

Yocto KICKstart

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Currently only for Intel SoC / FPGA with external DDR

The Yocto Project is a set of tools that helps to create customized Linux systems. This is a short description of how to prepare the host computer and how to create a project with yocto.

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Used source files

The following description was tested with the source files listed in this table:

Component	Source	Version/Git branch	Commit ID
Oracle VM VirtualBox	https://www.virtualbox.org/	6.1.26	---
Ubuntu 20.04 LTS	https://releases.ubuntu.com/20.04/	20.04.3 LTS	---
Yocto	https://git.yoctoproject.org/cgi/cgit.cgi/poky/	dunfell	b47125666fe44e491ce9a4ecadd1875bec9891db
meta-altera	https://github.com/kraj/meta-altera.git	dunfell	237cd5ecd28491dbcff16d8d64662d3b56ac30df
linux -socfpga	https://github.com/altera-opensource/linux-socfpga.git	socfpga-5.4.124-lts	cdb318393975f4bf9a392fb15af74aad45c57245
u-boot-socfpga	https://github.com/altera-opensource/u-boot-socfpga.git	socfpga_v2021.04	bdc9a4409de9cef4408eebd81196fd63887ac78f

Build Host

Yocto Project is supported in many Linux Distributions, this descriptions refers to Ubuntu 20.04 LTS. Information and requirements for other distributions can be found in the [Yocto Project Reference Manual](#).

General requirements

This requirements are generally needed for Yocto Project in Ubuntu 20.04:

- free disk space: at least 50 GB
- required packages:

```
sudo apt install gawk wget git diffstat unzip texinfo gcc build-essential chrpath socat cpio \  
python3 python3-pip python3-pexpect xz-utils \  
debianautils iputils-ping python3-git python3-jinja2 \  
libegl1-mesa libsdl1.2-dev pylint3 xterm python3-  
subunit mesa-common-dev
```

(optional) VM with supported Linux OS

If you do not have installed Linux OS on your host computer, you can optionally run a VM with a supported Linux OS:

- e.g. with OracleVM:
 - VM Setup:
 - RAM: ≥ 8 GB
 - CPU: ≥ 4
 - HDD: 200 GB dynamically
 - ubuntu-20.04-desktop-amd64.iso
 - install vm guest additions
 - Network: network bridge
 - optional: add shared folder, enable drag and drop
 - Note the [general requirements](#)

Install Yocto Project

1. Create and navigate to the yocto directory:

```
mkdir yocto && cd yocto
```

2. Clone the Yocto Project sources:

```
git clone -b dunfell https://git.yoctoproject.org/git/poky
```

Create a project for an Intel SoC/FPGA device

The following steps are required to create an image for the Intel SoC/FPGA devices:

1. For Intel SoC/FPGA devices you need the meta-layer 'meta-altera'. Run following command to clone this meta-layer from github into the 'poky' folder:

```
cd poky
git clone -b dunfell https://github.com/kraj/meta-altera.git
```

2. Run the oe-init-build-env script to initialize the environment:

```
source oe-init-build-env
```

3. Add meta-altera layer to *path/to/yocto/poky/build/conf/bblayers.conf*:

```
bitbake-layers add-layer ../meta-altera
```

4. Modify the *path/to/yocto/poky/build/conf/local.conf* file:
 - a. Remove default configuration of the MACHINE variable and set it to a supported machine (see [meta-altera/conf/machine](#) for more information) of meta-altera layer e.g 'cyclone5':

```
sed -i '/^MACHINE/s/MACHINE/#MACHINE/g' conf/local.conf
echo -e '\nMACHINE = "cyclone5"' >> conf/local.conf
```

- b. Set the preferred linux kernel version (see [meta-altera/recipes-kernel/linux](#) for other linux kernel versions):

```
echo -e '\nPREFERRED_PROVIDER_virtual/kernel = "linux-altera-lts"' >> conf/local.conf
echo -e 'PREFERRED_VERSION_linux-altera-lts = "5.4%"' >> conf/local.conf
```

- c. Set the preferred u-boot version (see [meta-altera/recipes-bsp/u-boot](#) for other u-boot versions):

```
echo -e '\nPREFERRED_VERSION_u-boot-socfpga = "v2021.04%"' >> conf/local.conf
```

5. Build the image:

```
bitbake core-image-minimal
```

The first run of this command can take several hours.

The generated files such as the u-boot file, kernel file or the complete Image (.wic file) are stored in `/yocto/poky/build/tmp/deploy/images/<MACHINE>/.`

6. Follow the steps described in [Reference Designs with Yocto - Intel SoC FPGAs#Copy .wic file to SD card](#) to copy the .wic file to the SD card.

References

1. [Yocto Project Reference Manual](#)
2. [Yocto Project Quick Build](#)
3. [OpenEmbedded Layer Index](#)