

A Framework for Automated Test Mocking of Mobile Apps

Mattia Fazzini



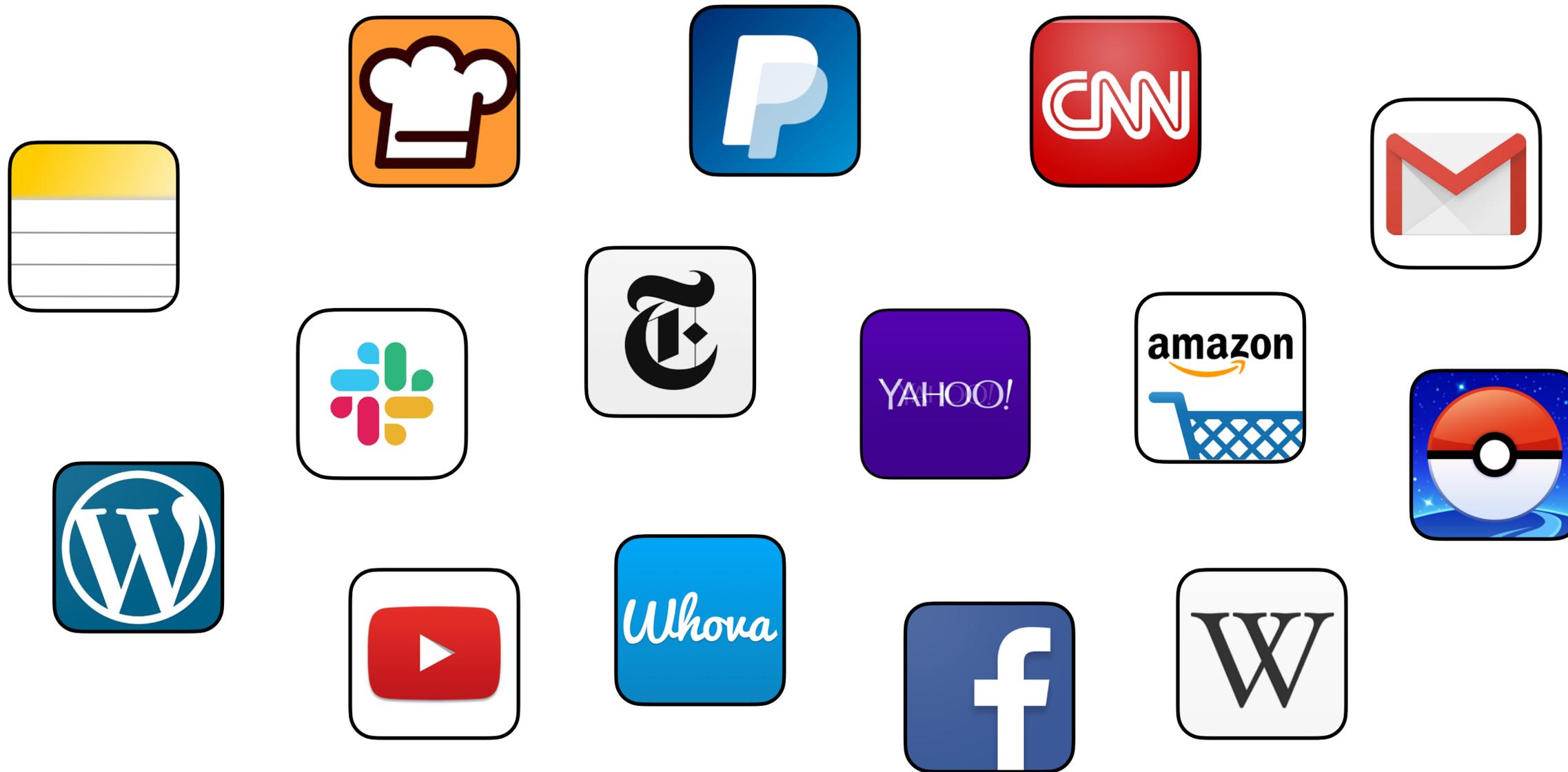
Alessandra Gorla



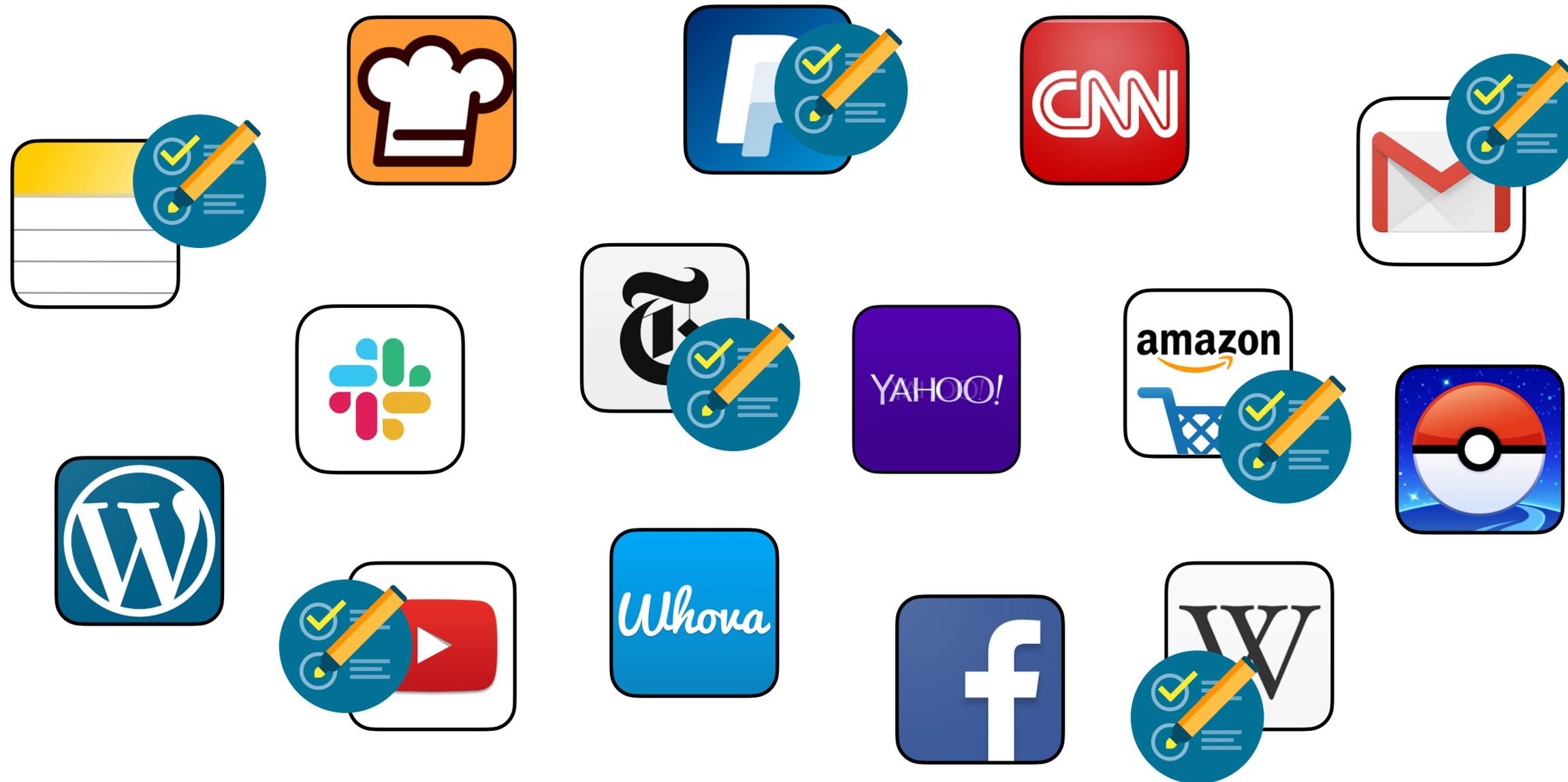
Alessandro Orso



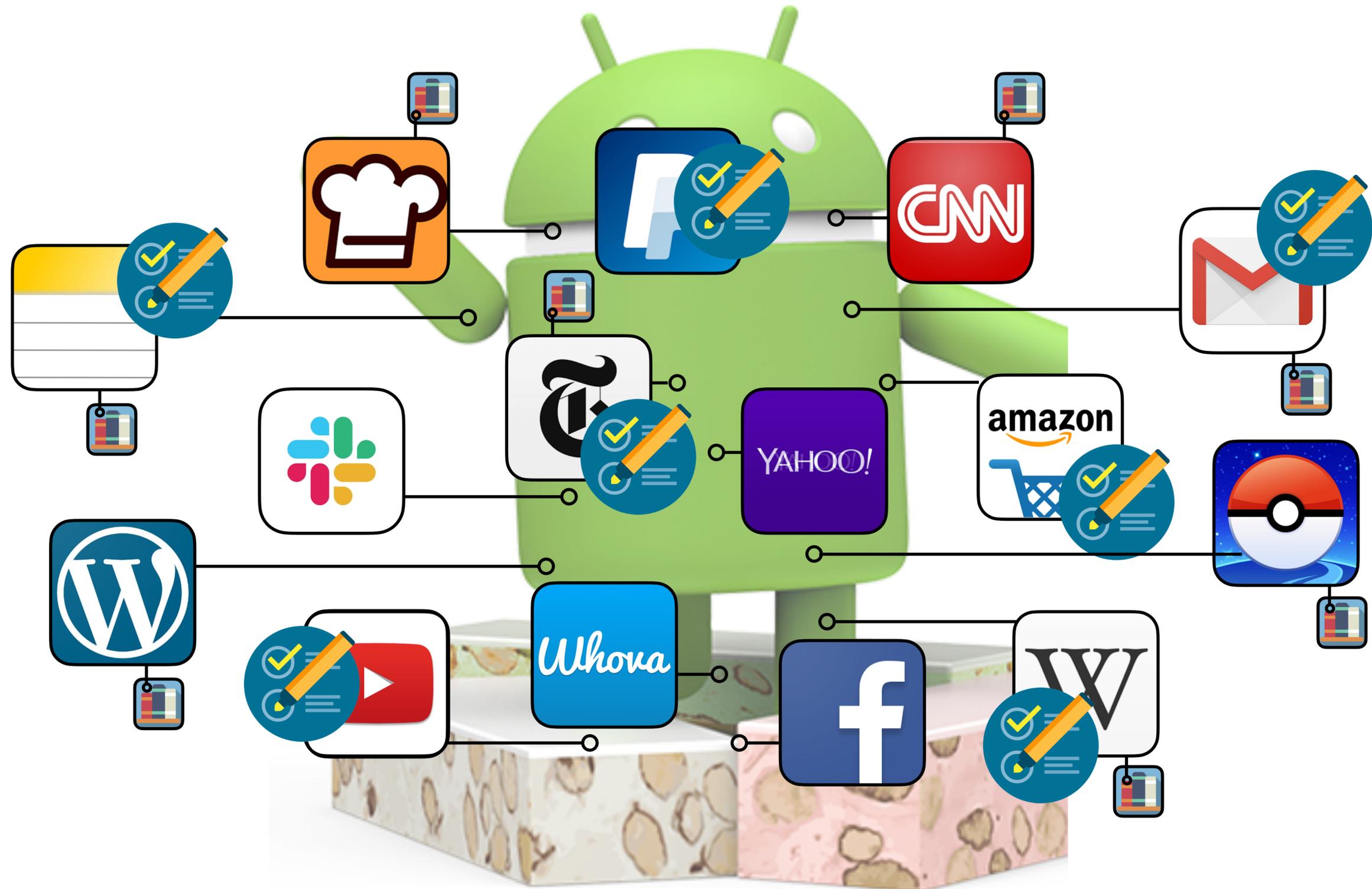
Mobile Applications



Testing



Software Environment



Testing in this Type of Software Environment

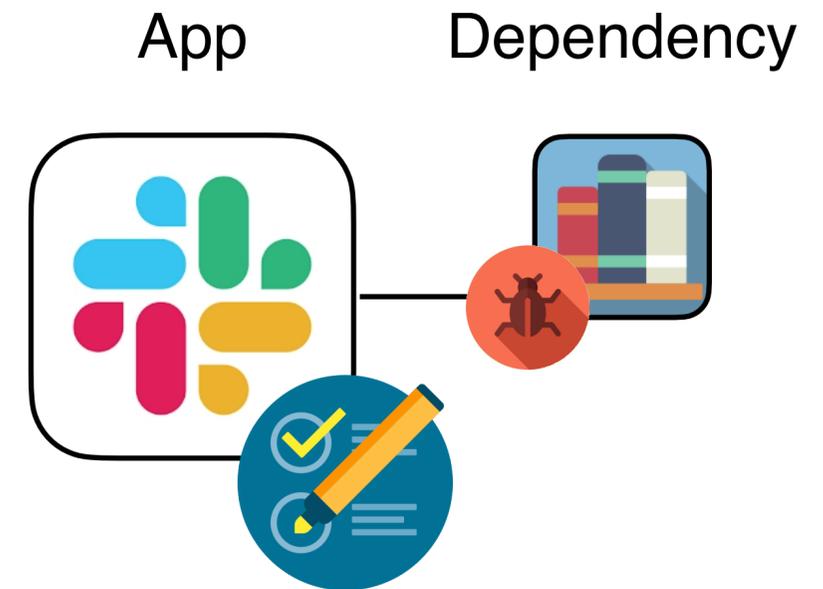
Flaky Tests

	Exec 1	Exec 2	Exec 3
Test 1			
Test 2			
Test 3			
Test 4			
Test 5			
Test 6			

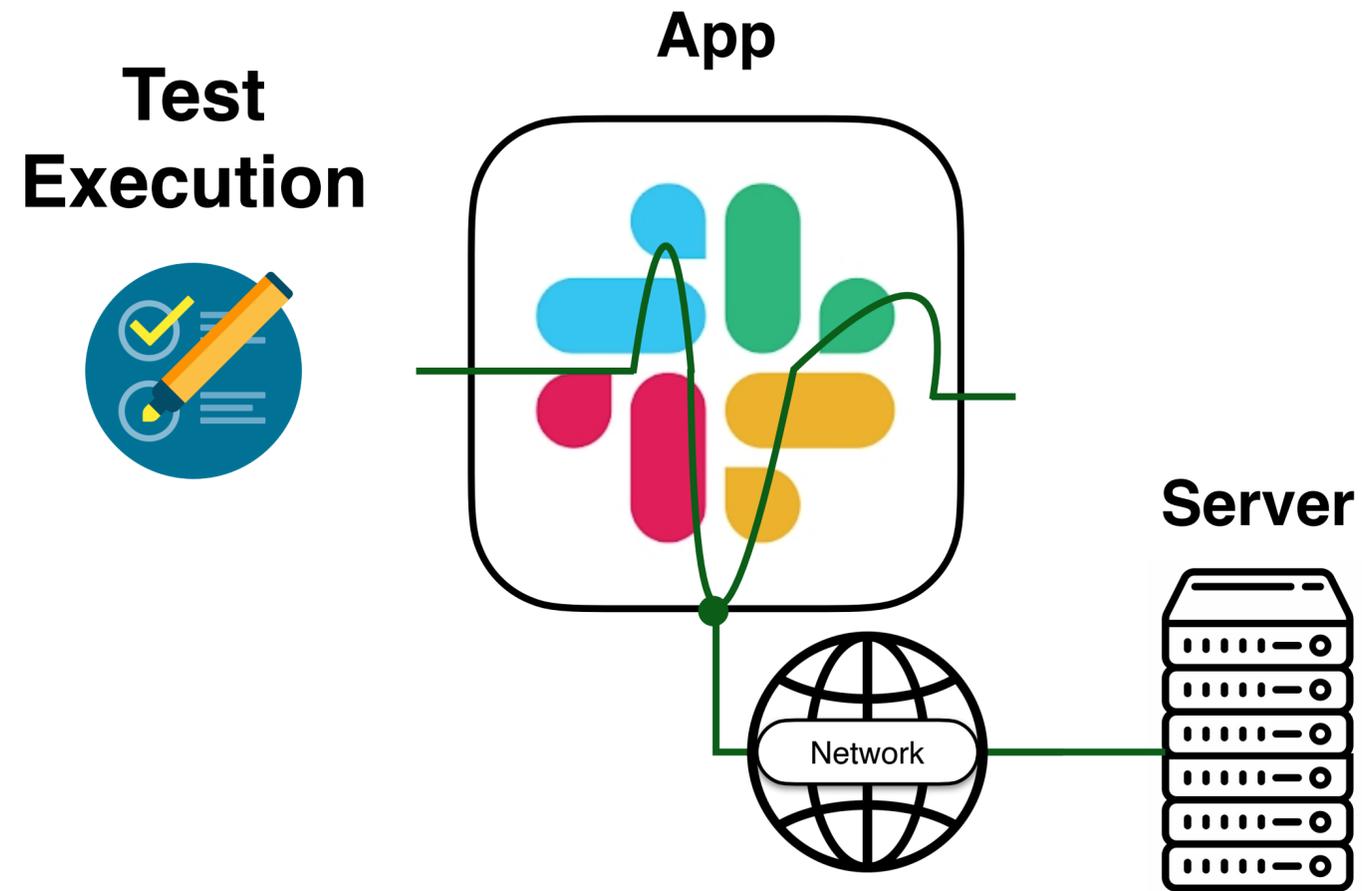
Slow Tests



Interference Bugs



Test Mocks

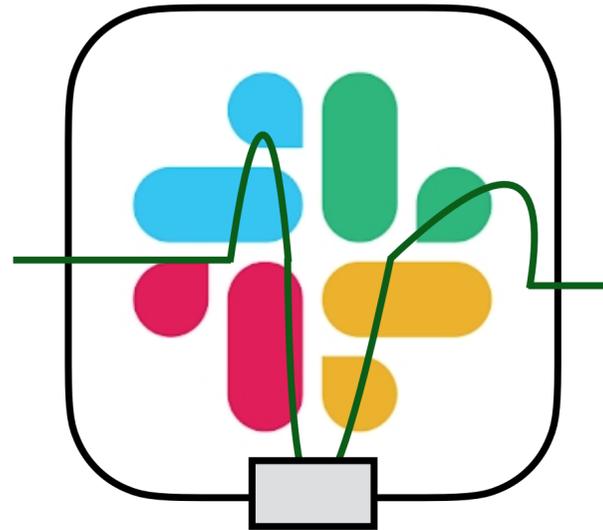


Test Mocks

Test Execution



App



Test Mock

Developer

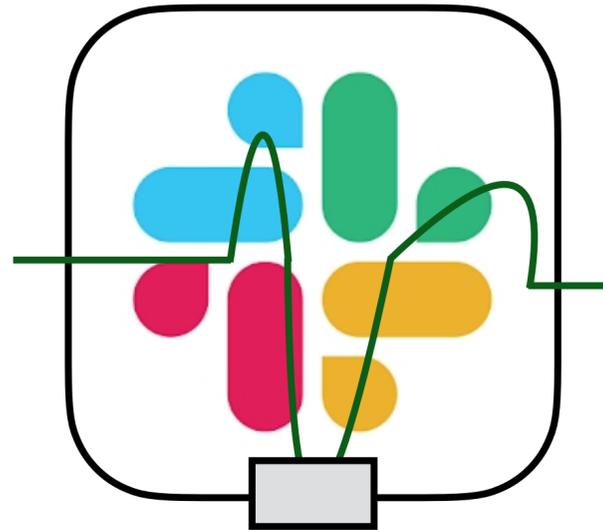


Test Mocks

Test Execution



App



Test Mock

Developer



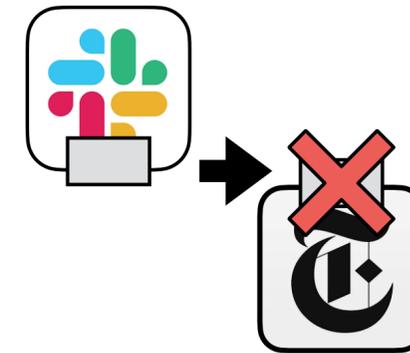
Time-consuming



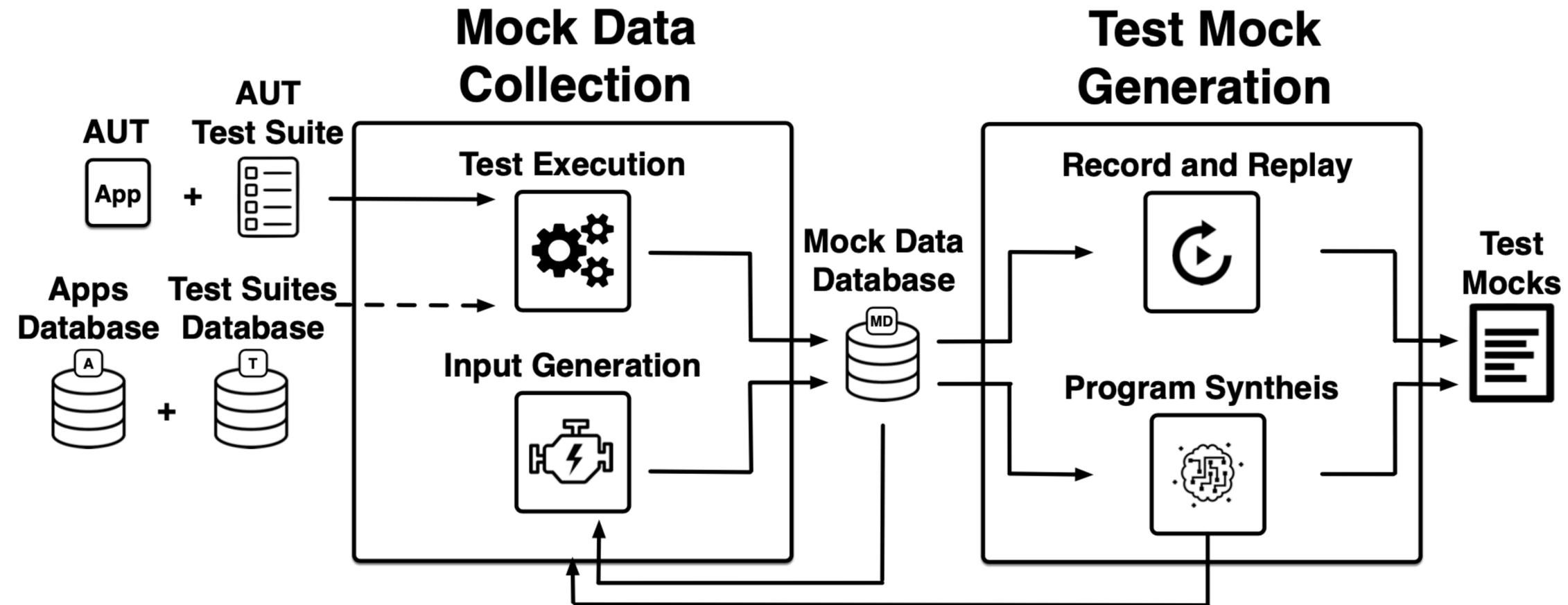
Error-prone



Too Specific



MOKA Overview



1

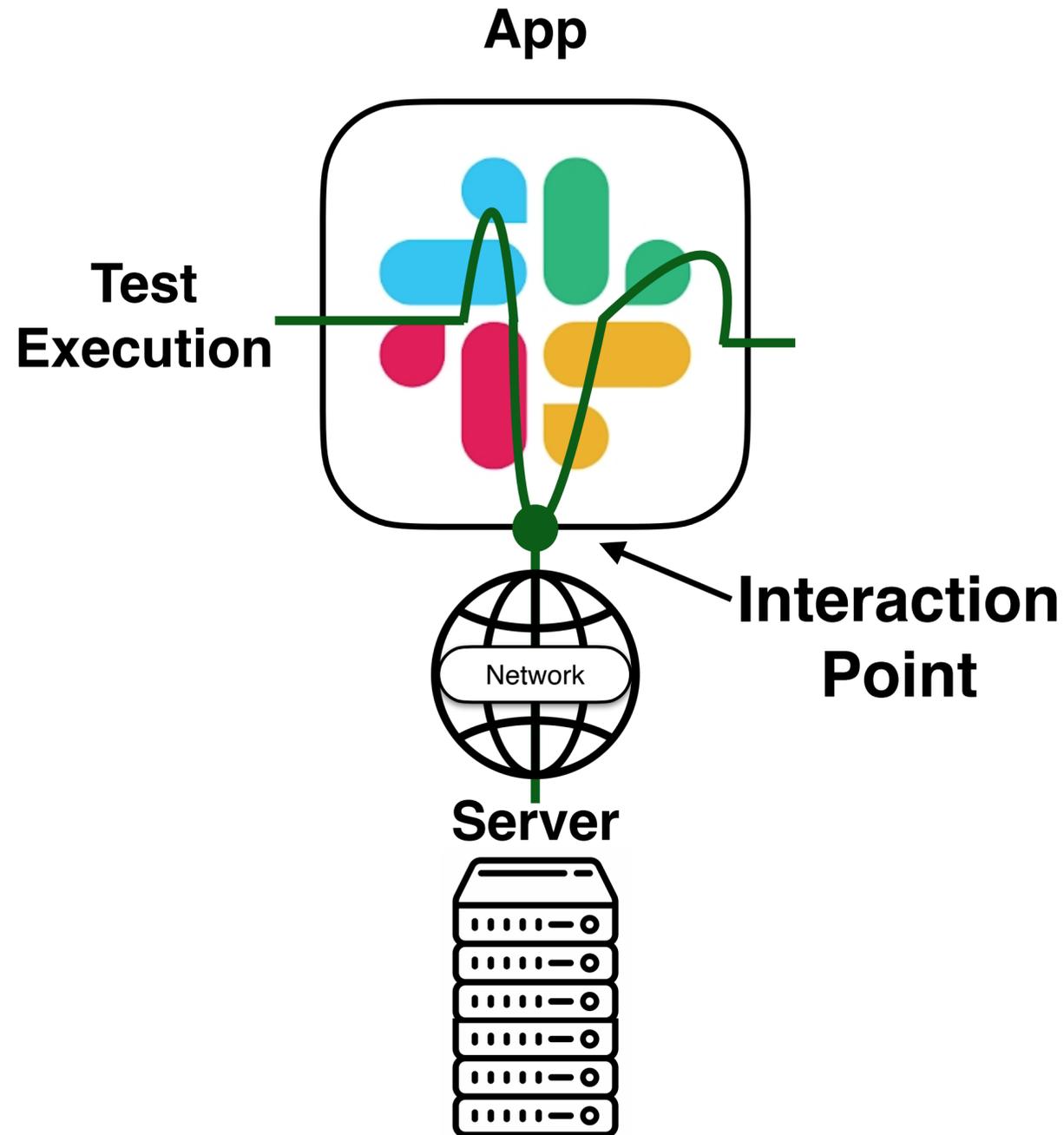
Collect mock data
from test executions

2

Use iterative
approach based on
program synthesis to
generate test mocks

Mock Data Collection

1



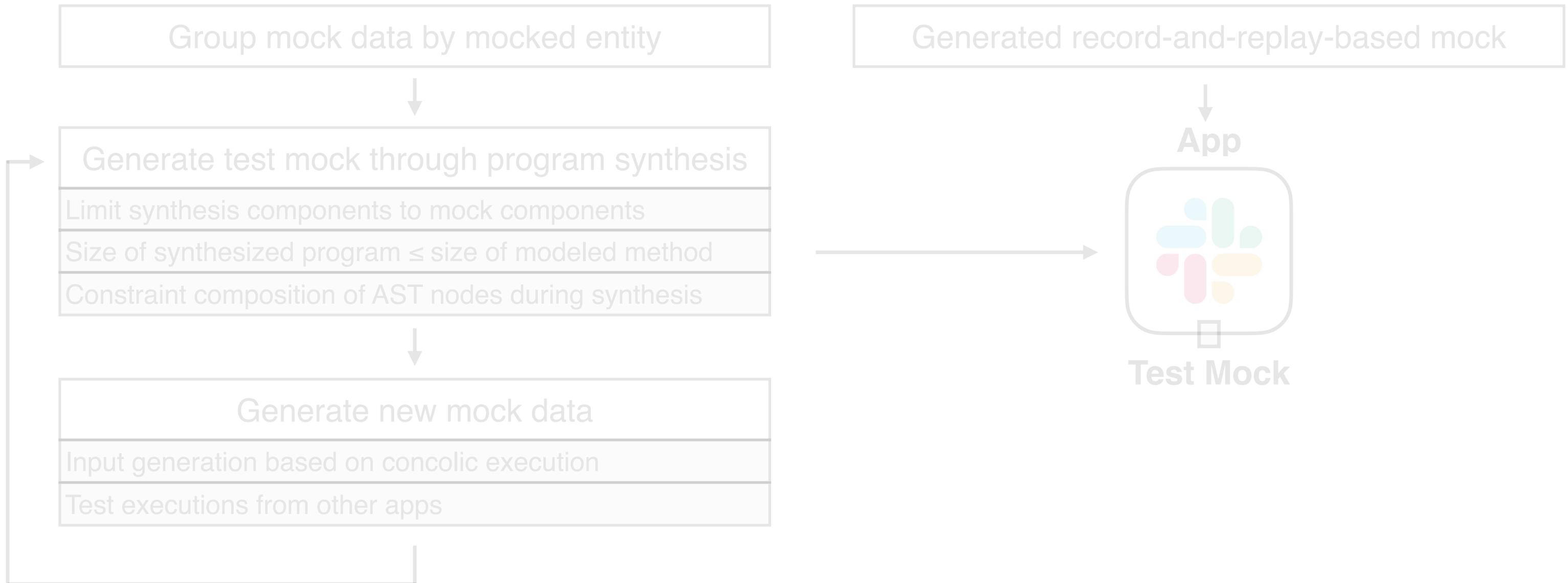
Mock Data

Mocked entity
Mock input
Mock output
Mock components
Mock coverage

Test Mock Generation

2

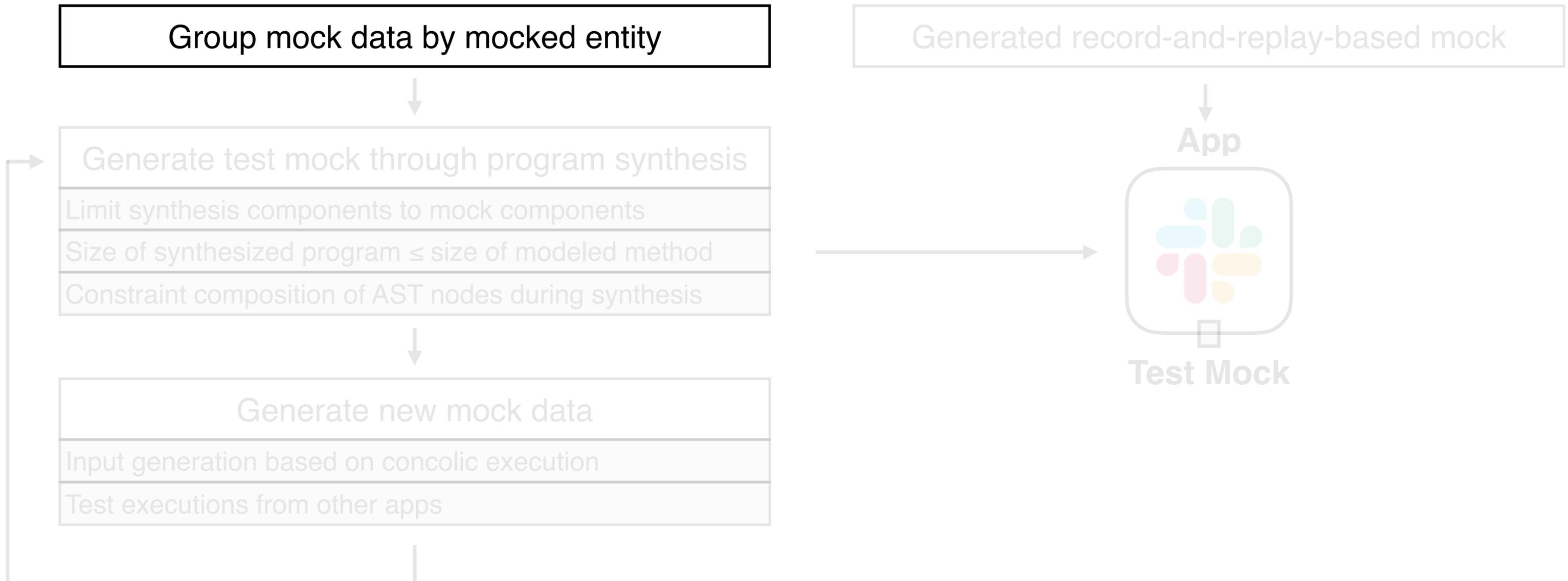
Iterative Mock Generation Process



Test Mock Generation

2

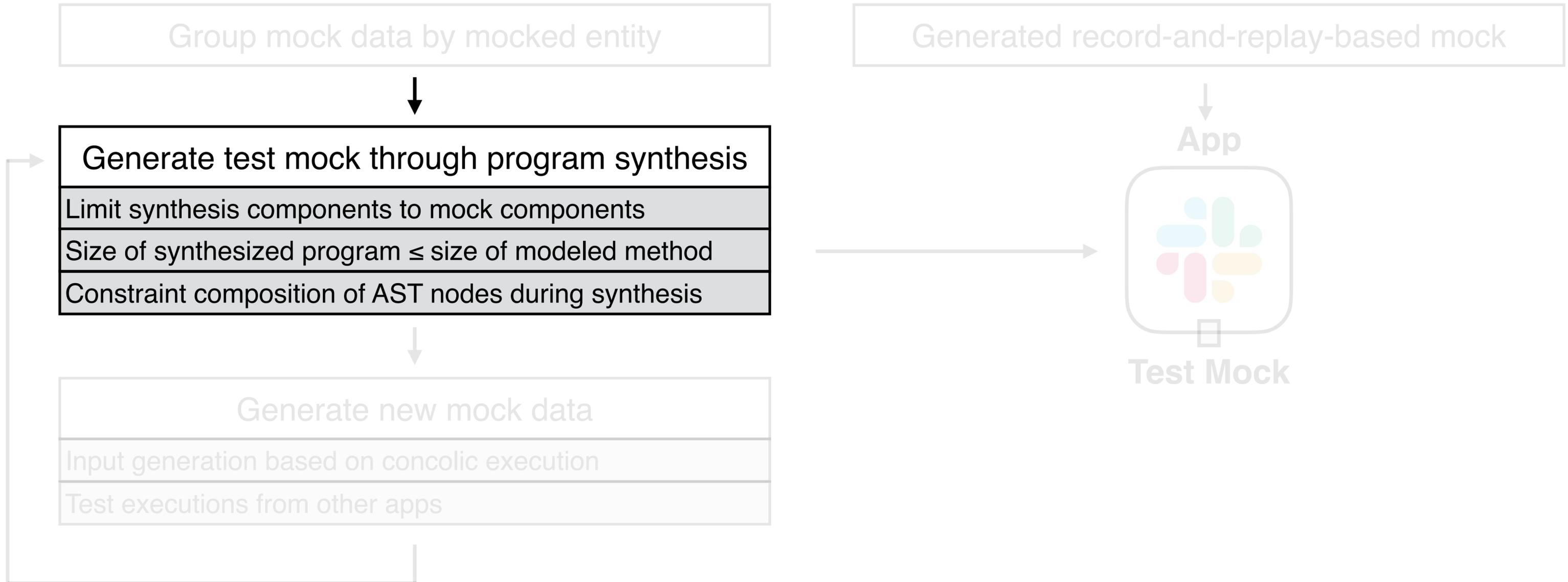
Iterative Mock Generation Process



Test Mock Generation

2

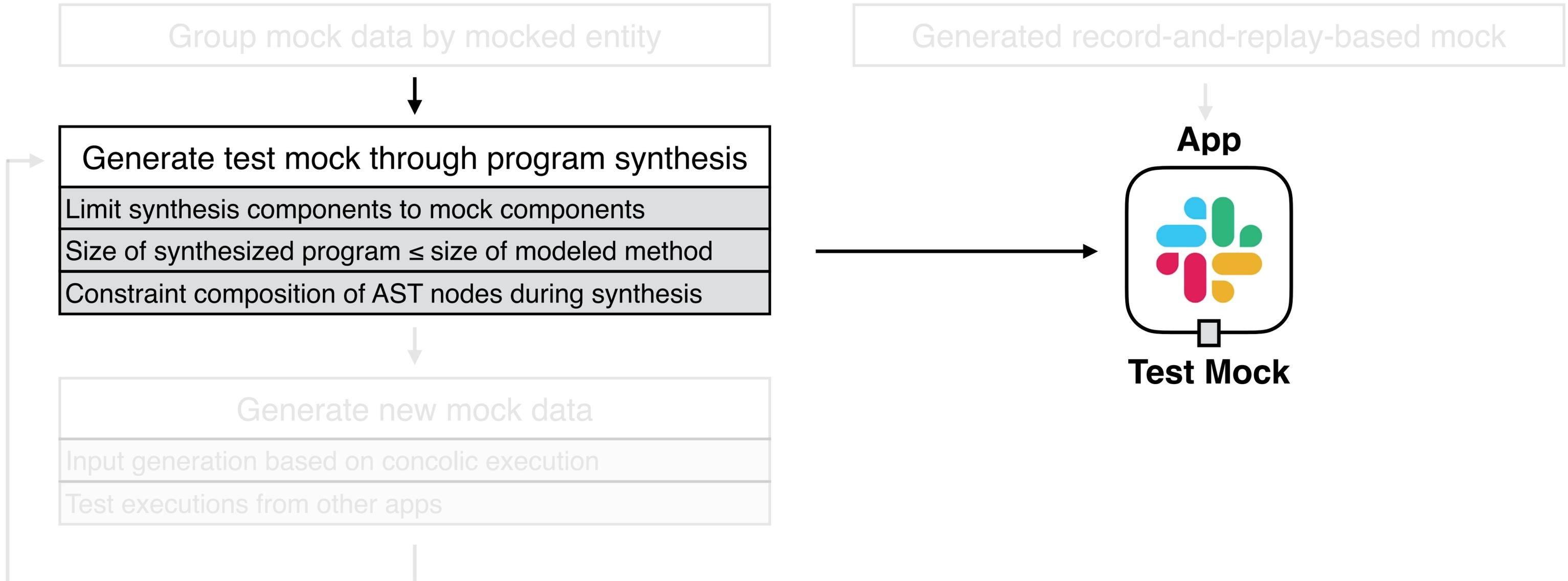
Iterative Mock Generation Process



Test Mock Generation

2

Iterative Mock Generation Process



Test Mock Generation

2

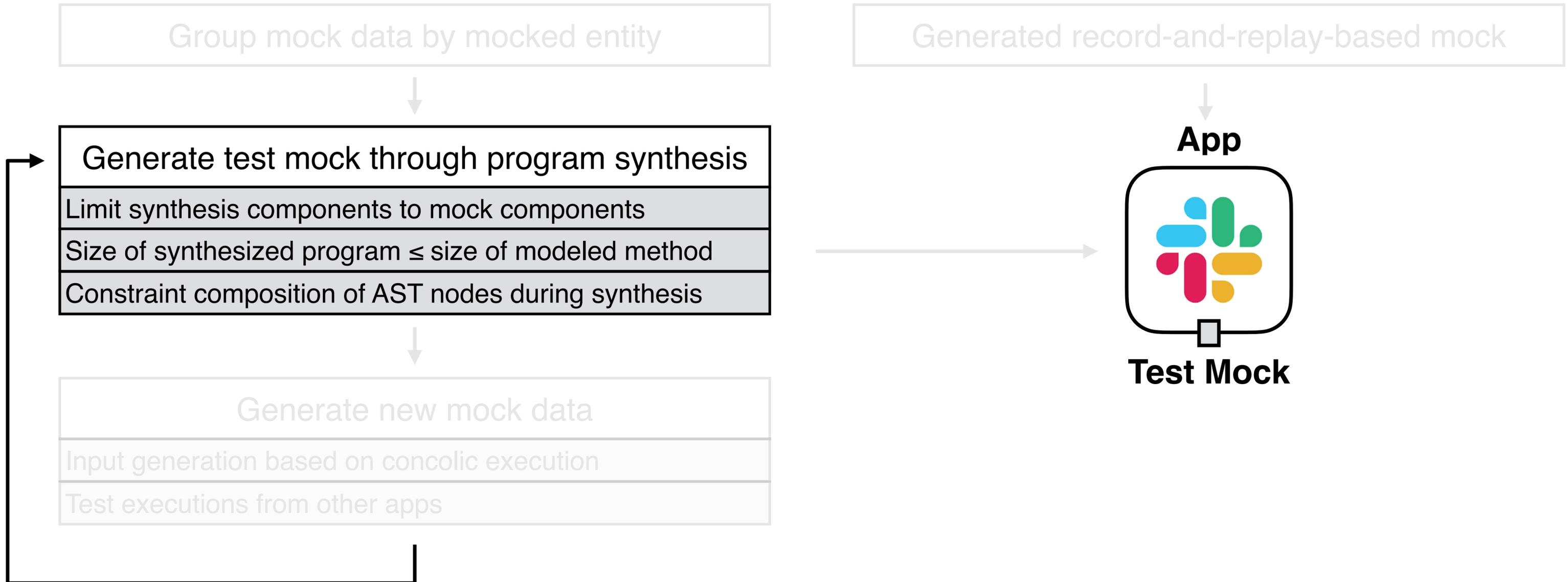
Iterative Mock Generation Process



Test Mock Generation

2

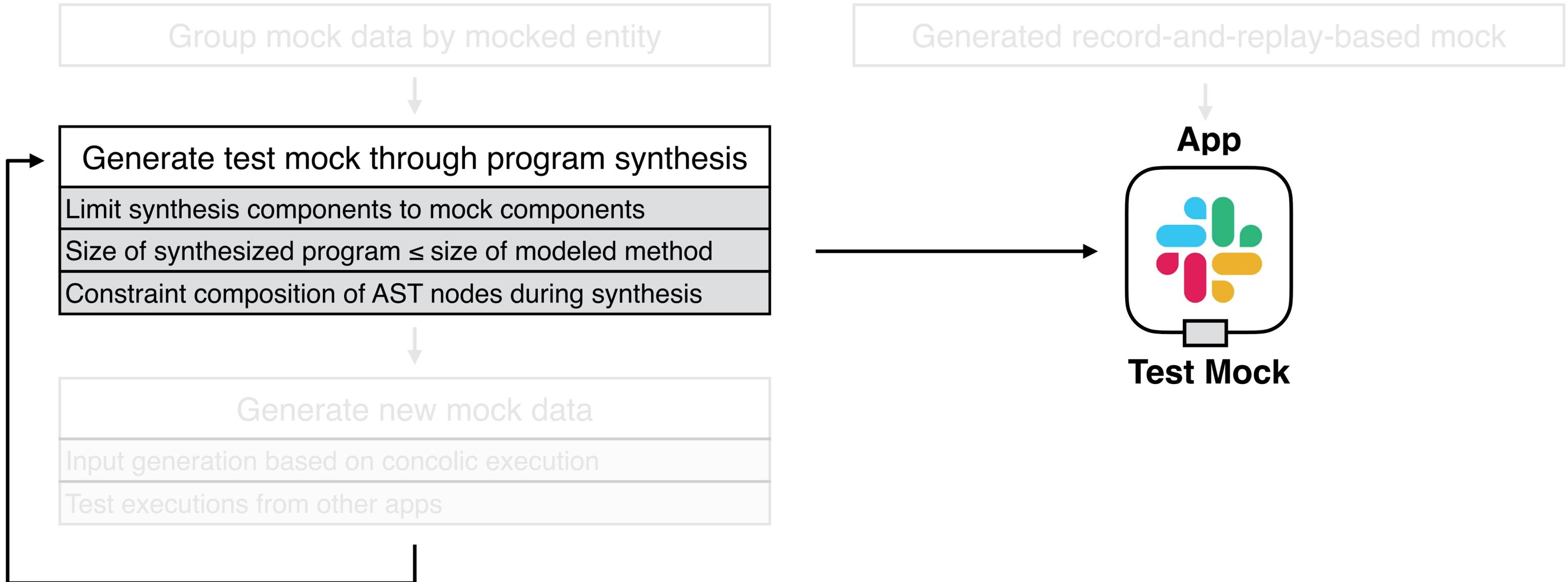
Iterative Mock Generation Process



Test Mock Generation

2

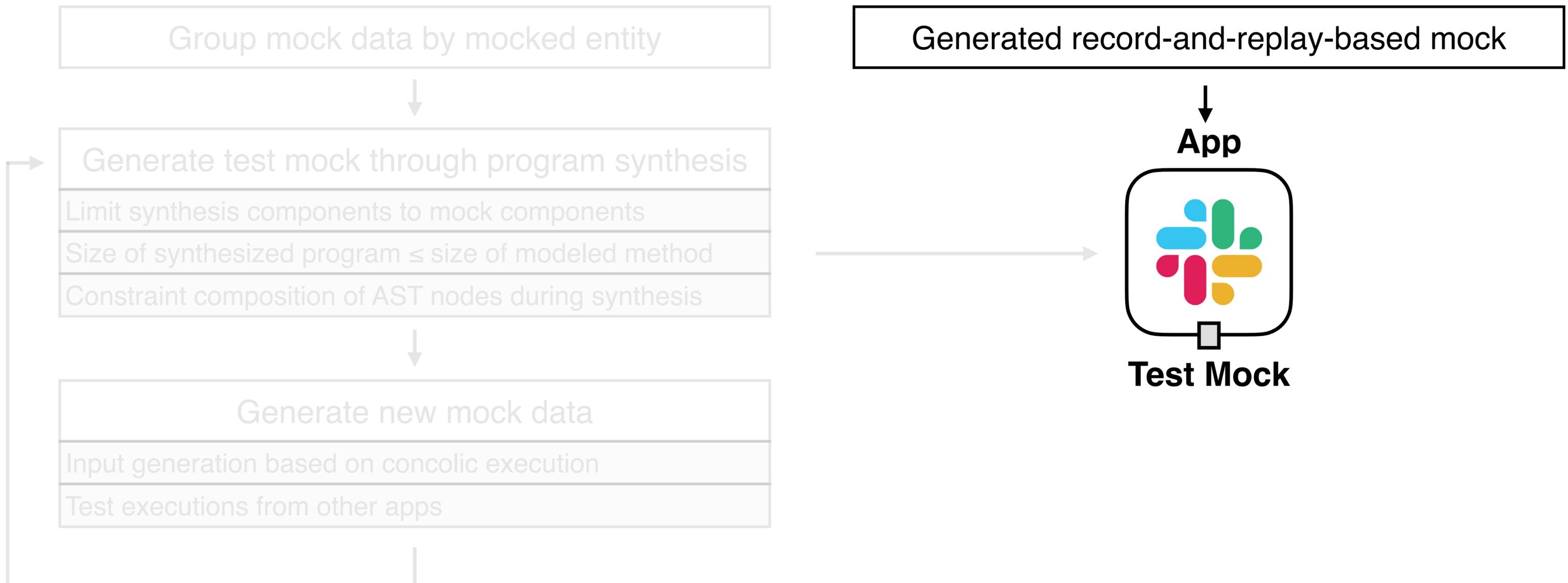
Iterative Mock Generation Process



Test Mock Generation

2

Iterative Mock Generation Process



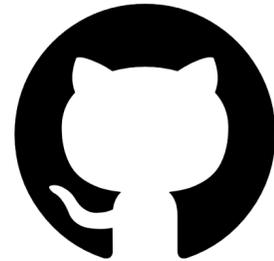
Preliminary Empirical Study

Analyzed tests and test mocks in mobile apps

F-Droid



GitHub



1,220 Apps



20% of the apps have tests, for a total of **11,487** tests

Preliminary Empirical Study - Test Mocks

<i>Name</i>	<i>Tests</i>	<i>TMs</i>	<i>AFTMs</i>	<i>ATMs</i>	<i>TLPTMs</i>
CINELOG	152	285	23	210	52
EVENTYAY	477	268	111	146	11
WiFiANALYZER	708	206	91	85	30
K-9 MAIL	536	135	20	104	11
MATERIALISTIC	312	97	24	49	24
SMS BACKUP+	217	75	11	53	11
DNS66	66	60	45	15	0
ANKIDROID	248	38	26	11	1
SMSSync	23	32	2	16	14
LOOP HABIT	277	32	0	32	0
COMMONS	21	32	30	2	0
OPEN KEYCHAIN	217	30	15	15	0
WIKIPEDIA	365	24	0	24	0
WEB OPAC	16	23	8	14	1
PAGETURNER	24	20	1	19	0
OPENFOODFACTS	155	20	2	18	0
FREEOTP	28	19	19	0	0
OANDBACKUP	57	3	3	15	0
CALCULATE!	101	9	9	8	0
ANYMEMO	139	1	1	14	0
	<i>4139</i>	<i>1446</i>	<i>441</i>	<i>850</i>	<i>155</i>

TMs = Test Mocks

AFTMs = Android Framework Test Mocks

ATMs = App Test Mocks

TLPTMs = Third-party Library Test Mocks

30% of the test mocks model the Android framework

41% model Android framework+third party libraries

Future Work

Implement MOKA for Android apps

Evaluate MOKA on real-world apps

Evaluate re-use across versions and with new tests

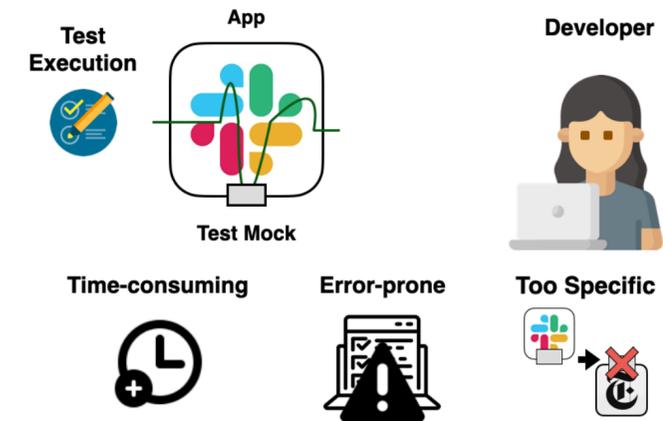
Evaluate time savings of MOKA's test mocks

Summary

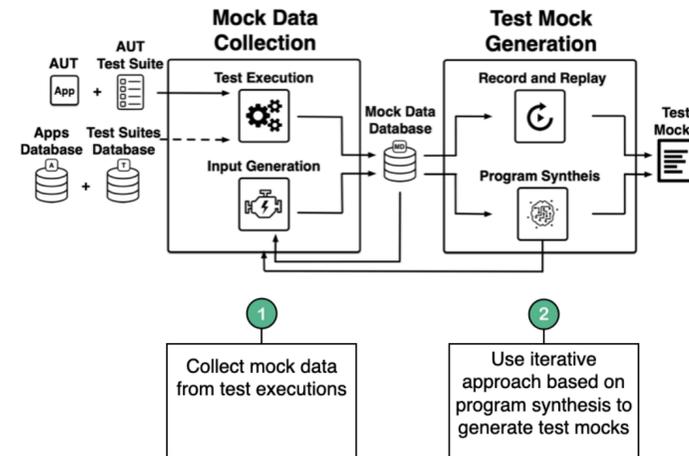
Software Environment



Test Mocks



MOKA Overview



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