TRUST aWARE

Enhancing Digital Security, Privacy and TRUST in softWARE

Static & Dynamic Analysis

Aniketh Girish, Gabriel Bogdan Hortea

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TRUST aWARE

CONTENTS

Introduction - Importance of Software Analysis

- **Software Privacy & Security Challenges:** Modern software collects user data for commercial purposes, employing obfuscation techniques to avoid scrutiny, posing risks to uninformed users.
- **Dependency Dilemma:** Developers depend on third-party libraries, introducing privacy and security risks into the software supply chain, despite bearing responsibility for software integrity.
- **Analysis Techniques:** Security and privacy assessment uses static analysis (predictive but limited by obfuscation and cloud components) and dynamic analysis (actual behavior with coverage limitations and anti-testing vulnerabilities).
- **Assessment Gaps:** The effectiveness of existing analysis techniques remains under-assessed due to a lack of benchmarks, while cyberthreat intelligence lacks methodological transparency, leading to potential misclassification of software.

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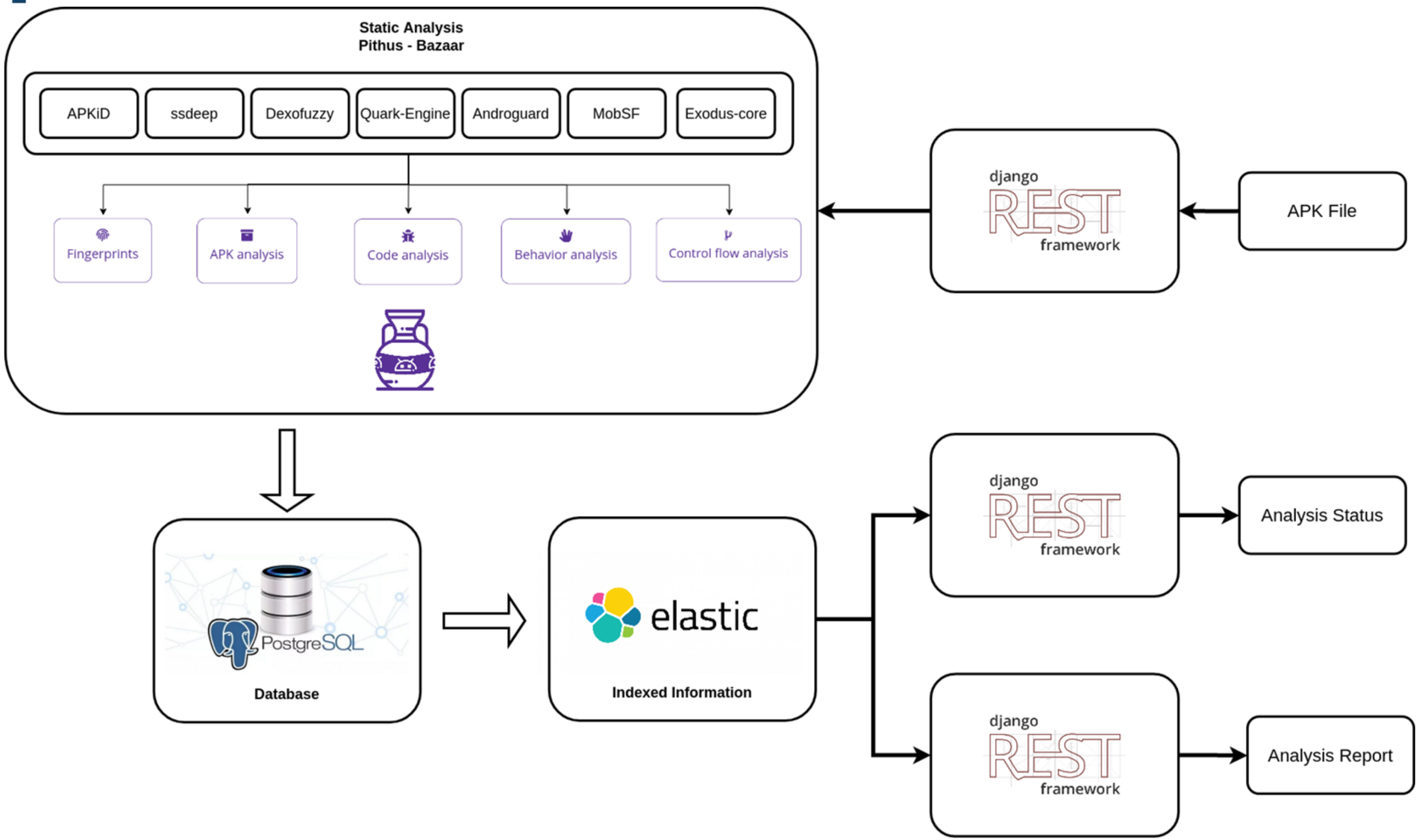
Static Analysis Pipeline - Framework (UC3M)



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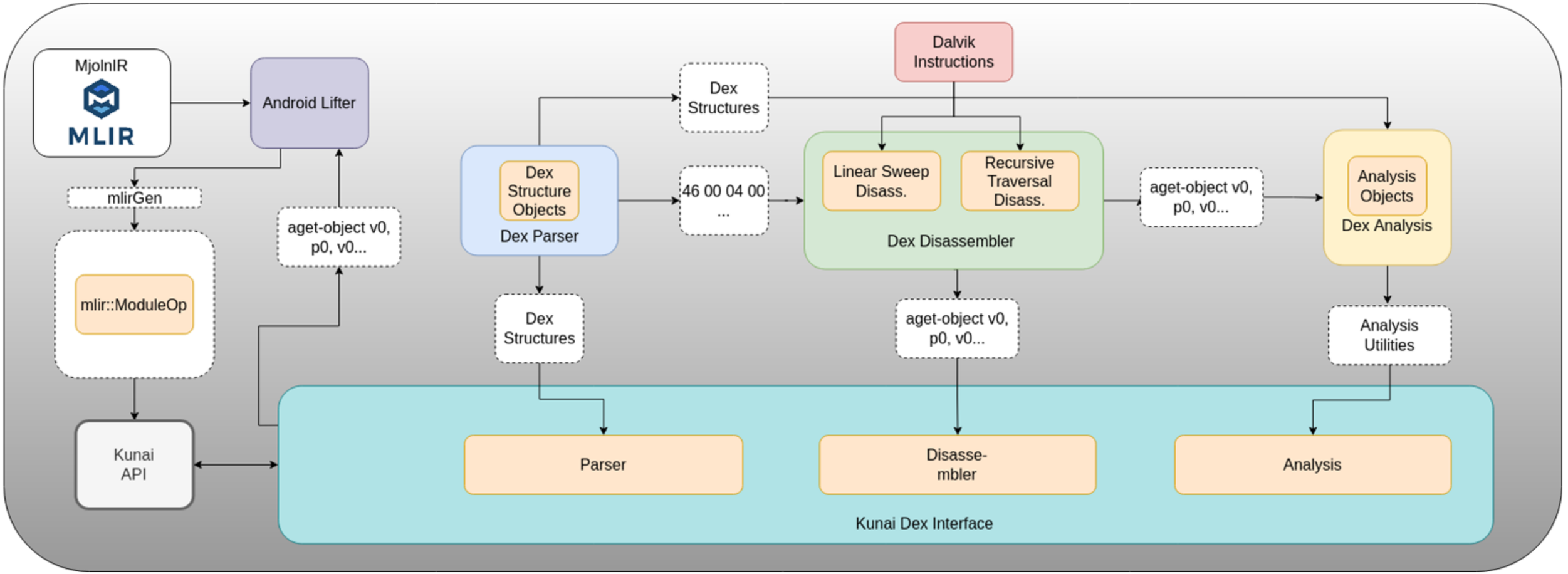
Static Analysis Pipeline - Kunai (UC3M)



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Static Analysis Pipeline - Demo (UC3M)

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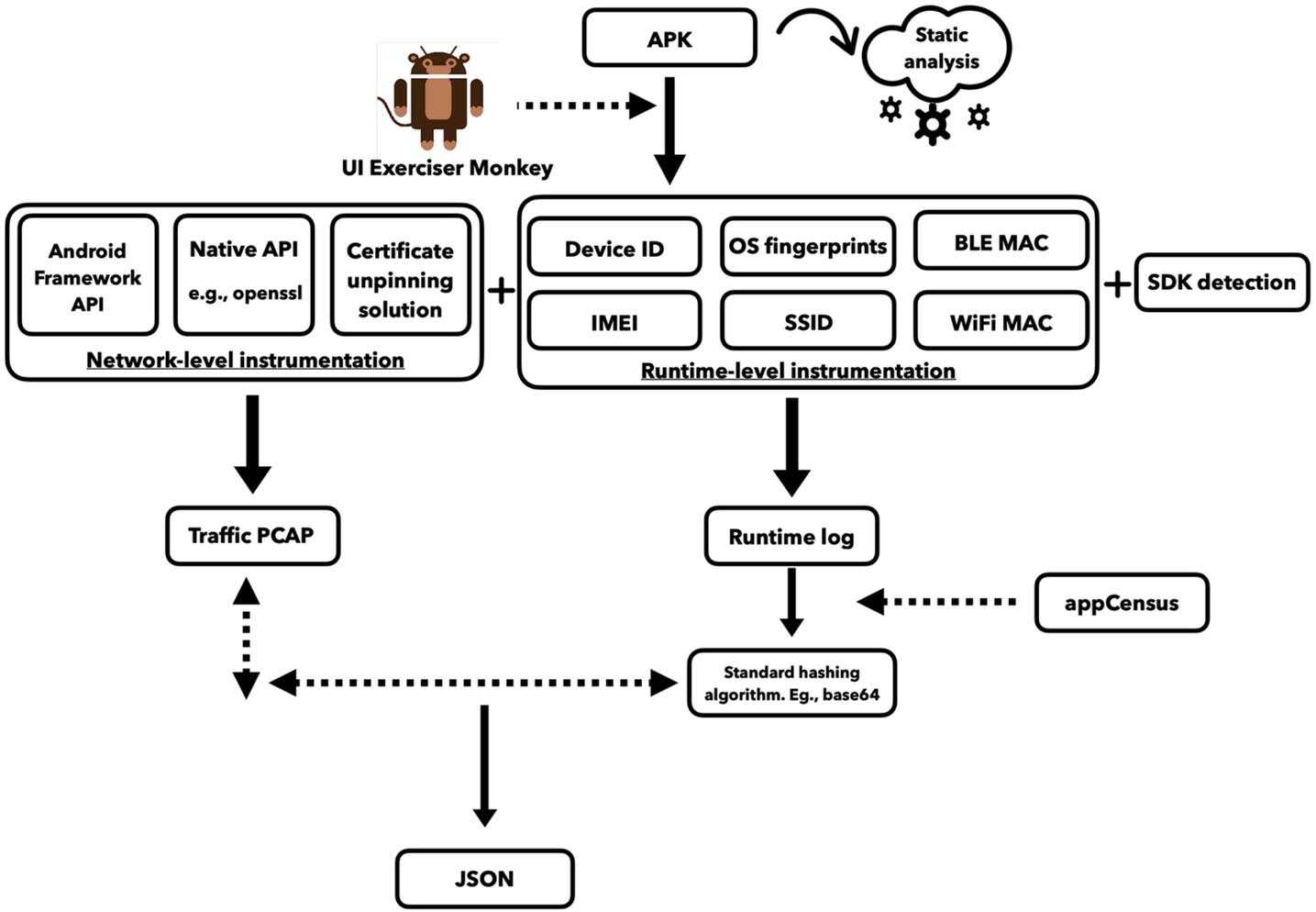
Dynamic Analysis Pipeline (IMDEA)



1. Runtime monitoring
2. Network layer instrumentation
3. SDK detection
4. Taint tracking
5. Final JSON report

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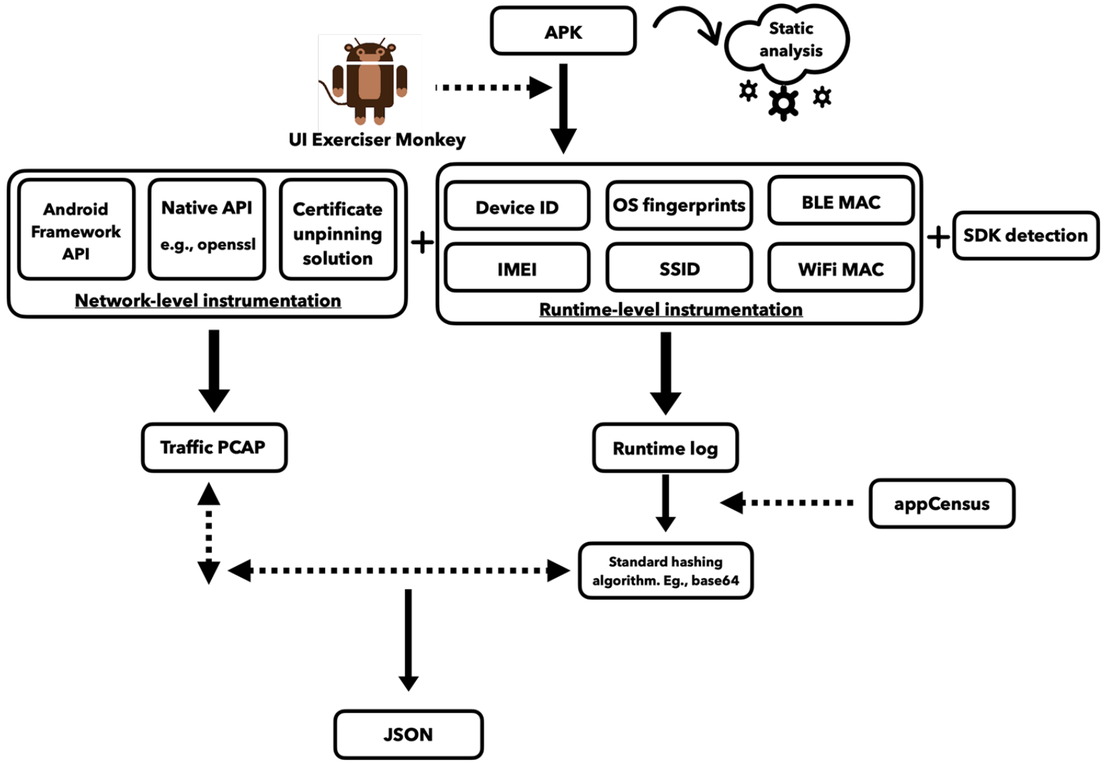
Dynamic Analysis Pipeline(IMDEA)

The dynamic analysis pipeline is designed to handle a high volume of apps, processing them one after the other

- Source code + Frida based instrumentation; Highly modular architecture
- ~5K LoC of JS and python
- Supports Android 9, 12, 14. Pipeline predominantly uses Android 12.
- Capable of circumventing certificate pinning on 18+ TLS libraries.
- Integration with AppCensus for improved coverage and data leak identification
- Has the capability to monitor more than 60 types of PII data types.
- Our SA + DA platform sends a combined report (JSON) to the MISP platform



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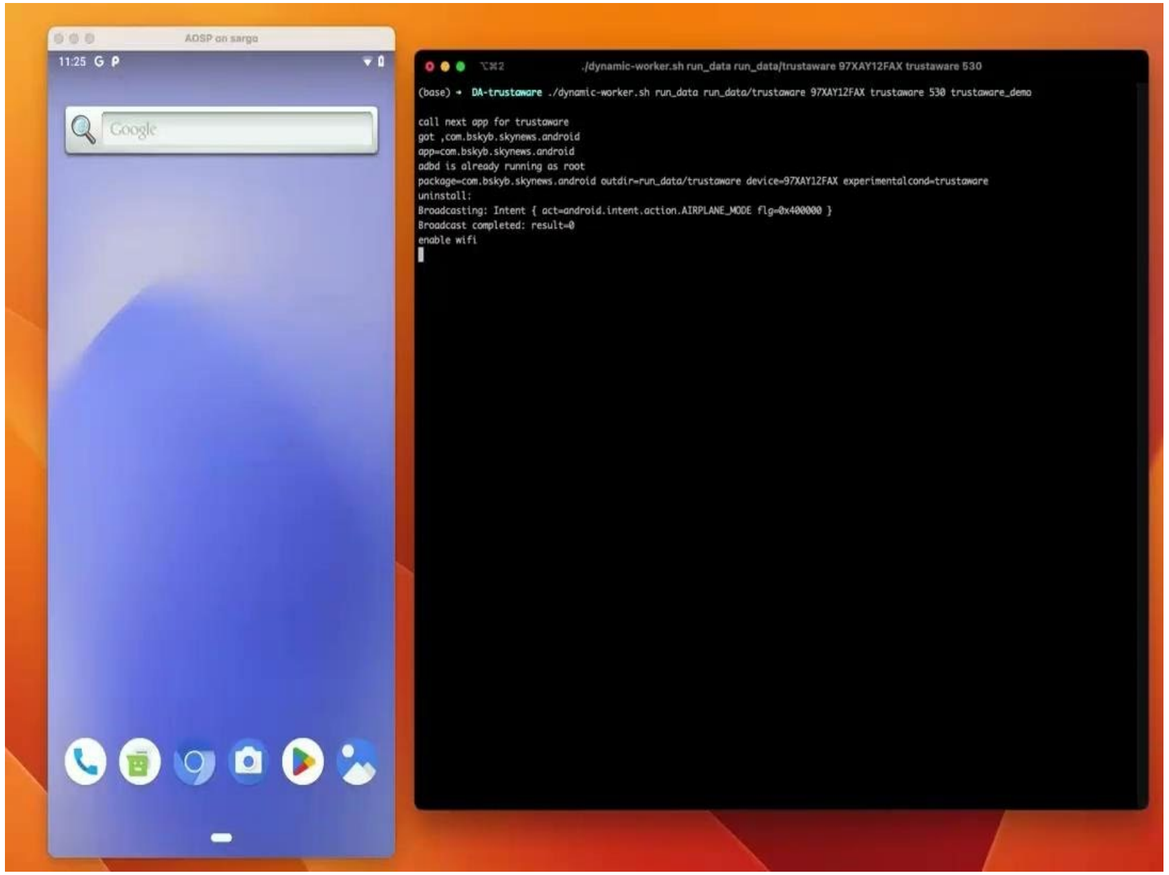
Dynamic Analysis Pipeline - Demo (IMDEA)



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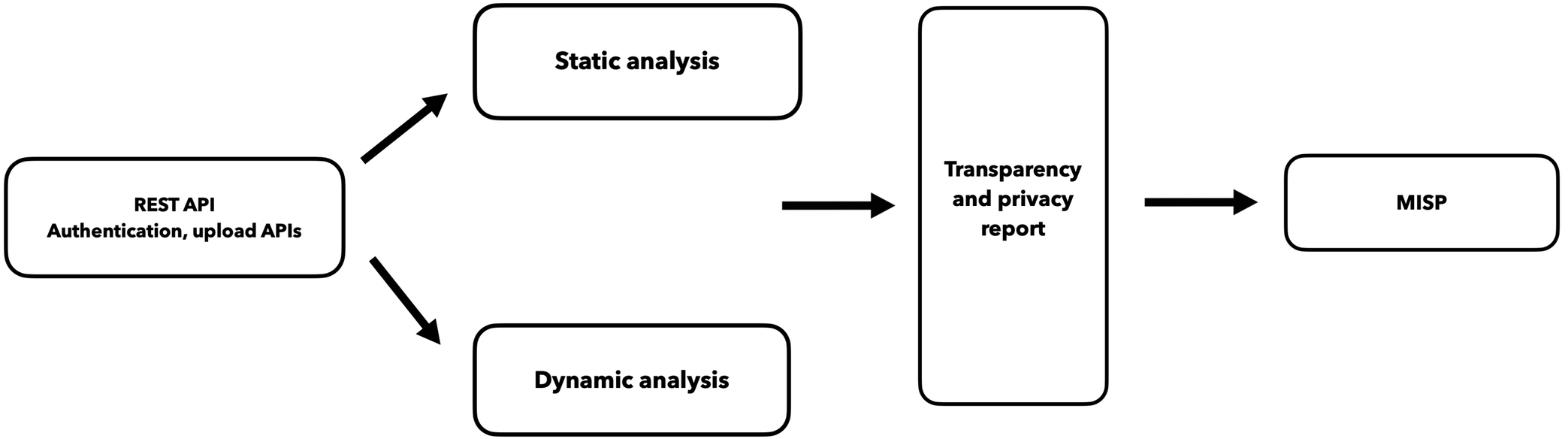
Connection API (IMDEA)

- Connection between Static and Dynamic Analysis Engines.
- Continuous testing of the pipeline; achieve stability and improved report data for MISP platform.



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Sending Results to MISP (IMDEA)

MISP platform updated with:

- App metadata (e.g., package name, version, permissions)
- Dynamic analysis results (e.g., API calls, network traffic, file system access)


```
{
    "dynamic_analysis": {
        "http://imagenes.elpais.com": {
            "Incoming Traffic": {
                "PII": [
                    "communicated"
                ],
                "timestamp": "1698942359215"
            },
          "http://sdk.privacy-center.org": {
            "Outgoing Traffic": {
                "PII": [
                    "communicated",
                    "bluetooth"
                ],
                "timestamp": "1698942299876",
                "dst_ip": "18.67.240.26",
                "dst_port": "443"
            },
            "Incoming Traffic": {
                "PII": [
                    "communicated"
                ],
                "timestamp": "1698942299876"
            }
        },
```

```
"http://firebase-settings.crashlytics.com": {
            "Outgoing Traffic": {
                "PII": [
                    "communicated",
                    "bluetooth"
                ],
                "timestamp": "1698942299918",
                "dst_ip": "142.250.184.3",
                "dst_port": "443"
            },
            "Incoming Traffic": {
                "PII": [
                    "communicated"
                ],
                "timestamp": "1698942299961"
            }
        },
        "http://aax.amazon-adsystem.com": {
            "Outgoing Traffic": {
                "PII": [
                    "communicated",
                    "bluetooth",
                    "aaid",
                    "coarsegeolatlon",
                    "geolatlon"
                ],
                "timestamp": "1698942359359",
                "dst_ip": "18.154.54.56",
                "dst_port": "443"
            },
            "Incoming Traffic": {
                "PII": [
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                ],
                "timestamp": "1698942359410"
            }
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