API Workshop

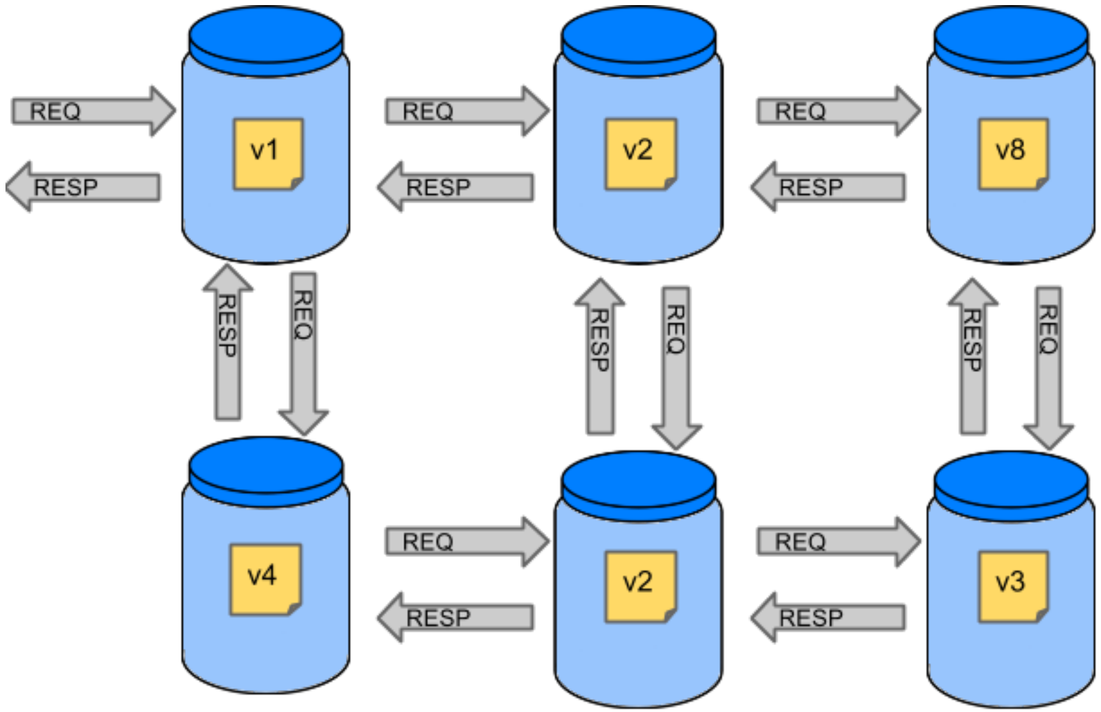
Contract Driven Development

Agenda

- Testing services
- What are contracts
- Contract development methodologies
- Distributing contracts

Problems with decoupled services

How do we test an application that calls out to other services?



Problems with decoupled services

End to end testing?

- Real tests like production, but comes at a cost
- May require a few other services, databases
- Difficult to debug if a problem occurs
- Late feedback makes it difficult to discover and fix bugs early

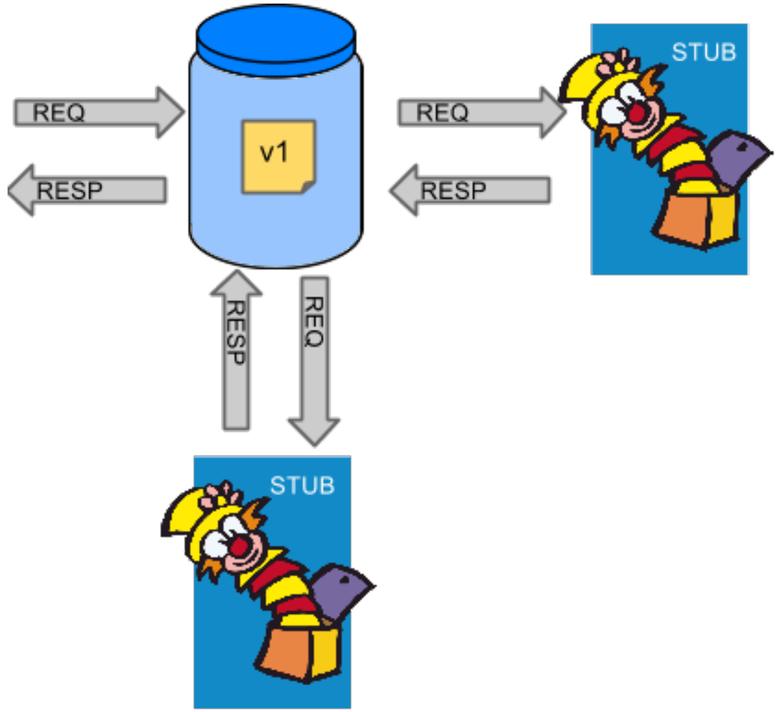
Problems with decoupled services

Mock dependencies in unit and integration tests?

- Very fast feedback and no infrastructure
- May differ vastly from reality
- Can end up in production with tests that pass, but would fail in production

Contract Driven Development

What about contracts?



Contract Driven Development

What about contracts?

- Ensures that HTTP messaging stubs are exactly how the server will behave
- Promotes acceptance test driven development (ATTD)
- Publish contracts that can immediately be used by the consumer and producer
- Generates and guides tests

In reality we want to have a balance of end to end, mocking and contract tests

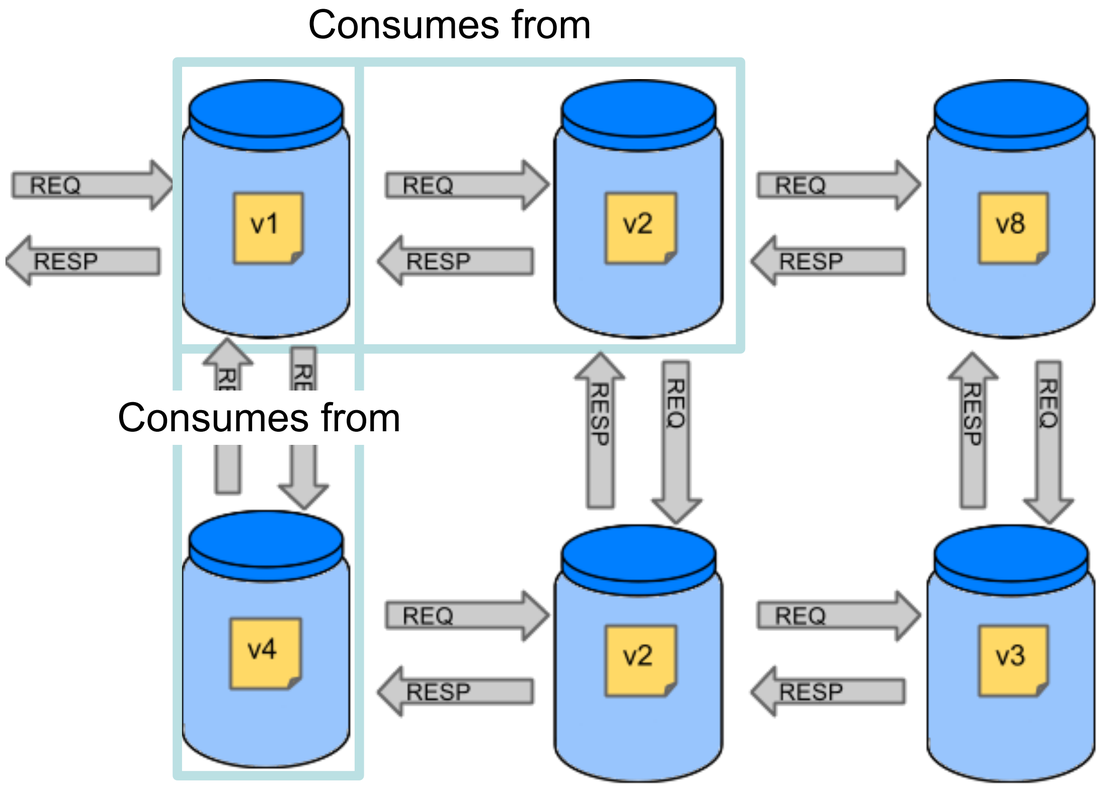
Contract Driven Development

The two entities

- Producer
  - An application that is producing data, e.g. We are currently writing a Todo application. The app is a producer as it **provides**
- Consumer
  - Any application that **consumes** information from a provider e.g. The webclient that is sending requests to the Todo application, it is consuming the Todo service

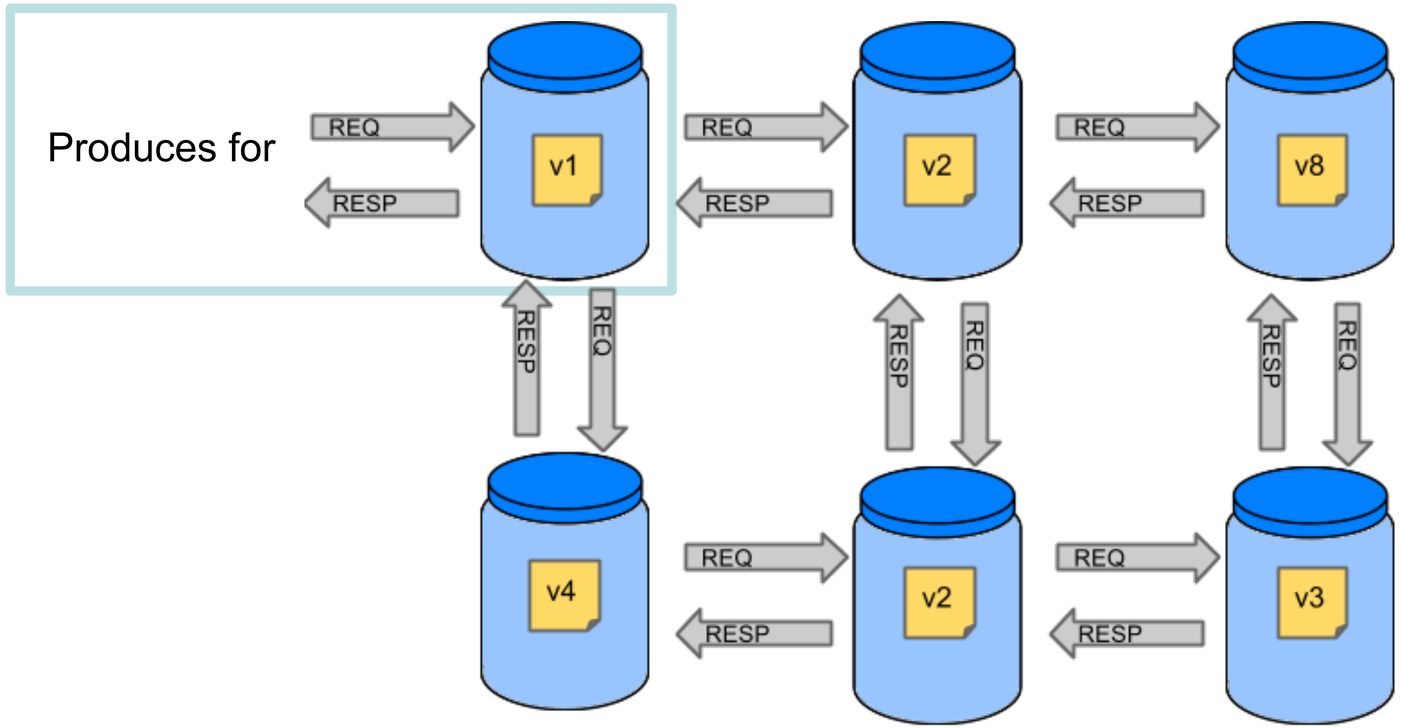
Contract Driven Development

Consumer



Contract Driven Development

Producer



Contract Driven Development

What do contracts do?

- Specify how we expect the client to interact with our service
- There may be multiple contracts per endpoint
- The API shape (or structure) does not define full behaviour
- Contracts provide quick feedback on evolving APIs

Contract Driven Development

Two types of Contract driven development

- Producer Contract Development
- Consumer Driven Contracts

Producer Contract Development

Producer Contract Development

Producer Contract Development

The Producer creates their own contracts.

- External facing, large client base
  - Example of usage: The Todo API we are developing is an external facing API used by millions

Example Contract

```
org.springframework.cloud.contract.spec.Contract.make {
    request {
        method POST()
        headers {
            contentType(applicationJson())
        }
        url '/todos'
        body(
                "message": "A new todo"
        )
    }
    response {
        status CREATED()
        headers {
            header(location(), anyUrl())
        }
    }
}
```

Example Contract - Generated test for producer

```
@Test
public void validate_task_create_entry() throws Exception {
  // given:
    MockMvcRequestSpecification request = given()
        .header("Content-Type", "application/json")
        .body("{\"message\":\"A new todo\"}");

  // when:
    ResponseOptions response = given().spec(request)
        .post("/todos");

  // then:
    assertThat(response.statusCode()).isEqualTo(201);
    assertThat(response.header(“Location”)).matches(anyUrlRegex());
}
```

Stub generated for Consumer

- The contracts also form stubs
- Stubs can be used to mock out services
- Allows consumers to work on their applications, whilst serverside logic is developed
- Decouples dependencies during the development process

Consumer Driven Contracts Development

Consumer Driven Contracts Development

Consumer Driven Contracts

- The Consumer creates that contracts for the Producer to fulfil
  - Teams working closely together
  - Example of usage: The Todo API will be used by a few teams in a company

Example Interaction

```
@Pact(consumer = "todo-api-consumer-pact")
public RequestResponsePact updateAToDoRequest(PactDslWithProvider builder) {
    return builder
            .given("an todo of id 1 has already been created")
            .uponReceiving("a request to update the todo")
            .matchPath("/todos/1")
            .method("PUT")
            .headers("Content-Type", "application/json")
            .body("{\"message\":\"Make all the beds\"}")
            .willRespondWith()
            .status(204)
            .toPact()
            ;
}
```

Example Interaction - Generated Contract


```
{
    "provider": {"name": "todo-api-producer-pact"},
    "consumer": {"name": "todo-api-consumer-pact"},
    "interactions": [
        {
            "description": "a request to update the todo",
            "request": {
                "method": "PUT",
                "path": "/todos/1",
                "headers": {"Content-Type": "application/json"},
                "body": {"message": "Make all the beds"},
                "matchingRules": {
                    "path": {"": {"matchers": [{
                                    "match": "regex",
                                    "regex": "/todos/1"
                                }],
                            "combine": "AND"
                        }},
                    "header": {},
                    "body": {}
                }
            },
            "response": {"status": 204},
            "providerStates": [
                {"name": "an todo of id 1 has already been created"}
            ]
        }
    ]
}
```

Test generated for Producer

- The interactions also form tests for the Producer
- Defines the interactions the Consumer wants to see fulfilled
- Allows consumers to drive out the features that they want to see and use
- Decouples dependencies during the development process

Contract broker

- An application for sharing for contracts (Pacts)
- Pact provide a broker