Automated Detection and Classification for Packed Android Applications

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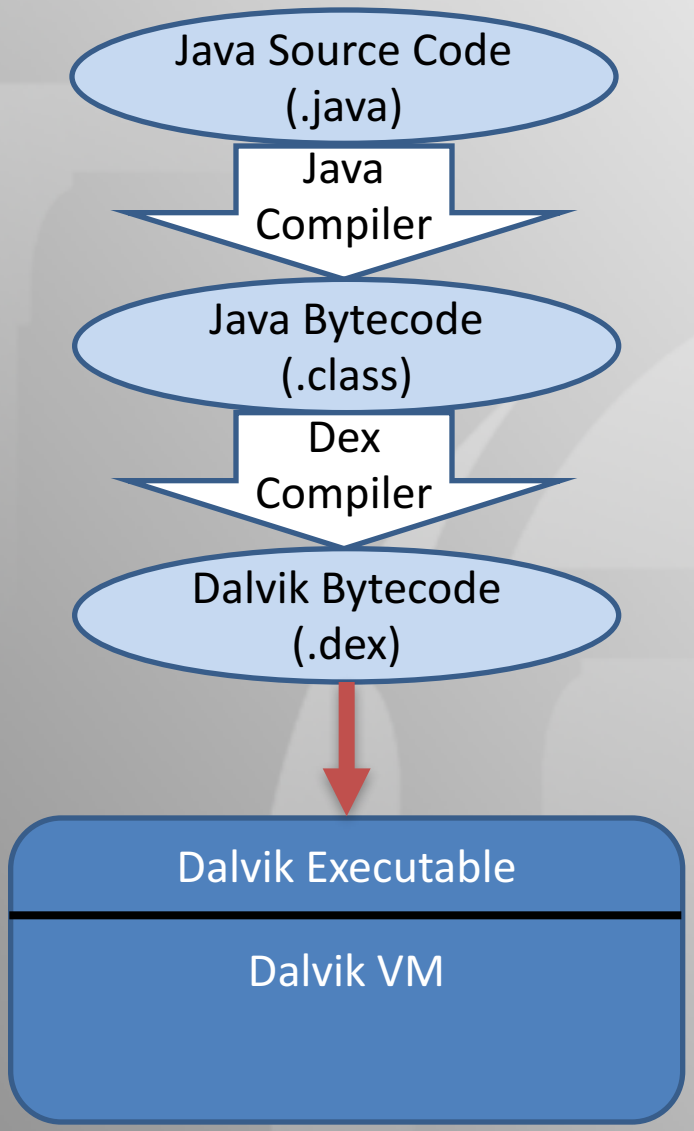
Goal

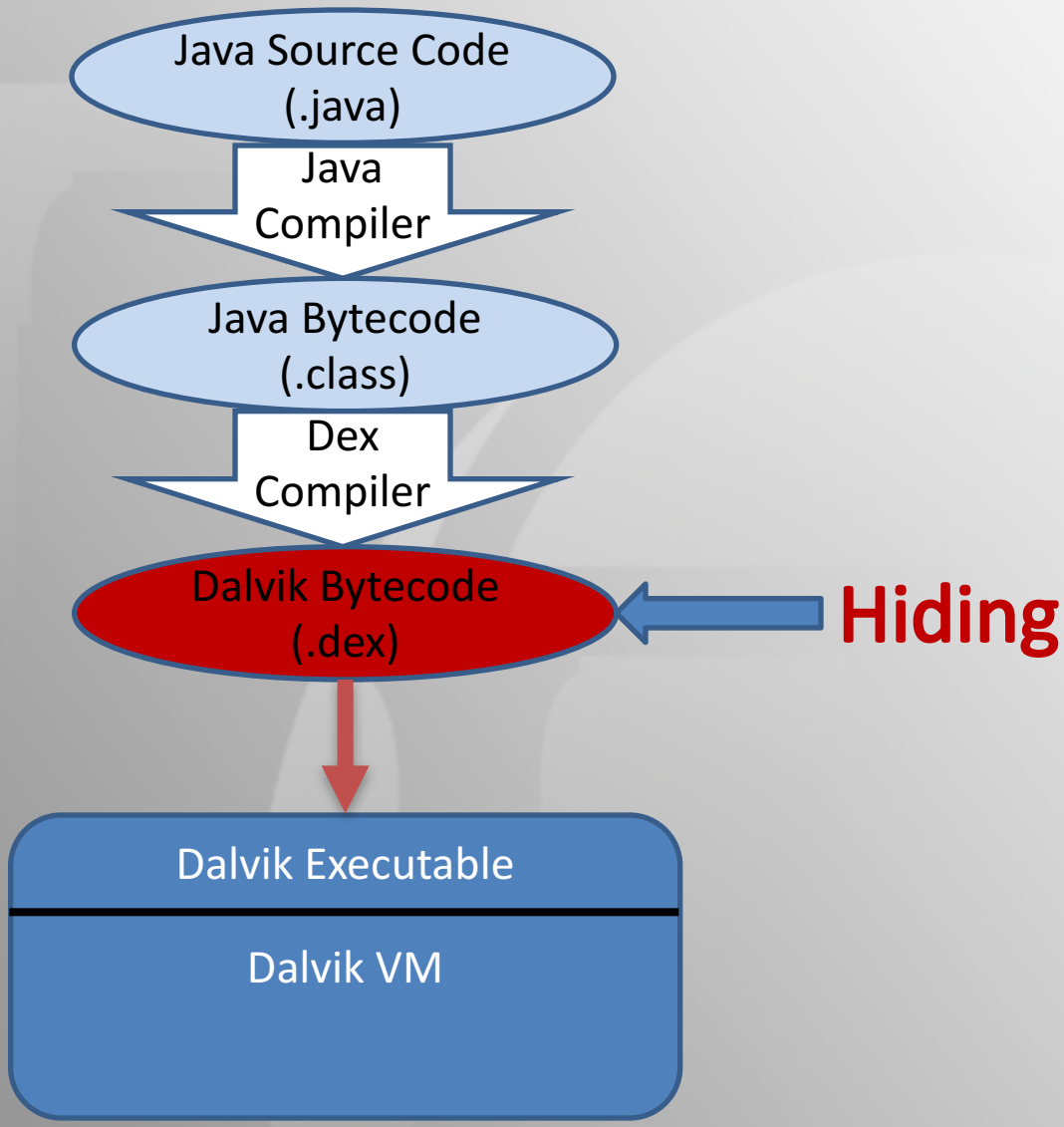
Network System Security

- Detection
  - Automatically identify packed Android apps
- Classification
  - Automatically classify different packers into different groups

How Android App is Built and Run



Packed Android App



Code Tree of Decompiled Dex

Network System Security

- android.support
- butterknife
- com
  - bmpak.anagramsolver
  - squareup.javawriter
- io.realm
  - annotations
  - exceptions
  - internal
  - processor
  - BuildConfig.class
  - EnglishWordRealmProxy.class
  - FranceWordRealmProxy.class
  - GermanWordRealmProxy.class
  - GreekWordRealmProxy.class
  - Realm.class
  - RealmBaseAdapter.class
  - RealmChangeListener.class
  - RealmList.class
  - RealmMigration.class
  - RealmObject.class
  - RealmQuery.class
  - RealmResults.class
  - ValidationList.class

Original

- com.shell
  - NativeApplication.class
  - SuperApplication.class

ijiami

- com.secneo.guard
  - ACall.class
  - ApplicationWrapper.class
  - FirstApplication.class
  - MyClassLoader.class
  - Util.class
- neo.proxy
  - DistributeReceiver.class

Bangcle

- com.ali.mobisecenhance
  - StubApplication.class

Ali

Current problems

Network System Security

- Packed Android Malware
- Manual effort for analysis
  - Tedious
- Packers are evolving.
  - Unpacking approaches only works for a limited time, or particular type of packers.

Current packing techniques

Network System Security

- Code obfuscation
- Anti-debugging
- Bytecode hiding
- Dynamic code modification
- Dynamic loading

Our approach

Network System Security

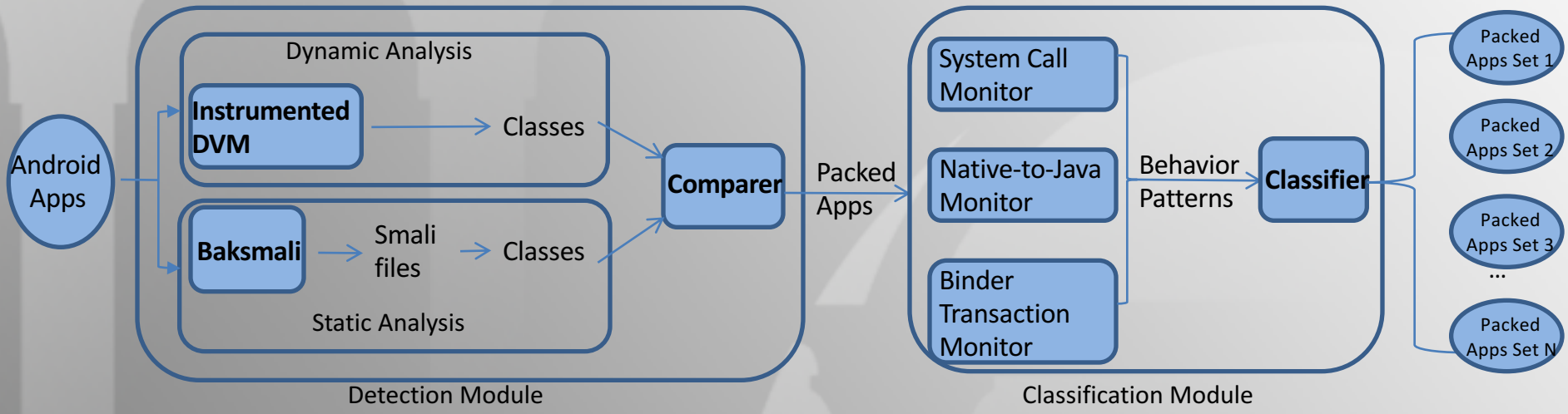
Detection

- Combined Static and Dynamic analysis
  - Static
    - Static analysis tools (baksmali)
  - Dynamic
    - DVM instrumentation
  - Compare classes from static and dynamic analysis

Classification

- Runtime environment monitoring to capture the execution behavior pattern
  - System calls
    - Kernel modules
  - IPC transaction
    - Binder trace
  - Native-to-Java interaction
    - JNI trace

Overview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Packed Apps Set N

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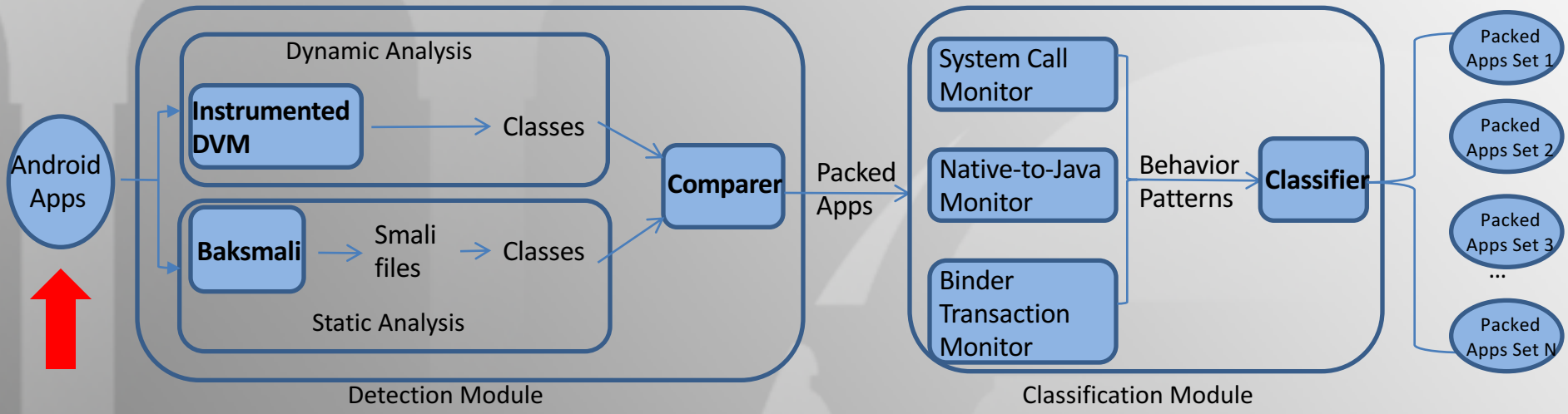
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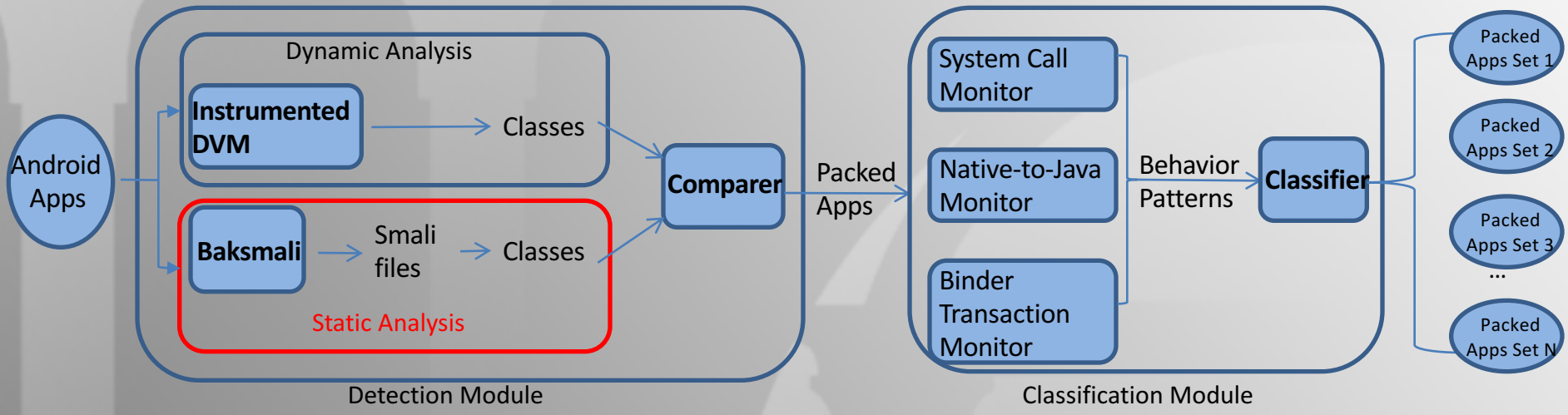
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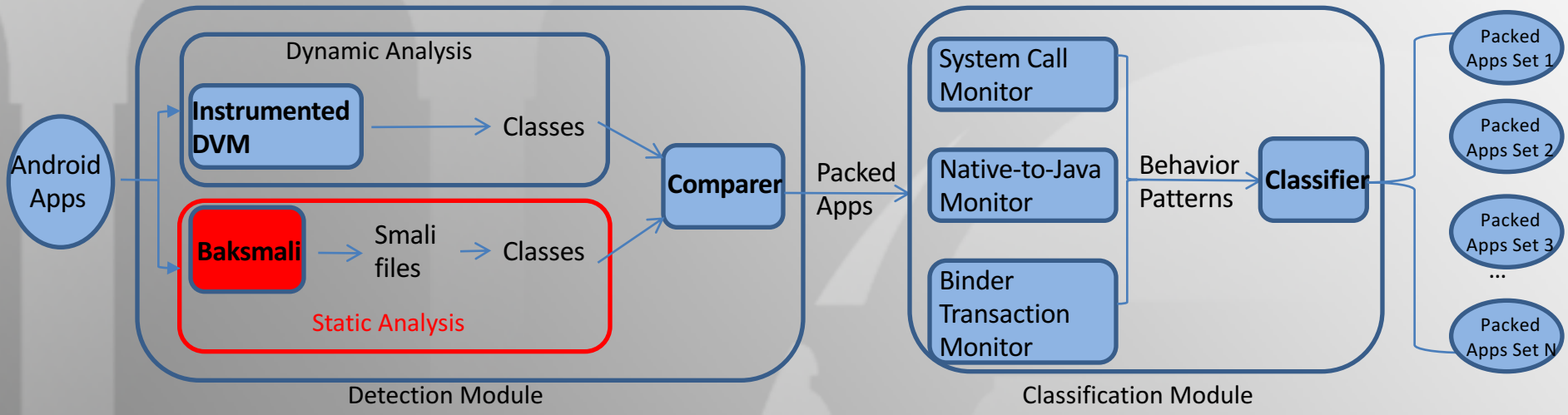
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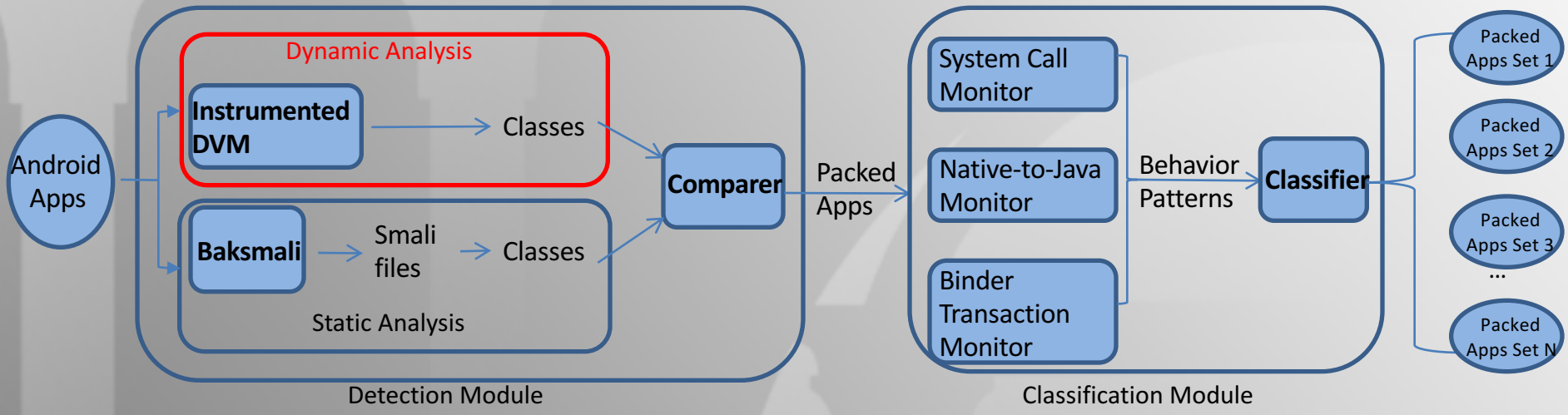
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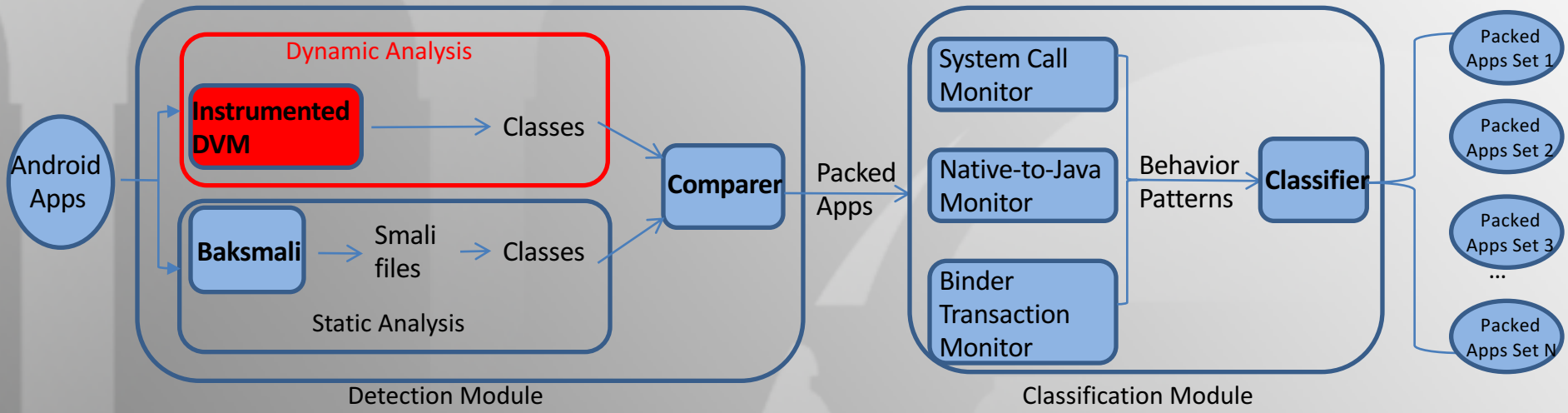
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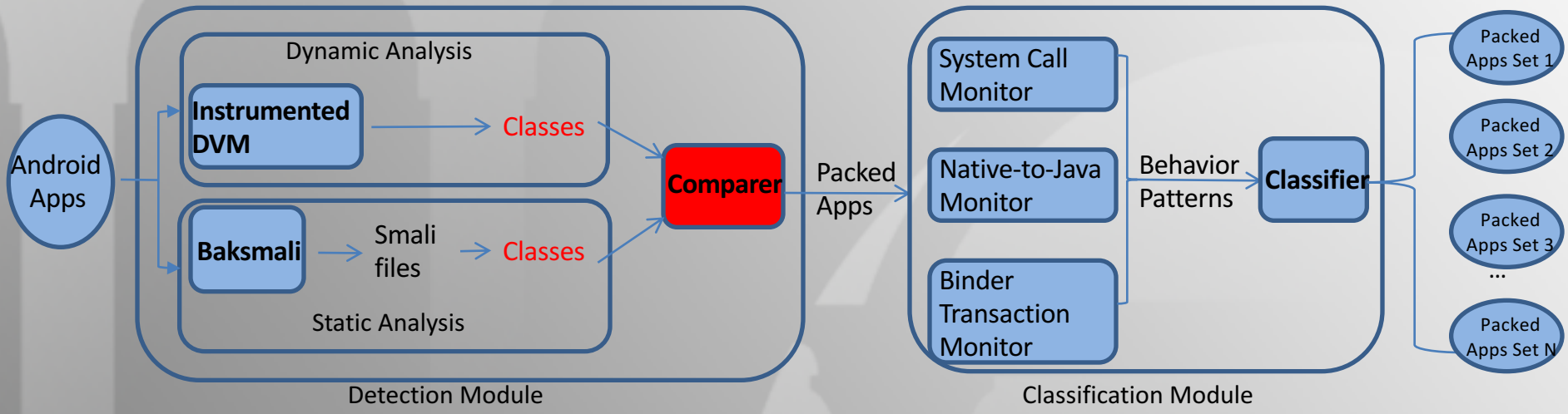
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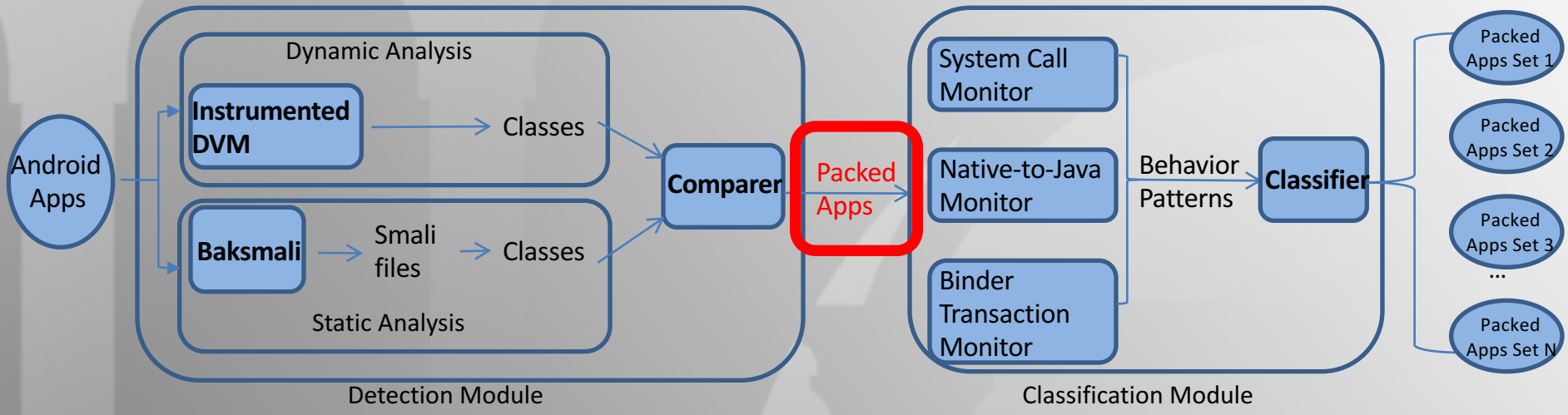
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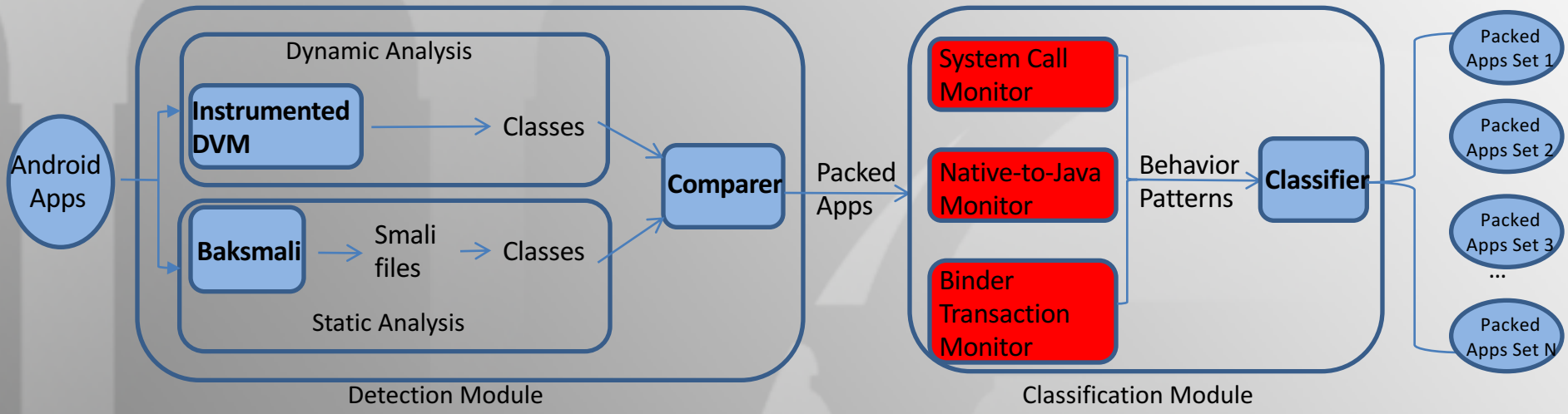
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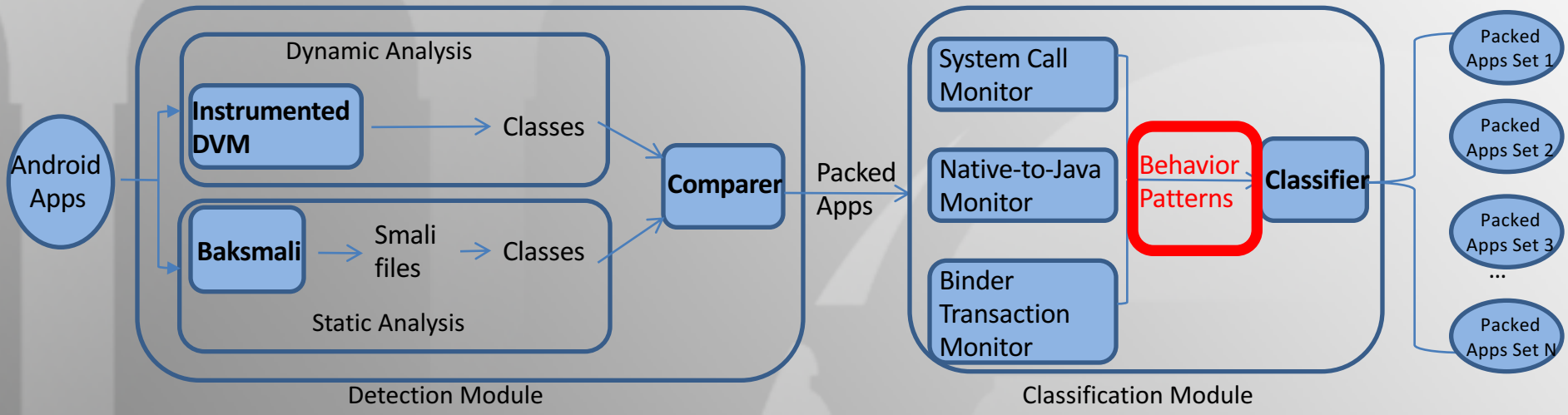
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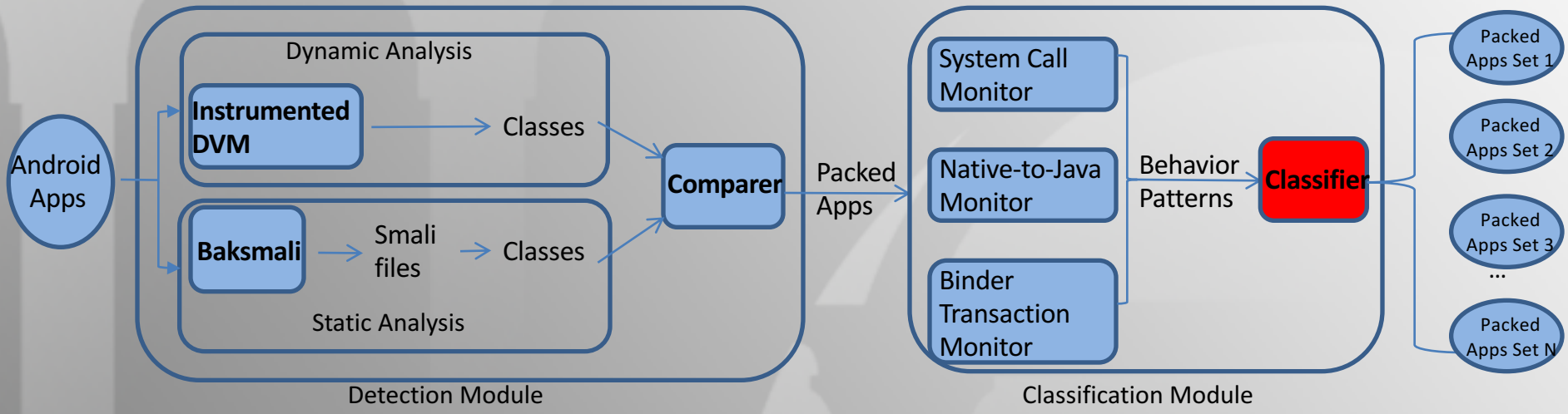
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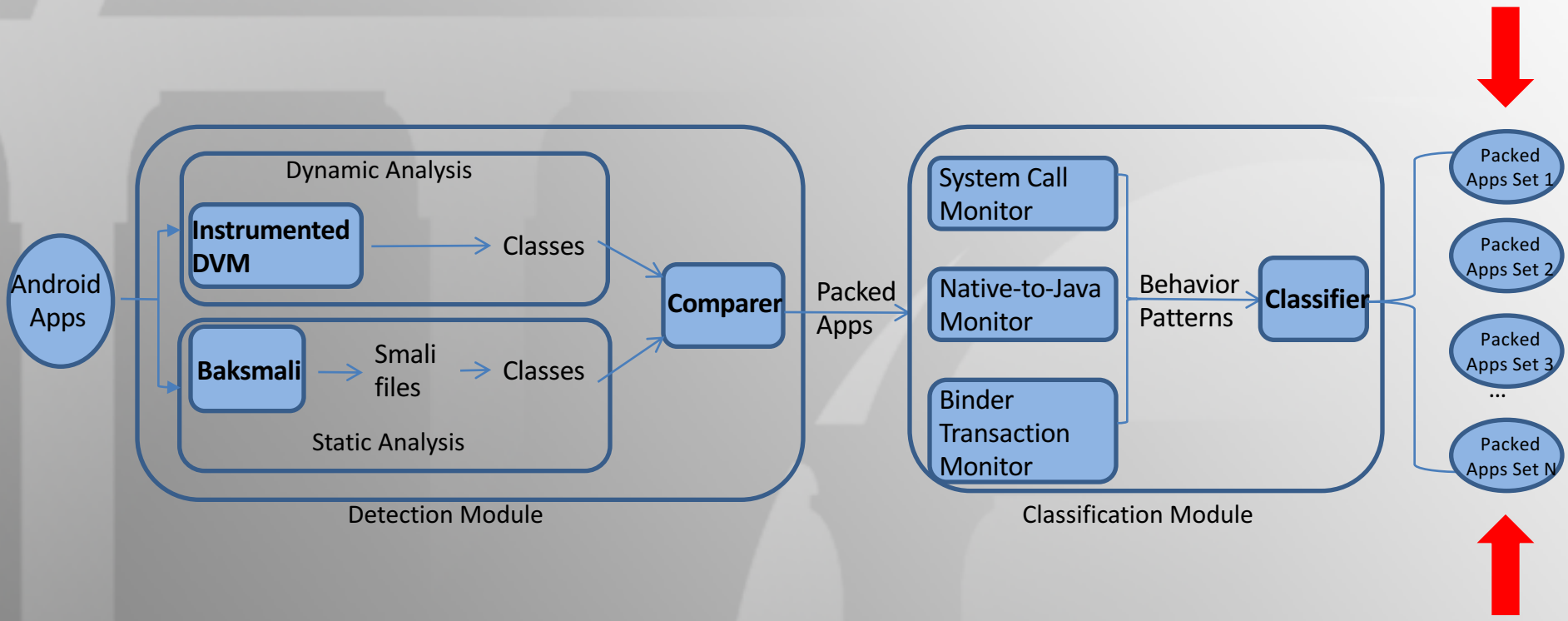
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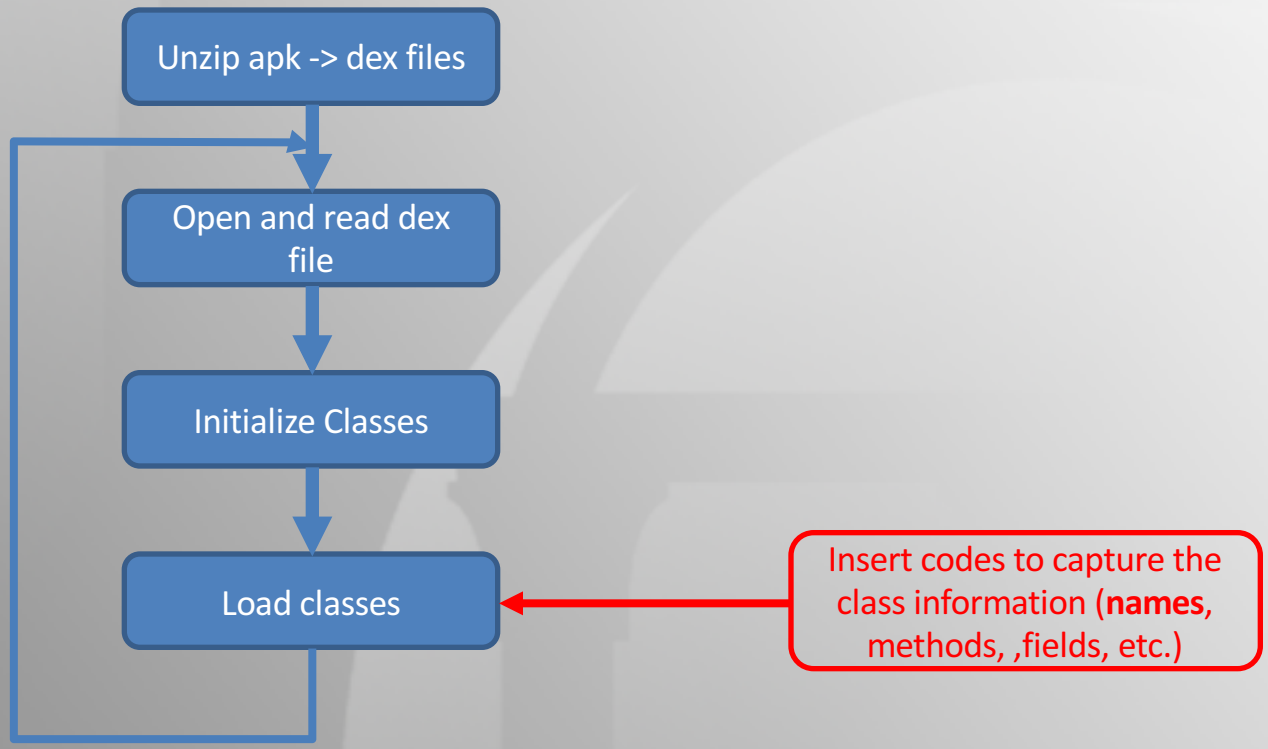
VM instrumentation (DVM)



Conclusion

Network System Security

- Implemented a detection module to identify packed Android Apps
- Proposed approaches to extract the execution behavior from different packers

Thank you

QA?