

Dandified way to package management in Yocto Project

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- Zheng Ruoqin, Fujitsu Ltd.
- Embedded Linux Developer
- In-House Embedded Linux Distributor of Fujitsu
- Our Distribution includes LTSI Kernel and is built with Yocto Project
- Our Distribution is used for
 - IVI, Server System Controller, Storage System, Network Equipment, Printer, etc.



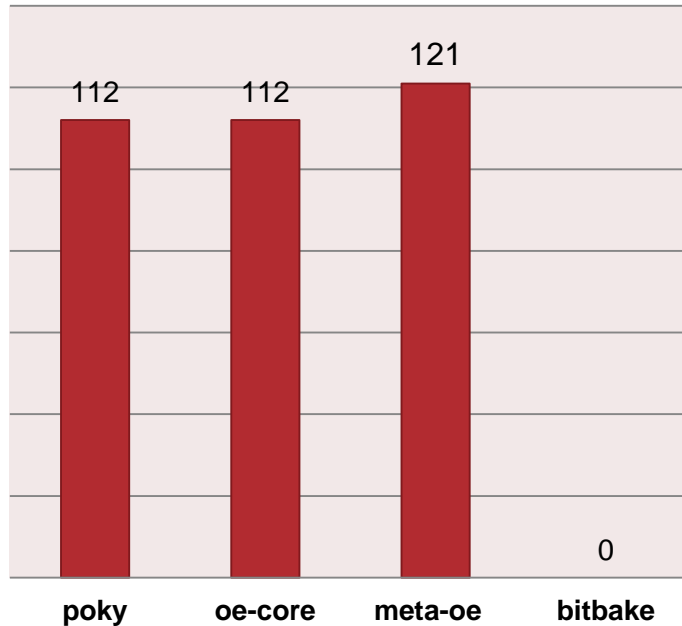
IVI: In-Vehicle Infotainment

Fujitsu's contributions to Yocto community

■ Data comes from yocto (2017-06-01 ~ 2018-06-01)

Contributions in yocto

■ commits



	Layers	Changesets
1	poky	112
2	oe-core	112
3	meta-oe	121
4	bitbake	0

Fujitsu's contributions to Yocto community

■ Data comes from yocto (2017-06-01 ~ 2018-06-01)

Top changeset contributors by employer

No.	employer	Changesets
1	Intel	3285
2	Wind River	1399
3	Fujitsu	345
4	Axis Communications	118
5	simens	79

Developers with the most changesets

No.	Our Developer	Changesets
poky		
12	Huang Qiyu	83 (1.8%)
40	fan.xin	24 (0.5%)
oe-core		
9	Huang Qiyu	83 (2.4%)
36	fan.xin	24 (0.7%)
Meta-oe		
5	Huang Qiyu	78 (3.7%)
16	Zheng Ruoqin	20 (0.9%)

Review of Yocto

- What is Yocto
- DNF in Yocto - overview
- DNF in Yocto - Cons

dnf-host - A way out of Yocto build system

- dnf-host overview
- dnf-host features

How to use dnf-host

- dnf-host Getting Started
- Demo

Future


- Support more package types
- Support different filesystem of rootfs
- Make TUI more user friendly
- Contribution plan

Review of Yocto

- What is Yocto
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- DNF in Yocto - Cons



What is Yocto

The banner features a night sky with a starry galaxy and silhouettes of mountains. The Yocto Project logo is in the top left. Navigation links are in the top center. The main text announces the release of Yocto Project 2.5, codenamed 'SUMO', dated May 11, 2018.

yocto
PROJECT

SOFTWARE DOCS COMMUNITY LEARN ECOSYSTEM ABOUT JOIN

YOCTO PROJECT® RELEASE 2.5
"SUMO"
May 11, 2018

THE YOCTO PROJECT. IT'S NOT AN EMBEDDED LINUX DISTRIBUTION,
IT CREATES A CUSTOM ONE FOR YOU.

The Yocto Project (YP) is an open source collaboration project that helps developers create custom Linux-based systems for embedded products, regardless of the hardware architecture.

The project provides a flexible set of tools and a space where embedded developers worldwide can share technologies, software stacks, configurations, and best practices that can be used to create tailored Linux images for embedded and IOT devices.

CAPABILITIES GET STARTED HERE BOOKMARK THIS DOC

IS YOCTO PROJECT FOR YOU? NEW TO THE PROJECT CURRENT RELEASE MEGA-MANUAL

Yocto Project is an open source collaboration project that help you create custom Linux-based systems for embedded products.

<https://www.yoctoproject.org/>

What is Yocto



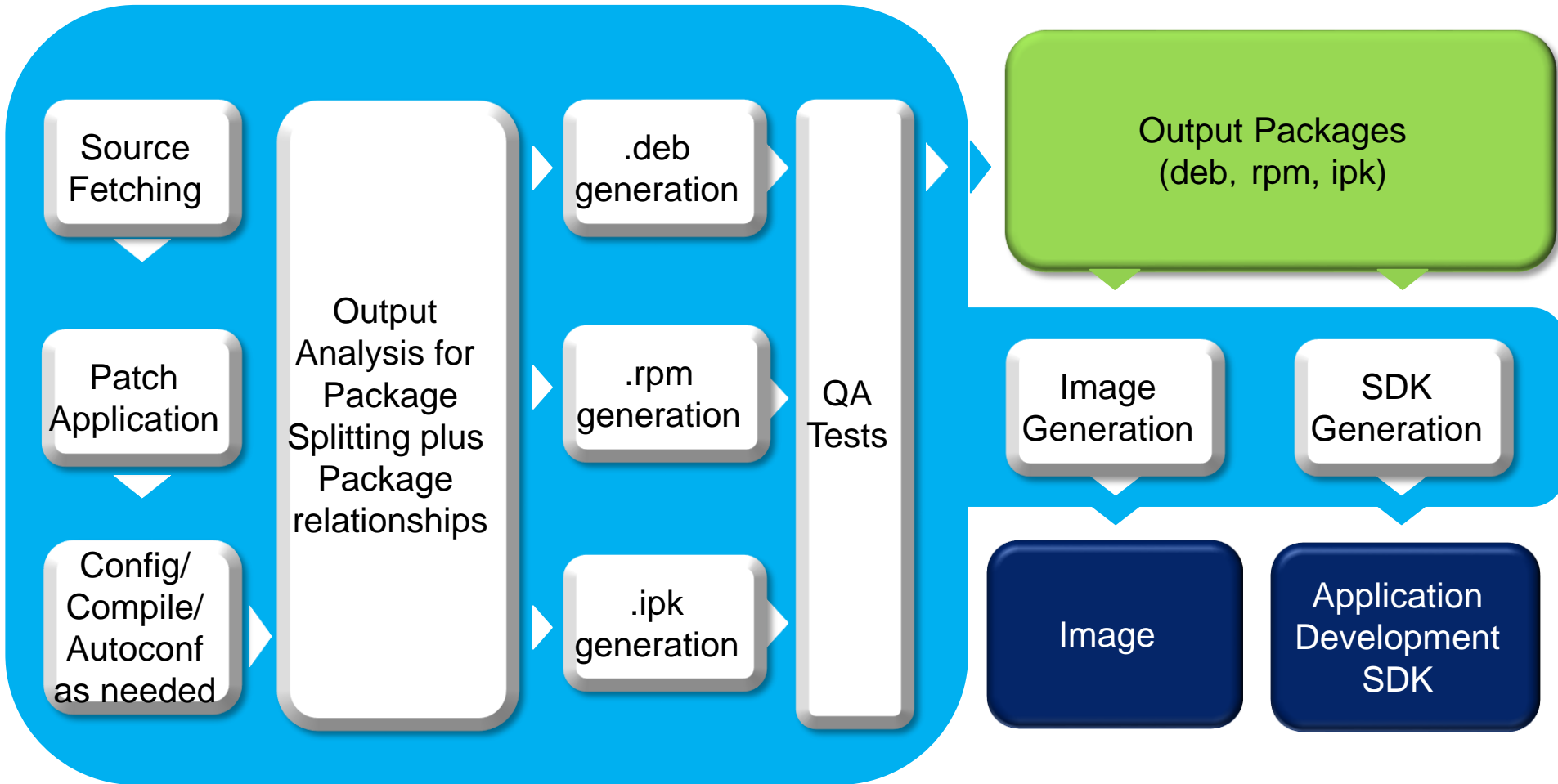
Build System



Output Image Data

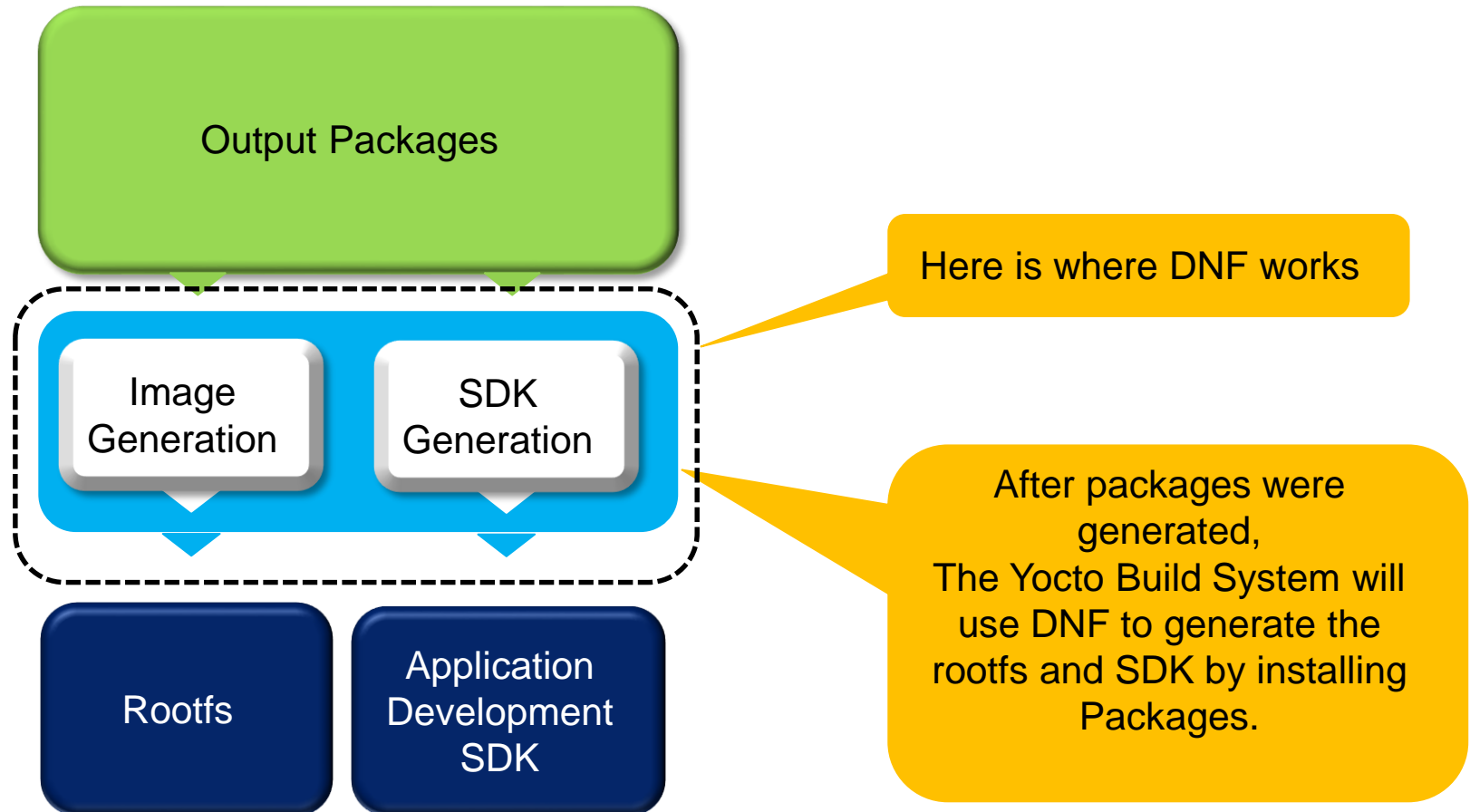


Packages



DNF in Yocto

- In Yocto, DNF is the default Package management to generate rootfs and SDK.



What is DNF

- **DNF** is a software package manager that installs, updates, and removes [packages](#) on [RPM](#)-based Linux distributions. It automatically computes dependencies and determines the actions required to install packages. DNF also makes it easier to maintain groups of machines, eliminating the need to manually update each one using [rpm](#). Introduced in Fedora 18, it has been the default package manager since Fedora 22.



More information here:

<https://github.com/rpm-software-management/dnf>



Typical case you meet when you try to modify your roots.



Issues we met

- You can only customize rootfs in Yocto build system which is not flexible enough.
- High waste of machine, time and developers for rootfs customization.
- Indeterminacy caused by rebuild.

Do we have a solution to avoid these cases?

Use dnf-host instead of the DNF in yocto build system.

dnf-host - A way out of Yocto build system

- dnf-host overview
- dnf-host features

Introduction

We redeveloped the DNF and Yocto to solve the issues mentioned above. We call it **dnf-host** which means it can work on the Cross-Development environment in your host for package management.

Git-Repo: <https://github.com/ubinux/dnf/tree/dnf-yocto2.5/>

Status: Support Yocto 2.4 and 2.5

Branch: dnf-yocto2.5 ▾

New pull request



Create new file


Upload files

Find file

Clone or download ▾






This branch is 16 commits ahead, 169 commits behind rpm-software-management:master.

 Pull request  Compare

 zhengrq-fnst

Fix the transaction problem of SAMPLE_INSTALL. ...

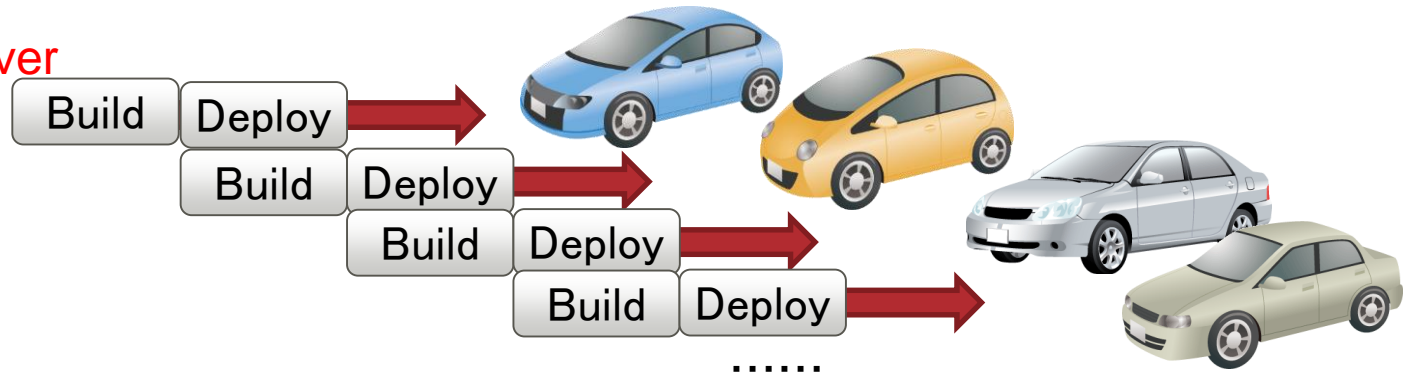
Latest commit 0934c64 3 days ago

 bin	Subject: Run python scripts using env	6 days ago
 dnf	Fix the transaction problem of SAMPLE_INSTALL.	3 days ago
 doc	doc: relnotes for 2.7.5	7 months ago
 etc	Subject: [PATCH 4/5] Corretly install tmpfiles.d configuration	6 days ago
 patches-yocto	Add two patches for yocto-2.5.	5 days ago

- **Work out of Yocto build system.**
- **Make customization more convenient with TUI.**
- **BoM Management.**
 - **SPDX Management**
- **Save and reuse package list.**
- **Vendors can customize installation samples.**

dnf-host features

Yocto Build server



Build and Deploy for Each Targets

Host

Simulation

Packages



Deploy

Upgrade

Build Once, Deploy Anywhere

Targets: 50

Before:

Rebuild time: 0.1hour

Deploy time: 1hour

Cost = $(0.1+1)*50=55$ hours

After:

Upgrade time: 0.1hour

Cost = $0.1*50=5$ hours

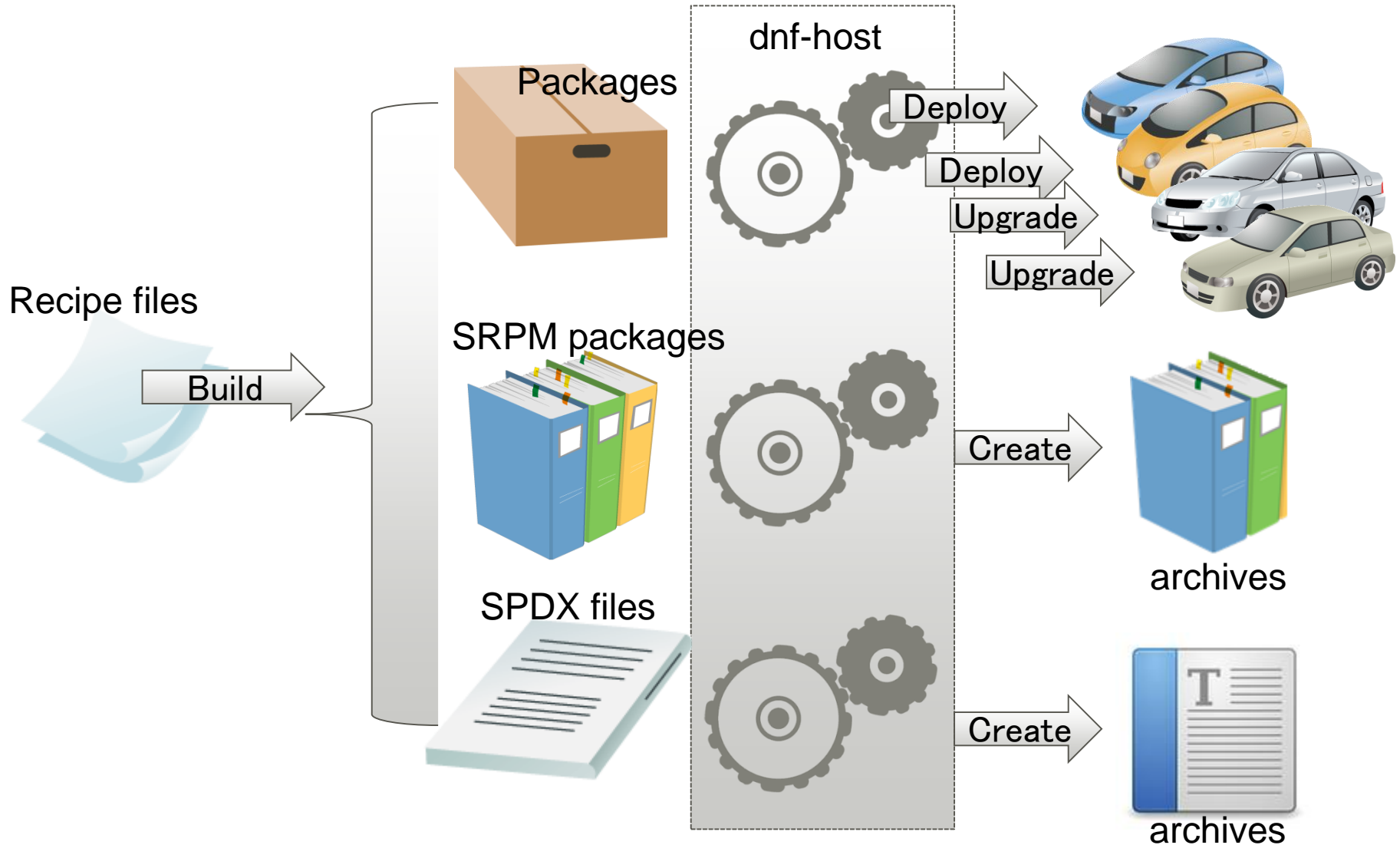
dnf-host TUI

- You can use the Text-based UI we developed for dnf-host

```
Package Installer
| Select package |
[ ] acl
[ ] attr
[ ] base-files
[ ] base-passwd
[ ] base-passwd-update
[ ] bash
[ ] bash-bashbug
[ ] bash-completion
[ ] bash-completion-extra
[ ] bc
[ ] bsdcpio
[ ] bsdtar
[ ] busybox
[ ] busybox-hwclock
[ ] busybox-syslog
[ ] busybox-udhcp
[ ] busybox-udhcpd
[ ] bzip2
[ ] ca-certificates
[ ] catchsegv
[ ] coreutils
[ ] cryptodev-linux
[ ] curl
-----
All Packages [2364]    Installed Packages [0]    Selected Packages [0]

F1:select/unselect All  F2:Search  F3:Next  F4:Back  F5:Info  F9:Exit
```

BoM Management



What is SPDX

- The full name of SPDX is **S**oftware **P**ackage **D**ata **E**xchange, which is a standard format for communicating the components, licenses and copyrights associated with a software package.

Kernel v4.14 added one-liners come from SPDX



index : kernel/git/torvalds/linux.git

Linux kernel source tree

[about](#) [summary](#) [refs](#) [log](#) [tree](#) [commit](#) [diff](#) [stats](#)

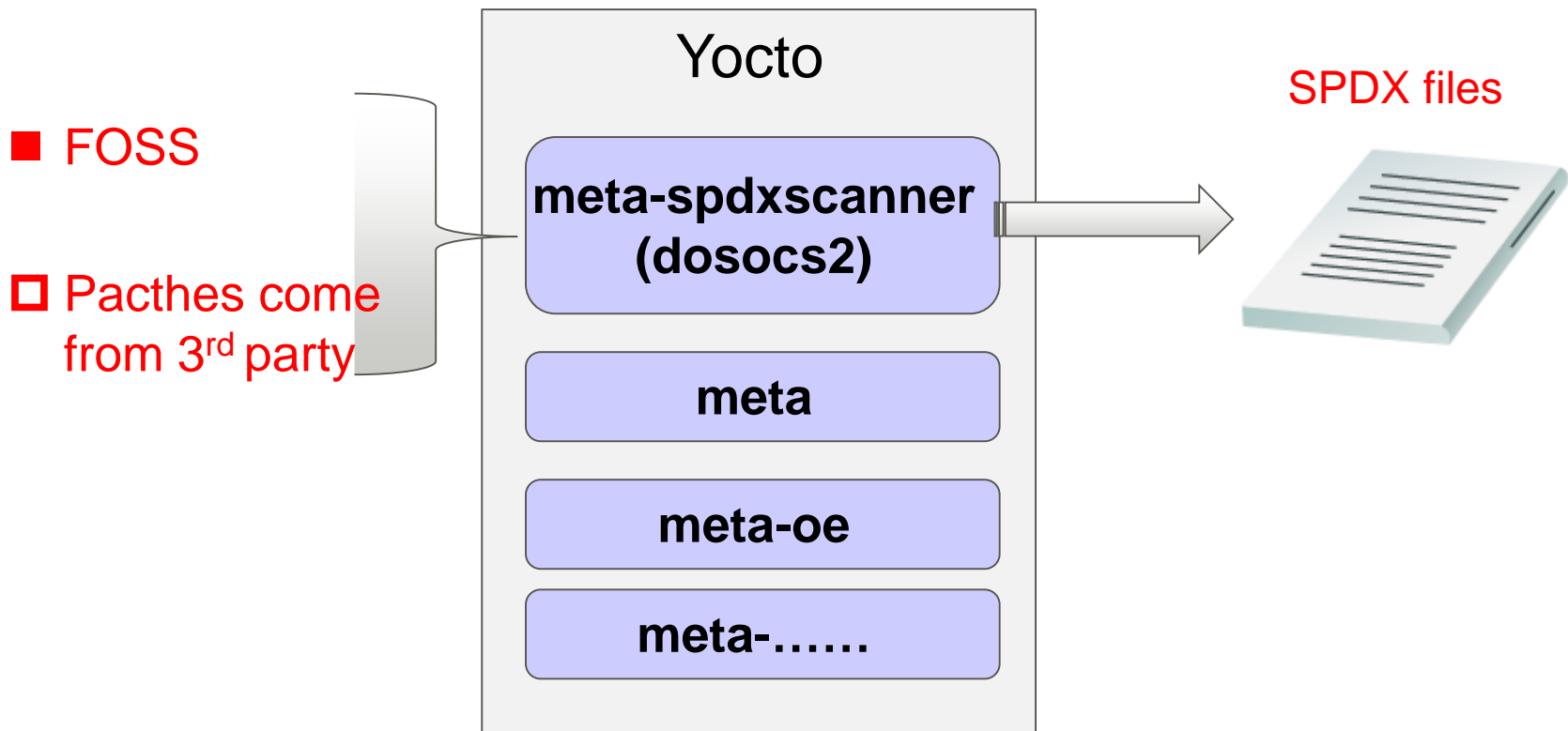
path: [root/arch/arm64/kernel/Makefile](#)

blob: 0025f86910469d2845bcd3bc3604a2bd95eb263f ([plain](#))

```
1 # SPDX-License-Identifier: GPL-2.0
2 #
3 # Makefile for the linux kernel.
4 #
5
6 CPPFLAGS_vmlinux.lds      := -DTEXT_OFFSET=$(TEXT_OFFSET)
7 AFLAGS_head.o             := -DTEXT_OFFSET=$(TEXT_OFFSET)
8 CFLAGS_armv8_deprecated.o := -I$(src)
9
10 CFLAGS_REMOVE_ftrace.o = -pg
11 CFLAGS_REMOVE_insn.o   = -pg
12 CFLAGS_REMOVE_return_address.o = -pg
```

meta-spdxscanner

- Git Repository: <https://github.com/dl9pf/meta-spdxscanner>

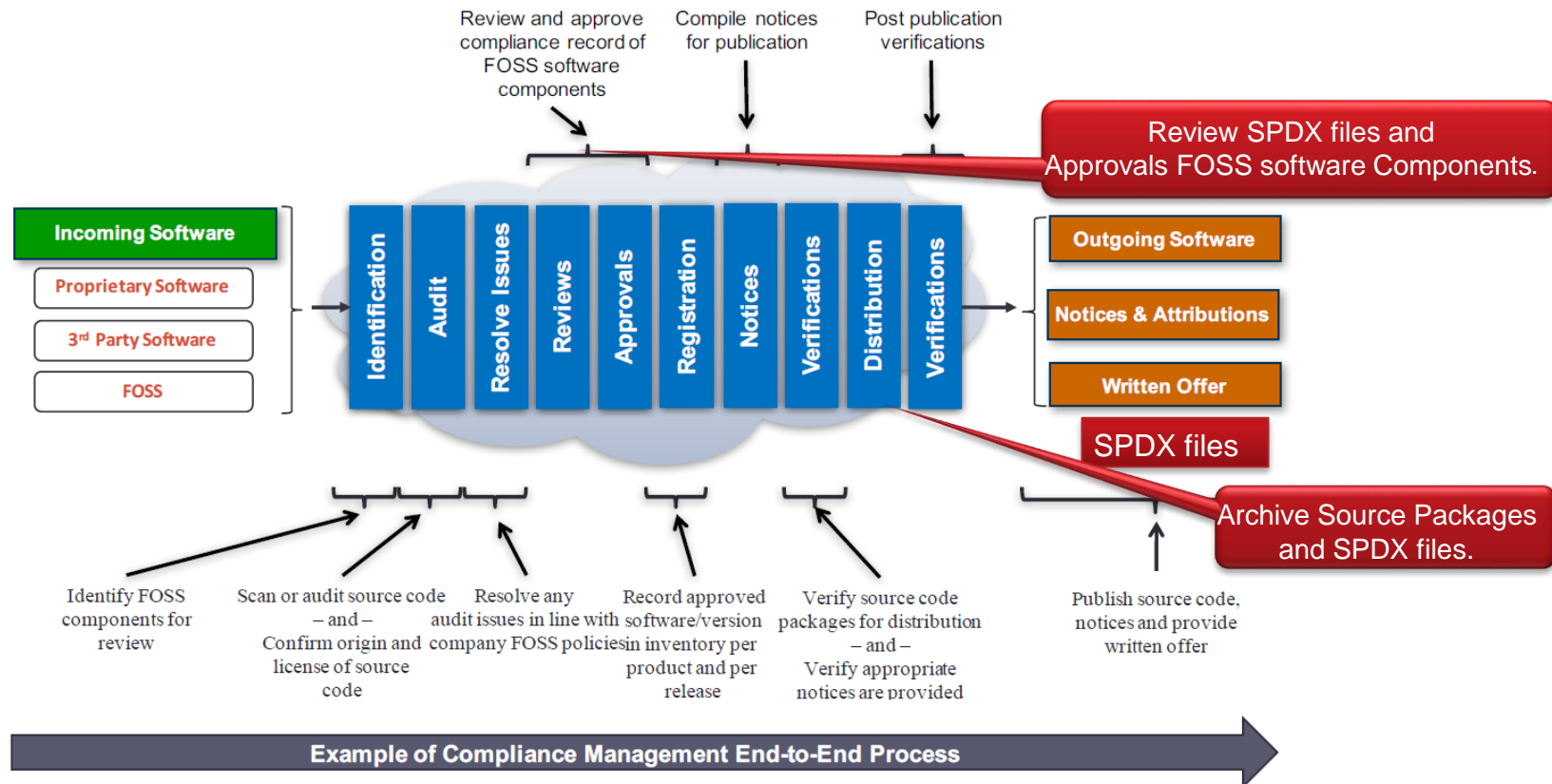


SPDX for FOSS Compliance Management

■ What's OpenChain Project?

- Activities to promote FOSS compliance in the software supply chain.
<https://www.openchainproject.org/>

■ Make SPDX files work in OpenChain



https://wiki.linuxfoundation.org/_media/openchain/openchain-curriculum-for-1-1.pdf

Save and reuse package list

- Like kernel config, selected package list can be saved and reused.

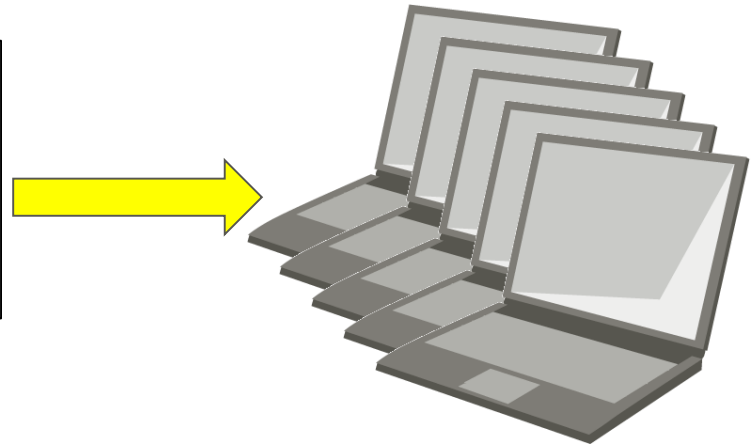
First time you install

```
[ ] acl
[ ] attr
[ ] base-files
[*] base-passwd
[*] base-passwd-update
[ ] bash
[ ] bash-bashbug
[ ] bash-completion
[ ] bash-completion-extra
[*] bc
[ ] busybox
```

```
$ cat .config
base-passwd
bc
base-passwd-
update
```

Load package list
(Optional)

Next time you install



- Config file is customizable.

Vendors can customize installation samples.

- To satisfy customization requirements for users, vendors can add some predefined samples for installation.

Select install type

```
New --->
Load package file --->
Reference1 (busybox based root file system) --->
Reference2 (systemd based root file system) --->
```

- The default samples directory is here.

```
$ cat /opt/poky/2.5/sysroots/x86_64-pokysdk-linux/usr/share/dnf/busybox
base-passwd
base-files
busybox
busybox-mdev
busybox-syslog
busybox-udhcpd
busybox-udhcpd
```

How to use dnf-host

- dnf-host Getting Started
- Demo

dnf-host Getting Started

Add dnf-host into toolchain

- First you need to add dnf-host into your Yocto Project.

Get the
Source Code

```
$ git clone https://github.com/ubinux/dnf.git -b dnf-yocto2.5  
$ ls dnf/patches-yocto/  
0001-Added-some-nativesdk-oss-for-dnf-host.patch  
0002-Modified-the-URL-of-dnf-intead-of-upstream.patch
```

Apply these
patches

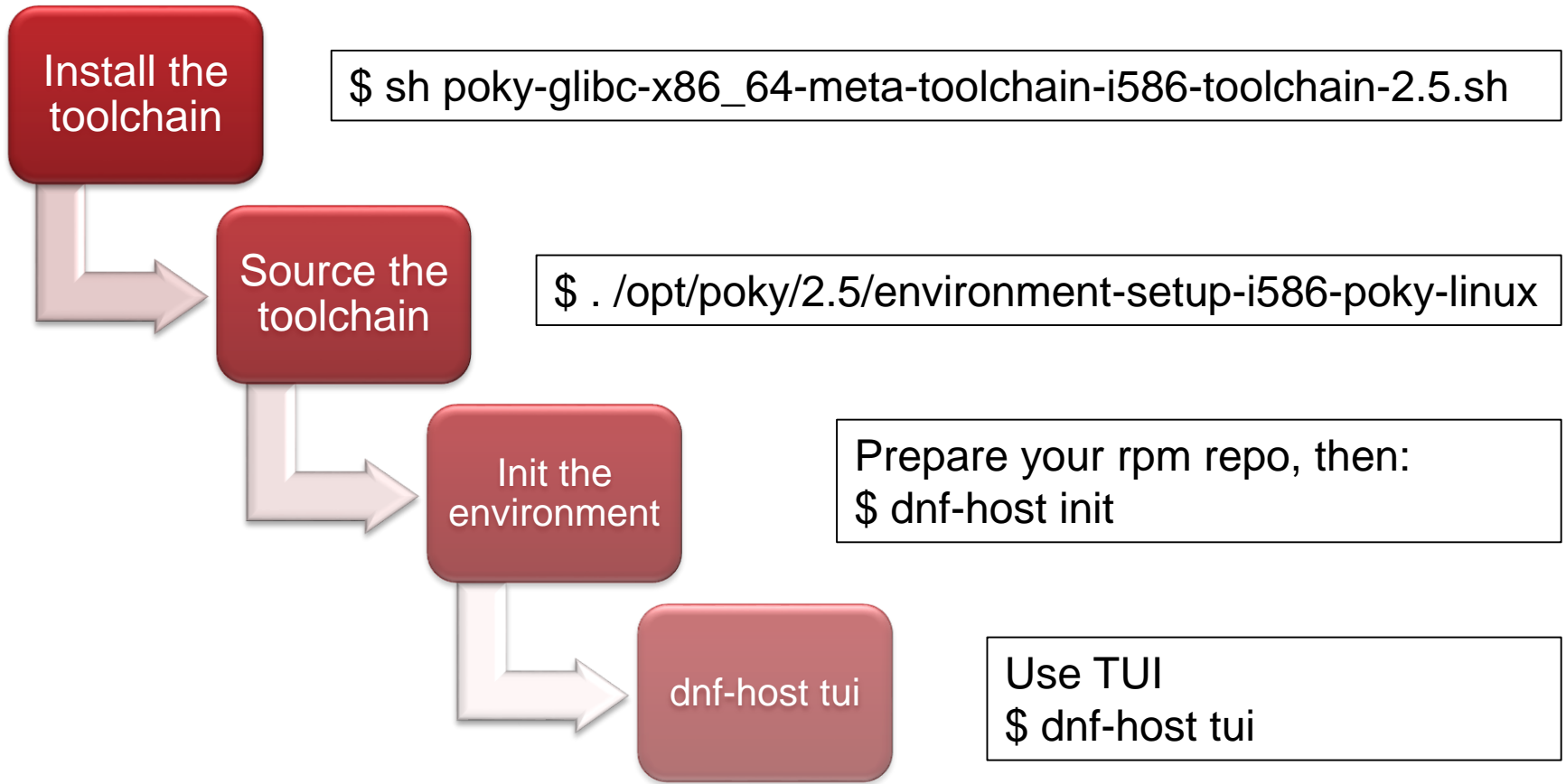
```
$ cd poky  
$ patch -p1 < XXX.patch
```

Bitbake the SDK

```
Build meta-toolchain to get sdk  
that includes dnf-host  
$ bitbake meta-toolchain
```

How to use dnf-host

- Then you can use dnf-host on the Cross-Development environment.



There is a Demo!

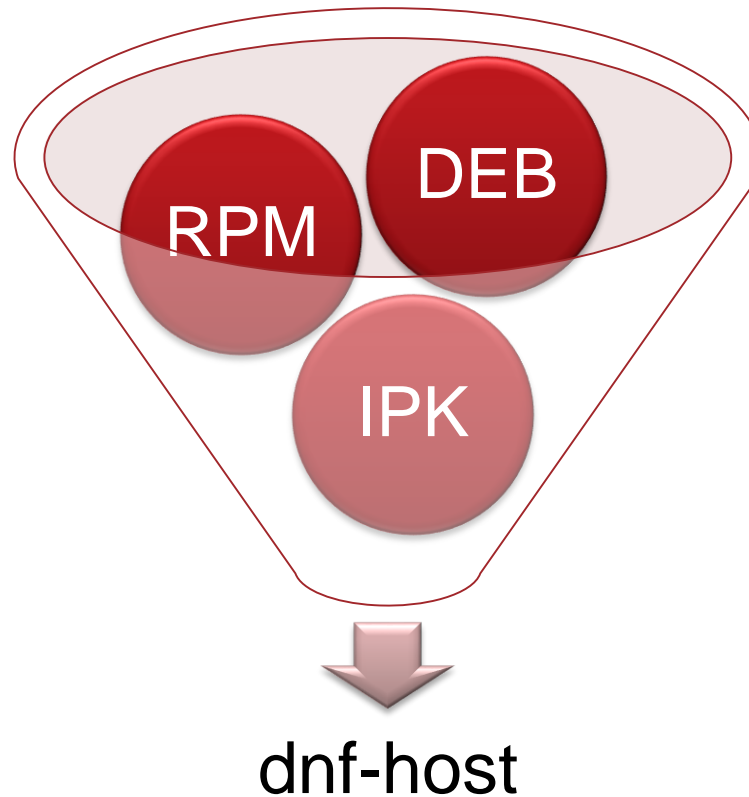
You can reference to:
<https://github.com/ubinux/dnf/tree/dnf-yocto2.5/README.md>

Future

- Support more package types
- Support different filesystem of rootfs
- Make TUI more user friendly
- Contribution plan

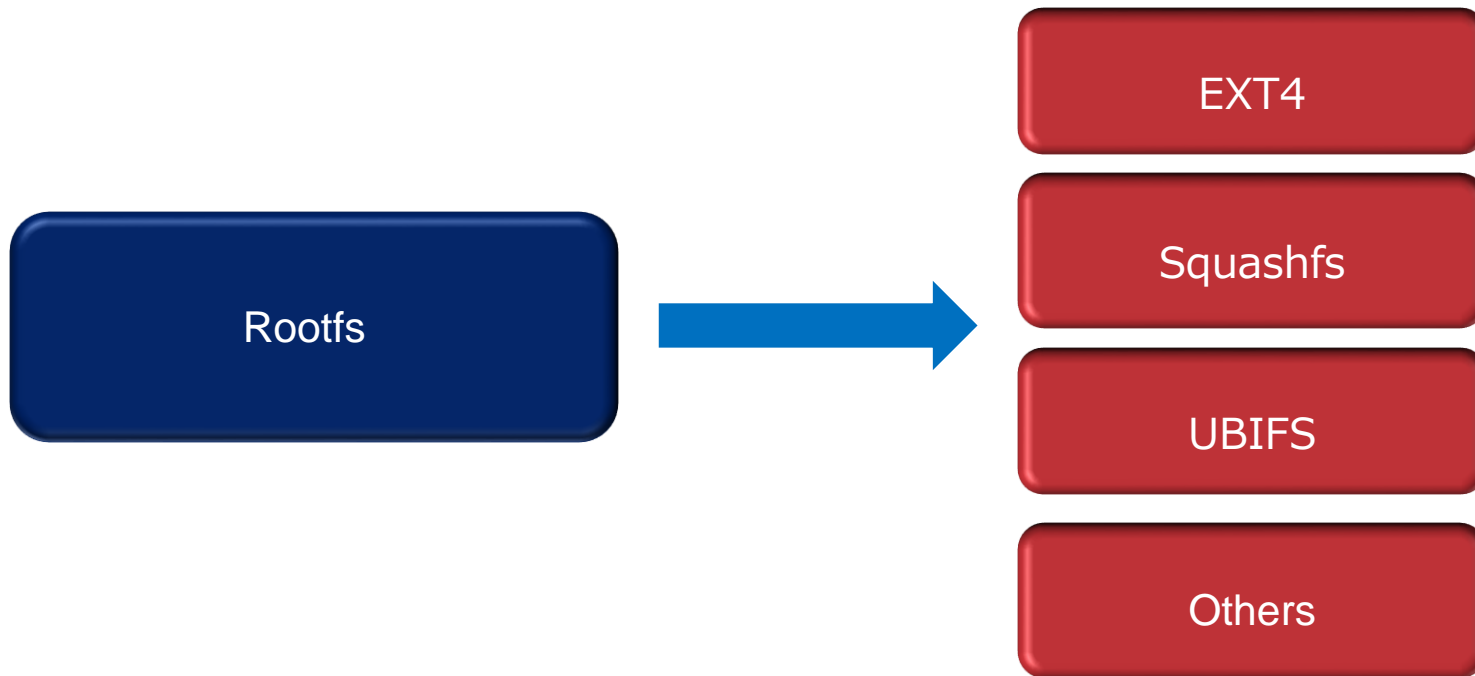
Support more package types

- Support more pkg types, e.g package_deb, package_ipk...



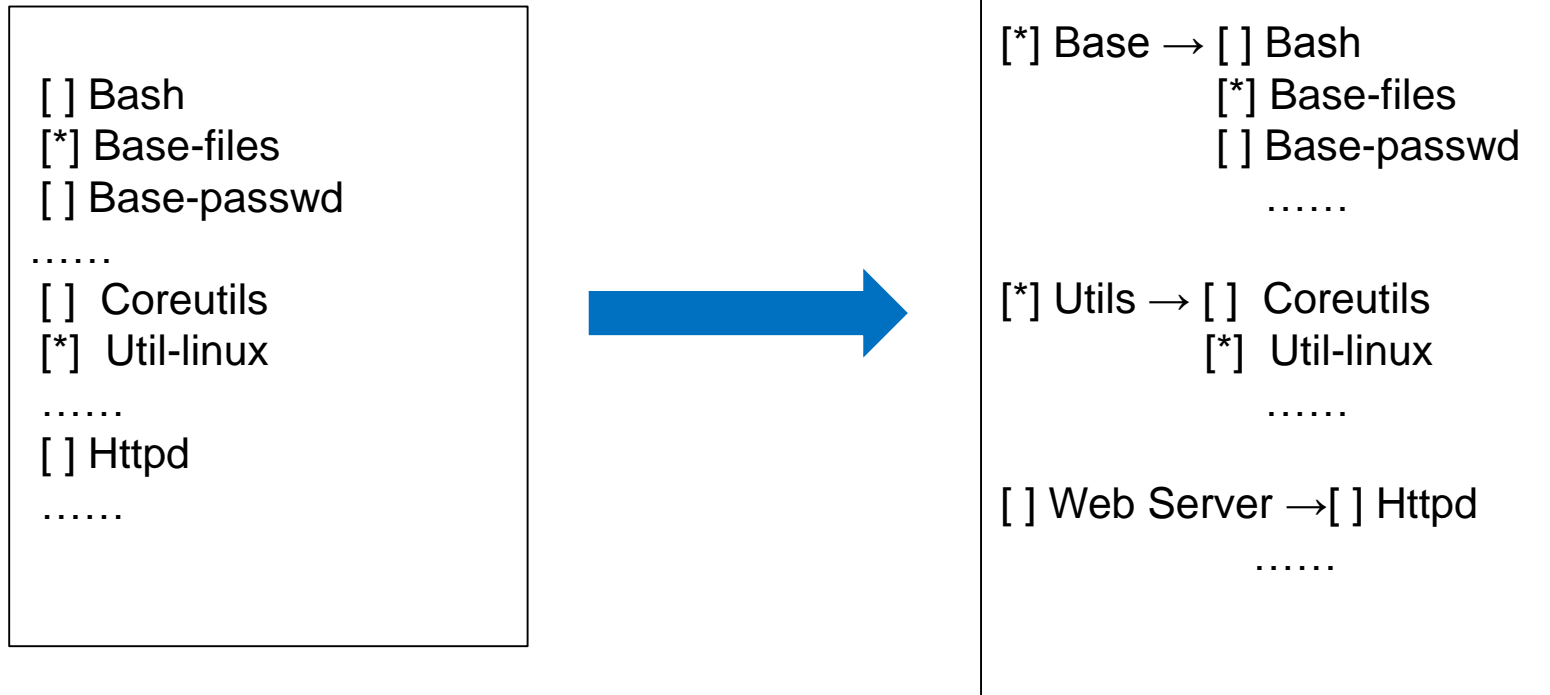
Support different images of rootfs

- Support more image format, e.g EXT4, Squashfs, UBIFS and so on.



Make TUI more user friendly

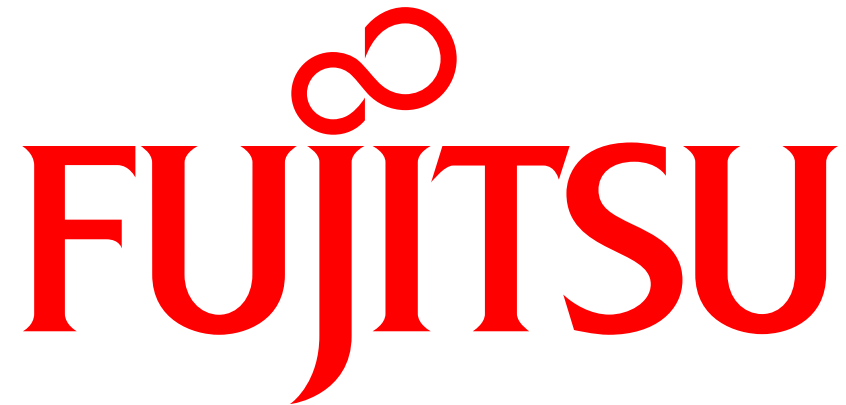
- Display packages in a hierarchical structure based on group information.



- Send patches to oe-core.
- Continuous development.
- Release dnf-host follow the step of Yocto.

Any Questions?

zhengrq.fnst@cn.fujitsu.com



shaping tomorrow with you