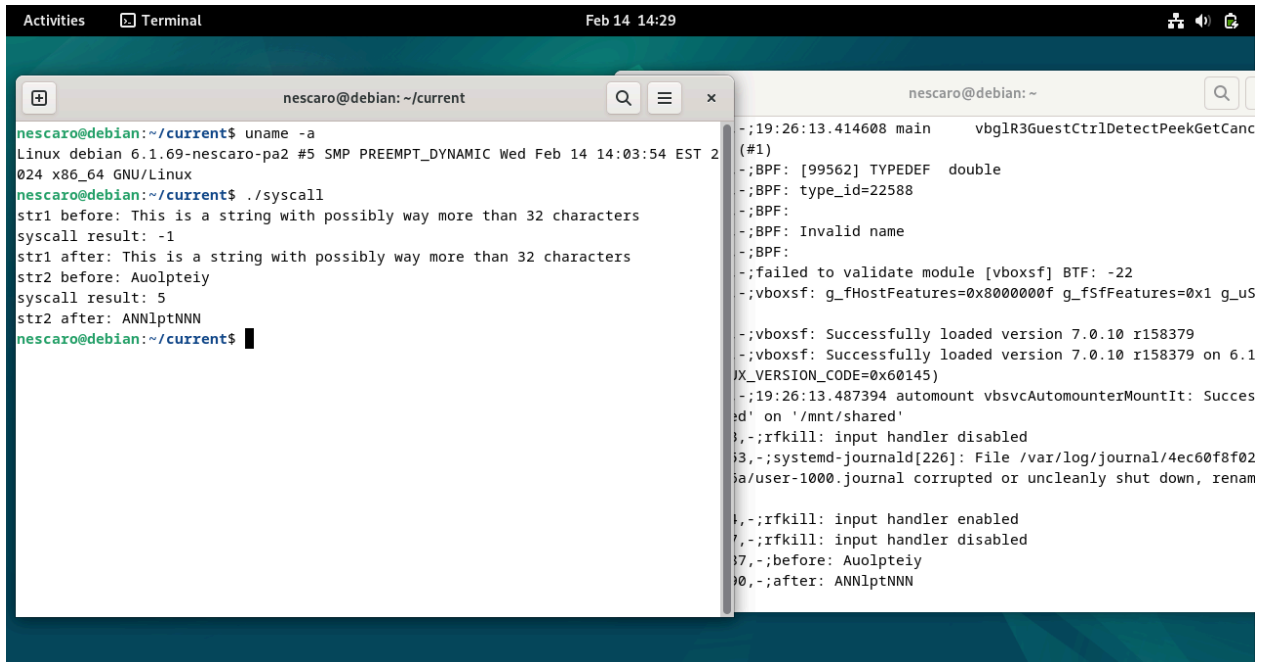
This image shows that I have configured, compiled, and installed a copy of the Linux kernel on my Debian OS.



The screenshot shows a terminal window titled 'nescaro@debian: ~/current/module'. The user has entered the command 'uname -a', which outputs: 'Linux debian 6.1.69-nescaro-pa2 #4 SMP PREEMPT_DYNAMIC Sat Feb 10 13:45:40 EST 2024 x86_64 GNU/Linux'. Then, the user enters 'sudo insmod ./nescaro.ko', which outputs: 'nescaro@debian:~/current/module\$ sudo insmod ./nescaro.ko'. Then, the user enters 'sudo rmmod nescaro', which outputs: 'nescaro@debian:~/current/module\$ sudo rmmod nescaro'. Finally, the user enters 'sudo insmod ./nescaro.ko', which outputs: 'nescaro@debian:~/current/module\$ sudo insmod ./nescaro.ko'. The output shows the kernel log messages, including 'vbgIR3GuestCtrlDetectPee', 'kGetCancelSupport: Supported (#1)', 'BPF: [99562] TYPEDEF double', 'BPF: type_id=22588', 'BPF: Invalid name', 'BPF: Successfully loaded version 7.0.10 r15837', 'BPF: Successfully loaded version 7.0.10 r15837', 'BPF: automount vbsvcAutomounterMountIt: Successfully mounted 'shared' on '/mnt/shared'', 'input handler disabled', 'input handler enabled', 'input handler disabled', 'Hello World from Nathaniel Escaro (nescaro)', 'PID is 3117 and program name is rmmod', 'Hello World from Nathaniel Escaro (nescaro)', and 'PID is 3126 and program name is rmmod'.

This image shows that I have inserted and removed my compiled module, nescaro.ko, and that it outputs messages onto the kernel log screen. When inserted it displays “Hello World” with my

name. When removed, it prints the PID and name of the “rmmod” process at it is currently running in order to disconnect my module from the kernel.



The screenshot shows a terminal window with two panes. The left pane shows the execution of a program that tests a system call. The right pane shows the corresponding kernel log output.

```
nescaro@debian: ~/current
nescaro@debian:~/current$ uname -a
Linux debian 6.1.69-nescaro-pa2 #5 SMP PREEMPT_DYNAMIC Wed Feb 14 14:03:54 EST 2024 x86_64 GNU/Linux
nescaro@debian:~/current$ ./syscall
str1 before: This is a string with possibly way more than 32 characters
syscall result: -1
str1 after: This is a string with possibly way more than 32 characters
str2 before: Auolpтей
syscall result: 5
str2 after: ANNlptNNN
nescaro@debian:~/current$
```

```
;-;19:26:13.414608 main      vbg1R3GuestCtrlDetectPeekGetCanc
(#1)
;-;BPF: [99562] TYPEDEF double
;-;BPF: type_id=22588
;-;BPF:
;-;BPF: Invalid name
;-;BPF:
;-;failed to validate module [vboxsf] BTF: -22
;-;vboxsf: g_fHostFeatures=0x8000000f g_fSfFeatures=0x1 g_u5
;-;vboxsf: Successfully loaded version 7.0.10 r158379
;-;vboxsf: Successfully loaded version 7.0.10 r158379 on 6.1
(X_VERSION_CODE=0x60145)
;-;19:26:13.487394 automount vbsvcAutomounterMountIt: Succes
ed' on '/mnt/shared'
;-;rfkill: input handler disabled
i3,-;systemd-journald[226]: File /var/log/journal/4ec60f8f02
ia/user-1000.journal corrupted or uncleanly shut down, renam
;-;rfkill: input handler enabled
;-;rfkill: input handler disabled
i7,-;before: Auolpтей
i0,-;after: ANNlptNNN
```

This image shows that I have implemented a system call that displays output (on the kernel log) only when the given string length is between 1 and 32. If a string exceeds this length, the syscall returns -1, and the string is not altered. Otherwise, it replaces all vowels (a, e, i, o, u, y) within the string with 'N', copies the modified text into user space, and returns the number of characters replaced in the string.