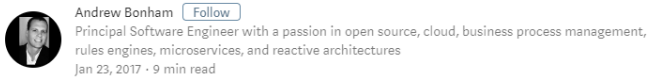
MICROSERVICES ORCHESTRATIONS WITH BPM

Dr. Marigianna Skouradaki

NOVATEC

Microservices…To BPM or not to BPM?



Microservices—When to React Vs. Orchestrate **Source:** https://goo.gl/SVkNkK

Business process management in a "microservices world"

By David Bush October 10, 2016

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WEDNESDAY, MARCH 01, 2017

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Wer Microservices richtig macht, braucht keine Workflow Engine und kein BPMN

01.09.2015 von **Tobias Flohre** 13 Kommentare

Source: https://goo.gl/hTG6nf

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RED HAT SUMMIT

Source: https://goo.gl/YF951d

Using BPM Suite in a Reactive Architecture with Microservices, Docker, and Amazon ECS

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Andrew Bonham Follow

Principal Software Engineer with a passion in open source, cloud, business process management, rules engines, microservices, and reactive architectures

Jan 23, 2017 · 9 min read

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conductor

Conductor

Conductor is an *orchestration* engine that runs in the cloud.

zeebe by Camunda

Microservice Orchestration Engine

camunda

Microservices and BPM

SWF

…

Agenda

- The principles of microservices
- Challenges in microservices architectures
- Microservices orchestrators
- Real-world practice use case
- Conclusion

VS.

THE PRINCIPLES OF MICROSERVICES

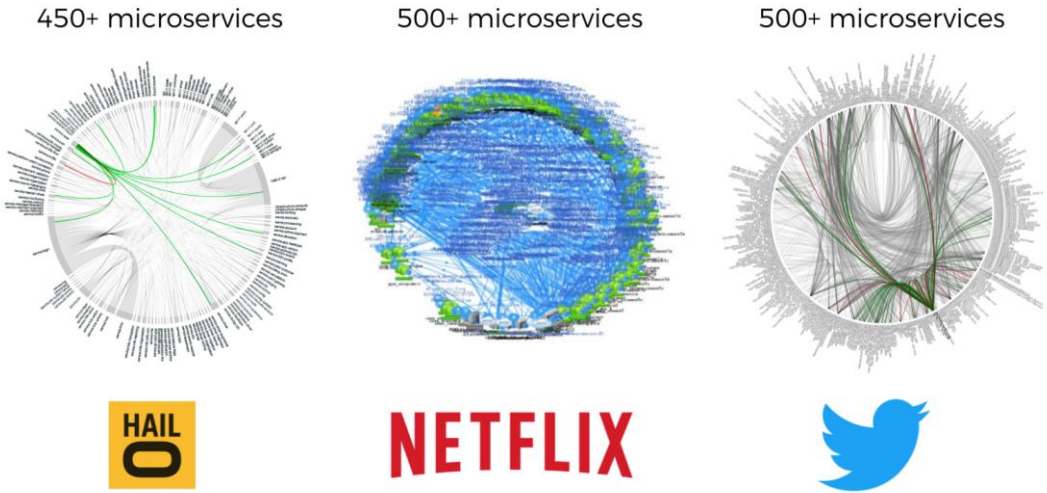
Microservice as a component

1. …do one thing and do it well
2. …organized in “bounded contexts”

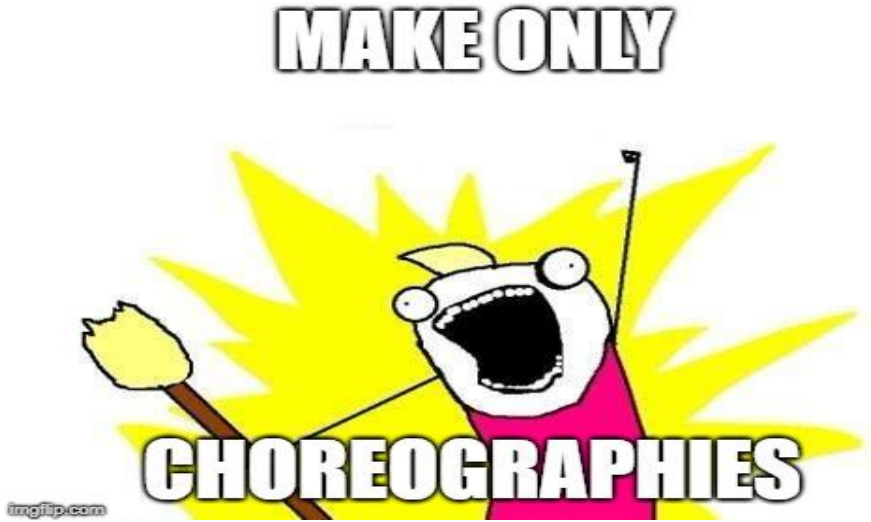
Source: https://www.youtube.com/watch?v=9gLrCPVrXo4

Microservices as a system (Lewis J. & Fowler M., 2014)

1. Smart endpoints – Dumb pipes
2. Decentralized governance
3. Decentralized data management
4. Infrastructure automation
5. Design for failure
6. Evolutionary design



Source:http://heidloff.net/article/introduction-reactive-microservices



- ✓ Systems are loosely-coupled
- ✓ No central-coordinator
- ✓ Bounded contexts are clear
- ✓ Microservices encapsulate own logic and data
- ✓ Event channels act as dumb pipes

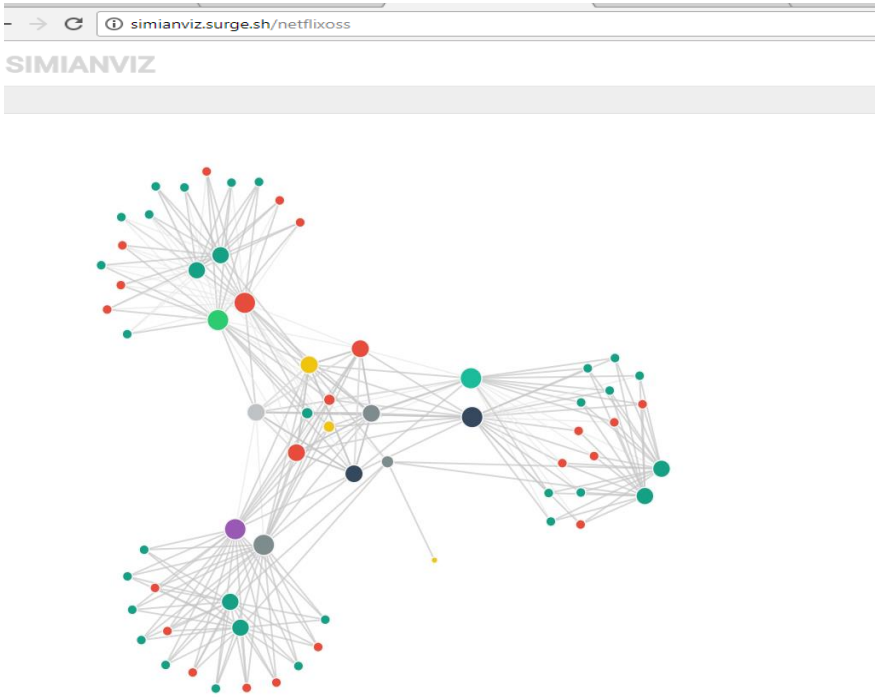
„With peer-to-peer choreography,
we found it was harder
to scale with growing needs
and complexities“

Viren Baraiya *& Vikram Singh*

NETFLIX

CHALLENGES IN MICROSERVICES ARCHITECTURES

Flows are hidden



It is difficult to clarify which microservice interacts with which.

There is no explicit end-to-end processs.

Screenshot of SimianViz demo for complex Netflix visualization of microservices

“Design for Failure” – Failover logic

Source: http://www.elblender.com/wordpress/wp-content/uploads/2016/12/Microservice-Resilient.png

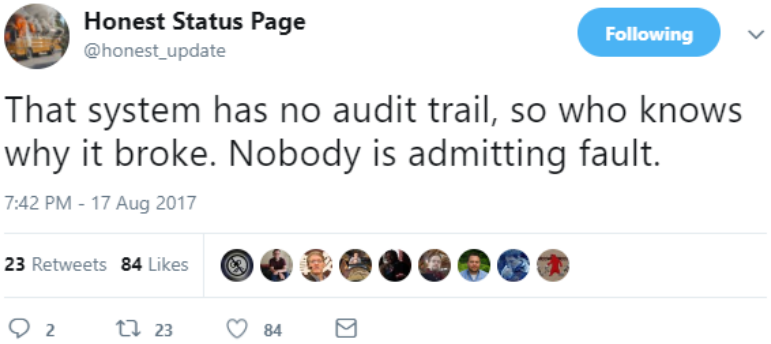
- Stateful retry in asynchronous manner
- Self-healing
- Failover Caching
- Retry Logic (retry with timeouts, retry after failure)
- Error Handling in Transactions (SAGA Pattern)

Transparency of status

How much is done until X completes?

Source: https://goo.gl/p3Ujws

Monitoring

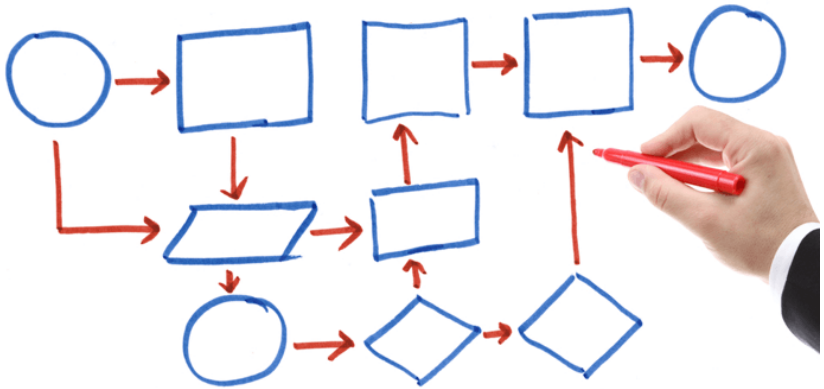


Have one place with gathered information about all running processes and collaborations

Managing a business process

Be able to manage a process –
i.e., run, restart and stop per need.

BPM solves it all..

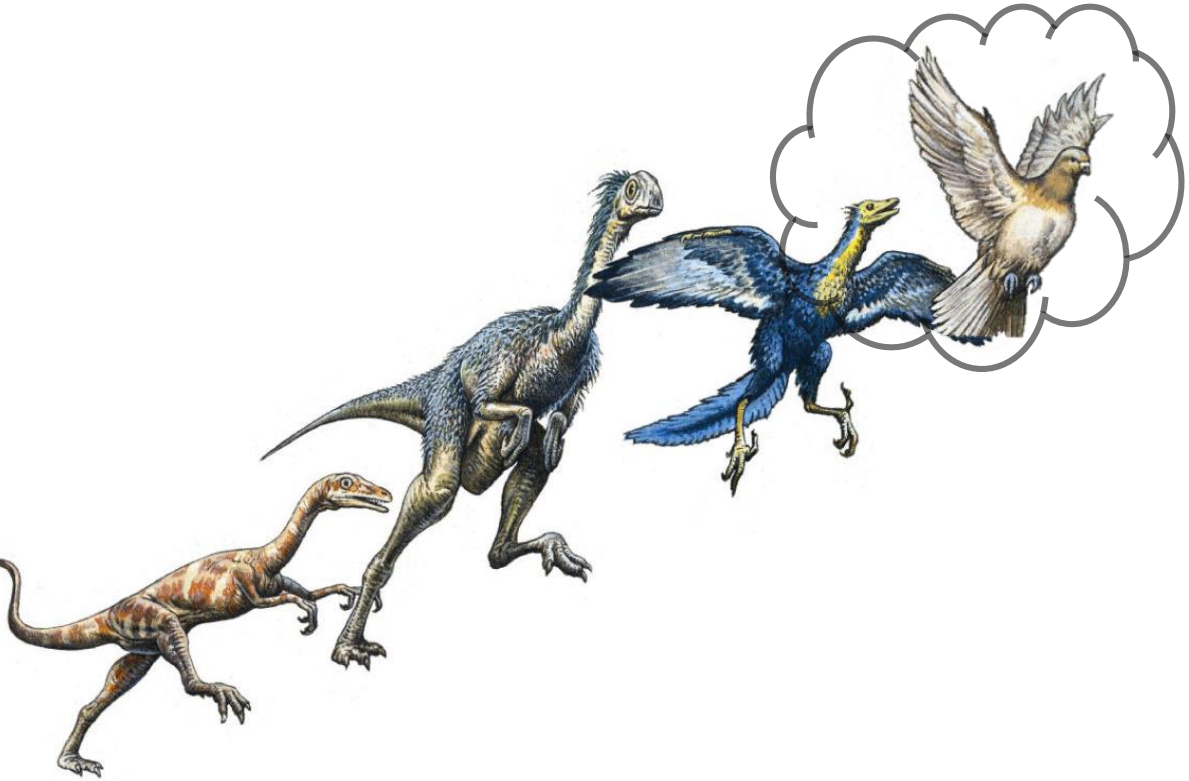


Source: https://goo.gl/EGhxrb

By construct…

- …workflows provide a visual overview of a business process
- …workflow engines provide management of a business process
- …workflow engines provide monitoring, audit logs and history

Process engines have evolved



- Embeddable
- Lightweight
- Cloud-ready
- Cloud-licensing models

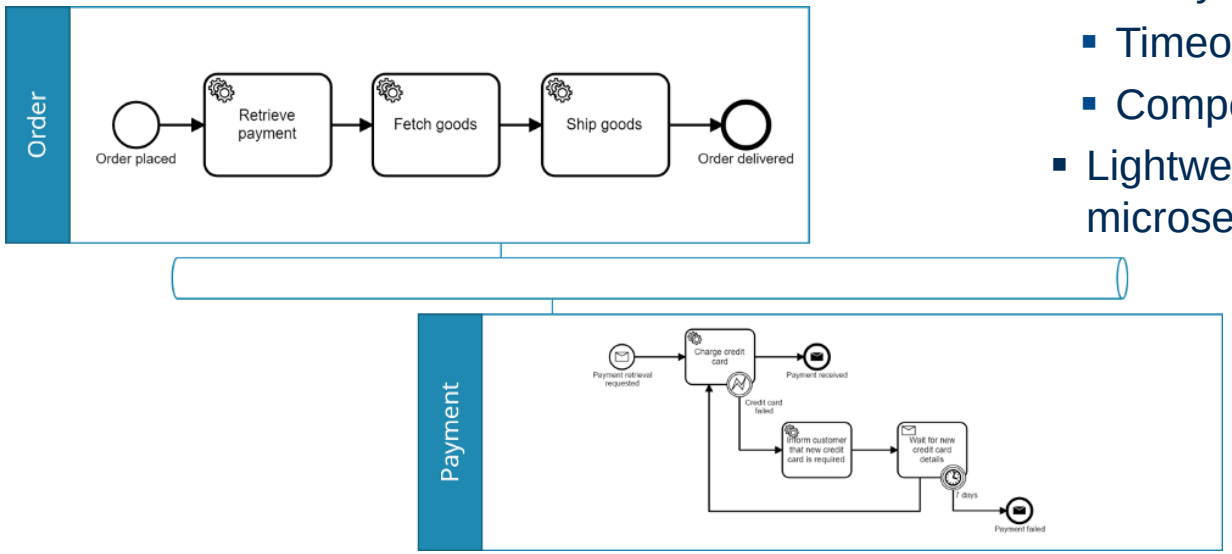
→ Can participate in microservice-friendly architectures

MICROSERVICES ORCHESTRATORS

“Classic” BPMN 2.0 process engines

camunda

Source: https://blog.bernd-ruecker.com/avoiding-the-bpm-monolith-when-using-bounded-contexts-d86be6308d8



- BPMN 2.0 based process engine
  - Retry
  - Timeouts
  - Compensation
- Lightweight – can run embeddable in the microservice

“Classic” BPMN 2.0 process engines

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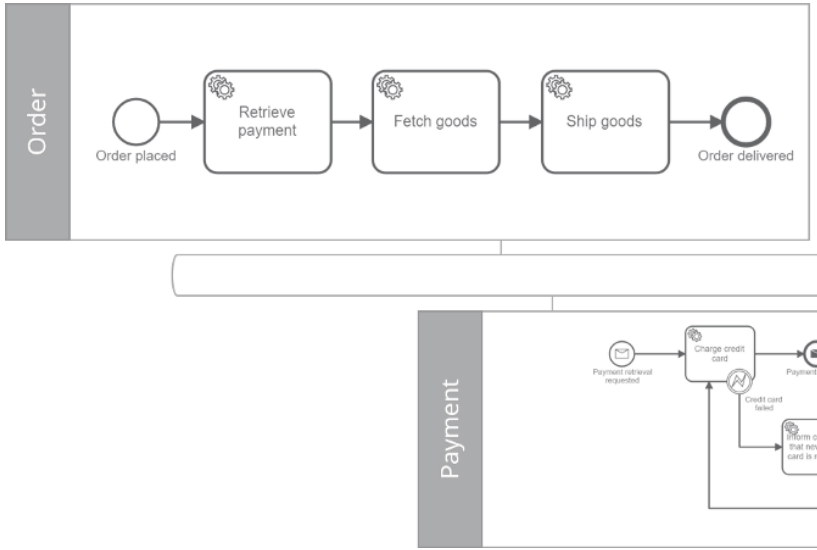
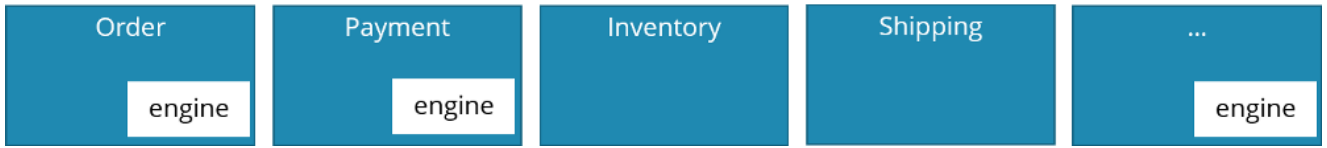
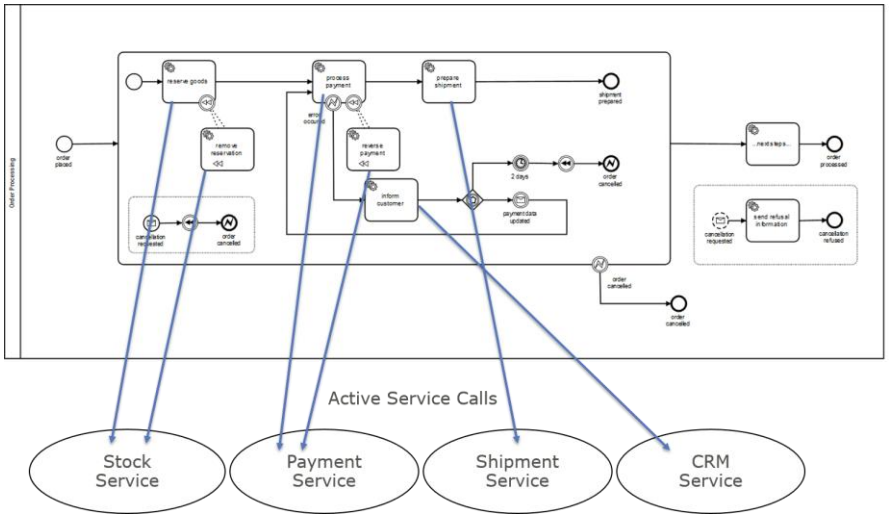


zeebe by Camunda



External tasks pattern



PUSH

Source: http://www.bpm-guide.de/wp-content/uploads/2015/04/service-call-pull.png

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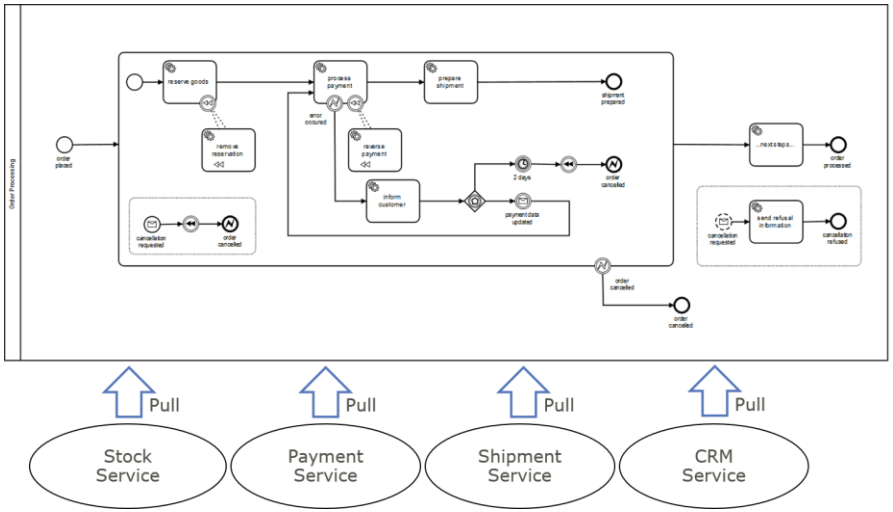
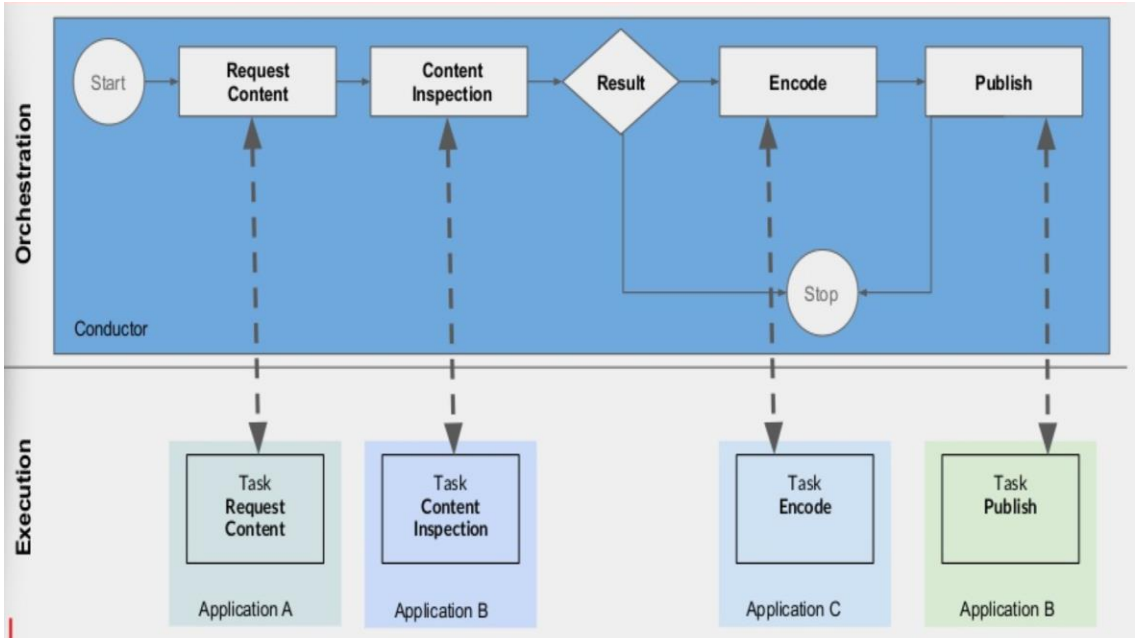


PULL

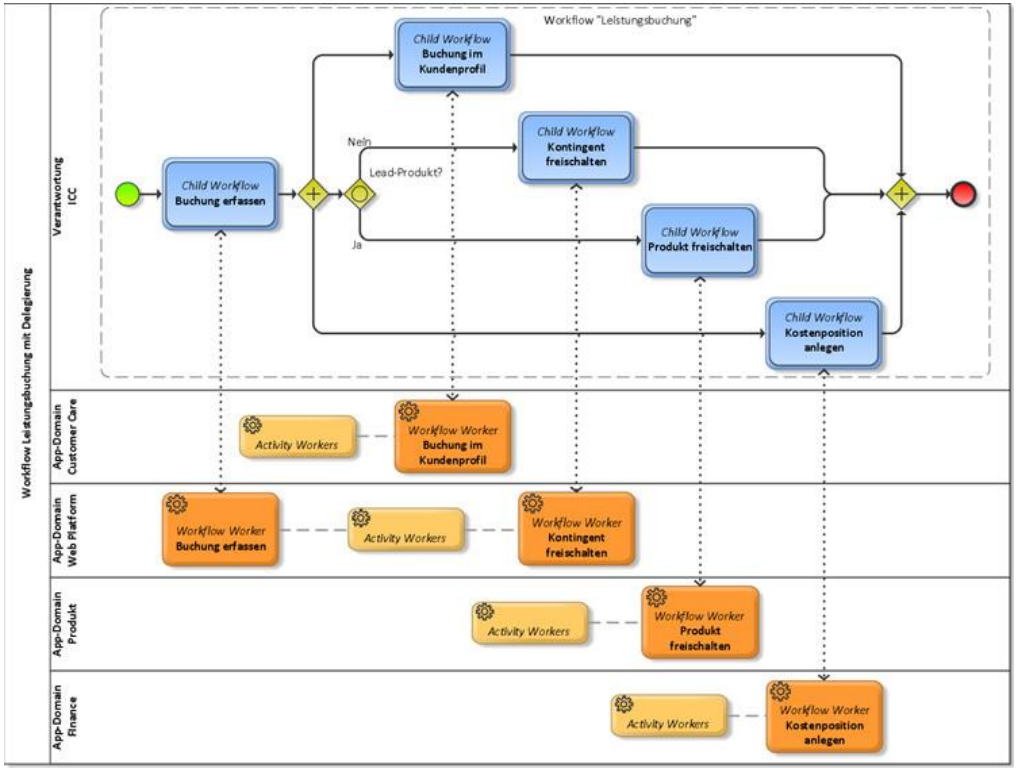
Netflix conductor



- Visualization of a process
- JSON-based DSL Language to define blueprint
- Management of a process
- Traceability
- Retries – Timeouts are allowed in task definitions
- Error/Failure handling

Source: https://image.slidesharecdn.com/netflixconductor-170210192244/95/netflix-conductor-12-638.jpg?cb=1487089280

Amazon Simple Workflows (SWF)

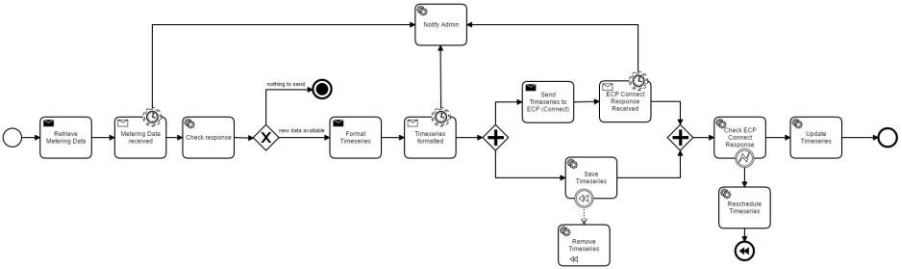


Source: https://media.licdn.com/dms/image/C4E12AQE-x7HbP_uDtw/article-inline_image-shrink_1000_1488/0?e=2127081600&v=beta&t=Bad-UxUAkeobq42NyOdVMlGGNm-X7su_q43jLQDD_DU

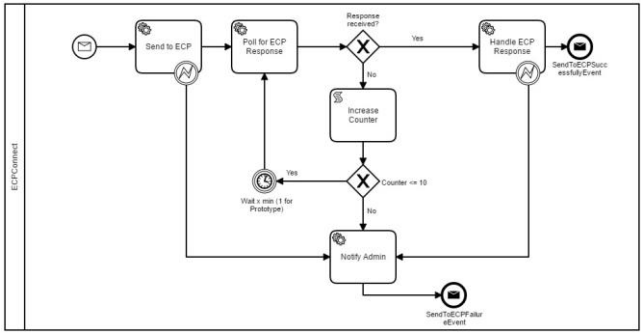
- Decider is a component were we delegate the logic.
- Microworker / decider (is a component where we delegate the business logic) → Microworkers have microworkers
- Workflow engine is only a working horse when it comes to message delivery, state management and error handling.
- Cause a nested sequence of workflow calls to “abstract” logic

REAL-WORLD PRACTICE USE CASE

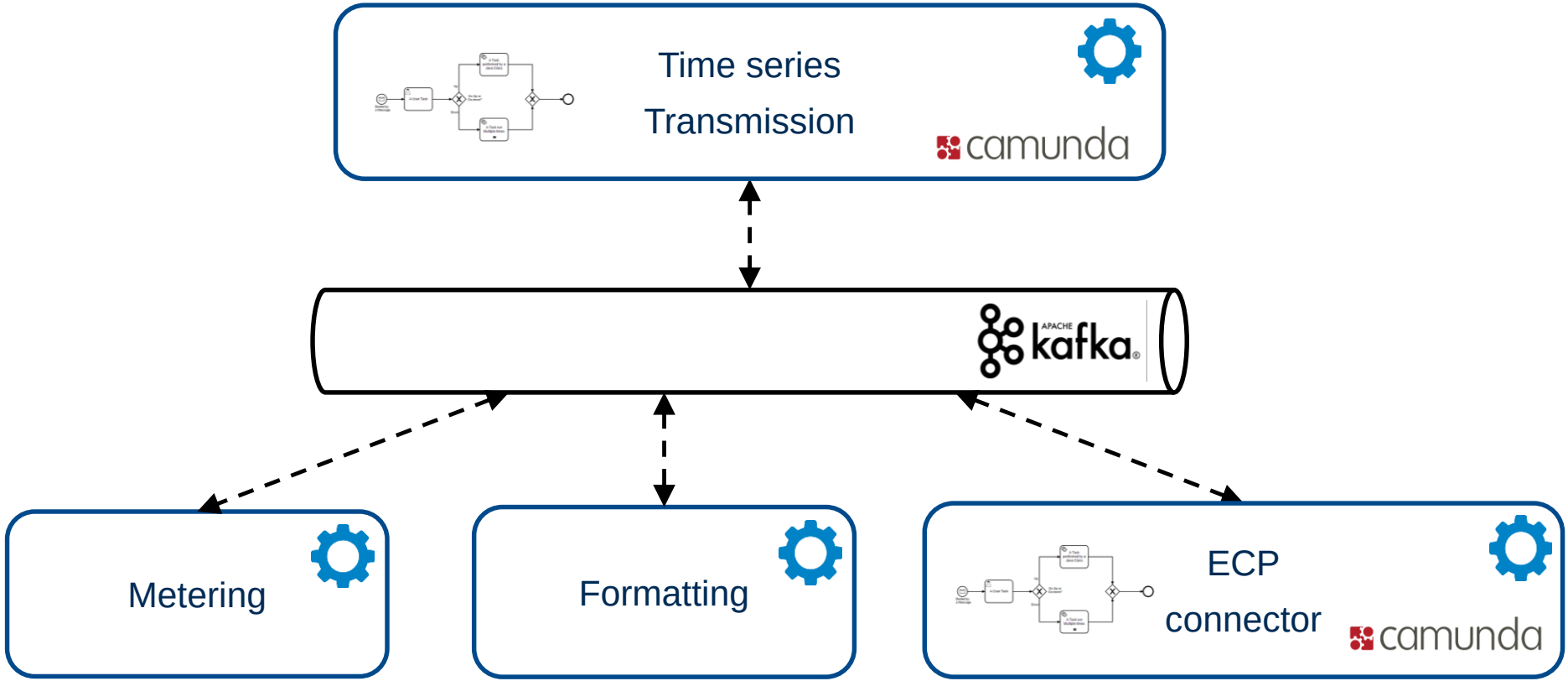
Time Series Process



ECP Connect Process



Prototypical implementation with Camunda



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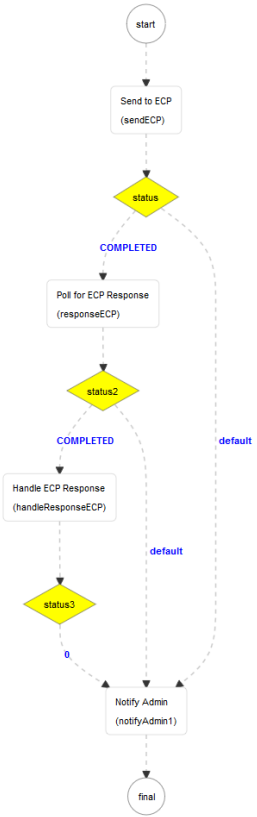

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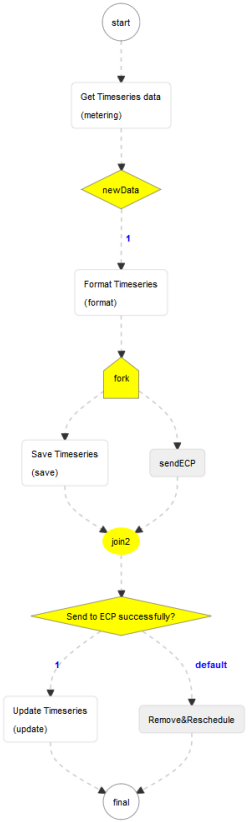
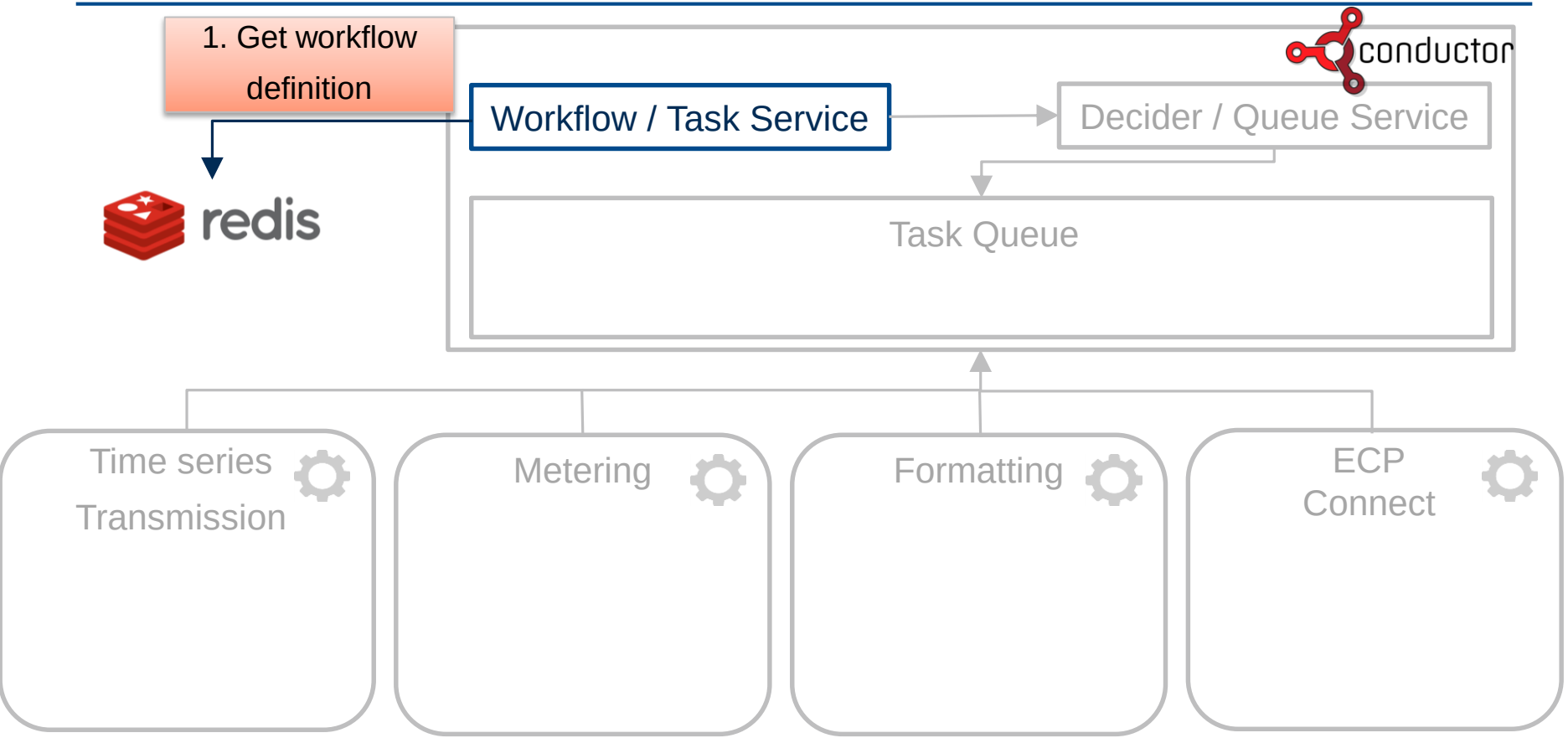


Prototypical Implementation with Conductor



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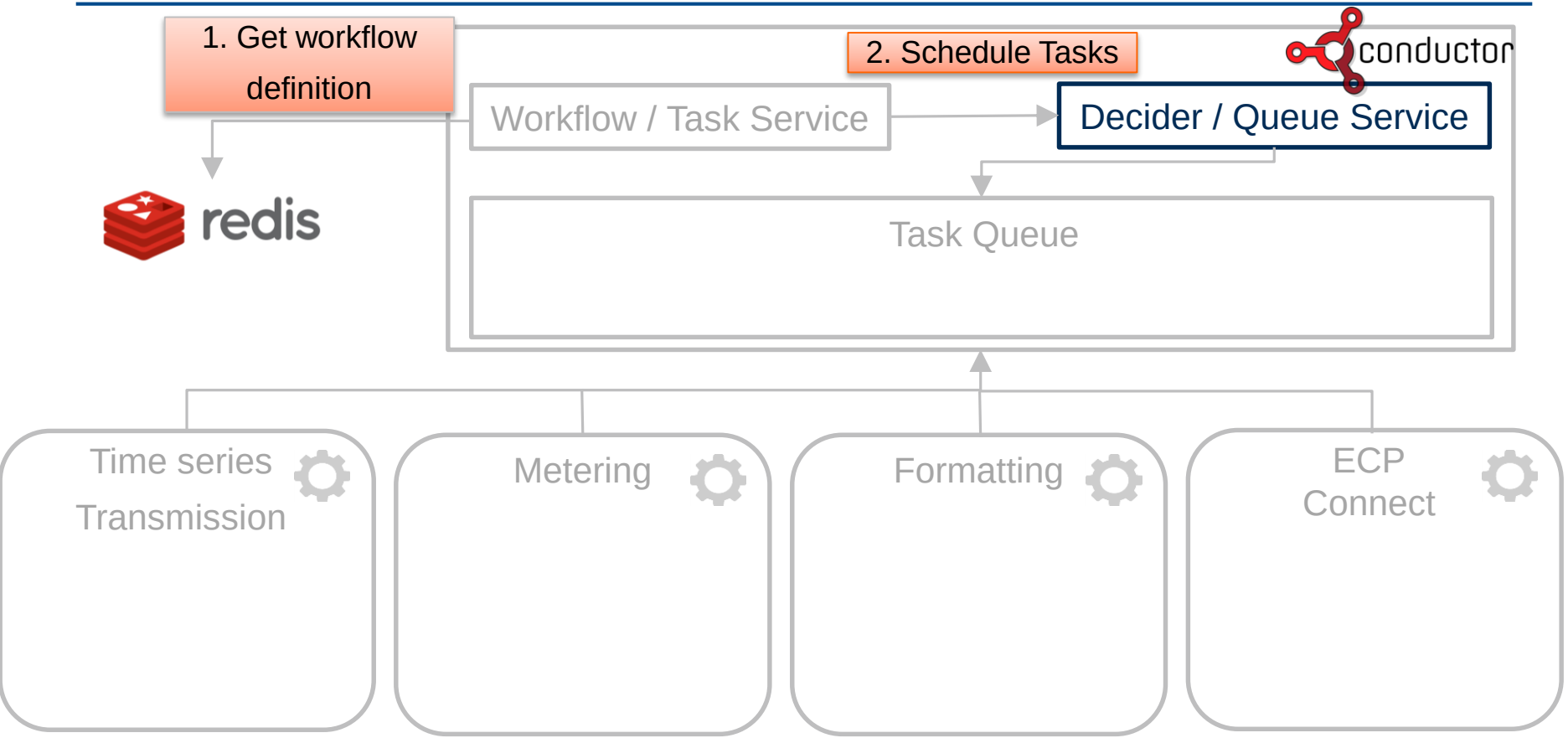

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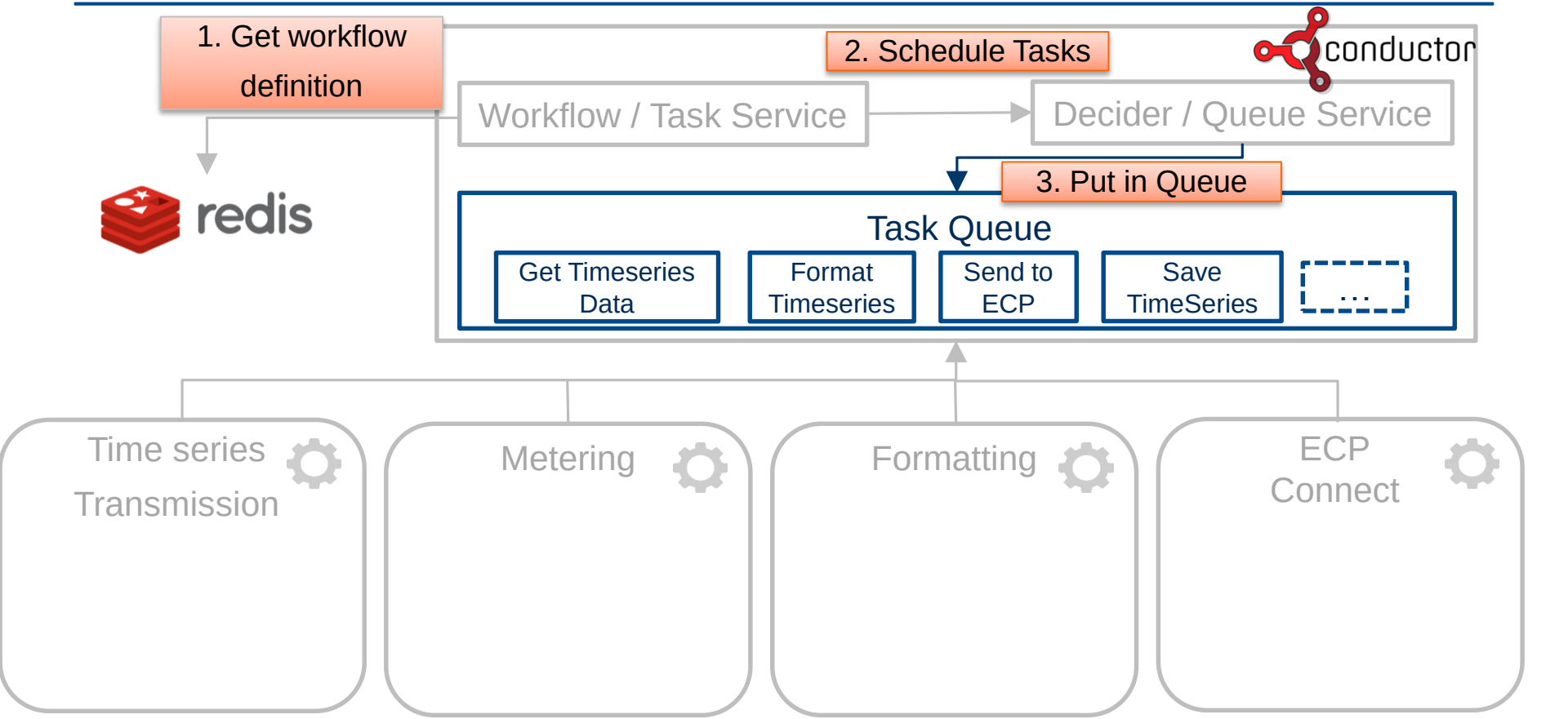

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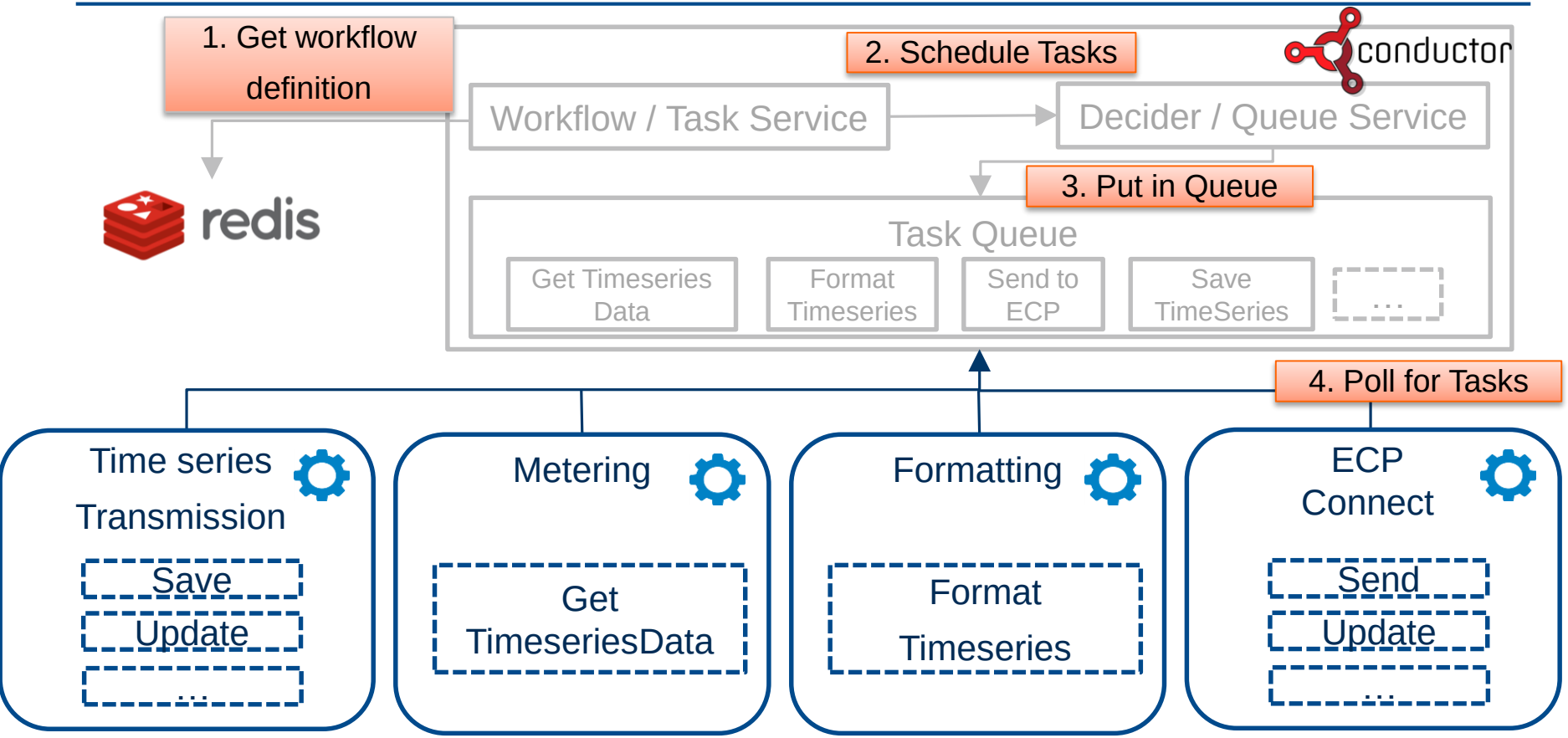

Observations (Delegate, Delegate, Delegate!)

- Delegation is key
- Simple flows instead of complex business processes
- Pull Tasks instead of pushing
- “Smart” workers and “dumb” engine
- New terminology commonly used in most tools
  - Flows
  - Decider
  - Worker
  - Task
  - …

Source: https://goo.gl/QYnuf7

Conclusions & Future Work

- Microservices have also changed the BPM landscape
- The same fundamental reasons have led the “market leaders” to develop orchestration solutions
- Microservice orchestrators provide a **unified but not unique** way to visualize, monitor and manage a distributed process
- Each architectural choice comes with trade-offs and should be chosen per use case


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