YOCTO PROJECT* EXTENSIBLE SDK

SIMPLIFYING THE WORKFLOW FOR APPLICATION DEVELOPERS

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WHAT WE'LL BE COVERING

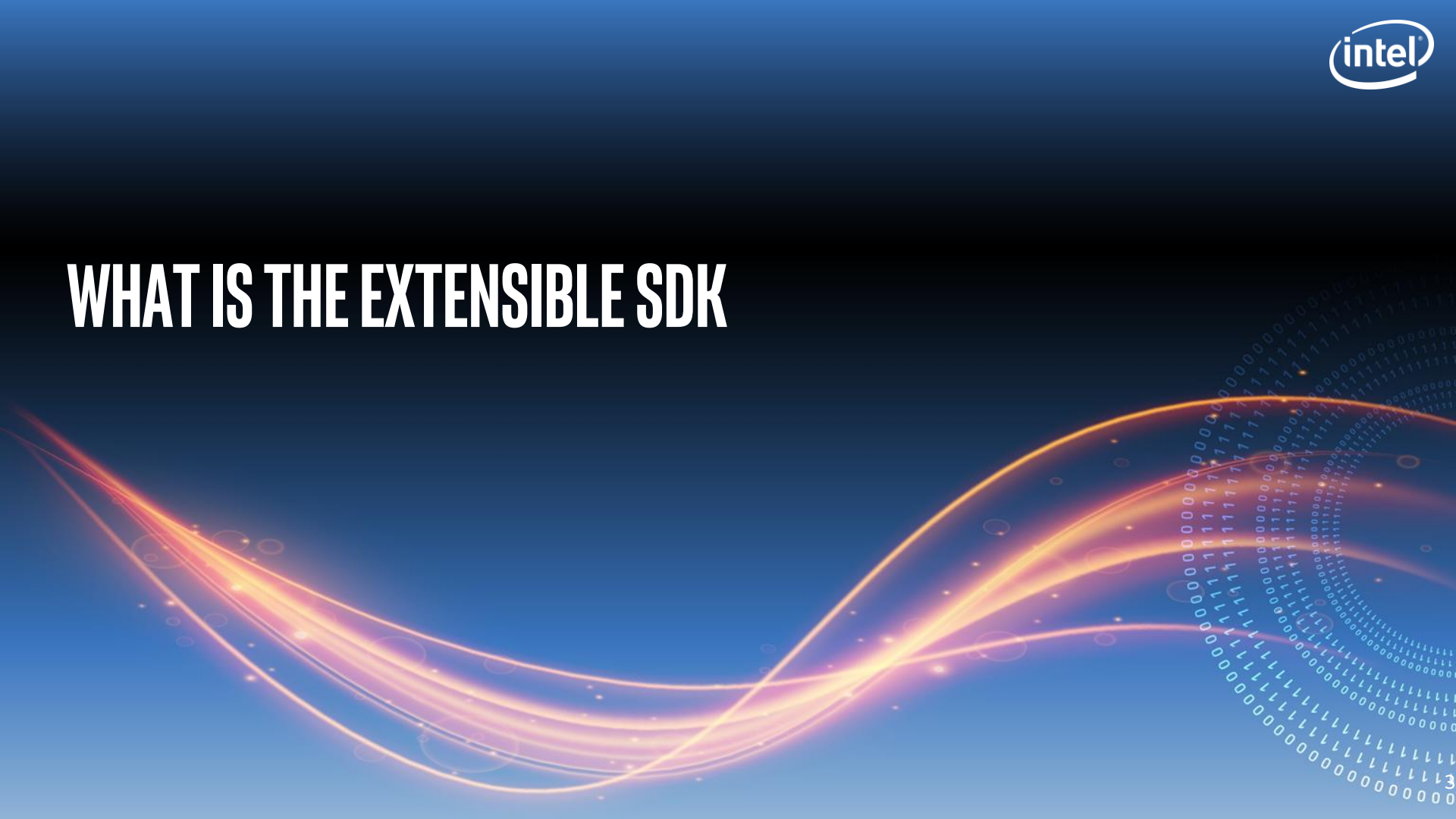
Why do we need the Extensible SDK?

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

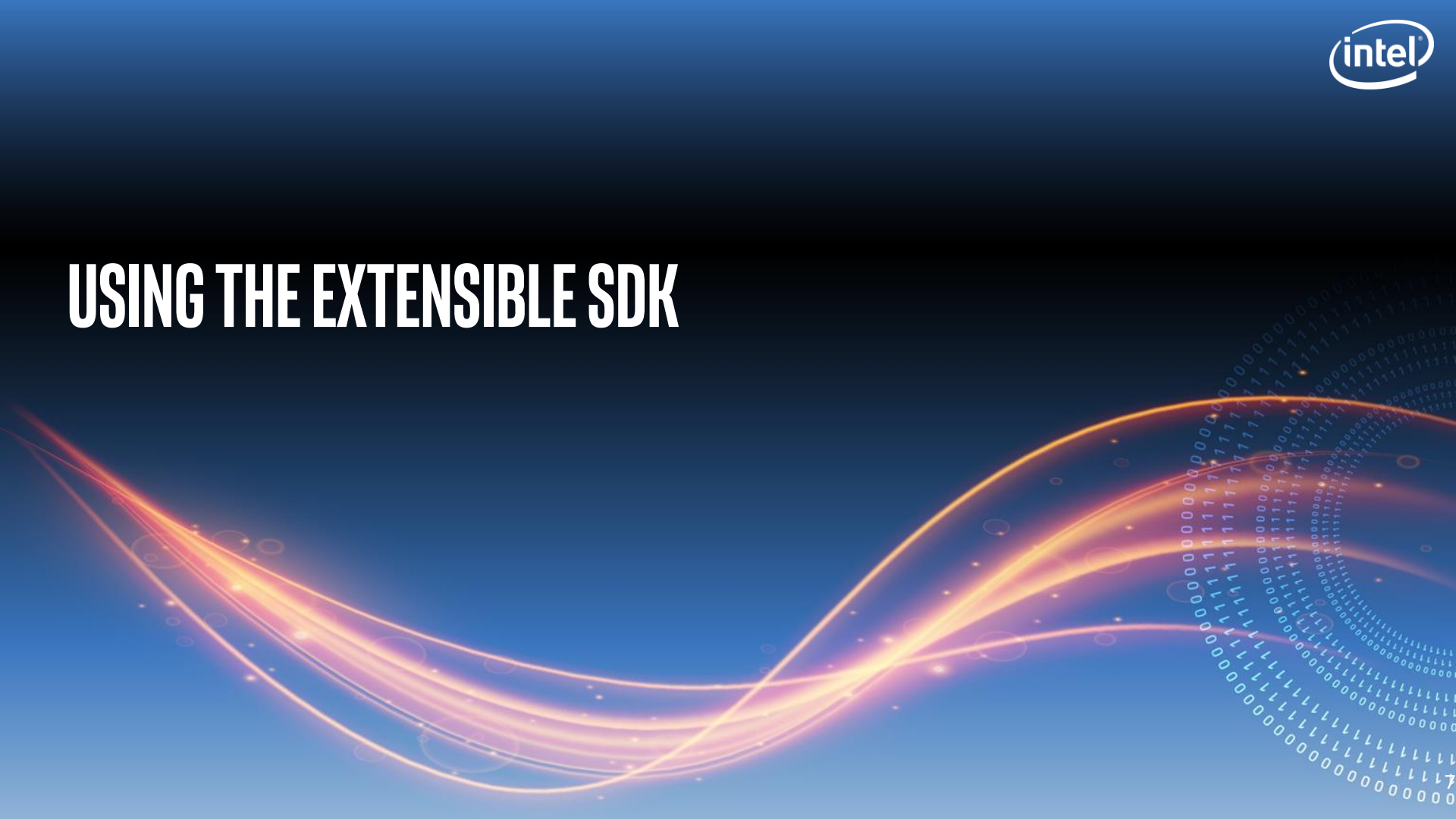
Allows compact installer (as small as 35MB)

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

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*

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`

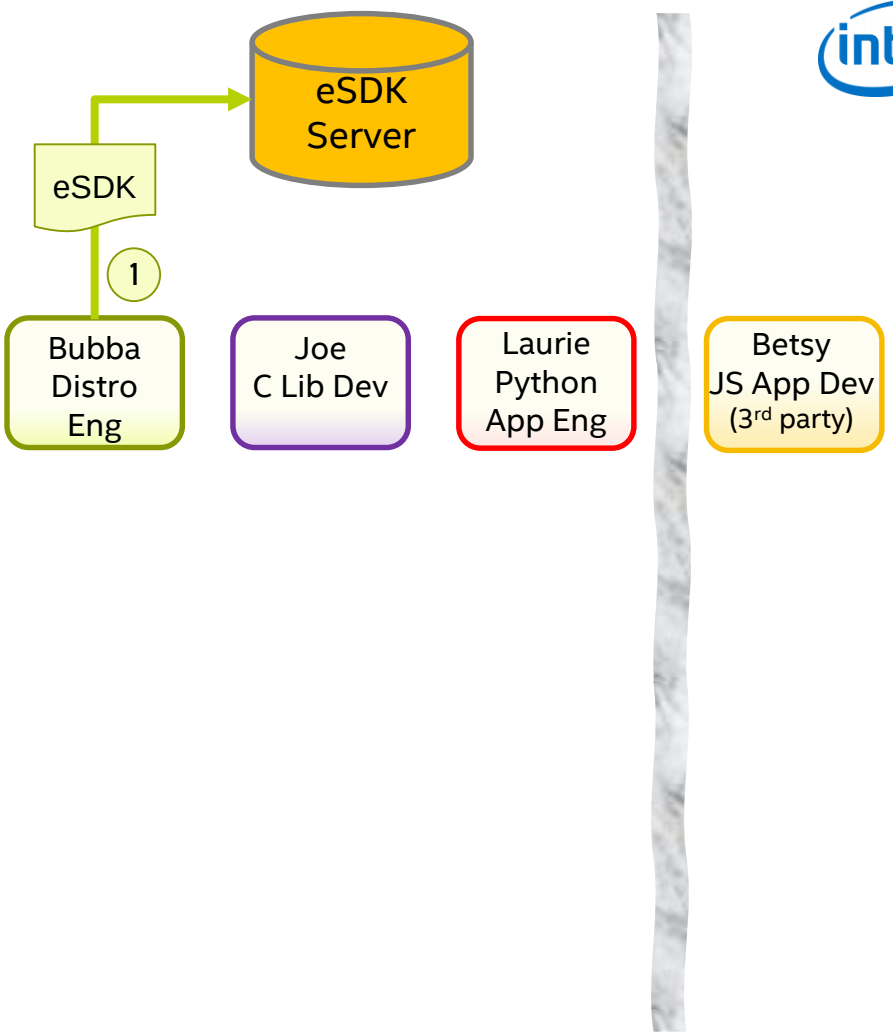
```
SSTATE_MIRRORS = "file://.* http://mysite.com/sstate-cache/PATH"
```

Ensure sstate-cache is served up at this location

EXTENSIBLE SDK WORKFLOW

Pulling it all together

1 Bubba makes eSDK



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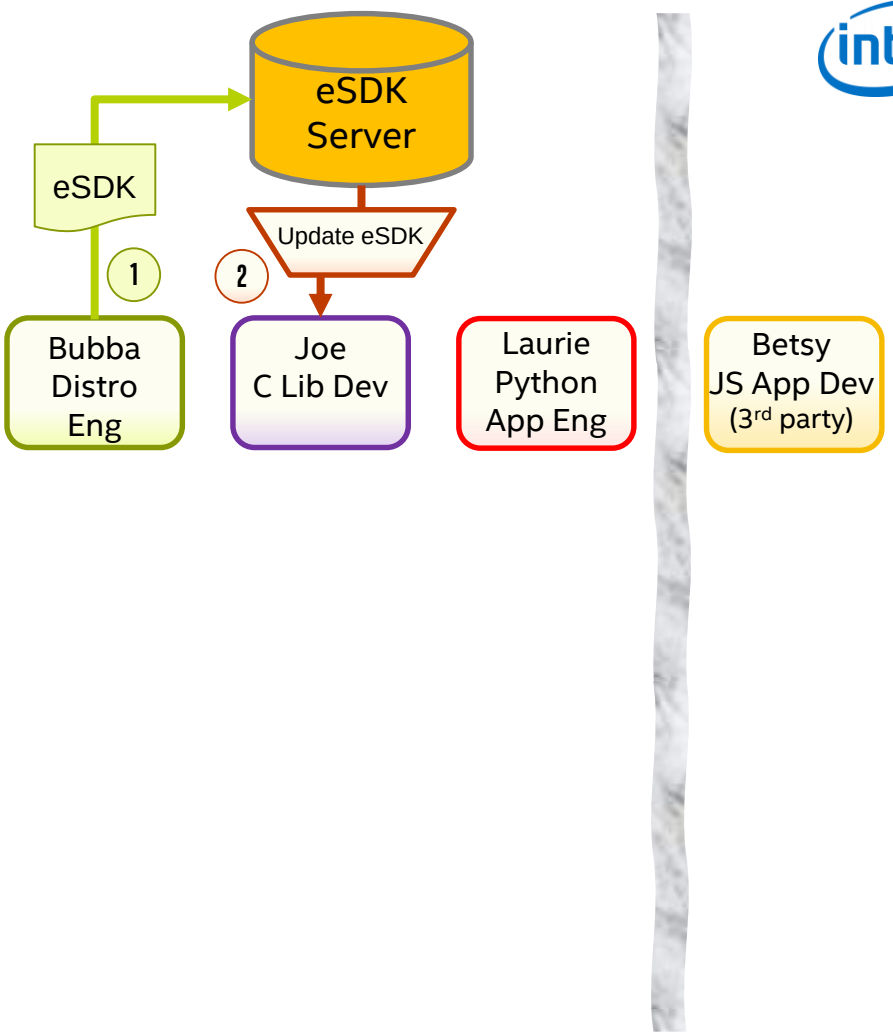

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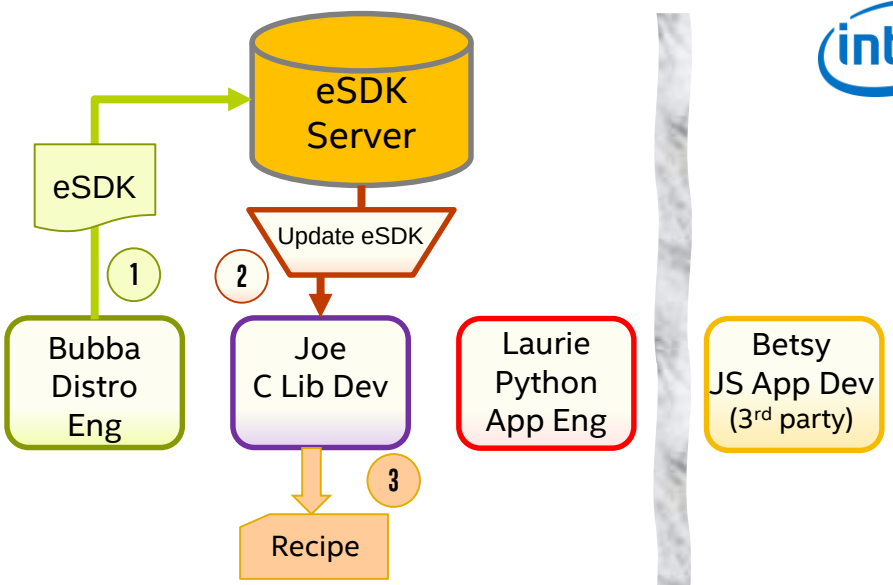

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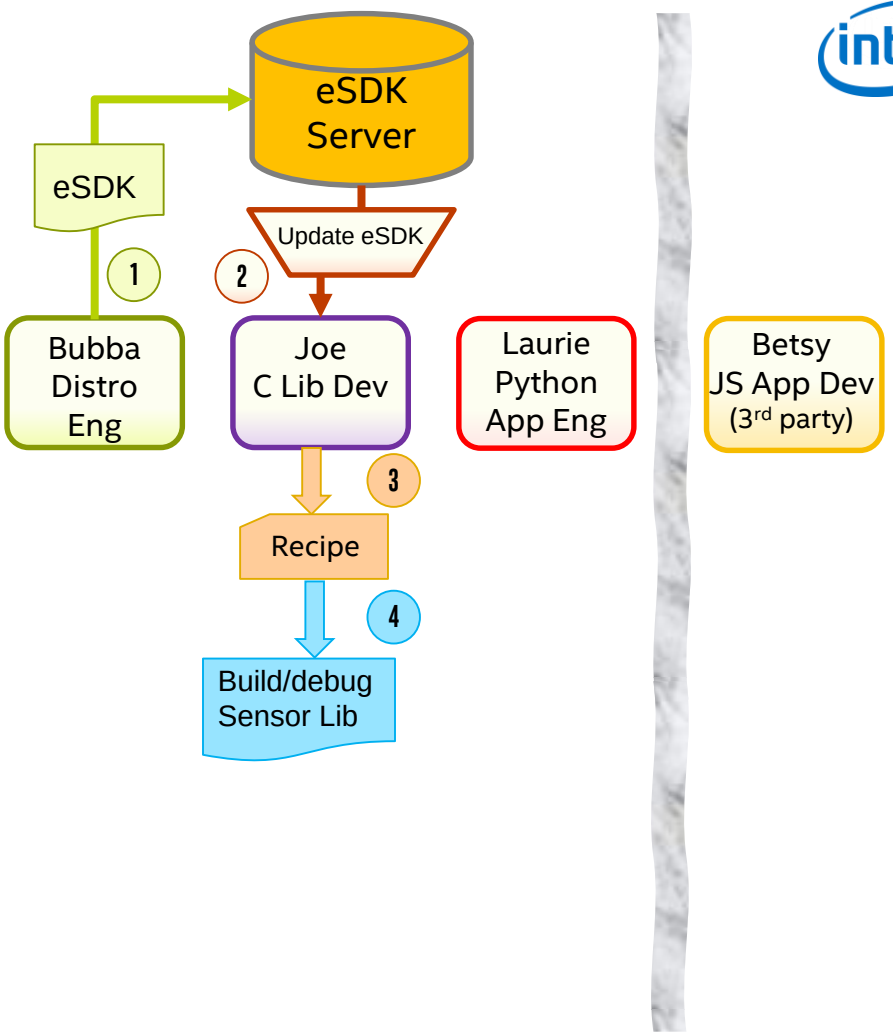

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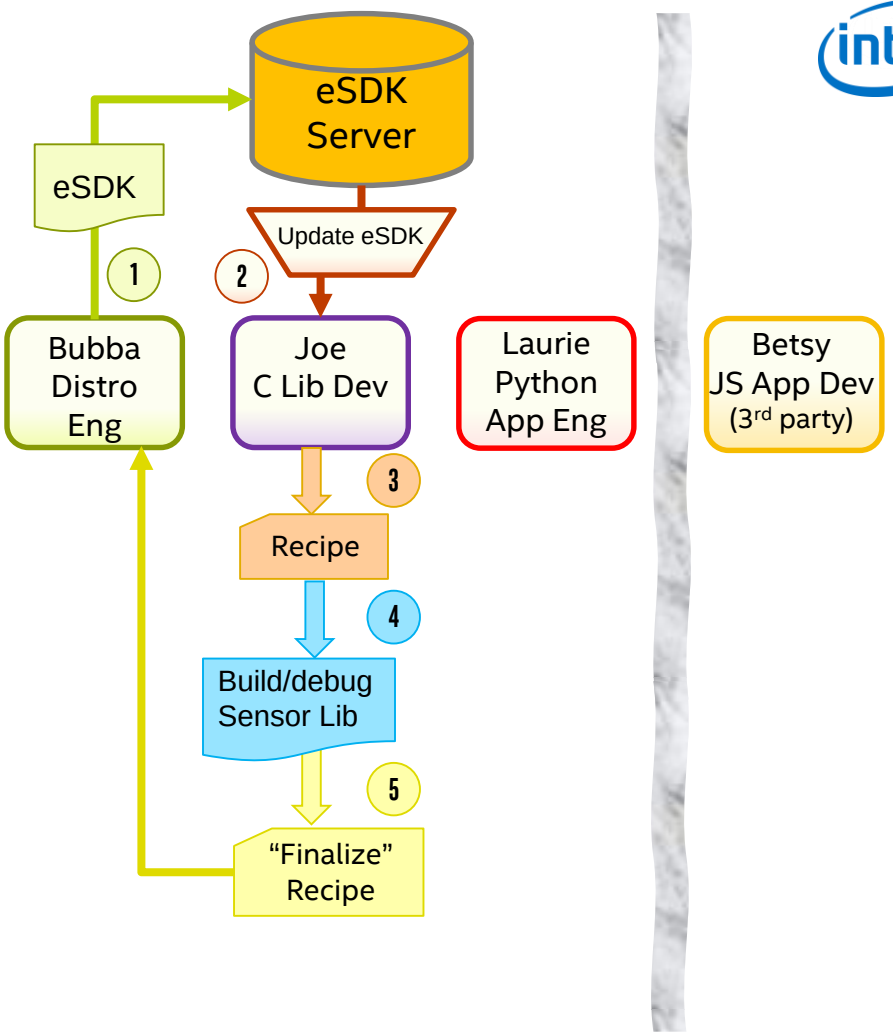

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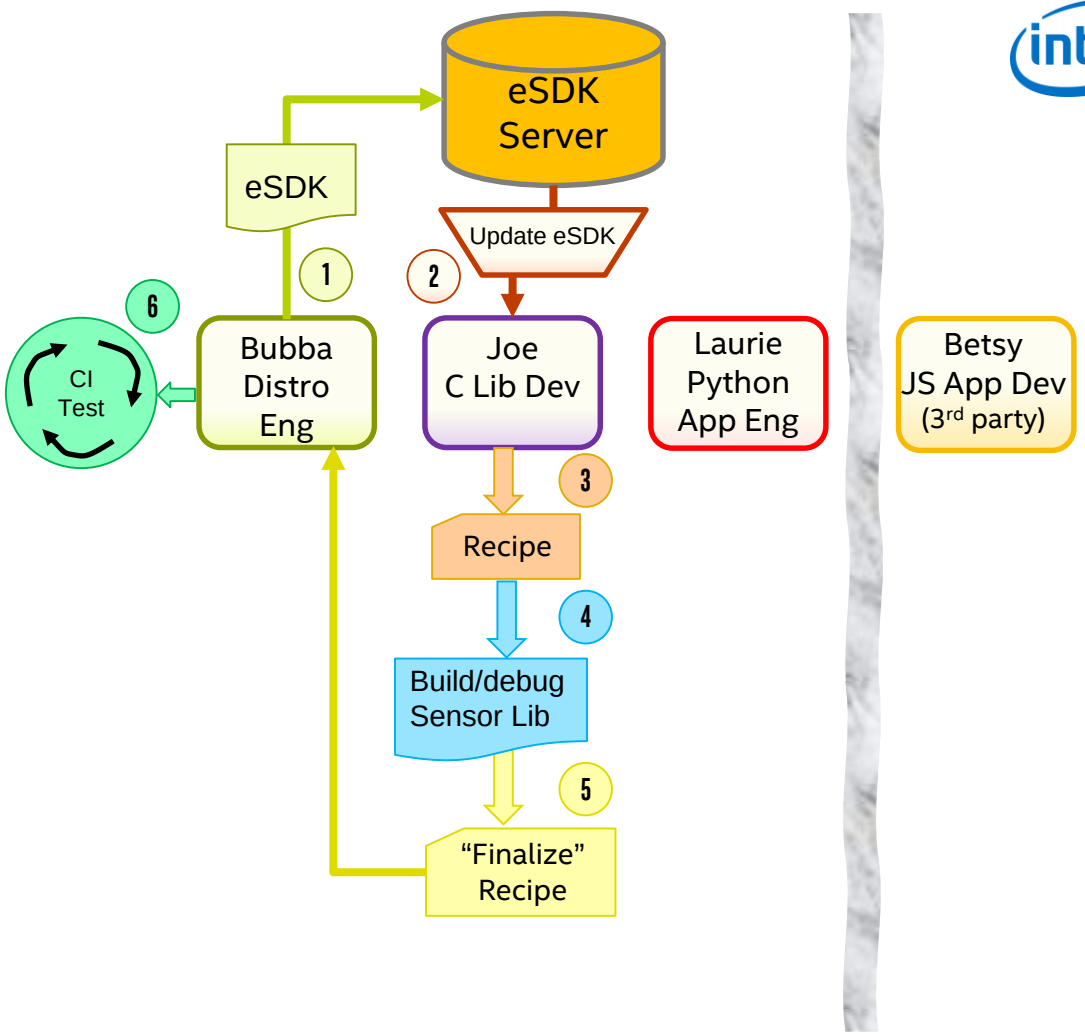

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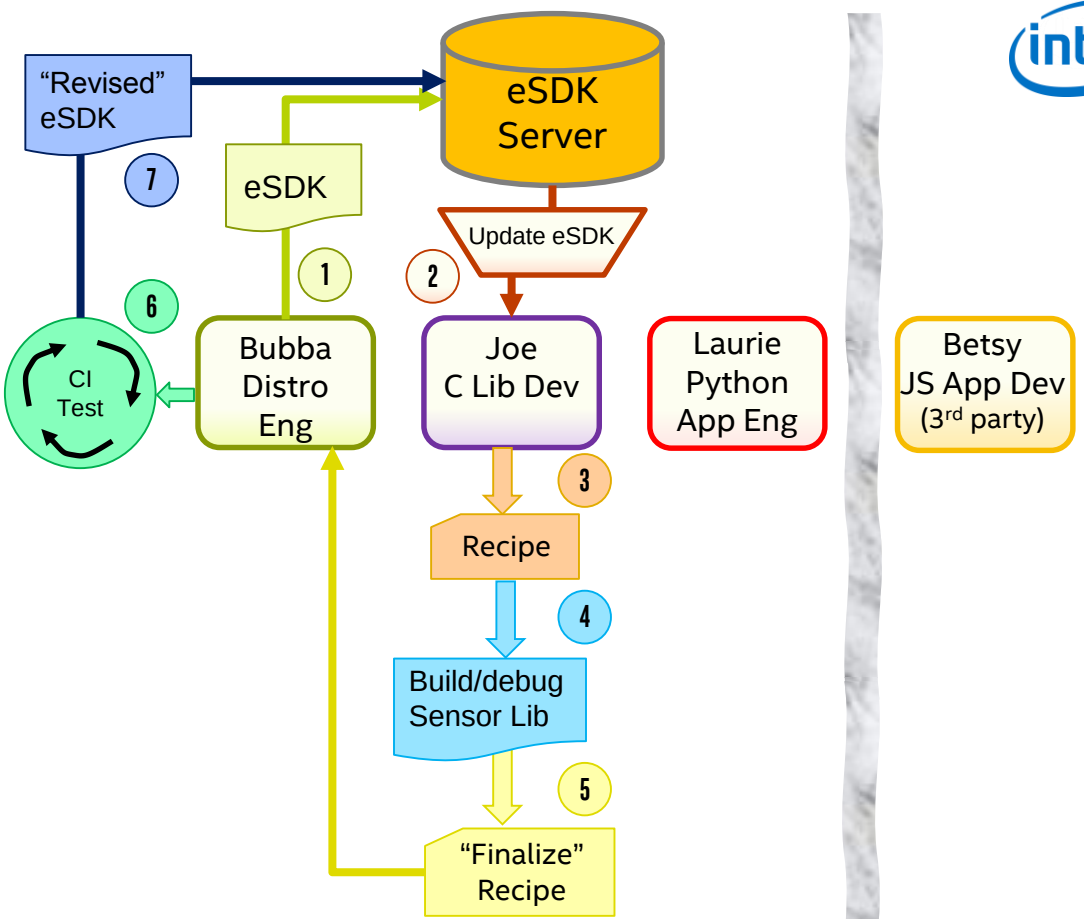

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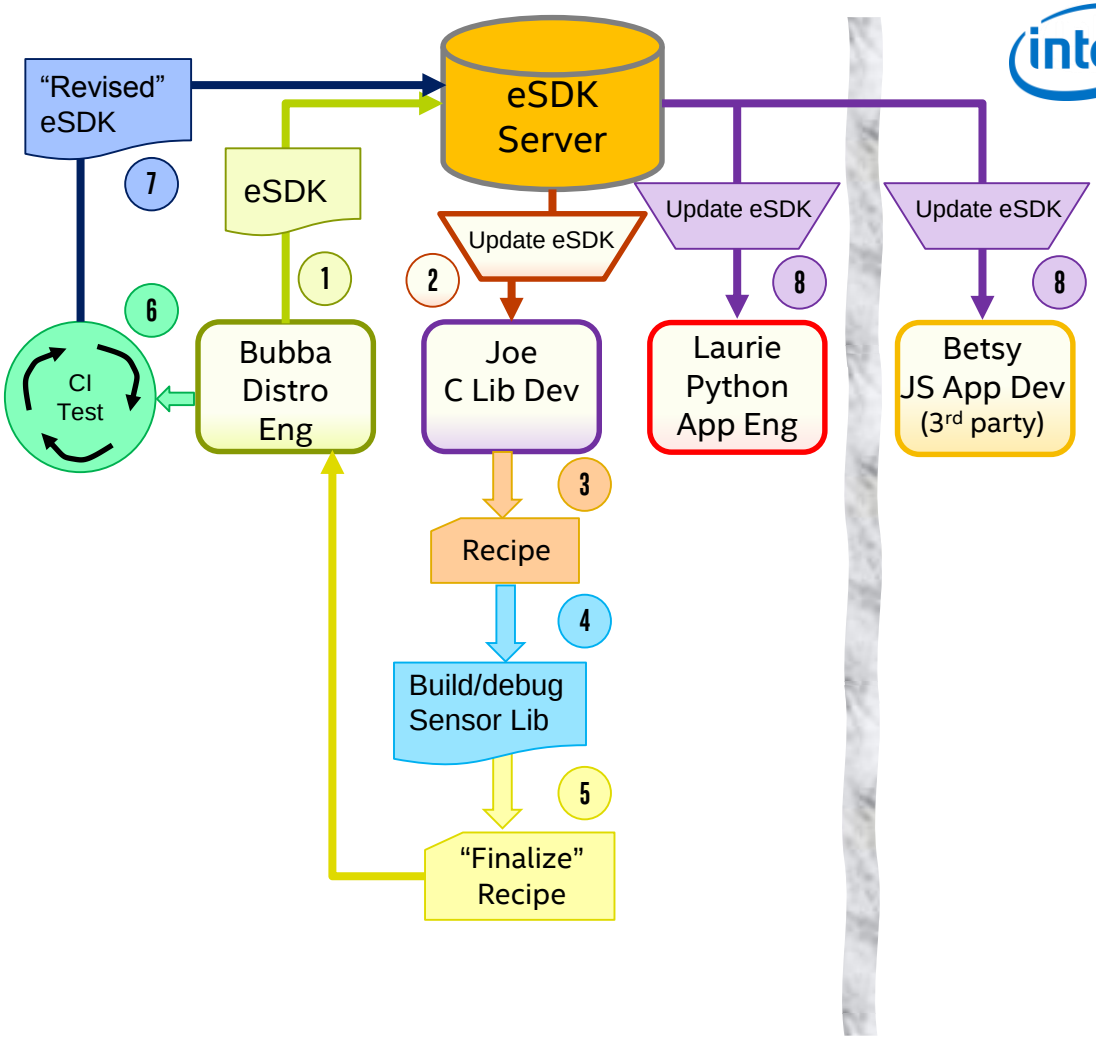

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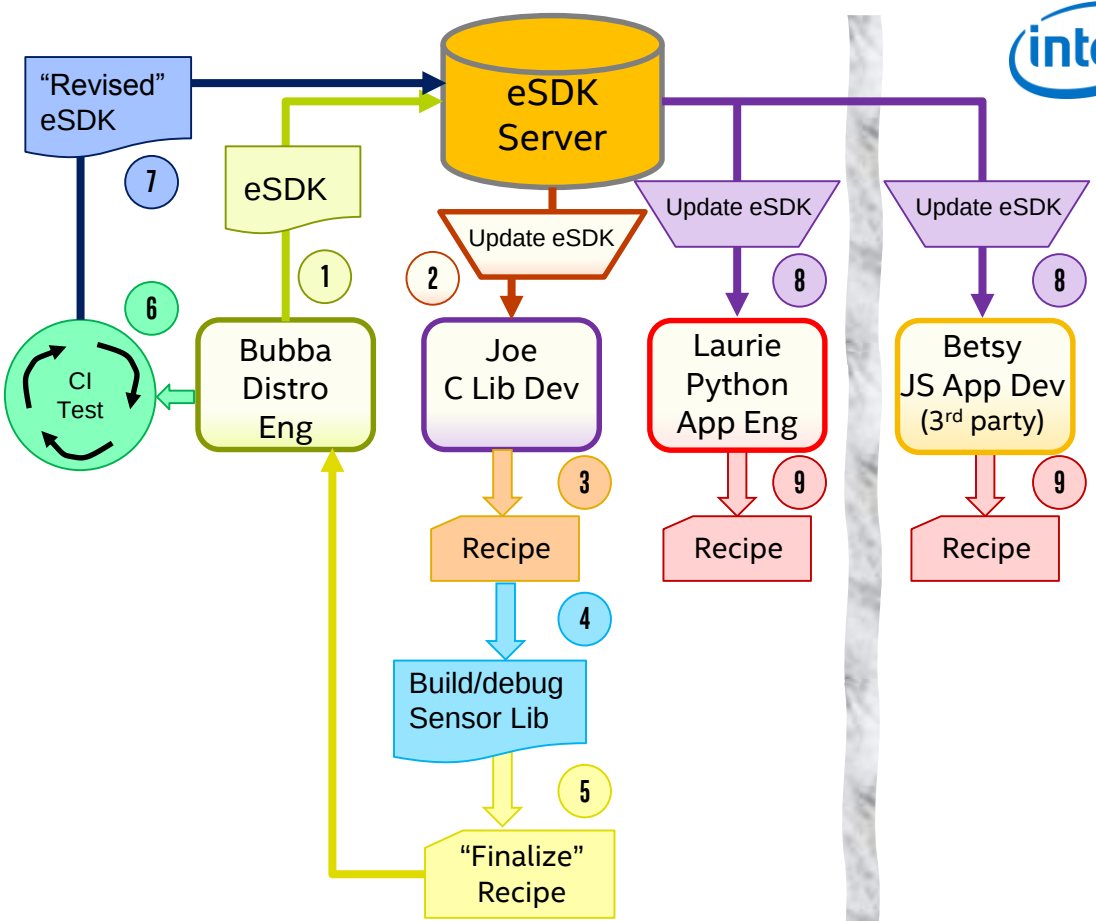

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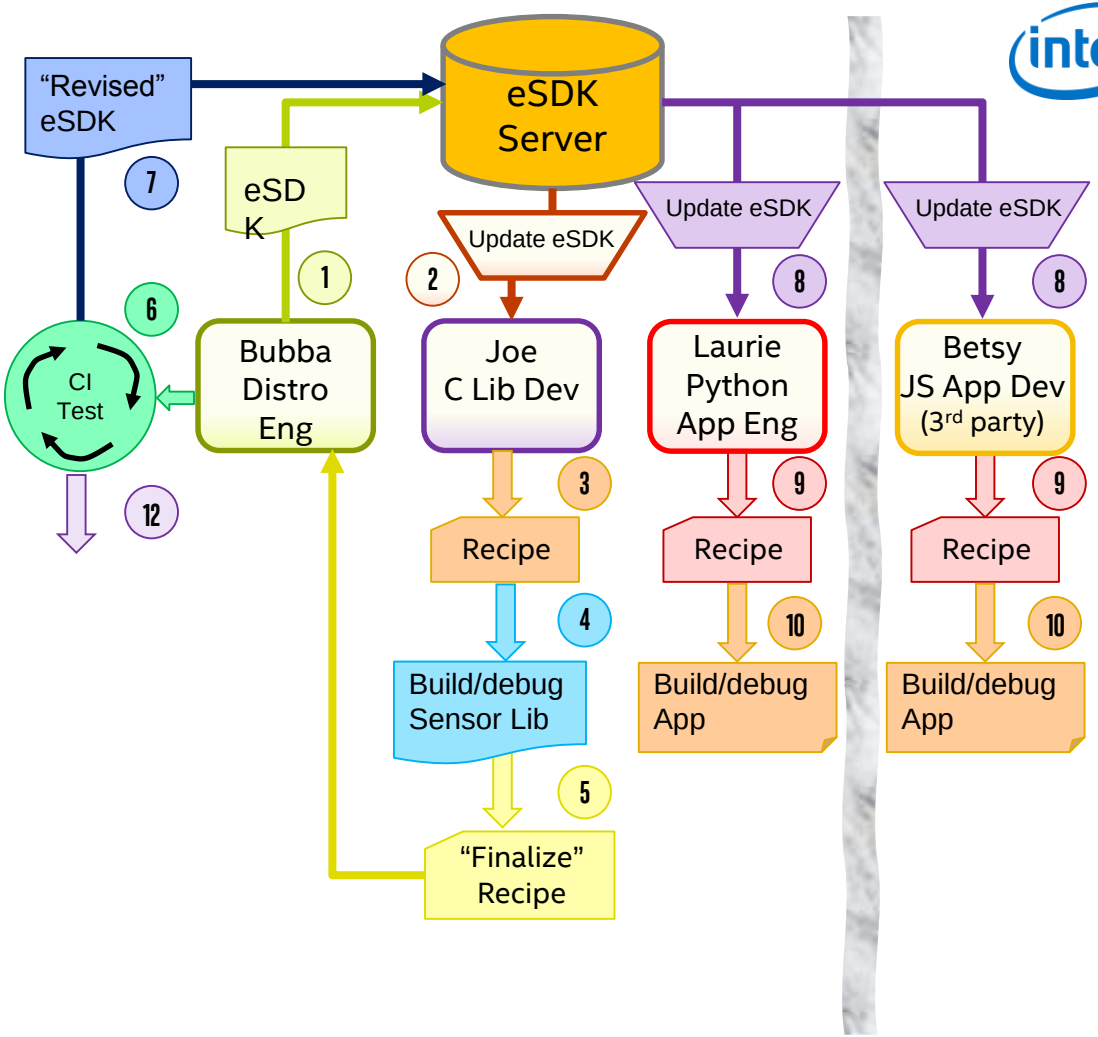

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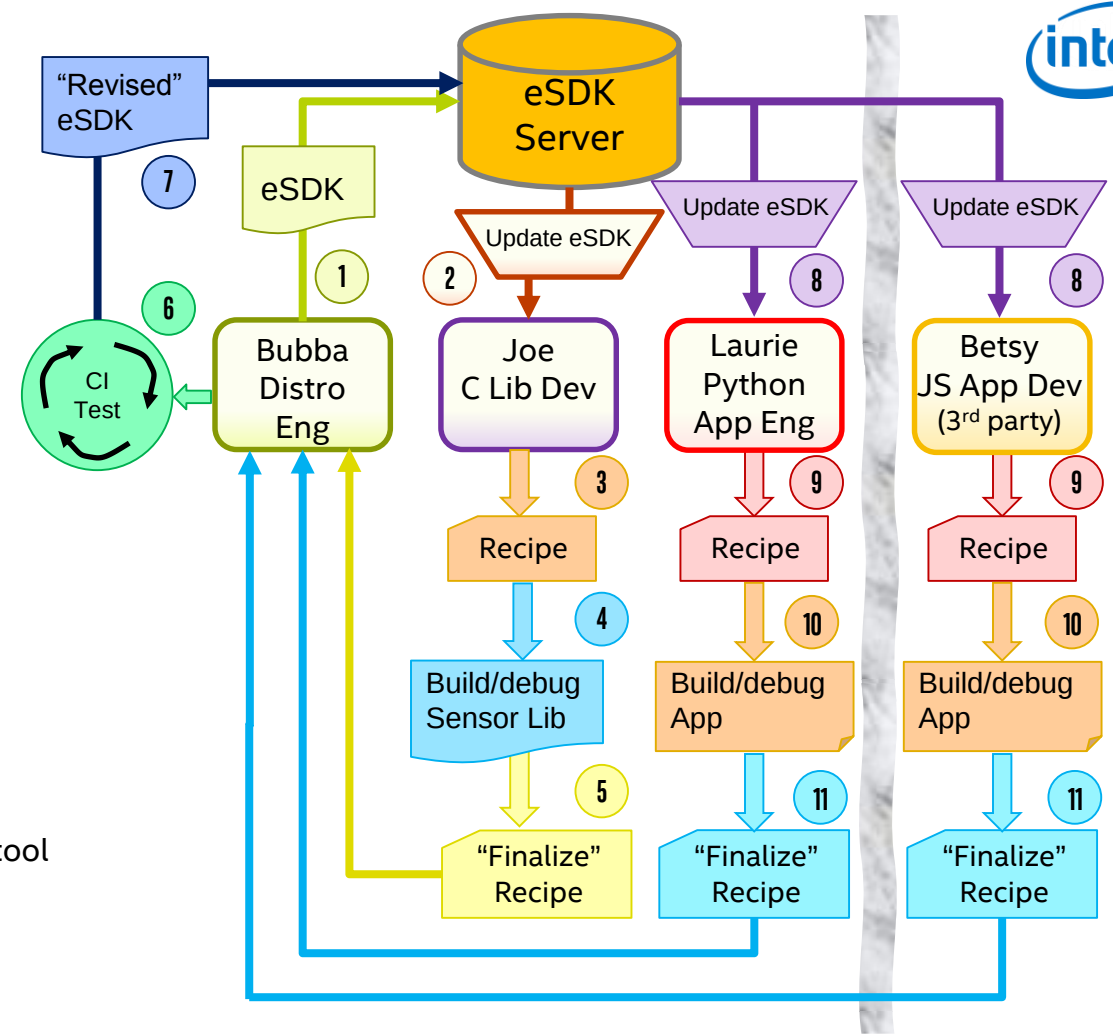

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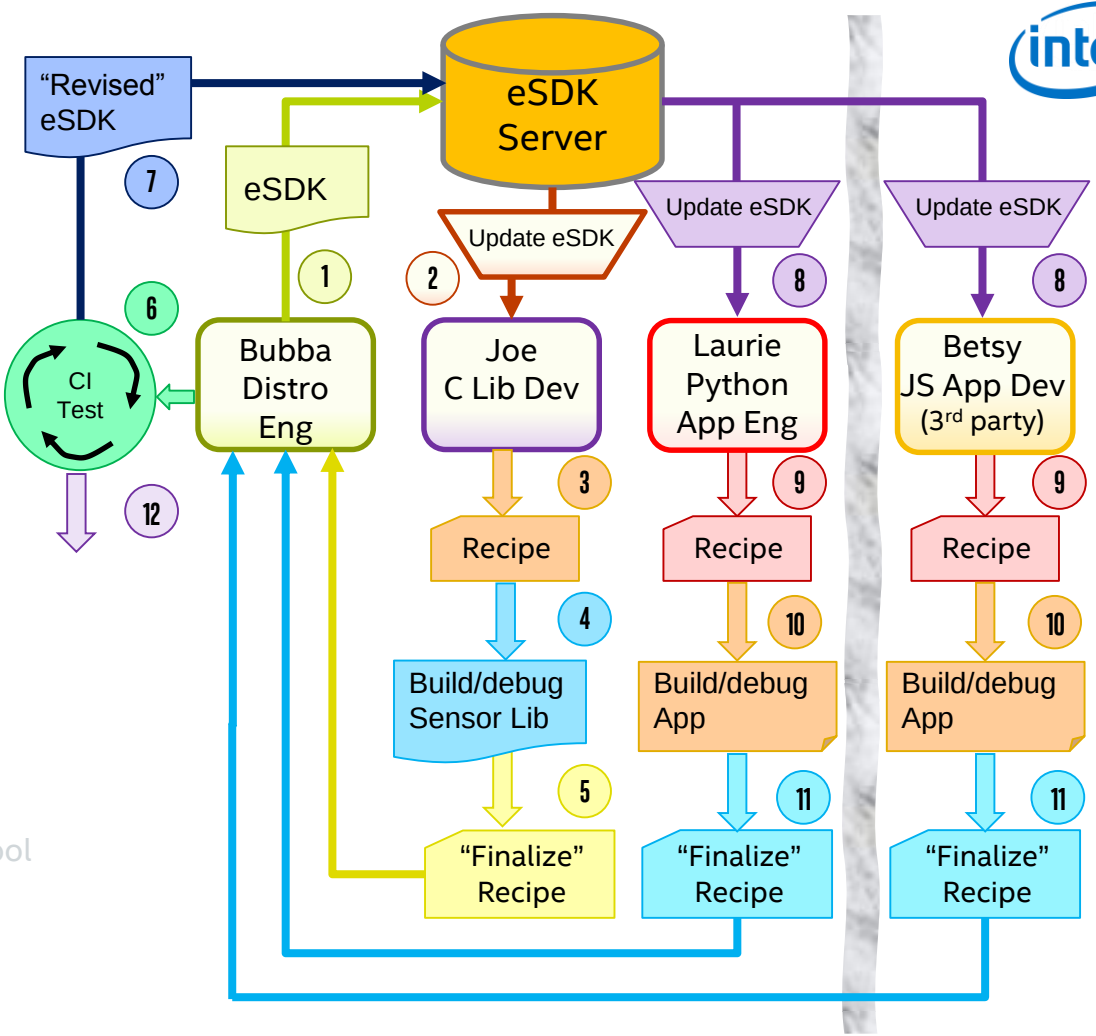

WRAP UP

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

DISCLAIMER