

# SystemTap 安装指南

## 1、Vmware 安装

### 1) Windows 安装 Vmware

下载地址：

[https://my.vmware.com/web/vmware/info/slug/desktop\\_end\\_user\\_computing/vmware\\_workstation\\_pro/14\\_0](https://my.vmware.com/web/vmware/info/slug/desktop_end_user_computing/vmware_workstation_pro/14_0)

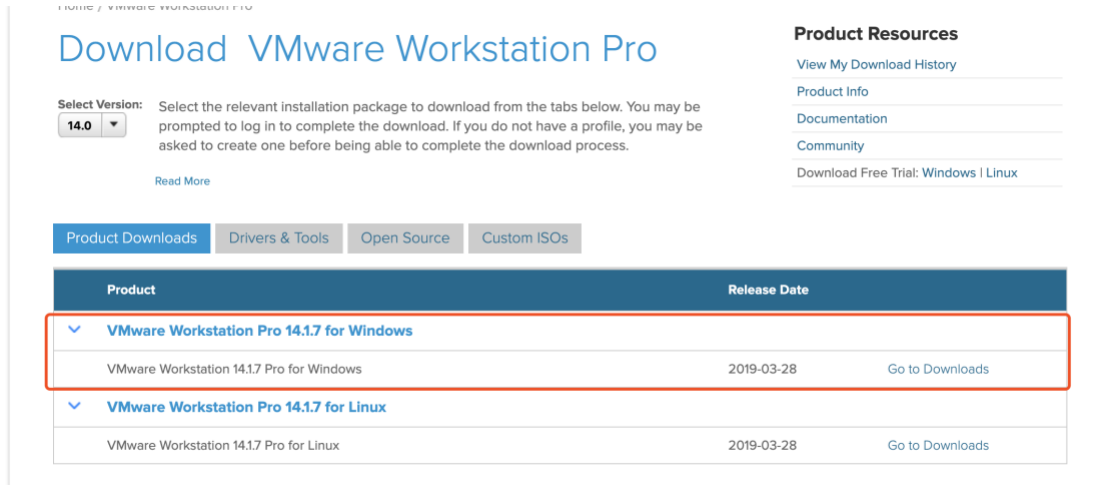


图 1-1 Vmware for Windows 下载

安装可参考：

<https://jingyan.baidu.com/article/e75057f207ea2bebc91a89f9.html>

### 2) Mac 安装 Vmware

下载地址：

[https://my.vmware.com/web/vmware/info/slug/desktop\\_end\\_user\\_computing/vmware\\_fusion/11\\_0](https://my.vmware.com/web/vmware/info/slug/desktop_end_user_computing/vmware_fusion/11_0)

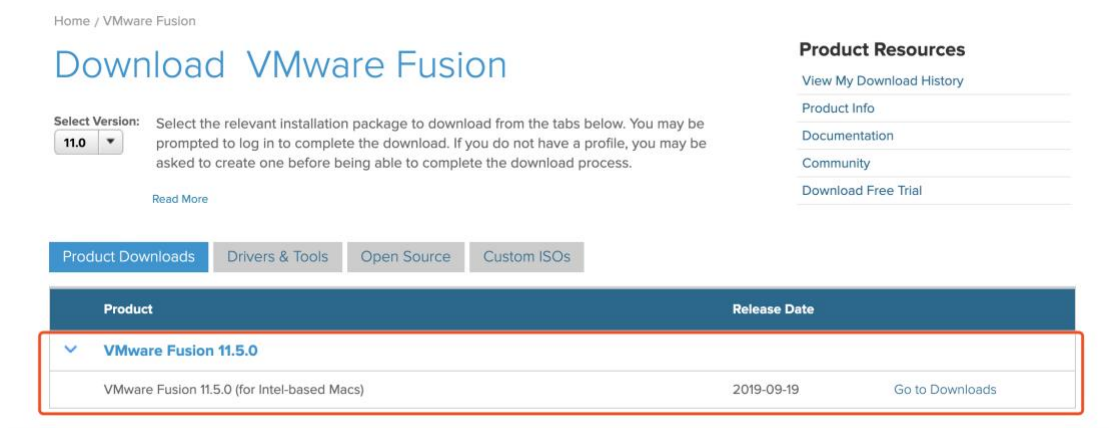


图 1-2 Vmware for Mac 下载

安装可参考：

<https://docs.vmware.com/cn/VMware-Fusion/11/fusion-11-user-guide.pdf>

## 2、Vmware 中安装 CentOS

下载地址：

[http://isoredirect.centos.org/centos/7/isos/x86\\_64/](http://isoredirect.centos.org/centos/7/isos/x86_64/)

**CentOS on the Web: [CentOS.org](#) | [Mailing Lists](#) | [Mirror List](#) | [IRC](#) | [Forums](#) | [B](#)**

In order to conserve the limited bandwidth available, ISO images are not downloadable from mirror.centos.org

The following mirrors in your region should have the ISO images available:

[http://mirrors.huaweicloud.com/centos/7.7.1908/isos/x86\\_64/](http://mirrors.huaweicloud.com/centos/7.7.1908/isos/x86_64/)  
[http://mirrors.nju.edu.cn/centos/7.7.1908/isos/x86\\_64/](http://mirrors.nju.edu.cn/centos/7.7.1908/isos/x86_64/)  
[http://mirrors.zju.edu.cn/centos/7.7.1908/isos/x86\\_64/](http://mirrors.zju.edu.cn/centos/7.7.1908/isos/x86_64/)  
[http://mirrors.cqu.edu.cn/CentOS/7.7.1908/isos/x86\\_64/](http://mirrors.cqu.edu.cn/CentOS/7.7.1908/isos/x86_64/)  
[http://mirrors.cn99.com/centos/7.7.1908/isos/x86\\_64/](http://mirrors.cn99.com/centos/7.7.1908/isos/x86_64/)  
[http://mirrors.neusoft.edu.cn/centos/7.7.1908/isos/x86\\_64/](http://mirrors.neusoft.edu.cn/centos/7.7.1908/isos/x86_64/)  
[http://mirrors.njupt.edu.cn/centos/7.7.1908/isos/x86\\_64/](http://mirrors.njupt.edu.cn/centos/7.7.1908/isos/x86_64/)  
[http://mirror.jdcloud.com/centos/7.7.1908/isos/x86\\_64/](http://mirror.jdcloud.com/centos/7.7.1908/isos/x86_64/)  
[http://mirrors.tuna.tsinghua.edu.cn/centos/7.7.1908/isos/x86\\_64/](http://mirrors.tuna.tsinghua.edu.cn/centos/7.7.1908/isos/x86_64/)  
[http://mirrors.aliyun.com/centos/7.7.1908/isos/x86\\_64/](http://mirrors.aliyun.com/centos/7.7.1908/isos/x86_64/)  
[http://mirrors.163.com/centos/7.7.1908/isos/x86\\_64/](http://mirrors.163.com/centos/7.7.1908/isos/x86_64/)  
[http://ap.stykers.moe/centos/7.7.1908/isos/x86\\_64/](http://ap.stykers.moe/centos/7.7.1908/isos/x86_64/)  
[http://ftp.sjtu.edu.cn/centos/7.7.1908/isos/x86\\_64/](http://ftp.sjtu.edu.cn/centos/7.7.1908/isos/x86_64/)

Other mirrors further away:

图 2-1 CentOS 7 下载

选择上图中任一链接即可进行下载, 以华为为例, 选择第一个链接, 跳转到如下图所示页面:

Index of /mirrors\_os/centos/7.7.1908/isos/x86\_64/

File Name ↓	File Size ↓	Date ↓
Parent directory/	-	-
0_README.txt	2.4 KiB	2019-Sep-17 02:44
CentOS-7-x86_64-DVD-1908.iso	4.3 GiB	2019-Sep-12 02:51
CentOS-7-x86_64-DVD-1908.torrent	87.4 KiB	2019-Sep-17 20:39
CentOS-7-x86_64-Everything-1908.iso	10.3 GiB	2019-Sep-10 03:09
CentOS-7-x86_64-Everything-1908.torrent	103.2 KiB	2019-Sep-17 20:38
CentOS-7-x86_64-LiveGNOME-1908.iso	1.4 GiB	2019-Sep-17 02:57
CentOS-7-x86_64-LiveGNOME-1908.torrent	28.8 KiB	2019-Sep-17 20:39
CentOS-7-x86_64-LiveKDE-1908.iso	1.9 GiB	2019-Sep-17 03:27
CentOS-7-x86_64-LiveKDE-1908.torrent	38.2 KiB	2019-Sep-17 20:39
CentOS-7-x86_64-Minimal-1908.iso	942.0 MiB	2019-Sep-12 03:04
CentOS-7-x86_64-Minimal-1908.torrent	37.3 KiB	2019-Sep-17 20:39
CentOS-7-x86_64-NetInstall-1908.iso	552.0 MiB	2019-Sep-06 19:49
CentOS-7-x86_64-NetInstall-1908.torrent	22.1 KiB	2019-Sep-17 20:39
sha256sum.txt	598 B	2019-Sep-17 04:03
sha256sum.txt.asc	1.4 KiB	2019-Sep-17 20:27

图 2-2 华为云下载 CentOS 7 镜像

安装可参考:

<https://blog.csdn.net/ElliotCs/article/details/79352540>

### 3、 SystemTap 安装

#### 1) 安装 SystemTap 及 SystemTap-runtime

首先切换到 root 用户，输入安装 CentOS7 时设置的 root 密码：

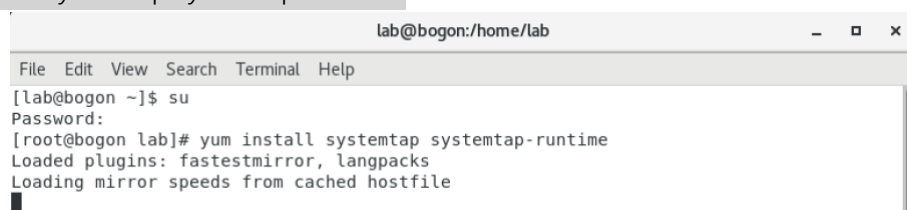


```
lab@bogon:~  
File Edit View Search Terminal Help  
[lab@bogon ~]$ su  
Password: 
```

图 3-1 切换到 root 用户

然后在命令行中运行以下命令：

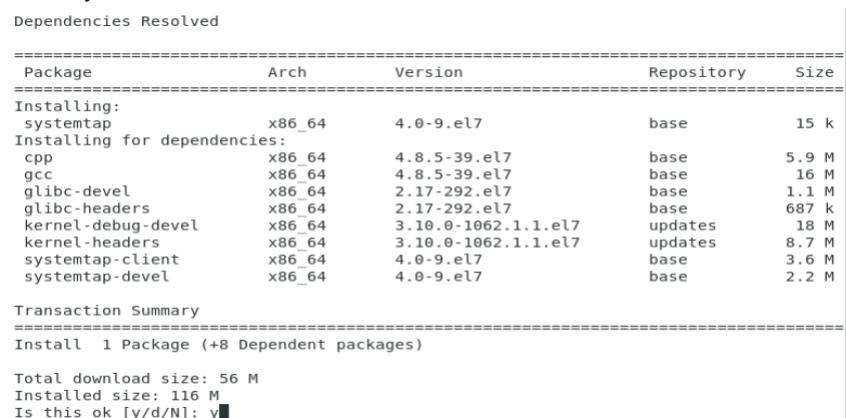
yum install systemtap systemtap-runtime



```
lab@bogon:/home/lab  
File Edit View Search Terminal Help  
[lab@bogon ~]$ su  
Password:  
[root@bogon lab]# yum install systemtap systemtap-runtime  
Loaded plugins: fastestmirror, langpacks  
Loading mirror speeds from cached hostfile  
#
```

图 3-2 安装 SystemTap

到如下界面输入 y 并回车：



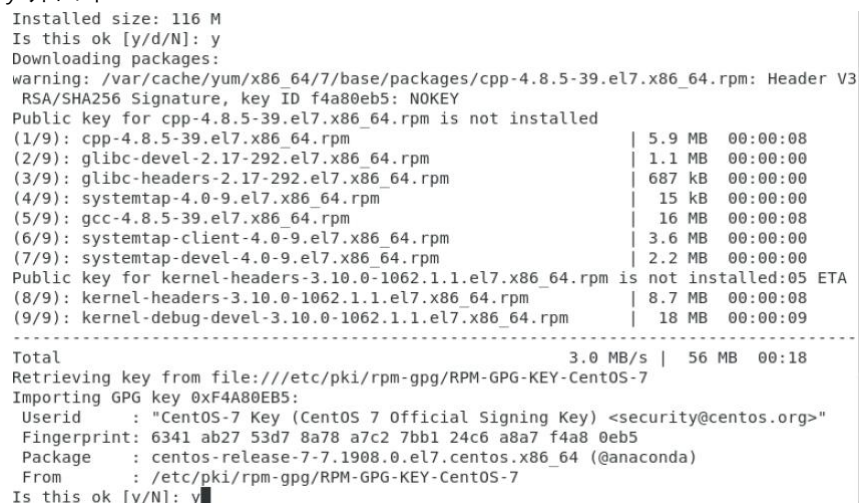
```
Dependencies Resolved  


| Package                      | Arch   | Version             | Repository | Size  |
|------------------------------|--------|---------------------|------------|-------|
| Installing:                  |        |                     |            |       |
| systemtap                    | x86_64 | 4.0-9.el7           | base       | 15 k  |
| Installing for dependencies: |        |                     |            |       |
| cpp                          | x86_64 | 4.8.5-39.el7        | base       | 5.9 M |
| gcc                          | x86_64 | 4.8.5-39.el7        | base       | 16 M  |
| glibc-devel                  | x86_64 | 2.17-292.el7        | base       | 1.1 M |
| glibc-headers                | x86_64 | 2.17-292.el7        | base       | 687 k |
| kernel-debug-devel           | x86_64 | 3.10.0-1062.1.1.el7 | updates    | 18 M  |
| kernel-headers               | x86_64 | 3.10.0-1062.1.1.el7 | updates    | 8.7 M |
| systemtap-client             | x86_64 | 4.0-9.el7           | base       | 3.6 M |
| systemtap-devel              | x86_64 | 4.0-9.el7           | base       | 2.2 M |

  
Transaction Summary  
=====
```

图 3-3 安装确认

继续输入 y 并回车：



```
Installed size: 116 M  
Is this ok [y/d/N]: y  
Downloading packages:  
warning: /var/cache/yum/x86_64/7/base/packages/cpp-4.8.5-39.el7.x86_64.rpm: Header V3  
RSA/SHA256 Signature, key ID f4a80eb5: NOKEY  
Public key for cpp-4.8.5-39.el7.x86_64.rpm is not installed  
(1/9): cpp-4.8.5-39.el7.x86_64.rpm | 5.9 MB 00:00:08  
(2/9): glibc-devel-2.17-292.el7.x86_64.rpm | 1.1 MB 00:00:00  
(3/9): glibc-headers-2.17-292.el7.x86_64.rpm | 687 kB 00:00:00  
(4/9): systemtap-4.0-9.el7.x86_64.rpm | 15 kB 00:00:00  
(5/9): gcc-4.8.5-39.el7.x86_64.rpm | 16 MB 00:00:08  
(6/9): systemtap-client-4.0-9.el7.x86_64.rpm | 3.6 MB 00:00:00  
(7/9): systemtap-devel-4.0-9.el7.x86_64.rpm | 2.2 MB 00:00:00  
Public key for kernel-headers-3.10.0-1062.1.1.el7.x86_64.rpm is not installed:05 ETA  
(8/9): kernel-headers-3.10.0-1062.1.1.el7.x86_64.rpm | 8.7 MB 00:00:08  
(9/9): kernel-debug-devel-3.10.0-1062.1.1.el7.x86_64.rpm | 18 MB 00:00:09  
-----  
Total 3.0 MB/s | 56 MB 00:18  
Retrieving key from file:///etc/pki/rpm-gpg/RPM-GPG-KEY-CentOS-7  
Importing GPG key 0xF4A80EB5:  
Userid : "CentOS-7 Key (CentOS 7 Official Signing Key) <security@centos.org>"  
Fingerprint: 6341 ab27 53d7 8a78 a7c2 7bb1 24c6 a8a7 f4a8 0eb5  
Package : centos-release-7-7.1908.0.el7.centos.x86_64 (@anaconda)  
From : /etc/pki/rpm-gpg/RPM-GPG-KEY-CentOS-7  
Is this ok [y/N]: y
```

图 3-4 安装确认

安装完成:

```
Installed:
  systemtap.x86_64 0:4.0-9.el7

Dependency Installed:
  cpp.x86_64 0:4.8.5-39.el7
  gcc.x86_64 0:4.8.5-39.el7
  glibc-devel.x86_64 0:2.17-292.el7
  glibc-headers.x86_64 0:2.17-292.el7
  kernel-debug-devel.x86_64 0:3.10.0-1062.1.1.el7
  kernel-headers.x86_64 0:3.10.0-1062.1.1.el7
  systemtap-client.x86_64 0:4.0-9.el7
  systemtap-devel.x86_64 0:4.0-9.el7

Complete!
[root@bogon lab]#
```

图 3-5 安装完成

## 2) 查看内核版本

```
[root@bogon lab]# uname -r
3.10.0-1062.el7.x86_64
[root@bogon lab]#
```

图 3-6 查看内核版本

注：后续安装的几个软件包都必须与此版本相同！

## 3) 下载需要的包：

依次下载并安装 kernel-debuginfo-common 和 kernel-debuginfo 两个包，两个依赖包的版本一定要和内核版本相同。Linux 中运行以下命令进行下载：

```
wget https://buildlogs.centos.org/c7.1908.00.x86_64/kernel/20190808101829/3.10.0-1062.el7.x86_64/kernel-debuginfo-common-x86_64-3.10.0-1062.el7.x86_64.rpm
```

```
wget https://buildlogs.centos.org/c7.1908.00.x86_64/kernel/20190808101829/3.10.0-1062.el7.x86_64/kernel-debuginfo-3.10.0-1062.el7.x86_64.rpm
```

也可在浏览器中下载，下载地址：

[https://buildlogs.centos.org/c7.1908.00.x86\\_64/kernel/20190808101829/3.10.0-1062.el7.x86\\_64/](https://buildlogs.centos.org/c7.1908.00.x86_64/kernel/20190808101829/3.10.0-1062.el7.x86_64/)

kernel-debug-3.10.0-1062.el7.x86_64.rpm	2019-08-07 18:31	52M
kernel-debug-debuginfo-3.10.0-1062.el7.x86_64.rpm	2019-08-07 18:34	450M
kernel-debug-devel-3.10.0-1062.el7.x86_64.rpm	2019-08-07 18:31	18M
kernel-debuginfo-3.10.0-1062.el7.x86_64.rpm	2019-08-07 18:31	437M
kernel-debuginfo-common-x86_64-3.10.0-1062.el7.x86_64.rpm	2019-08-07 18:28	61M
kernel-devel-3.10.0-1062.el7.x86_64.rpm	2019-08-07 18:28	18M
kernel-headers-3.10.0-1062.el7.x86_64.rpm	2019-08-07 18:28	8.7M
kernel-tools-3.10.0-1062.el7.x86_64.rpm	2019-08-07 18:28	7.8M
kernel-tools-debuginfo-3.10.0-1062.el7.x86_64.rpm	2019-08-07 18:28	7.8M
kernel-tools-libs-3.10.0-1062.el7.x86_64.rpm	2019-08-07 18:28	7.7M

图 3-7 下载相关 kernel 包

## 4) 安装 kernel-debuginfo-common

```
rpm -ivh kernel-debuginfo-common-x86_64-3.10.0-1062.el7.x86_64.rpm
```

```
[root@bogon Desktop]# ls
kernel-debuginfo-3.10.0-1062.el7.x86_64.rpm  kernel-debuginfo-common-x86_64-3.10.0-1062.el7.x86_64.rpm
[root@bogon Desktop]#

[root@bogon Desktop]# rpm -ivh kernel-debuginfo-common-x86_64-3.10.0-1062.el7.x86_64.rpm
Preparing...
Updating / installing...
 1:kernel-debuginfo-common-x86_64-3.10.0-1062.el7.x86_64.rpm [100%]
[root@bogon Desktop]#
```

图 3-8 安装 kernel-debuginfo-common

## 5) 安装 kernel-debuginfo

```
rpm -ivh kernel-debuginfo-3.10.0-1062.el7.x86_64.rpm
[root@bogon Desktop]# rpm -ivh kernel-debuginfo-3.10.0-1062.el7.x86_64.rpm
Preparing...##### [100%]
Updating / installing...
 1:kernel-debuginfo-3.10.0-1062.el7 ##### [100%]
[root@bogon Desktop]#
```

图 3-9 安装 kernel-debuginfo

注：步骤 4) 和 5) 顺序不能颠倒！

## 6) 安装 kernel-devel

```
yum install kernel-devel-3.10.0-1062.el7.x86_64
[root@bogon lab]# yum install kernel-devel-3.10.0-1062.el7.x86_64
Loaded plugins: fastestmirror, langpacks
Loading mirror speeds from cached hostfile
 * base: mirrors.aliyun.com
 * extras: mirrors.aliyun.com
 * updates: ftp.sjtu.edu.cn
Resolving Dependencies
--> Running transaction check
--> Package kernel-devel.x86_64 0:3.10.0-1062.el7 will be installed
--> Finished Dependency Resolution

Total download size: 18 M
Installed size: 38 M
Is this ok [y/d/N]: y
Downloading packages:
No Presto metadata available for base
kernel-devel-3.10.0-1062.el7.x86_64.rpm
Running transaction check
Running transaction test
Transaction test succeeded
Running transaction
Warning: RPMDB altered outside of yum.
Installing : kernel-devel-3.10.0-1062.el7.x86_64
Verifying : kernel-devel-3.10.0-1062.el7.x86_64

Installed:
kernel-devel.x86_64 0:3.10.0-1062.el7
```

图 3-10 安装 kernel-devel

## 7) 验证安装

```
stap -v -e 'probe vfs.read {printf("read performed\n"); exit()}'
[root@bogon ~]# stap -v -e 'probe vfs.read {printf("read performed\n"); exit()}'
Pass 1: parsed user script and 477 library scripts using 278964virt/76172res/3476shr/72936
data kb, in 480usr/60sys/626real ms.
Pass 2: analyzed script: 1 probe, 1 function, 7 embeds, 0 globals using 446844virt/240708r
es/4860shr/240816data kb, in 1730usr/620sys/2301real ms.
Pass 3: translated to C into "/tmp/stapcBEQNL/stap_9c41bb726ee8679373854a7ab3dc01c8_2770_s
rc.c" using 446844virt/240968res/5120shr/240816data kb, in 20usr/60sys/77real ms.
Pass 4: compiled C into "stap_9c41bb726ee8679373854a7ab3dc01c8_2770.ko" in 5450usr/1360sys
/6717real ms.
Pass 5: starting run.
read performed
Pass 5: run completed in 10usr/110sys/433real ms.
```

图 3-11 验证安装

## 4、 SystemTap 相关资料

- 官网教程

<https://sourceware.org/systemtap/tutorial/>

- 官方示例

<https://sourceware.org/systemtap/examples/keyword-index.html>

对应脚本代码在 CentOS 7 中的 SystemTap 安装目录下：

/usr/share/systemtap/examples

- SystemTap 语法手册

<https://sourceware.org/systemtap/langref/>

- SystemTap 封装函数以及探测点手册:

<https://sourceware.org/systemtap/tapsets/>

- SystemTap 官方文档

<https://sourceware.org/systemtap/documentation.html>

## 5、 补充说明

- 1) SystemTap 在 CentOS 中安装较易成功，在 Ubuntu 中安装 SystemTap 过程较为繁琐，感兴趣的同学可以自己进行实践，本课程 SystemTap 相关实验将在 CentOS 中进行。
- 2) 实验室已经为大家提前安装好了 SystemTap 实验环境，此文档可供同学们在自己的个人电脑上面搭建实验环境时参考。
- 3) SystemTap 安装过程中的相关软件包版本号必须要和所使用的 Linux 系统内核版本号相同，本文中所给版本号仅为示例，若使用其他内核版本的 CentOS 请下载对应版本的软件包进行安装。