It’s not an embedded Linux distribution –
It creates a custom one for you.

The Yocto Project Eclipse plug-in: An Effective IDE Environment for Embedded Application and System Developers

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● Embedded Linux Development

● What The Yocto Project Offers Embedded Linux Development

● The Yocto Project Eclipse Plug-in
  o For System Developers
  o For Application Developers

● What's Next?
Embedded Linux Development Flow

- System Developer
  - Base Platform Profile
  - toolchain
  - sysroot
  - rootfs
  - kernel

- Application Developer
  - Application Project
    - Application Files

- Packages

- System Developer
  - Customized Platform

- Runtime Image
Embedded Linux Development

- **System developer** - develop the Linux systems for the targeted embedded devices:
  - ✓ Build profile customization through package selection
  - ✓ Tune the image footprint
  - ✓ Create reproducible build with flexibility in customization (for example, target architecture, package format)
  - ✓ Build toolchain for application developers

- **Application developer** - develop applications running on the targeted embedded devices:
  - ✓ Use cross-toolchain
  - ✓ Take advantage of sysroot setup
  - ✓ Remotely debug application on target (real HW or emulator)
  - ✓ Tune performance using profiling/tracing tools

A framework that streamlines the development flow is highly desirable
It's not an embedded Linux distribution – it creates a custom one for you.
What The Yocto Project Offers Embedded Linux Development

● The build system and meta-data:
  o Using BitBake - a widely adopted build system by the embedded Linux developers
  o Meta-data consists of recipe and configuration files
  o Easy customization / extension of the core meta-data through layers
  o HOB – A graphical user interface for BitBake

    You don't need to be an expert of BitBake to be able to customize your build and image

● The Application Development Kit (ADT):
  o Cross-toolchain for the target device
    ✓ Supports sysroot setup
    ✓ Optimized for autotool-based projects
  o Qemu emulator
    ✓ Can be booted through unfs
    ✓ Rootfs is extracted as sysroot
  o Tools for target analysis, profiling and tracing
The Yocto Project Eclipse Plug-in

- An IDE environment to streamline the development flow:
  - Wizard
  - Template

- Based on open source solutions:
  - Eclipse communities' CDT, RSE, TCF and LinuxTools projects
  - BitBake Commander Project

- Within one IDE, users can fully benefit from Yocto Project offerings:
  - BitBake (through Hob)
  - Meta-data
  - ADT
  - Qemu
  - Tracing and profiling tools
The Yocto Project Eclipse Plug-in For the System Developers

Without the Plug-in, you must do these steps all from the command-line.

1. Clone the Yocto Project meta-data
2. Edit recipe files using your preferred editor: emacs, vim, ...
3. Source `oe-init-build-env` to setup your build directory
4. Edit the `conf/local.conf` file to configure the Yocto build and then use BitBake to kick off the build
   - OR -
4. Use Hob to facilitate further build customization, and then run the Yocto build from within Hob
Step 1: Create Yocto BitBake Commander Project for Yocto Project metadata (Note: Collaborate with other open source plug-ins, e.g. egit)
The Yocto Project Eclipse Plug-in For System Developers

Step 2: Customize meta-data recipe files

- Navigate the meta-data in the project tree view
- “Yocto BitBake Recipe Editor” with keywords highlighted
- New Recipe Wizard allows the user to quickly create new recipe files
Step 3: Launch Hob

- Set up a separate build area for the customized meta-data
- Using Hob, further customize and configure your build and image output
- Run the build from Hob
Demo
Without the Plug-in, you must do these steps all from the command-line.

1. Set up your cross toolchain and sysroot for cross development
2. Create your Makefile or autotool-based project
   - Best with autotool-based projects. Just pass host options to configure (e.g. ./configure host=i686-poky-linux -with-libtool-sysroot=/home/jzhang/x86)
   - For other projects, ensure the cross-tools are used, (e.g. CC=i686-poky-linux-gcc and LD=i686-poky-linux-ld in makefile)
3. Compile your project
4. Optionally bring up the Qemu emulator using the command line
5. Deploy your application to the remote target: rcp, scp, rsync, etc.
6. Setup cross debugging against the desired target: Qemu or real hardware
   - Start gdbserver on target
   - Run cross-gdb on host side to connect to remote target
7. Perform target analysis tasks like tracing and profiling
   - Follow each tool’s special setup for remote launch or interaction from the host

This is a very complex task if doing everything on your own and can dramatically slow down your development cycle.
The Yocto Project Eclipse Plug-in For Application Developer

Step 1: Set up your cross-toolchain and sysroot for cross-development
Step 2: Set up your Eclipse IDE with the Yocto Project Plug-in installed
Step 3: Configure Yocto Project ADT plug-in for IDE
Step 4: Pick one of the ADT autotool-based project templates
Step 5: Change the project’s cross-development settings if needed
Step 6: Work on your project, configure and compile using cross-development settings
Step 7: Use the auto-created Qemu launcher for the target to launch Qemu
Step 8: Finish the auto-created remote debug configuration template for the project
Step 9: Launch the remote debug session
Step 10: Use the tools under the “YoctoTools” menu. The tools suite contains the following essential tools that provide target analytical capabilities:

- PowerTop
- LatencyTop
- Oprofile
- Perf
- Lttng-ust
- SystemTap
Demo
What's Next?

- Continue to improve the Yocto Project’s overall user experience is the main theme of the next release
- Add new tools:
  - BSP/Kernel configuration tools
- Improve existing tools:
  - BitBake Commander
    - Create recipe wizard extensions
    - Add more features to make it easier for the user to create recipes
  - Hob:
    - Working on near- and longer-term plans for creating a better infrastructure to support a back-end BitBake server and front-end user interface model
    - Deliver key missing functionality, e.g. packages deselection, precise package information
  - Tracing and Profiling Tools:
    - Make tools easier to setup
    - Improve tool functionality in the long term
Other Sources

Yocto Project:
http://www.yoctoproject.org/

ADT manual:

Yocto Project Eclipse Plug-in Video:
http://vimeo.com/30557368

Hob Video:
http://www.youtube.com/embed/W3IXTdajqH4

ELC 2011 ADT Video:
“The Yocto project and its application development toolkit (ADT) - The answer to effective embedded application development”:
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