

- Take a screenshot of the prompt and the command that ChatGPT generates

ChatGPT 5 ▾

Share ...

what is a single command that includes sudo and its command-line flags that, when executed, lists all TCP sockets in a LISTEN state on an IPv4 address, showing the program that is using it

```
sudo ss -4 -tlnp
```

Explanation:

- `-4` — show only IPv4 sockets
- `-t` — TCP sockets
- `-l` — listening sockets
- `-n` — don't resolve names (show numeric addresses/ports)
- `-p` — show the process/program using the socket

Run that and you'll get a table of IPv4 TCP `LISTEN` sockets with the PID/program column.

🔗 🤗 ⚡ ⌂ ⚡ ...

+ Ask anything



ChatGPT can make mistakes. Check important info.

- Run the command using `sudo` and take a screenshot of the output to include in your lab notebook.

```
Last login: Tue Oct  7 04:58:30 2025 from 35.230.39.87
emmanart@course-vm:~$ sudo ss -4 -tlnp
State      Recv-Q      Send-Q           Local Address:Port          Peer Address:Port      Process
LISTEN      0            4096             127.0.0.53%lo:53          0.0.0.0:*              users:(("systemd-resolve",pid=392,fd=14))
LISTEN      0            128              0.0.0.0:22                0.0.0.0:*              users:(("sshd",pid=697,fd=3))
emmanart@course-vm:~$
```

- List a service that can be contacted from any interface on the machine. List a service that can only be contacted by local processes:

Answer: according to the screen shot the service than can be contacted from any interface on the machine is sshd and the service that can only be contacted by local processes is cupsd.

- List the services that this machine provides for external access:

Answer: From the screenshot it provides sshd on port 0.0.0.0:22 as an external service and as a local/loopback only service it provides these services:

Service	IP Address/Port
systemd-resolved	127.0.0.53%lo:53
Local agent/management socket	127.0.0.1:43129
Local service socket (packagekitd, fwupd, etc)	127.0.0.1:38301
Local service socket	127.0.0.1:38471
Internal system agent (range 6100–6108)	127.0.0.1:6108
Internal system agent (range 6100–6108)	127.0.0.1:6106
Internal system agent (range 6100–6108)	127.0.0.1:6107
Internal system agent (range 6100–6108)	127.0.0.1:6104
Internal system agent (range 6100–6108)	127.0.0.1:6105
Internal system agent (range 6100–6108)	127.0.0.1:6103
Internal system agent (range 6100–6108)	127.0.0.1:6100
Internal system agent (range 6100–6108)	127.0.0.1:6101
postfix or sendmail	127.0.0.1:25
systemd-resolved	127.0.0.54:53
cupsd	127.0.0.1:631
Local service socket	127.0.0.1:35163

- Take a screenshot of the prompt and the command that ChatGPT generates

ChatGPT 5 ✓

 Share ...

give me the "lsof" command and its command-line flags that, when executed, lists all TCP sockets in a LISTEN state on an IPv4 address, showing the program that is using it.

The command you're looking for is:

bash

 Copy code

```
sudo lsof -i4TCP -sTCP:LISTEN -n -P
```

Explanation of each flag:

- `sudo` — run with elevated privileges to see all processes' sockets
 - `-i4TCP` — show only IPv4 TCP network files
 - `-sTCP:LISTEN` — restrict output to LISTEN-state TCP sockets
 - `-n` — do **not** resolve hostnames (faster, shows numeric IPs)
 - `-P` — do **not** resolve port names (shows numeric port numbers)

✓ **Result:** lists all IPv4 TCP sockets currently in a LISTEN state, along with the **program name**, **PID**, **user**, **file descriptor**, and **port** each is using.



+ Ask anything

ChatGPT can make mistakes. Check important info.

- Run the command using sudo and take a screenshot of the output to include in your lab notebook.

```
emmanart@course-vm:~$ sudo lsof -i4TCP -sTCP:LISTEN -n -P
COMMAND PID USER FD TYPE DEVICE SIZE/OFF NODE NAME
systemd-r 392 systemd-resolve 14u IPv4 2983 0t0 TCP 127.0.0.53:53 (LISTEN)
sshd 697 root 3u IPv4 5859 0t0 TCP *:22 (LISTEN)
```

- Show a screenshot of the measured bandwidth available between your us-west1-b VM and each of the other Compute Engine VMs. Explain the relative differences (or lack thereof) in your results.

```
emmanart@vm-us-west1-b:~$ iperf -c 10.132.0.2 -p 80
-----
Client connecting to 10.132.0.2, TCP port 80
TCP window size: 85.0 KByte (default)
-----
[ 1] local 10.138.0.3 port 42446 connected with 10.132.0.2 port 80
[ ID] Interval      Transfer     Bandwidth
[ 1] 0.0000-10.1410 sec   186 MBytes   154 Mbits/sec

emmanart@vm-us-west1-b:~$ iperf -c 10.142.0.2 -p 80
-----
Client connecting to 10.142.0.2, TCP port 80
TCP window size: 85.0 KByte (default)
-----
[ 1] local 10.138.0.3 port 53828 connected with 10.142.0.2 port 80
[ ID] Interval      Transfer     Bandwidth
[ 1] 0.0000-10.1042 sec   403 MBytes   335 Mbits/sec
Last login: Wed Oct  8 22:31:11 ZEST from 172.17.0.2:15
emmanart@vm-us-west1-b:~$ iperf -c 10.152.0.2 -p 80
-----
Client connecting to 10.152.0.2, TCP port 80
TCP window size: 85.0 KByte (default)
-----
[ 1] local 10.138.0.3 port 35948 connected with 10.152.0.2 port 80
[ ID] Interval      Transfer     Bandwidth
[ 1] 0.0000-10.2170 sec   190 MBytes   156 Mbits/sec
emmanart@vm-us-west1-b:~$ []
```

- Take a screenshot of the initial requests for your lab notebook.

The screenshot shows the Network tab of a browser's developer tools. The left sidebar lists numerous requests, many of which are to Google URLs. The main area is the Headers panel, with the 'Headers' tab selected. It contains three sections: General, Response Headers, and Request Headers.

- General:**
 - Request URL: http://google.com/
 - Request Method: GET
 - Status Code: 307 Temporary Redirect
 - Referrer Policy: strict-origin-when-cross-origin
- Response Headers:**
 - Location: https://google.com/
 - Non-Authoritative-Reason: HTTPSUpgrades
- Request Headers:**
 - Upgrade-Insecure-Requests: 1
 - User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/141.0.0.0 Safari/537.36

A note at the bottom of the Request Headers section states: "⚠ Provisional headers are shown. [Learn more](#)".

- What is the URL being requested?

http://google.com

- Explain the HTTP status code that is returned and what the code indicates

The status code is 307 which is a temporary redirect

- Take a screenshot indicating the version of the HTTP protocol that is used for each request. (Hint: look at the response status line and `alt-svc`: HTTP response headers indicating HTTP/2 or HTTP/3).

Name

- google.com
- google.com
- www.google.com
- m=cdos,hsm,jsa,mb4ZUb,cE...
- m=cdos,hsm,jsa,mb4ZUb,cE...
- rs=AA2YrTvgUhcdDJKvAszjr...
- 4UaGrENHsxJlGDuGo1OIIl3...
- KFOmCnqEu92Fr1Mu4mxK...
- KFOICnqEu92Fr1MmWUlfb...
- desktop_searchbox_sprites3...
- data:image/png;base...
- rs=AA2YrTv4eqWEEnGmAQ2...
- gen_204?ei=FAHnaJzZHqzJ...
- hpba?yv=3&cs=0&ei=FAH...
- gen_204?s=webhp&t=aft&...
- gen_204?atyp=csi&ei=FAH...
- gen_204?s=async&atyp=h...
- search?q&cp=0&client=gw...
- m=sb_wiz,aa,abd,U9EYge,sy...
- m=sy15q,sy128,sy107,sy125...
- m=sy1bm,sy1c6,sy1bs,sy1bl...
- rs=ACT90oFT6iZvppuhFNcu...

39 requests | 62.2 kB transferred

Headers		Preview	Response	Initiator	>
General					
Request URL	https://google.com/				
Request Method	GET				
Status Code	301 Moved Permanently (from disk cache)				
Remote Address	142.251.215.238:443				
Referrer Policy	strict-origin-when-cross-origin				
Response Headers					
Alt-Svc	h3=":443"; ma=2592000,h3-29=":443"; ma=2592000				
Cache-Control	public, max-age=2592000				
Content-Length	220				
Content-Security-Policy-Report-Only	object-src 'none';base-uri 'self';script-src 'nonce-JZV3gT70khjyJxO_fBcRZQ' 'strict-dynamic' 'report-sample' 'unsafe-eval' 'unsafe-inline' https: http;report-uri https://csp.withgoogle.com/csp/gws/other-hp				
Content-Type	text/html; charset=UTF-8				
Cross-Origin-Opener-Policy					

- Show the URLs the browser is redirected to via this header:

The only URL the browser is being redirected to is https://google.com/

- Take a screenshot of when cookies are set via **Set-Cookie**:

Name	X	Headers	Preview	Response	Initiator	Timing	>>
google.com	X	Server		gws			
google.com		Set-Cookie		OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=www.google.com			
www.google.com		Set-Cookie		OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=.www.google.com			
m=cdos,hsm,jsa,m...		Set-Cookie		OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=google.com			
m=cdos,hsm,jsa,m...		Set-Cookie		OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=google.com			
rs=AA2YrTvgUhcd...		Set-Cookie		OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=.www.google.com			
4UaGrENHsxJlGDu...		Set-Cookie		OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=google.com			
KFOICnqEu92Fr1...		Set-Cookie		OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=google.com			
desktop_searchbo...		Set-Cookie		OTZ=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=.google.com			
data:image/png;b...		Set-Cookie		SIDCC=AKEyXzWDeRo5WyJ-Hq7qBdORkOrRCYjw1aTe141dnusrQCbrAo27GvBPUsMfKNdMilWJ7SIGyGA; expires=Fri, 09-Oct-2026 00:24:19 GMT; path=/; domain=.google.com; priority=high			
rs=AA2YrTv4eqWE...		Set-Cookie		_Secure-1PSIDCC=AKEyXzUC04X5gf8_R7O_CaXrhzWe2opcnGqsnxmnQDKi-Bep6vdFzZ1tt9xoZk9gUThe3Fwf mNU; expires=Fri, 09-Oct-2026 00:24:19 GMT; path=/; domain=.google.com; Secure; HttpOnly; priority=high			
AF2bZyjIMUhOb...		Set-Cookie		_Secure-3PSIDCC-ΔKFvX7V/hP04IR1nIISiΔ			
KFOICnqEu92Fr1...		Set-Cookie					
hpba?yv=3&cs=0...		Set-Cookie					
ABJXsYp22hSQCI...		Set-Cookie					
gen_204?s=webh...		Set-Cookie					
gen_204?atyp=csi...		Set-Cookie					
search?q&cp=0&...		Set-Cookie					
m=sb_wiz,aa,abd,...		Set-Cookie					
m=sy120,sy11y,sy...		Set-Cookie					
m=sy17c,sy17d,ep...		Set-Cookie					
rs=ACT90oFI5Neh...		Set-Cookie					
client_204?atyp=i...		Set-Cookie					
m=Gnl hfe sv1d4...		Set-Cookie					
89 requests 254 kB tran...							

- Take a screenshot of when cookies are attached via [Cookie](#):

Name	X Headers Preview Response Initiator Timing >
google.com	Accept-Language en-US,en;q=0.9
google.com	Cookie OTZ=8263741_84_88_104280_84_44 6940; HSID=Apfr4EneSe_OtPerG; SSID=ALZqlNqCTw0tlpJwh; APISID=qGU0LTFLn8OdZNhM/AnuN PWaRnGHtH32M8; SAPISID=3HR1uZyUSQLM9sq2/AihK hH146EwS5wubO; __Secure- 1PAPISID=3HR1uZyUSQLM9sq2/Aih KhH146EwS5wubO; __Secure- 3PAPISID=3HR1uZyUSQLM9sq2/Aih KhH146EwS5wubO; SID=g.a0001wigAkVE0RW5P3JIOz UyZQAt3WwczhG99D6NFjcFoGYtSA VnFx8jAFfrsS04MH8MJJgnQACgYKA RISARcSFQHGx2Mi3UMiVDxdH0oBi 8VIHzdwJRoVAUF8yKpXGDIzOSsDb8 C3pqfO42lb0076; __Secure- 1PSID=g.a0001wigAkVE0RW5P3JIO OzUyZQAt3WwczhG99D6NFjcFoGYt SAVDhS6edO4liLqz24iba3ShQACgYK AvgSARcSFQHGx2MiYzUG7liK1ztSzx WojojYwBoVAUF8yKoy3parZVaCDA9 _A_2UyQvi0076; __Secure- 3PSID=g.a0001wigAkVE0RW5P3JIO OzUyZQAt3WwczhG99D6NFjcFoGYt SAVPknWX0cjUClWtaJxt35wACgYK ASYSARcSFQHGx2Miyzu1yQEjYUzLu BH_EtEmBRoVAUF8yKo0onPmrTX9y ZJRyCddShzE0076; NID=525=NQGHOUv55dLCZA5KPbx NbixeChAyDLuJ0- DGncHDMZde2AHqjsPTP3qBMmkLI
www.google.com	
m=cdos,hsm,jsa,m...	
m=cdos,hsm,jsa,m...	
rs=AA2YrTvgUhcd...	
4UaGrENHsxJIGDu...	
KFOICnqEu92Fr1...	
desktop_searchbo...	
data:image/png;b...	
rs=AA2YrTv4eqWE...	
AF2bZyjIMUhOb_...	
KFOmCnqEu92Fr1...	
hpba?yv=3&cs=0...	
ABJXsYp22hSQCI...	
gen_204?s=webh...	
gen_204?atyp=csi...	
search?q&cp=0&...	
m=sb_wiz,aa,abd,...	
m=sy120,sy11y,sy...	
m=sy17c,sy17d,ep...	
rs=ACT90oFI5Neh...	
client_204?atyp=i...	
m=Gnl h6e sv1d4 ...	
92 requests 255 kB tran	

- Show the requests and responses in the listing. Click on the last request sent, then click on the response to see that its payload has returned the data that is then rendered on the search page similar to what is shown below for "rabbid"

About Store

Gmail Images

Sign in

Google

Portland State

Portland State University Library
University library - 1875 SW Park Ave, Portland, OR

Portland State University
Public university in Portland, Oregon

portland state farmers market
Portland Farmers Market at PSU - 1803 SW Park Ave, Portland, OR

portland state university admissions
Undergraduate Admissions - Academic and Student Recreation Center, 1800 SW 6th Ave #101, Portland, OR

portland state rec center
PSU Campus Recreation Center - 1800 SW 6th Ave, Portland, OR

Portland State Vikings football
Football team

portland state bookstore
Portland State University Bookstore - 1715 SW 5th Ave, Portland, OR

Portland State University jobs

Portland State academic calendar

Portland State football schedule

Select folder

Elements Console Sources Network Performance > Select folder

Preserve log Disable cache No throttling

Filter All Fetch/XHR Doc CSS JS Font Img Media Manifest Socket Wasm Other

50,000 ms 100,000 ms 150,000 ms 200,000 ms 250,000 ms

Name Headers Payload Preview Response

1)
-]
-)'
2 [{"portland state university library":46,

22 / 90 requests | 27.4 kB / 195 kB