

# *Annotation Processing with Android II*

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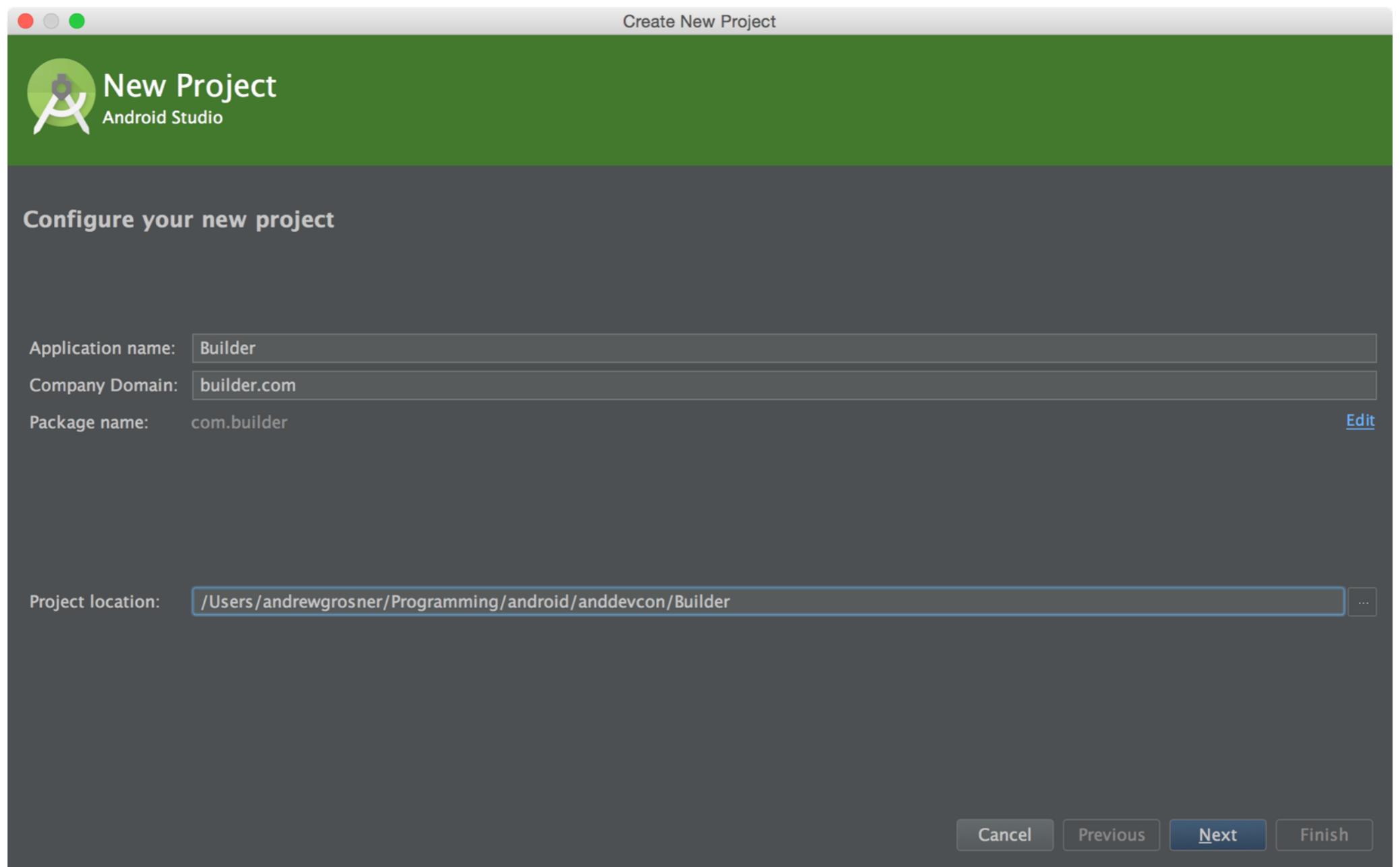
Fuzz Pro, Boston MA

# *Breakdown*

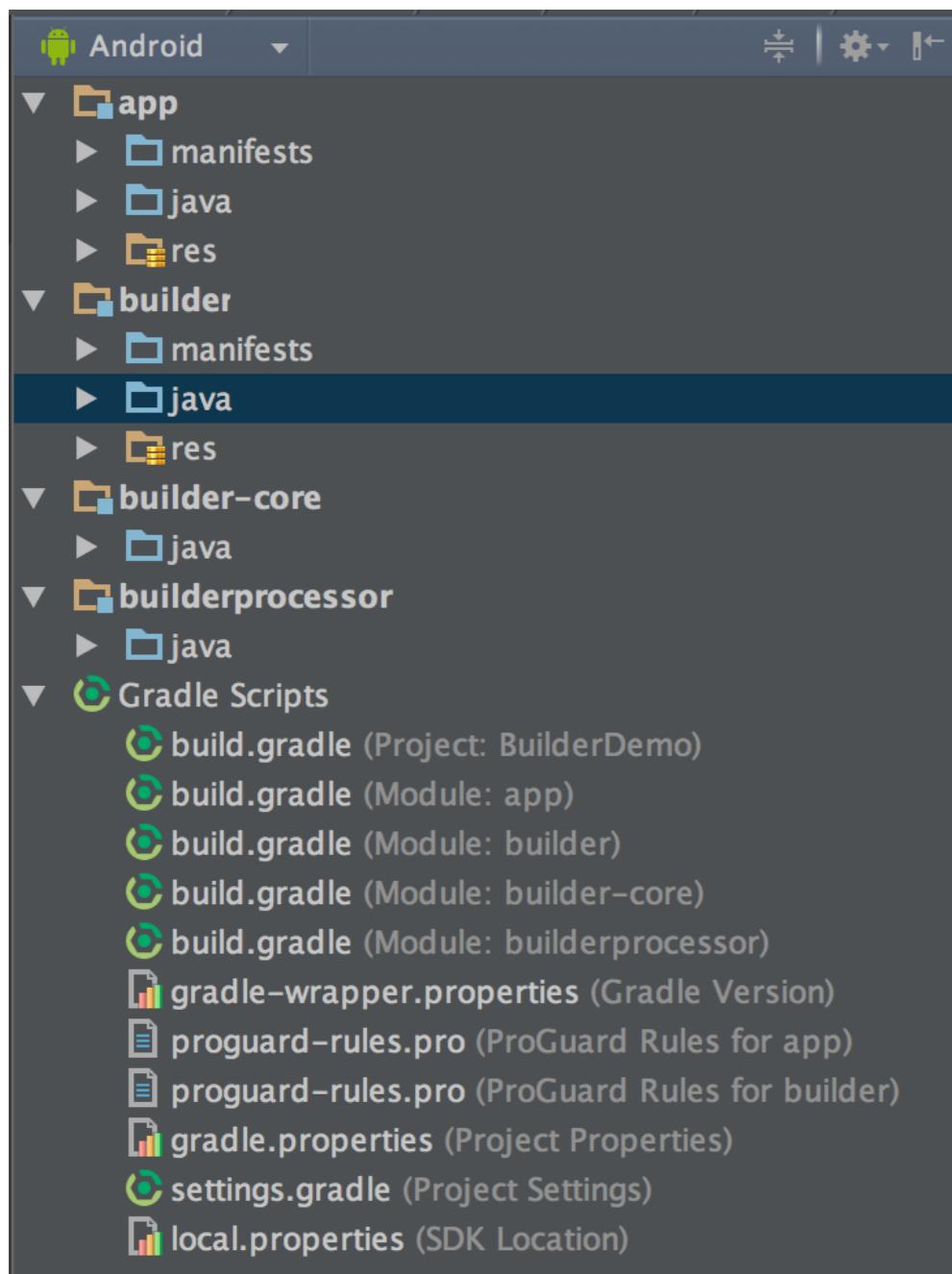
- Getting Started
- Best Practices
- Demo -> **@IntentBuilder!**
- Limitations + Gotchas

# *Getting Started*

# Create New Project



# Add Projects



→ Android Application  
→ Android Library  
→ Core Java Project w/Annotations  
→ Java Project  
-> Annotation Processor

# *Dependencies - Core Project*

```
apply plugin: 'java'

targetCompatibility = JavaVersion.VERSION_1_7
sourceCompatibility = JavaVersion.VERSION_1_7

dependencies {  
}
```

→ Java 7 Highly Recommended  
→ No dependencies necessary!

# Dependencies - Annotation Processor

```
apply plugin: 'java'

targetCompatibility = JavaVersion.VERSION_1_7
sourceCompatibility = JavaVersion.VERSION_1_7

dependencies {
    compile project(':builder-core')

    compile 'com.squareup:javapoet:1.1.0'
    compile 'com.google.auto.service:auto-service:1.0-rc2'
}
```

→ Need Access To Annotations

JavaPoet (<https://github.com/square/javapoet>)

Google Auto-Service (<https://github.com/google/auto/tree/master/service>)

# *Dependencies - Project's build.gradle*

```
buildscript {  
    repositories {  
        jcenter()  
    }  
    dependencies {  
        classpath 'com.android.tools.build:gradle:1.2.3'  
        classpath 'com.neenbedankt.gradle.plugins:android-apt:1.4'  
  
        // NOTE: Do not place your application dependencies here; they belong  
        // in the individual module build.gradle files  
    }  
}  
  
allprojects {  
    repositories {  
        jcenter()  
    }  
}
```



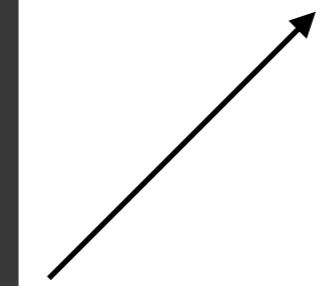
Android-apt plugin: Hugo Visser (<https://bitbucket.org/hvisser/android-apt>)

# Dependencies - Project's build.grade

```
apply plugin: 'com.android.library'  
apply plugin: 'android-apt'  
  
android {  
    compileSdkVersion 22  
    buildToolsVersion "23.0.0"  
  
    defaultConfig {  
        minSdkVersion 7  
        targetSdkVersion 22  
        versionCode 1  
        versionName "1.0"  
    }  
    buildTypes {  
        release {  
            minifyEnabled false  
        }  
    }  
}  
  
dependencies {  
    androidTestApt project(':builderprocessor')  
    compile project(':builder-core')  
  
    androidTestCompile "com.android.support:support-v4:22.2.1"  
    androidTestCompile "com.android.support:appcompat-v7:22.2.1"  
}
```

→ apt-plugin

Best Practice: Test :)



Core functionality here

# *Best Practices*

# *Best Practices Breakdown*

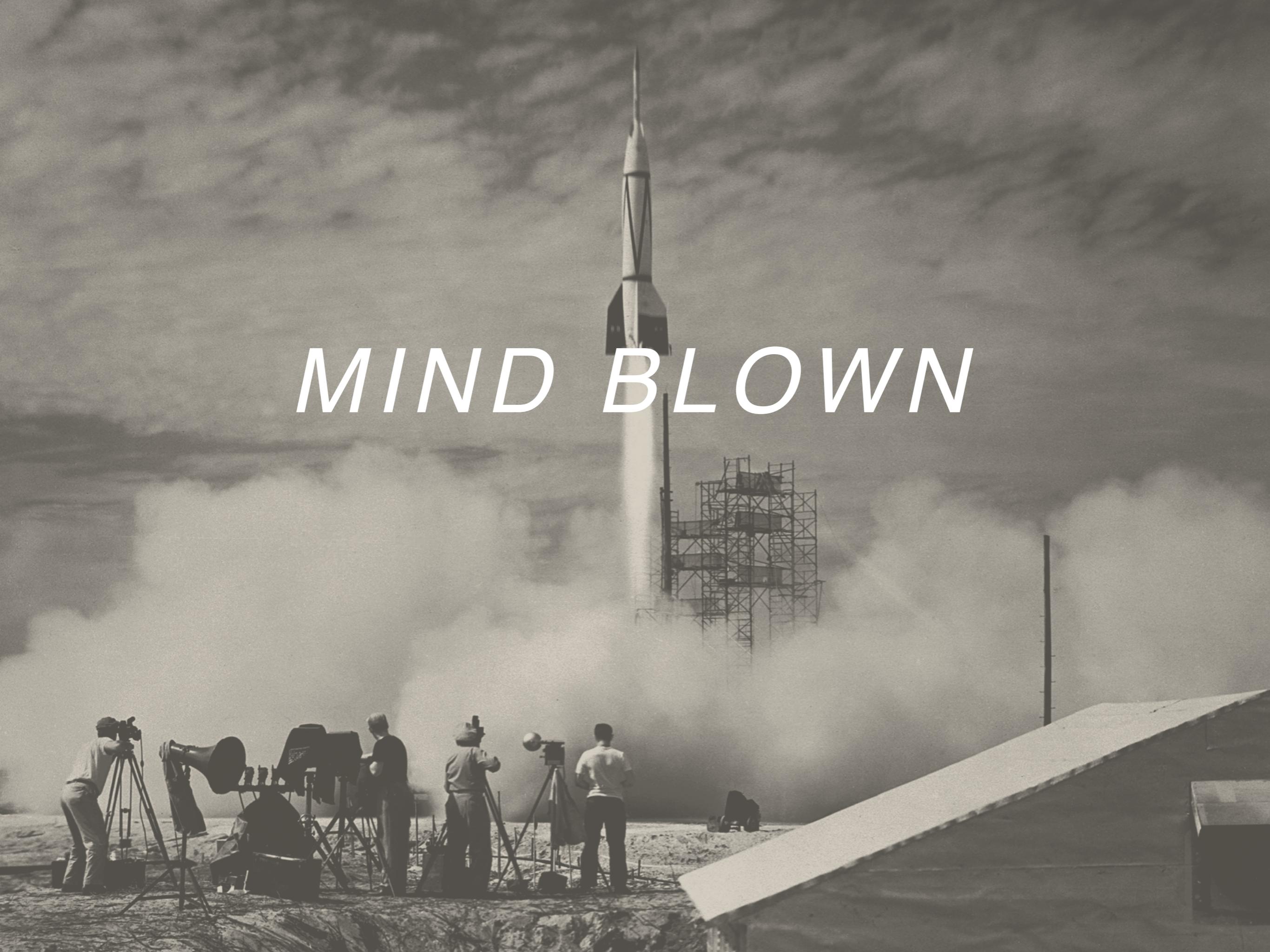
- JavaPoet
- High-Level Concepts
- And more!

*JavaPoet*

# *JavaPoet*

- Square :)
- Java API for generating Java files
  - WHAT?
  - Kind of meta

MIND BLOWN



# *JavaPoet*

- Wraps around code generation using **Builders**
- **JavaFile.Builder**, **TypeSpec.Builder**, **MethodSpec.Builder**,  
**Codeblock.Builder**, etc.
- Automatic importing for types used
  - Yes, you need to worry about imports in code generation
  - PS. They can be a pain

# *JavaPoet*

- Has its own string format syntax
  - Check it out yourself

```
MethodSpec main = MethodSpec.methodBuilder("main")
    .addStatement("int total = 0")
    .beginControlFlow("for (int i = 0; i < 10; i++)")
    .addStatement("total += i")
    .endControlFlow()
    .build();
```

# *High-Level Concepts*

# *High-level concepts*

- The Processor Manager
- Handler
- Definition
- Validator
- Class Names file

# *Processor Manager*

# *Processor Manager*

- Wrapper around **ProcessingEnvironment**
- Holds onto **Handler** classes, and pieces of information during parse
- Passed into **Handlers** and every **Definition** class.
- Convenience methods
- May output a “linker file”

# *Annotation Handlers*

# *Annotation Handlers*

- Convenience class around digesting top-level annotations
- **BaseHandler** associates itself with an annotation to process
- Handles elements found and validates them via a **Validator**
- Outputs class files using JavaPoet

# *Definitions*

# *Annotation Definitions*

- Wraps around single annotation, e.g. `@Table -> TableDefinition`
- Created during `Handler handle()` phase
- Provides base set of information, including the manager, package name, element class name, output class it writes to
- Subclasses provide implementation, base returns `TypeSpec`

*Validators*

# *Validators*

- Responsible for validating proper use of an annotation
  - GOTCHA
- Sends messages to the **Messenger** via **ProcessorManager**
  - GOTCHA
- Keeps **Definition** and **Handler** lean

# Validators

Wait What's Wrong Here?

The screenshot shows the Android Studio interface with the following details:

- Project Structure:** The left sidebar shows the project structure with modules: app, builder, builder-core, and builderprocessor.
- Code Editor:** The main window displays Java code for `MainActivity.java`. The code includes:

```
super.onCreate(savedInstanceState);
setContentView(R.layout.activity_main);

EditText inputText = (EditText) findViewById(R.id.inputText);

findViewById(R.id.nextActivity).setOnClickListener(v -> {
    startActivity(new TitleActivity_IntentBuilder()
        .setTitle(inputText.getText().toString())
        .build(v.getContext()));
});

@Override
public boolean onCreateOptionsMenu(Menu menu) {
    // Inflate the menu; this adds items to the action bar if it is present.
    getMenuInflater().inflate(R.menu.menu_main, menu);
    return true;
}

@Override
```
- Messages Panel:** The bottom panel shows build errors and warnings:
  - `:builderprocessor:compileJava`: [options] bootstrap class path not set in conjunction with -source 1.7
  - `:builderprocessor:processResources UP-TO-DATE`
  - `:builderprocessor:classes`
  - `:builderprocessor:jar`
  - `:app:compileDebugJava`: File for type 'com.builder.Builder\_Holder\_Generated' created in the last round will not be subject to annotation processing.
  - `/Users/andrewgrosner/Programming/android/BuilderDemo/app/src/main/java/com/builder/builder/MainActivity.java`: error: cannot find symbol method setTitle(String)
  - 1 warning
  - Execution failed for task ':app:compileDebugJava'.  
-> Compilation failed; see the compiler error output for details.
  - BUILD FAILED
  - Total time: 1.223 secs
  - 2 errors
  - 2 warnings
  - See complete output in console

# Validators

Oh! With good error messages it shows up now.

```
:builder:compileDebugNdk UP-TO-DATE
:builder:packageDebugJniLibs UP-TO-DATE
:builder:packageDebugLocalJar UP-TO-DATE
:builder:packageDebugRenderscript UP-TO-DATE
:builder:bundleDebug UP-TO-DATE
:builderprocessor:compileJava
⚠ [options] bootstrap class path not set in conjunction with -source 1.7
Note: /Users/andrewgrosner/Programming/android/BuilderDemo/builderprocessor/src/main/java/com/builder/handler/BaseHandler.java uses unchecked or unsafe operations.
Note: Recompile with -Xlint:unchecked for details.
:builderprocessor:processResources UP-TO-DATE
:builderprocessor:classes
:builderprocessor:jar
:app:compileDebugJava
❗ This error is buried
⚠ File for type 'com.builder.Builder_Holder_Generated' created in the last round will not be subject to annotation processing.
  1 warning
❗ Execution failed for task ':app:compileDebugJava'.
  > Compilation failed; see the compiler error output for details.
ℹ BUILD FAILED
```

```
 /**
 * Description:
 */
public class IntentArgValidator implements Validator<IntentArgDefinition> {

    @Override
    public boolean isValid(BuilderManager manager, IntentArgDefinition intentArgDefinition) {
        manager.LogError("This error is buried");
        return false;
    }
}
```

# *ClassNames File*

# *Class Names File*

- Constants file that centralizes classes that are *not* accessible to java / annotation processor
  - **Context, ContentValues, etc.**
- Constants of **JavaPoet ClassName**
- References to that field do *not* get updated when package name changes in file
  - GOTCHA

*Demo*

# *Demo*

- <https://github.com/agrosner/BuilderDemo>

*Questions?*

# Feedback

Please take a moment to fill out the class feedback form via the app. Paper feedback forms are also available in the back of the room.

[eventmobi.com/adcboston](http://eventmobi.com/adcboston)



**Raizlabs**

# *Thank You.*

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