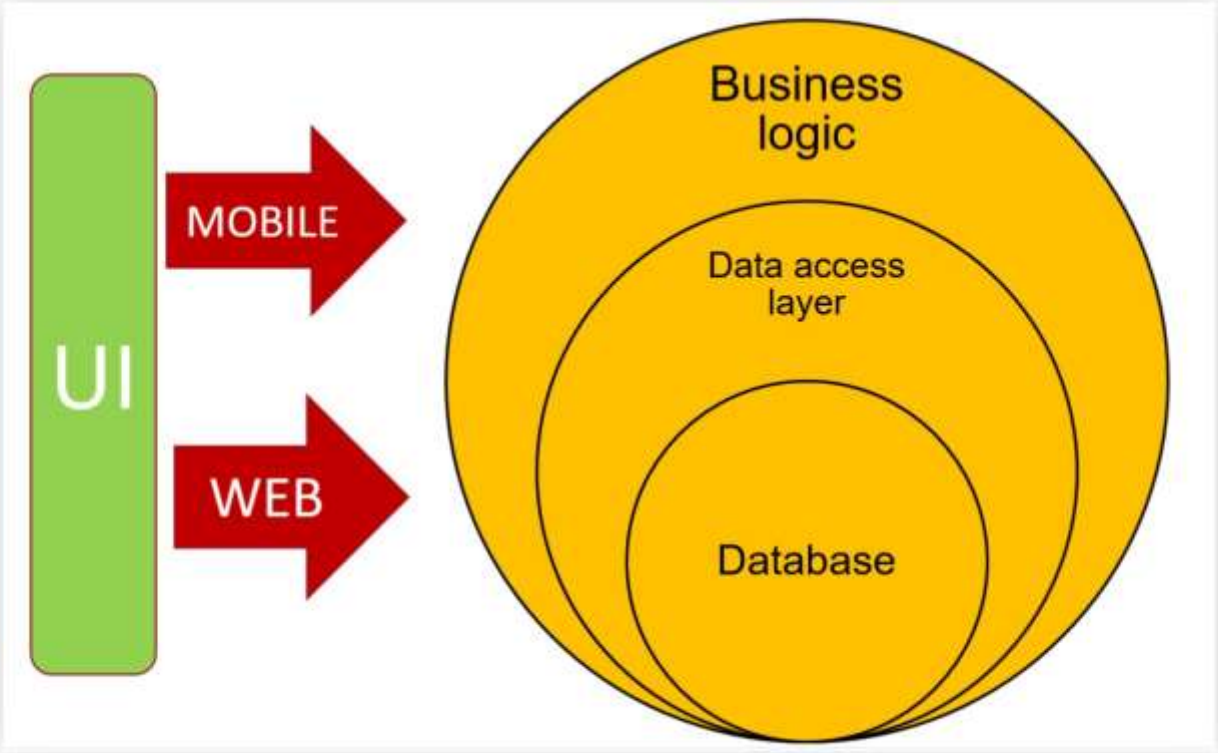
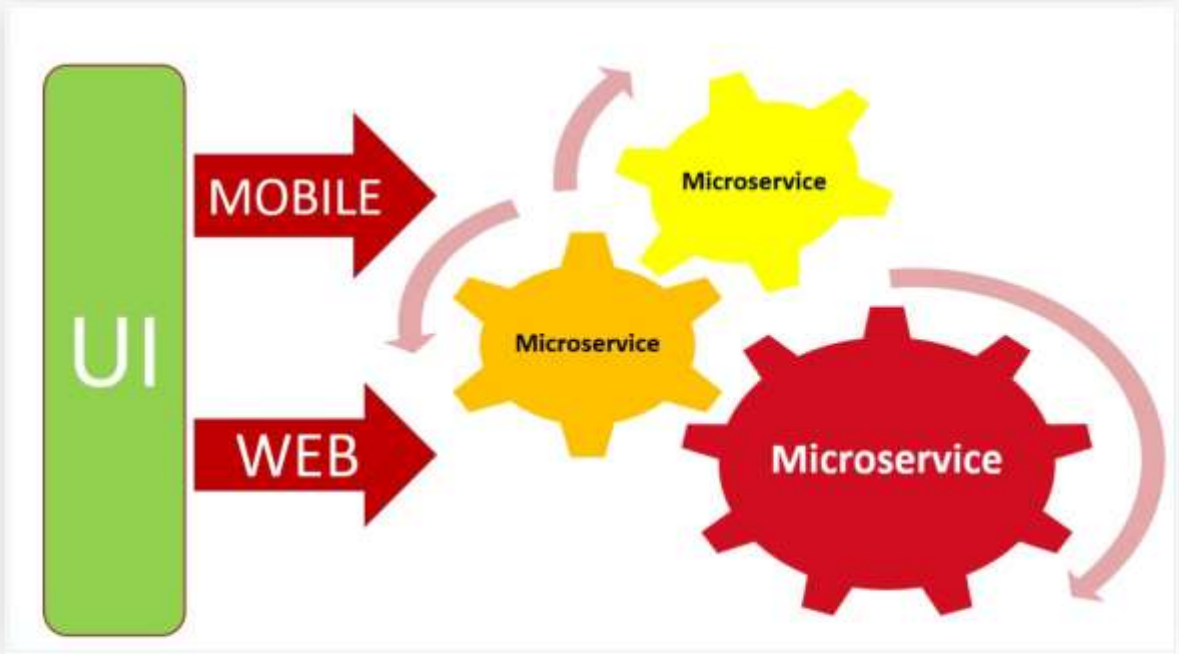
Practical contract testing with Spring Cloud Contract


Testing is not easy

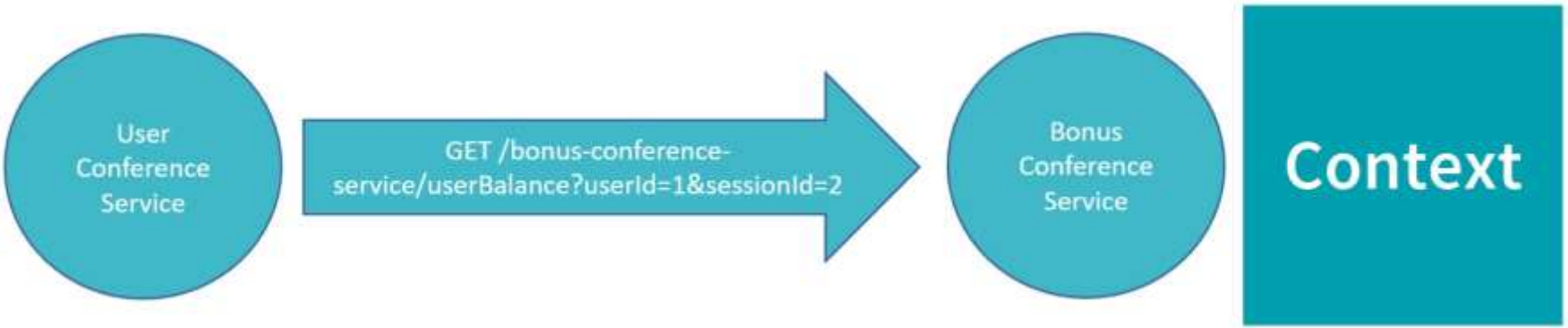
Monolith architecture



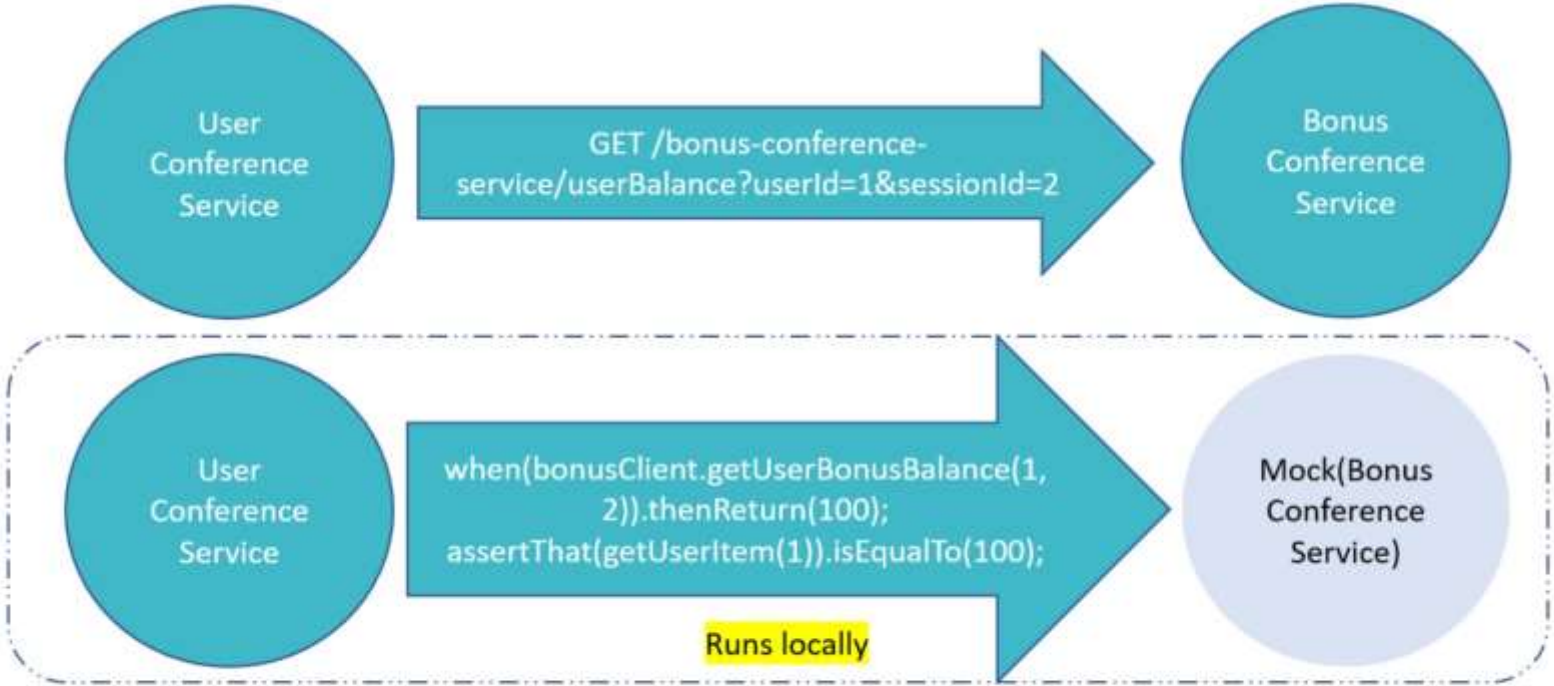
Microservices architecture



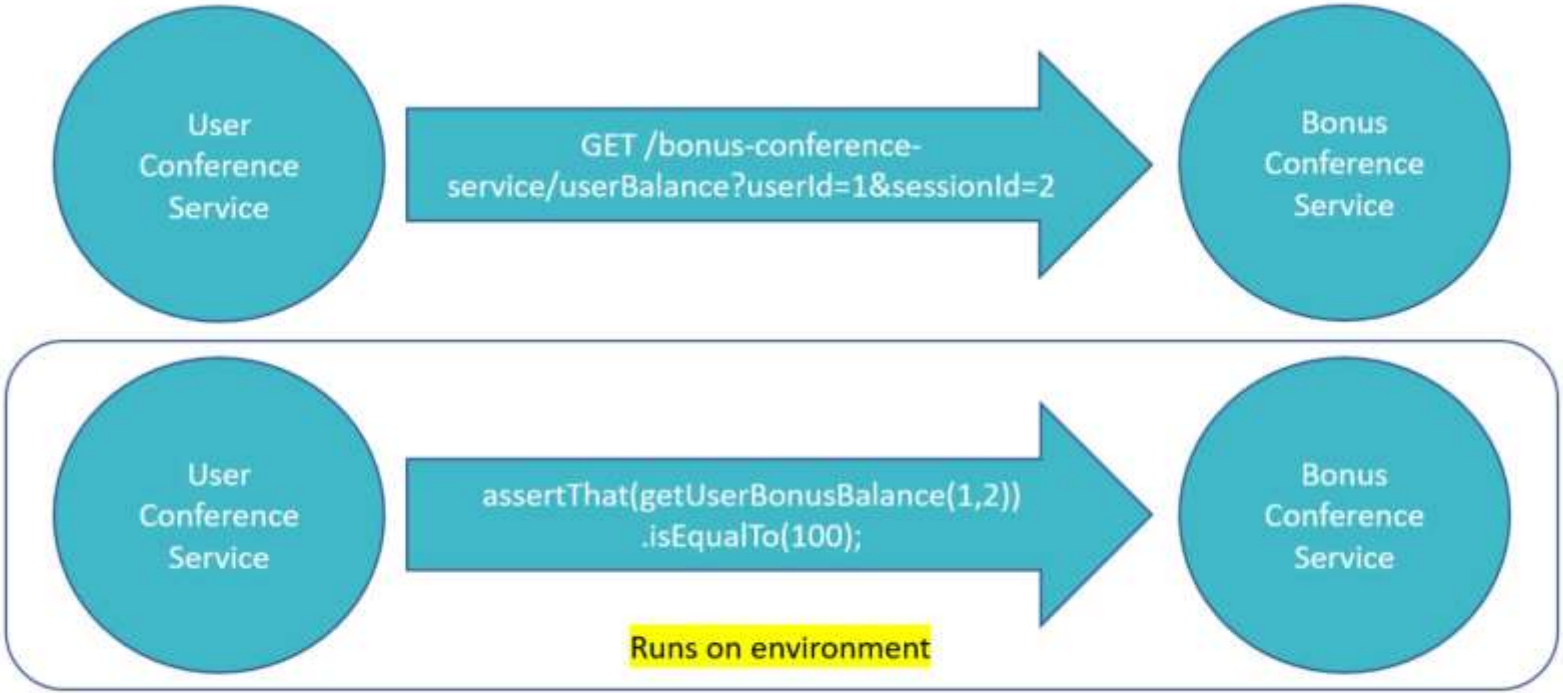

Let's play!


User
Conference
Service
GET /bonus-conference-
service/userBalance?userId=1&sessionId=2
Bonus
Conference
Service
Context

Unit test

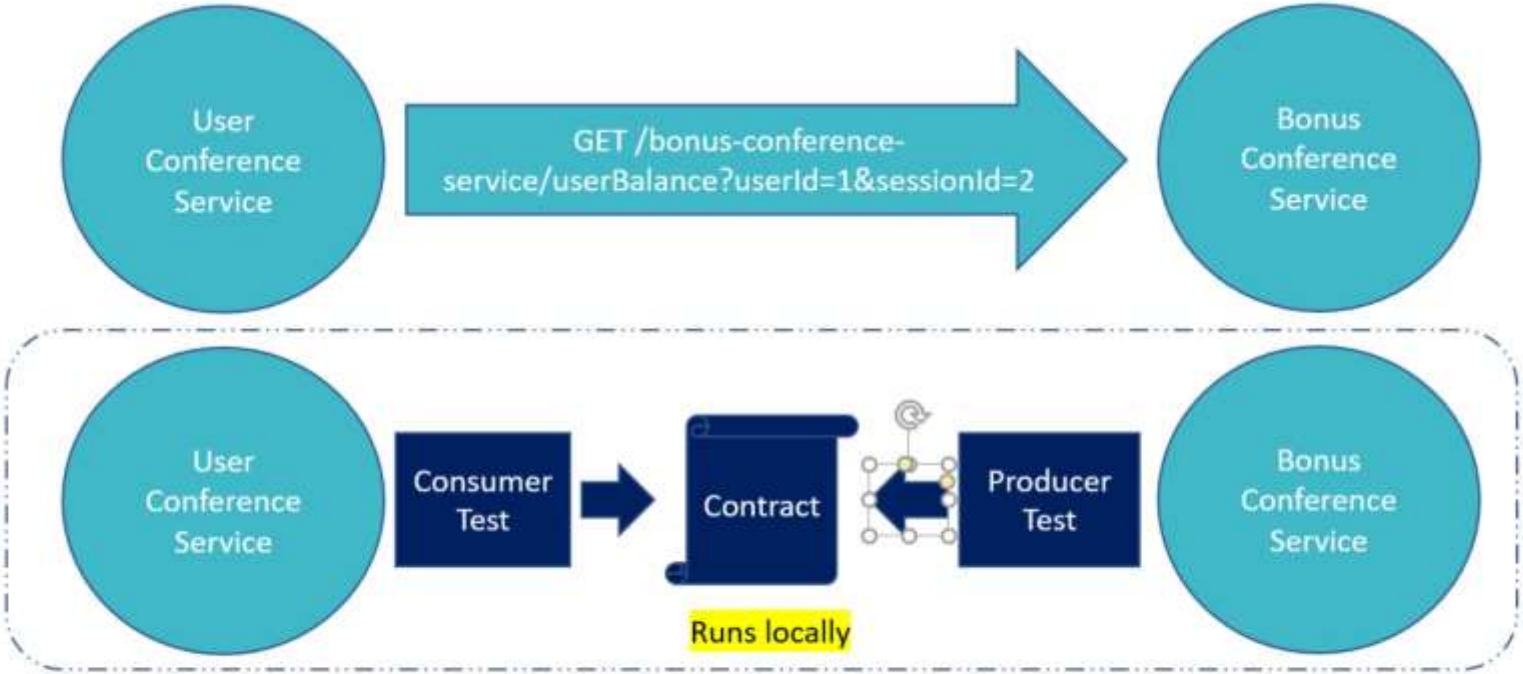

User Conference Service
GET /bonus-conference-service/userBalance?userId=1&sessionId=2
Bonus Conference Service
User Conference Service
when(bonusClient.getUserBonusBalance(1, 2)).thenReturn(100);
assertThat(getUserItem(1)).isEqualTo(100);
Mock(Bonus Conference Service)
Runs locally

API test


User Conference Service
GET /bonus-conference-service/userBalance?userId=1&sessionId=2
Bonus Conference Service
User Conference Service
assertThat(getUserBonusBalance(1,2)) .isEqualTo(100);
Bonus Conference Service
Runs on environment


What should I choose?

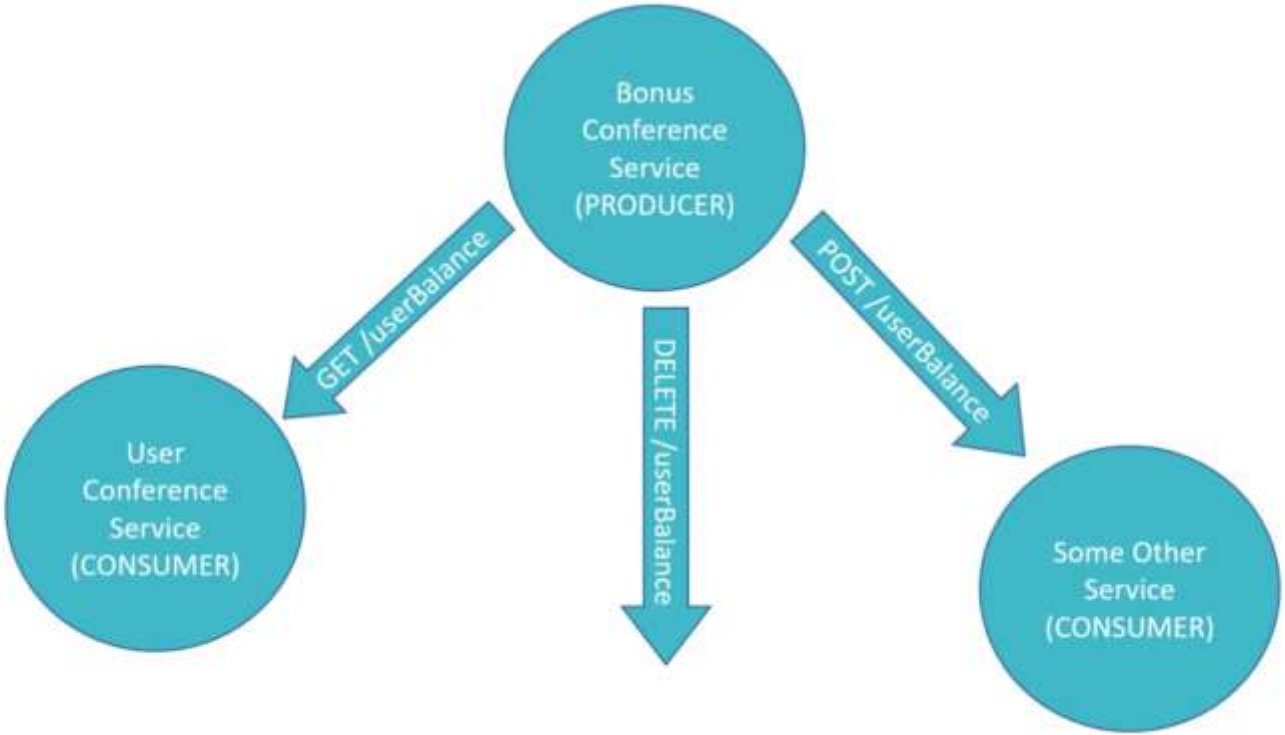
Contract testing to the rescue!



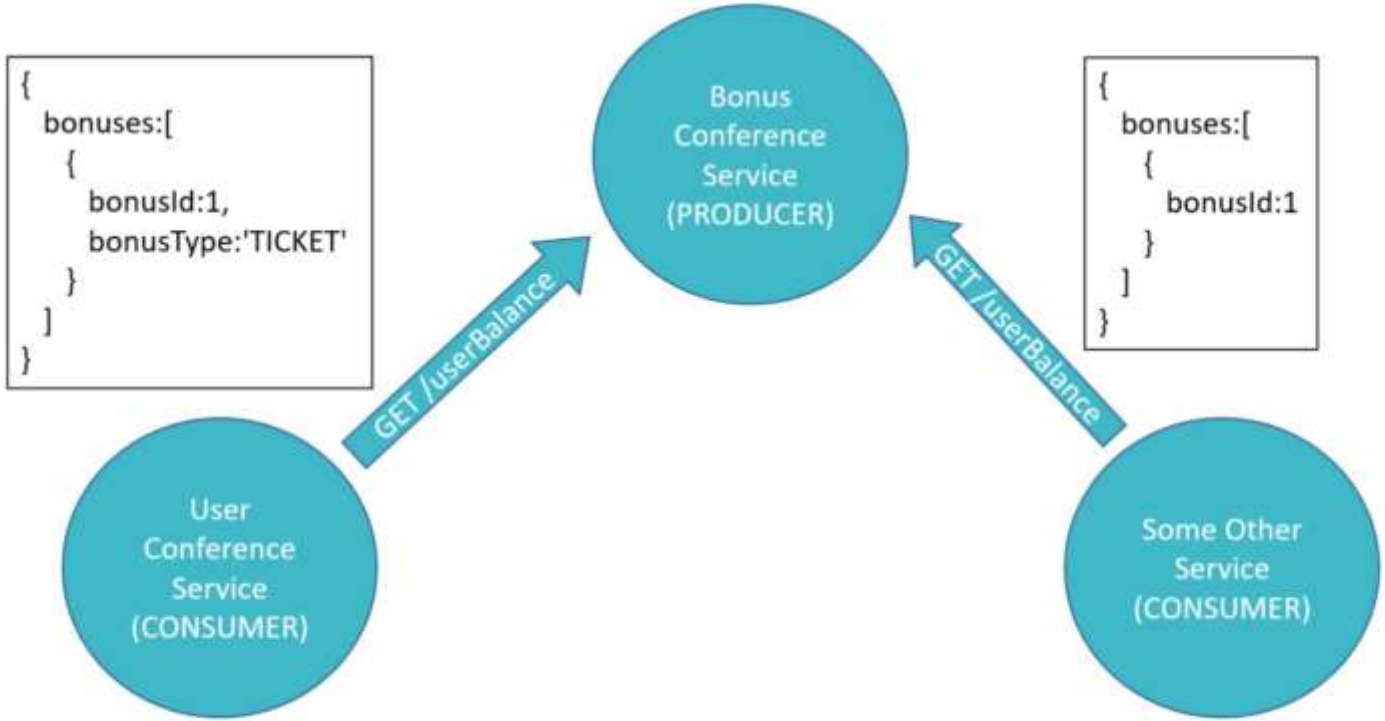
Why contract testing

ASPECT	UNIT	CONTRACT	API
WAY TO EXECUTE	LOCAL	LOCAL	ENVIRONMENT
FEEDBACK TIME	FAST	MEDIUM	SLOW
SETUP COMPLEXITY	LOW	MEDIUM	HIGH
CHANGE TOLERANCE	NO	YES	YES
CHECK FUNCTIONALITY	YES	NO	YES
CROSS-TEAM COLLABORATION	NO	YES	YES

Producer-driven contract testing



Consumer-driven contract testing



Toolset in Java

Spring Cloud
Contract

PACTS


Get some REST

REST: CONTRACT

```
Contract.make {
    description( description: """Should return bonuses for specific conference user""")
    request {
        method method: 'GET'
        urlPath($(consumer( clientValue: '/bonus-conference-service/userBalance'),
                producer( clientValue: '/userBalance'))
        ) {
            queryParameters {
                parameter 'userId': $(consumer(regex( regex: '\\d+')),
                        producer( clientValue: 777))
                parameter 'sessionId': $(consumer(regex( regex: '\\d+')),
                        producer( clientValue: 777))
            }
        }
    }
```

REST: CONTRACT

```
response {
    status status: 200
    body(
            "bonuses": [[
                                    "bonusId"     : $(consumer( clientValue: 1L),
                                            producer(positiveInt())),
                                    "bonusType": $(consumer( clientValue: "TICKET"),
                                            producer(anyNonEmptyString()))
                            ],
                    ])
    headers {
        contentType(applicationJsonUtf8())
    }
}
```

REST: CONTRACT

```
Contract.make {
    description( description: """Should return bonuses for specific conference user""")
    request {
        method  method: 'GET'
        urlPath($(consumer( clientValue: '/bonus-conference-service/userBalance'),
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                            ],
                        ]]
        )
        headers {
            contentType(applicationJsonUtf8())
        }
    }
}
```
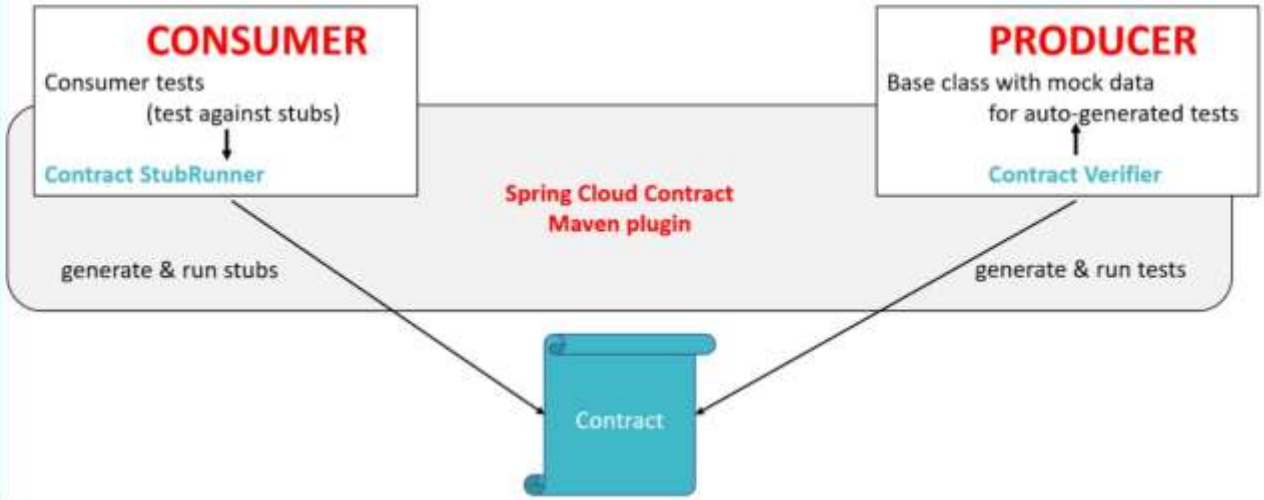

- Groovy / YAML / Kotlin DSLs
- Verify only format of request and response
- Use regular expressions

HOW SPRING CLOUD CONTRACT WORKS



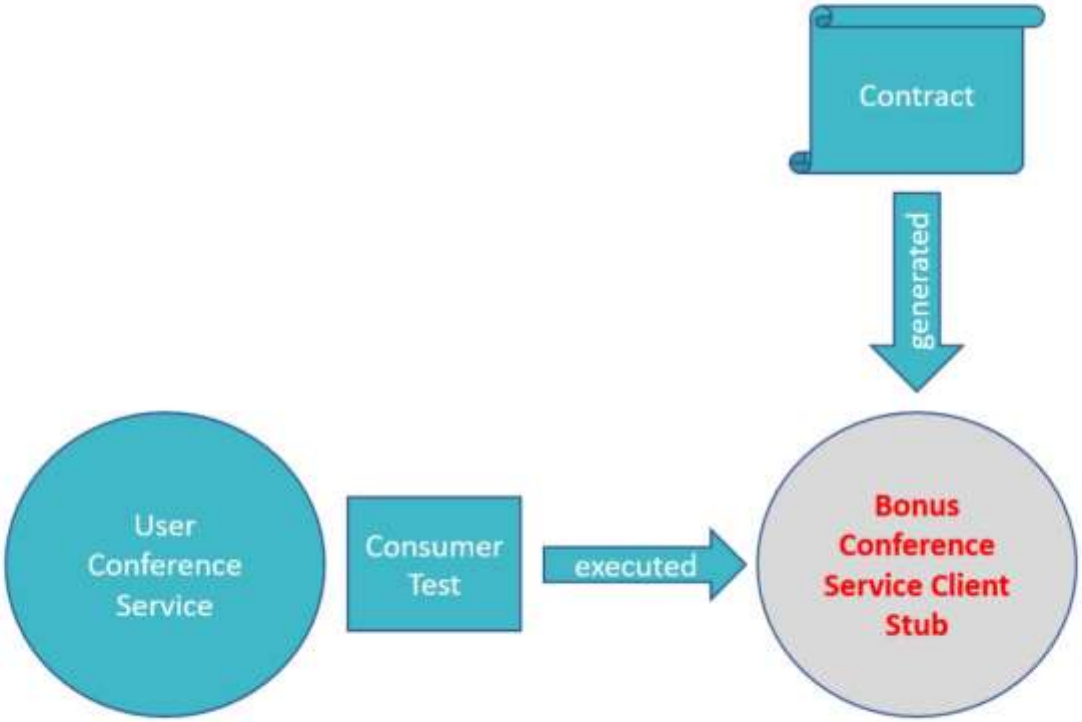
REST: CONSUMER TEST

```
@ClassRule
public static StubRunnerRule rule = new StubRunnerRule()
        .repoRoot("http://linktoartifactory.com")
        .downloadStub( ivyNotation: "com.yourcompany.contracts:bonus-conference-service:+:stubs")
        .withPort(STUB_RUNNER_PORT)
        .withConsumerName("user-conference-service")
        .withStubPerConsumer(true)
        .stubsMode(StubRunnerProperties.StubsMode.REMOTE);

@Autowired
private BonusConferenceClient bonusConferenceClient;
```

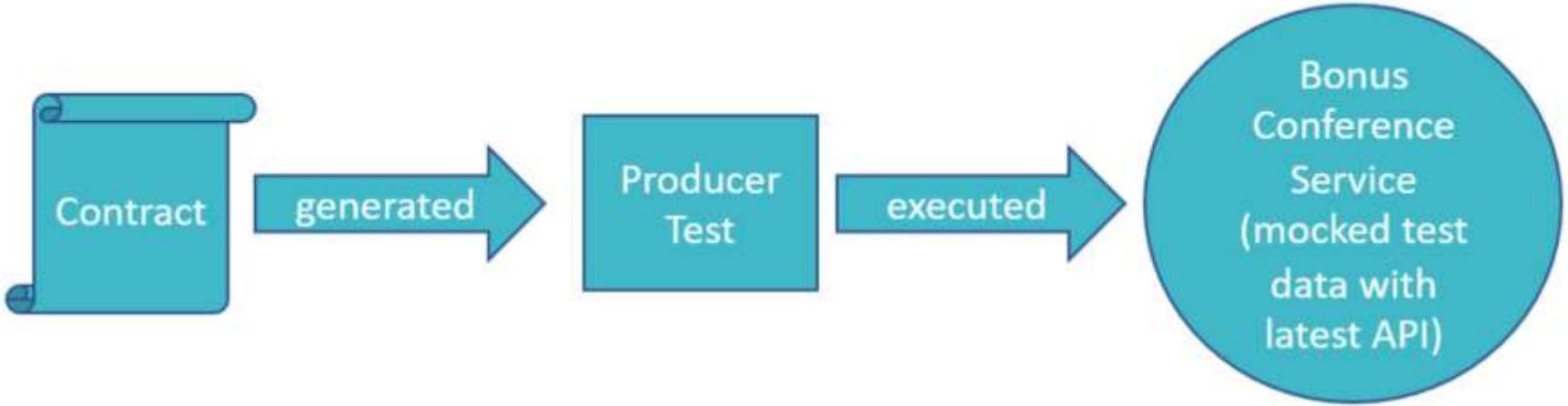
REST: CONSUMER TEST

```
@Test
public void shouldReturnConferenceBonusesForUser() {
    List<ConferenceBonusDto> userBonuses = bonusConferenceClient.getUserBonusBalance(USER_ID, SESSION_ID);
    assertThat(userBonuses).isNotEmpty().size().isNotEqualTo(0);
    ConferenceBonusDto bonus = userBonuses.get(0);
    assertThat(bonus.getBonusId()).isEqualTo(EXPECTED_BONUS_ID);
    assertThat(bonus.getBonusType()).isEqualTo(EXPECTED_BONUS_TYPE);
}
```

How consumer test works



How producer test works



REST: PRODUCER TEST

```
public class RestTest extends BalanceRestBase {

    @Test
    public void validate_shouldGetUserBonusBalance() throws Exception {
        // given:
            MockMvcRequestSpecification request = given();

        // when:
            ResponseOptions response = given().spec(request)
                    .queryParam( s: "userId", ...objects: "777")
                    .queryParam( s: "sessionId", ...objects: "777")
                    .get( s: "/userBalance");

        // then:
        assertThat(response.statusCode()).isEqualTo(200);
        assertThat(response.header( s: "Content-Type")).matches("application/json;charset=UTF-8.*");
        // and:
        DocumentContext parsedJson = JsonPath.parse(response.getBody().asString());
        assertThatJson(parsedJson).field("['bonusId']").isEqualTo(1);
        assertThatJson(parsedJson).field("['bonusType']").isEqualTo("TICKET");
    }
```

REST: PRODUCER TEST

```
@WebMvcTest(controllers = {
        UserBalanceInternalController.class,
        ExceptionHandlerController.class
})
public abstract class BalanceRestBase extends BaseContractTest {
    private static final long USER_ID = 1L;
    private static final long SESSION_ID = 2L;

    @MockBean
    private UserBalanceService userBalanceService;

    @Before
    public void setUp() {
        UserBonus bonus = UserBonus.builder().bonusId(1L).bonusType("TICKET").build();

        when(userBalanceService.getUserBonusBalance(USER_ID, SESSION_ID))
                .thenReturn(Collections.singletonList(bonus));
    }
}
```


What about messaging?

MESSAGING: CONTRACT

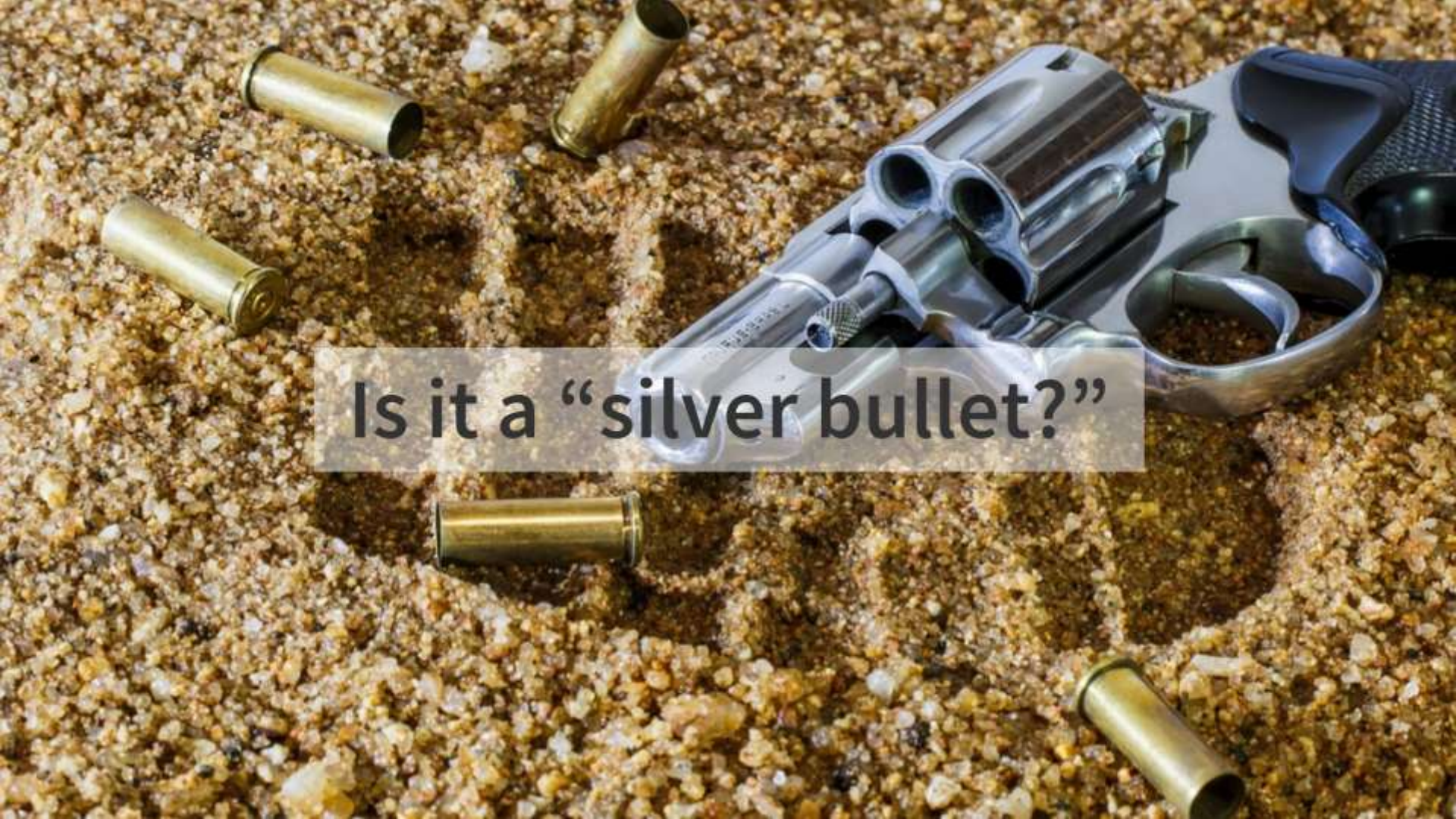
```
Contract.make {
    description( description: 'Should send a message in topic user_conference_balance_update')
    label  label: 'userConferenceBalanceUpdate'
    input {
        triggeredBy( triggeredBy: 'userConferenceBalanceUpdate()')
    }
    outputMessage {
        sentTo( sentTo: 'user_conference_balance_update')

        body([
                userId        : $(consumer( clientValue: 111), producer(~/\d+/)),
                sessionId     : $(consumer( clientValue: 222), producer(~/\d+/)),
                action     : $(consumer( clientValue: "WIN_CHALLENGE"), producer(~/.+/))
        ])
    }
}
```

MESSAGING: CONSUMER TEST

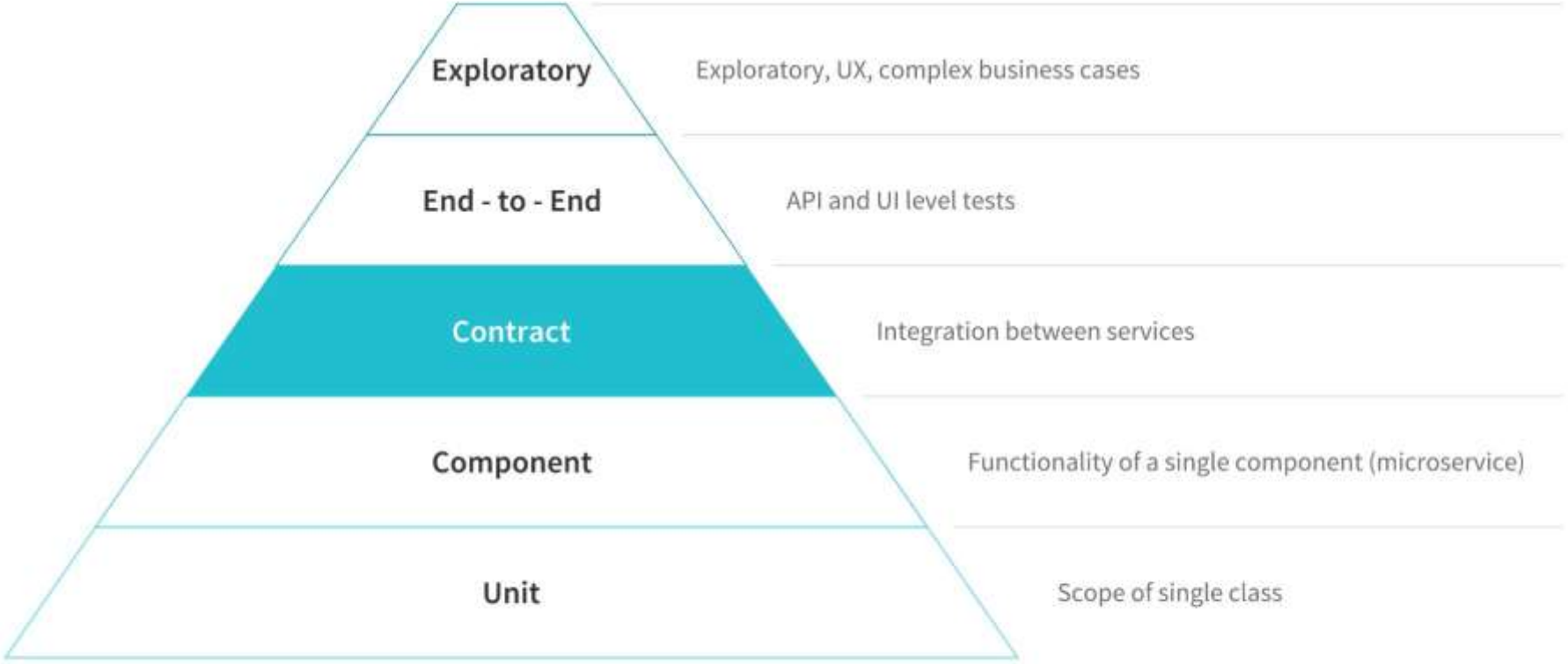
```
@RunWith(SpringRunner.class)
@SpringBootTest(classes = BonusConsumerMessagingTest.MessageListener.class,
        webEnvironment = SpringBootTest.WebEnvironment.NONE
)
@AutoConfigureStubRunner
@TestPropertySource("/messaging-contract-test.properties")
public class BonusConsumerMessagingTest {
    private static final String BONUS_UPDATE_MESSAGE_LABEL = "userConferenceBalanceUpdate";

    @Autowired
    MessageListener messageListener;

    @Autowired
    StubTrigger stubTrigger;

    @Test
    public void shouldReceiveStampCardMessage() {
        BonusUpdateMessage expectedUpdateMessage = BonusUpdateMessage.builder()
                                                                     .userId(111L)
                                                                     .sessionId(222L)
                                                                     .action("WIN_CHALLENGE")
                                                                     .build();

        stubTrigger.trigger(BONUS_UPDATE_MESSAGE_LABEL);

        assertThat(messageListener.balanceUpdateMessage).isEqualTo(expectedUpdateMessage);
    }
```

MESSAGING: PRODUCER TEST

```
@RunWith(SpringRunner.class)
@SpringBootTest(classes = BonusMessagingProducerBase.ContractConfiguration.class)
@TestPropertySource("/messaging-contract-test.properties")
@AutoConfigureMessageVerifier
public abstract class BonusMessagingProducerBase {
    @Autowired
    private BonusMessagingProducerBase.ChannelDefinition channelDefinition;

    @Autowired
    private MessagingServiceApi messagingServiceApi;

    public void userConferenceBalanceUpdate() {
        BonusUpdateMessage expectedUpdateMessage = BonusUpdateMessage.builder()
                                                                     .userId(111L)
                                                                     .sessionId(222L)
                                                                     .action("WIN_CHALLENGE")
                                                                     .build();
        channelDefinition.updateBonus().send(MessageBuilder.withPayload(expectedUpdateMessage).build());
    }
```


Is it a “silver bullet?”

Test pyramid for microservices



Contract testing challenges

Technical training

Process changes

Additional technical setup

Biggest challenge

Communication!


Is it for me?

Why you may not need contract testing :)

1. Communication between teams is broken
2. Need to substitute functional testing with contracts
3. Unit and component testing is missing
4. “Fancy thing to try”

Conclusions

Contract testing brings value

Changes are hard

Choose wisely

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QUESTIONS?
THANK YOU!