



YOCTO PROJECT* EXTENSIBLE SDK

SIMPLIFYING THE WORKFLOW FOR APPLICATION DEVELOPERS

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WHAT WE'LL BE COVERING

Why do we need the Extensible SDK?

How do distro maintainers create one?

How does the Extensible SDK improve workflow?

Not a devtool deep dive





WHAT IS THE EXTENSIBLE SDK





THE STANDARD SDK

Develop code to run on target machine

Delivered as a shell script installer

- Cross-Development toolchain
- Target libraries, headers, and symbols
- Environment setup script



WHAT COULD BE IMPROVED?

Updateable

Extensible

Packages

Images

Teamwork





MEET THE EXTENSIBLE SDK

Major design change

- Shrink-wrapped distro maintainer environment

Allows compact installer (as small as 35MB)

Updateable and extensible – lazy install

Simplifies team-work

First appeared in Jethro, usable in Krogoth





USING THE EXTENSIBLE SDK





INSTALL

Installer created by distro maintainer

Shell script installer

Completely self contained

Can be installed to an arbitrary location



INSTALL EXAMPLE

```
poky-glibc-x86_64-core-image-minimal-i586-toolchain-ext-2.2.1.sh
```

```
$ chmod +x poky-glibc-x86_64-core-image-minimal-i586-toolchain-ext-2.2.1.sh  
$ ./poky-glibc-x86_64-core-image-minimal-i586-toolchain-ext-2.2.1.sh -d mysdk
```

```
Poky (Yocto Project Reference Distro) Extensible SDK installer version 2.2.1  
You are about to install the SDK to "/home/hbruce/mysdk". Proceed[Y/n]? Y  
Extracting SDK....done  
Extracting buildtools...  
Preparing build system...  
Parsing recipes: 100% |#####| Time: 0:00:17  
SDK has been successfully set up and is ready to be used.  
Each time you wish to use the SDK in a new shell session, you need to source  
the environment setup script e.g.  
  . /home/hbruce/mysdk/environment-setup-i586-poky-linux
```

SIMPLE EXAMPLE

Assumes SDK contains toolchain

```
$ . /home/hbruce/mysdk/environment-setup-i586-poky-linux
```

```
$ $(CC) hello.c -o hello
```

Also enables Eclipse* integration

Keep updatability but act like standard SDK

*Other names and brands may be claimed as the property of others.

ACCESS TO NEW TOOLS

Most of the distro maintainer tools

- devtool
- recipetool
- wic
- ...



EXAMPLE DEVTOOL WORKFLOW

```
$ . /home/hbruce/mysdk/environment-setup-i586-poky-linux  
$ devtool add https://github.com/whbruce/bbexample.git  
$ devtool edit-recipe bbexample  
$ devtool build bbexample  
$ devtool deploy-target bbexample root@192.168.0.2
```

Run, fix, repeat.

```
$ devtool finish bbexample /path/to/bitbake/layer
```

Issue pull request

Maintainer builds and publishes updated eSDK with your work in it





UPDATING AND EXTENDING THE SDK

Update

```
$ devtool sdk-update [url]
```

Extend

```
$ devtool search package-name
```

```
$ devtool sdk-install [-s] recipe-name
```

Example

```
$ devtool sdk-install meta-extsdk-toolchain
```



RUN IN A CONTAINER

A Docker* container is available

<https://hub.docker.com/r/crops/extsdk-container>

Enables operation on macOS* and Windows*

*Other names and brands may be claimed as the property of others.



CREATING AND MAINTAINING AN EXTENSIBLE SDK

Tasks for the distro maintainer





GENERATING SDK: BUILDING

Build

```
$ bitbake image-recipe -c populate_sdk_ext
```

Default contains everything for image recipe

SDK installer in tmp/deploy/sdk

Make installer available to your developers





CONFIGURE ESDK: INSTALLER AND CONTENT

Make a minimal installer (full by default)

```
SDK_EXT_TYPE = "minimal"
```

Add toolchain to minimal installer

```
SDK_INCLUDE_TOOLCHAIN = "1"
```

Add all package info

```
SDK_INCLUDE_PKGDATA = "1"
```

Add specific tools or libraries

```
SDK_EXTRA_TOOLS += "nativesdk-package-name"  
TOOLCHAIN_HOST_TASK += "package-name"
```



CONFIGURE ESDK: UPDATER

Define a URL for the updater, say `http://mysite.com/sdk-updater`

Set default update URL in your configuration

```
SDK_UPDATE_URL = "http://mysite.com/sdk-updater"
```

When you make change, re-build SDK and generate updater files

```
$ oe-publish-sdk tmp/deploy/sdk/installer.sh /path/to/sdk-updater
```

Let your developers know when updates are available





FASTER BUILDS THROUGH SHARED STATE

Pre-built objects on a server

eSDK checks if you can re-use objects

Qemux86 core-image-minimal build times

- Without: 35mins
- With: 1 min





CONFIGURE SDK: SHARED STATE MIRROR

Define URL of the shared state mirror server.

```
http://mysite.com/sstate-cache
```

Set in `conf/sdk-extra.conf`

```
SSTATE_MIRRORS = "file://.*_http://mysite.com/sstate-cache/PATH"
```

Ensure `sstate-cache` is served up at this location



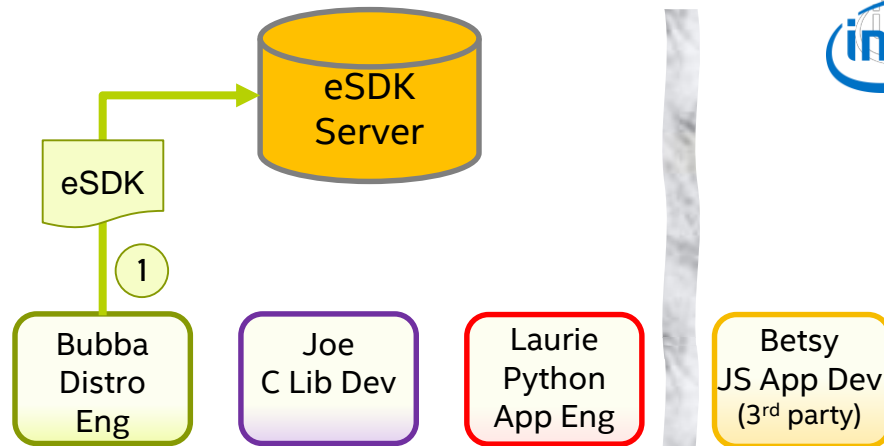


EXTENSIBLE SDK WORKFLOW

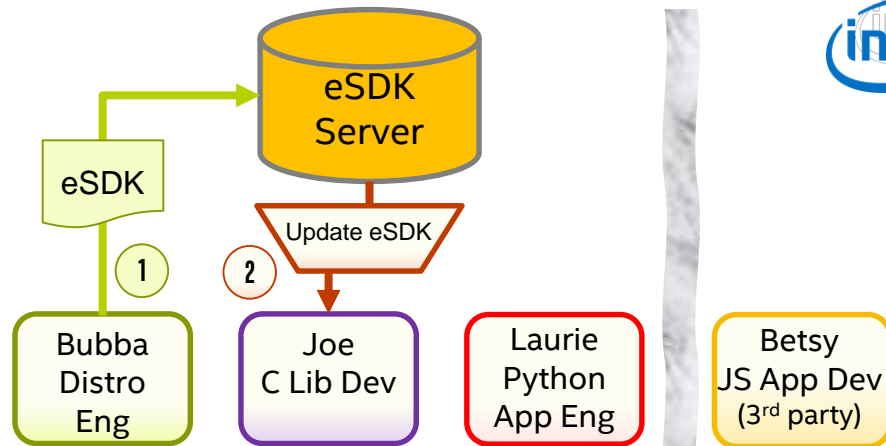
Pulling it all together



1 Bubba makes eSDK

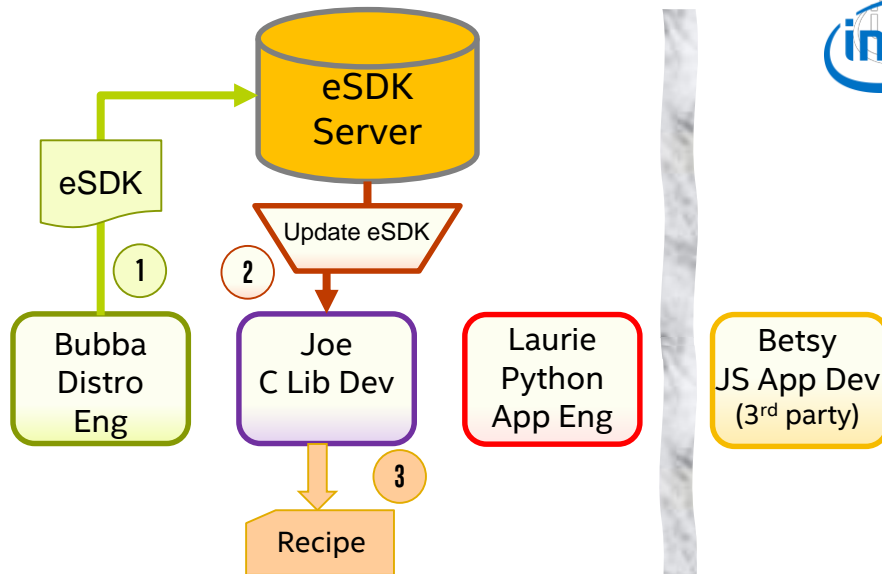


- 1 Bubba makes eSDK
- 2 Joe updates eSDK



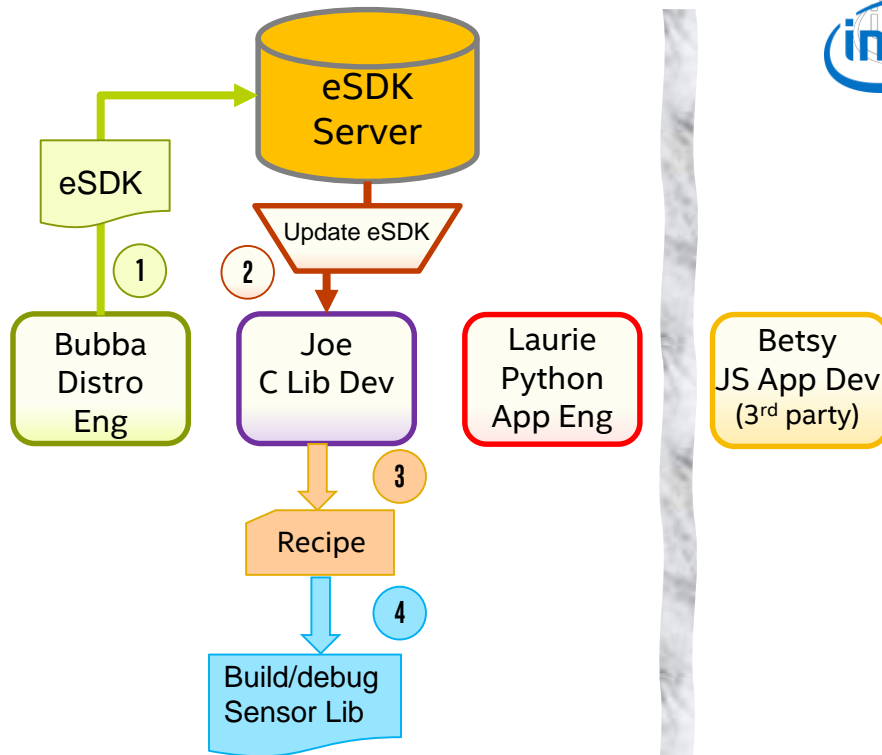


- 1 Bubba makes eSDK
- 2 Joe updates eSDK
- 3 Uses "devtool add" to generate recipe





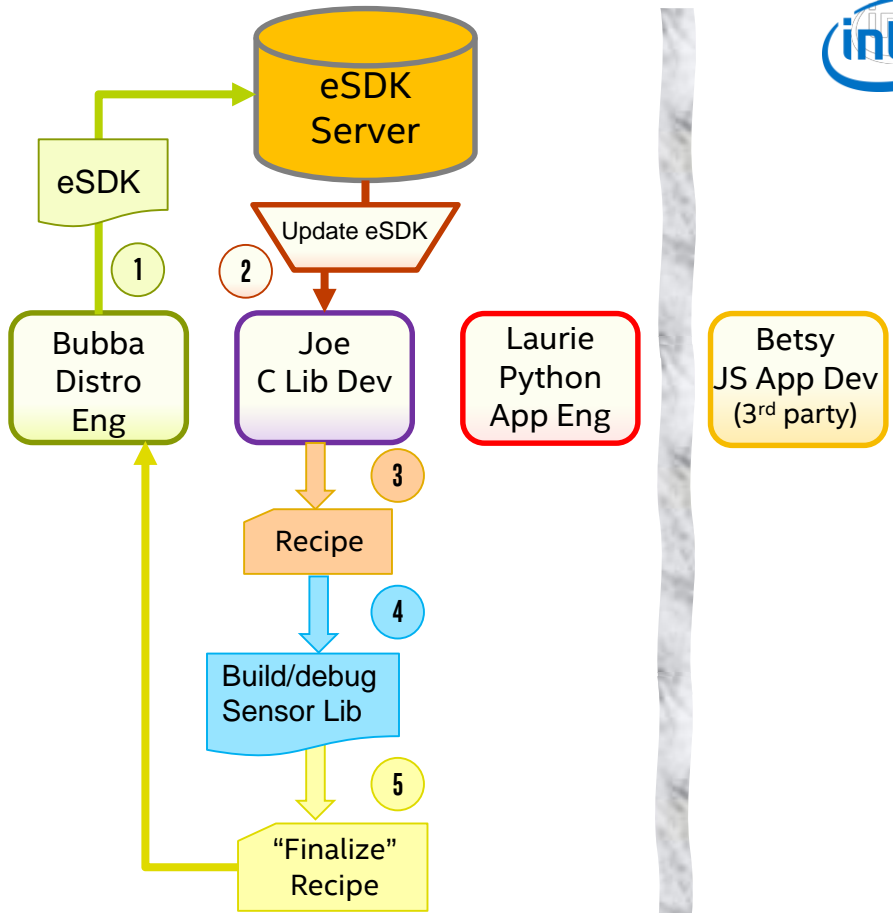
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- 4 Build and debug sensor Lib





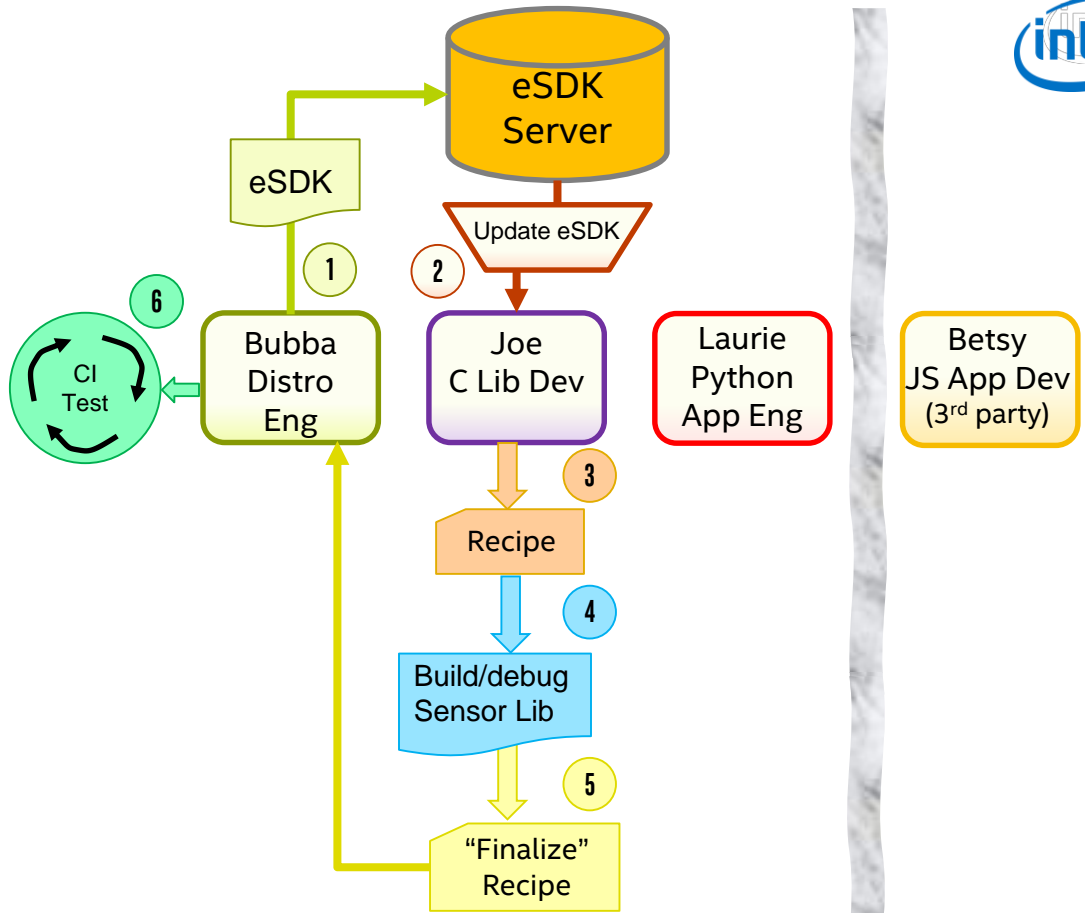
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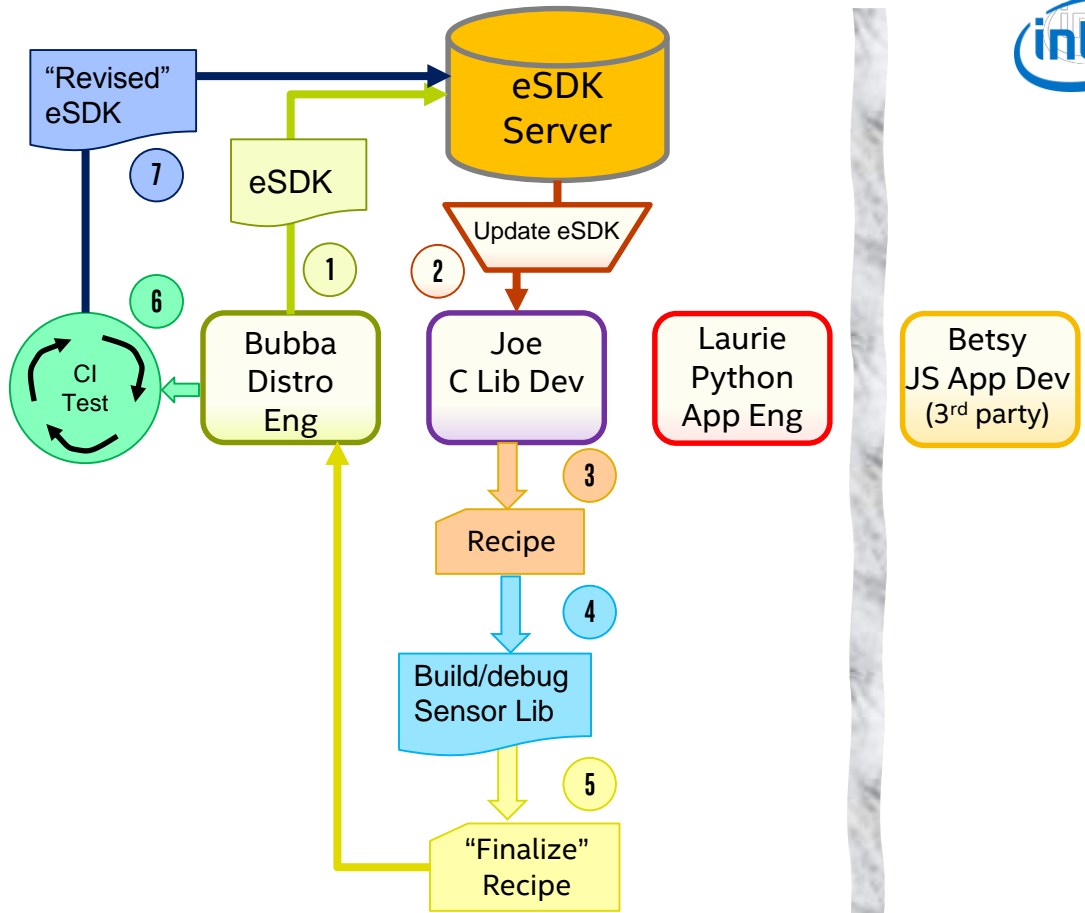


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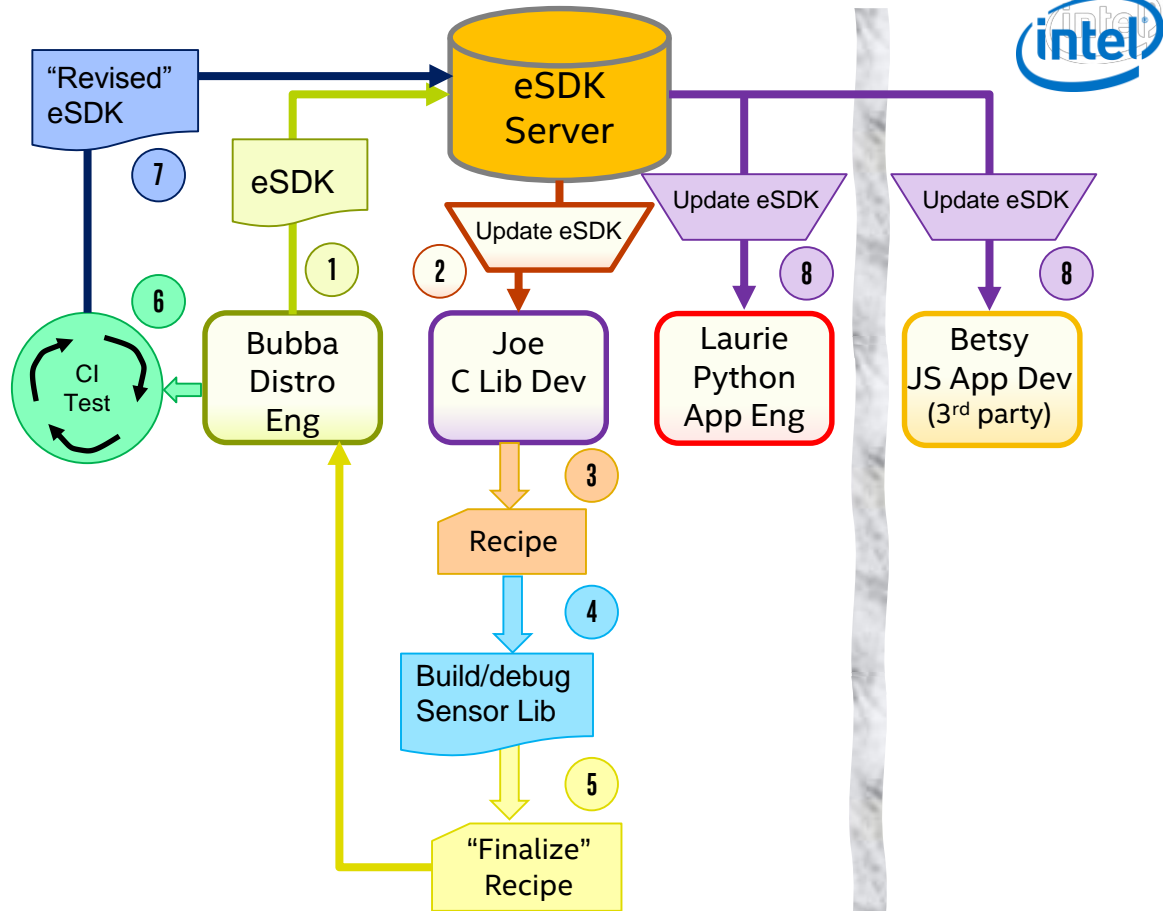




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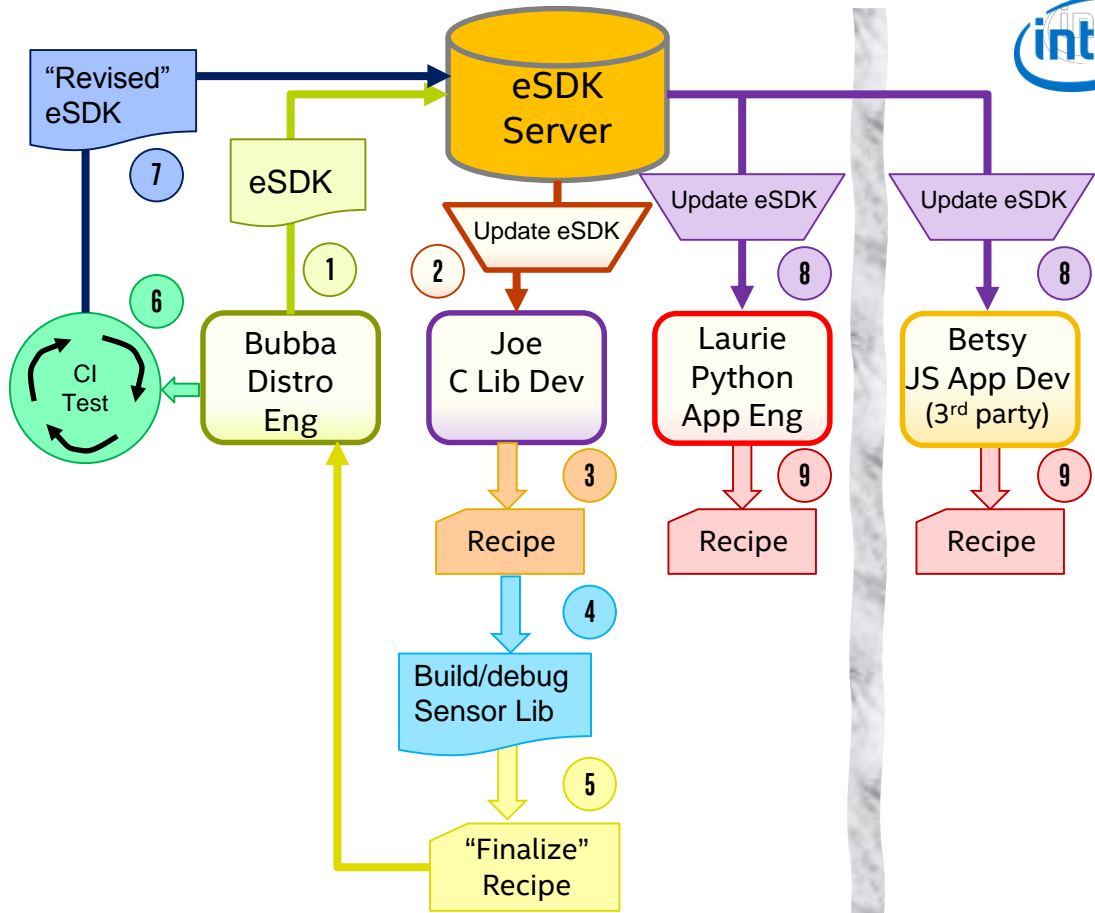


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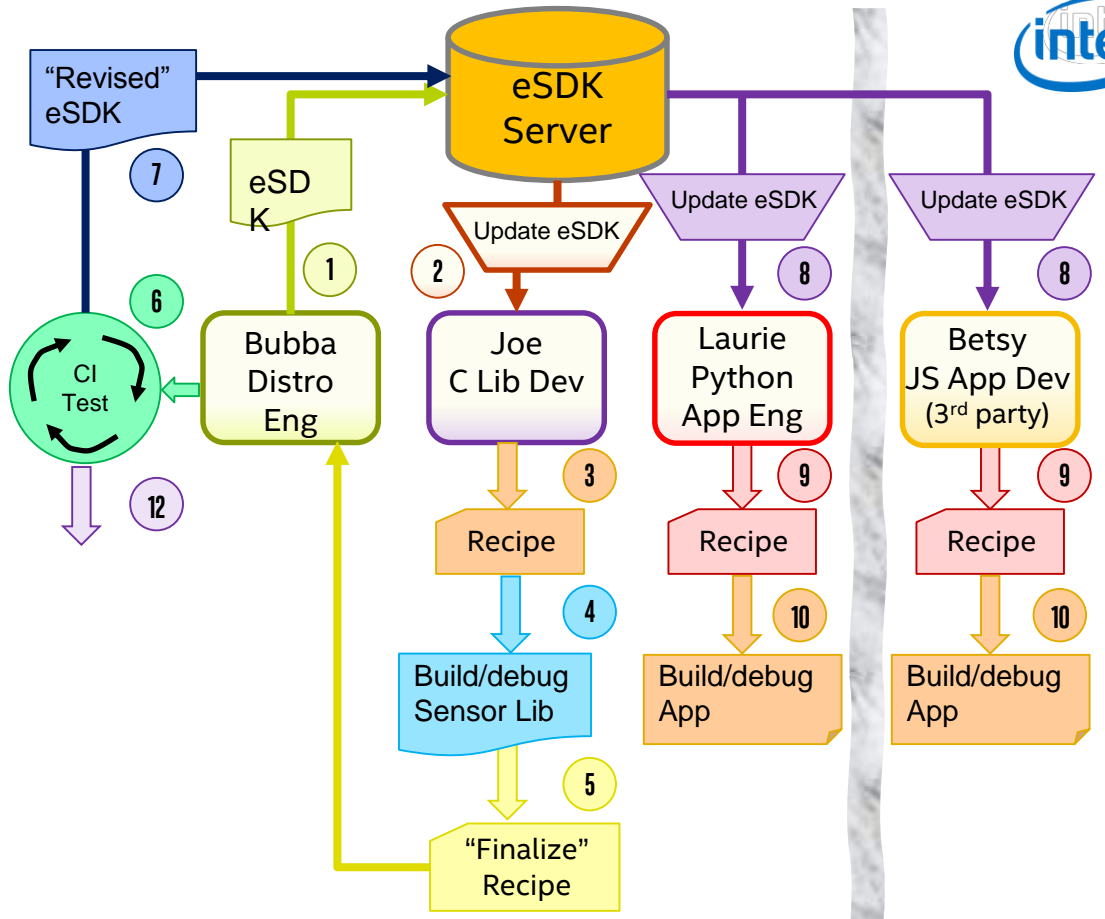


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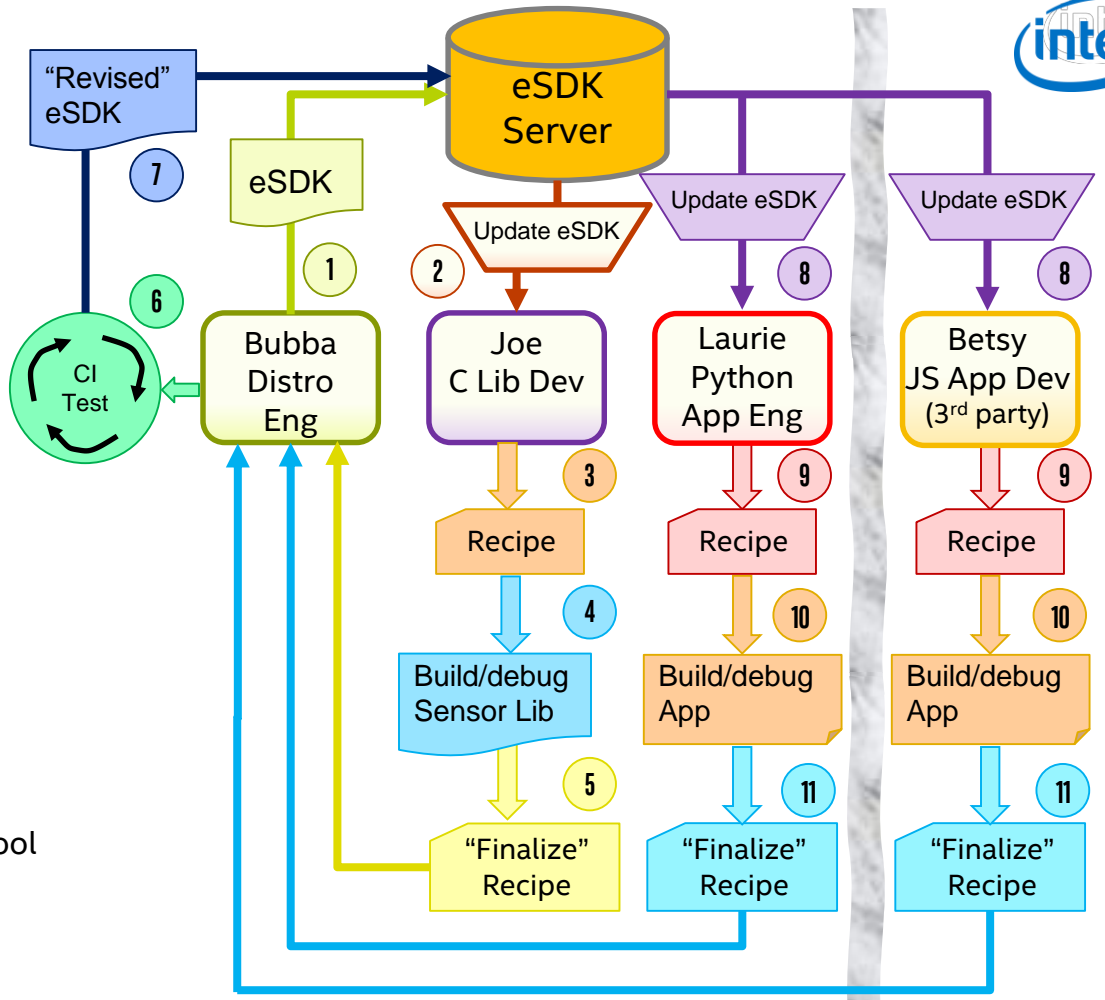


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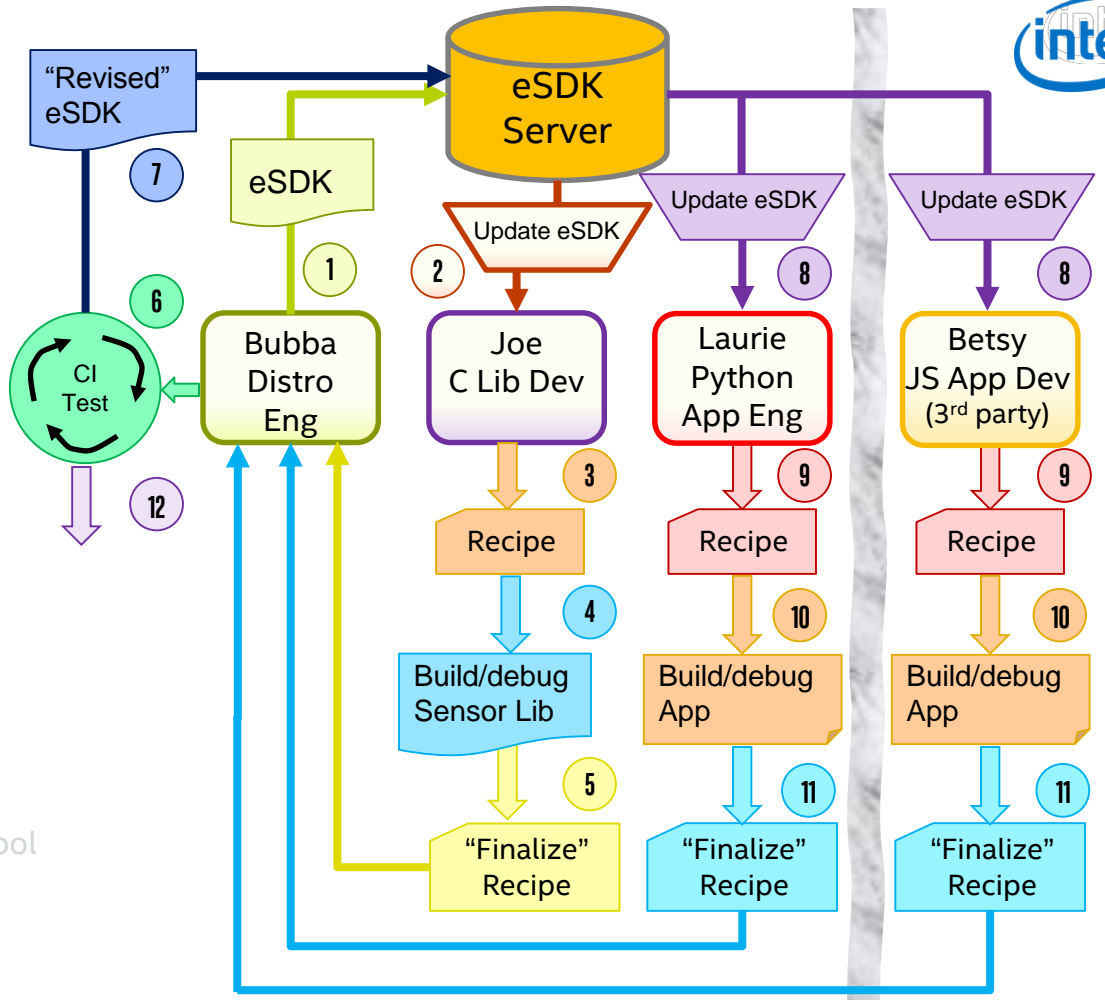


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- 11 When apps are working, they use "devtool finish" and send recipes to Bubba
- 12 Bubba "turns the crank" and ships the product image





WRAP UP





EXTENSIBLE SDK BENEFITS

Shared development environment

Power of devtool

Improved team workflow

Leverages shared state for faster builds

Runs on a range of host operating systems





THANKS

Paul Eggleton

Randy Witt

Brian Avery

Doug Martin



CALL TO ACTION

Use the Extensible SDK

Use it on Windows and Mac

https://wiki.yoctoproject.org/wiki/Extensible_SDK



QUESTIONS





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