# 3

# Yocto Project components

25 octombrie 2016

1.  Please  write al least four of the described components of a GNU  toolchain

2.  List the components which define a Linux distribution

3.  What is Poky?
    a.   The Yocto Project build engine
    b.   A Yocto Project tool in charge of metadata generation
    c.   The Yocto Project reference distribution

4.  GCC stands for:
    a.   GNU Compiler Collection
    b.   GNU Collection of Compilers
    c.   GNU Compiler Consortium

**MPSIT**

1. Kernel headers, Binutils, GCC, C library

2. Bootloader, Linux kernel, root filesystem

3. C

4. A

**MPSIT**

- ➢ Cross-toolchain

- ➢ U-boot

- ➢ Linux-kernel

- ➢ Busybox

- ➢ Userspace applications

- ➢ Yocto Project

➢ Poky

➢ Eclipse ADT plug-ins

➢ Graphical tools

➢ Automatic builds and testing support

➢ Other external tools

➢ The reference build system for the metadata and tools of the Yocto Project

➢ Platform independent

➢ Enables support for the full Linux software stack

➢ Mailing lists

    ➢ http://lists.yoctoproject.org/listinfo/yocto

    ➢ http://lists.yoctoproject.org/listinfo/poky

    ➢ http://lists.yoctoproject.org/listinfo/yocto-announce

➢ IRC channels

    ➢ #poky

    ➢ #yocto

➢ Yocto Project Bugzilla

➢ Yocto Project Documentation

    ➢ https://www.yoctoproject.org/documentation

➢ meta-poky/conf/distro/poky.conf

  ➢ SANITY_TESTED_DISTROS

➢ Required packages

  ➢ Essentials: sudo apt-get install gawk wget gitcore diffstat unzip texinfo gcc-multilib build-essential chrpath socat

  ➢ Graphical and Eclipse Plug-ins extras: sudo apt-get install libsdl1.2-dev xterm

  ➢ Documentation: sudo apt-get install make xsltproc docbook-utils fop dblatex xmlto

  ➢ ADT Installer Extras: sudo apt-get install autoconf automake libtool libglib2.0-dev

➢ Yocto Project release

**MPSIT**

- Custom Yocto Project kernel interaction

- The meta-yocto-kernel-extras git repository

- Supported Board Support Packages (BSPs)

- Eclipse Yocto Project Plug-ins

MPSIT

## System development

- http://www.yoctoproject.org/docs/2.1/bsp-guide/bspguide.html#creating-a-new-bsp-layer-using-the-yocto-bsp-script

- http://www.yoctoproject.org/docs/2.1/kernel-dev/kernel-dev.html

## User application development

- http://www.yoctoproject.org/docs/2.1/adt-manual/adt-manual.html

## Temporary modification of source code

## Devshell development

➤ Poky

➤ Eclipse ADT plug-ins

➤ Graphical tools

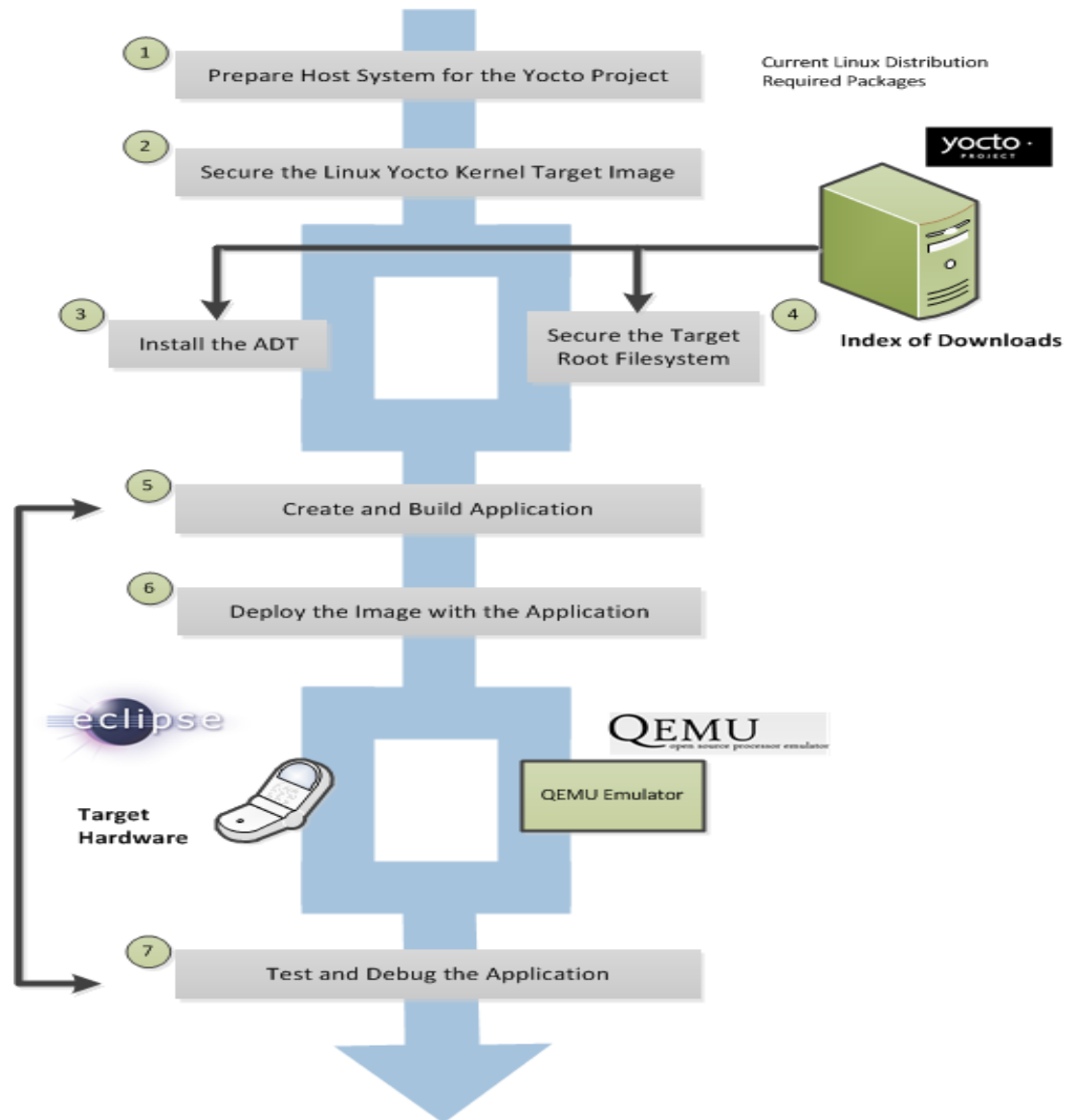➤ Automatic builds and testing support

➤ Other external tools

➢ Provides the core development platform: for user-targeted applications development

➢ Is comprised of the following elements:

  ➢ A cross-toolchain

  ➢ User-space tools

  ➢ The Qemu environment

  ➢ Eclipse IDE

**MPSIT**

➢ Cross-linker, cross-debugger, cross-compiler

➢ Required target sysroot dir (why?)

➢ Methods to generate it:

  ➢ Download it from http://downloads.yoctoproject.org/releases/yocto/yocto-2.1/toolchain/x86_64/ and get the appropriate toolchain installer for host and target configuration

  ➢ poky-glibc-x86_64-core-image-minimal-armv7a-neon-toolchain-ext-2.1.sh

  ➢ /opt/poky/2.1/

  ➢ Execute bitbake meta-ide-support

  ➢ environment-setup needs to be sourced

➢ Perf: performance counter

➢ PowerTOP: power measurement

➢ LatencyTOP: latency measurement

➢ Oprofile: system-wide profiler

➢ SystemTap: infrastructure performance and functional problems

➢ Lttng-ust: user-space tracer

➢ Which one did you used?

➢ Simulate a hardware device

➢ More info: http://wiki.qemu.org/Main_Page

➢ Usecase scenarios:

    ➢ Install the ADT using adt-installer script

    ➢ A Yocto Project is downloaded and the environment is setup

    ➢ A git clone of Poky is created and the environment is setup

    ➢ The cross-toolchain tarball is downloaded, installed and the environment is setup

➤ Most popular development environment

➤ Has Yocto Project Eclipse Plug-ins support:

  ➤ Cross-compile, cross-debugging

  ➤ Develop & Deploy

  ➤ Execute the binaries on a Qemu emulated environment

  ➤ Remote profiling

  ➤ Power data collection

➤ More info about Eclipse Plugins can be found here:
  http://www.yoctoproject.org/docs/2.1/mega-manual/mega-manual.html#adt-eclipse

➤ Poky

➤ Eclipse ADT plug-ins

➤ **Graphical tools**

➤ Automatic builds and testing support

➤ Other external tools

➢ Graphical user interface for Bitbake

➢ Simplify interaction with Yocto Project

➢ Generate Linux OS images

➢ Stopped with the release 1.6

    ➢ Lack of developers interest

    ➢ No major improvement in its core implementation

    ➢ Lots of bugs

➢ Used only ocassionally

**MPSIT**

- ➢ Customize an available image

- ➢ Create a custom image from scratch

- ➢ Build any image

- ➢ Run an image using Qemu

- ➢ Deploy an image on a USB disk for live-booting

**MPSIT**

➢ A web interface

➢ Application programming interface

➢ Used to configure and execute multiple builds on remote build servers

➢ Stores information in a database

➢ More info here: http://www.yoctoproject.org/docs/2.1/toaster-manual/toaster-manual.html

**MPSIT**

➢ Configure and run builds

    ➢ Browse and build any layer available

    ➢ Import own layers for building

    ➢ Add and remove layers from configuration

    ➢ Set configuration variables

    ➢ Set a target or multiple targets to build

    ➢ Start the build

➤ Information about the build process

  ➤ See what was built

  ➤ See what packages were installed into final image

  ➤ Browse the directory structure of the image

  ➤ See the value of all variables in a build configuration

  ➤ See which files set a corresponding value

  ➤ See dependency relationships between recipes, packages and tasks

  ➤ See performance information such as build time, task time, CPU usage and disk I/O

➢ Poky

➢ Eclipse ADT plug-ins

➢ Graphical tools

➢ **Automatic builds and testing support**

➢ Other external tools

**MPSIT**

- ➢ Buildbot base autobuilder implementation

- ➢ Builds test automation and conducts QA

- ➢ Publish QA test and test plans

- ➢ Develop new automatic testing, continuous integration and QA procedures

- ➢ Open for everyone to contribute

- ➢ Available here: http://autobuilder.yoctoproject.org/

➢ Not an internal component of Yocto Project

➢ Developed by Linaro

➢ Automated validation architecture

➢ Test the deployment of Linux systems on devices

➢ Young project: gathered a lot of interest

➢ More info: [https://validation.linaro.org/static/docs/](https://validation.linaro.org/static/docs/)

➢ Poky

➢ Eclipse ADT plug-ins

➢ Graphical tools

➢ Automatic builds and testing support

➢ **Other external tools**

- Can be seen more like a feature then as a project

- Documentation available

- Creates partitioned images

- Tries to solve special booting requirements

- Highly customizable and extensible

- Resides in Poky

# MPSIT

?

➢ Versioning system (git, svn etc.)

➢ Integration with Yocto Project is a plus

➢ Mobile and Web based applications are not the desired choices but are acceptable.

➢ Embedded interaction would be advised

➢ Really important to have the push-and-pull related to project functionalities

**MPSIT**

- ➢ QT graphical interface for home automation

- ➢ The interface monitors sensors values and enables or disables them remotely

- ➢ The application becomes a Yocto Project recipe which needs to inherit QT and QT modules support

- ➢ A new Yocto Project image adds the application recipe and required application dependencies

- ➢ A build of the image is realized for qemuarm machine

- ➢ The qemuarm machine boots the image and after the booting the application is starting and working