Lab[1]-report

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Task 1: Manipulating Environment Variables

1. 使用printenv命令输出环境变量输入命令printenv，得到如下结果

XDG\_VTNR=7

LC\_PAPER=zh\_CN.UTF-8

LC\_ADDRESS=zh\_CN.UTF-8

XDG\_SESSION\_ID=c1

XDG\_GREETER\_DATA\_DIR=/var/lib/lightdm-data/seed

LC\_MONETARY=zh\_CN.UTF-8

CLUTTER\_IM\_MODULE=xim

SESSION=ubuntu

ANDROID\_HOME=/home/seed/android/android-sdk-linux

GPG\_AGENT\_INFO=/home/seed/.gnupg/S.gpg-agent:0:1

TERM=xterm-256color

VTE\_VERSION=4205

XDG\_MENU\_PREFIX=gnome-

SHELL=/bin/bash

DERBY\_HOME=/usr/lib/jvm/java-8-oracle/db

QT\_LINUX\_ACCESSIBILITY\_ALWAYS\_ON=1

LD\_PRELOAD=/home/seed/lib/boost/libboost\_program\_options.so.1.64.0:/home/seed/lib/boost/libboost\_filesystem.so.1.64.0:/home/seed/lib/boost/libboost\_system.so.1.64.0

WINDOWID=60817418

LC\_NUMERIC=zh\_CN.UTF-8

UPSTART\_SESSION=unix:abstract=/com/ubuntu/upstart-session/1000/1189

GNOME\_KEYRING\_CONTROL=

GTK\_MODULES=gail:atk-bridge:unity-gtk-module

USER=seed

LS\_COLORS=rs=0:di=01;34:ln=01;36:mh=00:pi=40;33:so=01;35:do=01;35:bd=40;33;01:cd=40;33;01:or=40;31;01:mi=00:su=37;41:sg=30;43:ca=30;41:tw=30;42:ow=34;42:st=37;44:ex=01;32:\*.tar=01;31:\*.tgz=01;31:\*.arc=01;31:\*.arj=01;31:\*.taz=01;31:\*.lha=01;31:\*.lz4=01;31:\*.lzh=01;31:\*.lzma=01;31:\*.tlz=01;31:\*.txz=01;31:\*.tzo=01;31:\*.t7z=01;31:\*.zip=01;31:\*.z=01;31:\*.Z=01;31:\*.dz=01;31:\*.gz=01;31:\*.lrz=01;31:\*.lz=01;31:\*.lzo=01;31:\*.xz=01;31:\*.bz2=01;31:\*.bz=01;31:\*.tbz=01;31:\*.tbz2=01;31:\*.tz=01;31:\*.deb=01;31:\*.rpm=01;31:\*.jar=01;31:\*.war=01;31:\*.ear=01;31:\*.sar=01;31:\*.rar=01;31:\*.alz=01;31:\*.ace=01;31:\*.zoo=01;31:\*.cpio=01;31:\*.7z=01;31:\*.rz=01;31:\*.cab=01;31:\*.jpg=01;35:\*.jpeg=01;35:\*.gif=01;35:\*.bmp=01;35:\*.pbm=01;35:\*.pgm=01;35:\*.ppm=01;35:\*.tga=01;35:\*.xbm=01;35:\*.xpm=01;35:\*.tif=01;35:\*.tiff=01;35:\*.png=01;35:\*.svg=01;35:\*.svgz=01;35:\*.mng=01;35:\*.pcx=01;35:\*.mov=01;35:\*.mpg=01;35:\*.mpeg=01;35:\*.m2v=01;35:\*.mkv=01;35:\*.webm=01;35:\*.ogm=01;35:\*.mp4=01;35:\*.m4v=01;35:\*.mp4v=01;35:\*.vob=01;35:\*.qt=01;35:\*.nuv=01;35:\*.wmv=01;35:\*.asf=01;35:\*.rm=01;35:\*.rmvb=01;35:\*.flc=01;35:\*.avi=01;35:\*.fli=01;35:\*.flv=01;35:\*.gl=01;35:\*.dl=01;35:\*.xcf=01;35:\*.xwd=01;35:\*.yuv=01;35:\*.cgm=01;35:\*.emf=01;35:\*.ogv=01;35:\*.ogx=01;35:\*.aac=00;36:\*.au=00;36:\*.flac=00;36:\*.m4a=00;36:\*.mid=00;36:\*.midi=00;36:\*.mka=00;36:\*.mp3=00;36:\*.mpc=00;36:\*.ogg=00;36:\*.ra=00;36:\*.wav=00;36:\*.oga=00;36:\*.opus=00;36:\*.spx=00;36:\*.xspf=00;36:

QT\_ACCESSIBILITY=1

LC\_TELEPHONE=zh\_CN.UTF-8

LD\_LIBRARY\_PATH=/home/seed/source/boost\_1\_64\_0/stage/lib:/home/seed/source/boost\_1\_64\_0/stage/lib:

XDG\_SESSION\_PATH=/org/freedesktop/DisplayManager/Session0

XDG\_SEAT\_PATH=/org/freedesktop/DisplayManager/Seat0

SSH\_AUTH\_SOCK=/run/user/1000/keyring/ssh

SESSION\_MANAGER=local/VM:@/tmp/.ICE-unix/1701,unix/VM:/tmp/.ICE-unix/1701

DEFAULTS\_PATH=/usr/share/gconf/ubuntu.default.path

XDG\_CONFIG\_DIRS=/etc/xdg/xdg-ubuntu:/usr/share/upstart/xdg:/etc/xdg

DESKTOP\_SESSION=ubuntu

PATH=/home/seed/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:.:/snap/bin:/usr/lib/jvm/java-8-oracle/bin:/usr/lib/jvm/java-8-oracle/db/bin:/usr/lib/jvm/java-8-oracle/jre/bin:/home/seed/android/android-sdk-linux/tools:/home/seed/android/android-sdk-linux/platform-tools:/home/seed/android/android-ndk/android-ndk-r8d:/home/seed/.local/bin

QT\_IM\_MODULE=ibus

QT\_QPA\_PLATFORMTHEME=appmenu-qt5

LC\_IDENTIFICATION=zh\_CN.UTF-8

XDG\_SESSION\_TYPE=x11

PWD=/home/seed

JOB=dbus

XMODIFIERS=@im=ibus

JAVA\_HOME=/usr/lib/jvm/java-8-oracle

GNOME\_KEYRING\_PID=

LANG=zh\_CN.UTF-8

GDM\_LANG=zh\_CN

MANDATORY\_PATH=/usr/share/gconf/ubuntu.mandatory.path

LC\_MEASUREMENT=zh\_CN.UTF-8

COMPIZ\_CONFIG\_PROFILE=ubuntu

IM\_CONFIG\_PHASE=1

PAPERSIZE=a4

GDMSESSION=ubuntu

SESSIONTYPE=gnome-session

GTK2\_MODULES=overlay-scrollbar

SHLVL=1

HOME=/home/seed

XDG\_SEAT=seat0

LANGUAGE=zh\_CN:en\_US:en

LIBGL\_ALWAYS\_SOFTWARE=1

GNOME\_DESKTOP\_SESSION\_ID=this-is-deprecated

XDG\_SESSION\_DESKTOP=ubuntu

LOGNAME=seed

DBUS\_SESSION\_BUS\_ADDRESS=unix:abstract=/tmp/dbus-rwBo9PK3nq

J2SDKDIR=/usr/lib/jvm/java-8-oracle

XDG\_DATA\_DIRS=/usr/share/ubuntu:/usr/share/gnome:/usr/local/share/:/usr/share/:/var/lib/snapd/desktop

QT4\_IM\_MODULE=xim

LESSOPEN=| /usr/bin/lesspipe %s

INSTANCE=

XDG\_RUNTIME\_DIR=/run/user/1000

DISPLAY=:0

XDG\_CURRENT\_DESKTOP=Unity

GTK\_IM\_MODULE=ibus

J2REDIR=/usr/lib/jvm/java-8-oracle/jre

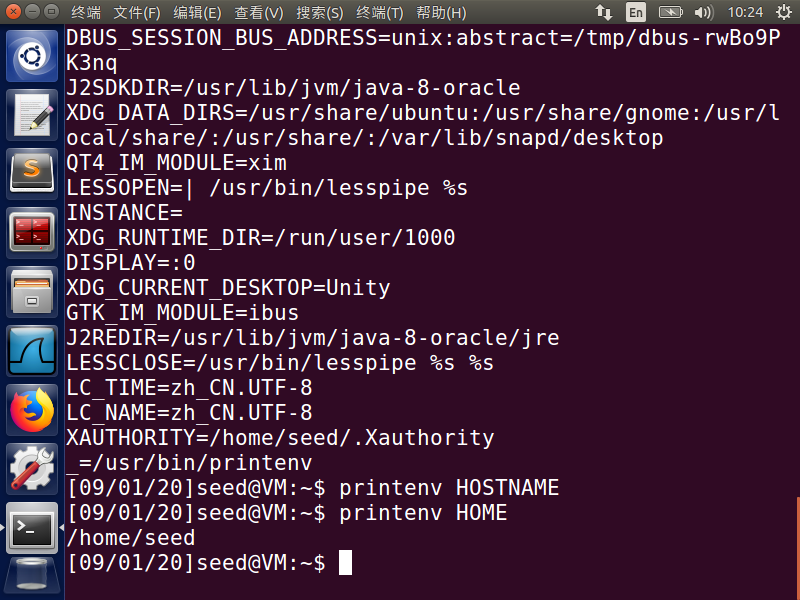
LESSCLOSE=/usr/bin/lesspipe %s %s

LC\_TIME=zh\_CN.UTF-8

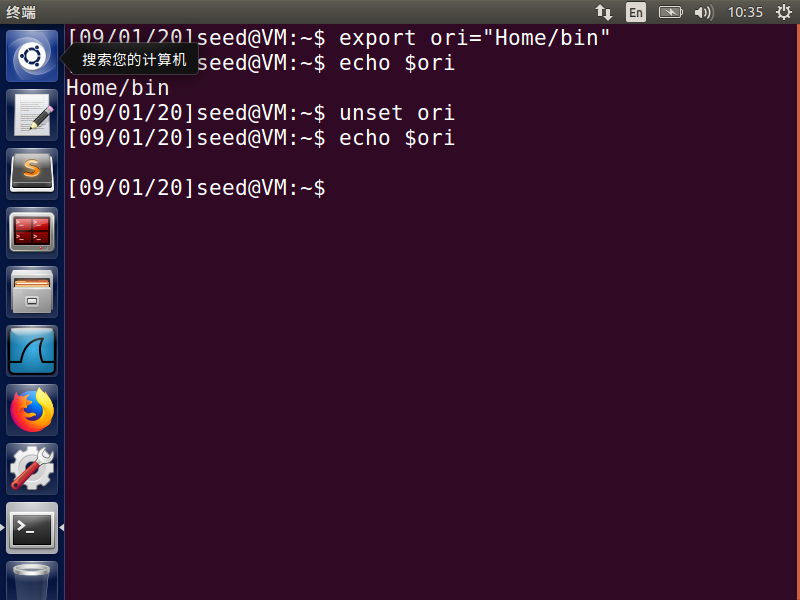
LC\_NAME=zh\_CN.UTF-8

XAUTHORITY=/home/seed/.Xauthority

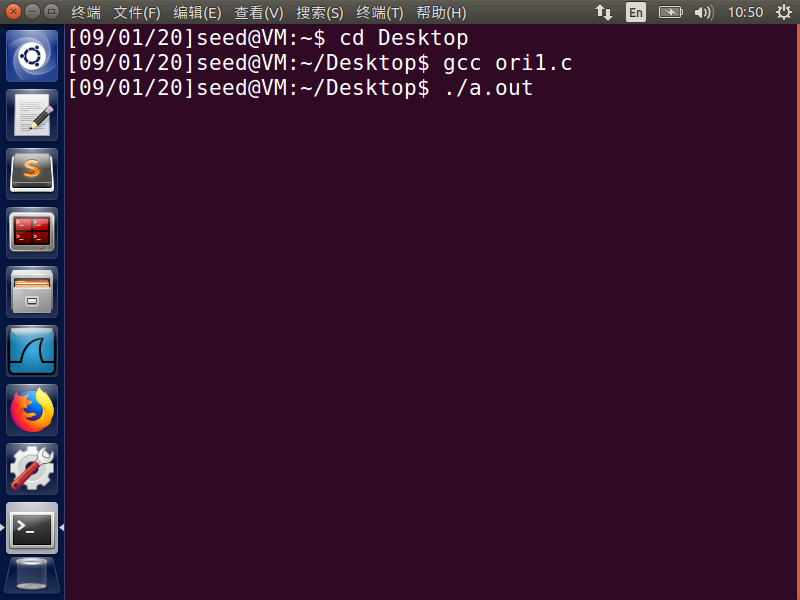
\_=/usr/bin/printenv

使用printenv命令查看HOME环境变量，得到如下结果：

（2）使用export和unset设置或删除环境变量

使用export设置环境变量，使用echo显示。使用unset删除环境变量。

Task 2: Inheriting environment variables from parents

1. 编译C文件，将结果保存为a.out文件将代码保存为ori1.c文件并放在桌面。进入桌面路径，编译C文件。

执行保存结果的a.out文件，查看代码的运行结果，发现为各个环境变量的值

XDG\_VTNR=7

LC\_PAPER=zh\_CN.UTF-8

LC\_ADDRESS=zh\_CN.UTF-8

XDG\_SESSION\_ID=c1

XDG\_GREETER\_DATA\_DIR=/var/lib/lightdm-data/seed

LC\_MONETARY=zh\_CN.UTF-8

CLUTTER\_IM\_MODULE=xim

SESSION=ubuntu

ANDROID\_HOME=/home/seed/android/android-sdk-linux

GPG\_AGENT\_INFO=/home/seed/.gnupg/S.gpg-agent:0:1

TERM=xterm-256color

VTE\_VERSION=4205

XDG\_MENU\_PREFIX=gnome-

SHELL=/bin/bash

DERBY\_HOME=/usr/lib/jvm/java-8-oracle/db

QT\_LINUX\_ACCESSIBILITY\_ALWAYS\_ON=1

LD\_PRELOAD=/home/seed/lib/boost/libboost\_program\_options.so.1.64.0:/home/seed/lib/boost/libboost\_filesystem.so.1.64.0:/home/seed/lib/boost/libboost\_system.so.1.64.0

WINDOWID=60817418

LC\_NUMERIC=zh\_CN.UTF-8

UPSTART\_SESSION=unix:abstract=/com/ubuntu/upstart-session/1000/1189

GNOME\_KEYRING\_CONTROL=

GTK\_MODULES=gail:atk-bridge:unity-gtk-module

USER=seed

LS\_COLORS=rs=0:di=01;34:ln=01;36:mh=00:pi=40;33:so=01;35:do=01;35:bd=40;33;01:cd=40;33;01:or=40;31;01:mi=00:su=37;41:sg=30;43:ca=30;41:tw=30;42:ow=34;42:st=37;44:ex=01;32:\*.tar=01;31:\*.tgz=01;31:\*.arc=01;31:\*.arj=01;31:\*.taz=01;31:\*.lha=01;31:\*.lz4=01;31:\*.lzh=01;31:\*.lzma=01;31:\*.tlz=01;31:\*.txz=01;31:\*.tzo=01;31:\*.t7z=01;31:\*.zip=01;31:\*.z=01;31:\*.Z=01;31:\*.dz=01;31:\*.gz=01;31:\*.lrz=01;31:\*.lz=01;31:\*.lzo=01;31:\*.xz=01;31:\*.bz2=01;31:\*.bz=01;31:\*.tbz=01;31:\*.tbz2=01;31:\*.tz=01;31:\*.deb=01;31:\*.rpm=01;31:\*.jar=01;31:\*.war=01;31:\*.ear=01;31:\*.sar=01;31:\*.rar=01;31:\*.alz=01;31:\*.ace=01;31:\*.zoo=01;31:\*.cpio=01;31:\*.7z=01;31:\*.rz=01;31:\*.cab=01;31:\*.jpg=01;35:\*.jpeg=01;35:\*.gif=01;35:\*.bmp=01;35:\*.pbm=01;35:\*.pgm=01;35:\*.ppm=01;35:\*.tga=01;35:\*.xbm=01;35:\*.xpm=01;35:\*.tif=01;35:\*.tiff=01;35:\*.png=01;35:\*.svg=01;35:\*.svgz=01;35:\*.mng=01;35:\*.pcx=01;35:\*.mov=01;35:\*.mpg=01;35:\*.mpeg=01;35:\*.m2v=01;35:\*.mkv=01;35:\*.webm=01;35:\*.ogm=01;35:\*.mp4=01;35:\*.m4v=01;35:\*.mp4v=01;35:\*.vob=01;35:\*.qt=01;35:\*.nuv=01;35:\*.wmv=01;35:\*.asf=01;35:\*.rm=01;35:\*.rmvb=01;35:\*.flc=01;35:\*.avi=01;35:\*.fli=01;35:\*.flv=01;35:\*.gl=01;35:\*.dl=01;35:\*.xcf=01;35:\*.xwd=01;35:\*.yuv=01;35:\*.cgm=01;35:\*.emf=01;35:\*.ogv=01;35:\*.ogx=01;35:\*.aac=00;36:\*.au=00;36:\*.flac=00;36:\*.m4a=00;36:\*.mid=00;36:\*.midi=00;36:\*.mka=00;36:\*.mp3=00;36:\*.mpc=00;36:\*.ogg=00;36:\*.ra=00;36:\*.wav=00;36:\*.oga=00;36:\*.opus=00;36:\*.spx=00;36:\*.xspf=00;36:

QT\_ACCESSIBILITY=1

LC\_TELEPHONE=zh\_CN.UTF-8

LD\_LIBRARY\_PATH=/home/seed/source/boost\_1\_64\_0/stage/lib:/home/seed/source/boost\_1\_64\_0/stage/lib:

XDG\_SESSION\_PATH=/org/freedesktop/DisplayManager/Session0

XDG\_SEAT\_PATH=/org/freedesktop/DisplayManager/Seat0

SSH\_AUTH\_SOCK=/run/user/1000/keyring/ssh

SESSION\_MANAGER=local/VM:@/tmp/.ICE-unix/1701,unix/VM:/tmp/.ICE-unix/1701

DEFAULTS\_PATH=/usr/share/gconf/ubuntu.default.path

XDG\_CONFIG\_DIRS=/etc/xdg/xdg-ubuntu:/usr/share/upstart/xdg:/etc/xdg

DESKTOP\_SESSION=ubuntu

PATH=/home/seed/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:.:/snap/bin:/usr/lib/jvm/java-8-oracle/bin:/usr/lib/jvm/java-8-oracle/db/bin:/usr/lib/jvm/java-8-oracle/jre/bin:/home/seed/android/android-sdk-linux/tools:/home/seed/android/android-sdk-linux/platform-tools:/home/seed/android/android-ndk/android-ndk-r8d:/home/seed/.local/bin

QT\_IM\_MODULE=ibus

QT\_QPA\_PLATFORMTHEME=appmenu-qt5

LC\_IDENTIFICATION=zh\_CN.UTF-8

XDG\_SESSION\_TYPE=x11

PWD=/home/seed/Desktop

JOB=dbus

XMODIFIERS=@im=ibus

JAVA\_HOME=/usr/lib/jvm/java-8-oracle

GNOME\_KEYRING\_PID=

LANG=zh\_CN.UTF-8

GDM\_LANG=zh\_CN

MANDATORY\_PATH=/usr/share/gconf/ubuntu.mandatory.path

LC\_MEASUREMENT=zh\_CN.UTF-8

COMPIZ\_CONFIG\_PROFILE=ubuntu

IM\_CONFIG\_PHASE=1

PAPERSIZE=a4

GDMSESSION=ubuntu

SESSIONTYPE=gnome-session

GTK2\_MODULES=overlay-scrollbar

SHLVL=1

HOME=/home/seed

XDG\_SEAT=seat0

LANGUAGE=zh\_CN:en\_US:en

LIBGL\_ALWAYS\_SOFTWARE=1

GNOME\_DESKTOP\_SESSION\_ID=this-is-deprecated

XDG\_SESSION\_DESKTOP=ubuntu

LOGNAME=seed

DBUS\_SESSION\_BUS\_ADDRESS=unix:abstract=/tmp/dbus-rwBo9PK3nq

J2SDKDIR=/usr/lib/jvm/java-8-oracle

XDG\_DATA\_DIRS=/usr/share/ubuntu:/usr/share/gnome:/usr/local/share/:/usr/share/:/var/lib/snapd/desktop

QT4\_IM\_MODULE=xim

LESSOPEN=| /usr/bin/lesspipe %s

INSTANCE=

XDG\_RUNTIME\_DIR=/run/user/1000

DISPLAY=:0

XDG\_CURRENT\_DESKTOP=Unity

GTK\_IM\_MODULE=ibus

J2REDIR=/usr/lib/jvm/java-8-oracle/jre

LESSCLOSE=/usr/bin/lesspipe %s %s

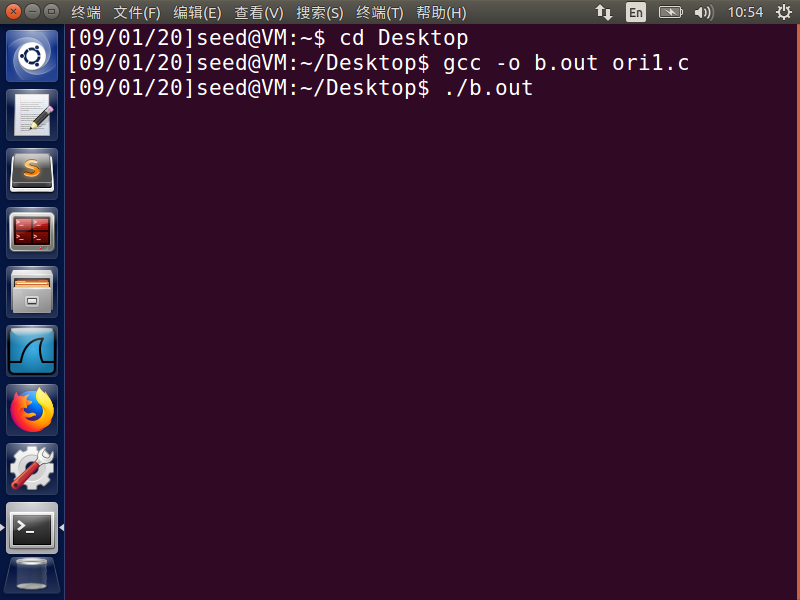
LC\_TIME=zh\_CN.UTF-8

LC\_NAME=zh\_CN.UTF-8

XAUTHORITY=/home/seed/.Xauthority

OLDPWD=/home/seed

\_=./a.out

(2) 将child process中printenv()注释，将process中parent printenv()取消注释，重新保存编译C文件。

执行保存结果的b.out文件，查看代码的运行结果，发现为各个环境变量的值

XDG\_VTNR=7

LC\_PAPER=zh\_CN.UTF-8

LC\_ADDRESS=zh\_CN.UTF-8

XDG\_SESSION\_ID=c1

XDG\_GREETER\_DATA\_DIR=/var/lib/lightdm-data/seed

LC\_MONETARY=zh\_CN.UTF-8

CLUTTER\_IM\_MODULE=xim

SESSION=ubuntu

ANDROID\_HOME=/home/seed/android/android-sdk-linux

GPG\_AGENT\_INFO=/home/seed/.gnupg/S.gpg-agent:0:1

TERM=xterm-256color

VTE\_VERSION=4205

XDG\_MENU\_PREFIX=gnome-

SHELL=/bin/bash

DERBY\_HOME=/usr/lib/jvm/java-8-oracle/db

QT\_LINUX\_ACCESSIBILITY\_ALWAYS\_ON=1

LD\_PRELOAD=/home/seed/lib/boost/libboost\_program\_options.so.1.64.0:/home/seed/lib/boost/libboost\_filesystem.so.1.64.0:/home/seed/lib/boost/libboost\_system.so.1.64.0

WINDOWID=60817418

LC\_NUMERIC=zh\_CN.UTF-8

UPSTART\_SESSION=unix:abstract=/com/ubuntu/upstart-session/1000/1189

GNOME\_KEYRING\_CONTROL=

GTK\_MODULES=gail:atk-bridge:unity-gtk-module

USER=seed

LS\_COLORS=rs=0:di=01;34:ln=01;36:mh=00:pi=40;33:so=01;35:do=01;35:bd=40;33;01:cd=40;33;01:or=40;31;01:mi=00:su=37;41:sg=30;43:ca=30;41:tw=30;42:ow=34;42:st=37;44:ex=01;32:\*.tar=01;31:\*.tgz=01;31:\*.arc=01;31:\*.arj=01;31:\*.taz=01;31:\*.lha=01;31:\*.lz4=01;31:\*.lzh=01;31:\*.lzma=01;31:\*.tlz=01;31:\*.txz=01;31:\*.tzo=01;31:\*.t7z=01;31:\*.zip=01;31:\*.z=01;31:\*.Z=01;31:\*.dz=01;31:\*.gz=01;31:\*.lrz=01;31:\*.lz=01;31:\*.lzo=01;31:\*.xz=01;31:\*.bz2=01;31:\*.bz=01;31:\*.tbz=01;31:\*.tbz2=01;31:\*.tz=01;31:\*.deb=01;31:\*.rpm=01;31:\*.jar=01;31:\*.war=01;31:\*.ear=01;31:\*.sar=01;31:\*.rar=01;31:\*.alz=01;31:\*.ace=01;31:\*.zoo=01;31:\*.cpio=01;31:\*.7z=01;31:\*.rz=01;31:\*.cab=01;31:\*.jpg=01;35:\*.jpeg=01;35:\*.gif=01;35:\*.bmp=01;35:\*.pbm=01;35:\*.pgm=01;35:\*.ppm=01;35:\*.tga=01;35:\*.xbm=01;35:\*.xpm=01;35:\*.tif=01;35:\*.tiff=01;35:\*.png=01;35:\*.svg=01;35:\*.svgz=01;35:\*.mng=01;35:\*.pcx=01;35:\*.mov=01;35:\*.mpg=01;35:\*.mpeg=01;35:\*.m2v=01;35:\*.mkv=01;35:\*.webm=01;35:\*.ogm=01;35:\*.mp4=01;35:\*.m4v=01;35:\*.mp4v=01;35:\*.vob=01;35:\*.qt=01;35:\*.nuv=01;35:\*.wmv=01;35:\*.asf=01;35:\*.rm=01;35:\*.rmvb=01;35:\*.flc=01;35:\*.avi=01;35:\*.fli=01;35:\*.flv=01;35:\*.gl=01;35:\*.dl=01;35:\*.xcf=01;35:\*.xwd=01;35:\*.yuv=01;35:\*.cgm=01;35:\*.emf=01;35:\*.ogv=01;35:\*.ogx=01;35:\*.aac=00;36:\*.au=00;36:\*.flac=00;36:\*.m4a=00;36:\*.mid=00;36:\*.midi=00;36:\*.mka=00;36:\*.mp3=00;36:\*.mpc=00;36:\*.ogg=00;36:\*.ra=00;36:\*.wav=00;36:\*.oga=00;36:\*.opus=00;36:\*.spx=00;36:\*.xspf=00;36:

QT\_ACCESSIBILITY=1

LC\_TELEPHONE=zh\_CN.UTF-8

LD\_LIBRARY\_PATH=/home/seed/source/boost\_1\_64\_0/stage/lib:/home/seed/source/boost\_1\_64\_0/stage/lib:

XDG\_SESSION\_PATH=/org/freedesktop/DisplayManager/Session0

XDG\_SEAT\_PATH=/org/freedesktop/DisplayManager/Seat0

SSH\_AUTH\_SOCK=/run/user/1000/keyring/ssh

SESSION\_MANAGER=local/VM:@/tmp/.ICE-unix/1701,unix/VM:/tmp/.ICE-unix/1701

DEFAULTS\_PATH=/usr/share/gconf/ubuntu.default.path

XDG\_CONFIG\_DIRS=/etc/xdg/xdg-ubuntu:/usr/share/upstart/xdg:/etc/xdg

DESKTOP\_SESSION=ubuntu

PATH=/home/seed/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:.:/snap/bin:/usr/lib/jvm/java-8-oracle/bin:/usr/lib/jvm/java-8-oracle/db/bin:/usr/lib/jvm/java-8-oracle/jre/bin:/home/seed/android/android-sdk-linux/tools:/home/seed/android/android-sdk-linux/platform-tools:/home/seed/android/android-ndk/android-ndk-r8d:/home/seed/.local/bin

QT\_IM\_MODULE=ibus

QT\_QPA\_PLATFORMTHEME=appmenu-qt5

LC\_IDENTIFICATION=zh\_CN.UTF-8

XDG\_SESSION\_TYPE=x11

PWD=/home/seed/Desktop

JOB=dbus

XMODIFIERS=@im=ibus

JAVA\_HOME=/usr/lib/jvm/java-8-oracle

GNOME\_KEYRING\_PID=

LANG=zh\_CN.UTF-8

GDM\_LANG=zh\_CN

MANDATORY\_PATH=/usr/share/gconf/ubuntu.mandatory.path

LC\_MEASUREMENT=zh\_CN.UTF-8

COMPIZ\_CONFIG\_PROFILE=ubuntu

IM\_CONFIG\_PHASE=1

PAPERSIZE=a4

GDMSESSION=ubuntu

SESSIONTYPE=gnome-session

GTK2\_MODULES=overlay-scrollbar

SHLVL=1

HOME=/home/seed

XDG\_SEAT=seat0

LANGUAGE=zh\_CN:en\_US:en

LIBGL\_ALWAYS\_SOFTWARE=1

GNOME\_DESKTOP\_SESSION\_ID=this-is-deprecated

XDG\_SESSION\_DESKTOP=ubuntu

LOGNAME=seed

DBUS\_SESSION\_BUS\_ADDRESS=unix:abstract=/tmp/dbus-rwBo9PK3nq

J2SDKDIR=/usr/lib/jvm/java-8-oracle

XDG\_DATA\_DIRS=/usr/share/ubuntu:/usr/share/gnome:/usr/local/share/:/usr/share/:/var/lib/snapd/desktop

QT4\_IM\_MODULE=xim

LESSOPEN=| /usr/bin/lesspipe %s

INSTANCE=

XDG\_RUNTIME\_DIR=/run/user/1000

DISPLAY=:0

XDG\_CURRENT\_DESKTOP=Unity

GTK\_IM\_MODULE=ibus

J2REDIR=/usr/lib/jvm/java-8-oracle/jre

LESSCLOSE=/usr/bin/lesspipe %s %s

LC\_TIME=zh\_CN.UTF-8

LC\_NAME=zh\_CN.UTF-8

XAUTHORITY=/home/seed/.Xauthority

OLDPWD=/home/seed

\_=./b.out

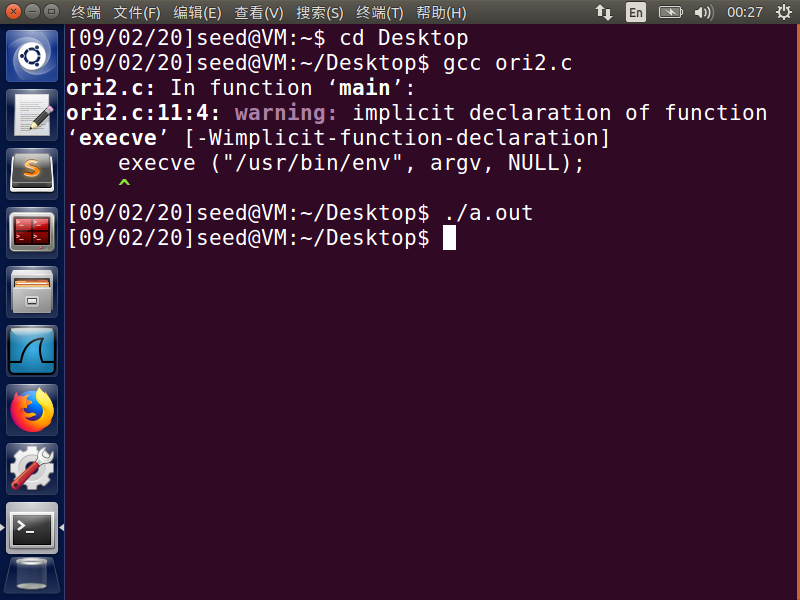
（3）比较两者结果

将a.out、b.out文件的结果分别保存为child和parent文件，再使用diff命令比较，发现两者仅在第79行不同，即其结果除了文件名外完全相同。

这说明子进程环境变量会继承父环境变量。

Task 3: Environment variables and execve()

1）编译并运行以下程序。描述观察到的实验结果。该程序简单地调用了/usr/bin/env,该系统调用能够打印出当前进程的环境变量。

重新保存和编译文件为ori2.c，将结果保存为a.out发现执行结果为空。

查询函数execve()的调用格式得知，第三个参数为传递给执行文件的新环境变量数，而其在此设置为空，故打印出的结果为空

2）把execve（）的调用改为以下内容，观察结果

将原语句换为：execve("/usr/bin/env", argv, environ); 重新保存和编译文件，将结果保存为a2.out ，执行得到如下结果。

XDG\_VTNR=7

LC\_PAPER=zh\_CN.UTF-8

LC\_ADDRESS=zh\_CN.UTF-8

XDG\_SESSION\_ID=c1

XDG\_GREETER\_DATA\_DIR=/var/lib/lightdm-data/seed

LC\_MONETARY=zh\_CN.UTF-8

CLUTTER\_IM\_MODULE=xim

SESSION=ubuntu

ANDROID\_HOME=/home/seed/android/android-sdk-linux

GPG\_AGENT\_INFO=/home/seed/.gnupg/S.gpg-agent:0:1

TERM=xterm-256color

VTE\_VERSION=4205

XDG\_MENU\_PREFIX=gnome-

SHELL=/bin/bash

DERBY\_HOME=/usr/lib/jvm/java-8-oracle/db

QT\_LINUX\_ACCESSIBILITY\_ALWAYS\_ON=1

LD\_PRELOAD=/home/seed/lib/boost/libboost\_program\_options.so.1.64.0:/home/seed/lib/boost/libboost\_filesystem.so.1.64.0:/home/seed/lib/boost/libboost\_system.so.1.64.0

WINDOWID=60817418

LC\_NUMERIC=zh\_CN.UTF-8

UPSTART\_SESSION=unix:abstract=/com/ubuntu/upstart-session/1000/1464

GNOME\_KEYRING\_CONTROL=

GTK\_MODULES=gail:atk-bridge:unity-gtk-module

USER=seed

LS\_COLORS=rs=0:di=01;34:ln=01;36:mh=00:pi=40;33:so=01;35:do=01;35:bd=40;33;01:cd=40;33;01:or=40;31;01:mi=00:su=37;41:sg=30;43:ca=30;41:tw=30;42:ow=34;42:st=37;44:ex=01;32:\*.tar=01;31:\*.tgz=01;31:\*.arc=01;31:\*.arj=01;31:\*.taz=01;31:\*.lha=01;31:\*.lz4=01;31:\*.lzh=01;31:\*.lzma=01;31:\*.tlz=01;31:\*.txz=01;31:\*.tzo=01;31:\*.t7z=01;31:\*.zip=01;31:\*.z=01;31:\*.Z=01;31:\*.dz=01;31:\*.gz=01;31:\*.lrz=01;31:\*.lz=01;31:\*.lzo=01;31:\*.xz=01;31:\*.bz2=01;31:\*.bz=01;31:\*.tbz=01;31:\*.tbz2=01;31:\*.tz=01;31:\*.deb=01;31:\*.rpm=01;31:\*.jar=01;31:\*.war=01;31:\*.ear=01;31:\*.sar=01;31:\*.rar=01;31:\*.alz=01;31:\*.ace=01;31:\*.zoo=01;31:\*.cpio=01;31:\*.7z=01;31:\*.rz=01;31:\*.cab=01;31:\*.jpg=01;35:\*.jpeg=01;35:\*.gif=01;35:\*.bmp=01;35:\*.pbm=01;35:\*.pgm=01;35:\*.ppm=01;35:\*.tga=01;35:\*.xbm=01;35:\*.xpm=01;35:\*.tif=01;35:\*.tiff=01;35:\*.png=01;35:\*.svg=01;35:\*.svgz=01;35:\*.mng=01;35:\*.pcx=01;35:\*.mov=01;35:\*.mpg=01;35:\*.mpeg=01;35:\*.m2v=01;35:\*.mkv=01;35:\*.webm=01;35:\*.ogm=01;35:\*.mp4=01;35:\*.m4v=01;35:\*.mp4v=01;35:\*.vob=01;35:\*.qt=01;35:\*.nuv=01;35:\*.wmv=01;35:\*.asf=01;35:\*.rm=01;35:\*.rmvb=01;35:\*.flc=01;35:\*.avi=01;35:\*.fli=01;35:\*.flv=01;35:\*.gl=01;35:\*.dl=01;35:\*.xcf=01;35:\*.xwd=01;35:\*.yuv=01;35:\*.cgm=01;35:\*.emf=01;35:\*.ogv=01;35:\*.ogx=01;35:\*.aac=00;36:\*.au=00;36:\*.flac=00;36:\*.m4a=00;36:\*.mid=00;36:\*.midi=00;36:\*.mka=00;36:\*.mp3=00;36:\*.mpc=00;36:\*.ogg=00;36:\*.ra=00;36:\*.wav=00;36:\*.oga=00;36:\*.opus=00;36:\*.spx=00;36:\*.xspf=00;36:

QT\_ACCESSIBILITY=1

LC\_TELEPHONE=zh\_CN.UTF-8

LD\_LIBRARY\_PATH=/home/seed/source/boost\_1\_64\_0/stage/lib:/home/seed/source/boost\_1\_64\_0/stage/lib:

XDG\_SESSION\_PATH=/org/freedesktop/DisplayManager/Session0

XDG\_SEAT\_PATH=/org/freedesktop/DisplayManager/Seat0

SSH\_AUTH\_SOCK=/run/user/1000/keyring/ssh

SESSION\_MANAGER=local/VM:@/tmp/.ICE-unix/1741,unix/VM:/tmp/.ICE-unix/1741

DEFAULTS\_PATH=/usr/share/gconf/ubuntu.default.path

XDG\_CONFIG\_DIRS=/etc/xdg/xdg-ubuntu:/usr/share/upstart/xdg:/etc/xdg

DESKTOP\_SESSION=ubuntu

PATH=/home/seed/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:.:/snap/bin:/usr/lib/jvm/java-8-oracle/bin:/usr/lib/jvm/java-8-oracle/db/bin:/usr/lib/jvm/java-8-oracle/jre/bin:/home/seed/android/android-sdk-linux/tools:/home/seed/android/android-sdk-linux/platform-tools:/home/seed/android/android-ndk/android-ndk-r8d:/home/seed/.local/bin

QT\_IM\_MODULE=ibus

QT\_QPA\_PLATFORMTHEME=appmenu-qt5

LC\_IDENTIFICATION=zh\_CN.UTF-8

XDG\_SESSION\_TYPE=x11

PWD=/home/seed/Desktop

JOB=dbus

XMODIFIERS=@im=ibus

JAVA\_HOME=/usr/lib/jvm/java-8-oracle

GNOME\_KEYRING\_PID=

LANG=zh\_CN.UTF-8

GDM\_LANG=zh\_CN

MANDATORY\_PATH=/usr/share/gconf/ubuntu.mandatory.path

LC\_MEASUREMENT=zh\_CN.UTF-8

COMPIZ\_CONFIG\_PROFILE=ubuntu

IM\_CONFIG\_PHASE=1

PAPERSIZE=a4

GDMSESSION=ubuntu

SESSIONTYPE=gnome-session

GTK2\_MODULES=overlay-scrollbar

SHLVL=1

HOME=/home/seed

XDG\_SEAT=seat0

LANGUAGE=zh\_CN:en\_US:en

LIBGL\_ALWAYS\_SOFTWARE=1

GNOME\_DESKTOP\_SESSION\_ID=this-is-deprecated

XDG\_SESSION\_DESKTOP=ubuntu

LOGNAME=seed

DBUS\_SESSION\_BUS\_ADDRESS=unix:abstract=/tmp/dbus-l0vM7HYMZS

J2SDKDIR=/usr/lib/jvm/java-8-oracle

XDG\_DATA\_DIRS=/usr/share/ubuntu:/usr/share/gnome:/usr/local/share/:/usr/share/:/var/lib/snapd/desktop

QT4\_IM\_MODULE=xim

LESSOPEN=| /usr/bin/lesspipe %s

INSTANCE=

XDG\_RUNTIME\_DIR=/run/user/1000

DISPLAY=:0

XDG\_CURRENT\_DESKTOP=Unity

GTK\_IM\_MODULE=ibus

J2REDIR=/usr/lib/jvm/java-8-oracle/jre

LESSCLOSE=/usr/bin/lesspipe %s %s

LC\_TIME=zh\_CN.UTF-8

LC\_NAME=zh\_CN.UTF-8

XAUTHORITY=/home/seed/.Xauthority

OLDPWD=/home/seed

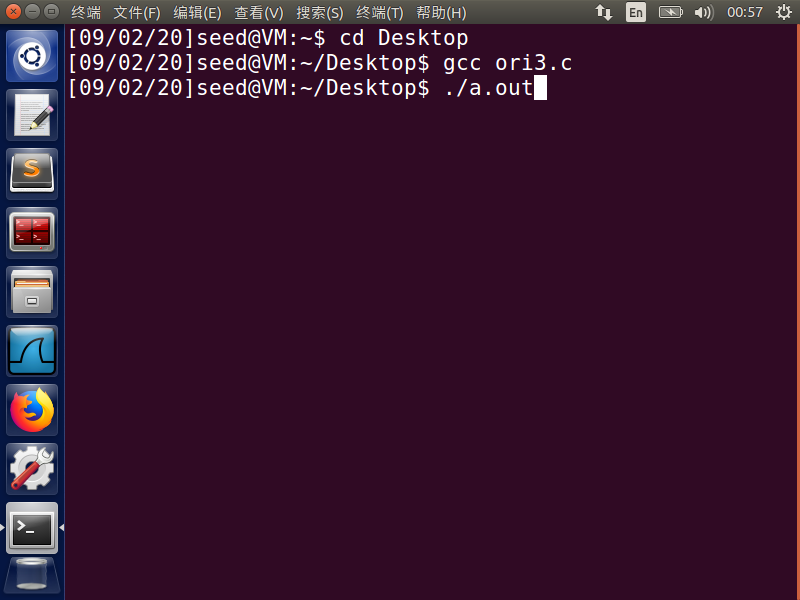
\_=./a2.out

此时执行结果为该进程的所有环境变量

（3）描述实验结论

execve()函数 产生的新进程的环境变量是在调用时重新赋予，而fork()函数创建的子进程则直接继承父进程的环境变量。

Task 4: Environment variables and system()

重新保存和编译文件为ori3.c，将结果保存为a.out

执行结果为

LESSOPEN=| /usr/bin/lesspipe %s

GNOME\_KEYRING\_PID=

USER=seed

LANGUAGE=zh\_CN:en\_US:en

J2SDKDIR=/usr/lib/jvm/java-8-oracle

LC\_TIME=zh\_CN.UTF-8

XDG\_SEAT=seat0

SESSION=ubuntu

XDG\_SESSION\_TYPE=x11

COMPIZ\_CONFIG\_PROFILE=ubuntu

LD\_LIBRARY\_PATH=/home/seed/source/boost\_1\_64\_0/stage/lib:/home/seed/source/boost\_1\_64\_0/stage/lib:

SHLVL=1

LIBGL\_ALWAYS\_SOFTWARE=1

J2REDIR=/usr/lib/jvm/java-8-oracle/jre

HOME=/home/seed

QT4\_IM\_MODULE=xim

OLDPWD=/home/seed

DESKTOP\_SESSION=ubuntu

QT\_LINUX\_ACCESSIBILITY\_ALWAYS\_ON=1

GTK\_MODULES=gail:atk-bridge:unity-gtk-module

XDG\_SEAT\_PATH=/org/freedesktop/DisplayManager/Seat0

LC\_MONETARY=zh\_CN.UTF-8

INSTANCE=

DBUS\_SESSION\_BUS\_ADDRESS=unix:abstract=/tmp/dbus-l0vM7HYMZS

GNOME\_KEYRING\_CONTROL=

QT\_QPA\_PLATFORMTHEME=appmenu-qt5

MANDATORY\_PATH=/usr/share/gconf/ubuntu.mandatory.path

IM\_CONFIG\_PHASE=1

SESSIONTYPE=gnome-session

LOGNAME=seed

GTK\_IM\_MODULE=ibus

WINDOWID=60817418

\_=./a.out

DEFAULTS\_PATH=/usr/share/gconf/ubuntu.default.path

XDG\_SESSION\_ID=c1

TERM=xterm-256color

GNOME\_DESKTOP\_SESSION\_ID=this-is-deprecated

GTK2\_MODULES=overlay-scrollbar

PATH=/home/seed/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:.:/snap/bin:/usr/lib/jvm/java-8-oracle/bin:/usr/lib/jvm/java-8-oracle/db/bin:/usr/lib/jvm/java-8-oracle/jre/bin:/home/seed/android/android-sdk-linux/tools:/home/seed/android/android-sdk-linux/platform-tools:/home/seed/android/android-ndk/android-ndk-r8d:/home/seed/.local/bin

DERBY\_HOME=/usr/lib/jvm/java-8-oracle/db

SESSION\_MANAGER=local/VM:@/tmp/.ICE-unix/1741,unix/VM:/tmp/.ICE-unix/1741

GDM\_LANG=zh\_CN

PAPERSIZE=a4

LC\_ADDRESS=zh\_CN.UTF-8

XDG\_MENU\_PREFIX=gnome-

XDG\_SESSION\_PATH=/org/freedesktop/DisplayManager/Session0

XDG\_RUNTIME\_DIR=/run/user/1000

DISPLAY=:0

LD\_PRELOAD=/home/seed/lib/boost/libboost\_program\_options.so.1.64.0:/home/seed/lib/boost/libboost\_filesystem.so.1.64.0:/home/seed/lib/boost/libboost\_system.so.1.64.0

LC\_TELEPHONE=zh\_CN.UTF-8

LANG=zh\_CN.UTF-8

XDG\_CURRENT\_DESKTOP=Unity

LS\_COLORS=rs=0:di=01;34:ln=01;36:mh=00:pi=40;33:so=01;35:do=01;35:bd=40;33;01:cd=40;33;01:or=40;31;01:mi=00:su=37;41:sg=30;43:ca=30;41:tw=30;42:ow=34;42:st=37;44:ex=01;32:\*.tar=01;31:\*.tgz=01;31:\*.arc=01;31:\*.arj=01;31:\*.taz=01;31:\*.lha=01;31:\*.lz4=01;31:\*.lzh=01;31:\*.lzma=01;31:\*.tlz=01;31:\*.txz=01;31:\*.tzo=01;31:\*.t7z=01;31:\*.zip=01;31:\*.z=01;31:\*.Z=01;31:\*.dz=01;31:\*.gz=01;31:\*.lrz=01;31:\*.lz=01;31:\*.lzo=01;31:\*.xz=01;31:\*.bz2=01;31:\*.bz=01;31:\*.tbz=01;31:\*.tbz2=01;31:\*.tz=01;31:\*.deb=01;31:\*.rpm=01;31:\*.jar=01;31:\*.war=01;31:\*.ear=01;31:\*.sar=01;31:\*.rar=01;31:\*.alz=01;31:\*.ace=01;31:\*.zoo=01;31:\*.cpio=01;31:\*.7z=01;31:\*.rz=01;31:\*.cab=01;31:\*.jpg=01;35:\*.jpeg=01;35:\*.gif=01;35:\*.bmp=01;35:\*.pbm=01;35:\*.pgm=01;35:\*.ppm=01;35:\*.tga=01;35:\*.xbm=01;35:\*.xpm=01;35:\*.tif=01;35:\*.tiff=01;35:\*.png=01;35:\*.svg=01;35:\*.svgz=01;35:\*.mng=01;35:\*.pcx=01;35:\*.mov=01;35:\*.mpg=01;35:\*.mpeg=01;35:\*.m2v=01;35:\*.mkv=01;35:\*.webm=01;35:\*.ogm=01;35:\*.mp4=01;35:\*.m4v=01;35:\*.mp4v=01;35:\*.vob=01;35:\*.qt=01;35:\*.nuv=01;35:\*.wmv=01;35:\*.asf=01;35:\*.rm=01;35:\*.rmvb=01;35:\*.flc=01;35:\*.avi=01;35:\*.fli=01;35:\*.flv=01;35:\*.gl=01;35:\*.dl=01;35:\*.xcf=01;35:\*.xwd=01;35:\*.yuv=01;35:\*.cgm=01;35:\*.emf=01;35:\*.ogv=01;35:\*.ogx=01;35:\*.aac=00;36:\*.au=00;36:\*.flac=00;36:\*.m4a=00;36:\*.mid=00;36:\*.midi=00;36:\*.mka=00;36:\*.mp3=00;36:\*.mpc=00;36:\*.ogg=00;36:\*.ra=00;36:\*.wav=00;36:\*.oga=00;36:\*.opus=00;36:\*.spx=00;36:\*.xspf=00;36:

XMODIFIERS=@im=ibus

XDG\_SESSION\_DESKTOP=ubuntu

XAUTHORITY=/home/seed/.Xauthority

XDG\_GREETER\_DATA\_DIR=/var/lib/lightdm-data/seed

SSH\_AUTH\_SOCK=/run/user/1000/keyring/ssh

SHELL=/bin/bash

LC\_NAME=zh\_CN.UTF-8

QT\_ACCESSIBILITY=1

GDMSESSION=ubuntu

LESSCLOSE=/usr/bin/lesspipe %s %s

LC\_MEASUREMENT=zh\_CN.UTF-8

GPG\_AGENT\_INFO=/home/seed/.gnupg/S.gpg-agent:0:1

UPSTART\_SESSION=unix:abstract=/com/ubuntu/upstart-session/1000/1464

LC\_IDENTIFICATION=zh\_CN.UTF-8

XDG\_VTNR=7

QT\_IM\_MODULE=ibus

PWD=/home/seed/Desktop

JAVA\_HOME=/usr/lib/jvm/java-8-oracle

CLUTTER\_IM\_MODULE=xim

ANDROID\_HOME=/home/seed/android/android-sdk-linux

XDG\_CONFIG\_DIRS=/etc/xdg/xdg-ubuntu:/usr/share/upstart/xdg:/etc/xdg

XDG\_DATA\_DIRS=/usr/share/ubuntu:/usr/share/gnome:/usr/local/share/:/usr/share/:/var/lib/snapd/desktop

LC\_NUMERIC=zh\_CN.UTF-8

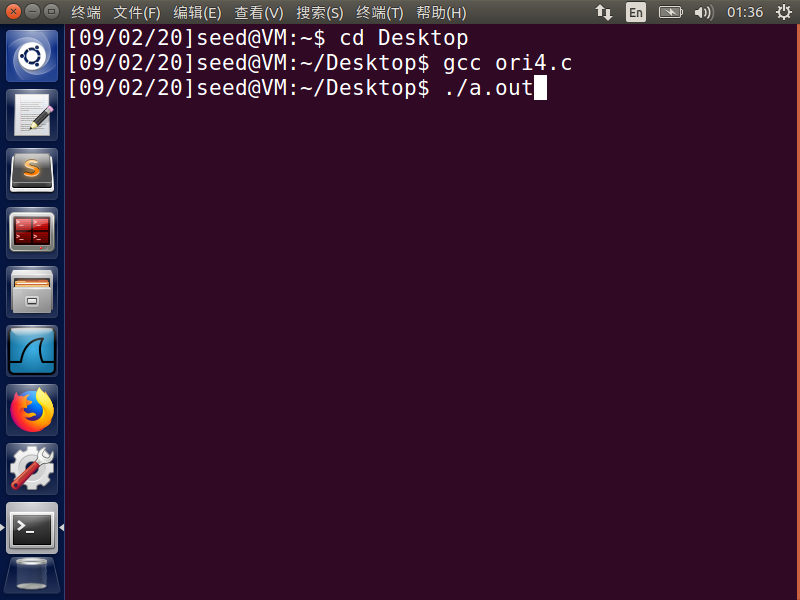
LC\_PAPER=zh\_CN.UTF-8

VTE\_VERSION=4205

JOB=dbus

Task 5: Environment variable and Set-UID Programs

（1）在当前进程中打印出所有的环境变量

重新保存代码为ori4.c ，将执行结果保存为a.out，得到如下结果，即为当前所有环境变量：

XDG\_VTNR=7

LC\_PAPER=zh\_CN.UTF-8

LC\_ADDRESS=zh\_CN.UTF-8

XDG\_SESSION\_ID=c1

XDG\_GREETER\_DATA\_DIR=/var/lib/lightdm-data/seed

LC\_MONETARY=zh\_CN.UTF-8

CLUTTER\_IM\_MODULE=xim

SESSION=ubuntu

ANDROID\_HOME=/home/seed/android/android-sdk-linux

GPG\_AGENT\_INFO=/home/seed/.gnupg/S.gpg-agent:0:1

TERM=xterm-256color

VTE\_VERSION=4205

XDG\_MENU\_PREFIX=gnome-

SHELL=/bin/bash

DERBY\_HOME=/usr/lib/jvm/java-8-oracle/db

QT\_LINUX\_ACCESSIBILITY\_ALWAYS\_ON=1

LD\_PRELOAD=/home/seed/lib/boost/libboost\_program\_options.so.1.64.0:/home/seed/lib/boost/libboost\_filesystem.so.1.64.0:/home/seed/lib/boost/libboost\_system.so.1.64.0

WINDOWID=60817418

LC\_NUMERIC=zh\_CN.UTF-8

UPSTART\_SESSION=unix:abstract=/com/ubuntu/upstart-session/1000/1464

GNOME\_KEYRING\_CONTROL=

GTK\_MODULES=gail:atk-bridge:unity-gtk-module

USER=seed

LS\_COLORS=rs=0:di=01;34:ln=01;36:mh=00:pi=40;33:so=01;35:do=01;35:bd=40;33;01:cd=40;33;01:or=40;31;01:mi=00:su=37;41:sg=30;43:ca=30;41:tw=30;42:ow=34;42:st=37;44:ex=01;32:\*.tar=01;31:\*.tgz=01;31:\*.arc=01;31:\*.arj=01;31:\*.taz=01;31:\*.lha=01;31:\*.lz4=01;31:\*.lzh=01;31:\*.lzma=01;31:\*.tlz=01;31:\*.txz=01;31:\*.tzo=01;31:\*.t7z=01;31:\*.zip=01;31:\*.z=01;31:\*.Z=01;31:\*.dz=01;31:\*.gz=01;31:\*.lrz=01;31:\*.lz=01;31:\*.lzo=01;31:\*.xz=01;31:\*.bz2=01;31:\*.bz=01;31:\*.tbz=01;31:\*.tbz2=01;31:\*.tz=01;31:\*.deb=01;31:\*.rpm=01;31:\*.jar=01;31:\*.war=01;31:\*.ear=01;31:\*.sar=01;31:\*.rar=01;31:\*.alz=01;31:\*.ace=01;31:\*.zoo=01;31:\*.cpio=01;31:\*.7z=01;31:\*.rz=01;31:\*.cab=01;31:\*.jpg=01;35:\*.jpeg=01;35:\*.gif=01;35:\*.bmp=01;35:\*.pbm=01;35:\*.pgm=01;35:\*.ppm=01;35:\*.tga=01;35:\*.xbm=01;35:\*.xpm=01;35:\*.tif=01;35:\*.tiff=01;35:\*.png=01;35:\*.svg=01;35:\*.svgz=01;35:\*.mng=01;35:\*.pcx=01;35:\*.mov=01;35:\*.mpg=01;35:\*.mpeg=01;35:\*.m2v=01;35:\*.mkv=01;35:\*.webm=01;35:\*.ogm=01;35:\*.mp4=01;35:\*.m4v=01;35:\*.mp4v=01;35:\*.vob=01;35:\*.qt=01;35:\*.nuv=01;35:\*.wmv=01;35:\*.asf=01;35:\*.rm=01;35:\*.rmvb=01;35:\*.flc=01;35:\*.avi=01;35:\*.fli=01;35:\*.flv=01;35:\*.gl=01;35:\*.dl=01;35:\*.xcf=01;35:\*.xwd=01;35:\*.yuv=01;35:\*.cgm=01;35:\*.emf=01;35:\*.ogv=01;35:\*.ogx=01;35:\*.aac=00;36:\*.au=00;36:\*.flac=00;36:\*.m4a=00;36:\*.mid=00;36:\*.midi=00;36:\*.mka=00;36:\*.mp3=00;36:\*.mpc=00;36:\*.ogg=00;36:\*.ra=00;36:\*.wav=00;36:\*.oga=00;36:\*.opus=00;36:\*.spx=00;36:\*.xspf=00;36:

QT\_ACCESSIBILITY=1

LC\_TELEPHONE=zh\_CN.UTF-8

LD\_LIBRARY\_PATH=/home/seed/source/boost\_1\_64\_0/stage/lib:/home/seed/source/boost\_1\_64\_0/stage/lib:

XDG\_SESSION\_PATH=/org/freedesktop/DisplayManager/Session0

XDG\_SEAT\_PATH=/org/freedesktop/DisplayManager/Seat0

SSH\_AUTH\_SOCK=/run/user/1000/keyring/ssh

SESSION\_MANAGER=local/VM:@/tmp/.ICE-unix/1741,unix/VM:/tmp/.ICE-unix/1741

DEFAULTS\_PATH=/usr/share/gconf/ubuntu.default.path

XDG\_CONFIG\_DIRS=/etc/xdg/xdg-ubuntu:/usr/share/upstart/xdg:/etc/xdg

DESKTOP\_SESSION=ubuntu

PATH=/home/seed/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:.:/snap/bin:/usr/lib/jvm/java-8-oracle/bin:/usr/lib/jvm/java-8-oracle/db/bin:/usr/lib/jvm/java-8-oracle/jre/bin:/home/seed/android/android-sdk-linux/tools:/home/seed/android/android-sdk-linux/platform-tools:/home/seed/android/android-ndk/android-ndk-r8d:/home/seed/.local/bin

QT\_IM\_MODULE=ibus

QT\_QPA\_PLATFORMTHEME=appmenu-qt5

LC\_IDENTIFICATION=zh\_CN.UTF-8

XDG\_SESSION\_TYPE=x11

PWD=/home/seed/Desktop

JOB=dbus

XMODIFIERS=@im=ibus

JAVA\_HOME=/usr/lib/jvm/java-8-oracle

GNOME\_KEYRING\_PID=

LANG=zh\_CN.UTF-8

GDM\_LANG=zh\_CN

MANDATORY\_PATH=/usr/share/gconf/ubuntu.mandatory.path

LC\_MEASUREMENT=zh\_CN.UTF-8

COMPIZ\_CONFIG\_PROFILE=ubuntu

IM\_CONFIG\_PHASE=1

PAPERSIZE=a4

GDMSESSION=ubuntu

SESSIONTYPE=gnome-session

GTK2\_MODULES=overlay-scrollbar

SHLVL=1

HOME=/home/seed

XDG\_SEAT=seat0

LANGUAGE=zh\_CN:en\_US:en

LIBGL\_ALWAYS\_SOFTWARE=1

GNOME\_DESKTOP\_SESSION\_ID=this-is-deprecated

XDG\_SESSION\_DESKTOP=ubuntu

LOGNAME=seed

DBUS\_SESSION\_BUS\_ADDRESS=unix:abstract=/tmp/dbus-l0vM7HYMZS

J2SDKDIR=/usr/lib/jvm/java-8-oracle

XDG\_DATA\_DIRS=/usr/share/ubuntu:/usr/share/gnome:/usr/local/share/:/usr/share/:/var/lib/snapd/desktop

QT4\_IM\_MODULE=xim

LESSOPEN=| /usr/bin/lesspipe %s

INSTANCE=

XDG\_RUNTIME\_DIR=/run/user/1000

DISPLAY=:0

XDG\_CURRENT\_DESKTOP=Unity

GTK\_IM\_MODULE=ibus

J2REDIR=/usr/lib/jvm/java-8-oracle/jre

LESSCLOSE=/usr/bin/lesspipe %s %s

LC\_TIME=zh\_CN.UTF-8

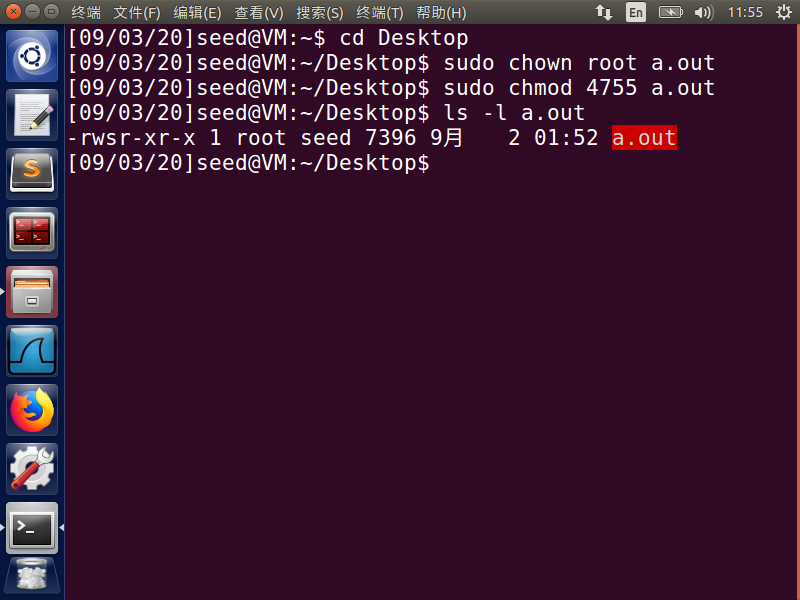
LC\_NAME=zh\_CN.UTF-8

XAUTHORITY=/home/seed/.Xauthority

OLDPWD=/home/seed

\_=./a.out

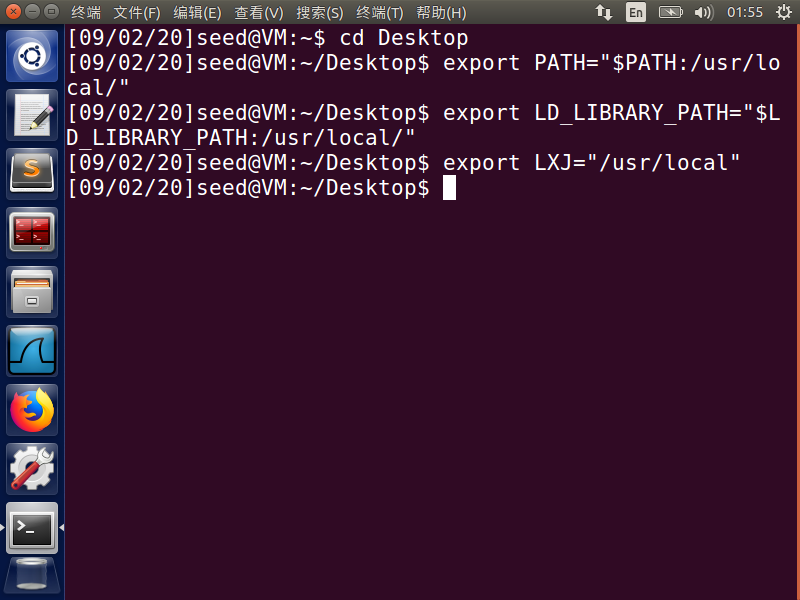
1. 将上述程序的所有权改为root，并使它成为一个Set-UID程序

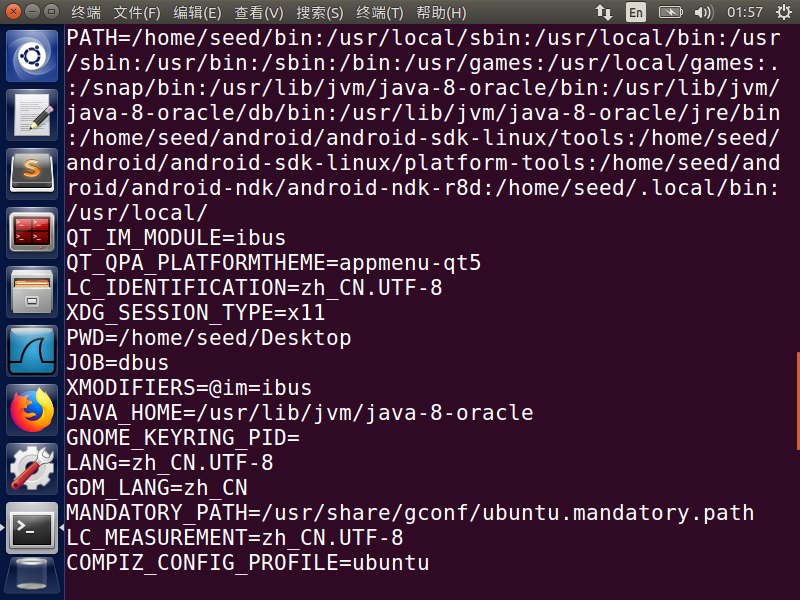
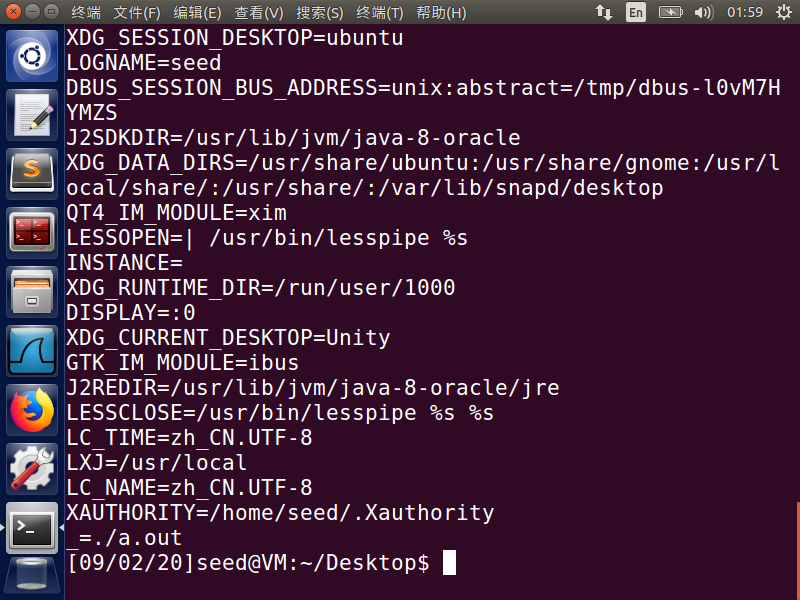
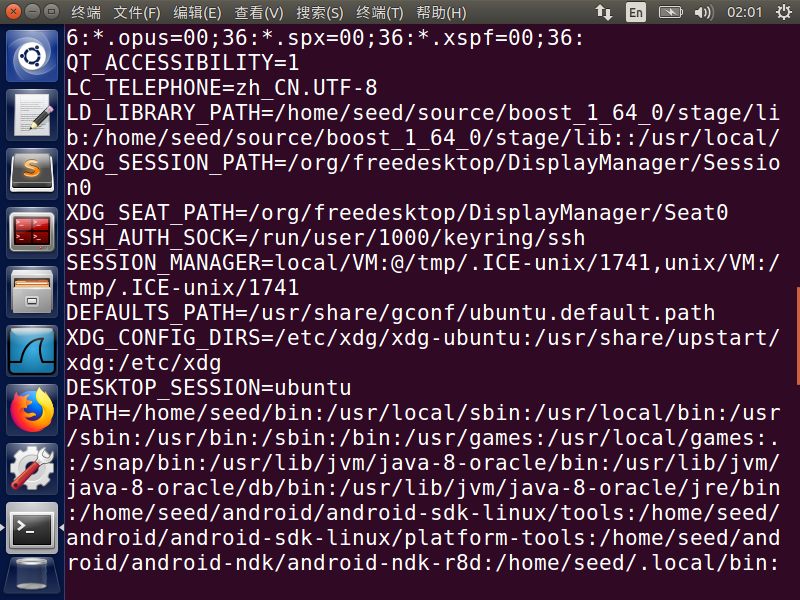


（3）使用一般用户登录终端，使用export命令设置如下环境变量：PATH 、LD\_LIBRARY\_PATH、ANY\_NAME

export PATH="$PATH:/usr/local/"

export LD\_LIBRARY\_PATH="$LD\_LIBRARY\_PATH:/usr/local/"

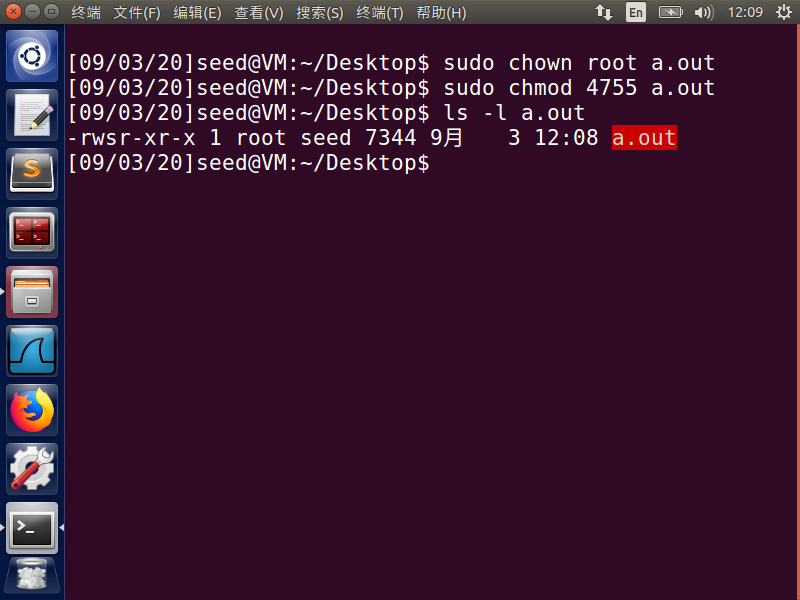
export LXJ="/usr/local"

执行已经赋予Set-UID的ori4.c程序，得到如下结果：

Task 6: The PATH Environment variable and Set-UID Programs

将代码保存为ori5.c，执行结果保存为a.out

将上述程序的所有权改为root，并使它成为一个Set-UID程序



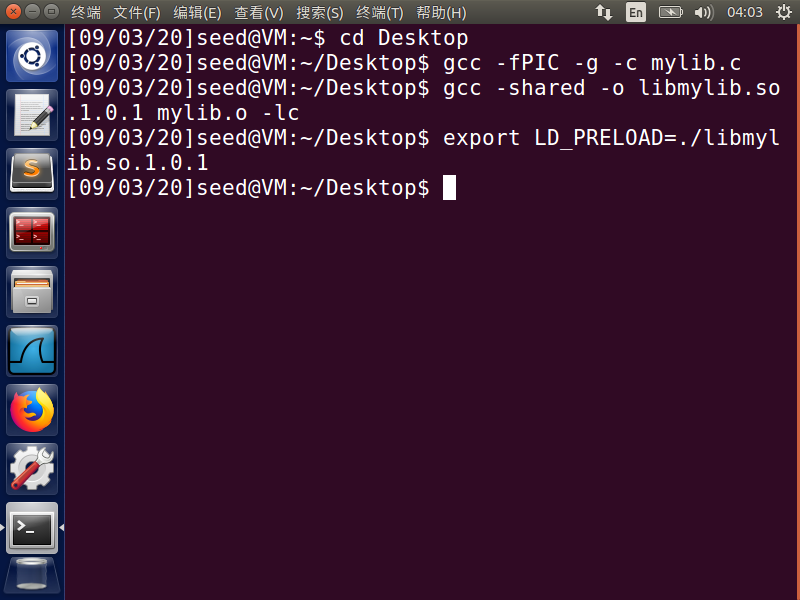
将bin/ls复制到当前目录并命名为ls，根据PATH环境变量，它的找寻顺序是先找寻当前目录，而当前目录我们自己编造了一个ls，所以程序就会直接执行伪造的ls。

Task 7: The LD PRELOAD Environment Variable and Set-UID Programs

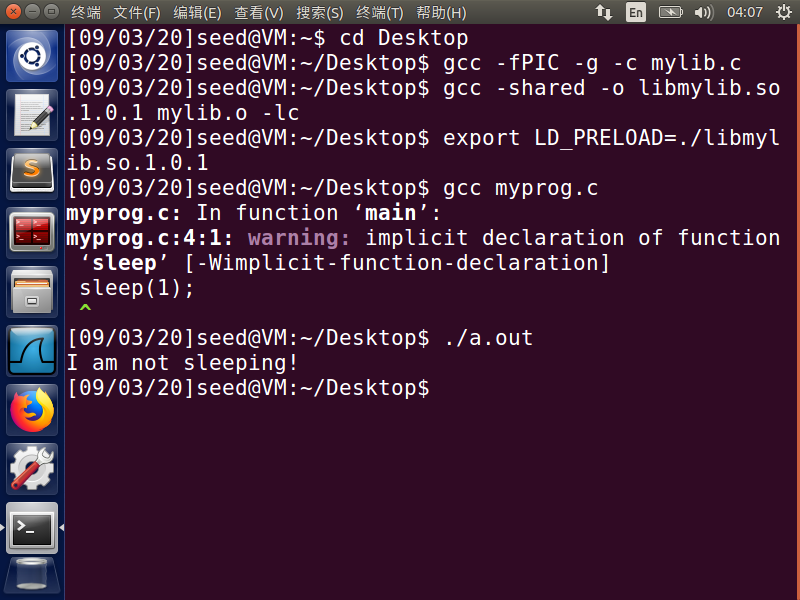
1. 创建一个新的动态链接库，将代码保存为mylib.c，该程序覆盖了原先的sleep()函数；用下列命令编译mylib.c：

gcc -fPIC -g -c mylib.c #fPIC表示编译生成代码与位置无关

gcc -shared -o libmylib.so.1.0.1 mylib.o -lc #让编译器知道是要编译一个共享库

设置LD\_PRELOAD环境变量：export LD\_PRELOAD=./libmylib.so.1.0.1

编译程序myprog.c，得到如下结果



（2）

在以下情况中运行程序：

以普通用户的身份运行程序。

以普通用户运行拥有root权限的SetUID程序。

使a.out成为一个Set-UID 的user1程序，在user2用户（非root用户）中再次设置LD\_PRELOAD环境变量，运行程序。

执行结果：

以普通用户的身份运行程序时，输出：I am not sleeping!

以普通用户运行拥有root权限的Set-UID程序时，无输出。

将a.out设置为拥有root权限的Set-UID程序，在root用户下重设LD PRELOAD环境变量并运行，输出：I am not sleeping!

在user2用户中再次设置LD\_PRELOAD环境变量并运行拥有root权限的Set-UID程序时，输出：I am not sleeping!

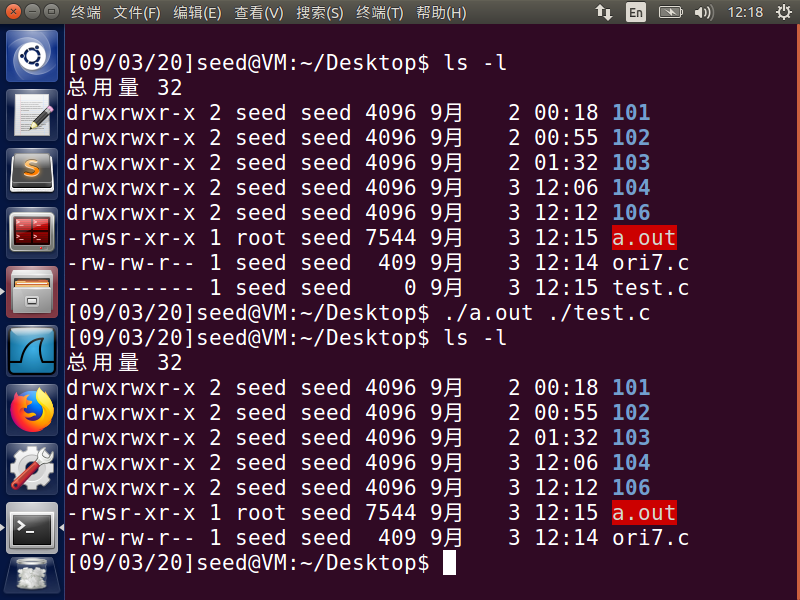
导致以上几次输出不同的原因就在于LD\_PRELOAD环境变量。LD\_PRELOAD环境变量可以影响程序的运行时的链接，它允许用户定义在程序运行前优先加载的动态链接库。这个功能主要是用来有选择性的载入不同动态链接库中的相同函数。故当用户的LD\_PRELOAD环境变量中成功添加了libmylib.so.1.0.1链接库后，就能打印出结果。

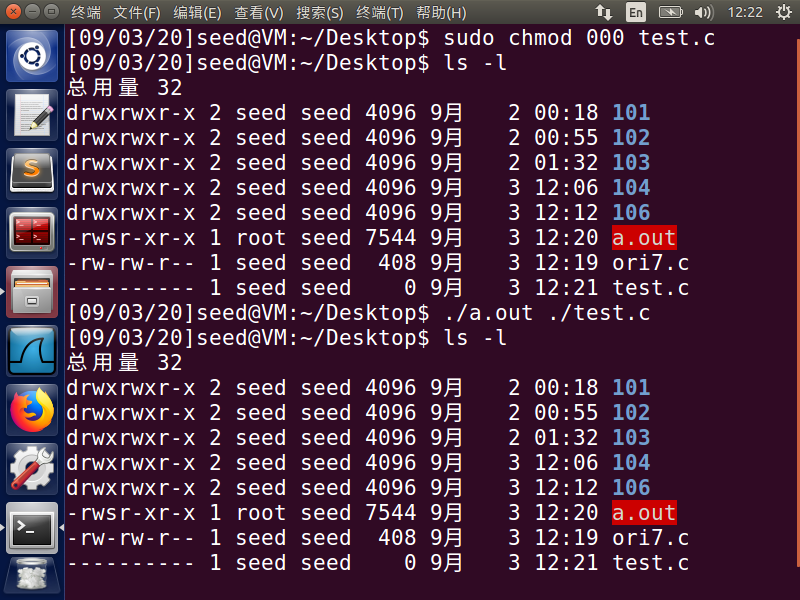
Task 8: Invoking external programs using system() versus execve()

1. 将代码保存为ori7.c ，并设置为拥有root权限的Set-UID程序

若将ori8.c中的v[0] = "/bin/cat"改为v[0] = "rm",即删除命令。创建test.c文件，将其权限改为000，执行以下命令：

./a.out ./test.c

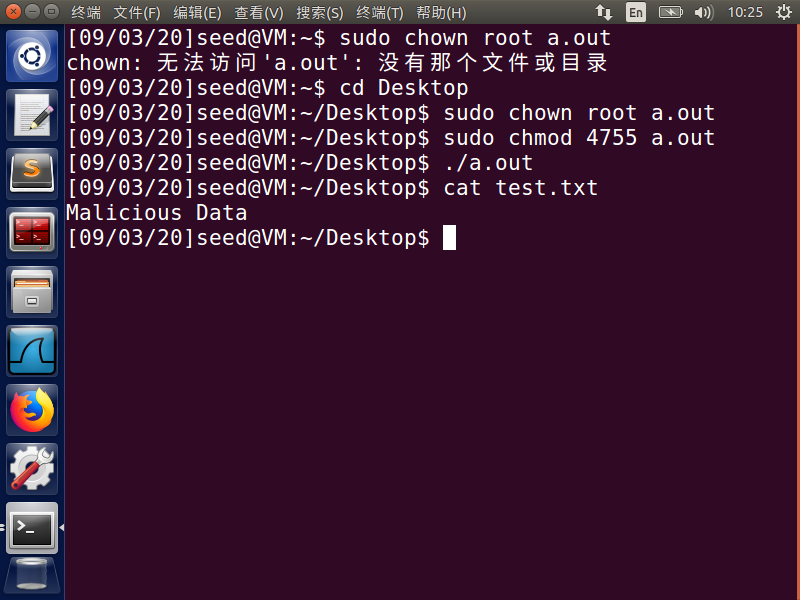
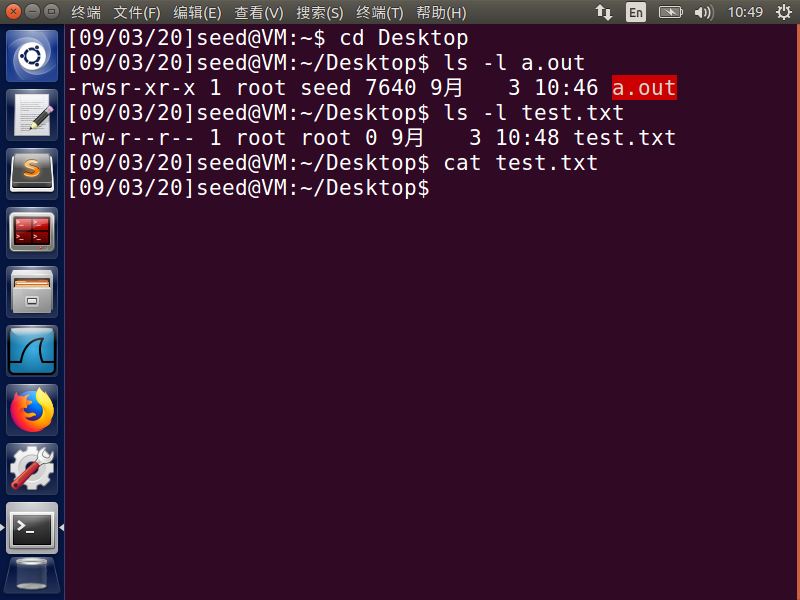
可发现test.c文件被删除。

1. 注释掉system(command)语句，并取消注释execve()语句；程序将使用execve()来调用命令。编译程序，并使其成为Set-UID程序。

可以看见，攻击失效

Task 9: Capability Leaking

将代码保存为ori8.c，结果保存为a.out，测试文件为test.txt，

测试结果如下，字符串被成功写进test.txt

分析其原因是因为其在取消权限前并没有关闭文件，导致seed用户任然可以进行root用户才可以执行的写入操作。