Yocto KICKstart

Currently only for Intel SoC / FPGA with external DDR

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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.

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/cgit/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. Infor mation 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
debianutils 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