



# Intelligent Application Security

**Cristina Cifuentes**

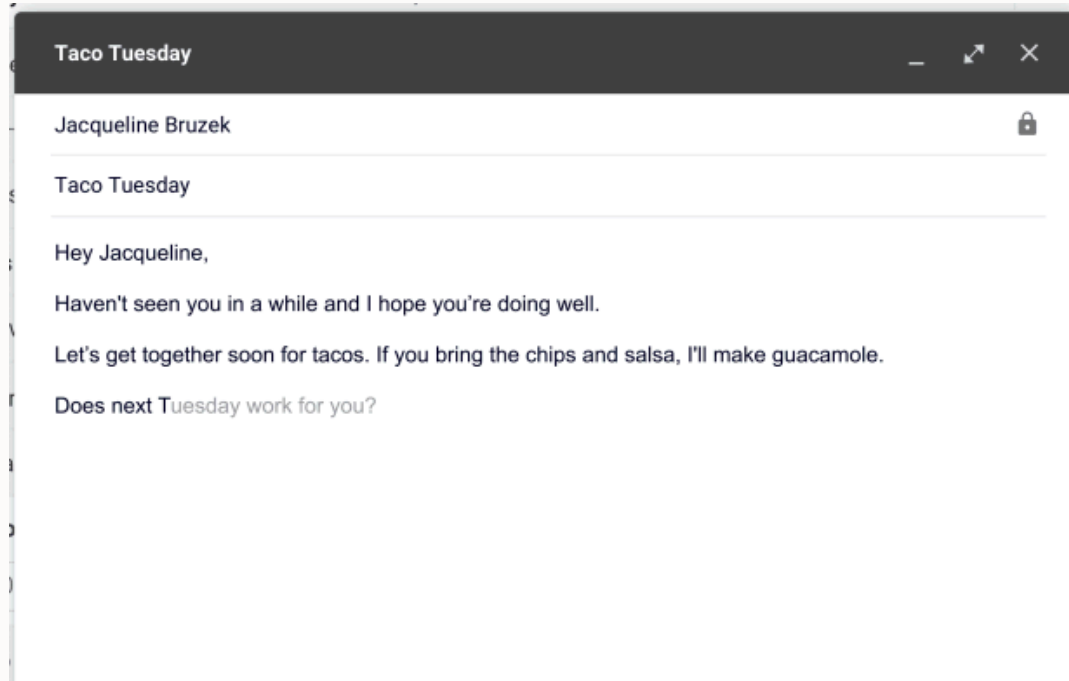
Oracle Labs, Australia

May 25<sup>th</sup>, 2021



# We Are Living With Intelligent Applications

## Gmail's Smart Compose



## iOS's Predictive Text



# Microsoft's Visual Studio IntelliCode

Code completion suggestions based on 1,000s of open source projects

```
127 → // use the code formatter
128 → String lineDelim = TextUtilities.getDefaultLineDelimiter(document);
129 → String replacement = CodeFormatterUtil.format(CodeFormatter.K_CLASS_BODY_DECLARATIONS,
130
131 → // remove line delimiters
132 → if (replacement.endsWith(lineDelim)) {
133 →     int endIndex = replacement.length() - lineDelim.length();
134 →     replacement = replacement.
135 → }
136
137 → return replacement;
138 → }
139 }
140
```

- ★ substring(int beginIndex, int endIndex) : String ⓘ
- ★ length() : int
- ★ endsWith(String suffix) : boolean
- ★ charAt(int index) : char
- ★ substring(int beginIndex) : String
- ★ concat(String str) : String
- ★ intern() : String
- ★ replace(CharSequence target, CharSequence replacement) : String
- ★ replace(char oldChar, char newChar) : String
- ★ replaceAll(String regex, String replacement) : String
- ★ replaceFirst(String regex, String replacement) : String
- ★ toLowerCase() : String



# Facebook's Aroma

Code-to-code search and recommendation tool

```
1  Bitmap bitmap = BitmapFactory.decodeStream(input);
```

```
1  final BitmapFactory.Options options = new BitmapFactory.Options();
2  options.inSampleSize = 2;
3  // ...
4  Bitmap bmp = BitmapFactory.decodeStream(is, null, options);
```

```
1  try {
2      InputStream is = am.open(fileName);
3      image = BitmapFactory.decodeStream(is);
4      is.close();
5  } catch (IOException e) {
6      // ...
7  }
```





# Amazon's CodeGuru Reviewer

Identifies critical issues and hard-to-find performance bugs and suggests ways to fix them

HelloWorldFunction/src/main/java/helloworld/App.java

56 +

item\_values.put("location", new AttributeValue(ipv4));


57 +

item\_values.put("date", new AttributeValue(now));

58 +

59 +

final AmazonDynamoDB ddb = AmazonDynamoDBClientBuilder.defaultClient();




**danilop** 3 minutes ago Author Owner 😊 ⋮

Recommendation generated by Amazon CodeGuru Reviewer. Leave feedback on this recommendation by replying to the comment or by reacting to the comment using emoji.

This code is written so that the client cannot be reused across invocations of the Lambda function. To improve the performance of the Lambda function, consider using static initialization/constructor, global/static variables and singletons. It allows to keep alive and reuse HTTP connections that were established during a previous invocation.

Learn more about [best practices for working with AWS Lambda functions](#).

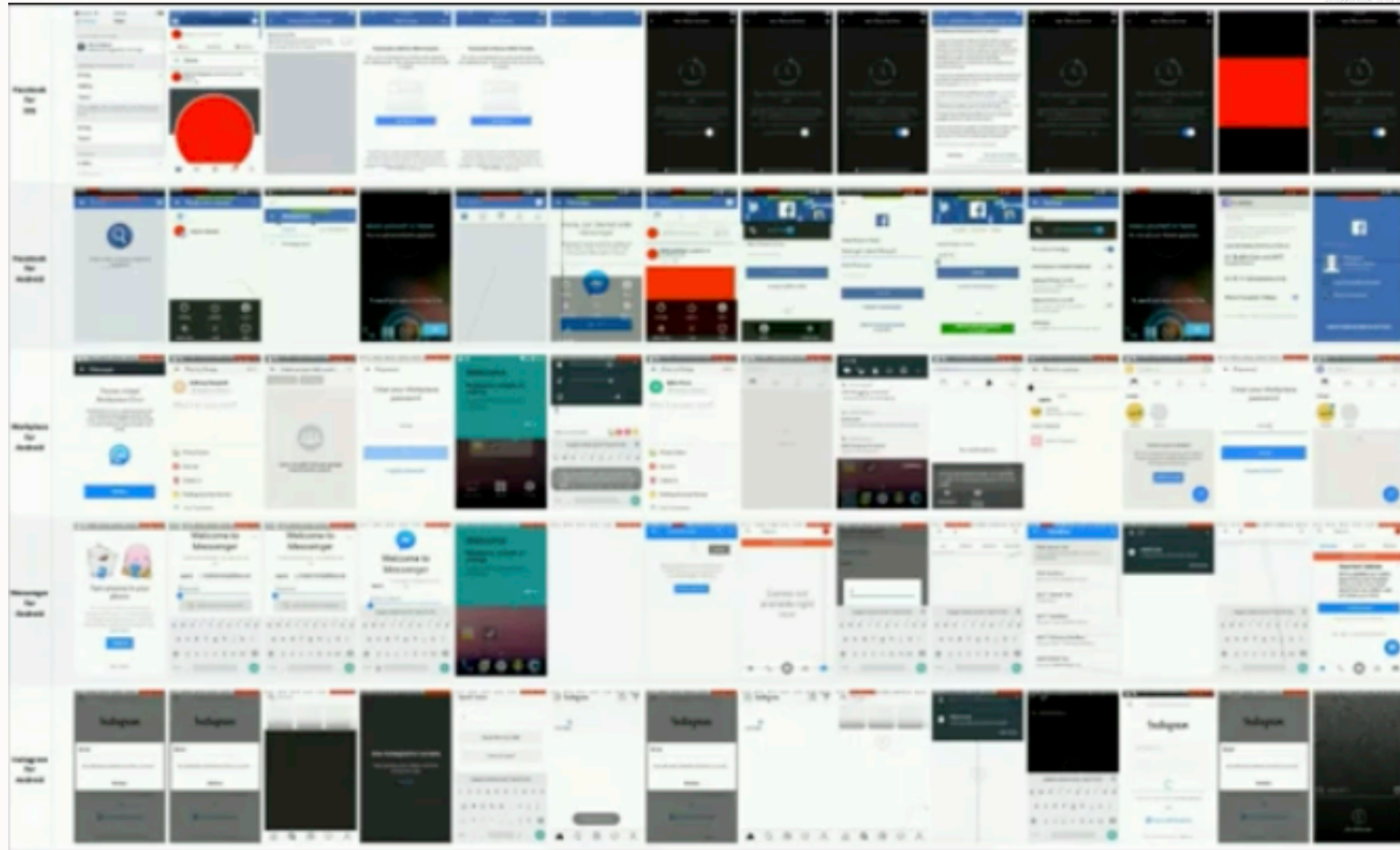


Reply...

Resolve conversation

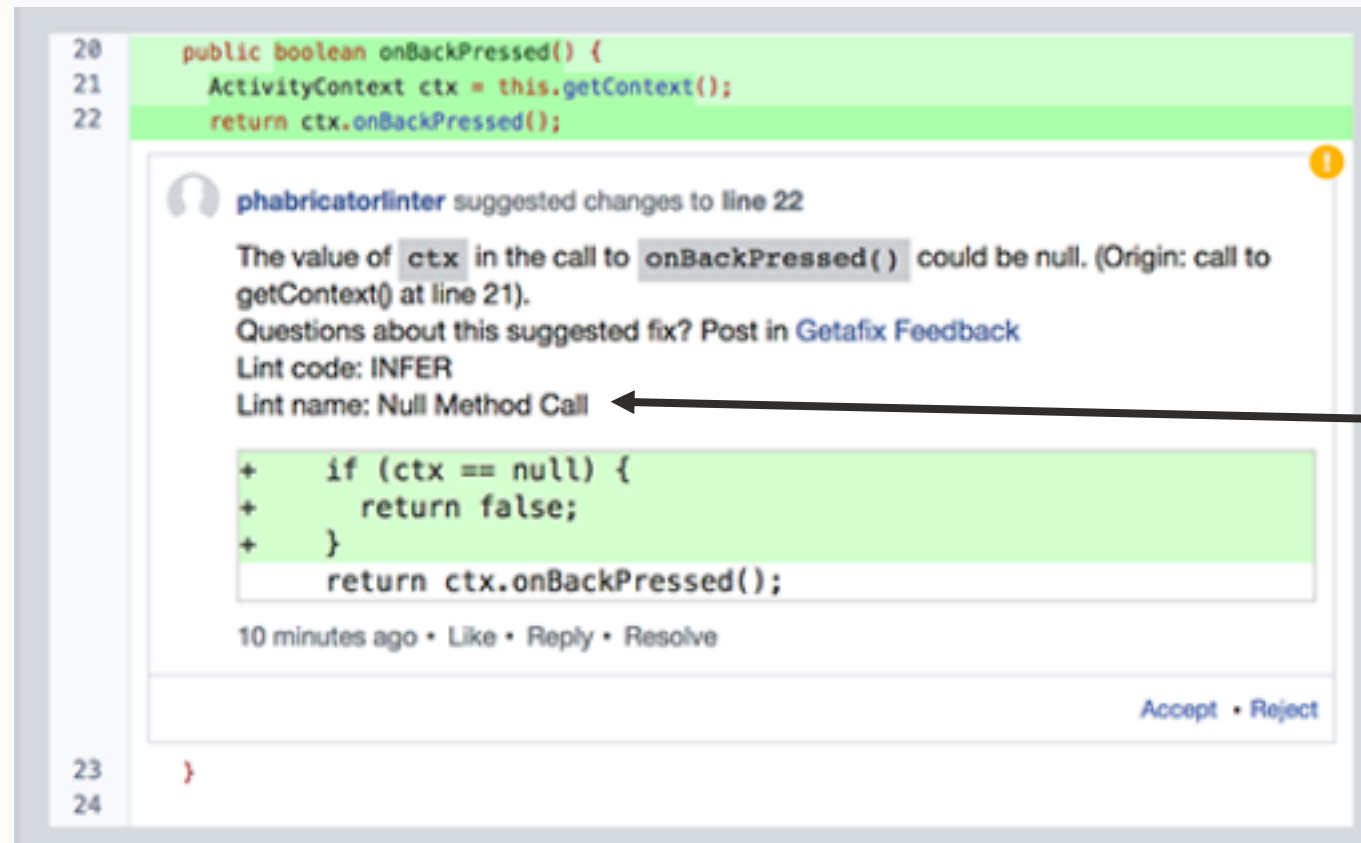
# Facebook's Sapienz

Automatic generation of tests for Android applications based on system testing



# Facebook's GetAFix

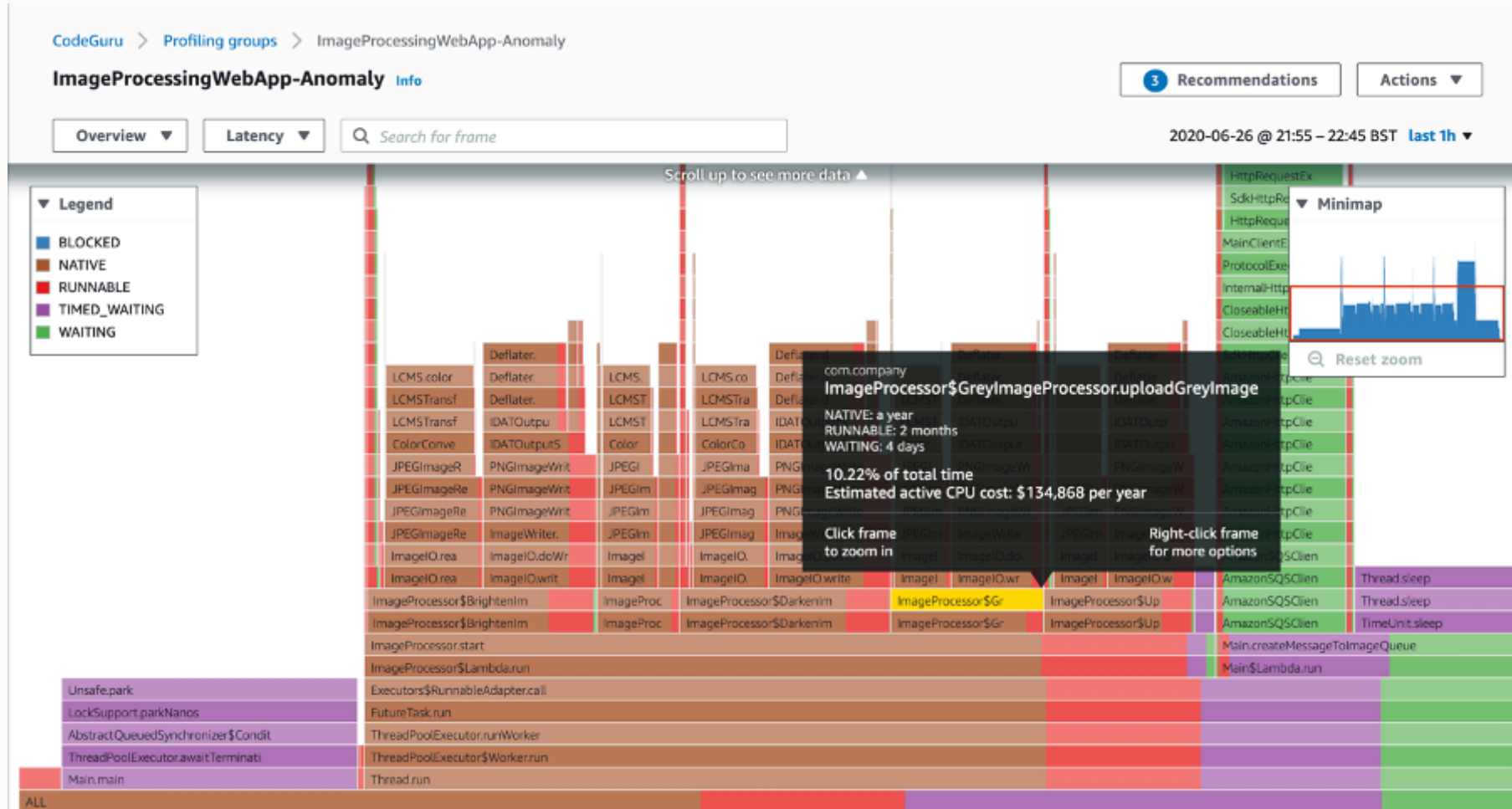
Finds fixes for bugs and offers them to engineers



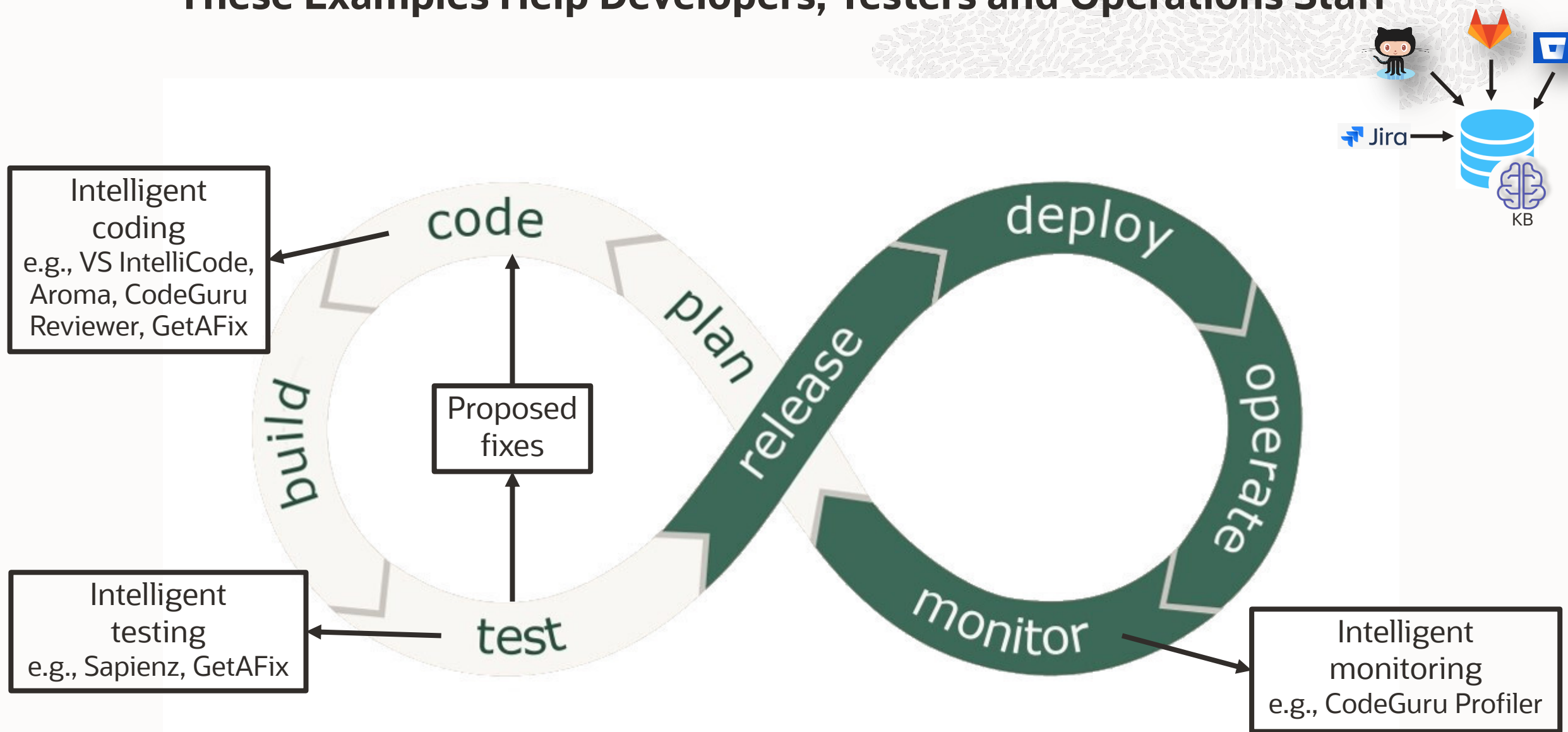
A code fix to  
a **lint** error

# Amazon's CodeGuru Profiler

## Finds most expensive lines of code and recommends improvements



# These Examples Help Developers, Testers and Operations Staff





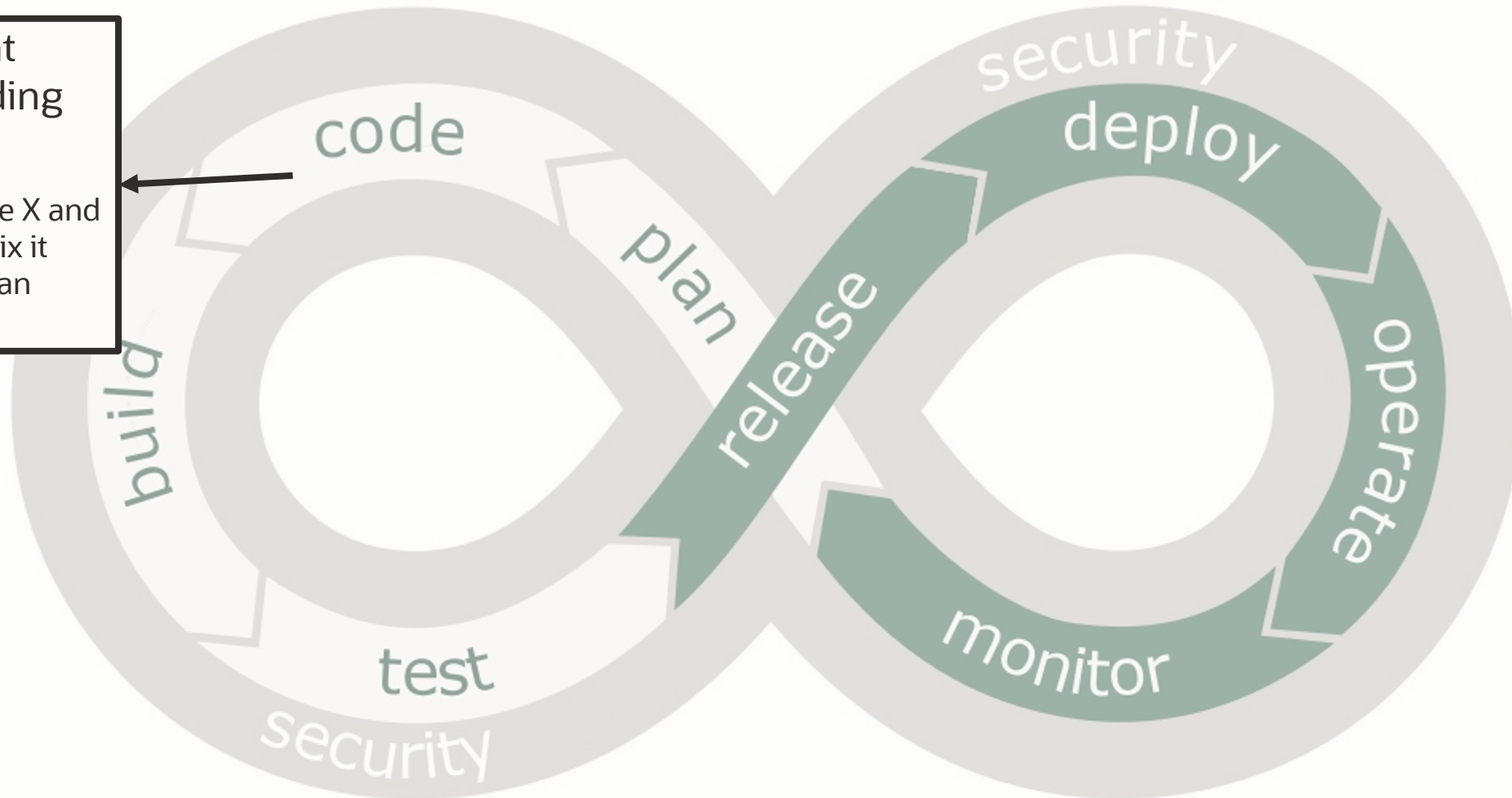
# We Can Build an Intelligent Application Security Future

#ias

# Intelligent Application Security

## Intelligent security coding

You have a vulnerability at line X and here's how to fix it [before you can commit]

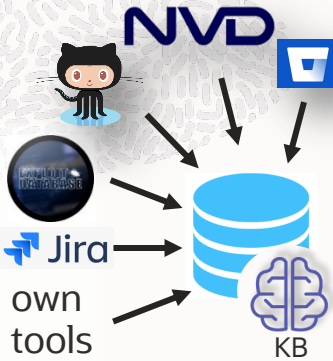
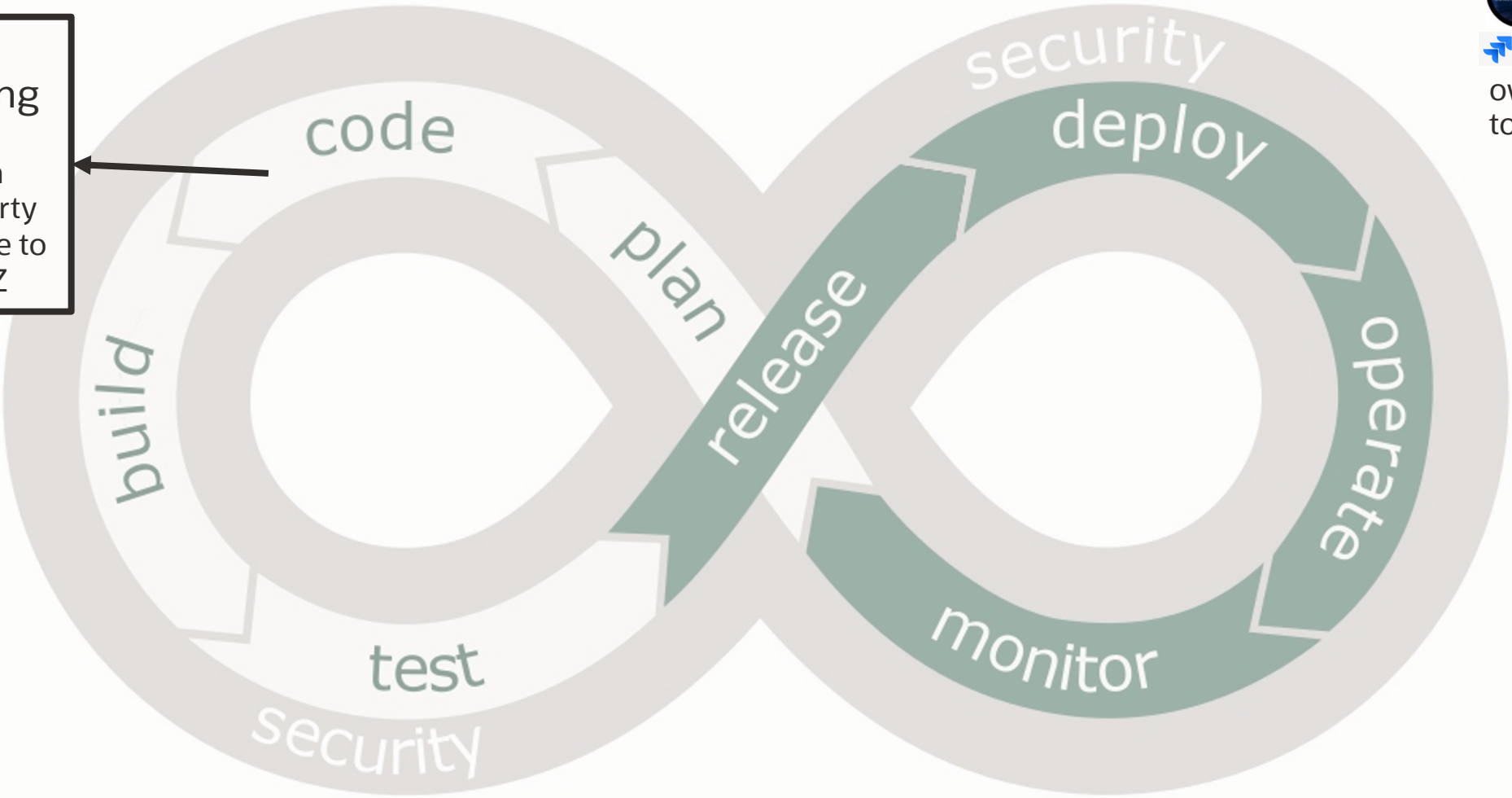


# Intelligent Application Security



## Intelligent security coding

You depend on vulnerable 3<sup>rd</sup> party library Y – upgrade to clean version Z



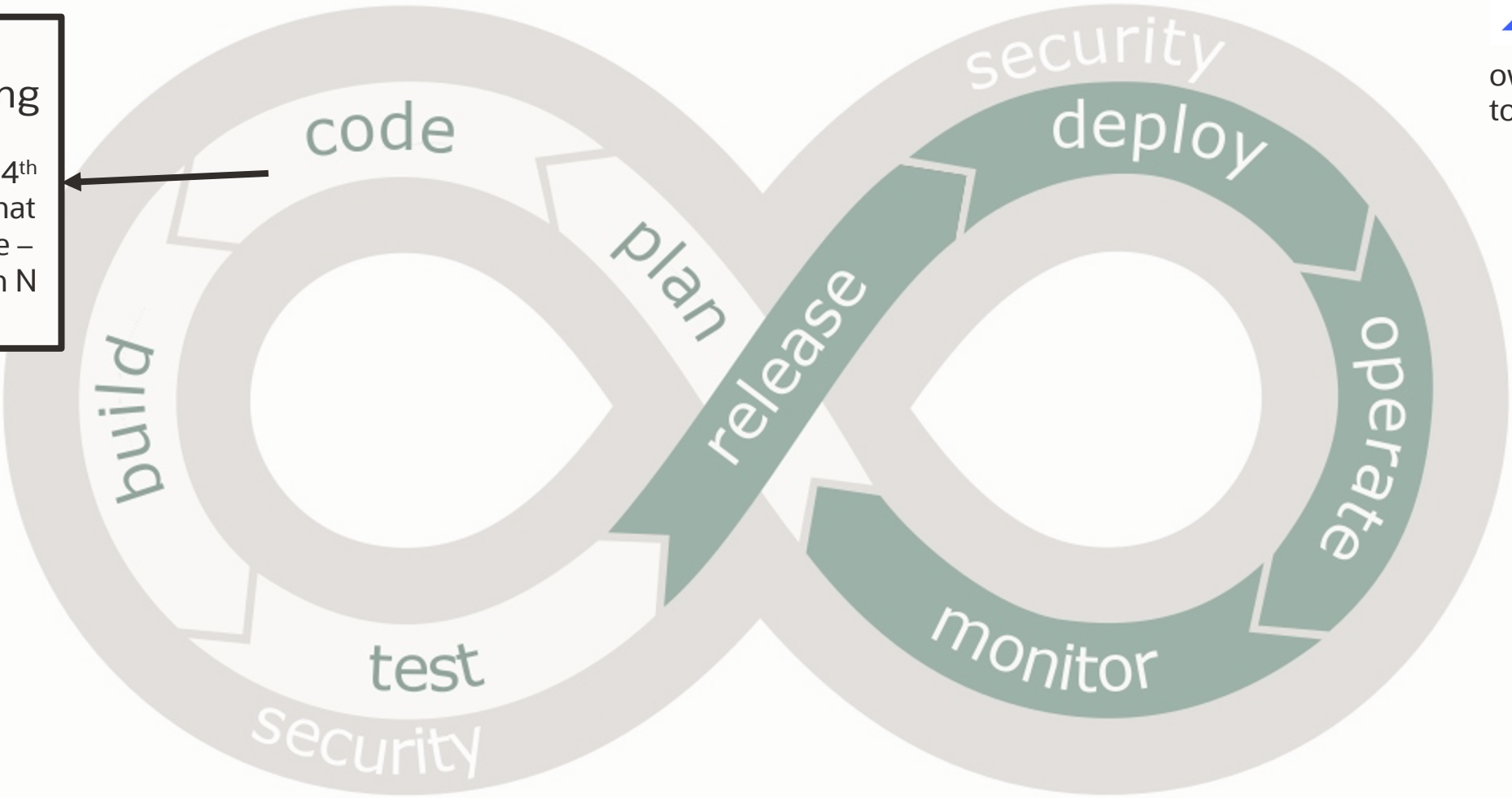


# Intelligent Application Security

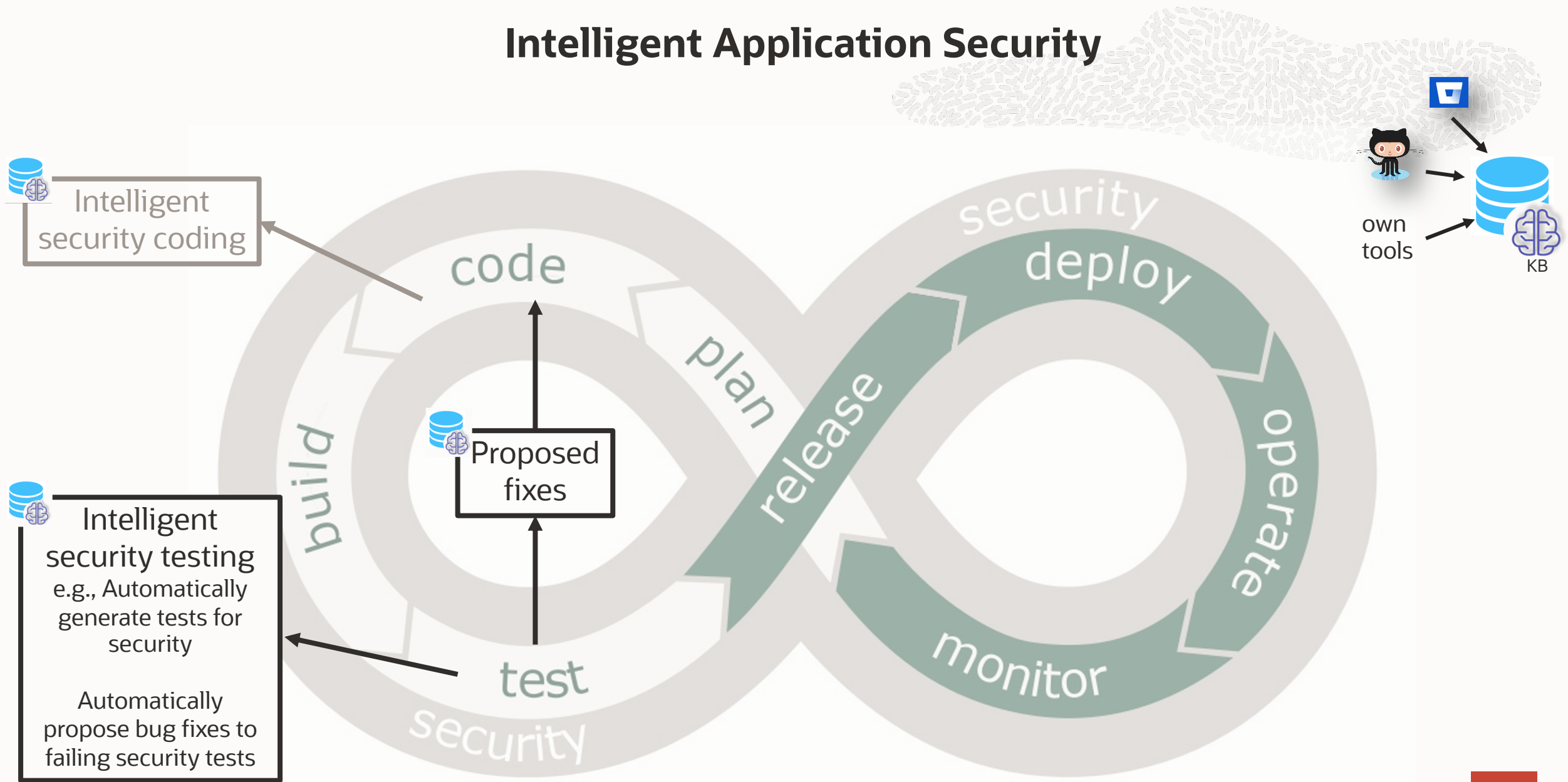


**Intelligent security coding**

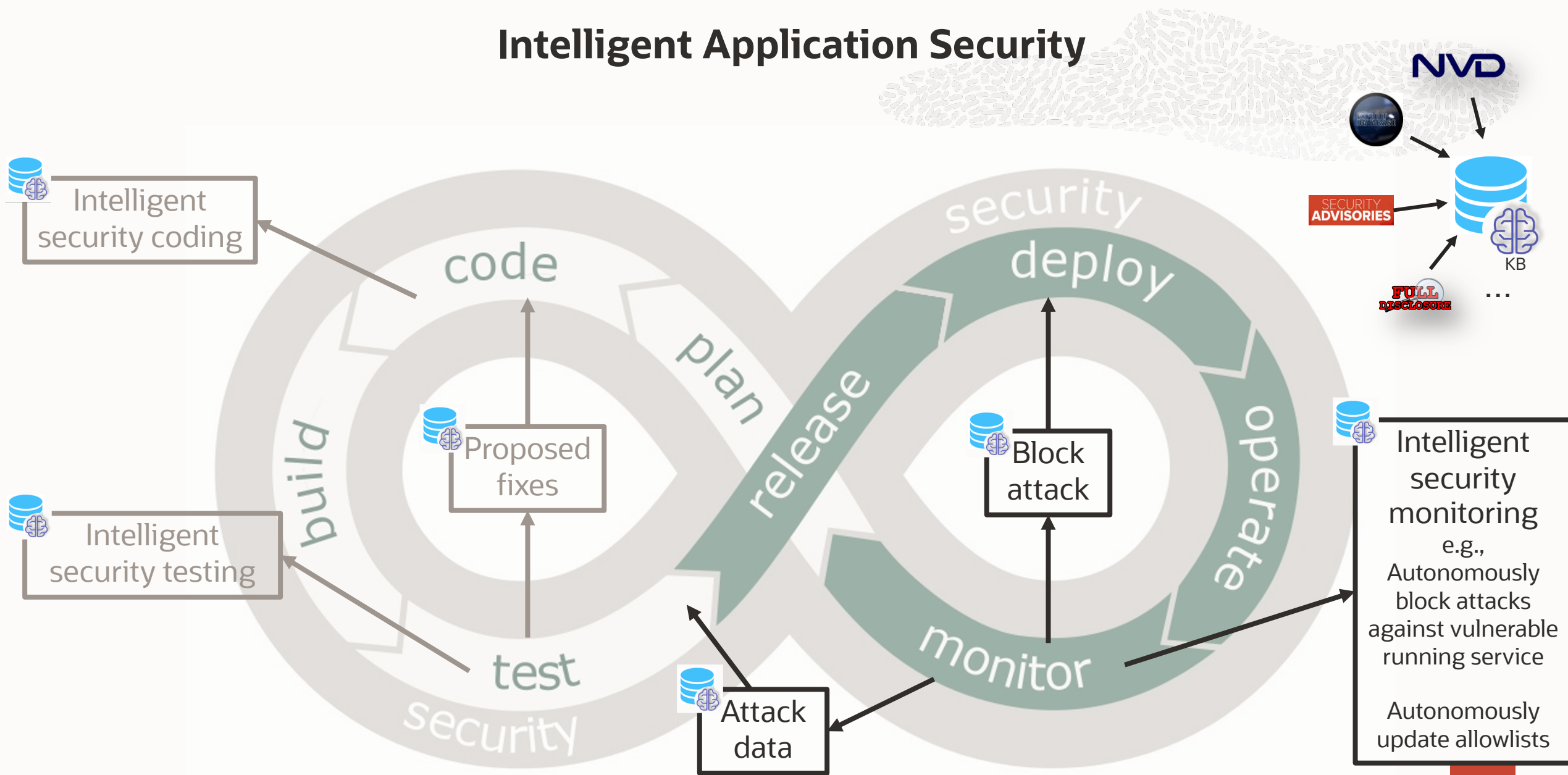
You depend on a 4<sup>th</sup> party library M that contains malware – use clean version N instead



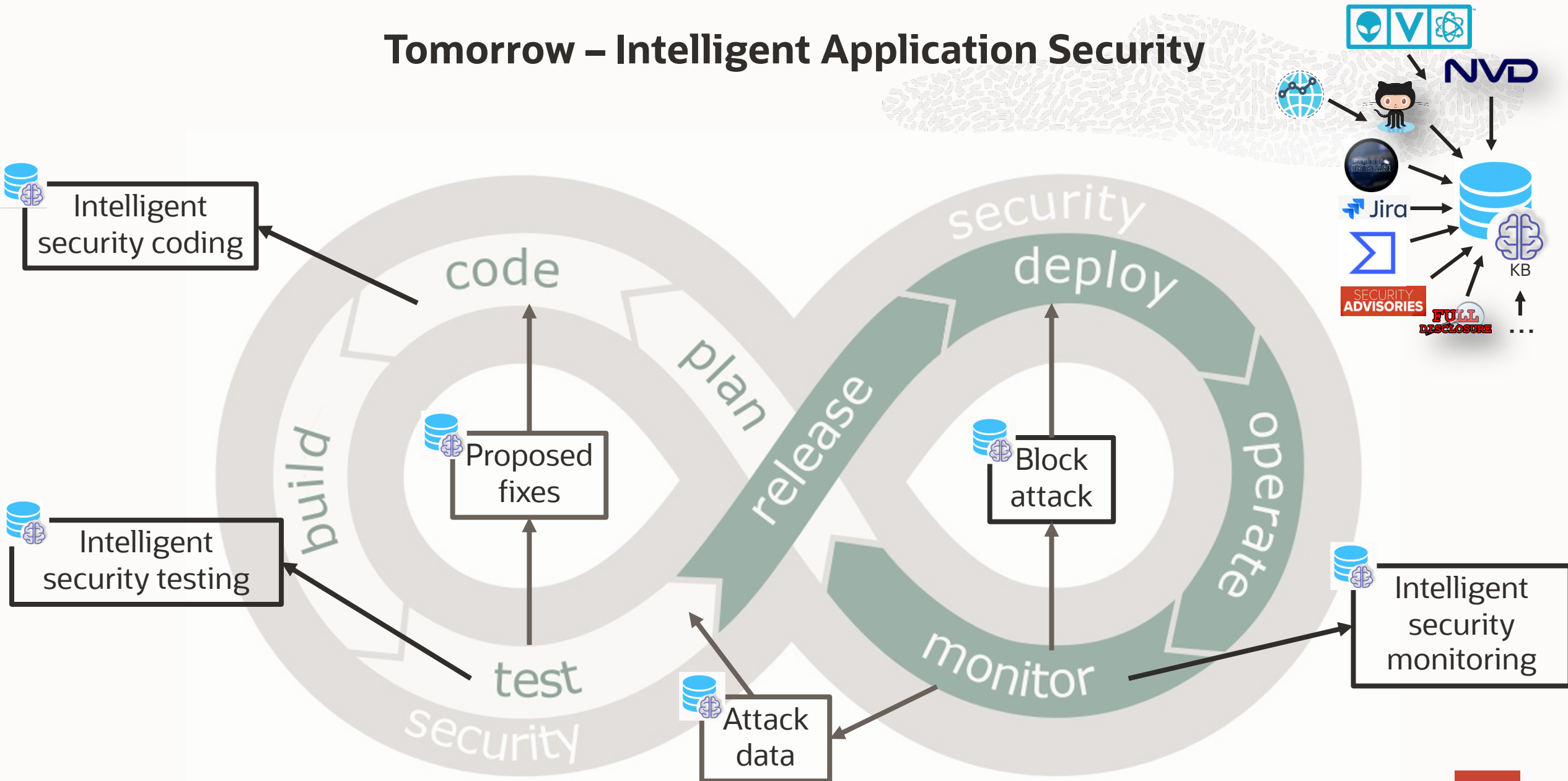
# Intelligent Application Security



# Intelligent Application Security



# Tomorrow – Intelligent Application Security





“Intelligent Application Security aims to provide an automated approach to integrate security into all aspects of application development and operations, at scale, using learning techniques that incorporate signals from the code and beyond, to provide actionable intelligence to developers, security analysts, operations staff, and autonomous systems.”

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