Deploy with Confidence!

Making your micro-services pay nicely together with Pact and Consumer Driven Contracts

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DIUS
WHERE IDEAS ARE ENGINEERED

Picture the scene

Monday Morning

9AM

You just got in to work

You haven’t had a coffee

You get pulled into a meeting

The weekends security roll-out failed

It broke everything in production

Due to a API change

Which you did not implement

And when you ask about it

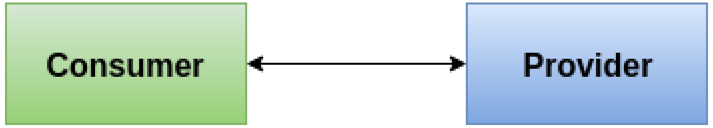
Didn’t you read the yammer post?

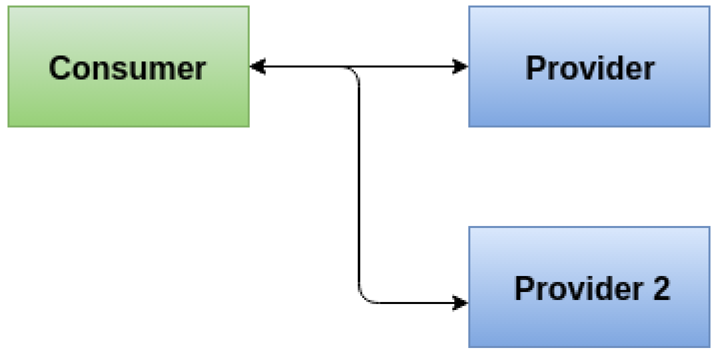
This is a real story

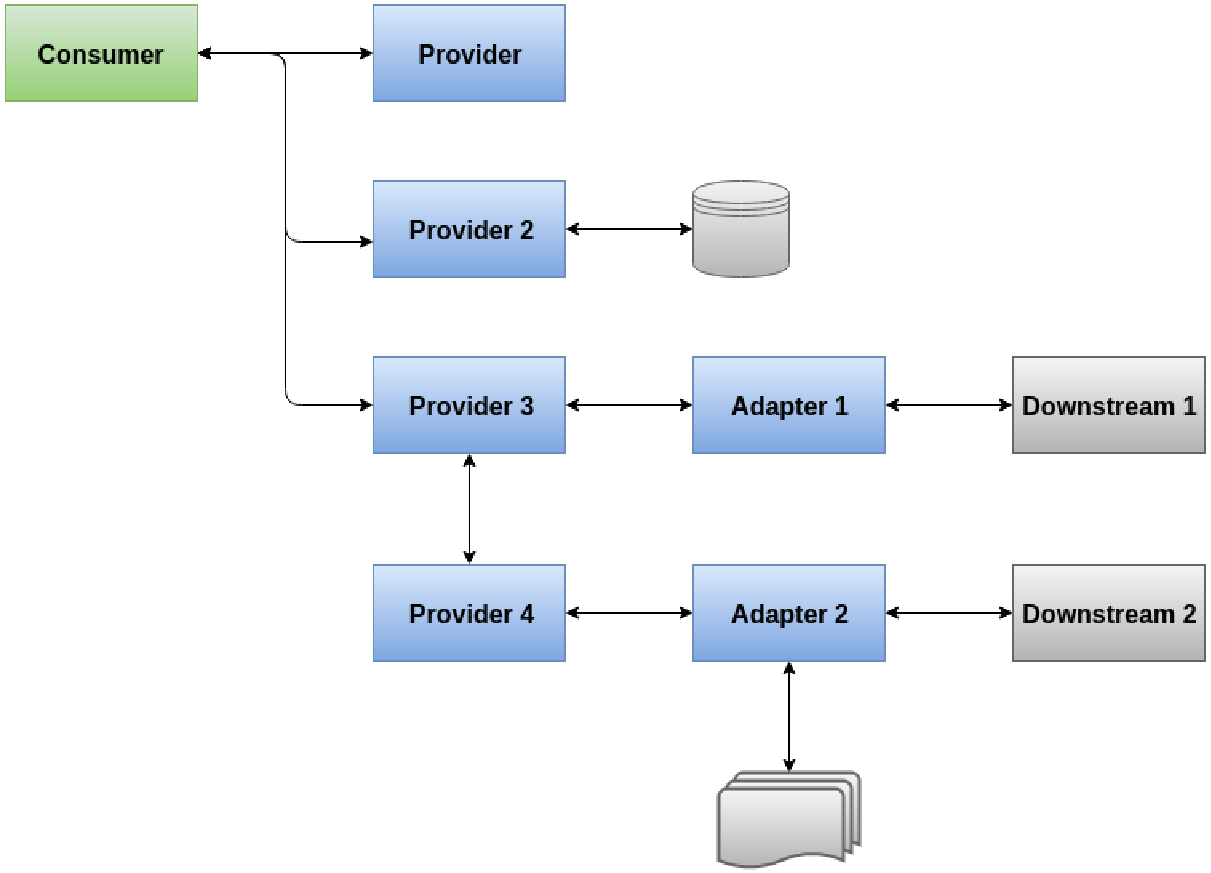
Kind of

`What we got here is a failure to communicate`

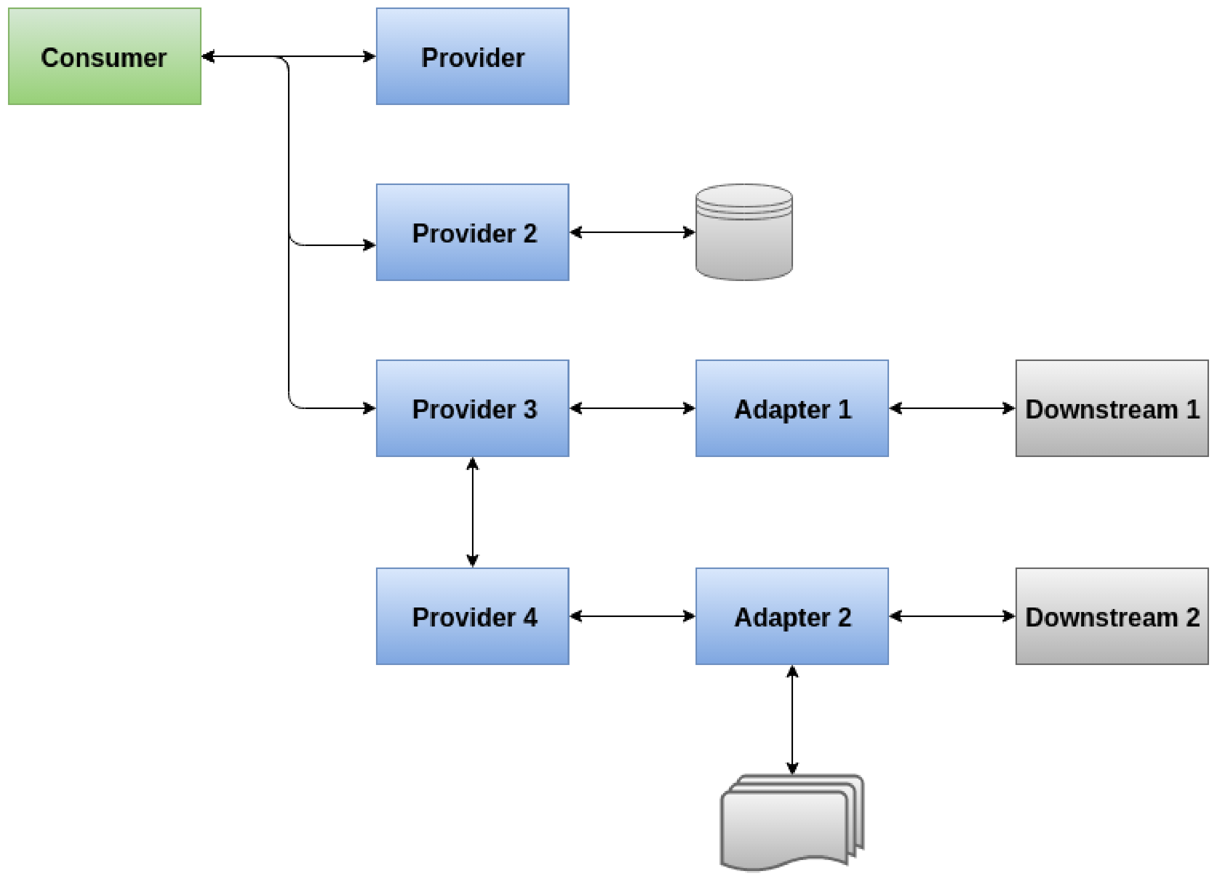
Everyone's moving to micro-services


Consumer
Provider


Consumer
Provider
Provider 2

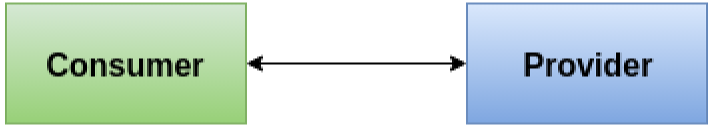

Consumer
Provider
Provider 2
Provider 3
Adapter 1
Downstream 1
Provider 4
Adapter 2
Downstream 2

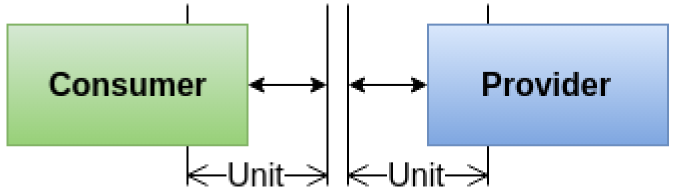
How do you test this?

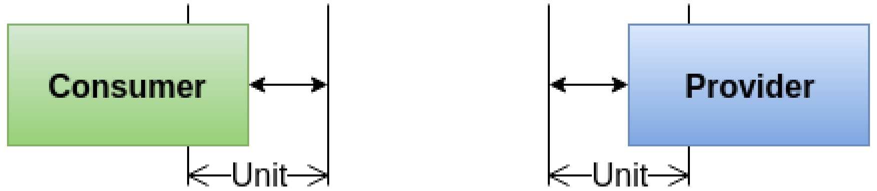

Consumer
Provider
Provider 2
Provider 3
Adapter 1
Downstream 1
Provider 4
Adapter 2
Downstream 2

`Integration tests are a scam`

J.B. Rainsberger

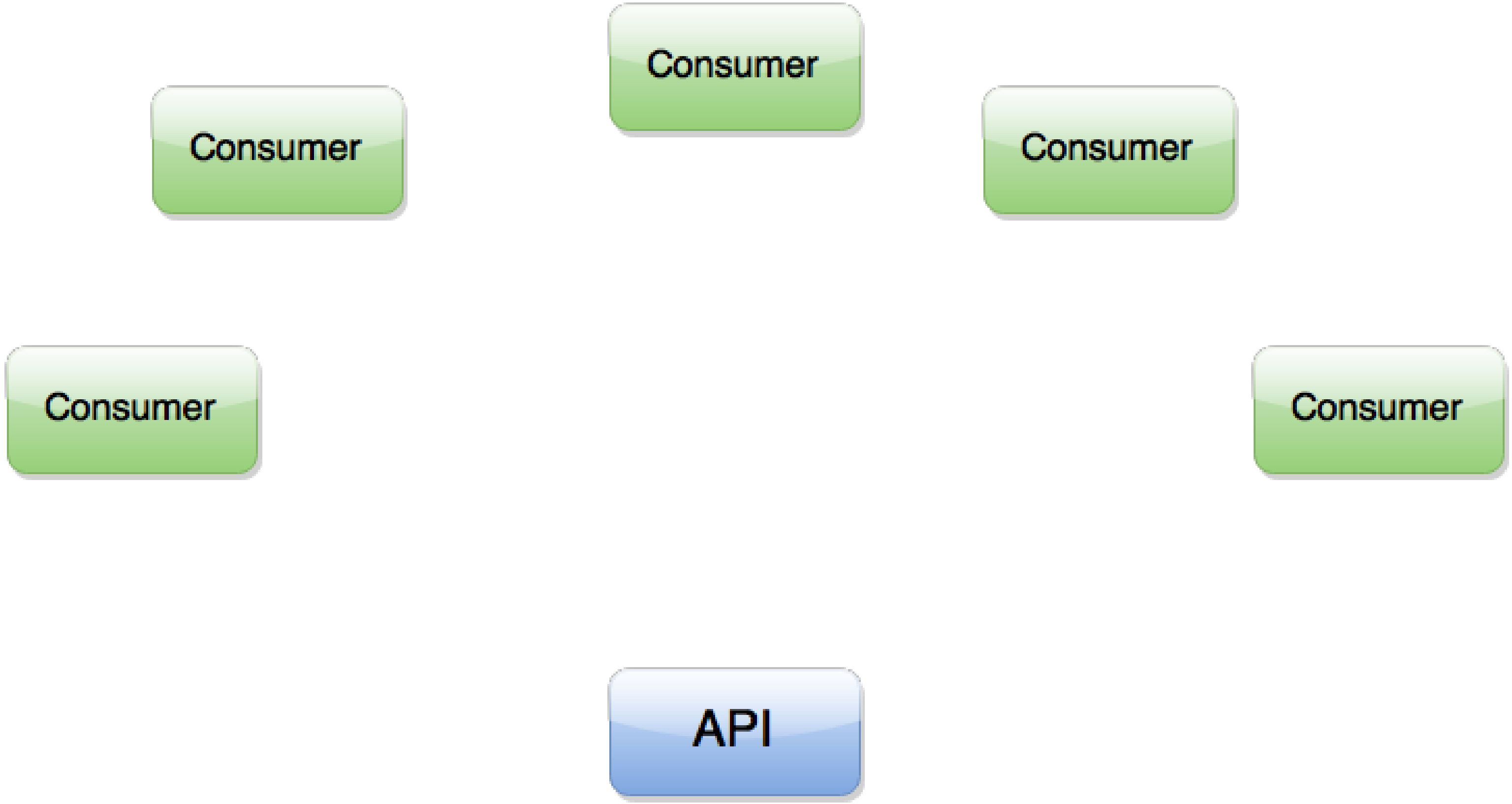

Consumer
Provider

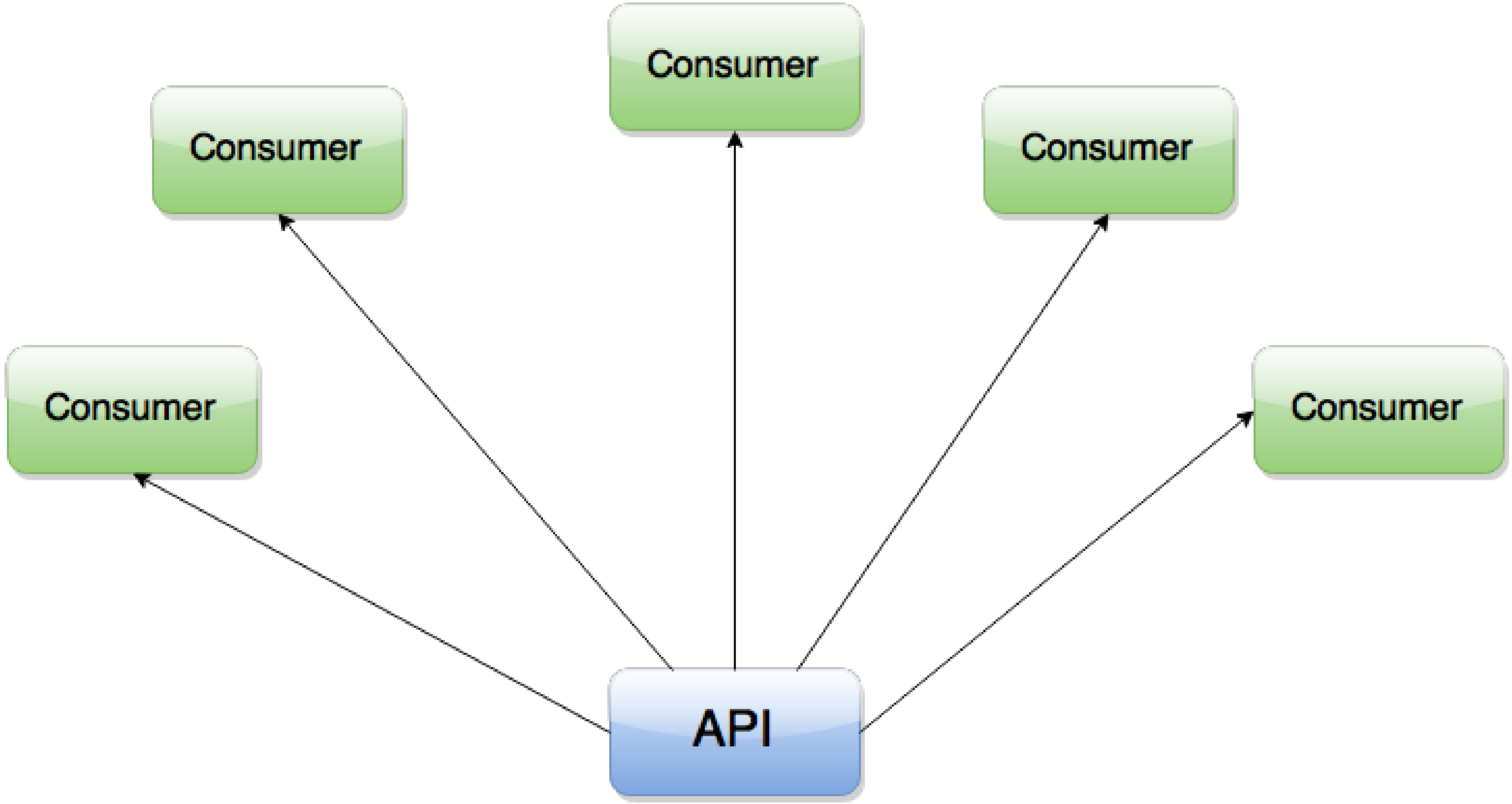

Consumer
Provider
Unit
Unit

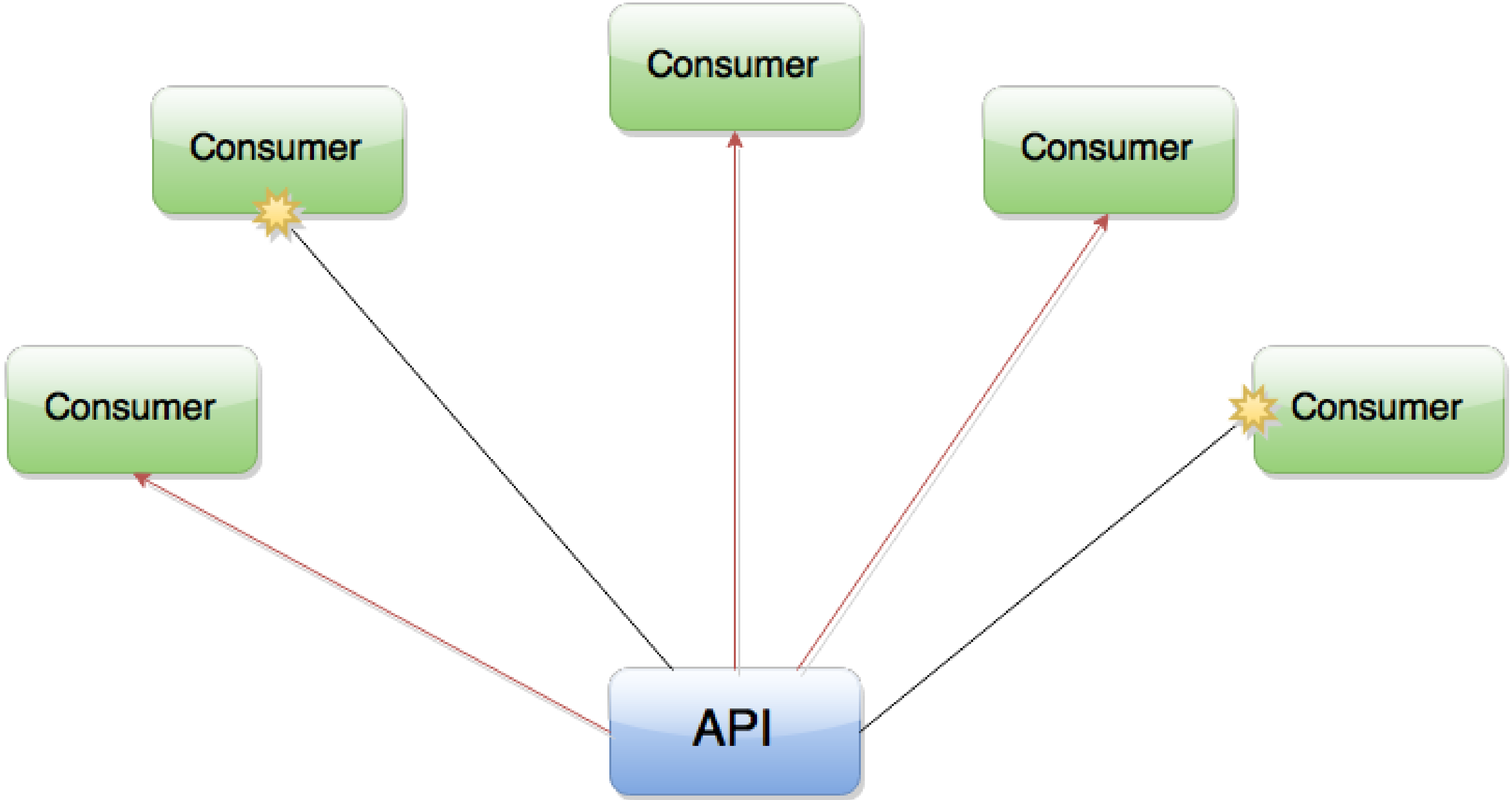

Consumer
Unit
Unit
Provider

Consumer Driven Contracts

API


Consumer
Consumer
Consumer
Consumer
Consumer
API


Consumer
Consumer
Consumer
Consumer
Consumer
API


Consumer
Consumer
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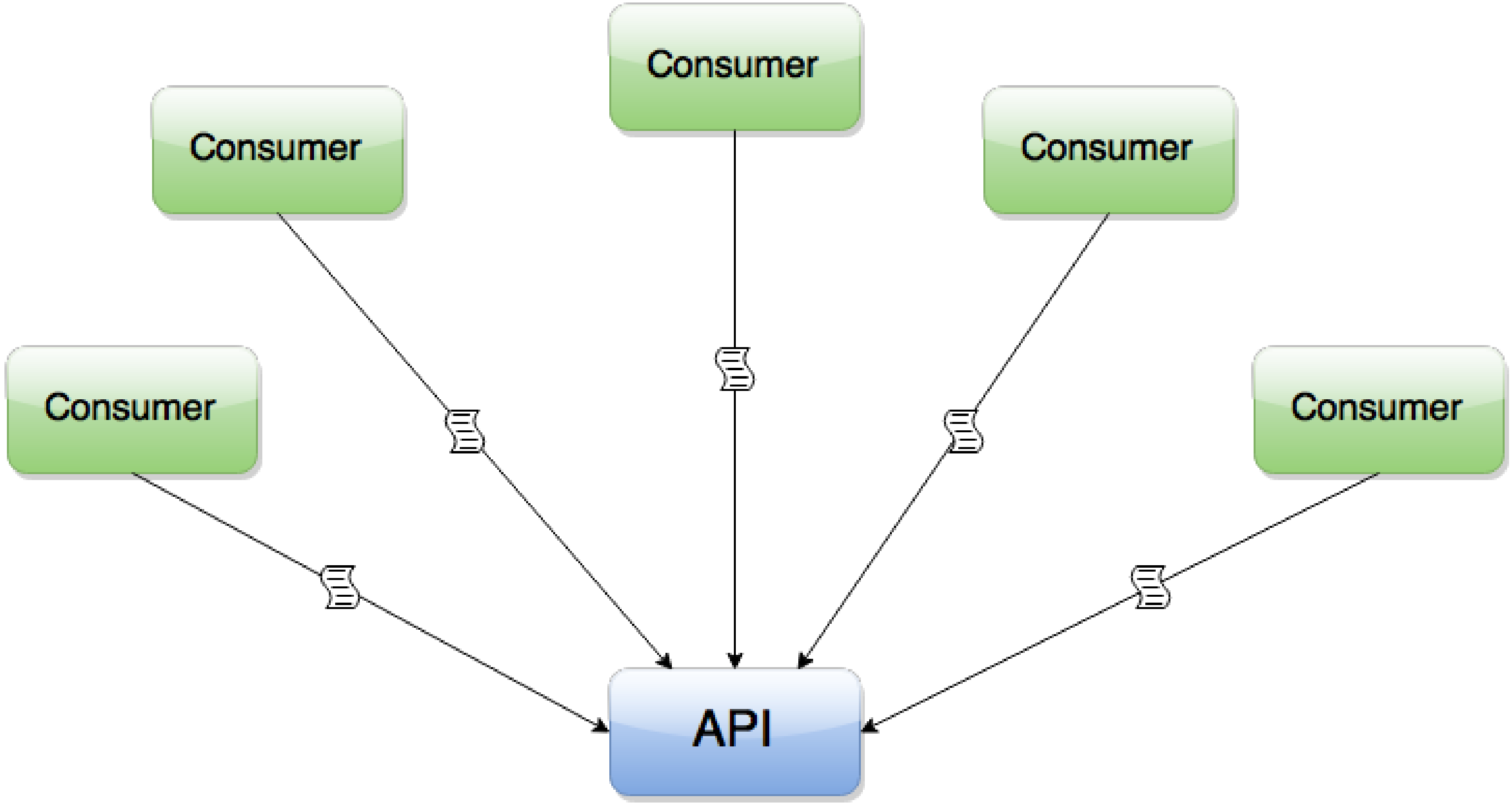
Consumer
Consumer
API


Consumer
Consumer
Consumer
Consumer
Consumer
API

Benefits?

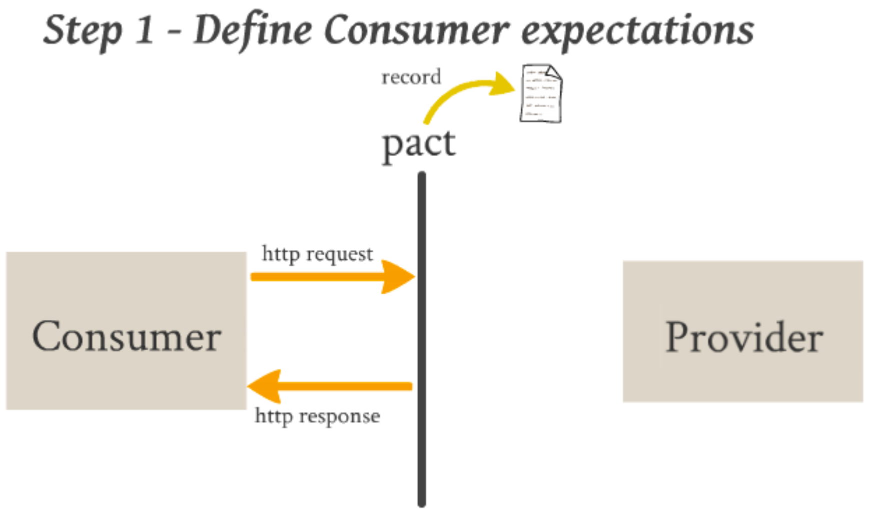
You’ll know when you break a consumer

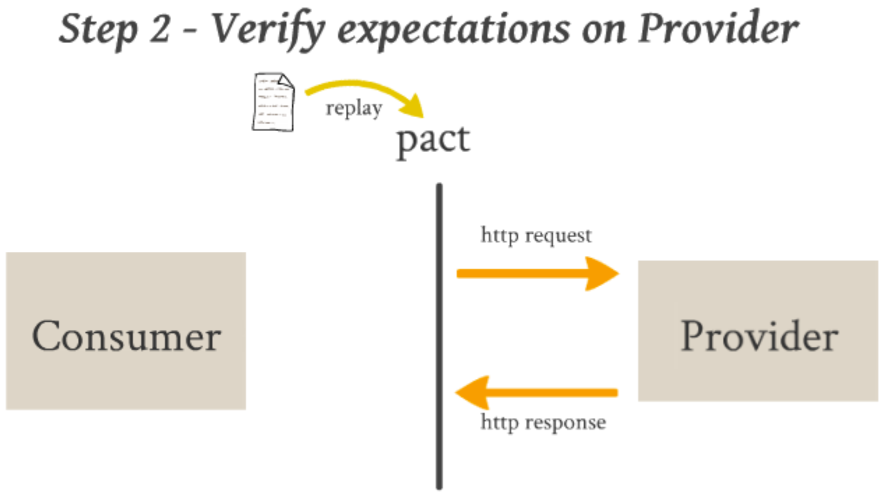
You have a form of documentation

Pact

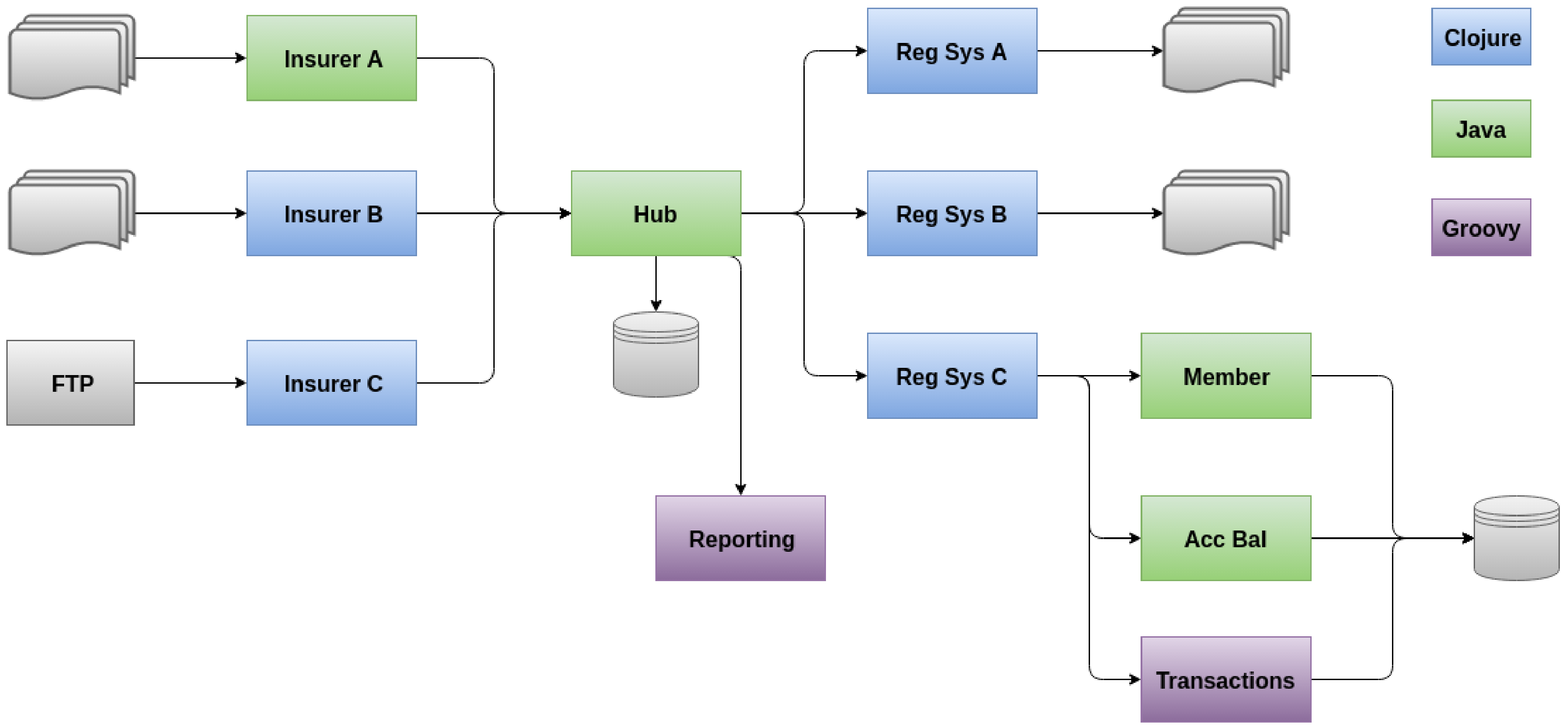
www.pact.io

Evolved from combining these two principals


Step 1 - Define Consumer expectations
record
pact
http request
Consumer
http response
Provider

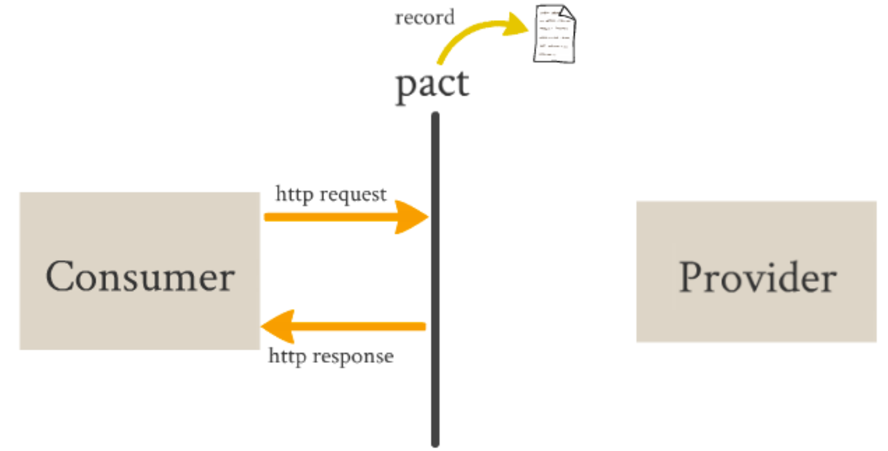

Step 2 - Verify expectations on Provider
replay
pact
http request
Consumer
Provider
http response

NO

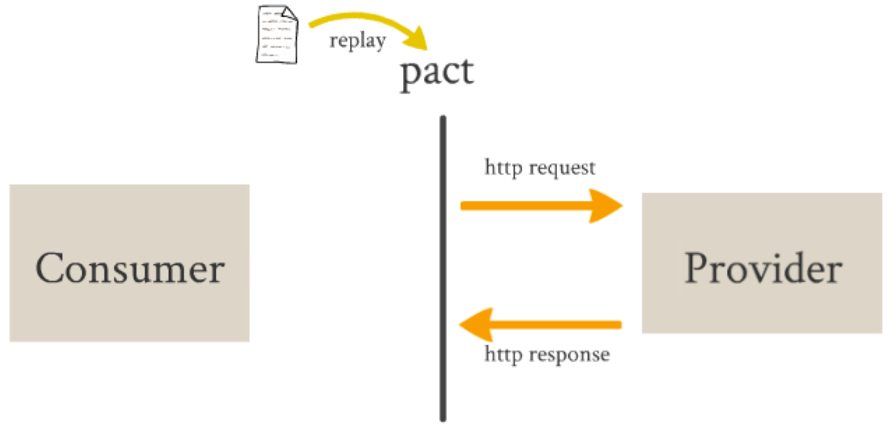

Insurer A
Insurer B
FTP
Insurer C
Hub
Reporting
Reg Sys A
Reg Sys B
Reg Sys C
Member
Acc Bal
Transactions
Clojure
Java
Groovy

So how does it work?

Step 1 - Define Consumer expectations



Step 2 - Verify expectations on Provider



Start with a consumer test

Given “some state exists”

When I Receive “a GET request for data”

With “these headers and query”

Respond with “200 OK”

And “this data in the body”

Given **“User A exists”**

When I Receive **“a GET request for user A”**

Respond with **“200 OK”**

And **“User A’s details in the body”**

Given “User A does not exist”

When I Receive “a GET request for user A”

Respond with “404 Not Found”

Ruby

JVM (Java, Groovy, Scala, Clojure)

.Net (1.1)

JavaScript/Node.js (Mocha, Jasmine)

Rust/Go/Python/PHP

Java Example

```java
@Rule
public PactProviderRule provider = new PactProviderRule("test_provider", "localhost", 8080, this);

@Pact(provider="test_provider", consumer="test_consumer")
public PactFragment createFragment(PactDslWithProvider builder) {
    Map<String, String> headers = new HashMap<String, String>();
    headers.put("testreqheader", "testreqheadervalue");

    return builder
        .given("test state")
        .uponReceiving("ExampleJavaConsumerPactRuleTest test interaction")
            .path("/")
            .method("GET")
            .headers(headers)
        .willRespondWith()
            .status(200)
            .headers(headers)
            .body("{\"responsetest\": true, \"name\": \"harry\"}")
        .given("test state")
        .uponReceiving("ExampleJavaConsumerPactRuleTest second test interaction")
            .method("OPTIONS")
            .headers(headers)
            .path("/second")
            .body("")
        .willRespondWith()
            .status(200)
            .headers(headers)
            .body("")
        .toFragment();
}

@Test
@PactVerification("test_provider")
public void runTest() throws IOException {
    Assert.assertEquals(new ConsumerClient("http://localhost:8080").options("/second"), 200);
    Map expectedResponse = new HashMap();
    expectedResponse.put("responsetest", true);
    expectedResponse.put("name", "harry");
    assertEquals(new ConsumerClient("http://localhost:8080").getAsMap("/", ""), expectedResponse);
}
```

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    expectedResponse.put("name", "harry");
    assertEquals(new ConsumerClient("http://localhost:8080").getAsMap("/", ""), expectedResponse);
}
```

Groovy Example

```groovy
    def 'example V3 spec test'() {
      given:
      def matcherService = new PactBuilder()
      matcherService {
        serviceConsumer 'MatcherConsumer'
        hasPactWith 'MatcherService'
        port 1234
      }

      matcherService {
        uponReceiving('a request')
        withAttributes(method: 'put', path: '/')
        withBody(mimeType: JSON.toString()) {
          name(~/\w+/, 'harry')
          surname regexp(~/\w+/, 'larry')
          position regexp(~/staff|contractor/, 'staff')
          id identifier('1234567890')
          age(100)

          role {
            name('admin')
            id(uuid)
            kind {
              id(100)
            }
            dob date('MM/dd/yyyy')
          }
        }
        willRespondWith(status: 200)
        withBody(mimeType: JSON.toString()) {
          name(~/\w+/, 'harry')
        }
      }
    when:
    VerificationResult result = matcherService.run(specificationVersion: PactSpecVersion.V3) {
      def client = new RESTClient('http://localhost:1234/')
      def response = client.put(requestContentType: JSON, body: [
          'name': 'harry',
          'surname': 'larry',
          'position': 'staff',
          'id': 6444667731,
          'age': 32,
          'role': [
            'name': 'admin',
            'id': '7a97e929-c5b1-43cf-9b2c-295e9d4fa3cd',
            'kind': [
              'id': 100
            ],
            'dob': '12/05/2015'
          ]
        ]
      )

      assert response.status == 200
      assert response.data == [name: 'harry']
    }

    then:
    result == PactVerified$.MODULE$
  }
```

Next publish your pacts

```
{
    "provider": {
        "name": "Alice Service"
    },
    "consumer": {
        "name": "Consumer"
    },
    "interactions": [
        {
            "providerState": "",
            "description": "a retrieve Mallory request",
            "request": {
                "method": "GET",
                "path": "/mallory",
                "query": "name=ron&status=good",
                "body": null
            },
            "response": {
                "status": 200,
                "headers": {
                    "Content-Type": "text/html"
                },
                "body": "\"That is some good Mallory.\""
            }
        }
    ],
    "metadata": {
        "pact-specification": {
            "version": "2.0.0"
        },
        "pact-jvm": {
            "version": "3.2.7"
        }
    }
}
```

PactBroker

Build Artifacts

S3

Version Control

Then verify your provider

Gradle

Maven

Leiningen

SBT

JUnit

Ruby (Rake)

.Net (xUnit)

JS (NPM, Grunt, …)

Go

```
Verifying a pact between sampleconsumer and Activity Service
 [Using file /home/ronald/Development/Projects/Pact/pact-gradle-test/src/test/resources/sample-pact.json]
 Given many activities exist
        WARNING: State Change ignored as there is no stateChange URL
 a request for activities
   returns a response which
     has status code 200 (OK)
     includes headers
       "Content-Type" with value "application/json" (OK)
     has a matching body (OK)

Verifying a pact between sampleconsumer2 and Activity Service
 [Using file /home/ronald/Development/Projects/Pact/pact-gradle-test/src/test/resources/sample-pact2.json]
 Given many activities exist
        WARNING: State Change ignored as there is no stateChange URL
 a request for activities
   returns a response which
     has status code 200 (OK)
     includes headers
       "Content-Type" with value "application/json" (OK)
     has a matching body (OK)

Verifying a pact between sampleconsumer3 and Activity Service
 [Using file /home/ronald/Development/Projects/Pact/pact-gradle-test/src/test/resources/sample-pact3.json]
 add a broker
   returns a response which
     has status code 200 (OK)
     includes headers
       "Content-Type" with value "text/plain;charset=UTF-8" (OK)
     has a matching body (OK)
:pactVerify

BUILD SUCCESSFUL
```

```
Verifying a pact between sampleconsumer and Activity Service
 [Using file /home/ronald/Development/Projects/Pact/pact-gradle-test/src/test/resources/sample-pact.json]
 Given many activities exist
        WARNING: State Change ignored as there is no stateChange URL
 a request for activities
   returns a response which
     has status code 200 (OK)
     includes headers
       "Content-Type" with value "application/json" (OK)
     has a matching body (FAILED)

Failures:

0) Verifying a pact between sampleconsumer and Activity Service - a request for activities Given many activities exist returns a
response which has a matching body
     $.body.activities -> Expected List(Map(description -> 100, id -> 100, name -> Bob)) to have minimum 2
     $.body.activities.0.description -> Expected 100 to be the same type as 'f_UXcxIXYhgqtxjiPumRiCo9C5JNDX'

     Diff:

     @3
             {
     -            "description": "f_UXcxIXYhgqtxjiPumRiCo9C5JNDX",
     -            "name": "hx55sbvMPk1kF-9"
     -        },
     -        {
     -            "description": "f_UXcxIXYhgqtxjiPumRiCo9C5JNDX",
     -            "name": "hx55sbvMPk1kF-9"
     +            "description": 100,
     +            "id": 100,
     +            "name": "Bob"
             }


:pactVerify_Activity Service FAILED

FAILURE: Build failed with an exception.

* What went wrong:
There were 1 pact failures for provider Activity Service
```

Well, that’s interesting ...

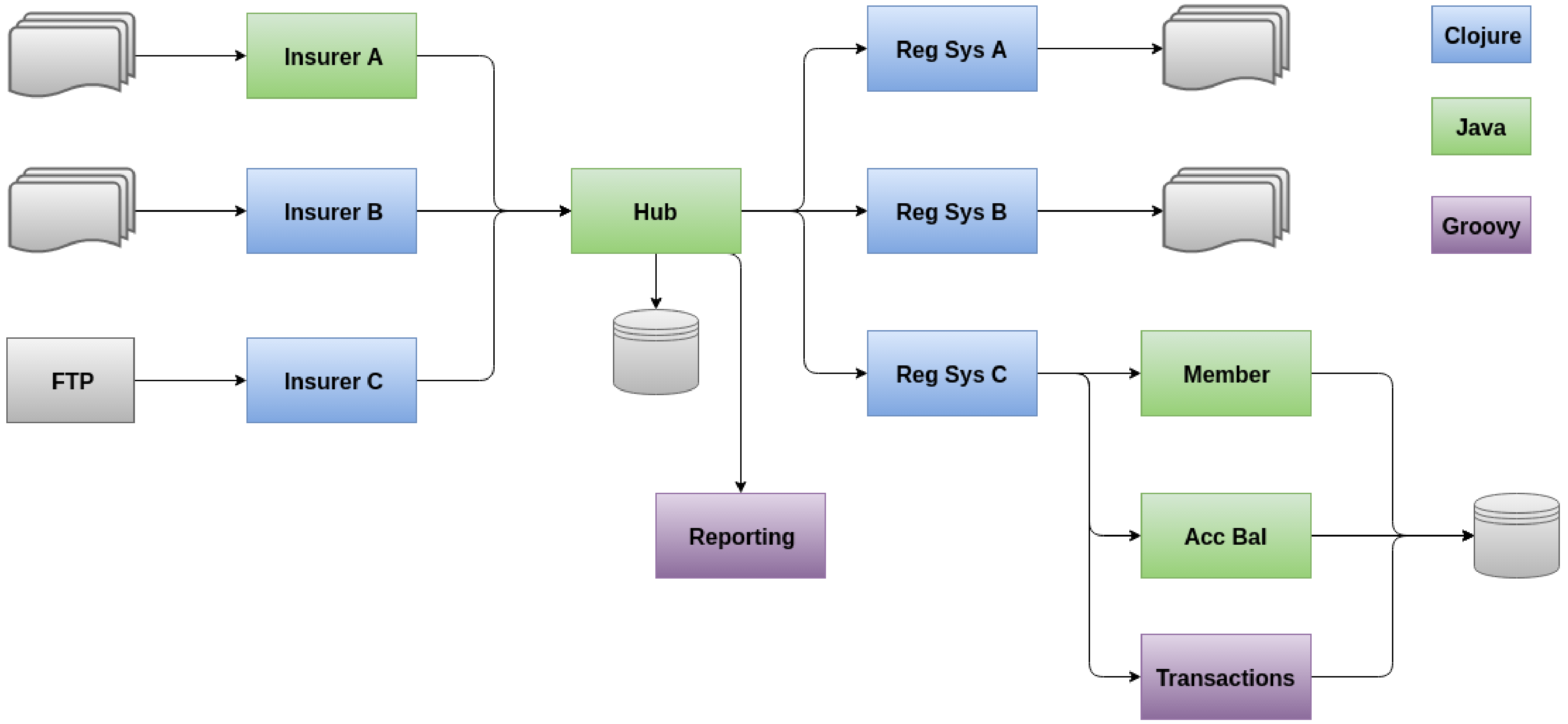
Specification by Example

TDD for services

But ...

A pitfall for every person

Isolated build data dependency


Insurer A
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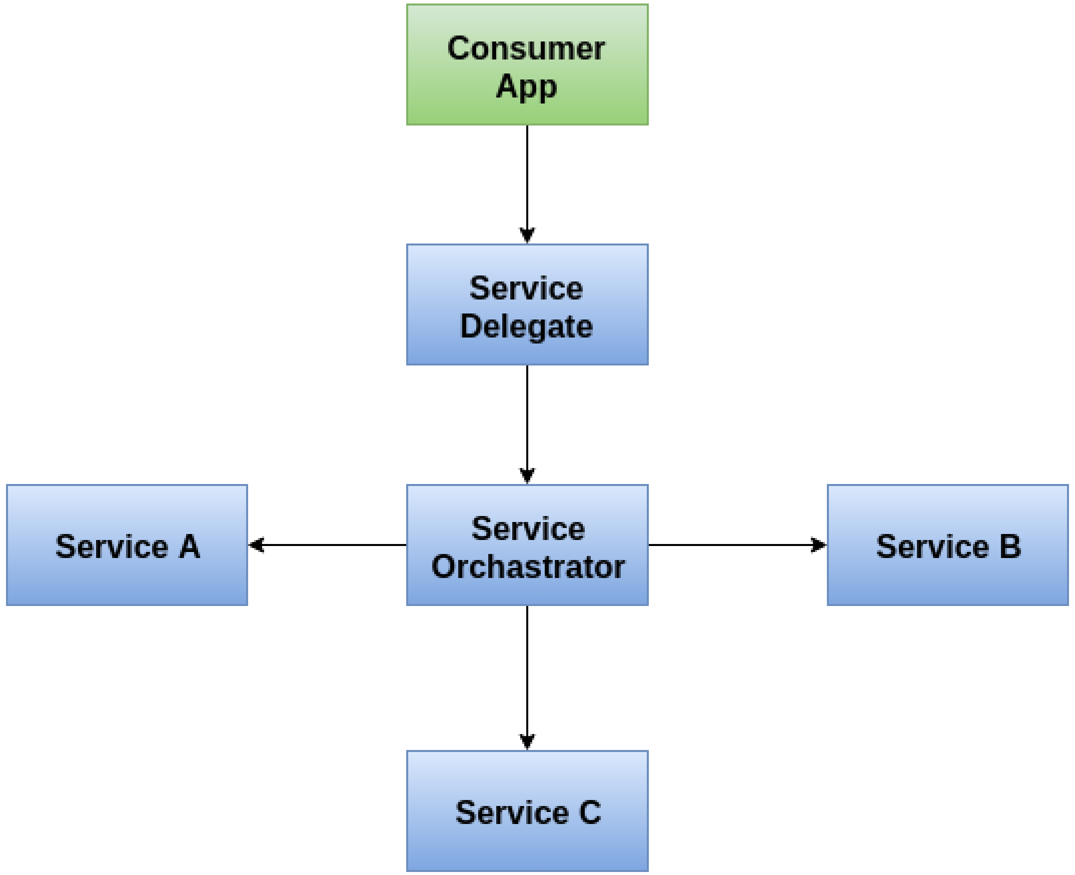
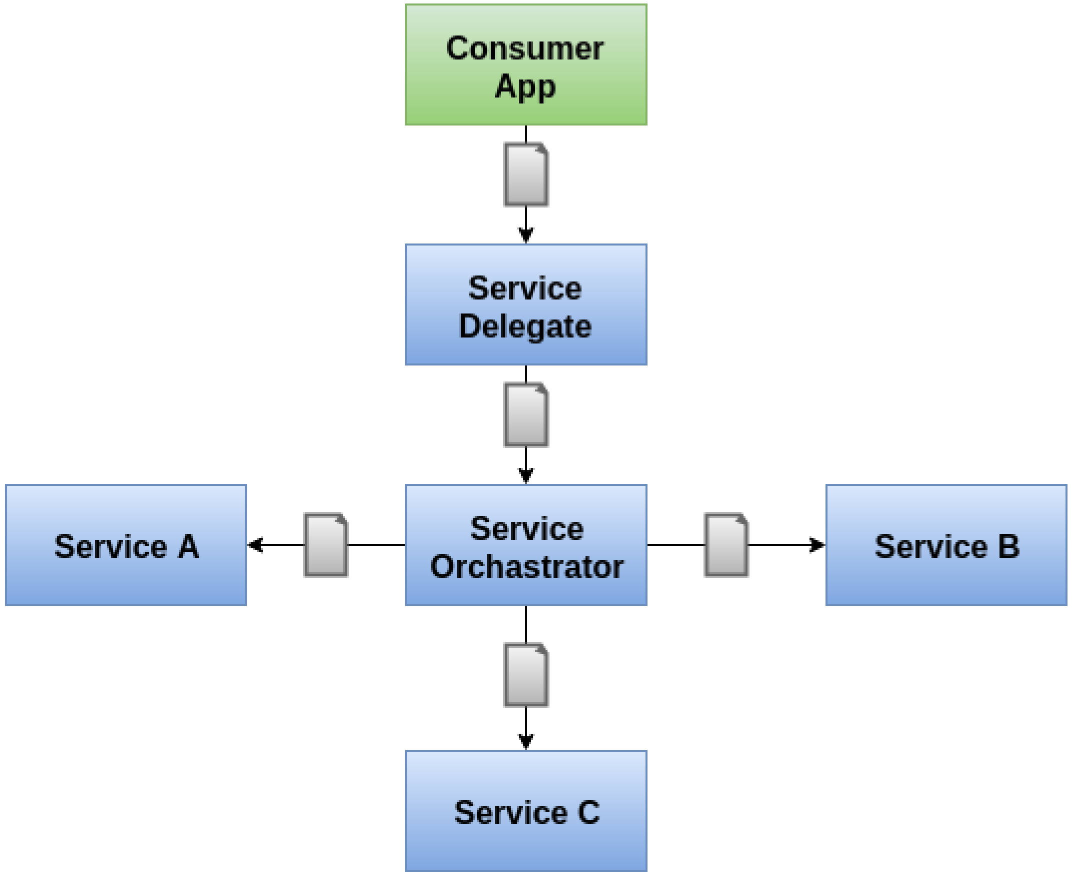
Clojure
Java
Groovy


Consumer App
Service Delegate
Service Orchastrator
Service A
Service B
Service C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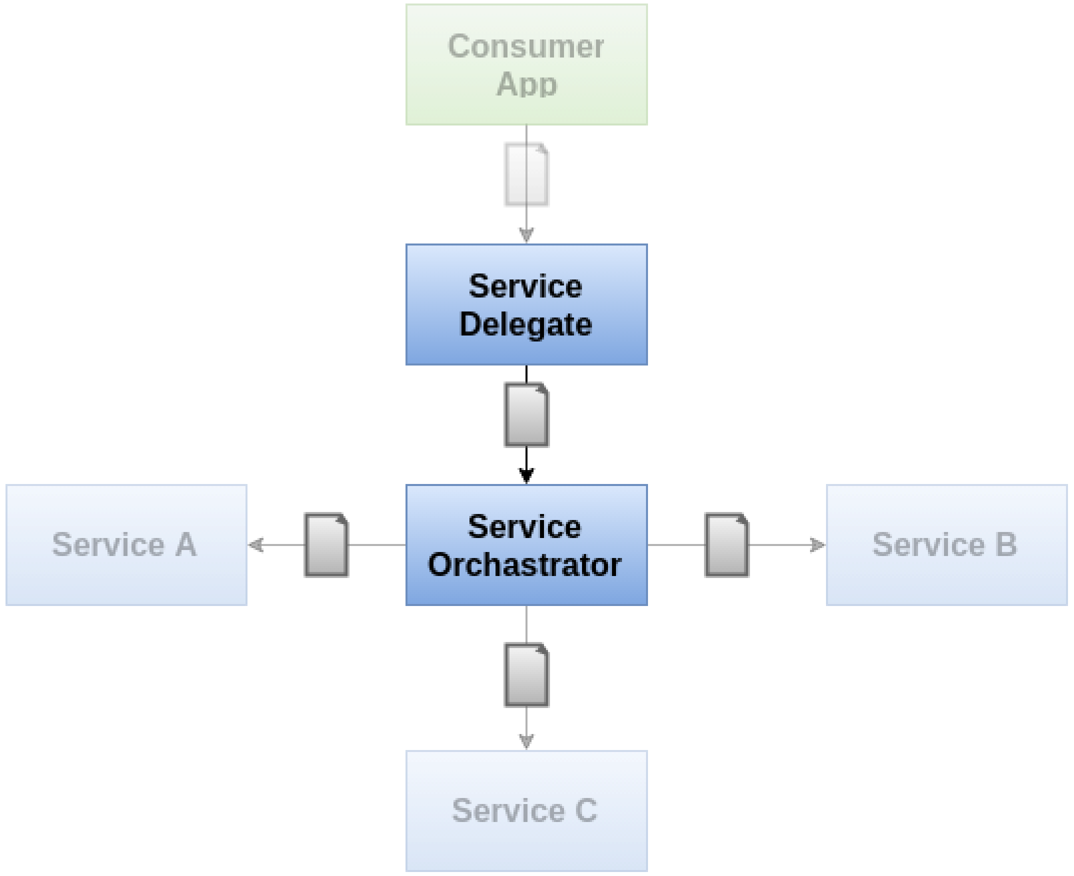
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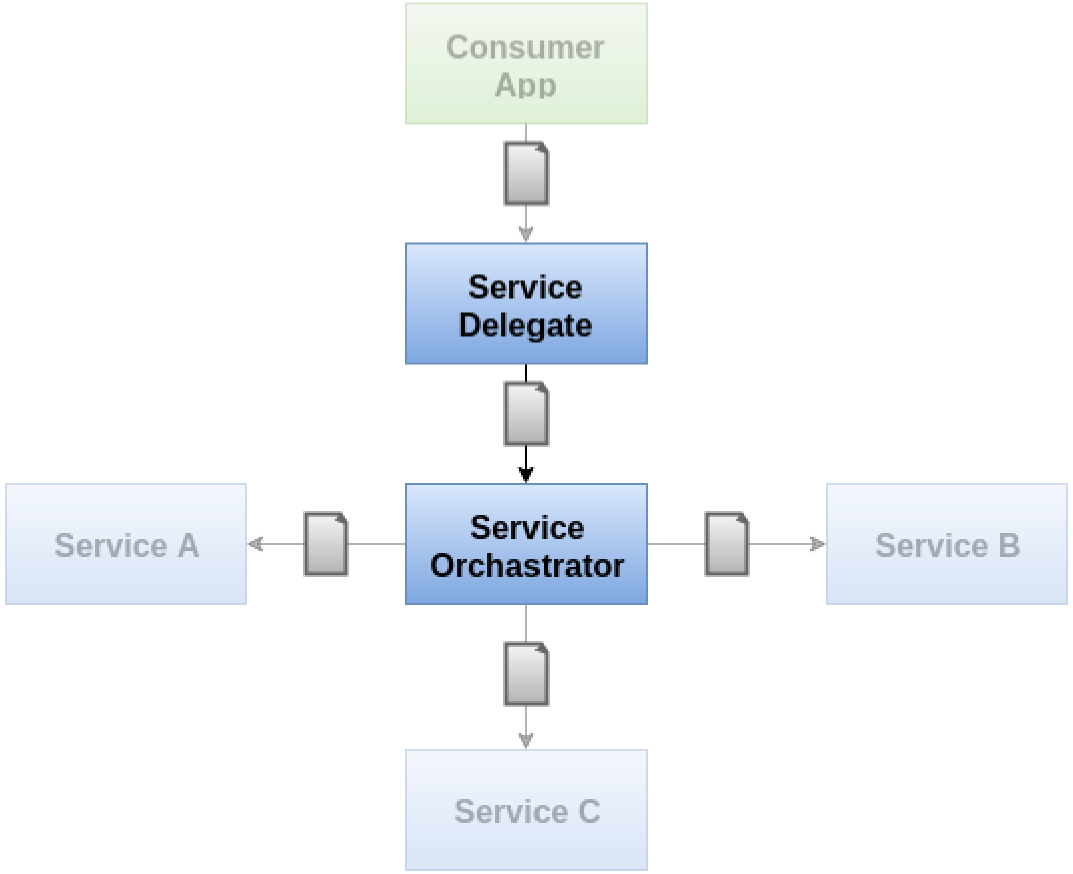
Consumer App
Service Delegate
Service Orchastrator
Service A
Service B
Service C

True Mock Server
JUnit Provider Test

```java
@RunWith(PactRunner.class) // Say JUnit to run tests with custom Runner
@Provider("Hello Provider") // Set up name of tested provider
//@PactUrl(urls = {"file:///home/ronald/Development/Projects/Pact/pact-gradle-test/src/test/resources/hello_consumer-hello_provider.json"})
@PactFolder("pacts")
public class ContractTrialTest {
  @TestTarget // Annotation denotes Target that will be used for tests
  public final Target target = new HttpTarget(5050);

  @TargetRequestFilter
  public void exampleRequestFilter(HttpRequest request) {
    request.addHeader("Authorization", "Basic " + base64StringOf("admin", "admin"));
  }

  private String base64StringOf(String username, String password) {
    return Base64.getEncoder().encodeToString((username + ":" + password).getBytes());
  }
}
```

More Info

- **Gitbook:** docs.pact.io
- **Github:** realestate-com-au/pact **and** DiUS/pact-jvm
- **Google users group:** https://groups.google.com/forum/#!forum/pact-support
- **Gitter: Join the chat at** https://gitter.im/realestate-com-au/pact **and** https://gitter.im/DiUS/pact-jvm
- **Twitter:** @pact_up

Given “The presentation is over”

Upon Receiving “A request for an answer”

With “A valid question”

Respond With “A valid answer”

DIUS