

AN14748

How to Run Application on M7 Core of i.MX 95

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Application note

Document information

Information	Content
Keywords	AN14748, i.MX 95, M7 Core, MCUXpresso SDK, BareMetal Application, FreeRTOS
Abstract	This document details the steps to get the toolchain, SDK, compile example source code, and create the image to run on the M7 core of i.MX 95.



1 Introduction

This document describes the steps to get the toolchain, SDK, compile example source code, and create the image to run on the M7 core of i.MX 95.

Revision 1.0 of this document was verified with i.MX Linux 6.12.20_2.0.0 release and SDK_25.06.00. There is a significant change in the directory structure of the SDK_25.12.00 release. Therefore, the document is updated with the latest Linux release 6.12.49_2.2.0 and SDK_25.12.00.

If you use an older SDK (up to SDK_25.09.00), the compilation information for the old SDKs is kept.

2 Toolchain setup

1. Link to the toolchain: https://developer.arm.com/-/media/Files/downloads/gnu/13.3.rel1/binrel/arm-gnu-toolchain-13.3.rel1-x86_64-arm-none-eabi.tar.xz
2. Set up the toolchain in the `~/project` directory:

```
mkdir ~/project && cd ~/project
tar xvf arm-gnu-toolchain-13.3.rel1-x86_64-arm-none-eabi.tar.xz
export ARMGCC_DIR=~/project/arm-gnu-toolchain-13.3.rel1-x86_64-arm-none-eabi
```

3 Getting started

To download MCUXpresso SDK, perform the following steps:

1. Go to the MCUXpresso SDK webpage: [MCUXpresso SDK](#).
2. Click **DOWNLOADS**. To download the software, choose the **MCUXpresso SDK - SDK Builder** option, which launches the MCUXpresso SDK Builder webpage.
3. On the MCUXpresso SDK Builder webpage, perform the following steps:
 - a. Click **Select Development Board**.
 - b. In the **Search for Hardware** field, type "imx95".
 - c. From the search results, select a board—for example, IMX95LPD5EVK-19.
 - d. At the bottom right-hand side of the page, the SDK version number is 25.12.0. Click the **ARMGCC** button to pick the toolchain.
 - e. Click **BUILD SDK**.
 - f. The first item is **SDK_25.12.00_IMX95LPD5EVK-19**.
 - g. Click **Download > Download SDK archive > AGREE**.
 - h. The file **SDK_25_12_00_IMX95LPD5EVK-19.zip** downloads.

4 How to build imx-mkimage from BSP

The `imx-mkimage` tool is used to create a bootable image `flash.bin`. The `imx-mkimage` can be built and extracted from Linux BSP.

To build Linux BSP, install some packages to set up the host. For more details, see the *i.MX Yocto Project User's Guide* (document [UG10164](#)).

To install packages on Ubuntu 22.04, use the following command:

```
sudo apt install gawk wget diffstat unzip texinfo gcc build-essential chrpath
socat cpio python3 python3-pip python3-pexpect xz-utils debianutils iputils-
```

```
ping python3-git python3-jinja2 python3-subunit zstd liblz4-tool file locales  
libacl1 curl repo cma
```

To build the imx-mkimage tool, follow the steps below:

```
mkdir ~/bin (this step may not be needed if the bin folder already exists)  
curl https://storage.googleapis.com/git-repo-downloads/repo > ~/bin/repo  
chmod a+x ~/bin/repo  
export PATH=~/.bin:$PATH  
cd ~/project  
mkdir IMX_YOCTO_BSP && cd IMX_YOCTO_BSP  
repo init -u https://github.com/nxp-imx/imx-manifest -b imx-linux-walnascar \  
-m imx-6.12.49-2.2.0.xml  
repo sync  
EULA=1 MACHINE=imx95-19x19-lpddr5-evk DISTRO=fsl-imx-xwayland source \  
imx-setup-release.sh -b build-imx95-19x19-lpddr5-evk  
bitbake imx-boot
```

In Yocto, it is called imx-boot instead of imx-mkimage. After the compilation completes, the tool has all the necessary images and it resides in build-imx95-19x19-lpddr5-evk/tmp/work/imx95_19x19_lpddr5_evk-poky-linux/imx-boot/1.0/git.

```
cp -rp tmp/work/imx95_19x19_lpddr5_evk-poky-linux/imx-boot/1.0/git/ ~/project/  
imx-boot
```

5 How to compile the SDK

This section describes how to compile the SDK.

5.1 SDK_25.12.00 and later SDK compilation

Make sure that the host has the following tools installed:

- Python: 3.10 or newer
- cmake: 3.30.0 or newer
- ninja: 1.12.1 or newer

To compile the SDK_25.12.00 and later, perform the following steps:

```
cd ~/project  
mkdir SDK_25_12_00 && cd SDK_25_12_00  
unzip SDK_25_12_00_IMX95LPD5EVK-19.zip  
python3 -m venv .venv  
source .venv/bin/activate  
pip install west
```

To compile hello_world to run on ITCM, run the following command:

```
west build -p always examples/demo_apps/hello_world --toolchain armgcc --config  
release -b imx95lpd5evk19 -Dcore_id=cm7
```

To compile hello_world to run on DDR, run the following command:

```
west build -p always examples/demo_apps/hello_world --toolchain armgcc --config  
ddr_release -b imx95lpd5evk19 -Dcore_id=cm7
```

The image is `build/hello_world_cm7.bin` for both the ITCM and DDR builds.

To compile FreeRTOS `hello_world` to run on ITCM, run the following command:

```
west build -p always examples/freertos_examples/freertos_hello --toolchain
armgcc --config release -b imx95lpd5evk19 -Dcore_id=cm7
```

To compile FreeRTOS `hello_world` to run on DDR, run the following command:

```
west build -p always examples/freertos_examples/freertos_hello --toolchain
armgcc --config ddr_release -b imx95lpd5evk19 -Dcore_id=cm7
```

The image is `build/freertos_hello_cm7.bin` for both the ITCM and DDR builds.

5.2 SDK_25.09.00 and earlier SDK compilation

To compile the SDK_25.09.00 and earlier, perform the following steps:

1. To compile the BareMetal `hello_world`, run the following commands:

```
cd ~/project
mkdir SDK_25_06_00 && cd SDK_25_06_00
tar xvf ../SDK_25_06_00_IMX95LPD5EVK-19.tar.gz
cd ~/project/SDK_25_06_00/boards/imx95lpd5evk19/demo_apps/hello_world/cm7/
armgcc
./clean.sh
./build_all.sh
```

Images that run on ITCM and DDR are created. They are available in:

- ITCM: `release/hello_world.bin`
- DDR: `ddr_release/hello_world.bin`

2. To compile the FreeRTOS `hello_world`, run the following commands:

```
cd ~/project/SDK_25_06_00/boards/imx95lpd5evk19/freertos_examples/
freertos_hello/cm7/armgcc
./clean.sh
./build_all.sh
```

The created M7 image is available in:

- ITCM: `release/freertos_hello.bin`

Note: *The FreeRTOS only creates an image for running from ITCM.*

To create an image for DDR:

- a. Use `MIMX9596xxxxN_cm7_ddr_ram.ld` in `~/project/SDK_25_06_00/boards/imx95lpd5evk19/demo_apps/hello_world/cm7/armgcc` to replace `MIMX9596xxxxN_cm7_ram.ld` in `~/project/SDK_25_06_00/boards/imx95lpd5evk19/freertos_examples/freertos_hello/cm7/armgcc`, using name `MIMX9596xxxxN_cm7_ram.ld`
- b. Then, run `build_all.sh`.

The created M7 image for DDR is in:

- DDR: `release/freertos_hello.bin`

6 Generate a bootable image for running M7 from ITCM

Copy the SDK output image to the `imx-boot/iMX95` directory and rename it to `m7_image.bin`. The SDK output images are `build/hello_world_cm7.bin` and `build/freertos_hello_cm7.bin`

for SDK_25.12.00. For older SDKs, the images are `release/hello_world.bin` and `release/freertos_hello.bin`. To build the `flash.bin` file to run from ITCM, use the following commands:

```
cd ~/project/imx-boot
make SOC=iMX95 REV=B0 flash_all LPDDR_TYPE=lpddr5 OEI=YES
```

`iMX95/flash.bin` is the bootable image that can be programmed to `flash/sd/emmc`.

7 Generate a bootable image for running M7 from DDR

Copy SDK output image to the `imx-boot/iMX95` directory and rename it to `m7_image.bin`. The SDK output images are `build/hello_world_cm7.bin` and `build/freertos_hello_cm7.bin` for SDK_25.12.00. For older SDKs, the images are `ddr_release/hello_world.bin` and `release/freertos_hello.bin`. To build the `flash.bin` file for running from DDR, use the following commands:

```
cd ~/project/imx-boot
make SOC=iMX95 REV=B0 flash_all_ddr LPDDR_TYPE=lpddr5 OEI=YES
```

8 Program flash.bin to i.MX 95

To program `flash.bin` to the board, perform the following steps:

1. Download and install the flash programming tool UUU:
The UUU tool can be downloaded from [Github](#). On the right side of the page, click the latest release. Then download `uuu.exe` for your Windows computer.
2. Create a folder `c:\UUU` and move `uuu.exe` to `c:\UUU`.
3. Connect both USB-Type C ports to a Windows computer.
4. Consoles:
 - a. Start three TeraTerm consoles.
 - b. Connect the first, third, and fourth COM port.
 - c. Consider COM27, COM28, COM29, and COM30 and use COM27/29/30.

```
- COM27: M7
- COM29: A55 U-boot/Linux
- COM30: M33 System Manager
```

5. Set the `boot_mode` to the serial download:

```
SW7[1:4] = 1001 (ON OFF OFF ON)
```

6. On the Windows computer, copy `flash.bin` to the `c:\UUU` directory.
7. On the Windows computer, open the command prompt in the `UUU` directory and run the following command:

- For SD programming:

```
C:\UUU> uuu -b sd flash.bin
```

- For eMMC programming:

```
C:\UUU> uuu -b emmc flash.binc
```

Power cycle the board. UUU programs `flash.bin` to an SD card or an eMMC.

8. Set the `boot_mode`:

- Boot from SD:

```
SW7[1:4] = 1011 (ON OFF ON ON)
```

- Boot from eMMC:

```
SW7[1:4] = 1010 (ON OFF ON OFF)
```

9. Power cycle the board. The COM27 console displays the message from the hello_world program.

9 Note about the source code in the document

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10 Abbreviations

Table 1. Abbreviations

Abbreviation	Description
BSD	Berkeley Software Distribution
BSP	Board Support Package
DDR	Double Data Rate
eMMC	embedded Multi-Media Card
SDK	Software Development Kit
USB	Universal Serial Bus
UUU	Universal Update Utility

11 Revision history

[Table 2](#) summarizes the revisions to this document.

Table 2. Revision history

Document ID	Release date	Description
AN14748 v.2.0	9 February 2026	Updated for SDK_25.12.00

Table 2. Revision history...continued

Document ID	Release date	Description
AN14748 v.1.0	31 July 2025	Initial public release

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