
Briefcase Documentation

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Briefcase is a tool for converting a Python project into a standalone native application. It supports producing binaries for:

- macOS, as a standalone .app;
- Windows, as an MSI installer;
- Linux, as an AppImage;
- iOS, as an XCode project; and
- Android, as a Gradle project.

It is also extensible, allowing for additional platforms and installation formats to be produced.

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Get started with a hands-on introduction for beginners

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COMMUNITY

Briefcase is part of the [BeeWare suite](#). You can talk to the community through:

- [@pybeeware](#) on Twitter
- [Discord](#)
- The Briefcase [Github Discussions](#) forum

2.1 Tutorial

Briefcase is a packaging tool - but first you need something to package. The best way to learn about Briefcase is to see it working with the rest of the BeeWare suite of tools.

The [BeeWare tutorial](#) walks you through the process of building a native Python application from scratch.

Once you've done that tutorial, the [Briefcase How-To Guides](#) provide details on performing specific tasks with Briefcase.

2.2 How-to guides

How-to guides are recipes that take the user through steps in key subjects. They are more advanced than tutorials and assume a lot more about what the user already knows than tutorials do, and unlike documents in the tutorial they can stand alone.

2.2.1 Obtaining a Code Signing identity

If you are intending to distribute an application, it is advisable (and, on some platforms, necessary) to code sign your application. This is a cryptographic process that identifies you as a developer, and identifies your application as something that has been distributed by you.

The process of obtaining a code signing identity is slightly different on every platform. The following are guides for every platform that Briefcase supports:

Android

Overview

Android [requires that all apps be digitally signed with a certificate before they are installed on a device or updated](#). Android phones enforce a policy that updates to an app must come from the same signing key to validate. This allows the phone to be sure an update is fundamentally the same app, i.e., has the same author.

This documentation covers one way to sign your app where the Google Play Store maintains the authoritative key for your app. This approach is called [App Signing by Google Play](#).

You will need to generate a key on your development workstation to sign an app package before sending it to the Google Play store. If you use app signing by Google Play, the key on your workstation is called the upload key.

Generate a key

You will need to decide where to store the upload key. A good default is to use one keystore file per app you are creating and to store it in the `.android` folder within your home folder. The folder is automatically created by the Android tools; but if it doesn't exist, create it.

We recommend using a separate keystore file per app. Below, we use the **upload-key-helloworld.jks** filename. This assumes you are building an app called "Hello World"; use the (lowercase, no spaces) app name, `helloworld` in the filename for the keystore.

Try not to lose this key; make backups if needed. If you do lose this key, you can [contact Google Play support to reset it](#). If you choose not to use app signing by Google Play, it is absolutely essential that you not lose this key. For this reason, we recommend using App Signing by Google Play.

macOS

Linux

Windows (PowerShell)

Windows (cmd)

```
$ mkdir -p ~/.android
$ ~/Library/Caches/org.beeware.briefcase/tools/java/Contents/Home/bin/keytool -keyalg_
↪RSA -deststoretype pkcs12 -genkey -v -storepass android -keystore ~/.android/upload-
↪key-helloworld.jks -keysize 2048 -dname "cn=Upload Key" -alias upload-key -validity_
↪10000
```

```
$ mkdir -p ~/.android
$ ~/.cache/briefcase/tools/java/bin/keytool -keyalg RSA -deststoretype pkcs12 -genkey -v_
↪-storepass android -keystore ~/.android/upload-key-helloworld.jks -keysize 2048 -dname
↪"cn=Upload Key" -alias upload-key -validity 10000
```

```
C:\...>If (-Not (Test-Path "$env:HOME\PATH\.android")) { New-Item -Path "$env:HOME\PATH\.
↪android" -ItemType Directory }
C:\...>& "$env:LOCALAPPDATA\BeeWare\briefcase\Cache\tools\java\bin\keytool.exe" -keyalg_
↪RSA -deststoretype pkcs12 -genkey -v -storepass android -keystore "$env:HOME\PATH\.
↪android\upload-key-helloworld.jks" -keysize 2048 -dname "cn=Upload Key" -alias upload-
↪key -validity 10000
```

```
C:\...>IF not exist %HOMEPATH%\android mkdir %HOMEPATH%\android
C:\...>%LOCALAPPDATA%\BeeWare\briefcase\Cache\tools\java\bin\keytool.exe -keyalg RSA -
↪deststoretype pkcs12 -genkey -v -storepass android -keystore %HOMEPATH%\android\
↪upload-key-helloworld.jks -keysize 2048 -dname "cn=Upload Key" -alias upload-key -
↪validity 10000
```

This creates a 2048-bit key and stores it in a Java keystore located in the `.android` folder within your home folder. Since the key’s purpose is to be used as an upload key for the Google Play store, we call the key “upload-key”.

We use a password of `android`. This is the [default password for common Android keystores](#). You can change the password if you like. It is more important to limit who has access to the keystore file than to change the password.

See [Publishing your app](#) for instructions on using this key to upload an app to the Google Play store.

macOS

Overview

In this tutorial, we’ll learn how to generate a macOS code signing identity, which is required to distribute your application across MacOS and iOS devices.

We will specifically focus on generating a [Developer ID Application identity](#), which is used to distribute a *macOS application outside of the Mac App store*. However, the procedure for creating all other types of identities is exactly the same. Once you familiarize yourself with the general process, you’ll be able to create identities required to upload applications to the Mac or iOS App stores without much trouble.

Getting the code signing identity will require five main steps, which you will be guided through in this tutorial:

1. Enrolling in the Apple Developer program
2. Generating a Certificate Signing Request on Keychain Access
3. Creating a Developer ID Application Certificate
4. Accessing the details of the Certificate on your Terminal
5. Anticipating potential issues with the identity in the future

Enrolling in the Apple Developer program

You can enrol in the Apple Developer program either as an individual, or as an organization. In both cases, you’ll have to follow the instructions on the [Apple Developer website](#).

Once you click “Start Enrollment Now” at the bottom of the page, you can either sign in with your existing Apple ID or alternatively, create a new one:

Sign in to Apple Developer

Apple ID



☐ Remember me

[Forgot Apple ID or password? ↗](#)

[Don't have an Apple ID? Create yours now. ↗](#)

As part of the registration procedure, you'll have to pay a **\$99 fee**, which will be charged on an annual basis.

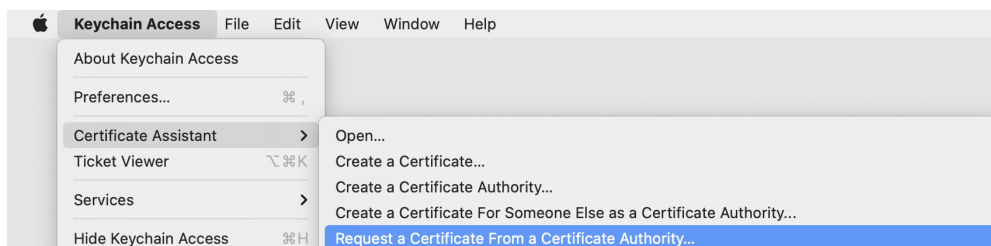
Fee waivers

If you're registering as a non-profit organization, an educational institution or a government entity, you may be eligible for a fee waiver, which you can read more about [here](#).

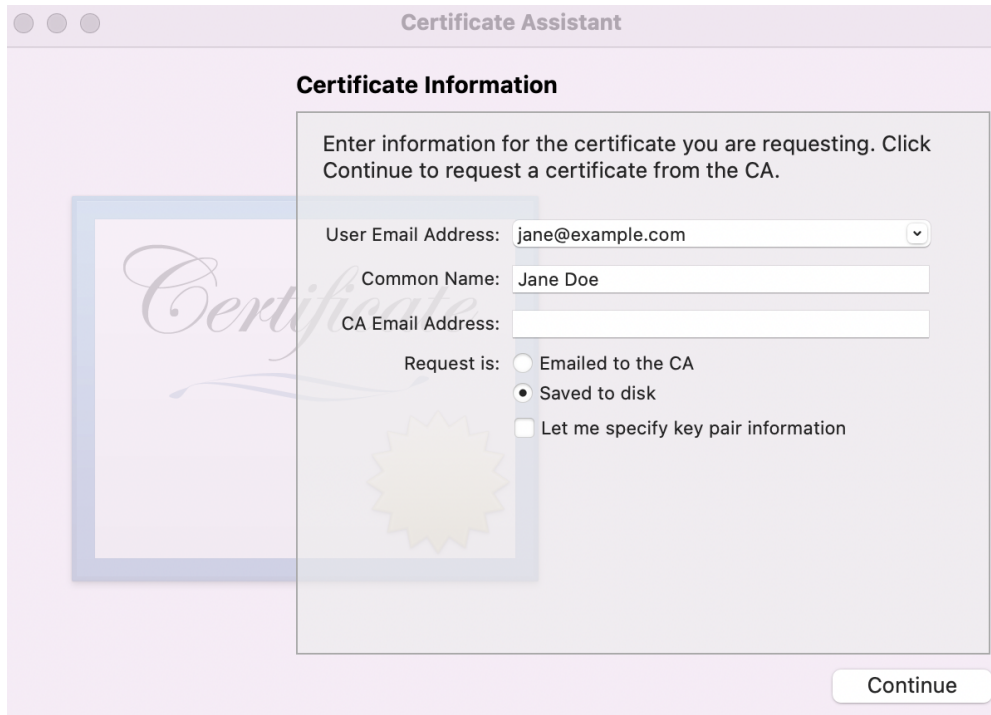
Generating a certificate request on Keychain Access

Now that you're set up with an Apple Developer ID, it's time to create a *certificate request*, which you'll then use to generate a valid Developer ID certificate.

First, open the Keychain Access application on your Mac. At the top left of your screen, click **Keychain Access > Certificate Assistant > Request a Certificate From a Certificate Authority**:



A Certificate Assistant window should open up, looking similar to this one:



Certificate Assistant

Certificate Information

Enter information for the certificate you are requesting. Click Continue to request a certificate from the CA.

User Email Address:

Common Name:

CA Email Address:

Request is: ☐ Emailed to the CA
☒ Saved to disk
☐ Let me specify key pair information

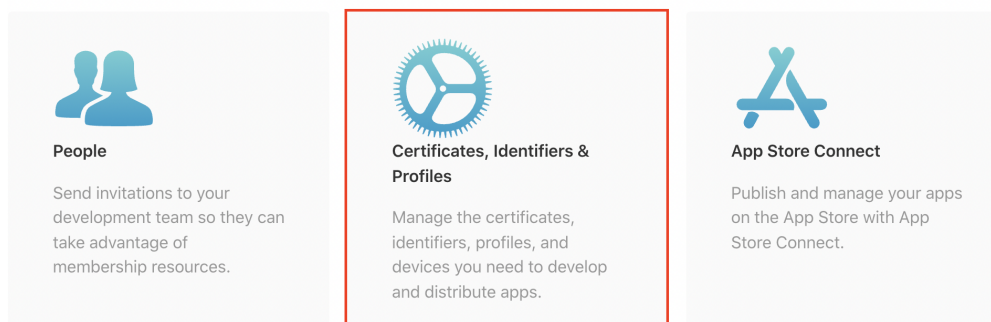
Continue

- In the field **User Email Address**, type the email address associated with your Apple Developer Account (e.g. `jane@example.com`).
- **Common Name** should refer to the name with which you registered to the Apple Developer program (e.g. `Jane Doe`).
- The field **CA Email Address** can be left empty.
- Make sure that you choose **Saved to Disk** in the **Request is** field.
- Click “Continue”, and save your Certificate Signing Request somewhere on your local machine. The saved certificate request should be of the format `example.certSigningRequest`.

As documented by [Apple](#), this procedure creates not only the file you have just saved, but also a private key in your Keychain, which will establish the validity of your actual Developer ID Application certificate later on.

Creating a Developer ID Application Certificate

Once you have saved the certificate request, head to the [Apple Developer website](#) and click “Certificates, Identifiers and Profiles”:



When you land in the Certificates section, click the “+” symbol to create a new certificate:

Certificates

Certificates

In the next page, you'll have to choose the type of certificate you want to generate. In the Software section, choose the option of **“Developer ID Application”**. **It's very important you choose the right type of certificate.**

Later on, if you want to generate another code signing certificate for other purposes, such as uploading your application the App store, you'll simply have to choose a different type of a certificate on this page.

[← All Certificates](#)

Create a New Certificate

[Continue](#)

Software

- ☐ **Apple Development**
Sign development versions of your iOS, macOS, tvOS, and watchOS apps. For use in Xcode 11 or later.
- ☐ **Apple Distribution**
Sign your apps for submission to the App Store or for Ad Hoc distribution. For use with Xcode 11 or later.
- ☐ **iOS App Development**
Sign development versions of your iOS app.
- ☐ **iOS Distribution (App Store and Ad Hoc)**
Sign your iOS app for submission to the App Store or for Ad Hoc distribution.
- ☐ **Mac Development**
Sign development versions of your Mac app.
- ☐ **Mac App Distribution**
This certificate is used to code sign your app and configure a Distribution Provisioning Profile for submission to the Mac App Store.
- ☐ **Mac Installer Distribution**
This certificate is used to sign your app's Installer Package for submission to the Mac App Store.
- ☐ **Developer ID Installer**
This certificate is used to sign your app's Installer Package for distribution outside of the Mac App Store.
- ☒ **Developer ID Application**
This certificate is used to code sign your app for distribution outside of the Mac App Store.

Note: If you've been registered as an organization, there's a chance that the option to choose the Developer ID Application certificate is unavailable. This may happen if you're not assigned the role of the [Account Holder](#). You can access and change these roles using [App Store Connect](#).

Select “Developer ID Application” and click “Continue”. In the next window, click “Choose file” and upload the Certificate Signing Request you have just generated on your Keychain:

Create a New Certificate

[Back](#)

[Continue](#)

Upload a Certificate Signing Request
To manually generate a Certificate, you need a Certificate Signing Request (CSR) file from your Mac.
[Learn more >](#)

[Choose File](#)

CertificateSigningRequest.certSigningRequest

Once you click “Continue”, Apple will generate your Developer ID Application Certificate. Click the “Download” button and save the certificate on your local machine:

[← All Certificates](#)

Download Your Certificate

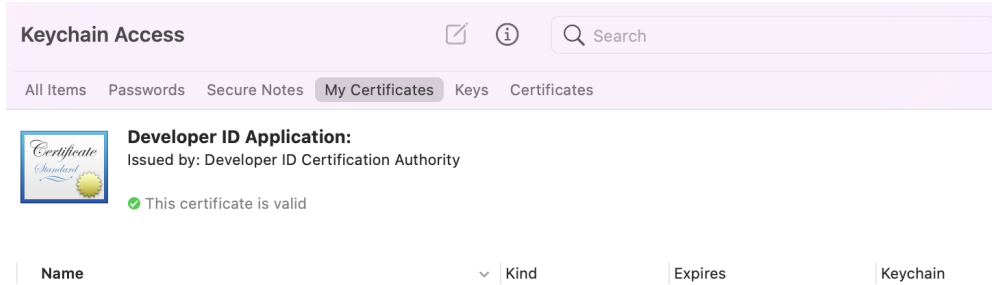
[Revoke](#)

[Download](#)

The certificate should be of the format `example.cer`. Once you download it, double-click to install it in your Keychain Access.

If you now open your Keychain, selected the login keychain on the left-hand side, and select the My Certificates tab, you should see a certificate with the title “Developer ID Application: <your name>”.

Click on the certificate and make sure you see a note that reads `This certificate is valid`.



Note: In this screenshot, the certificate details have been redacted. Your certificate should show expiration details, trust chains, and other details about you, the certificate issuer (Apple), and the certificate.

Congratulations! You’ve just successfully installed the Developer ID Application certificate.

Keep this certificate safe!

The *specific type* of the certificate you have just created is quite precious, and you should make sure to keep it safe. A single Developer ID Application Certificate can be used to [sign, notarize and distribute multiple applications](#) outside of the Mac App store, which is why a [very limited number of them](#) can be created on a particular Developer Account. You should consider making a backup copy, which will require you to export the certificate together with the associated private key from the Keychain. The procedure for doing so is [documented by Apple](#).

Next steps

Now it’s time to start using the Developer ID Application Certificate to sign, notarize, and distribute your application!

2.2.2 Upgrading from Briefcase v0.2

Briefcase v0.2 was built as a `setuptools` extension. The configuration for your project was contained in a `setup.py` or `setup.cfg` file, and you invoked Briefcase using `python setup.py <platform>`.

Briefcase v0.3 represents a significant change in the development of Briefcase. Briefcase is now a [PEP518-compliant build tool](#). It uses `pyproject.toml` for configuration, and is invoked using a standalone `briefcase` command. This change gives significantly improved flexibility in configuring Briefcase apps, and much better control over the development process.

However, this change is also **backwards incompatible**. If you have a project that was using Briefcase v0.2, you’ll need to make some major changes to your configuration and processes as part of upgrading to v0.3.

Configuration

To port your application’s configuration to Briefcase v0.3, you’ll need to add a `pyproject.toml` file (in, as the extension suggests, [TOML format](#)). This file contains similar content to your `setup.py` or `setup.cfg` file.

The following is a minimal starting point for your `pyproject.toml` file:

```
[tool.briefcase]
project_name = "My Project"
bundle = "com.example"
```

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```

version = "0.1"
author = "Jane Developer"
author_email = "jane@example.com"
requires = []

[tool.briefcase.app.myapp]
formal_name = "My App"
description = "My first Briefcase App"
requires = []
sources = ['src/myapp']

[tool.briefcase.app.myapp.macOS]
requires = ['toga-cocoa==0.3.0.dev15']

[tool.briefcase.app.myapp.windows]
requires = ['toga-winforms==0.3.0.dev15']

[tool.briefcase.app.myapp.linux]
requires = ['toga-gtk==0.3.0.dev15']

[tool.briefcase.app.myapp.iOS]
requires = ['toga-iOS==0.3.0.dev15']

```

The configuration sections are tool specific, and start with the prefix `tool.briefcase`. Additional dotted paths define the specificity of the settings that follow.

Most of the keys in your `setup.py` will map directly to the same key in your `pyproject.toml` (e.g., `version`, `description`). However, the following pointers may help port other values.

- Briefcase v0.2 assumed that a `setup.py` file described a single app. Briefcase v0.3 allows a project to define multiple distributable applications. The `project_name` is the name for the collection of apps described by this `pyproject.toml`; `formal_name` is the name for a single app. If your project defines a single app, your formal name and project name will probably be the same.
- There is no explicit definition for the app's name - the app name is derived from the section header name (i.e., `[tool.briefcase.app.myapp]` defines the existence of an app named `myapp`).
- `version` *must* be defined as a string in your `pyproject.toml` file. If you need to know the version of your app (or the value of any other app metadata specified in `pyproject.toml`) at runtime, you should use `importlib.metadata`. Briefcase will create `myapp.dist-info` for your application (using your app name instead of `myapp`).
- Briefcase v0.3 configuration files are heirarchical. `[tool.briefcase]` describes configuration arguments for the entire project; `[tool.briefcase.app.myapp]` describes configuration arguments for the application named `myapp`; `[tool.briefcase.app.myapp.macOS]` describes configuration arguments for macOS deployments of `myapp`, and `[tool.briefcase.app.myapp.macOS.dmg]` describes configuration arguments for DMG deployments of `myapp` on macOS. The example above doesn't contain a `dmg` section; generally, you won't need one unless you're packaging for multiple output formats on a single platform.

For most keys, the “most specific” value wins - so, a value for `description` defined at the platform level will override any value at the app level, and so on. The two exceptions are `requires` and `sources`, which are cumulative - the values defined at the platform level will be *appended* to the values at the app level and the project level.

- The `install_requires` and `app_requires` keys in `setup.py` are replaced by `requires` in your `pyproject.toml`. `requires` can be specified at the project level, the app level, the platform level, or the output format level.

- The `packages` (and other various source code and data-defining attributes) in `setup.py` have been replaced with a single `sources` key. The paths specified in `sources` will be copied in their entirety into the packaged application.

Once you’ve created and tested your `pyproject.toml`, you can delete your `setup.py` file. You may also be able to delete your `setup.cfg` file, depending on whether it defines any tool configurations (e.g., `flake8` or `pytest` configurations).

Invocation

In Briefcase v0.2, there was only one entry point: `python setup.py <platform>`. This would generate a complete output artefact; and, if you provided the `-s` argument, would also start the app.

Briefcase v0.3 uses it’s own `briefcase` entry point, with *subcommands* to perform specific functions:

- `briefcase new` - Bootstrap a new project (generating a `pyproject.toml` and other stub content).
- `briefcase dev` - Run the app in developer mode, using the current virtual environment.
- `briefcase create` - Use the platform template to generate the files needed to build a distributable artefact for the platform.
- `briefcase update` - Update the source code of the application in the generated project.
- `briefcase build` - Run whatever compilation process is necessary to produce an executable file for the platform.
- `briefcase run` - Run the executable file for the platform.
- `briefcase package` - Perform whatever post-processing is necessary to wrap the executable into a distributable artefact (e.g., an installer).

When using these commands, there is no need to specify the platform (i.e. `macOS` when on a Mac). The current platform will be detected and the appropriate output format will be selected.

If you want to target a different platform, you can specify that platform as an argument. This will be required when building for mobile platforms (since you’ll never be running Briefcase where the mobile platform is “native”). For example, if you’re on a Mac, `briefcase create macOS` and `briefcase create` would perform the same task; `briefcase create iOS` would build an iOS project.

The exceptions to this platform specification are `briefcase new` and `briefcase dev`. These two commands are platform agnostic.

The Briefcase subcommands will also detect if previous steps haven’t been executed, and invoke any prior steps that are required. For example, if you execute `briefcase run` on clean project, Briefcase will detect that there are no platform files, and will automatically run `briefcase create` and `briefcase build`. This won’t occur on subsequent runs.

Briefcase v0.3 also allows for multiple output formats on a single platform. The only platform that currently exposes capability is `macOS`, which supports both `app` and `dmg` output formats (with `dmg` being the platform default).

To use a different output format, add the format as an extra argument to each command after the platform. For example, to create a `app` file for `macOS`, you would run:

```
$ briefcase create macOS app
$ briefcase build macOS app
$ briefcase run macOS app
$ briefcase package macOS app
```

In the future, we hope to add other output formats for other platforms - `Snap` and `FlatPak` on Linux; `NSIS` installers on Windows, and possibly others. If you’re interested in adding support for one of these platforms, please [get in touch](#) (or, submit a pull request!)

2.2.3 Accessing Briefcase packaging metadata at runtime

When Briefcase installs your app, it adds a [PEP566](#) metadata file containing information about your app, and Briefcase itself. You can retrieve this information at runtime using the [Python builtin library](#) `importlib.metadata`. `importlib.metadata` was added in Python 3.8; however, it has been backported and published on PyPI as `importlib_metadata` for older versions of Python.

To access application metadata at runtime, you can use the following code:

```
import sys
try:
    from importlib import metadata as importlib_metadata
except ImportError:
    # Backwards compatibility - importlib.metadata was added in Python 3.8
    import importlib_metadata

# Find the name of the module that was used to start the app
app_module = sys.modules['__main__'].__package__
# Retrieve the app's metadata
metadata = importlib_metadata.metadata(app_module)
```

The metadata returned by this code will be a dictionary-like object that contains the following identifying keys:

- **Metadata-Version** - The syntax version of the metadata file itself (as defined in [PEP566](#)).
- **Briefcase-Version** - The version of Briefcase used to package the app. The existence of this key in app metadata can be used to identify if your application code is running in a Briefcase container; it will only exist if the app has been packaged by Briefcase.

It will also have the following keys, derived from your application's `pyproject.toml` configuration:

- **Name** - `app_name`
- **Formal-Name** - `formal_name`
- **App-ID** - `bundle` and `app_name`, joined with a `.`
- **Version** - `version`
- **Summary** - `description`

The metadata may also contain the following keys, if they have been defined in your app's `pyproject.toml` configuration:

- **Home-page** - `url`
- **Author** - `author`
- **Author-email** - `author_email`

For example, the metadata for the app constructed by the [Beeware Tutorial](#) would contain:

```
Metadata-Version: 2.1
Briefcase-Version: 0.3.1
Name: helloworld
Formal-Name: Hello World
App-ID: com.example.helloworld
Version: 0.0.1
Home-page: https://example.com/helloworld
Author: Jane Developer
```

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```
Author-email: jane@example.com
```

```
Summary: My first application
```

2.2.4 Contributing code to Briefcase

If you experience problems with Briefcase, [log them on GitHub](#). If you want to contribute code, please [fork the code](#) and [submit a pull request](#).

Setting up your development environment

The recommended way of setting up your development environment for Briefcase is to use a [virtual environment](#), and then install the development dependencies:

macOS

Linux

Windows

```
$ git clone https://github.com/beeware/briefcase.git
$ cd briefcase
$ python3 -m venv venv
$ . venv/bin/activate
(venv) $ python3 -m pip install -r requirements.dev.txt
```

```
$ git clone https://github.com/beeware/briefcase.git
$ cd briefcase
$ python3 -m venv venv
$ . venv/bin/activate
(venv) $ python3 -m pip install -r requirements.dev.txt
```

```
C:\...>git clone https://github.com/beeware/briefcase.git
C:\...>cd briefcase
C:\...>py -m venv venv
C:\...>venv\Scripts\activate
(venv) C:\...>python3 -m pip install -r requirements.dev.txt
```

To install all the development version of Briefcase, along with all it's requirements, run the following commands within your virtual environment:

macOS

Linux

Windows

```
(venv) $ pip install -e .
```

```
(venv) $ pip install -e .
```

```
(venv) C:\...>pip install -e .
```

Briefcase uses a tool called [Pre-Commit](#) to identify simple issues and standardize code formatting. It does this by installing a git hook that automatically runs a series of code linters prior to finalizing any git commit. To enable pre-commit, run:

macOS

Linux

Windows

```
(venv) $ pre-commit install
pre-commit installed at .git/hooks/pre-commit
```

```
(venv) $ pre-commit install
pre-commit installed at .git/hooks/pre-commit
```

```
(venv) C:\>pre-commit install
pre-commit installed at .git/hooks/pre-commit
```

When you commit any change, pre-commit will run automatically. If there are any issues found with the commit, this will cause your commit to fail. Where possible, pre-commit will make the changes needed to correct the problems it has found:

macOS

Linux

Windows

```
(venv) $ git add some/interesting_file.py
(venv) $ git commit -m "Minor change"
black.....Failed
- hook id: black
- files were modified by this hook

reformatted some/interesting_file.py

All done!
1 file reformatted.

flake8.....Passed
check toml.....(no files to check)Skipped
check yaml.....(no files to check)Skipped
check for case conflicts.....Passed
check docstring is first.....Passed
fix end of files.....Passed
trim trailing whitespace.....Passed
isort.....Passed
pyupgrade.....Passed
docformatter.....Passed
```

```
(venv) $ git add some/interesting_file.py
(venv) $ git commit -m "Minor change"
black.....Failed
- hook id: black
- files were modified by this hook
```

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```
reformatted some/interesting_file.py
```

```
All done!
```

```
1 file reformatted.
```

```
flake8.....Passed
check toml.....(no files to check)Skipped
check yaml.....(no files to check)Skipped
check for case conflicts.....Passed
check docstring is first.....Passed
fix end of files.....Passed
trim trailing whitespace.....Passed
isort.....Passed
pyupgrade.....Passed
docformatter.....Passed
```

```
(venv) C:\>git add some/interesting_file.py
```

```
(venv) C:\>git commit -m "Minor change"
```

```
black.....Failed
```

```
- hook id: black
```

```
- files were modified by this hook
```

```
reformatted some\interesting_file.py
```

```
All done!
```

```
1 file reformatted.
```

```
flake8.....Passed
check toml.....(no files to check)Skipped
check yaml.....(no files to check)Skipped
check for case conflicts.....Passed
check docstring is first.....Passed
fix end of files.....Passed
trim trailing whitespace.....Passed
isort.....Passed
pyupgrade.....Passed
docformatter.....Passed
```

You can then re-add any files that were modified as a result of the pre-commit checks, and re-commit the change.

macOS

Linux

Windows

```
(venv) $ git add some/interesting_file.py
```

```
(venv) $ git commit -m "Minor change"
```

```
black.....Passed
flake8.....Passed
check toml.....(no files to check)Skipped
check yaml.....(no files to check)Skipped
```

(continues on next page)

(continued from previous page)

```

check for case conflicts.....Passed
check docstring is first.....Passed
fix end of files.....Passed
trim trailing whitespace.....Passed
isort.....Passed
pyupgrade.....Passed
docformatter.....Passed
[bugfix e3e0f73] Minor change
1 file changed, 4 insertions(+), 2 deletions(-)

```

```

(venv) $ git add some/interesting_file.py
(venv) $ git commit -m "Minor change"
black.....Passed
flake8.....Passed
check toml.....(no files to check)Skipped
check yaml.....(no files to check)Skipped
check for case conflicts.....Passed
check docstring is first.....Passed
fix end of files.....Passed
trim trailing whitespace.....Passed
isort.....Passed
pyupgrade.....Passed
docformatter.....Passed
[bugfix e3e0f73] Minor change
1 file changed, 4 insertions(+), 2 deletions(-)

```

```

(venv) C:\>git add some\interesting_file.py
(venv) C:\>git commit -m "Minor change"
black.....Passed
flake8.....Passed
check toml.....(no files to check)Skipped
check yaml.....(no files to check)Skipped
check for case conflicts.....Passed
check docstring is first.....Passed
fix end of files.....Passed
trim trailing whitespace.....Passed
isort.....Passed
pyupgrade.....Passed
docformatter.....Passed

```

Briefcase uses `PyTest` for its own test suite. It uses `tox` to manage the testing process. To set up a testing environment and run the full test suite:

macOS

Linux

Windows

```
(venv) $ tox
```

```
(venv) $ tox
```

```
(venv) C:\...>tox
```

By default this will run the test suite multiple times, once on each Python version supported by Briefcase, as well as running some pre-commit checks of code style and validity. This can take a while, so if you want to speed up the process while developing, you can run the tests on one Python version only:

macOS

Linux

Windows

```
(venv) $ tox -e py
```

```
(venv) $ tox -e py
```

```
(venv) C:\...>tox -e py
```

Or, to run using a specific version of Python, e.g. when you want to use Python 3.7:

macOS

Linux

Windows

```
(venv) $ tox -e py37
```

```
(venv) $ tox -e py37
```

```
(venv) C:\...>tox -e py37
```

substituting the version number that you want to target. You can also specify the *towncrier-check*, *docs* or *package* targets to check release notes, documentation syntax and packaging metadata, respectively.

Add change information for release notes

Briefcase uses [towncrier](#) to automate building release notes. To support this, every pull request needs to have a corresponding file in the `changes/` directory that provides a short description of the change implemented by the pull request.

This description should be a high level summary of the change from the perspective of the user, not a deep technical description or implementation detail. It should also be written in past tense (i.e., “Added an option to enable X” or “Fixed handling of Y”).

See [News Fragments](#) for more details on the types of news fragments you can add. You can also see existing examples of news fragments in the `changes/` folder.

Now you are ready to start hacking! Have fun!

2.2.5 Contributing to the documentation

Here are some tips for working on this documentation. You're welcome to add more and help us out!

First of all, you should check the [Restructured Text \(reST\)](#) and [Sphinx CheatSheet](#) to learn how to write your .rst file.

Create a .rst file

Look at the structure and choose the best category to put your .rst file. Make sure that it is referenced in the index of the corresponding category, so it will show on in the documentation. If you have no idea how to do this, study the other index files for clues.

Build documentation locally

To build the documentation locally, *set up a development environment*, and run:

macOS

Linux

Windows

```
(venv) $ tox -e docs
```

```
(venv) $ tox -e docs
```

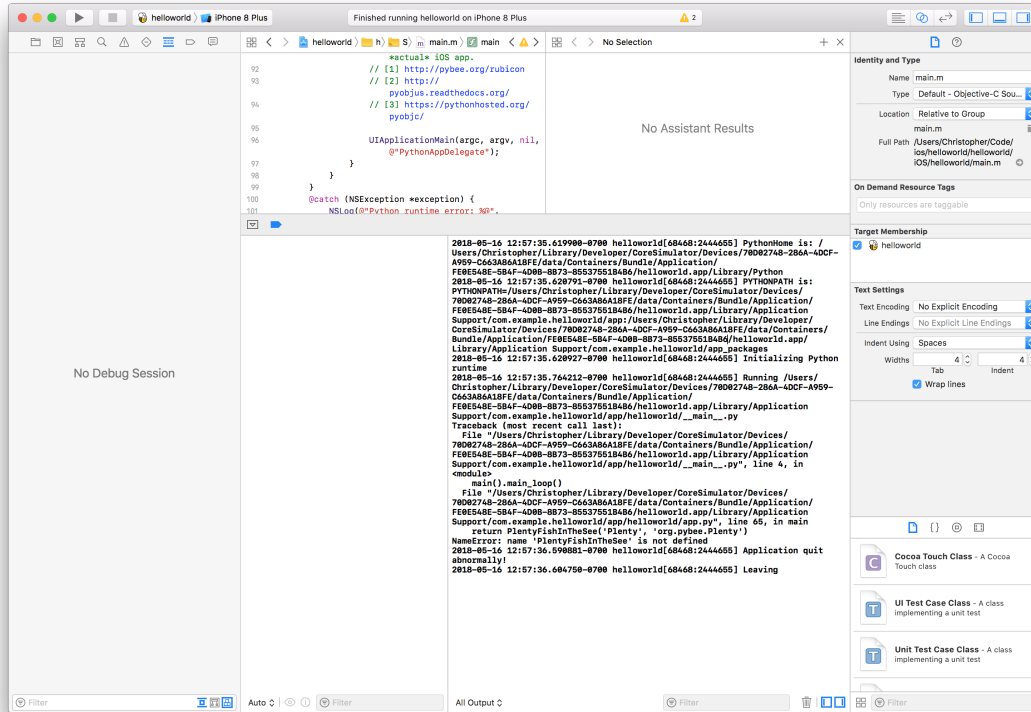
```
C:\...>tox -e docs
```

The output of the file should be in the build/sphinx/html folder. If there are any markup problems, they'll raise an error.

2.2.6 See Errors on iOS

If you have a beeware iOS project that has a crash, it can be difficult to see the stacktrace. Here's how to do it -

1. Build your iOS project. You don't have to start it.
2. Open that iOS project in Xcode. Click the Run button (looks like an arrow) and wait for the simulator to open. Cause the app to crash.
3. Your stack trace ought to appear in the 'debugger area' at the bottom of the screen. If you can't see that area, you may have to activate it with View > Debug Area > Show Debug Area



2.2.7 Internal How-to guides

These guides are for the maintainers of the Briefcase project, documenting internal project procedures.

How to cut a Briefcase release

The release infrastructure for Briefcase is semi-automated, using GitHub Actions to formally publish releases.

This guide assumes that you have an `upstream` remote configured on your local clone of the Briefcase repository, pointing at the official repository. If all you have is a checkout of a personal fork of the Briefcase repository, you can configure that checkout by running:

```
$ git remote add upstream https://github.com/beeware/briefcase.git
```

The procedure for cutting a new release is as follows:

1. Check the contents of the upstream repository's main branch:

```
$ git fetch upstream
$ git checkout --detach upstream/main
```

Check that the HEAD of release now matches upstream/main.

2. Make sure the branch is ready for release. Ensure that:

1. The version number has been bumped.
2. The release notes are up to date. If they are, the `changes` directory should be empty, except for the `template.rst` file.

These two changes (the version bump and release notes update) should go through the normal pull request and review process. They should generally comprise the last PR merged before the release occurs.

If the version number *hasn't* been updated, or `changes` directory *isn't* empty, you need to create a PR (using the normal development process) that contains these changes. Run:

```
$ tox -e towncrier -- --draft
```

to review the release notes that will be included, and then:

```
$ tox -e towncrier
```

to generate the updated release notes. Submit the PR; once it's been reviewed and merged, you can restart the release process from step 1.

3. Tag the release, and push the tag upstream:

```
$ git tag v1.2.3
$ git push upstream v1.2.3
```

4. Pushing the tag will start a workflow to create a draft release on GitHub. You can [follow the progress of the workflow on GitHub](#); once the workflow completes, there should be a new [draft release](#).
5. Edit the GitHub release. Add release notes (you can use the text generated by towncrier). Check the pre-release checkbox (if necessary).
6. Double check everything, then click Publish. This will trigger a [publication workflow on GitHub](#).
7. Wait for the [package to appear on PyPI](#).

Congratulations, you've just published a release!

If anything went wrong during steps 3 or 5, you will need to delete the draft release from GitHub, and push an updated tag. Once the release has successfully appeared on PyPI, it cannot be changed; if you spot a problem in a published package, you'll need to tag a completely new release.

2.2.8 Publishing your app

Some Briefcase platforms are linked to app distribution systems. This documentation covers how to publish your app to the appropriate distribution system.

Android

Overview

The Google Play Store is the most widely-used Android app store. This guide focuses on how to distribute a BeeWare app on the Google Play Store.

Build the app in release mode

Use Briefcase to build a release bundle for your application:

macOS

Linux

Windows

```
(venv) $ briefcase package android
[hello-world] Building Android App Bundle and APK in release mode...
...
[hello-world] Packaged android/Hello World/app/build/outputs/bundle/release/app-release.
↪ aab
```

```
(venv) $ briefcase package android
[hello-world] Building Android App Bundle and APK in release mode...
...
[hello-world] Packaged android/Hello World/app/build/outputs/bundle/release/app-release.
↪ aab
```

```
(venv) C:\...>briefcase package android
[hello-world] Building Android App Bundle and APK in release mode...
...
[hello-world] Packaged android\Hello World\app\build\outputs\bundle\release\app-release.
↪ aab
```

This will result in an Android App Bundle file being generated. An **Android App Bundle** is a publishing format that includes all your app’s compiled code and resources.

Note: AAB and APK

You may have heard of the “Android Package”, or APK format. The AAB format is a newer format that simplifies the process of uploading your app to the Play Store, allows Google to manage the signing process, and allows the app bundle that is installed on your end-user’s device to be smaller.

Sign the Android App Bundle

Create code signing identity

Before you sign the APK files, you need to *create a code signing identity*.

The Google Play Store requires that the Android App Bundle is signed before it is uploaded, using the Java jarsigner tool.

In this example below, we assume your code signing identity is stored in **upload-key-helloworld.jks** under **.android** within your home folder. We also assume that the app’s formal name is Hello World. You will need to change the path to the AAB file based on your app’s formal name.

macOS

Linux

Windows (PowerShell)

Windows (cmd)

```
$ ~/Library/Caches/org.beeware.briefcase/tools/java/Contents/Home/bin/jarsigner -verbose -
↳-sigalg SHA1withRSA -digestalg SHA1 -keystore ~/.android/upload-key-helloworld.jks
↳"android/gradle/Hello World/app/build/outputs/bundle/release/app-release.aab" upload-
↳key -storepass android
  adding: META-INF/MANIFEST.MF
  adding: META-INF/UPLOAD-K.SF
  adding: META-INF/UPLOAD-K.RSA
  signing: BundleConfig.pb
  signing: BUNDLE-METADATA/com.android.tools.build.libraries/dependencies.pb
  signing: base/assets/python/app/README
...
  signing: base/manifest/AndroidManifest.xml
  signing: base/assets.pb
  signing: base/native.pb
  signing: base/resources.pb
>>> Signer
  X.509, CN=Upload Key
  [trusted certificate]

jar signed.

Warning:
The signer's certificate is self-signed.
```

```
$ ~/.cache/briefcase/tools/java/bin/jarsigner -verbose -sigalg SHA1withRSA -digestalg -
↳SHA1 -keystore ~/.android/upload-key-helloworld.jks "android/gradle/Hello World/app/
↳build/outputs/bundle/release/app-release.aab" upload-key -storepass android
  adding: META-INF/MANIFEST.MF
  adding: META-INF/UPLOAD-K.SF
  adding: META-INF/UPLOAD-K.RSA
  signing: BundleConfig.pb
  signing: BUNDLE-METADATA/com.android.tools.build.libraries/dependencies.pb
  signing: base/assets/python/app/README
...
  signing: base/manifest/AndroidManifest.xml
  signing: base/assets.pb
  signing: base/native.pb
  signing: base/resources.pb
>>> Signer
  X.509, CN=Upload Key
  [trusted certificate]

jar signed.

Warning:
The signer's certificate is self-signed.
```

```
C:\...>& "$env:LOCALAPPDATA\BeeWare\briefcase\Cache\tools\java\bin\jarsigner.exe" -
↳verbose -sigalg SHA1withRSA -digestalg SHA1 -keystore "$env:HOME\PATH\.android\upload-
```

(continues on next page)

(continued from previous page)

```

↪key-helloworld.jks" "android\gradle\Hello World\app\build\outputs\bundle\release\app-
↪release.aab" upload-key -storepass android
  adding: META-INF/MANIFEST.MF
  adding: META-INF/UPLOAD-K.SF
  adding: META-INF/UPLOAD-K.RSA
signing: BundleConfig.pb
signing: BUNDLE-METADATA/com.android.tools.build.libraries/dependencies.pb
signing: base/assets/python/app/README
...
signing: base/manifest/AndroidManifest.xml
signing: base/assets.pb
signing: base/native.pb
signing: base/resources.pb
>>> Signer
X.509, CN=Upload Key
[trusted certificate]

jar signed.

Warning:
The signer's certificate is self-signed.

```

```

C:\...>%LOCALAPPDATA%\BeeWare\briefcase\Cache\tools\java\bin\jarsigner.exe -verbose -
↪sigalg SHA1withRSA -digestalg SHA1 -keystore %HOMEPATH%\android\upload-key-helloworld.
↪jks "android\gradle\Hello World\app\build\outputs\bundle\release\app-release.aab"
↪upload-key -storepass android
  adding: META-INF/MANIFEST.MF
  adding: META-INF/UPLOAD-K.SF
  adding: META-INF/UPLOAD-K.RSA
signing: BundleConfig.pb
signing: BUNDLE-METADATA/com.android.tools.build.libraries/dependencies.pb
signing: base/assets/python/app/README
...
signing: base/manifest/AndroidManifest.xml
signing: base/assets.pb
signing: base/native.pb
signing: base/resources.pb
>>> Signer
X.509, CN=Upload Key
[trusted certificate]

jar signed.

Warning:
The signer's certificate is self-signed.

```

You can safely ignore the warning about the signer's certificate being self-signed. Google will manage the process of signing the app with a verified certificate when you upload your app for distribution.

Add the app to the Google Play store

To publish to the Google Play store, you will need a Google Play Developer account, which costs ~\$25 USD per year. You will then need to provide information for your app's store listing including an icon and screenshots, upload the app to Google, and finally roll the app out to production.

Register for a Google Play Developer account

Registering for a Google Play Developer account requires a Google Account. You will need to pay registration fee and accept an agreement in the process.

To check if you already have a Google Play Developer account, you can visit the [Google Play console](#). If you see a button to **Publish an Android App on Google Play** or a button to **Create Application**, you can skip this step.

To create your Google Play developer account, pay the fee, and review the agreements, [follow Google's documentation](#).

Create a listing

Visit the [Google Play console](#). You will see a button labeled **Publish an Android App on Google Play** or a button to **Create Application**. Click it.

Once you've done that, click **Create Application**. Choose a language and write a brief app title, up to 50 characters. We suggest making this the same as your app's Formal Name in its `pyproject.toml`.

This will take you to **Store Listing** section of your app. You will need to provide a short app description (up to 80 characters) and a full description (up to 4000 characters). Your app metadata may be helpful here.

You will also need to provide a collection of assets that will be used to promote your application:

- **A 512x512px icon.** This will be the icon that appears in the Play Store. It should match the icon you set on the application itself.
- **At least 2 screen screenshots of the app.** Google recommends using a screenshot [without framing](#). One way to capture such a screenshot is with the Android emulator's screenshot functionality (the camera icon on the simulator controls). This allows your screenshot to contain just what appears on the screen rather than a picture of the virtual device. This will store a file in your Desktop folder.

Screenshots must be at least 320px on their smallest dimension, no larger than 3480px on their largest dimension, and can't have an aspect ratio more extreme than 2:1. A screenshot from the Android emulator typically fulfills these requirements.

- **A 1024x500px feature graphic.** A feature graphic visually represents the purpose of the app or your logo and can optionally include a screenshot of the app in use, typically including device framing.

Google Play supports optional graphic assets including promo videos, TV banners, and 360 degree stereoscopic images. See also [Google's advice on graphic assets](#).

Once you've completed the store listing, you'll need to fill out a range of other details about your app, including the category where it should appear in the Play Store, pricing details, details about the app's content and its suitability for children, and contact details for you as a developer. The navigation pane (typically on the left side of the screen) contains grayed out check marks covering all the sections with required details. Visit each of these sections in turn; when you have met the requirements of each section, the checkmark will turn green. Once all the checkmarks are green, you're ready to release your app.

Create a release

Click **App releases** in the navigation pane. To produce a production app (i.e., an app in the public Play Store that anyone can download) click **Manage** within the **Production track**, then select **Create Release**. If prompted to enable App Signing by Google Play, click **Continue**.

Note: Non-production releases

The Play Store also supports releasing your app for internal, alpha and beta testing. Google's documentation [contains more details about creating test releases](#).

In an earlier section of this tutorial, we used `briefcase publish` and `jarsigner` to create a signed Android App Bundle file. It is stored at `android/Hello World/app/build/outputs/bundle/release/app-release.aab` (substituting the name of your own app as necessary). Upload this file to the Google Play console within **Browse Files** under **Android App Bundles and APKs to add**.

You will need to write release notes for the app in the **What's new in this release?** section. If this is your first upload of the app, you can use something like "Initial application release." Review your application details,

Once you have answered those questions, you can switch back to the **App releases** tab. Click **Edit release**, save your changes, and click **Start Rollout To Production**.

The Google Play Store will now review your app. You will be emailed if any updates are required; otherwise, after a day or two, your app will be rolled out to the Play Store.

Publish an update

At some point, you'll want to publish an updated version of your application. Generate a fresh AAB file, signed with the *same* certificate as your original release. Then log into the Play Store console, and select your application. Select **Release Management** in the navigation bar, then **App Releases**.

At this point, the release process is the same as it was for your initial release; create a release, upload your AAB file, and submit the application for rollout.

2.3 About Briefcase

2.3.1 Frequently Asked Questions

What version of Python does Briefcase support?

Python 3.5 or higher.

What platforms does Briefcase support?

Briefcase currently has support for:

- macOS (producing DMG files, or raw .app files)
- Linux (producing AppImage files)
- Windows (producing MSI installers)
- iOS (producing Xcode projects)
- Android (producing Gradle projects)

Support for other some other packaging formats (e.g., NSIS installers for Windows; Snap and Flatpak installers for Linux) and other operating systems (e.g., tvOS, watchOS, WearOS) are on our roadmap.

Briefcase's platform support is built on a plugin system, so if you want to add support for a custom platform, you can do so; or, you can contribute the backend to Briefcase itself.

How do I detect if my app is running in a Briefcase-packaged container?

Briefcase adds a [PEP566](#) metadata file when it installs your app's code. The metadata can be retrieved at runtime as described in the [Accessing Briefcase packaging metadata at runtime](#) how-to. You can determine if your app was packaged with Briefcase by testing for the existence of the `Briefcase-Version` tag:

```
in_briefcase = 'Briefcase-Version' in metadata
```

2.3.2 The Briefcase Developer and User community

Briefcase is part of the [BeeWare suite](#). You can talk to the community through:

- [@pybeeware](#) on Twitter
- [BeeWare Getting Help page](#)

Code of Conduct

The BeeWare community has a strict [Code of Conduct](#). All users and developers are expected to adhere to this code.

If you have any concerns about this code of conduct, or you wish to report a violation of this code, please contact the project founder [Russell Keith-Magee](#).

Contributing

If you experience problems with Briefcase, [log them on GitHub](#). If you want to contribute code, please [fork the code](#) and [submit a pull request](#).

2.3.3 Success Stories

Want to see examples of Briefcase in use? Here's some:

- [Travel Tips](#) is an app in the iOS App Store that was packaged for distribution using Briefcase.
- [Mu](#) is a simple code editor for beginner programmers. It uses Briefcase to prepare a macOS installer.
- [Napari](#) is a multi-dimensional image viewer for python. It uses Briefcase to prepare bundled Windows, MacOS, and Linux installers.

2.3.4 Release History

0.3.9 (2022-08-17)

Features

- Linux apps can now be packaged in Flatpak format. (#359)
- SDKs, tools, and other downloads needed to support app builds are now stored in an OS-native user cache directory instead of `~/.briefcase`. (#374)
- Windows MSI installers can now be configured to ask the user whether they want a per-user or per-machine install. (#382)
- The console output of Windows apps is now captured and displayed during `briefcase run`. (#620)
- Windows apps are now packaged with a stub application. This ensures that Windows apps present with the name and icon of the app, rather than the `pythonw.exe` name and icon. It also allows for improvements in logging and error handling. (#629)
- Temporary docker containers are now cleaned up after use. The wording of Docker progress messages has also been improved. (#774)
- Users can now define a `BRIEFCASE_HOME` environment variable. This allows you to specify the location of the Briefcase tool cache, allowing the user to avoid issues with spaces in paths or disk space limitations. (#789)
- Android emulator output is now printed to the console if it fails to start properly. (#799)
- `briefcase android run` now shows logs from only the current process, and includes all log tags except some particularly noisy and useless ones. It also no longer clears the Logcat buffer. (#814)

Bugfixes

- Apps now have better isolation against the current working directory. This ensures that code in the current working directory isn't inadvertently included when an app runs. (#662)
- Windows MSI installers now install in `Program Files`, rather than `Program Files (x86)`. (#688)
- `Linuxdeploy` plugiuns can now be used when building Linux AppImages; this resolves many issues with GTK app deployment. (#756)
- Collision protection has been added to custom support packages that have the same name, but are served by different URLs. (#797)
- Python 3.7 and 3.8 on Windows will no longer deadlock when CTRL+C is sent during a subprocess command. (#809)

Misc

- #778, #783, #784, #785, #786, #787, #794, #800, #805, #810, #813, #815

0.3.8 (2022-06-27)

Features

- macOS apps are now notarized as part of the packaging process. (#365)
- Console output now uses Rich to provide visual highlights and progress bars. (#740)
- The macOS log streamer now automatically exits using the run command when the app exits. (#742)
- A verbose log is written to file when a critical error occurs or `-log` is specified. (#760)

Bugfixes

- Updating an Android app now forces a re-install of the app. This corrects a problem (usually seen on physical devices) where app updates wouldn't be deployed if the app was already on the device. (#395)
- The iOS simulator is now able to correctly detect the iOS version when only a device name is provided. (#528)
- Windows MSI projects are now able to support files with non-ASCII filenames. (#749)
- The existence of an appropriate Android system image is now verified independently to the existence of the emulator. (#762)
- The error message presented when the Xcode Commandline Tools are installed, but Xcode is not, has been clarified. (#763)
- The METADATA file generated by Briefcase is now UTF-8 encoded, so it can handle non-Latin-1 characters. (#767)
- Output from subprocesses is correctly encoded, avoiding errors (especially on Windows) when tool output includes non-ASCII content. (#770)

Improved Documentation

- Documented a workaround for ELF load command address/offset errors seen when using manylinux wheels. (#718)

Misc

- #743, #744, #755

0.3.7 (2022-05-17)

Features

- Apps can be updated as part of a call to package. (#473)
- The Android emulator can now be used on Apple M1 hardware. (#616)
- Names that are reserved words in Python (or other common programming languages) are now prevented when creating apps. (#617)
- Names that are invalid on Windows as filenames (such as CON and LPT0) are now invalid as app names. (#685)
- Verbose logging via -v and -vv now includes the return code, output, and environment variables for shell commands (#704)
- When the output of a wrapped command cannot be parsed, full command output, and failure reason is now logged. (#728)
- The iOS emulator will now run apps natively on M1 hardware, rather than through Rosetta emulation. (#739)

Bugfixes

- Bundle identifiers are now validated to ensure they don't contain reserved words. (#460)
- The error reporting when the user is on an unsupported platform or Python version has been improved. (#541)
- When the formal name uses non-Latin characters, the suggested Class and App names are now valid. (#612)
- The code signing process for macOS apps has been made more robust. (#652)
- macOS app binaries are now adhoc signed by default, ensuring they can run on M1 hardware. (#664)
- Xcode version checks are now more robust. (#668)
- Android projects that have punctuation in their formal names can now build without error. (#696)
- Bundle name validation no longer excludes valid country identifiers (like `in.example`). (#709)
- Application code and dist-info is now fully replaced during an update. (#720)
- Errors related to Java JDK detection now properly contain the value of JAVA_HOME instead of the word None (#727)
- All log entries will now be displayed for the run command on iOS and macOS; previously, initial log entries may have been omitted. (#731)
- Using CTRL+C to stop showing Android emulator logs while running the app will no longer cause the emulator to shutdown. (#733)

Misc

- #680, #681, #699, #726, #734

0.3.6 (2022-02-28)

Features

- On macOS, iOS, and Android, `briefcase run` now displays the application logs once the application has started. (#591)
- Xcode detection code now allows for Xcode to be installed in locations other than `/Applications/Xcode.app`. (#622)
- Deprecated support for Python 3.6. (#653)

Bugfixes

- Existing app packages are now cleared before reinstalling dependencies. (#644)
- Added binary patcher for linuxtools AppImage to increase compatibility. (#667)

Improved Documentation

- Documentation on creating macOS/iOS code signing identities has been added (#641)

Misc

- #587, #588, #592, #598, #621, #643, #654, #670

0.3.5 (2021-03-06)

Features

- macOS projects can now be generated as an Xcode project. (#523)

Bugfixes

- macOS apps are now built as an embedded native binary, rather than a shell script invoking a Python script. This was necessary to provide better support for macOS app notarization and sandboxing. (#523)
- Fixed the registration of setuptools entry points caused by a change in case sensitivity handling in Setuptools 53.1.0. (#574)

Misc

- #562

0.3.4 (2021-01-03)

Features

- Added signing options for all platforms. App signing is only implemented on macOS, but `--no-sign` can now be used regardless of your target platform. (#486)
- Windows MSI installers can be configured to be per-machine, system-wide installers. (#498)
- Projects can specify a custom branch for the template used to generate the app. (#519)
- Added the `--no-run` flag to the `dev` command. This allows developers to install app dependencies without running the app. (#522)
- The new project wizard will now warn users when they select a platform that doesn't support mobile deployment. (#539)

Bugfixes

- Modified the volume mounting process to allow for SELinux. (#500)
- Fixed missing signature for Python executable in macOS app bundle. This enables the packaged dmg to be notarized by Apple. (#514)
- Modified the Windows tests to allow them to pass on 32-bit machines. (#521)
- Fixed a crash when running with verbose output. (#532)

Improved Documentation

- Clarified documentation around `system_requires` dependencies on Linux. (#459)

Misc

- #465, #475, #496, #512, #518

0.3.3 (2020-07-18)

Features

- WiX is now auto-downloaded when the MSI backend is used. (#389)
- The `upgrade` command now provides a way to upgrade tools that Briefcase has downloaded, including WiX, Java, `linuxdeploy`, and the Android SDK. (#450)

Bugfixes

- Binary modules in Linux AppImages are now processed correctly, ensuring that no references to system libraries are retained in the AppImage. (#420)
- If pip is configured to use a per-user site_packages, this no longer clashes with the installation of application packages. (#441)
- Docker-using commands now check whether the Docker daemon is running and if the user has permission to access it. (#442)

0.3.2 (2020-07-04)

Features

- Added pytest coverage to CI/CD process. (#417)
- Application metadata now contains a `Briefcase-Version` indicator. (#425)
- The device list returned by `briefcase run android` now uses the Android device model name and unique ID e.g. a Pixel 3a shows up as `Pixel 3a (adbDeviceId)`. (#433)
- Android apps are now packaged in Android App Bundle format. This allows the Play Store to dynamically build the smallest APK appropriate to a device installing an app. (#438)
- PursuedPyBear is now included in the new project wizard. (#440)

Bugfixes

- iOS builds will now warn if the Xcode command line tools are the active. (#397)
- Linux Docker builds no longer use interactive mode, allowing builds to run on CI (or other TTY-less devices). (#439)

Improved Documentation

- Documented the process of signing Android apps & publishing them to the Google Play store. (#342)

Misc

- #428

0.3.1 (2020-06-13)

Features

- The Linux AppImage backend has been modified to use Docker. This ensures that the AppImage is always built in an environment that is compatible with the support package. It also enables Linux AppImages to be built on macOS and Windows. “Native” builds (i.e., builds that *don't* use Docker) can be invoked using the `--no-docker` argument. (#344)
- A `PYTHONPATH` property has been added to `AppConfig` that describes the `sys.path` changes needed to run the app. (#401)

- Ad-hoc code signing is now possible on macOS with `briefcase package --adhoc-sign`. (#409)
- Android apps can now use `-` in their bundle name; we now convert `-` to `_` in the resulting Android package identifier and Java package name. (#415)
- Mobile applications now support setting the background color of the splash screen, and setting a build identifier. (#422)
- Android now has a `package` command that produces the release APK. After manually signing this APK, it can be published to the Google Play Store. (#423)

Bugfixes

- Some stray punctuation in the Android device helper output has been removed. (#396)
- An explicit version check for Docker is now performed. (#402)
- The Linux build process ensures the Docker user matches the UID/GID of the host user. (#403)
- Briefcase now ensures that the Python installation ecosystem tools (`pip`, `setuptools`, and `wheel`), are all present and up to date. (#421)

Improved Documentation

- Documented that Windows MSI builds produce per-user installable MSI installers, while still supporting per-maching installs via the CLI. (#382)
- `CONTRIBUTING.md` has been updated to link to Briefcase-specific documentation. (#404)
- Removed references to the `build-system` table in `pyproject.toml`. (#410)

Misc

- #380, #384

0.3.0 (2020-04-18)

Features

- Converted Briefcase to be a PEP518 tool, rather than a `setuptools` extension. (#266)

0.2.10

- Improved pre-detection of XCode and related tools
- Improved error handling when starting external tools
- Fixed iOS simulator integration

0.2.9

- Updated mechanism for starting the iOS simulator
- Added support for environment markers in `install_requires`
- Improved error handling when Wix isn't found

0.2.8

- Corrects packaging problem with `urllib3`, caused by inconsistency between requests and boto3.
- Corrected problems with Start menu targets being created on Windows.

0.2.7

- Added support for launch images for iPhone X, Xs, Xr, Xs Max and Xr Max
- Completed removal of internal pip API dependencies.

0.2.6

- Added support for registering OS-level document type handlers.
- Removed dependency on an internal pip API.
- Corrected invocation of `gradlew` on Windows
- Addressed support for support builds greater than b9.

0.2.5

- Restored download progress bars when downloading support packages.

0.2.4

- Corrected a bug in the iOS backend that prevented iOS builds.

0.2.3

- Bugfix release, correcting the fix for pip 10 support.

0.2.2

- Added compatibility with pip 10.
- Improved Windows packaging to allow for multiple executables
- Added a `--clean` command line option to force a refresh of generated code.
- Improved error handling for bad builds

0.2.1

- Improved error reporting when a support package isn't available.

0.2.0

- Added `-s` option to launch projects
- Switch to using AWS S3 resources rather than Github Files.

0.1.9

- Added a full Windows installer backend

0.1.8

- Modified template rollout process to avoid API limits on Github.

0.1.7

- Added check for existing directories, with the option to replace existing content.
- Added a Linux backend.
- Added a Windows backend.
- Added a splash screen for Android

0.1.6

- Added a Django backend (@glasnt)

0.1.5

- Added initial Android template
- Force versions of pip (≥ 8.1) and setuptools (≥ 27.0)
- Drop support for Python 2

0.1.4

- Added support for tvOS projects
- Moved to using branches in the project template repositories.

0.1.3

- Added support for Android projects using VOC.

0.1.2

- Added support for having multi-target support projects. This clears the way for Briefcase to be used for watchOS and tvOS projects, and potentially for Python-OSX-support and Python-iOS-support to be merged into a single Python-Apple-support.

0.1.1

- Added support for app icons and splash screens.

0.1.0

Initial public release.

2.4 Reference

This is the technical reference for public APIs provided by Briefcase.

2.4.1 Briefcase configuration options

Environment variables

BRIEFCASE_HOME

When briefcase runs, it will download the support files, tools, and SDKs necessary to support building and packaging apps. By default, it will store the files in a platform-native cache folder:

- macOS: ~/Library/Caches/org.beeware.briefcase
- Windows: %LOCALAPPDATA%\BeeWare\briefcase\Cache
- Linux: ~/.cache/briefcase

If you want to use a different folder to store the Briefcase resources, you can define a BRIEFCASE_HOME environment variable.

There are three restrictions on this path specification:

1. The path must already exist. If it doesn't exist, you should create it manually.
2. It *must not* contain any spaces.
3. It *must not* be on a network drive.

The second two restrictions both exist because some of the tools that Briefcase uses (in particular, the Android SDK) do not work in these locations.

2.4.2 Project configuration options

Briefcase is a [PEP518](#)-compliant build tool. It uses a `pyproject.toml` file, in the root directory of your project, to provide build instructions for the packaged file.

If you have an application called “My App”, with source code in the `src/myapp` directory, the simplest possible `pyproject.toml` Briefcase configuration file would be:

```
[tool.briefcase]
project_name = "My Project"
bundle = "com.example"
version = "0.1"

[tool.briefcase.app.myapp]
formal_name = "My App"
description = "My first Briefcase App"
sources = ['src/myapp']
```

The configuration sections are tool specific, and start with the prefix `tool.briefcase`.

The location of the `pyproject.toml` file is treated as the root of the project definition. Briefcase should be invoked in a directory that contains a `pyproject.toml` file, and all relative file path references contained in the `pyproject.toml` file will be interpreted relative to the directory that contains the `pyproject.toml` file.

Configuration sections

A project that is packaged by Briefcase can declare multiple *applications*. Each application is a distributable product of the build process. A simple project will only have a single application. However, a complex project may contain multiple applications with shared code.

Each setting can be specified:

- At the level of an output format (e.g., settings specific to building macOS DMGs);
- At the level of an platform for an app (e.g., macOS specific settings);
- At the level of an individual app; or
- Globally, for all applications in the project.

When building an application in a particular output format, Briefcase will look for settings in the same order. For example, if you’re building a macOS DMG for an application called `myapp`, Briefcase will look for macOS DMG settings for `myapp`, then for macOS settings for `myapp`, then for `myapp` settings, then for project-level settings.

[tool.briefcase]

The base `[tool.briefcase]` section declares settings that project specific, or are common to all applications in this repository.

`[tool.briefcase.app.<app name>]`

Configuration options for a specific application.

`<app name>` must adhere to a valid Python distribution name as specified in [PEP508](#). The app name must also *not* be a reserved word in Python, Java or JavaScript (i.e., app names like `switch` or `pass` would not be valid); and it may not include any of the [filenames prohibited by Windows](#) (i.e., `CON`, `PRN`, or `LPT1`).

`[tool.briefcase.app.<app name>.<platform>]`

Configuration options for an application that are platform specific. The platform must match a name for a platform supported by Briefcase (e.g., `macOS` or `windows`). A list of the platforms supported by Briefcase can be obtained by running `briefcase -h`, and inspecting the help for the `platform` option

`[tool.briefcase.app.<app name>.<platform>.<output format>]`

Configuration options that are specific to a particular output format. For example, `macOS` applications can be generated in `app` or `dmg` format.

Project configuration

Required values

`bundle`

A reverse-domain name that can be used to identify resources for the application e.g., `com.example`. The bundle identifier will be combined with the app name to produce a unique application identifier - e.g., if the bundle identifier is `com.example` and the app name is `myapp`, the application will be identified as `com.example.myapp`.

`project_name`

The project is the collection of all applications that are described by the briefcase configuration. For projects with a single app, this may be the same as the formal name of the solitary packaged app.

`version`

A [PEP440](#) compliant version string.

Examples of valid version strings:

- `1.0`
- `1.2.3`
- `1.2.3.dev4` - A development release
- `1.2.3a5` - An alpha pre-release
- `1.2.3b6` - A Beta pre-release
- `1.2.3rc7` - A release candidate

- 1.2.3.post8 - A post-release

Optional values

`author`

The person or organization responsible for the project.

`author_email`

The contact email address for the person or organization responsible for the project.

`url`

A URL where more details about the project can be found.

Application configuration

Required

`description`

A short, one-line description of the purpose of the application.

`sources`

A list of paths, relative to the `pyproject.toml` file, where source code for the application can be found. The contents of any named files or folders will be copied into the application bundle. Parent directories in any named path will not be included. For example, if you specify `src/myapp` as a source, the contents of the *myapp* folder will be copied into the application bundle; the `src` directory will not be reproduced.

Unlike most other keys in a configuration file, `sources` is *cumulative* setting. If an application defines sources at the global level, application level, *and* platform level, the final set of sources will be the *concatenation* of sources from all levels, starting from least to most specific.

Optional values

`author`

The person or organization responsible for the application.

`author_email`

The contact email address for the person or organization responsible for the application.

`build`

A build identifier. An integer, used in addition to the version specifier, to identify a specific compiled version of an application.

`formal_name`

The application name as it should be displayed to humans. This name may contain capitalization and punctuation. If it is not specified, the `name` will be used.

`icon`

A path, relative to the directory where the `pyproject.toml` file is located, to an image to use as the icon for the application. The path should *exclude* the extension; Briefcase will append a platform appropriate extension when configuring the application. For example, an icon specification of `icon = "resources/icon"` will use `resources/icon.icns` on macOS, and `resources/icon.ico` on Windows.

Some platforms require multiple icons, at different sizes; these will be handled by appending the required size to the provided icon name. For example, iOS requires multiple icon sizes (ranging from 20px to 1024px); Briefcase will look for `resources/icon-20.png`, `resources/icon-1024.png`, and so on. The sizes that are required are determined by the platform template.

`installer_icon`

A path, relative to the directory where the `pyproject.toml` file is located, to an image to use as the icon for the installer. As with `icon`, the path should *exclude* the extension, and a platform-appropriate extension will be appended when the application is built.

`installer_background`

A path, relative to the directory where the `pyproject.toml` file is located, to an image to use as the background for the installer. As with `splash`, the path should *exclude* the extension, and a platform-appropriate extension will be appended when the application is built.

`requires`

A list of packages that must be packaged with this application.

Unlike most other keys in a configuration file, `requires` is *cumulative* setting. If an application defines requirements at the global level, application level, *and* platform level, the final set of requirements will be the *concatenation* of requirements from all levels, starting from least to most specific.

splash

A path, relative to the directory where the `pyproject.toml` file is located, to an image to use as the splash screen for the application. The path should *exclude* the extension; Briefcase will append a platform appropriate extension when configuring the application.

Some platforms require multiple splash images, at different sizes; these will be handled by appending the required size to the provided icon name. For example, iOS requires multiple splash images, (1024px, 2048px and 3072px); with a `splash` setting of `resources/my_splash`, Briefcase will look for `resources/my_splash-1024.png`, `resources/my_splash-2045.png`, and `resources/my_splash-3072.png`. The sizes that are required are determined by the platform template.

Some platforms also require different *variants*. For example, Android requires splash screens for “normal”, “large” and “xlarge” devices. These variants can be specified by qualifying the splash specification:

```
splash.normal = "resource/normal-splash" splash.large = "resource/large-splash" splash.xlarge =  
"resource/xlarge-splash"
```

These settings can, if you wish, all use the same prefix.

If the platform requires different sizes for each variant (as Android does), those size will be appended to path provided by the variant specifier. For example, using the previous example, Android would look for `resource/normal-splash-320.png`, `resource/normal-splash-480.png`, `resource/large-splash.480.png`, `resource/xlarge-splash-720.png`, amongst others.

If the platform output format does not use a splash screen, the `splash` setting is ignored.

splash_background_color

A hexadecimal RGB color value (e.g., `#6495ED`) to use as the background color for splash screens.

If the platform output format does not use a splash screen, this setting is ignored.

support_package

A file path or URL pointing at a tarball containing a Python support package. (i.e., a precompiled, embeddable Python interpreter for the platform)

If this setting is not provided, Briefcase will use the default support package for the platform.

support_revision

The specific revision of a support package that should be used. By default, Briefcase will always use the most recently released support package; if you specify a support revision, the support package will be pinned to that version for your app.

If the support package is a URL, a query argument of `revision=<support_revision>` will be added to the support package URL when it is downloaded.

If the support package is a file path, this argument is ignored.

supported

Indicates that the platform is not supported. For example, if you know that the app cannot be deployed to Android for some reason, you can explicitly prevent deployment by setting *supported=False* in the Android section of the app configuration file.

If *supported* is set to *false*, the create command will fail, advising the user of the limitation.

template

A file path or URL pointing at a [cookiecutter](#) template for the output format.

If this setting is not provided, Briefcase will use a default template for the output format and Python version.

template_branch

The branch of the project template to use when generating the app. If the template is a local file, this attribute will be ignored. If not specified, Briefcase will use a branch matching the Python version in use (i.e., the 3.8 branch will be used when Python 3.8 is used to generate the app).

url

A URL where more details about the application can be found.

Document types

Applications in a project can register themselves with the operating system as handlers for specific document types by adding a `document_type` configuration section for each document type the application can support. This section follows the format:

```
[tool.briefcase.app.<app name>.document_type.<extension>]
```

or, for a platform specific definition:

```
[tool.briefcase.app.<app name>.<platform>.document_type.<extension>]
```

where `extension` is the file extension to register. For example, `myapp` could register as a handler for PNG image files by defining the configuration section `[tool.briefcase.app.myapp.document_type.png]`.

The document type declaration requires the following settings:

description

A short, one-line description of the document format.

icon

A path, relative to the directory where the `pyproject.toml` file is located, to an image for an icon to register for use with documents of this type. The path should *exclude* the extension; Briefcase will append a platform appropriate extension when configuring the application. For example, an icon specification of:

```
icon = "resources/icon"
```

will use `resources/icon.icns` on macOS, and `resources/icon.ico` on Windows.

Some platforms also require different *variants* (e.g., both square and round icons). These variants can be specified by qualifying the icon specification:

```
icon.round = "resource/round-icon" icon.square = "resource/square-icon"
```

Some platforms require multiple icons, at different sizes; these will be handled by appending the required size to the provided icon name. For example, iOS requires multiple icon sizes (ranging from 20px to 1024px); Briefcase will look for `resources/icon-20.png`, `resources/icon-1024.png`, and so on. The sizes that are required are determined by the platform template.

If a platform requires both different sizes *and* variants, the variant handling and size handling will be combined. For example, Android requires round and square icons, in sizes ranging from 48px to 192px; Briefcase will look for `resource/round-icon-42.png`, `resource/square-icon-42.png`, `resource/round-icon-192.png`, and so on.

url

A URL for help related to the document format.

2.4.3 Command reference

new

Start a new Briefcase project. Runs a wizard to ask questions about your new application, and creates a stub project using the details provided.

Usage

To start a new application, run:

```
$ briefcase new
```

Options

The following options can be provided at the command line.

-t <template> / --template <template>

A local directory path or URL to use as a cookiecutter template for the new project.

If a URL is provided, the `master` branch of the referenced repository will be used.

dev

Run the application in developer mode.

Usage

To run the app, run:

```
$ briefcase dev
```

The first time the application runs in developer mode, any dependencies listed in a *requires* configuration item in *pyproject.toml* will be installed into the current environment.

Options

The following options can be provided at the command line.

-a <app name> / --app <app name>

Run a specific application target in your project. This argument is only required if your project contains more than one application target. The app name specified should be the machine-readable package name for the app.

-d / --update-dependencies

Update application dependencies.

--no-run

Do not run the application and only install application dependencies.

create

Create a scaffold for an application installer. By default, targets the current platform's default output format.

Usage

To create a scaffold for the default output format for the current platform:

```
$ briefcase create
```

To create a scaffold for a different platform:

```
$ briefcase create <platform>
```

To create a scaffold for a specific output format:

```
$ briefcase create <platform> <output format>
```

If a scaffold for the nominated platform already exists, you'll be prompted to delete and regenerate the app.

Options

There are no additional command line options.

update

While you're developing an application, you may need to rapidly iterate on the code, making small changes and then re-building. The update command applies any changes you've made to your codebase to the packaged application code.

It will *not* update dependencies or installer resources unless specifically requested.

Usage

To repackage your application's code for the current platform's default output format:

```
$ briefcase update
```

To repackage your application's code for a different platform:

```
$ briefcase update <platform>
```

To repackage your application's code for a specific output format:

```
$ briefcase update <platform> <output format>
```

Options

The following options can be provided at the command line.

-d / --update-dependencies

Update application dependencies.

-r / --update-resources

Update application resources (e.g., icons and splash screens).

build

Compile/build an application. By default, targets the current platform's default output format.

This will only compile the components necessary to *run* the application. It won't necessarily result in the generation of an installable artefact.

Usage

To build the application for the default output format for the current platform:

```
$ briefcase build
```

To build the application for a different platform:

```
$ briefcase build <platform>
```

To build the application for a specific output format:

```
$ briefcase build <platform> <output format>
```

Build tool dependencies

Building for some platforms depends on the build tools for the platform you're targetting being available on the platform you're using. For example, you will only be able to create iOS applications on macOS. Briefcase will check for any required tools, and will report an error if the platform you're targetting is not supported.

Options

The following options can be provided at the command line.

-u / --update

Update the application's source code before running. Equivalent to running:

```
$ briefcase update  
$ briefcase build
```

run

Starts the application, using the packaged version of the application code. By default, targets the current platform's default output format.

If the output format is an executable (e.g., a macOS .app file), the `run` command will start that executable. If the output is an installer, `run` will attempt to replicate as much as possible of the runtime environment that would be installed, but will not actually install the app. For example, on Windows, `run` will use the interpreter that will be included in the installer, and the versions of code and dependencies that will be installed, but *won't* run the installer to produce Start Menu items, registry records, etc.

Usage

To run your application on the current platform's default output format:

```
$ briefcase run
```

To run your application for a different platform:

```
$ briefcase run <platform>
```

To run your application using a specific output format:

```
$ briefcase run <platform> <output format>
```

Options

The following options can be provided at the command line.

-a <app name> / --app <app name>

Run a specific application target in your project. This argument is only required if your project contains more than one application target. The app name specified should be the machine-readable package name for the app.

-u / --update

Update the application's source code before running. Equivalent to running:

```
$ briefcase update
$ briefcase run
```

package

Compile/build an application installer. By default, targets the current platform's default output format. This will produce an installable artefact.

Usage

To build an installer of the default output format for the current platform:

```
$ briefcase package
```

To build an installer for a different platform:

```
$ briefcase package <platform>
```

To build an installer for a specific output format:

```
$ briefcase package <platform> <output format>
```

Packaging tool dependencies

Building installers for some platforms depends on the build tools for the platform you're targetting being available on the platform you're using. For example, you will only be able to create iOS applications on macOS. Briefcase will check for any required tools, and will report an error if the platform you're targetting is not supported.

Options

The following options can be provided at the command line.

-u / --update

Update and recompile the application's code before running. Equivalent to running:

```
$ briefcase update  
$ briefcase package
```

-p <format>, --packaging-format <format>

The format to use for packaging. The available packaging formats are platform dependent.

--no-sign

Don't perform code signing on the app.

--adhoc-sign

Sign app with adhoc identity.

-i <identity> / --identity <identity>

The code signing identity to use when signing the app.

publish**COMING SOON**

Uploads your application to a publication channel. By default, targets the current platform's default output format, using that format's default publication channel.

You may need to provide additional configuration details (e.g., authentication credentials), depending on the publication channel selected.

Usage

To publish the application artefacts for the current platform's default output format to the default publication channel:

```
$ briefcase publish
```

To publish the application artefacts for a different platform:

```
$ briefcase publish <platform>
```

To publish the application artefacts for a specific output format:

```
$ briefcase publish <platform> <output format>
```

Options

The following options can be provided at the command line.

`-c <channel> / --channel <channel>`

Nominate a publication channel to use.

upgrade

Briefcase uses external tools to manage the process of packaging apps. Where possible, Briefcase will manage the process of obtaining those tools. This is currently done for

- **WiX** (used by the Windows MSI backend)
- **linuxdeploy** (used by the Linux AppImage backend)
- **Java JDK** (used by the Android backed)
- **Android SDK** (used by the Android backend)

Over time, it may be necessary to upgrade these tools. The `upgrade` command provides a way to perform these upgrades.

If you are managing your own version of these tools (e.g., if you have downloaded a version of WiX and have set the `WIX_HOME` environment variable), you must manage any upgrades on your own.

Usage

To see what tools are currently being managed by Briefcase:

```
$ briefcase upgrade --list
```

To upgrade all the tools that are currently being managed by Briefcase:

```
$ briefcase upgrade
```

To upgrade a specific tool:

```
$ briefcase upgrade <tool_name>
```

Options

The following options can be provided at the command line.

`-l / --list`

List the tools that are currently being managed by Briefcase.

2.4.4 Platform support

macOS

The default output format for macOS is an *app*.

Briefcase also supports creating an *Xcode project* which in turn can be used to build an app.

Both output formats support packaging as a macOS DMG or as a standalone signed app bundle.

.app bundle

A macOS *.app* bundle is a collection of directory with a specific layout, and with some key metadata. If this structure and metadata exists, macOS treats the folder as an executable file, giving it an icon.

.app bundles can be copied around as if they are a single file. They can also be compressed to reduce their size for transport.

By default, apps will be both signed and notarized when they are packaged.

The *.app* bundle is a distributable artefact. Alternatively, the *.app* bundle can be packaged as a *.dmg* that contains the *.app* bundle. The default packaging format is *.dmg*.

Icon format

macOS *.app* bundles use *.icns* format icons.

Splash Image format

macOS *.app* bundles do not support splash screens or installer images.

Additional options

The following options can be provided at the command line when packaging macOS apps.

--no-notarize

Do not submit the application for notarization. By default, apps will be submitted for notarization unless they have been signed with an ad-hoc signing identity.

Xcode project

Briefcase supports creating a full Xcode project for a macOS app. This project can then be used to build an actual app bundle, with the `briefcase build` command or directly from Xcode.

By default, apps will be both signed and notarized when they are packaged.

The Xcode project will produce a *.app* bundle is a distributable artefact. Alternatively, this *.app* bundle can be packaged as a *.dmg* that contains the *.app* bundle. The default packaging format is *.dmg*.

Icon format

macOS Xcode projects use .png format icons. An application must provide icons of the following sizes:

- 16px
- 32px
- 64px
- 128px
- 256px
- 512px
- 1024px

Splash Image format

macOS Xcode projects do not support splash screens.

Additional options

The following options can be provided at the command line when packaging macOS apps.

--no-notarize

Do not submit the application for notarization. By default, apps will be submitted for notarization unless they have been signed with an ad-hoc signing identity.

Windows

The default output format for Windows is an *app*.

Briefcase also supports creating a *Visual Studio project* which in turn can be used to build an app.

Both output formats support packaging as an MSI.

Windows App

A Windows app is a stub binary, allow with a collection of folders taht contain the Python code for the app and the Python runtime libraries.

Briefcase uses the [WiX Toolset](#) to build an MSI installer for a Windows App. WiX, in turn, requires that .NET Framework 3.5 is enabled. To ensure .NET Framework 3.5 is enabled:

1. Open the Windows Control Panel
2. Traverse to Programs -> Programs and Features
3. Select “Turn Windows features On or Off”
4. Ensure that “.NET framework 3.5 (includes .NET 2.0 and 3.0)” is selected.

Icon format

Windows apps installers use multiformat `.ico` icons; these icons should contain images in the following sizes:

- 16x16
- 32x32
- 48x48
- 64x64
- 256x256

Splash Image format

Windows Apps do not support splash screens or installer images.

Application configuration

The following options can be added to the `tool.briefcase.app.<appname>.windows` section of your `pyproject.toml` file.

`system_installer`

Controls whether the app will be installed as a per-user or per-machine app. Per-machine apps are “system” apps, and require admin permissions to run the installer; however, they are installed once and shared between all users on a computer.

If `true` the installer will attempt to install the app as a per-machine app, available to all users. If `false`, the installer will install as a per-user app. If undefined the installer will ask the user for their preference.

`version_triple`

Python and Briefcase allow any valid [PEP440 version number](#) as a `version` specifier. However, MSI installers require a strict integer triple version number. Many PEP440-compliant version numbers, such as “1.2”, “1.2.3b3”, and “1.2.3.4”, are invalid for MSI installers.

Briefcase will attempt to convert your `version` into a valid MSI value by extracting the first three parts of the main series version number (excluding pre, post and dev version indicators), padding with zeros if necessary:

- 1.2 becomes 1.2.0
- 1.2b4 becomes 1.2.0
- 1.2.3b3 becomes 1.2.3
- 1.2.3.4 becomes 1.2.3.

However, if you need to override this default value, you can define `version_triple` in your app settings. If provided, this value will be used in the MSI configuration file instead of the auto-generated value.

Visual Studio project

Briefcase supports creating a full Visual Studio project for a Windows App. This project can then be used to build the stub app binary with the `briefcase build` command, or directly from Visual Studio.

Building the Visual Studio project requires that you install Visual Studio 2022 or later. Visual Studio 2022 Community Edition [can be downloaded for free from Microsoft](#). You can also use the Professional or Enterprise versions if you have them.

Briefcase will auto-detect the location of your Visual Studio installation, provided one of the following three things are true:

1. You install Visual Studio in the standard location in your Program Files folder.
2. `MSBuild.exe` is on your path.
3. You define the environment variable `MSBUILD` that points at the location of your `MSBuild.exe` executable

When you install Visual Studio, there are many optional components. You should ensure that you have installed the following:

- .NET Desktop Development - All default packages
- Desktop Development with C++ - All default packages - C++/CLI support for v143 build tools

Briefcase uses the [WiX Toolset](#) to build an MSI installer for a Windows App. WiX, in turn, requires that .NET Framework 3.5 is enabled. To ensure .NET Framework 3.5 is enabled:

1. Open the Windows Control Panel
2. Traverse to Programs -> Programs and Features
3. Select “Turn Windows features On or Off”
4. Ensure that “.NET framework 3.5 (includes .NET 2.0 and 3.0)” is selected.

Icon format

Windows apps installers use multiformat `.ico` icons; these icons should contain images in the following sizes:

- 16x16
- 32x32
- 48x48
- 64x64
- 256x256

Splash Image format

Windows Apps do not support splash screens or installer images.

Application configuration

The following options can be added to the `tool.briefcase.app.<appname>.windows` section of your `pyproject.toml` file.

`system_installer`

Controls whether the app will be installed as a per-user or per-machine app. Per-machine apps are “system” apps, and require admin permissions to run the installer; however, they are installed once and shared between all users on a computer.

If `true` the installer will attempt to install the app as a per-machine app, available to all users. If `false`, the installer will install as a per-user app. If undefined the installer will ask the user for their preference.

`version_triple`

Python and Briefcase allow any valid [PEP440 version number](#) as a `version` specifier. However, MSI installers require a strict integer triple version number. Many PEP440-compliant version numbers, such as “1.2”, “1.2.3b3”, and “1.2.3.4”, are invalid for MSI installers.

Briefcase will attempt to convert your `version` into a valid MSI value by extracting the first three parts of the main series version number (excluding pre, post and dev version indicators), padding with zeros if necessary:

- 1.2 becomes 1.2.0
- 1.2b4 becomes 1.2.0
- 1.2.3b3 becomes 1.2.3
- 1.2.3.4 becomes 1.2.3.

However, if you need to override this default value, you can define `version_triple` in your app settings. If provided, this value will be used in the MSI configuration file instead of the auto-generated value.

Linux

Briefcase supports packaging Linux apps in [AppImage](#) and [Flatpak](#) formats.

The default output format for Linux is [AppImage](#).

AppImage

[AppImage](#) provides a way for developers to provide “native” binaries for Linux users. It allow packaging applications for any common Linux based operating system, including Ubuntu, Debian, Fedora, and more. AppImages contain all the dependencies that cannot be assumed to be part of each target system, and will run on most Linux distributions without further modifications. Briefcase uses [linuxdeploy](#) to build the AppImage in the correct format.

Packaging binaries for Linux is complicated, because of the inconsistent library versions present on each distribution. An AppImage can be executed on *any* Linux distribution with a version of `libc` greater than or equal the version of the distribution where the AppImage was created.

To simplify the packaging process, Briefcase provides a pre-compiled Python support library. This support library was compiled on Ubuntu 18.04, which means the AppImages build by Briefcase can be used on *any* Linux distribution of about the same age or newer - but those AppImages *must* be compiled on Ubuntu 18.04.

This means you have four options for using Briefcase to compile a Linux AppImage:

1. Run the version-sensitive parts of the build process inside Docker. This is the default behavior of Briefcase. This also means that it is possible to build Linux binaries on any platform that can run Docker.
2. Install Ubuntu 18.04 on your own machine.
3. Find a cloud or CI provider that can provide you an Ubuntu 18.04 machine for build purposes. Github Actions, for example, provides Ubuntu 18.04 as a build option. Again, you'll need to use the `--no-docker` command line option.
4. Build your own version of the BeeWare [Python support libraries](#). If you take this approach, be aware that your AppImage will only be as portable as the version of libc that is available on the distribution you use. If you build using Ubuntu 19.10, for example, you can expect that only people on the most recent versions of another distribution will be able to run your AppImage.

Icon format

AppImages uses `.png` format icons. An application must provide icons in the following sizes:

- 16px
- 32px
- 64px
- 128px
- 256px
- 512px

Splash Image format

AppImages do not support splash screens or installer images.

Additional options

The following options can be provided at the command line when producing AppImages.

`--no-docker`

Use native execution, rather than using Docker to start a container.

Application configuration

The following options can be added to the `tool.briefcase.app.<appname>.linux` section of your `pyproject.toml` file.

system_requires

A list of operating system packages that must be installed for the AppImage build to succeed. If a Docker build is requested, this list will be passed to the Docker context when building the container for the app build. By default, entries should be Ubuntu 18.04 apt package requirements. For example,

```
system_requires = ['libgirepository1.0-dev', 'libcairo2-dev']
```

would make the GTK GI and Cairo operating system libraries available to your app.

If you see errors during `briefcase build` of the form:

```
Could not find dependency: libSomething.so.1
```

but the app works under `briefcase dev`, the problem may be an incomplete `system_requires` definition. The `briefcase build` process generates a new environment that is completely isolated from your development environment, so if your app has any operating system dependencies, they *must* be listed in your `system_requires` definition.

linuxdeploy_plugins

A list of `linuxdeploy_plugins` that you wish to be included when building the AppImage. This is needed for applications that depend on libraries that have dependencies that cannot be automatically discovered by `linuxdeploy`. GTK and Qt both have complex runtime resource requirements that can be difficult for `linuxdeploy` to identify automatically.

The `linuxdeploy_plugins` declaration is a list of strings. Briefcase can take plugin definitions in three formats:

1. The name of a plugin known by Briefcase. One of `gtk` or `qt`.
2. A URL where a plugin can be downloaded
3. A path to a local plugin file

If your plugin requires an environment variable for configuration, that environment variable can be provided as a prefix to the plugin declaration, similar to how environment variables can be defined for a shell command.

For example, the `gtk` plugin requires the `DEPLOY_GTK_VERSION` environment variable. To set this variable with the Briefcase-managed GTK `linuxdeploy` plugin, you would define:

```
linuxdeploy_plugins = ["DEPLOY_GTK_VERSION=3 gtk"]
```

Or, if you were using a plugin stored as a local file:

```
linuxdeploy_plugins = ["DEPLOY_GTK_VERSION=3 path/to/plugins/linuxdeploy-gtk-plugin.sh"]
```

Runtime issues with AppImages

Packaging on Linux is a difficult problem - especially when it comes to binary libraries. The following are some common problems you may see, and ways that they can be mitigated.

Undefined symbol and Namespace not available errors

If you get the error:

```
ValueError: Namespace Something not available
```

or:

```
ImportError: /usr/lib/libSomething.so.0: undefined symbol: some_symbol
```

it is likely that one or more of the libraries you are using in your app requires a linuxdeploy plugin. GUI libraries, or libraries that do dynamic module loading are particularly prone to this problem.

ELF load command address/offset not properly aligned

Briefcase uses a tool named `linuxdeploy` to build AppImages. `linuxdeploy` processes all the libraries used by an app so that they can be relocated into the final packaged binary. Building a `manylinux` binary wheel involves a tool named `auditwheel` that performs a very similar process. Unfortunately, processing a binary with `linuxdeploy` after it has been processed by `auditwheel` can result in a binary library that cannot be loaded at runtime.

This is particularly common when a module installed as a binary wheel has a dependency on external libraries. For example, Pillow is a Python library that contains a binary submodule; that submodule uses `libpng`, `libtiff`, and other system libraries for image manipulation. If you install Pillow from a `manylinux` wheel, you may see an error similar to the following at runtime:

```
Traceback (most recent call last):
File "/tmp/.mount_TestbewwDi98/usr/app/testbed/app.py", line 54, in main
    test()
File "/tmp/.mount_TestbewwDi98/usr/app/testbed/linux.py", line 94, in test_pillow
    from PIL import Image
File "/tmp/.mount_TestbewwDi98/usr/app_packages/PIL/Image.py", line 132, in <module>
    from . import _imaging as core
ImportError: libtiff-d0580107.so.5.7.0: ELF load command address/offset not properly
↳ aligned
```

This indicates that one of the libraries that has been included in the AppImage has become corrupted as a result of double processing.

The solution is to ask Briefcase to install the affected library from source. This can be done by adding a `--no-binary` entry to the `requires` declaration for your app. For example, if your app includes Pillow as a requirement:

```
requires = ["pillow==9.1.0"]
```

You can force Briefcase to install Pillow from source by adding:

```
requires = [
    "pillow==9.1.0",
    "--no-binary", "pillow",
]
```

Since the library will be installed from source, you also need to add any system requirements that are needed to compile the binary library. For example, Pillow requires the development libraries for the various image formats that it uses:


```
system_requires = [
    ... other system requirements ...
    "libjpeg-dev",
    "libpng-dev",
    "libtiff-dev",
]
```

If you are missing a system requirement, the call to `briefcase build` will fail with an error:

```
error: subprocess-exited-with-error
```

```
× pip subprocess to install build dependencies did not run successfully.
| exit code: 1
-> See above for output.
```

```
note: This error originates from a subprocess, and is likely not a problem with pip.
>>> Return code: 1
```

```
Unable to install dependencies. This may be because one of your
dependencies is invalid, or because pip was unable to connect
to the PyPI server.
```

You must add a separate `--no-binary` option for every binary library you want to install from source. For example, if your app also includes the `cryptography` library, and you want to install that library from source, you would add:

```
requires = [
    "pillow==9.1.0",
    "cryptography==37.0.2",
    "--no-binary", "pillow",
    "--no-binary", "cryptography",
]
```

If you want to force *all* packages to be installed from source, you can add a single `:all` declaration:

```
requires = [
    "pillow==9.1.0",
    "cryptography==37.0.2",
    "--no-binary", ":all:",
]
```

The `--no-binary` declaration doesn't need to be added to the same `requires` declaration that defines the requirement. For example, if you have a library that is used on all platforms, the declaration will probably be in the top-level `requires`, not the platform-specific `requires`. If you add `--no-binary` in the top-level `requires`, the use of a binary wheel would be prevented on *all* platforms. To avoid this, you can add the requirement in the top-level `requires`, but add the `--no-binary` declaration to the linux-specific requirements:

```
[tool.briefcase.app.helloworld]
formal_name = "Hello World"
...
requires = [
    "pillow",
]
```

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```
[tool.briefcase.app.helloworld.linux]
requires = [
    "--no-binary", "pillow"
]
```

Flatpak

[Flatpak](#) provides a way for developers to distribute apps to Linux users in a format that is independent of the specific distribution used by the end-user. It allow packaging applications for use on any common Linux distribution, including Ubuntu, Debian, Fedora, and more. There are some system packages needed to run and build Flatpaks; see the [Flatpak setup guide](#) for more details.

A Flatpak app is built by compiling against a *runtime*. Runtimes provide the basic dependencies that are used by applications. Each application must be built against a runtime, and this runtime must be installed on a host system in order for the application to run (Flatpak can automatically install the runtime required by an application).

The end user will install the Flatpak into their local app repository; this can be done by installing directly from a single file *.flatpak* bundle, or by installing from a package repository like [Flathub](#). Apps can be installed into user-space, or if the user has sufficient privileges, they can be installed into a system-wide app repository.

Briefcase currently supports creating *.flatpak* single file bundles; end users can install the app bundle by running:

```
$ flatpak install --user App_Name-1.2.3-x86_64.flatpak
```

substituting the name of the flatpak file as appropriate. The `--user` option can be omitted if the user wants to install the app system-wide.

The app can then be run with:

```
$ flatpak run com.example.appname
```

specifying the app bundle identifier as appropriate.

Briefcase *can* be published to Flathub or another Flatpak repository; but Briefcase does not currently support automated publication of apps.

Icon format

Flatpak uses *.png* format icons. An application must provide icons in the following sizes:

- 16px
- 32px
- 64px
- 128px
- 256px
- 512px

Splash Image format

Flatpaks do not support splash screens or installer images.

Application configuration

The following options can be added to the `tool.briefcase.app.<appname>.linux` section of your `pyproject.toml` file.

`flatpak_runtime_repo_alias`

An alias to use when registering the Flatpak repository that will store the Flatpak runtime used to build the app. By default, Briefcase will use [Flathub](#) as it's runtime repository, with an alias of `flathub`.

`flatpak_runtime_repo_url`

The repository URL hosting the runtime and SDK package that the Flatpak will use. By default, Briefcase will use [Flathub](#) as it's runtime repository.

`flatpak_runtime`

A string, identifying the runtime to use as a base for the Flatpak app. By default, Flatpaks build with Briefcase will use the `org.freedesktop.Platform` runtime.

The Flatpak runtime and SDK are paired; so if you define `flatpak_runtime`, you *must* also define `flatpak_sdk`.

`flatpak_runtime_version`

A string, identifying the version of the Flatpak runtime that should be used. Flatpaks built with Briefcase will use version 21.08 of the FreeDesktop platform runtime.

`flatpak_sdk`

A string, identifying the SDK associated with the platform that will be used to build the Flatpak app. By default, Flatpaks build with Briefcase will use the `org.freedesktop.Sdk` SDK. The SDK will use the same version as the runtime.

The Flatpak runtime and SDK are paired; so if you define `flatpak_sdk`, you *must* also define `flatpak_runtime`.

Compilation issues with Flatpak

Flatpak works by building a sandbox in which to compile the application bundle. This sandbox uses some low-level kernel and filesystem operations to provide the sandboxing behavior. As a result, Flatpaks cannot be built inside a Docker container, and they cannot be build on an NFS mounted drive.

If you get errors about `renameat` when building an app, similar to the following:

```
[helloworld] Building Flatpak...
Downloading sources
Initializing build dir
Committing stage init to cache
Error: Writing metadata object: renameat: Operation not permitted
Building...

Error while building app helloworld.

Log saved to ...
```

you may be building on an NFS drive. Move your project to local storage, and retry the build.

iOS

When generating an iOS project, Briefcase produces an Xcode project.

Icon format

iOS projects use `.png` format icons. An application must provide icons of the following sizes:

- 20px
- 29px
- 40px
- 58px
- 60px
- 76px
- 80px
- 87px
- 120px
- 152px
- 167px
- 180px
- 1024px

Splash Image format

iOS projects use `.png` format splash screen images. A splash screen should be a square, transparent image, provided in the following sizes:

- 1024px
- 2048px
- 3072px

You can specify a background color for the splash screen using the `splash_background_color` configuration setting. iOS projects do not support installer images.

Additional options

The following options can be provided at the command line when producing iOS projects

build

`-d <device> / --device <device>`

The device simulator to target. Can be either a UDID, a device name (e.g., "iPhone 11"), or a device name and OS version ("iPhone 11:13.3").

run

The device simulator to target. Can be either a UDID, a device name (e.g., "iPhone 11"), or a device name and OS version ("iPhone 11:13.3").

Android

When generating an Android project, Briefcase produces a Gradle project.

Icon format

Android projects use `.png` format icons, in round and square variants. An application must provide the icons in the following sizes, for 2 variants:

- round:
 - 48px
 - 72px
 - 96px
 - 144px
 - 192px
- square:
 - 48px

- 72px
- 96px
- 144px
- 192px

Splash Image format

Android projects use `.png` format splash screen images. A splash screen should be a square image with a transparent background. It must be specified in a range of sizes and variants, to suit different possible device sizes and device display densities:

- **normal** (typical phones; up to 480 density-independent pixels):
 - 320px
 - 480px (hdpi)
 - 640px (xhdpi)
 - 1280px (xxxhdpi)
- **large** (large format phones, or phone-tablet “phablet” hybrids; up to 720 density-independent pixels):
 - 480px
 - 720px (hdpi)
 - 960px (xhdpi)
 - 1920px (xxxhdpi)
- **xlarge** (tablets; larger than 720 density-independent pixels)
 - 720px
 - 1080px (hdpi)
 - 1440px (xhdpi)
 - 2880px (xxxhdpi)

Consult [the Android documentation](#) for more details on devices, sizes, and display densities. [This list of common devices with their sizes and DPI](#) may also be helpful.

You can specify a background color for the splash screen using the `splash_background_color` configuration setting.

Android projects do not support installer images.

Application configuration

The following options can be added to the `tool.briefcase.app.<appname>.android` section of your `pyproject.toml` file.

version_code

In addition to a version number, Android projects require a version “code”. This code is an integer version of your version number that *must* increase with every new release pushed to the Play Store.

Briefcase will attempt to generate a version code by combining the version number with the build number. It does this by using each part of the main version number (padded to 3 digits if necessary) and the build number as 2 significant digits of the final version code:

- Version 1.0, build 1 becomes 1000001 (i.e., 1, 00, 00, 01)
- Version 1.2, build 37 becomes 1020037 (i.e., 1, 02, 00, 37)
- Version 1.2.37, build 42 becomes 1023742 (i.e., 1, 02, 37, 42)
- Version 2020.6, build 4 becomes 2020060004 (i.e., 2020, 06, 00, 04)

If you want to manually specify a version code by defining `version_code` in your application configuration. If provided, this value will override any auto-generated value.

Additional options

The following options can be provided at the command line when producing Android projects

build

`-d <device> / --device <device>`

The device simulator to target. Can be either a device ID, or a device name.

run

The device simulator to target. Can be either a device ID, or a device name.