How to determine if a process runs inside lxc/Docker?

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Asked 10 years, 11 months ago Modified 4 months ago Viewed 118k times

263

Is there any way to determine if a process (script) runs inside an lxc container (~ Docker runtime)? I know that some programs are able to detect whether they run inside a virtual machine, is something similar available for lxc/docker?

linux bash docker

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edited Apr 7, 2018 at 22:40
Ciro Santilli OurBigBook.com
377k 115 1.3k 1.1k

asked Nov 15, 2013 at 20:42
Mate Varga
3,386 2 16 18

It might seem pedantic, but it would be best to rephrase your question to describe a problem you're having and ask how to solve it -- without that, the question stands a higher chance of being closed. In many cases it's difficult to make that change but in yours it wouldn't be hard to simply rephrase if you wish. – mah Nov 15, 2013 at 21:04

there is an interesting response when issuing this command while inside a container : uptime – Scott Stensland Feb 19, 2017 at 1:16

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19 Answers

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257

it is created on container startup.

You can run this script to verify:

```
#!/bin/bash
if [ -f /.dockerenv ]; then
    echo "I'm inside matrix ;(";
else
    echo "I'm living in real world!";
fi
```

MORE: Ubuntu actually has a bash script: `/bin/running-in-container` and it can return the type of container it has been invoked in. Might be helpful. Don't know about other major distros though.

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edited May 15, 2022 at 6:09

Archimedes Trajano

40.5k • 24 • 201 • 327

answered Aug 27, 2014 at 3:09

at0S

4,846 • 2 • 15 • 10

4 On Debian `/bin/running-in-container` is provided by `upstart`. With the transition to systemd it might go away. I hope not - it sounds useful! – Max Murphy Sep 1, 2016 at 9:12

9 Others have pointed out that checking `.dockerenv` is not recommended – Dave Sep 25, 2018 at 10:53

7 Note: testing for .dockerenv works only if the runtime is docker daemon. If you are using podman or something else this fails. – Ben Kircher Sep 7, 2019 at 10:13

2 It's Aug 2020 and `/.dockerenv` is available on ubuntu:20.04 and alpine:3.12, so I'd say that's definitely the best answer – Meir Gabay Aug 6, 2020 at 11:12

3 Ubuntu 18.0.4 doesn't have `/bin/running-in-container`. – Daniel Griscom Oct 19, 2020 at 12:58

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210

The most reliable way is to check `/proc/1/cgroup`. It will tell you the control groups of the init process, and when you are *not* in a container, that will be `/` for all hierarchies. When you are *inside* a container, you will see the name of the

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edited Jul 2, 2019 at 2:44
tshepang
12.4k • 24 • 95 • 139

answered Nov 15, 2013 at 23:36

jpetazzo
15.5k • 3 • 44 • 46

14 docker now uses `docker` instead of `lxc` in those paths – Andy Nov 21, 2015 at 16:29

6 Does not work for lxd/lxc containers, but stackoverflow.com/a/20010626/170230 does. – Draco Ater Jun 8, 2016 at 6:39

3 With later versions of systemd it looks like you can't rely on process 1 using `/` for all cgroups; on my Debian 9 system (systemd 232) only three of the ten cgroups (`3:cpuset`, `4:perf_event` and `7:freezer`) are at root; the rest are under `/init.scope`. That said, I think that searching that file for `:/docker/` is probably the most reliable heuristic at the moment. – cjs Feb 28, 2018 at 7:40

4 Not working for me. Host Ubuntu 19.04, guest Ubuntu 18.04 using LXC privileged container. /proc/1/cgroup does NOT contain the lxc string. – Gab Sep 1, 2019 at 11:51

11 On my docker image: cat /proc/1/cgroup 0::/ so doesn't work. – Brett Sutton Nov 18, 2021 at 10:54

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On a new ubuntu 16.04 system, new systemd & lxc 2.0

```
sudo grep -qa container=lxc /proc/1/environ
```

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answered Mar 2, 2016 at 15:12

larss
301 • 3 • 2

2 This works for me on Ubuntu focal 20.04. None of the answers above this point did. – Jonathan Hartley Apr 23, 2020 at 15:18

Thanks! it works for lxc! Can you please explain why '-a' is needed? Isn't `grep -q container=lxc /proc/1/environ` enough? – Alek Apr 28, 2021 at 16:55

1 `/proc/$$/environ` separates environment variables with null bytes. Without `-a`, this passage from the man page applies: > By default, TYPE is binary, and grep suppresses output after null input binary data is discovered – Adam Azarchs Sep 22, 2021 at 20:56

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21

A concise way to check for docker/lxc in a bash script is:

```
#!/bin/bash
if grep -sq 'docker\|lxc' /proc/1/cgroup; then
    echo "I am running on Docker."
fi
```

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edited Jun 15, 2022 at 17:14
Ömer An
654 ● 6 ● 17

answered Jan 10, 2017 at 1:40
oNaiPs
651 ● 7 ● 15

Thanks @DanielGriscom that looks way better. – oNaiPs Mar 29, 2021 at 20:53

This didn't work when my container was running within kubernetes. – erik Jun 22, 2021 at 15:02

FYI the echo command should use double quotes due to the single quote in "I'm" – TommyD Feb 14, 2022 at 14:56

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17

Handy Python function to check if running in Docker:

```
def in_docker():
    """ Returns: True if running in a Docker container, else False
    with open('/proc/1/cgroup', 'rt') as ifh:
        return 'docker' in ifh.read()
```

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edited Jan 31 at 21:22
Josh Correia
4,279 ● 3 ● 40 ● 61

answered Mar 8, 2017 at 15:09
JJC
9,983 ● 8 ● 50 ● 55

5 Important Note! This does not appear to work when the container is running in kubernetes. Instead, replace the last line with 'kubepod' in place of 'docker'. (Or, put in an "or" statement that checks for both ;)) – JJC Jan 13, 2019 at 3:20

2 It's `kubepods` I guess. – rookie099 Aug 29, 2019 at 7:53

14

As of 2022, with lxd v4.0+, none of the answers so far work for both docker and lxc.

- A `.dockerenv` file doesn't work for non-docker containers.
- Checking that all hierarchies in `/proc/1/cgroup` are `/` kinda maybe works. However, some hierarchies on non-containers are `/init.scope` (Ubuntu 20.04 cgroup 0 and 1). So also not entirely reliable.
- Checking for `container=lxc` in `/proc/1/environ` works for lxc but not docker. Also, it requires root rights.

The only way I've found so far that works reliably on both CentOS and Ubuntu with lxc (4.0) containers and Docker, and *also* doesn't require root rights, is to check PID 2.

On all host systems, PID 2 is `kthreadd`:

```
$ ps -p 2
  PID TTY          TIME CMD
    2 ?        00:00:00 kthreadd
```

In containers, this PID either doesn't exist, or isn't kthreadd. Both docker and lxc show:

```
root@85396f8bce58:/# ps -p 2
    PID TTY          TIME CMD
root@85396f8bce58:/#
```

The best way seems to be to check `/proc/2/status`:

```
$ head -n1 /proc/2/status
Name:   kthreadd
```

So something like this seems to work:

```
if [ -n "$(grep 'kthreadd' /proc/2/status 2>/dev/null)" ]; then
    echo "Not in container"
else
```

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answered May 6, 2022 at 6:08

Ferry Boender
768 ● 1 ● 7 ● 14

4 Running docker on macOS; have no pid 2 normally. – Daniel Widdis Jul 6, 2022 at 21:26

With lxd 5.8, no process seen with pid 2 – Prem Anand Dec 6, 2022 at 11:09

With Windows 10, WSL 2 distribution Ubuntu 22.04.1, it does not have process of pid 2. But it certainly is not docker environment. – zerox May 8, 2023 at 4:43

You can simplify the if statement to `if ! grep -q kthreadd /proc/2/status 2>/dev/null; then; echo "In container"; fi` – Alex Henrie Feb 5 at 22:30

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12

We use the proc's sched (/proc/$PID/sched) to extract the PID of the process. The process's PID inside the container will differ then it's PID on the host (a non-container system).

For example, the output of /proc/1/sched on a container will return:

```
root@33044d65037c:~# cat /proc/1/sched | head -n 1
bash (5276, #threads: 1)
```

While on a non-container host:

```
$ cat /proc/1/sched  | head -n 1
init (1, #threads: 1)
```

This helps to differentiate if you are in a container or not.

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answered May 4, 2016 at 0:00

Founder
619 ● 6 ● 6

Depending on the OS, "init" might need to be replaced by "systemd". More information on systemd here. – BrianV Jun 23, 2017 at 1:50

2 This seems to only work on Docker. In an LXC container It's returning Systemd PID 1 – MillerGeek May 2, 2018 at 14:32

3 It's now returning 1 in docker as well. It is usually `sh` and not `init` there, but it may be almost anything in either. – Jan Hudec May 6, 2020 at 14:58

5 Under docker, this is no longer the case - `bash-5.0# cat /proc/1/sched bash (1, #threads: 1)` – shalomb Jun 4, 2020 at 10:57

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9

The easiest way would be to check the environment. If you have the `container=lxc` variable, you are within a container.

Otherwise, if you are root, you can try to perform `mknod` or `mount` operation, if it fails, you are most likely in a container with dropped capabilities.

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answered Nov 15, 2013 at 21:09

creack
121k 12 100 73

This one works not only for docker (I didn't check that), but more importantly for lxd/lxc containers (checked), where `/proc/1/cgroup` does not allow you to detect that. – Draco Ater Jun 8, 2016 at 6:37

5 can you edit the answer with code instead of pseudocode? "container=lxc" ?is not proper anything. do you mean something like if [["lxc" = "$container"]] ? – Alexander Mills Dec 20, 2016 at 10:20

4 I mean...it is weird, usually env variables are in all caps, so looking for some precision here – Alexander Mills Dec 20, 2016 at 10:22

14 `docker run alpine env` does not give anything that looks like that variable – Archimedes Trajano Mar 10, 2019 at 16:01

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7

This is an old question, but a REALLY good one. :)

I've written some automation scripts that we run on baremetal, VM and in a docker container, with logic branching based on which platform the script is executing on. In my case I have the privilege of creating both the container and the docker image, so this solution will only work if you are in control of the entire stack:

```
FROM ubuntu:18.04

ENV PLATFORM="docker"

RUN apt update; \
...
```

The script can then just check the value of `$PLATFORM` for desired outcomes on each platform:

```
#!/bin/bash

# Check for executor specification in environment
case $PLATFORM in
  docker)
    # If running in Docker, do this stuff
    echo "Running containerized, proceeding..."
    ;;
  virtual)
    # If running in a VM, do different stuff
    echo "Running on a VM, loading VM stuff..."
    modprobe some-kernel-module
    ;;
  *)
    echo "Unknown executor specified! Exiting..."
    exit 1
    ;;
esac
```

I've omitted baremetal in the above code to keep it concise.

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answered Nov 26, 2020 at 5:17

mainmachine
307 ● 5 ● 10

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4

Check for all the solutions above in Python:

```
import os

def in_container():
    proc_1 = r'/proc/1/sched'

    if os.path.exists(proc_1):
```

```
        out = ''

    checks = [
        'docker' in out,
        '/lxc/' in out,
        out.split(' ')[0] not in ('systemd', 'init',),
        os.path.exists('./dockerenv'),
        os.path.exists('/.dockerenv'),
        os.path.exists('/.dockerinit'),
        os.getenv('container') is not None
    ]
    return any(checks)


if __name__ == '__main__':
    print(in_container())
```

Proof of concept:

```
$ docker run --rm -it --mount type=bind,source=${PWD}/incontainer.p
True
```

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edited Jun 1, 2023 at 22:39

answered Sep 26, 2017 at 22:54

blakev
4,419 ● 2 ● 37 ● 52

This didn't work for me on Mac based docker container. Returns empty. Docker version 2.1.0.1 (37199). – splintercell Nov 26, 2019 at 18:01

This one did: `def is_non_docker():  return os.path.exists('/proc/1/cgroup')` as per the accepted answer here stackoverflow.com/questions/20010199/... – splintercell Nov 26, 2019 at 18:08

7 You get a Useless Use Of Cat Award. And Useless Use Of Subprocess one. – Jan Hudec May 6, 2020 at 15:00

Yeah this is a whole new level of unnecessary `cat` ! Nice one :-D – Timmmm May 7, 2020 at 7:14

You're right, I'll update it the answer even though it's still not all-encompassing. @JanHudec – blakev May 7, 2020 at 17:32

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3

which container you're in (if at all).

In particular, install and read the code of this bash script which seems to work pretty well:

virt-what :

```
sudo apt install virt-what
```

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edited Apr 13, 2017 at 12:36
Community Bot
1 • 1

answered Apr 1, 2017 at 3:08

kaiwan
2,144 • 1 • 18 • 25

Doesn't work with `virt-what` version 1.14-1 on Ubuntu 16.04. Needs patch. – Lucas Jan 4, 2018 at 22:23

Interestingly, inside docker on windows, `virt-what` reports `hyperv`, just as my WSL2 bash shell does. – Peter V. Mørch Mar 3, 2021 at 6:44

This does work in Ubuntu 20.04, it greps for "lxc" in /proc/1/environ – teknopaul Jun 22, 2021 at 21:05

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3

In a docker container, entries `/proc/self/cgroup` are mounted to cgroups on the host.

e.g. in a container

```
# awk -F: '/cpuset/' /proc/self/cgroup
3:cpuset:/docker/22bd0c154fb4e0d1b6c748faf1f1a12116acc21ce287618a11
```

whereas, the same on the host

```
$ awk -F: '/cpuset/' /proc/self/cgroup
3:cpuset:/
```

Using something in the shell for a low profile test

```
}

if is_running_in_container; then
  echo "Aye!! I'm in a container"
else
  echo "Nay!! I'm not in a container"
fi
```

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edited Oct 7, 2022 at 19:50

answered Jul 15, 2018 at 21:13

shalomb
3,635 ● 2 ● 24 ● 19

Returns 1 on both. – sorin Feb 1, 2020 at 14:37

Works! Thanks! @sorin, it actually returns 1 only on host-level, but inside container returns zero. – Dmitry Shevkoplyas Oct 5, 2022 at 23:53

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2

My answer only applies for **Node.js processes** but may be relevant for some visitors who stumble to this question looking for a Node.js specific answer.

I had the same problem and relying on `/proc/self/cgroup` I created an **npm package** for solely this purpose — to detect whether a Node.js process runs inside a Docker container or not.

The containerized npm module will help you out in Node.js. It is not currently tested in Io.js but may just as well work there too.

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answered Sep 23, 2015 at 23:05

Martin Tajur
6,140 ● 1 ● 22 ● 15

Thanks for this module, seems to be a couple of open fixes pending - are you still maintaining this? – stevokk Aug 2, 2018 at 8:51

This module is no longer maintained. Additionally, a Node.js module that detects non-Docker container environments is needed. – Jeff Apr 29, 2022 at 14:12

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I have translated JJC's answer into ruby

2

```
    return contents =~ /docker/i || contents =~ /kubepod/i
  end
rescue StandardError => e
  p 'Local development'
  p e
  false
end
```

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edited Jun 26, 2019 at 4:09

answered Jun 26, 2019 at 3:26

Souradeep Nanda
3,256 ● 2 ● 33 ● 48

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2

A little bit of off topic, you can check **if you're in a container or not** in two ways:

1. `cat /proc/1/environ|tr "\0" "\n"|grep container` : you will see `container` variable if you're in a container.
2. `ps -ef | grep '\['` : you will see nothing but only the grep process when you're in a container, which means there's no kernel process that you can see (e.g. `[kthreadd]`). Caution: normal macOS also don't show kernel processes.

reference: this linux quiz page

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answered Dec 24, 2022 at 13:58

Roeniss
406 ● 7 ● 16

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1

Here's a solution in Ruby,

```
# Usage: DockerHelper.running_in_docker?
module DockerHelper
  extend self

  def running_in_docker?
    !!(File.read("/proc/1/cgroup") =~ %r[^\d+:\w+:/docker/]) # !! =
  rescue Errno::ENOENT
    false
  end
end
```

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answered Sep 24, 2020 at 20:56

tantrix
1,277 12 15

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1

The golang code get pid container_id and you can get map container_id get docker image

```
func GetContainerID(pid int32) string {
    cgroupPath := fmt.Sprintf("/proc/%s/cgroup", strconv.Itoa(int(p
    return getContainerID(cgroupPath)
}

func GetImage(containerId string) string {
    if containerId == "" {
        return ""
    }
    image, ok := containerImage[containerId]
    if ok {
        return image
    } else {
        return ""
    }
}
func getContainerID(cgroupPath string) string {
    containerID := ""
    content, err := ioutil.ReadFile(cgroupPath)
    if err != nil {
        return containerID
    }
    lines := strings.Split(string(content), "\n")
    for _, line := range lines {
        field := strings.Split(line, ":")
        if len(field) < 3 {
            continue
        }
        cgroup_path := field[2]
        if len(cgroup_path) < 64 {
            continue
        }
        // Non-systemd Docker
        //5:net_prio,net_cls:/docker/de630f22746b9c06c412858f26ca28
        //3:net_cls:/kubepods/burstable/pod5f399c1a-f9fc-11e8-bf65-
```

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answered Dec 15, 2020 at 9:45

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0

Docker is evolving day by day, so we can't say for sure if they are going to keep `.dockerenv .dockerinit` in the future.

In most of the Linux flavours `init` is the first process to start. But in case of containers this is not true.

```
#!/bin/bash
if ps -p1|grep -q init;then
  echo "non-docker"
else
  echo "docker"
fi
```

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answered May 11, 2016 at 3:36

Govind Kailas
2,894 • 6 • 23 • 25

6 @RomanTrofimov LXC/Docker doesn't either. What a funny comment. – abourget Mar 3, 2017 at 17:41

2 It does not work in centos 7 as well. When I run in my host machine it says docker. Looks like systemd is running as process id 1 – Venkateswara Rao Jan 26, 2018 at 5:02

@VenkateswaraRao - This must be run inside the container. The intent is to find out if you are inside a docker container or not. – Govind Kailas Jan 30, 2018 at 4:43

1 @GovindKailas: The problem is that this assumes that the normal PID one is `init`, which is not true on `systemd` or `launchd` based systems... – Gert van den Berg Feb 16, 2018 at 14:24

3 @SamThomas: launchd, upstart, Solaris SMF, systemd, Sys V style init, BSD style init (these two and some others might call their PID 1 `init` though), OpenRC, initng, runit. See here. Most modern Linux-based systems would use `systemd`, some older ones, upstart.... All modern OS X systems would use `launchd` – Gert van den Berg May 23, 2018 at 8:16

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-7

Maybe this do the trick:

```
if [ -z $(docker ps -q) ]; then
    echo "There is not process currently running"
```

Is that what you want? Hope it helps =)

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edited Apr 16, 2020 at 18:53

answered Jun 11, 2018 at 15:15

Leonardo Da Vinci
65 ● 2 ● 9

2 No `docker` binary is available from inside of container, obviously. – toriningen Jul 5, 2018 at 17:02

3 Umm, this would fail in situations (e.g. gitlab docker-in-docker) where the controlling container has `docker` and access to the hosts' docker socket. – shalomb Jul 15, 2018 at 21:02

2 yeah, you're right, of course there isn't ^^. I got the wrong interpretation about the question back at the time when I read it. Thank you, Shalomb. – Leonardo Da Vinci Apr 16, 2020 at 18:51

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