

# Qualcomm RB6 Platform Robotics SDK Manager User Guide

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## Qualcomm Thundercomm AIOT ENABLER Robotics SDK Manager User Guide Rev. K Aug 21, 2023



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## Revision History

Revision	Date	Description
A	Jul 30, 2020	Initial release.
B	Oct 27, 2020	<ul style="list-style-type: none"> <li>· Add information on Windows 10 Professional and Windows 10 Enterprise operation.</li> <li>· Update TROUBLESHOOTING.</li> </ul>
C	Dec 14, 2020	Optimize file construction.
D	Jul 29, 2022	Add contents to make this user guide compatible with RB6.
E	Jan 12, 2023	<ul style="list-style-type: none"> <li>· Add disk requirements in Chapter 2.</li> <li>· Update Step 5 in Chapter 5.</li> <li>· Update Step 4 in Chapter 6.</li> <li>· Update Step 9 – 4) in Chapter 7.</li> </ul>
F	Mar 31, 2023	<p>Add contents to make this document compatible with RB2 platform:</p> <ul style="list-style-type: none"> <li>· Update Chapter 1. Overview.</li> <li>· Update the download link of SDK manager in Chapter 4. SDK Manager Download and Unzip.</li> <li>· Update Chapter 5.</li> <li>· Add Figure 5-3, Figure 5-4, Figure 7-3 and Figure 7-4.</li> <li>· Fix command font problem.</li> </ul>
G	Apr 10, 2023	<ul style="list-style-type: none"> <li>· Restructure the document.</li> <li>· Add RB5 LU2.0 relevant info. throughout this document:</li> </ul> <p>Y Chapter 1. Overview</p> <p>Y Chapter 3. System and Disk Requirements</p> <p>Y Chapter 4. Download SDK Manager</p> <p>Y Chapter 5. On Ubuntu Host</p> <p>Y Chapter 6. Generate Ubuntu Docker Image</p> <p>Y Step 4 and 5 in Chapter 7. On Windows 10 (64-bit) Host</p>
H	Apr 19, 2023	Update the note at the beginning of <a href="#">Chapter 5. On Ubuntu Host.</a>
I	May 08, 2023	Update <a href="#">Chapter 7. On Windows 10 (64-bit) Host.</a>
J	June 09, 2023	<ul style="list-style-type: none"> <li>· Restructure the document.</li> </ul> <p>Y Update <a href="#">4.1.1. OS version is recommended version.</a></p> <p>Y Update <a href="#">4.2. On Windows 10 (64-bit) Host.</a></p> <p>Y Update <a href="#">Table 5-1. Troubleshooting information.</a></p> <p>Y Update <a href="#">Table 6-1. For additional reference please refer to: .</a></p>
K	Aug 21, 2023	<ul style="list-style-type: none"> <li>· Update <a href="#">Chapter 1. Overview.</a></li> <li>· Update <a href="#">3.1. OS requirements.</a></li> <li>· Update <a href="#">Chapter 4. SDK Manager Operation Process .</a></li> </ul>

## Table List

[Table 5-1. Troubleshooting information](#)

[Table 6-1. For additional reference please refer to:](#)

## About This Document

- Illustrations in this documentation might look different from your product.
- Depending on the model, some optional accessories, features, and software programs might not be available on your device.
- Depending on the version of operating systems and programs, some user interface instructions might not be applicable to your device.
- Documentation content is subject to change without notice. Thundercomm makes constant improvements on the documentation of the products, including this guidebook.
- Function declarations, function names, type declarations, attributes, and code samples appear in a different format, for example, `cp armcc armcpp`.
- Code variables appear in angle brackets, for example, `<number>`.
- Button, tool, and key names appear in bold font, for example, click **Save** or press **Enter**.
- Commands to be entered appear in a different font; on the host computer use \$ as shell prompt, while on the target device use # as shell prompt, for example,  
**\$ adb devices**  
**# logcat**
- Part of the code that does not contain instructions appear in a different format, for example,  
**SUBSYSTEM=="usb", ATTR{idVendor}=="18d1", MODE=="0777", GROUP="adm"**
- Folders, path and files are formatted in italic, for example, *turbox\_flash\_flat.sh*.

## Overview

SDK Manager provides a complete set of tools for generating and flashing the RBx firmware, supporting systems including Ubuntu 16.04, Ubuntu 18.04, Ubuntu 20.04, Windows 10 Professional (64-bit) and Windows 10 Enterprise (64-bit).

V4.0.0 supports the following products:

- Robotics RB1 Platform
- Robotics RB2 Platform
- Robotics RB5 Platform
- Robotics RB5N (Non-Pop) Platform
- Robotics RB6 Platform

## Read This First

- To register a Thundercomm Account, go to <http://www.thundercomm.com>.
- Keep the internet connected during the image generation.
- The full process lasts for at least 40 minutes, depending on Internet speed.
- A working directory is needed to be built with the write and read permission in SDK Manager. For Docker container user, create your target directory under `/home/hostPC/`.
- Docker Desktop is only supported on Windows 10 Professional (64-bit) and Windows 10 Enterprise (64-bit) system.
- Before flashing full build, generate the image first.
- USB 3.0 port and USB 3.0 cable are recommended for flashing images.

- When flashing the device on a Linux host, run the command below before connecting the device to the host.  
**\$ sudo systemctl stop ModemManager**
- Plug in a USB device before starting Option 2 (EDL programming sequence), if an Ubuntu 18.04 host is running the SDK Manager by the Ubuntu 18.04 Docker.

## System and Disk Requirements

### 3.1. OS requirements

- For Robotics RB5 LU2.0 and RB5N LU2.0 platform  
Recommended OS (Operating System): Ubuntu 20.04.  
Alternatively, run an Ubuntu 20.04 Docker on a host of Ubuntu 16.04, Ubuntu 18.04, Ubuntu 20.04, Windows 10 Professional (64-bit), or Windows 10 Enterprise (64-bit) system.
- For RB5LU1.0, RB6, RB1 and RB2 platforms  
Recommended OS: Ubuntu 18.04.  
Alternatively, run an Ubuntu 18.04 Docker on a host of Ubuntu 16.04, Ubuntu 18.04, Ubuntu 20.04, Windows 10 Professional (64-bit), or Windows 10 Enterprise (64-bit) system.

### 3.2. Disk requirements

Make sure that the following minimum disk requirements are met.

- At least 1.5GB disk space to download a software version.
- It requires at least 50GB disk space to download LU resources and generate system.img with current release.

## DK Manager Operation Process

Step 1. Download SDK manager via the following link:

<https://thundercomm.s3.ap-northeast-1.amazonaws.com/uploads/web/common/TC-sdkmanager4.0.0.zip>

Step 2. Unzip the SDK manager file with the following command:

**\$ unzip TC-sdkmanager-x.x.x.zip**

### 4.1. On Ubuntu Host

#### 4.1.1. For recommended OS versions

**NOTE:** It is required to observe the following requirements on package version.

- For Robotics RB5 LU2.0 and RB5N LU2.0 Platform (recommended OS: Ubuntu 20.04)
- Required minimum package version: coreutils 8.30, fakechroot 2.19, fakeroot 1.24, kmod 27-1ubuntu2.1, libc6-arm64-cross 2.31, python 2.7.18, qemu-user-static 1:7.2+dfsg-5ubuntu1, udev 245.44ubuntu3.20, unzip 6.0, wget 1.20.3.
- un these commands to create soft links:  
**\$ sudo rm -rf /lib/ld-linux-aarch64.so.1**  
**\$ sudo ln -sf /usr/aarch64-linux-gnu/lib/ld-2.31.so /lib/ld-linux-aarch64.so.1**  
**\$ sudo ln -sf /bin/bash /bin/sh**  
**\$ sudo dpkg -P qemu-user-static**  
**\$ wget**

## [2ubuntu6\\_amd64.deb](#)

**\$ sudo dpkg-i qemu-user-static\_6.2+dfsg-2ubuntu6\_amd64.deb**

- For RB5LU1.0, RB6, RB1, RB2 Platforms (recommended OS: Ubuntu 18.04)

Required minimum package version: coreutils 8.28, fakechroot 2.19, fakeroot 1.22, kmod 24-1ubuntu3.2, libc6-arm64-cross 2.27, python 2.7.15, qemu-user-static 1:2.11+dfsg-1ubuntu7.28, udev 237-3ubuntu10.42, unzip 6.0, wget 1.19.4.

Step 1. Install the dependency libraries to the host computer:

**\$ sudo apt-get install coreutils fakechroot fakeroot \ kmod libc6-arm64-cross python2.7 qemu-user-static wget udev openssh-server**

Step 2. Unzip TC-sdkmanager-x.x.x.zip and navigate to TC-sdkmanager-x.x.x directory from a terminal window, and install or re-install SDK Manager:

**\$ sudo dpkg -i tc-sdkmanager-vx.x.x\_amd64.deb**

Step 3. Launch SDK Manager.

**\$ sdkmanager**

Step 4. Run SDK Manager.

1. Provide Thundercomm login credentials:

**Credential Checking ...**

**Enter your Thundercomm username:**

**Enter your Thundercomm password:**

2. If you need to change the path of installation, provide a working directory when a target directory is required (for example: /home/user). Then, enter the absolute target directory for SDK Manager to overwrite existing files (Default directory: /home/user).

**Enter absolute target directory for Image resources (overwrites existing files, default: /home/user/):**

**NOTE:** Docker users shall provide a working directory as /home/hostPC/[workingdirectory].

3. Enter the number selection product, for example, 1.

**Select your product:**

**1: RB1**

**2: RB2**

**3: RB5**

**4: RB5N (Non-Pop)**

**5: RB6**

**Select one number of product ( 1 | 2 | 3 ...) to continue with:**

**NOTE:** If the product only supports single platform, the SDK Manager will automatically skip Step 4 – 4) and directly go to Step 4 – 5).

4. Enter the number of the available platform for Robotics RBx device, for example, 1.

**Choose a platform for Robotics RBx device**

**Enter 1 to use LU platform, 2 to use LE platform:**

5. Enter the number of the available version for image repack, for example, 1:

**Checking current versions of release ...**

**Available versions:**

**1: QRB5165.x.x.x-xxxxxx**

**... ..**

**Select one number of available version ( 1 | 2 | 3 ...) to continue with:**

6. Enter 1 when the message below appears on your screen:

---

**SDK has been successfully set up and is ready to be used**

**Type 'help' for commands**

---

>

NOTES:

This step lasts for at least 40 minutes.

Enter help for more information:

> **help**

**commands:**

**help = Show usage help for LU platform**

**1 = Download LU resources and generate system.img with current release**

**2 = Flash full build (require system.img generation first)**

**q = exit sdk manager**

7. The system images are successfully generated in the working directory with the following messages displayed.

---

**Move sparse images to full\_build ...done**

**You may proceed to flash full\_build to your device**

---

**NOTE:** For Docker users, the system image is generated in /home/hostPC/[workingdirectory].

8.

**Step 5.** Disconnect the device from the computer, then follow the steps below to flash full build:

**NOTE:** When flashing the device on a Linux host, run the command below before connecting the device to the host.

**\$ sudo systemctl stop ModemManager**

1. Power off the device (unplug power cable and USB cable).
2. Press the F\_DL Key.
3. Power on the device (Required voltage: 12 V).





Figure 4-1.RB5 F\_DL Key



Figure 4-2.RB6/RB5N F\_DL Key



Figure 4-3.RB1 F\_DL Key



Figure 4-4.RB2 F\_DL Key

4. Keep pressing F\_DL Key while connecting the board to your computer with a Type-C USB (This step will switch the device to EDL mode).
5. Release F\_DL Key after connecting the board to your computer.
6. Start flashing process from the SDK manager with "Flash full build".
7. SDK Manager shall detect the device and start the flashing process automatically.
8. After the flashing process been finished, the board will reboot automatically (this step may take some time).

```
Flashing image ... done
Waiting for device to reboot ...
* daemon not running; starting now at tcp:5037
* daemon started successfully
Waiting for boot up, time elapsed: 10s
Waiting for boot up, time elapsed: 20s
Waiting for boot up, time elapsed: 30s
Waiting for boot up, time elapsed: 40s
Waiting for boot up, time elapsed: 50s

=====
RB5 device is ready to use.
Open another terminal and enter 'adb shell' to interact with your device.
=====
```

Figure 4-5.Flash Process

9. When your device has successfully boot up, enter the command below in a new terminal window of the host computer:

**\$ adb wait-for-device shell**

#### 4.1.2. For other OS versions

**NOTES:** Different OS versions require different Docker images.



- Robotics RB5 LU2.0 and RB5N LU2.0 Platform

For an Ubuntu 16.04 or 18.04 host, an Ubuntu 20.04 Docker image is required.

- RB5LU1.0, RB6, RB1, and RB2 Platforms

For an Ubuntu 16.04 or 20.04 host, an Ubuntu 18.04 Docker image is required.

**Step 1.** Install qemu-user-static, openssh-server and udev to the host PC.

**\$ sudo apt-get install qemu-user-static openssh-server udev -y**

Step 2. To install Docker, refer to: <https://docs.docker.com/engine/install/ubuntu/>.

Step 3. Generate Ubuntu 18.04/20.04 docker image:

Unzip TC-sdkmanager-x.x.x.zip and navigate to TC-sdkmanager-x.x.x directory from a new terminal window, then execute the following commands:

**# Ubuntu terminal #**

**# Generate Ubuntu 18.04 docker image #**

**\$ ln -sf Dockerfile\_18.04 Dockerfile**

**\$ sudo docker build -t ubuntu:18.04-sdkmanager .**

**# Generate Ubuntu 20.04 docker image #**

**\$ ln -sf Dockerfile\_20.04 Dockerfile**

**\$ sudo docker build -t ubuntu:20.04-sdkmanager .**

---

#### NOTES:

- Make sure to include the space and full stop at the end of the command: ..
- Generated Docker image name: ubuntu:18.04-sdkmanager or ubuntu:20.04-sdkmanager.

**Step 4. Create Docker container:**

**# Ubuntu 18.04 docker image #**

**\$ sudo docker run -v /home/\${USER}:/home/hostPC/ --privileged -v /dev:/dev -v /run/udev:/run/udev -d --name sdkmanager\_container -p 36000:22 ubuntu:18.04-sdkmanager**

**# Ubuntu 20.04 docker image #**

**\$ sudo docker run -v /home/\${USER}:/home/hostPC/ --privileged -v /dev:/dev -v /run/udev:/run/udev -d --name sdkmanager\_container -p 36000:22 ubuntu:20.04-sdkmanager**

---

**Host PC's /home/\${USER} is mounted on /home/hostPC in Docker container sdkmanager\_container:**  
**container name**

**NOTE:** With the above commands, a Docker container name will be generated after sdkmanager\_container:..

Step 5. Launch SDK Manager in Docker container.

**\$ sudo docker exec -it sdkmanager\_container sdkmanager**

Step 6. Run SDK Manager. Refer to Step 4 of 4.1.1. **OS version is recommended version.**

Step 7. Disconnect the device from the computer, then follow the operation steps below to flash full build:

Refer to Step 5 of 4.1.1. **OS version is recommended version.**

Step 8. When your device has successfully boot up, enter the command below in a new terminal window of the host computer.

**\$ adb wait-for-device shell**

## 4.2. On Windows 10 (64-bit) Host

Step 1. To download Docker Desktop, go to: <https://hub.docker.com/editions/community/docker-ce-desktop->

## windows/

Step 2. Open Dashboard from Docker notification menu to launch Docker Desktop.

Step 3. Open Windows PowerShell and enter docker images to verify docker installation. If PowerShell console instructs error, either the installation or Docker Desktop operation fails.

Step 4. Generate Ubuntu docker image.

1. Unzip TC-sdkmanager-x.x.x.zip and navigate to TC/sdkmanager/x.x.x directory from a Windows PowerShell.

2. Execute the following commands:

**# Windows PowerShell #**

**# For RB5LU1.0,RB6,RB1,RB2 Platforms Generate Ubuntu 18.04 docker image #**

**\$ rm .\Dockerfile**

**\$ cmd /c mklink Dockerfile Dockerfile\_18.04**

**\$ docker build -t ubuntu:18.04-sdkmanager .**

**# For Robotics RB5 LU2.0 and RB5N LU2.0 Platform Generate Ubuntu 20.04 docker image #**

**\$ rm .\Dockerfile**

**\$ cmd /c mklink Dockerfile Dockerfile\_20.04**

**\$ docker build -t ubuntu:20.04-sdkmanager .**

---

## NOTES:

- Make sure to include the 'space' and 'period' at the end of the command.
- Generated docker image name: ubuntu:18.04-sdkmanager or ubuntu:20.04-sdkmanager.

**Step 5.** Create docker container.

**# For RB5LU1.0,RB6,RB1,RB2 Platforms Generate Ubuntu 18.04 docker image #**

**\$ docker run -it -d --name sdkmanager\_container ubuntu:18.04-sdkmanager**

**# For Robotics RB5 LU2.0 and RB5N LU2.0 Platform Generate Ubuntu 20.04 docker image#**

**\$ docker run -it -d --name sdkmanager\_container ubuntu:20.04-sdkmanager**

**NOTE:** A docker container name can be generated after sdkmanager\_container with the above command.

**Step 9. Flash the device.**

1. Download MULTIDL\_TOOL\_v1.0.14.zip file and install MULTIDL\_TOOL, go to:

- RB5: [https://docs.thundercomm.com/turbox\\_doc/products/qualcomm-robotics-developementkit/qualcomm-robotics-rb5-development-kit](https://docs.thundercomm.com/turbox_doc/products/qualcomm-robotics-developementkit/qualcomm-robotics-rb5-development-kit)
- RB6: [https://docs.thundercomm.com/turbox\\_doc/products/qualcomm-robotics-developementkit/qualcomm-robotics-rb6-development-kit](https://docs.thundercomm.com/turbox_doc/products/qualcomm-robotics-developementkit/qualcomm-robotics-rb6-development-kit)
- RB1/RB2: [https://docs.thundercomm.com/turbox\\_doc/products/qualcomm-robotics-developement-kit/qualcomm-robotics-rb1-rb2-platform](https://docs.thundercomm.com/turbox_doc/products/qualcomm-robotics-developement-kit/qualcomm-robotics-rb1-rb2-platform)
- Refer to [MULTIDL\\_TOOL\\_USER\\_GUIDE.pdf](#).

2. Follow the steps below to check if your device is in Emergency Download (EDL) mode:

Option 1: Enter adb reboot edl.

Option 2: Press F\_DL Key to power on.

- NOTES:

- Check the Device Manager to ensure that the device has been detected as Qualcomm HS-USB QLoader 9008 (COMx), or you might need to download and install the correct USB drivers.
- To download and install the correct USB drivers, go to:

RB5: [https://docs.thundercomm.com/turbox\\_doc/products/qualcomm-robotics-development-kit/qualcomm-robotics-rb5-development-kit](https://docs.thundercomm.com/turbox_doc/products/qualcomm-robotics-development-kit/qualcomm-robotics-rb5-development-kit)

RB6: [https://docs.thundercomm.com/turbox\\_doc/products/qualcomm-robotics-development-kit/qualcomm-robotics-rb6-development-kit](https://docs.thundercomm.com/turbox_doc/products/qualcomm-robotics-development-kit/qualcomm-robotics-rb6-development-kit)

RB1/RB2: [https://docs.thundercomm.com/turbox\\_doc/products/qualcomm-robotics-development-kit/qualcomm-robotics-rb1-rb2-platform](https://docs.thundercomm.com/turbox_doc/products/qualcomm-robotics-development-kit/qualcomm-robotics-rb1-rb2-platform)

3. Flash the full build with MULTIDL\_TOOL:

- Launch MULTIDL\_TOOL.
- Click Options — > Configuration to set the full-build path.
- Enter 123456 at the password prompt.
- Choose Flat Build, set Flash Type as ufs.
- Select your local full-build path and programmer file (prog\_firehose\_dds.elf).
- Click Load XML to load xml files. When xml files prompt, select all XML files and all Patch files in the full\_build\ufs folder. Keep other settings as default; then click OK to return to the home page.
- Disconnect the device from the computer and power it off.
- Press the F\_DL Key.
- Power on the device (required voltage: 12 V).



Figure 4-6.RB5 F\_DL Key

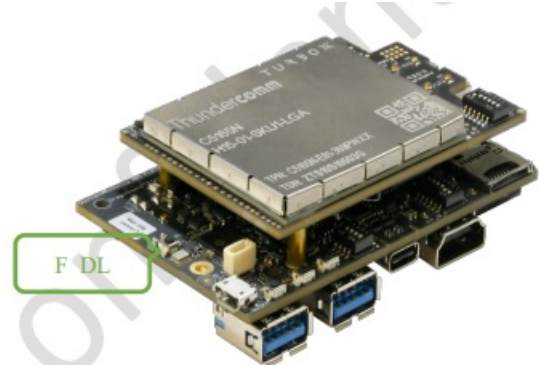


Figure 4-7.RB6/RB5N F\_DL Key



Figure 4-8.RB1 F\_DL Key



Figure 4-9.RB2 F\_DL Key

- Keep pressing F\_DL Key while connecting the board to your computer with a Type-C USB.

**NOTE:** This step will switch the device to EDL mode.

k) Release F\_DL Key after the board has been connected to your computer.

l) Start the flashing process by clicking START button corresponding to your device port in MULTIDL\_TOOL window.

m) After the flashing process is finished, the board will reboot automatically. This step may take some time.

## Troubleshoot

Refer to Table 5-1 for the solutions to problems that have definite symptoms.

**Table 5-1. Troubleshooting information**

Problem	Solution
Internet Timeout Issue: Internet timeout issue may happen during the image generation process, such as Unable to fetch.	Try to run Command 1 again. <b>commands:</b> <b>help = Show usage help for XX platform</b> <b>1 = Download LU resources and generate system. img with current release</b> <b>2 = xxxx &gt;1</b>
APT Source Issue	If the download fails, check the internet connection and the source list.
Device Boot Up Issue: SDK Manager cannot detect the device after reboot.	<ul style="list-style-type: none"><li>•If Ubuntu 18.04 is used on Docker, check whether adb kill-server is entered on the host PC before flashing image.</li><li>•Reboot your device manually, open a terminal, then enter adb shell.</li><li>•Check if any debian packages are modified.</li></ul>
Process Issue: The flashing process of Ubuntu system does not function well.	Copy the full folder to a computer with Windows system, then flash the image using Thundercomm MULTIDL TOOL. For further information, refer to: MULTIDL TOOL USER GUIDE v2.pdf.
SDK Manager Flash Issue	Enter the following command on host machine before restarting the flash: <b>\$ sudo systemctl stop ModemManager</b>

## Reference

**Table 6-1. For additional reference please refer to:**

Robotics RB5 Platform	
Quick Start Guide	<a href="https://developer.qualcomm.com/qualcomm-robotics-rb5-kit/quick-start-guide">https://developer.qualcomm.com/qualcomm-robotics-rb5-kit/quick-start-guide</a>
Hardware Reference Guide	<a href="https://developer.qualcomm.com/qualcomm-robotics-rb5-kit/hardware-reference-guide">https://developer.qualcomm.com/qualcomm-robotics-rb5-kit/hardware-reference-guide</a>
Software Reference Manual	<a href="https://developer.qualcomm.com/qualcomm-robotics-rb5-kit/software-reference-manual">https://developer.qualcomm.com/qualcomm-robotics-rb5-kit/software-reference-manual</a>
Robotics RB1/RB2 Platform	
Quick Start Guide	<a href="https://developer.qualcomm.com/hardware/qualcomm-robotics-rb1-rb2-kits/quick-start-guides">https://developer.qualcomm.com/hardware/qualcomm-robotics-rb1-rb2-kits/quick-start-guides</a>
Hardware Reference Guide	<a href="https://developer.qualcomm.com/hardware/qualcomm-robotics-rb1-rb2-kits/hardware-reference-guide">https://developer.qualcomm.com/hardware/qualcomm-robotics-rb1-rb2-kits/hardware-reference-guide</a>

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TURBOX

Documents / Resources

	<p><a href="#">Qualcomm RB6 Platform Robotics SDK Manager</a> [pdf] User Guide</p> <p>RB6 Platform Robotics SDK Manager, RB6, Platform Robotics SDK Manager, Robotics SDK Manager, SDK Manager, Manager</p>
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References

- [Thundercomm - World leading IoT product and solution provider](#)
- [Thundercomm - World leading IoT product and solution provider](#)
- [Hardware Reference Guide - Qualcomm Developer Network](#)
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