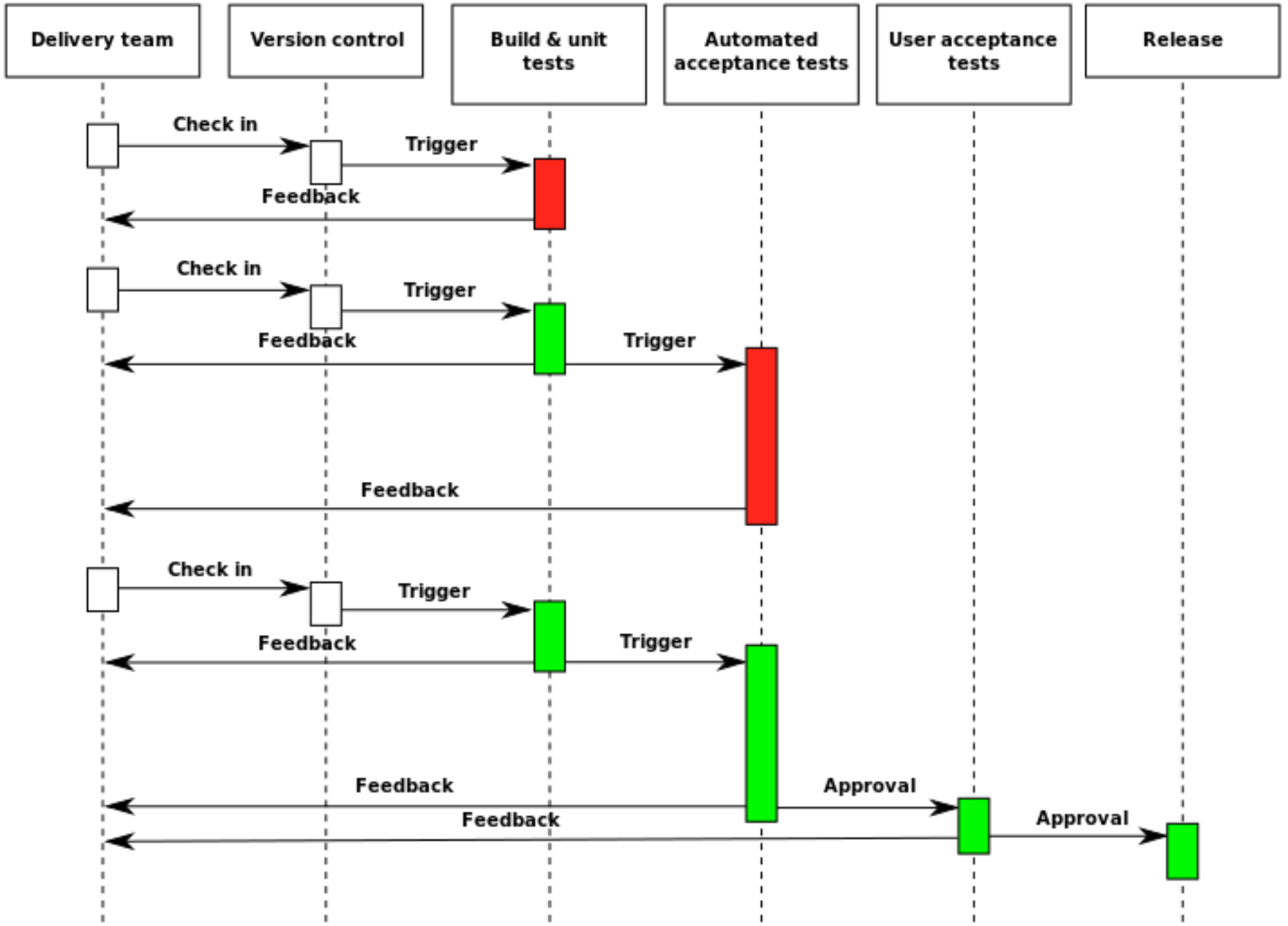
COMP.SE.140

Automation

Kari Systä

About automation

Deployment pipeline (a possible example)



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Infrastructure as code

From: https://docs.microsoft.com/en-us/azure/devops/learn/what-is-infrastructure-as-code

Infrastructure as Code (IaC) is

- the management of infrastructure (networks, virtual machines, load balancers, and connection topology) in a descriptive model,
- using the same versioning as DevOps team uses for source code.
- Like the principle that the same source code generates the same binary, an IaC model generates the same environment every time it is applied.
- IaC is a key DevOps practice and is used in conjunction with continuous delivery.

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Benefits of automation

- Prevent errors
- Is repeatable
- No need to write documentation
- Enables collaboration because everything is explicit in scripts
- Expertise encapsulated in scripts
- Manual work is boring
- Fast and relentless feedback
- Risk management: Automated checking and auditing

Automation includes

- Building
  -> no command-line tools needed
- Testing
  -> run frequently
- Other quality analysis
  -> less manual inspection needed;
- Deployment
  -> VMs and containers created automatically
  -> configuration management
- Database tools
  -> initialization
  -> management
- Scaling

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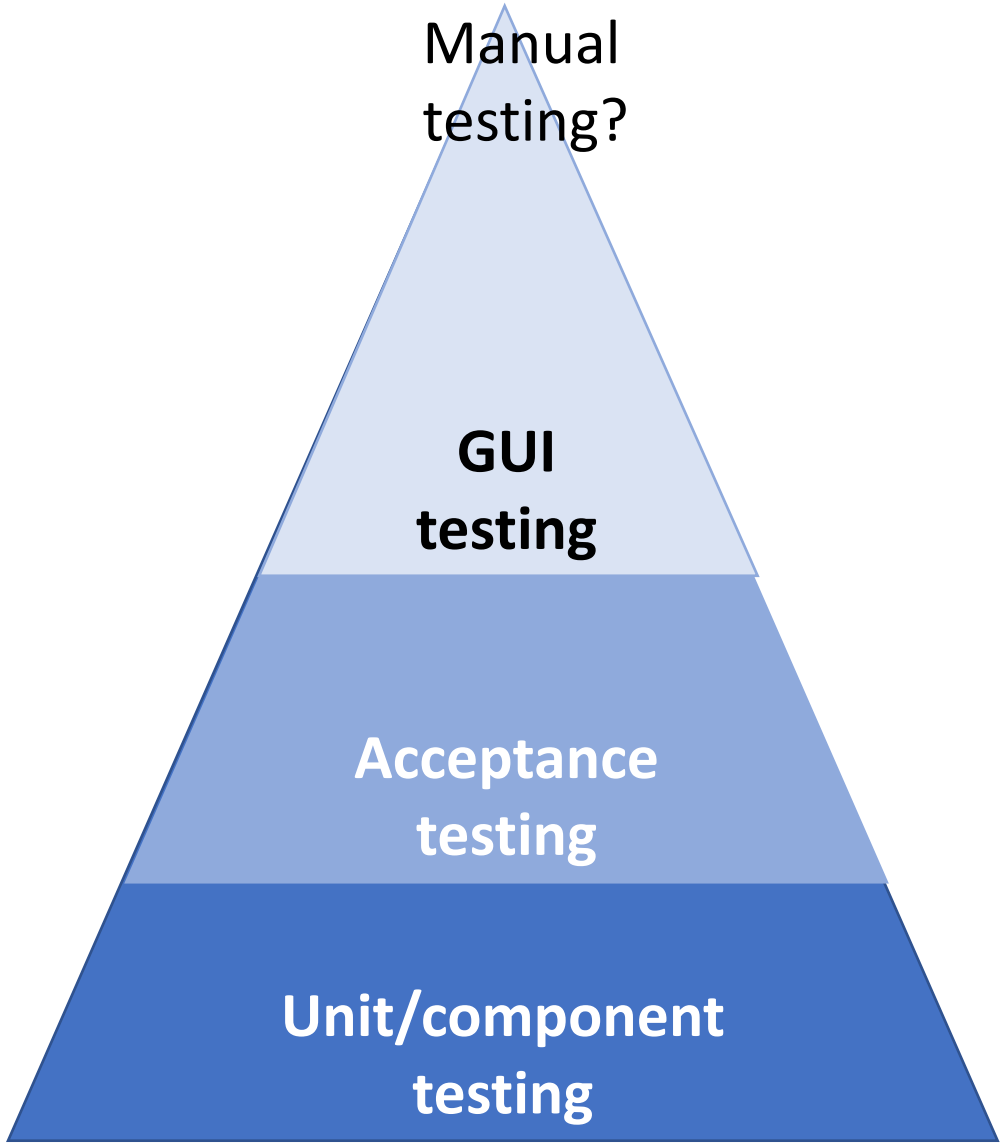
Automated tests

- A common practice in CI and CD
- Does not invent the test (usually);
  - test are designed and implemented manually but
  - executed automatically
- Tests need to maintained
- Software needs to be testable
- Not a silver bullet for testing, but necessary helper in CI/CD

Testability

- Testbed can command the software
- Tests can investigate state and results
- Proper architecture and coding style helps
  e.g. Standard getters and setters
- Well-defined APIs


Manual testing?
GUI testing
Acceptance testing
Unit/component testing

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Automated acceptance tests

- Acceptance tests do not test everything but is an essential “gate” if deployment is automated.
- Some best practices (according to Humbley and Farley):
  - Test in realistic environment(s)
  - Acceptence tests are owned by the whole team (no separate team for it)
  - Developers should be able to run the tests in their own dev environment)
  - Tie to business value – not to technical solution of the system
- Nonfunctional testing
  - Capacity, scalability
  - Code quality analysis

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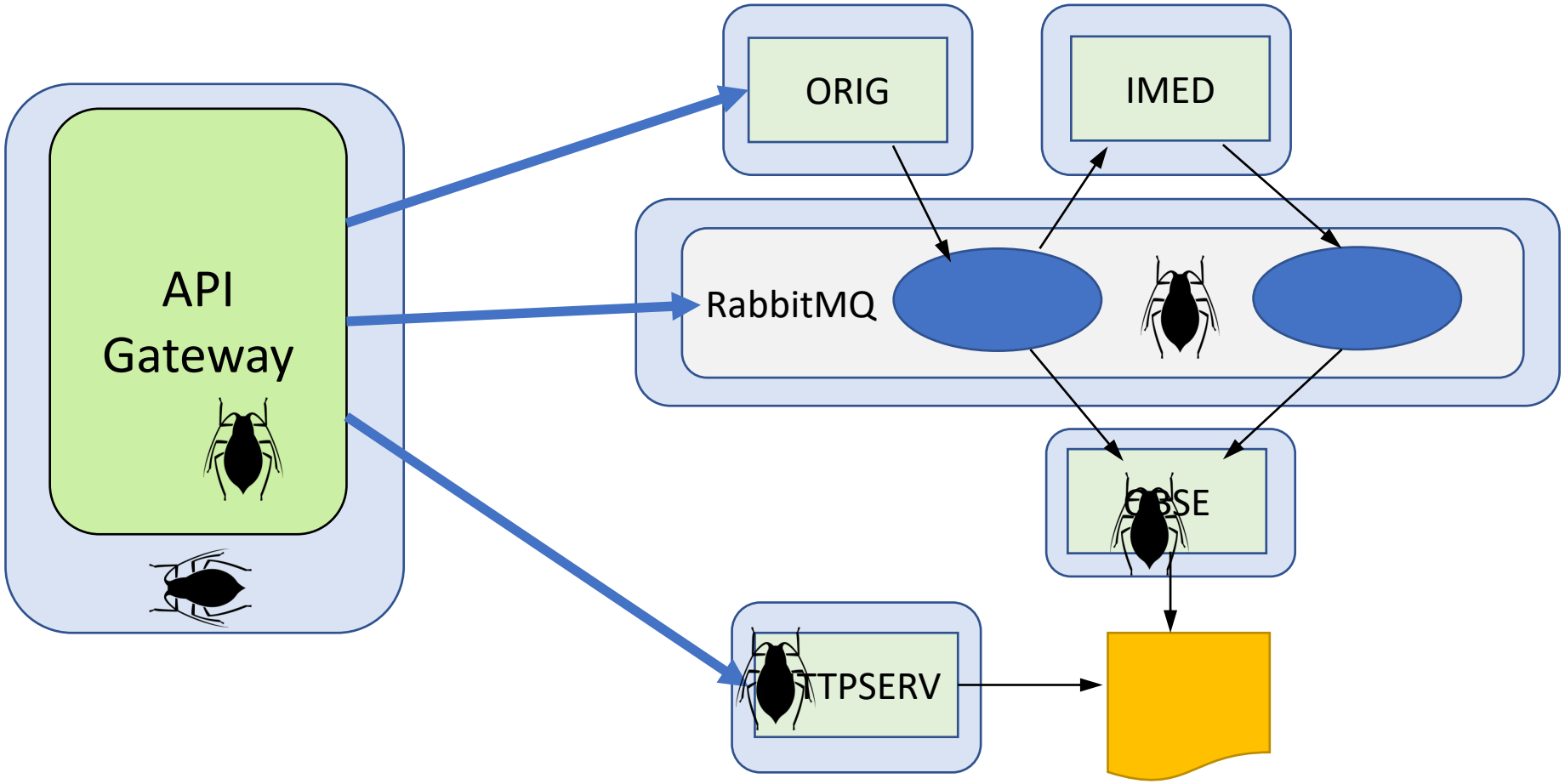
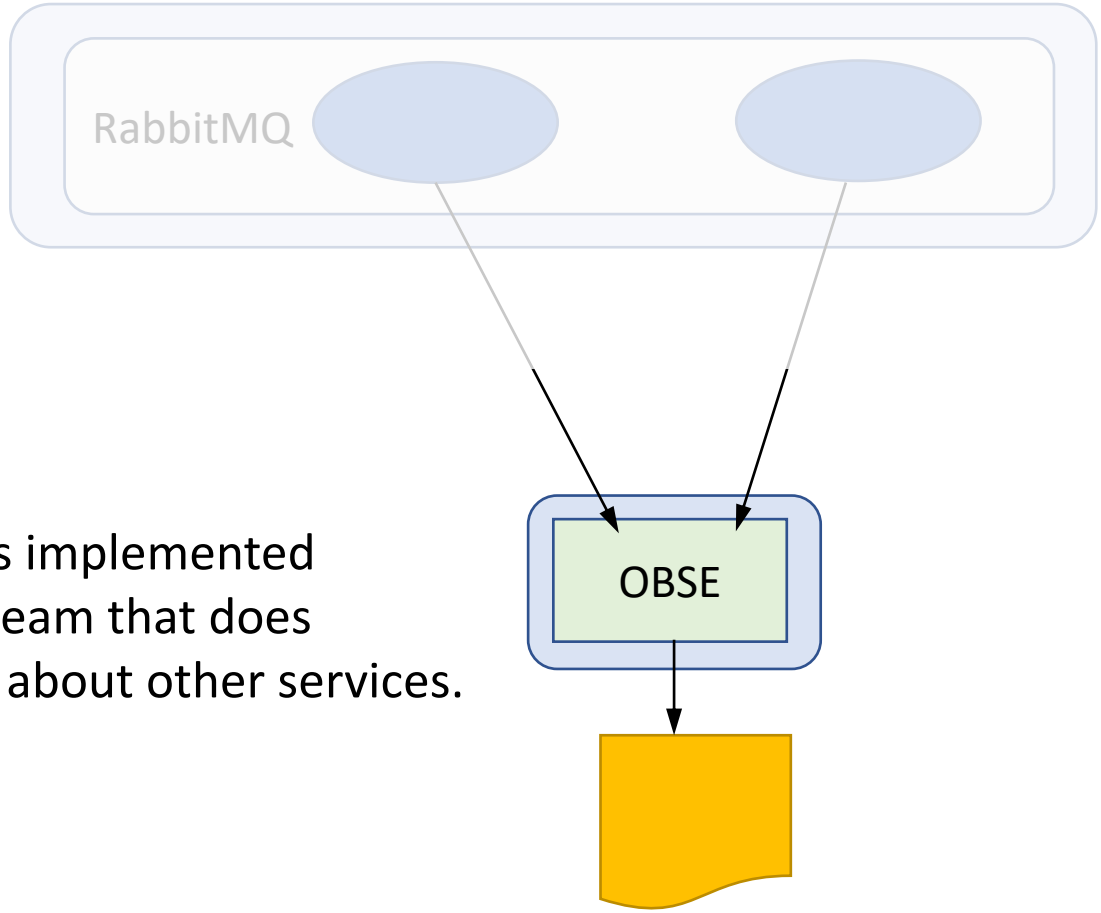
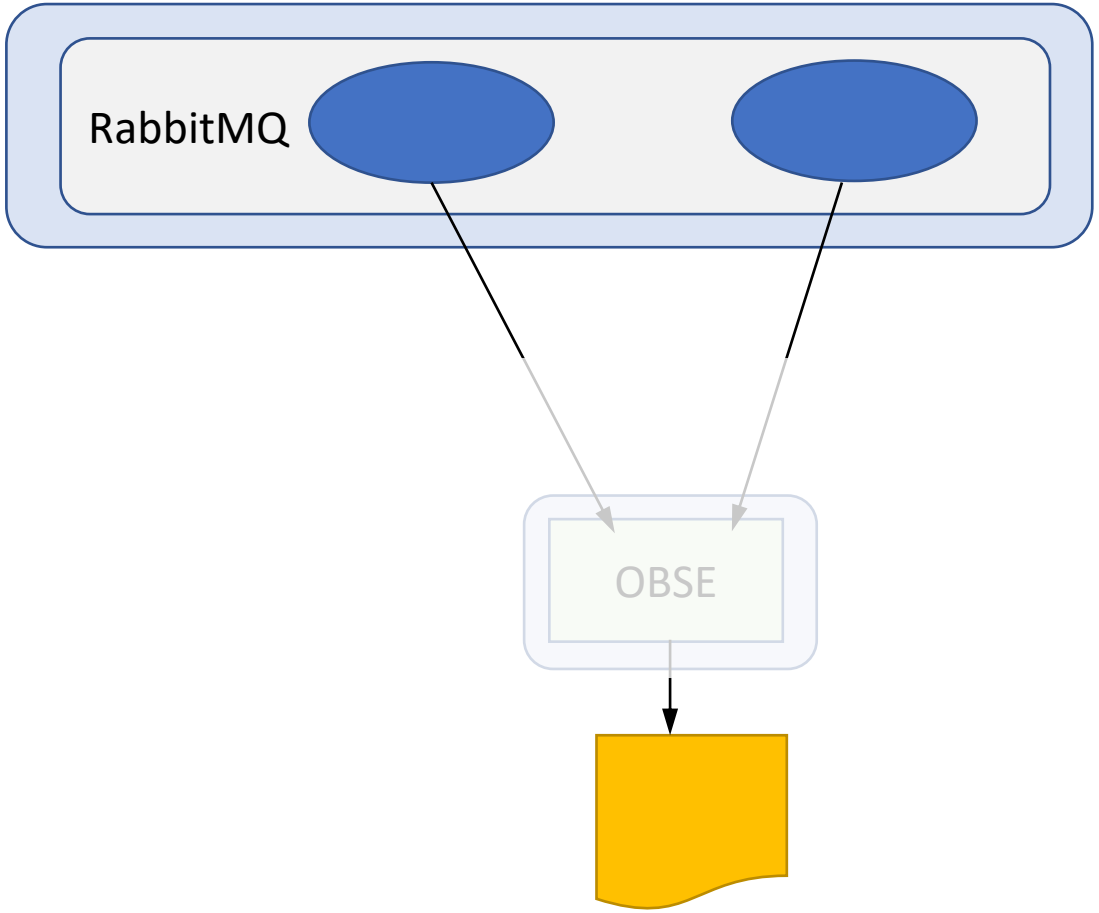
Testing cloud-native is difficult
And debugging even more difficult



What if OBSE is implemented
by a separate team that does
not now much about other services.




RabbitMQ
OBSE

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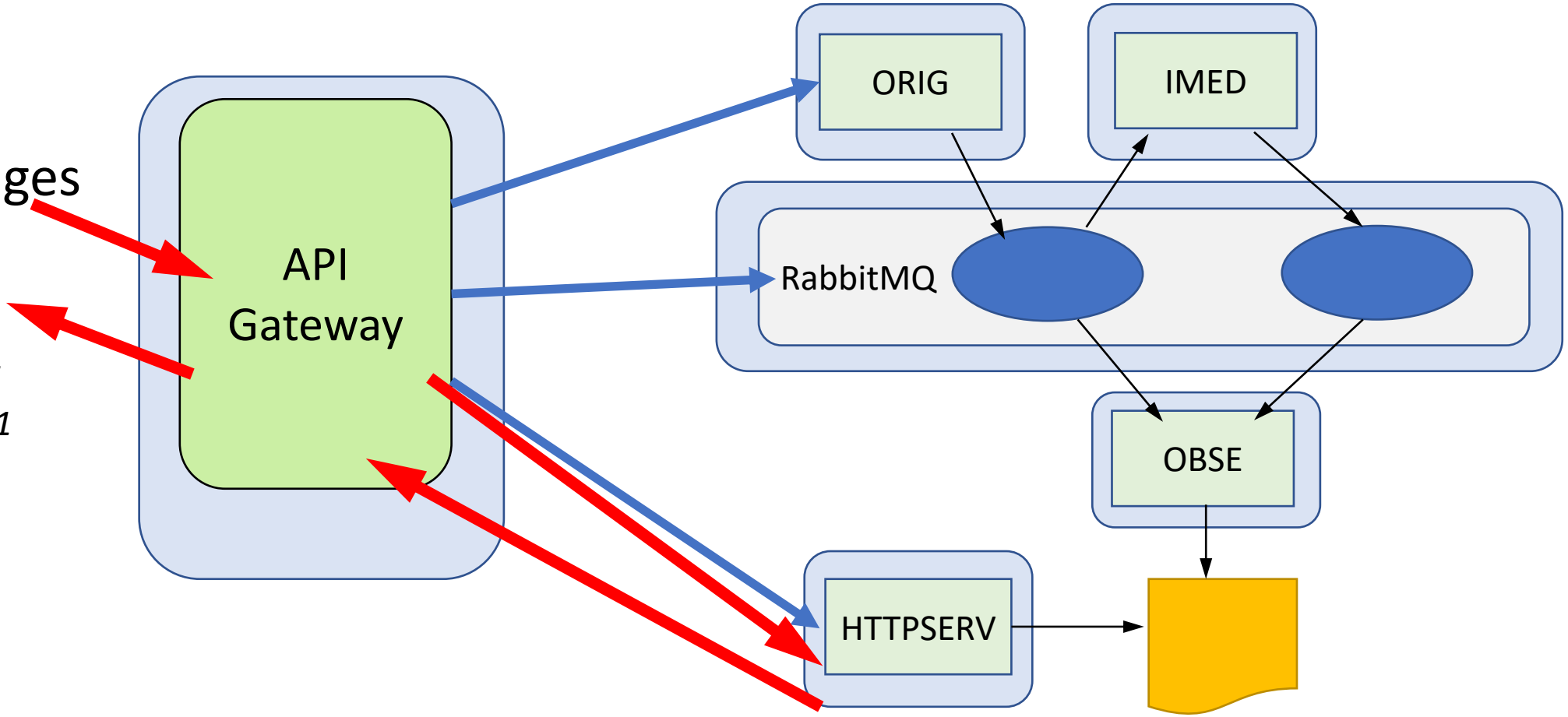
GET /messages

2020-10-01T06:35:01.373Z
Topic my.o: MSG_1

Correct?



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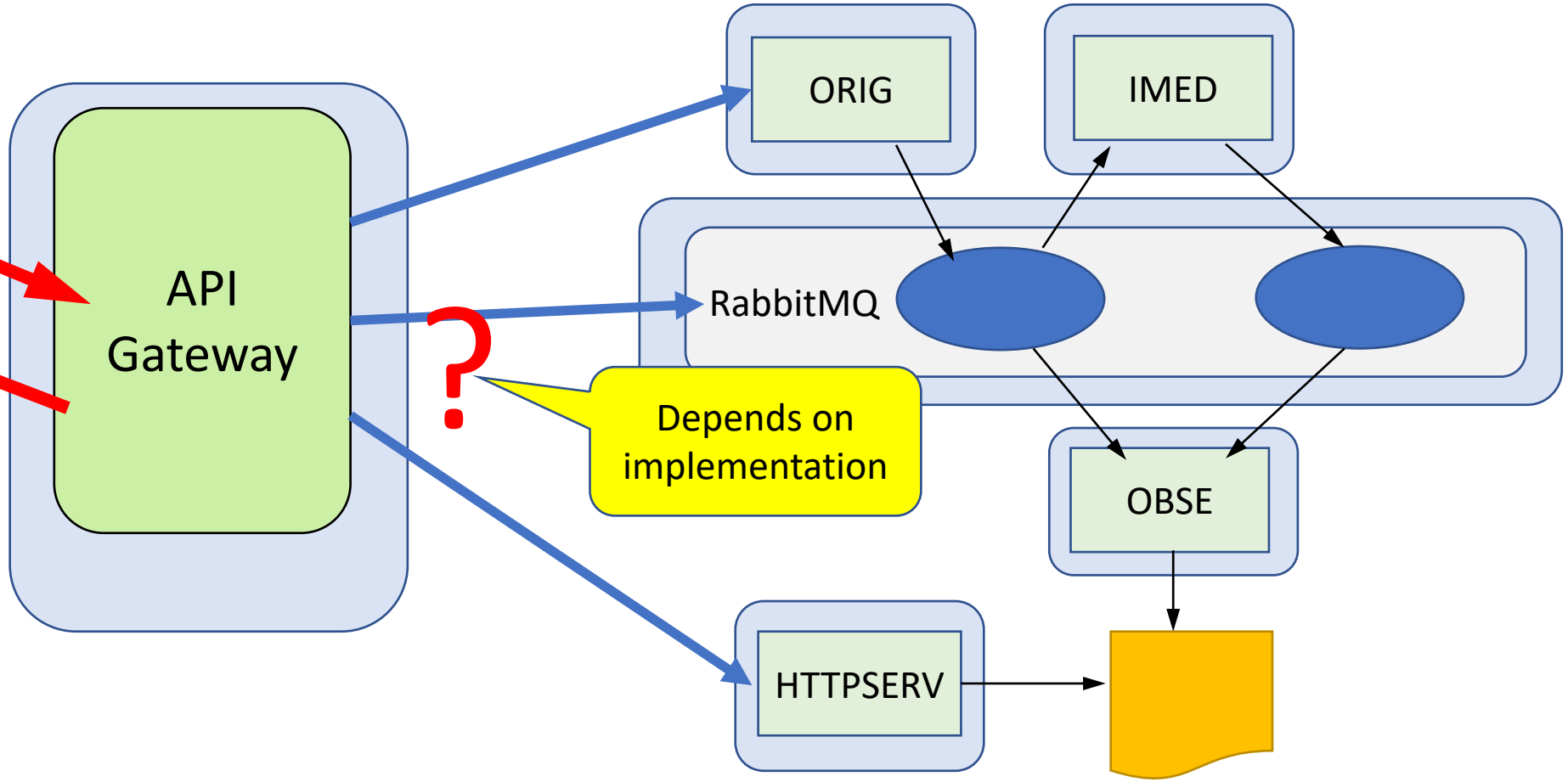
GET /run-log

2020-11-01T06:35:01.373Z: INIT
2020-11-01T06:40:01.373Z: PAUSED
2020-11-01T06:40:01.373Z: RUNNING

Correct?



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Testing microservices

(https://www.infoq.com/articles/twelve-testing-techniques-microservices-intro/)

Key takeaways

- Because a microservice architecture relies more on over-the-wire (remote) dependencies and less on in-process components, your testing strategy and test environments need to adapt to these changes.
- When testing monoliths using existing techniques like service virtualization, you do not have to test everything together; instead, you can divide and conquer, and test individual modules or coherent groups of components.
- When working with microservices, there are also several more options available, because microservices are deployed typically in environments that use containers like Docker.
- You will need to manage the interdependent components in order to test microservices in a cost and time effective way. You can use test doubles in your microservice tests that pretend to be real dependencies for the purpose of the test.

Automation challenges

- ”…provisioning scripts were considered error-prone and, according to developers, they did not work in some environments…”
- ”…automation of the network in was said to be difficult in addition to dealing with legacy system…”
- ”Networks are pretty hard. Some of the databases are pretty hard too because the old relational databases haven’t been designed to be clustered…”

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Automation scripts are programs Infrastructure as code

- ”Infrastructure as code (IaC) is the process of managing and provisioning computer data centers through machine-readable definition files, rather than physical hardware configuration or interactive configuration tools.”
- three approaches to IaC: declarative (functional) vs. imperative (procedural) vs. intelligent (environment aware)

```
tasks:
- name: ensure apache is at the
        latest version
  yum:
    name: httpd
    state: latest
- name: ensure that postgresql is started
    service:
      name: postgresql
      state: started
```

```
apt-get install …
```

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Infrastructure as code

All SW engineering principles should be applied.

- Testing
- Maintenance
- Documentation
- Version and configuration management

- Bugs may stop the whole engine

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Huge number or tools available

- https://digital.ai/periodic-table-of-devops-tools
- https://landscape.cncf.io