Transferring Transactional Business Processes To FaaS

Eighth International Workshop on Serverless Computing 2022 (WoSC8)

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A few thing about BPMN2.0...

Community

Managers

Business Analysts

Technical Developers

Application Area

Management

Purchases

Orders

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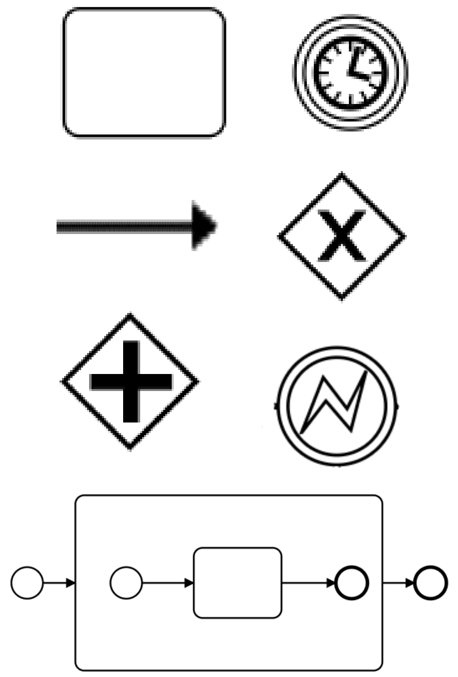
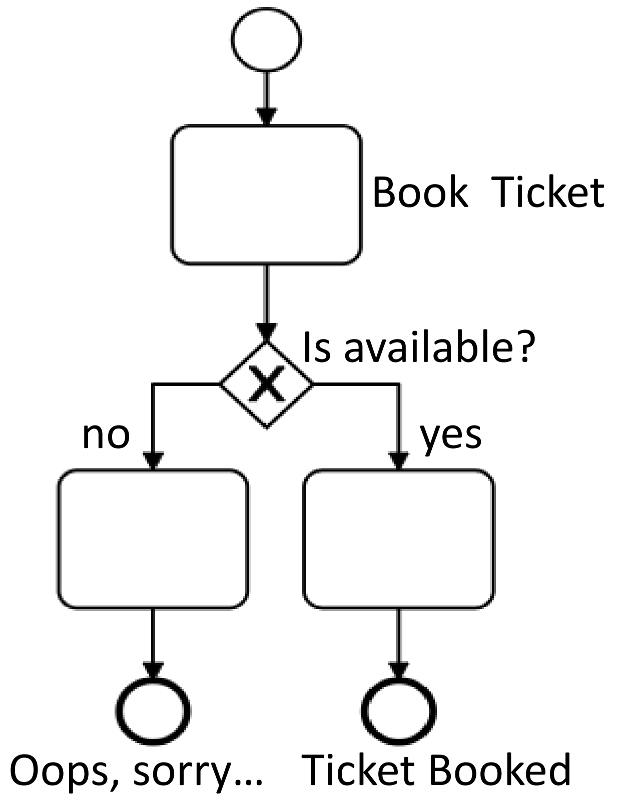
What is BPMN2.0 ?

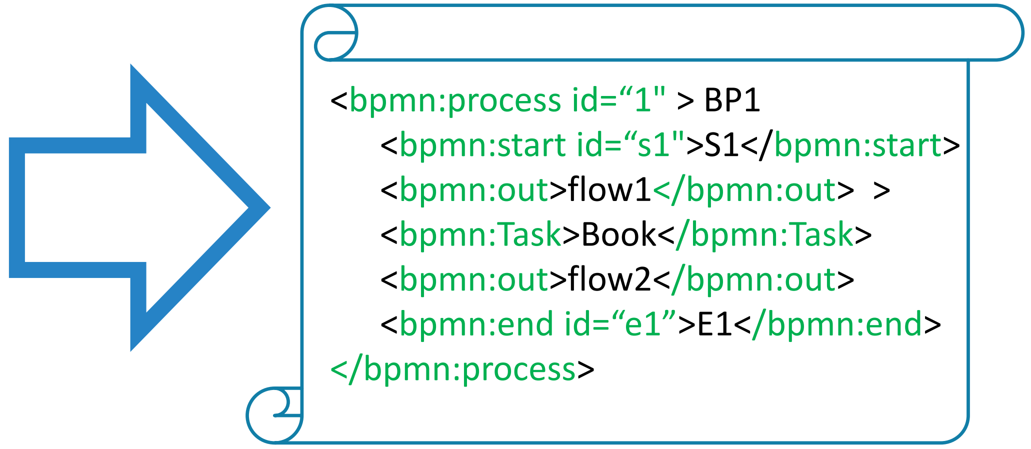
BPMN symbols



Workflows



XML standard



```
<bpmn:process id="1" > BP1
    <bpmn:start id="s1">S1</bpmn:start>
    <bpmn:out>flow1</bpmn:out>  >
    <bpmn:Task>Book</bpmn:Task>
    <bpmn:out>flow2</bpmn:out>
    <bpmn:end id="e1">E1</bpmn:end>
</bpmn:process>
```

ISO/IEC 19510:2013

BPMN2.0 engines

can build whole applications

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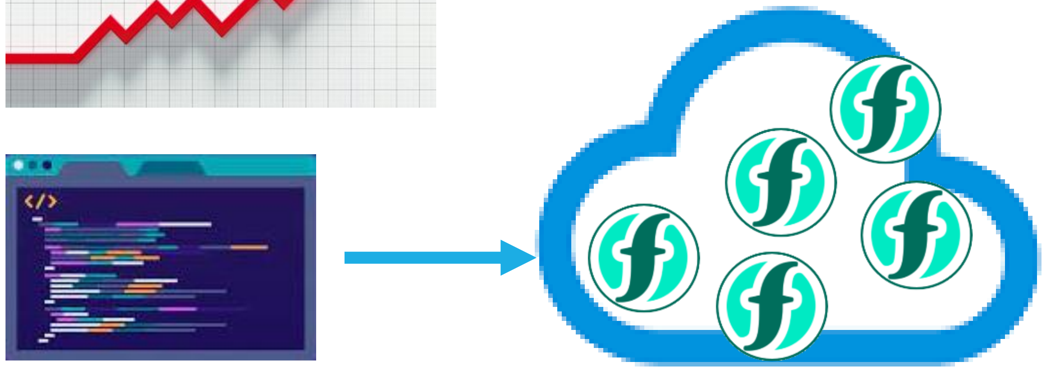
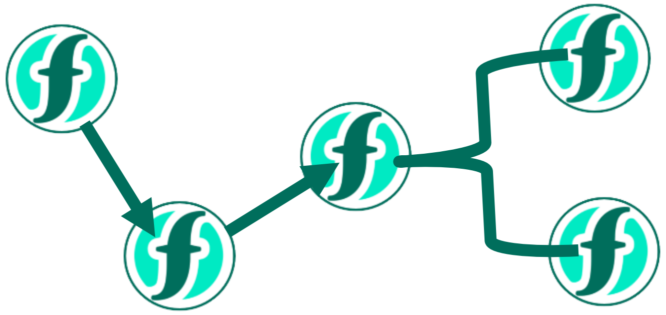
FaaS is a trend!



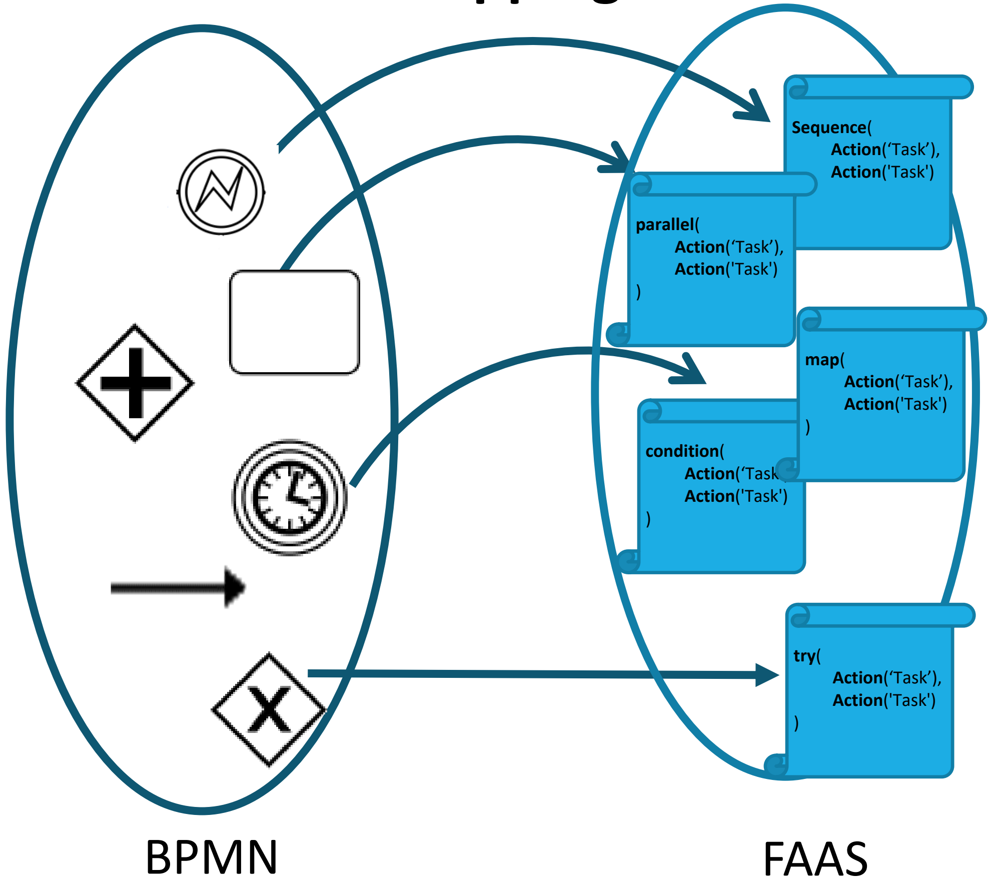
Orchestration → Define Relationships



```
Sequence(
        Action('Task'),
        Action('Task')
)
```

Bridge BPMN2.0 & FaaS

Mapping

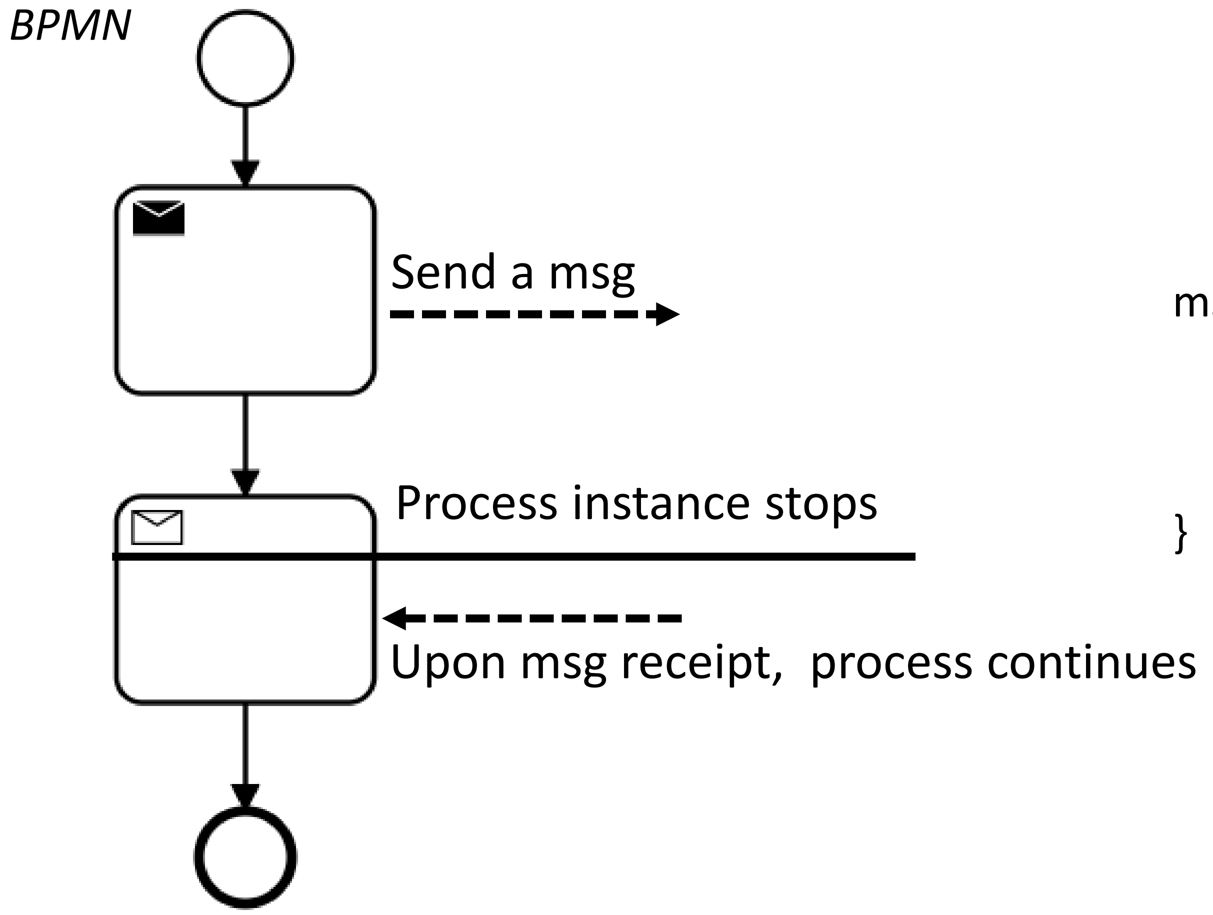

Sequence(Action('Task'), Action('Task')
parallel(Action('Task'), Action('Task'))
map(Action('Task'), Action('Task'))
condition(Action('Task Action('Task'))
try(Action('Task'), Action('Task'))
BPMN
FAAS

One-to-one mapping of common constructs

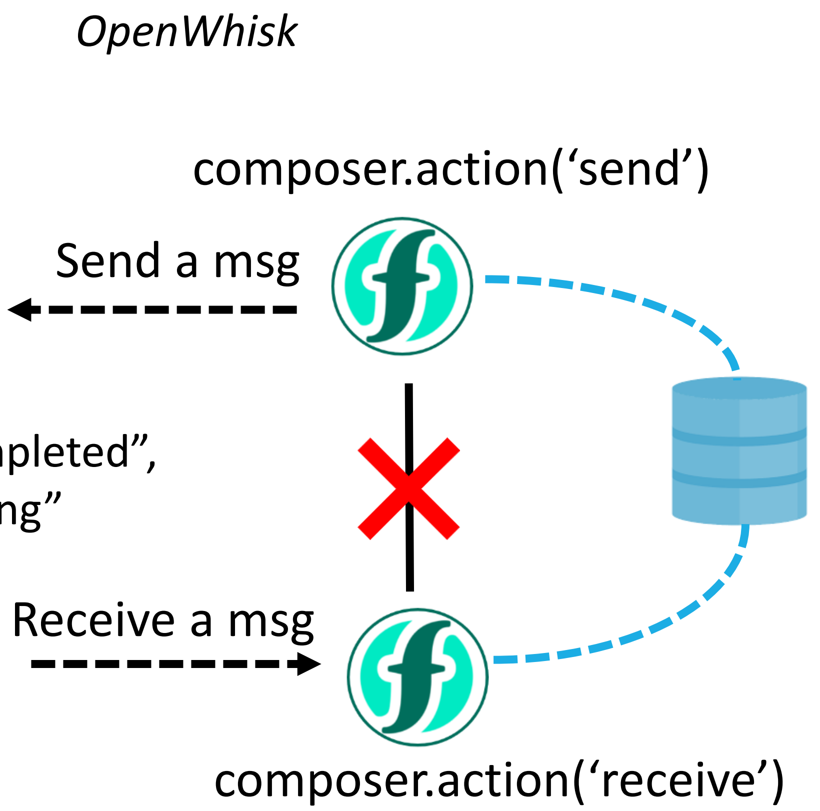
BPMN notation	BPMN representation	OpenWhisk concept	Visual representation
Task	name	composer.action('name')	ƒ
Sequence	→	composer.sequence(action1, action2)	→
Exclusive gateway	⊗	composer.if(condition, path1, path2)	⊗
Parallel gateway	⊕	composer.parallel(action1, action2)	⊕

● ● ●

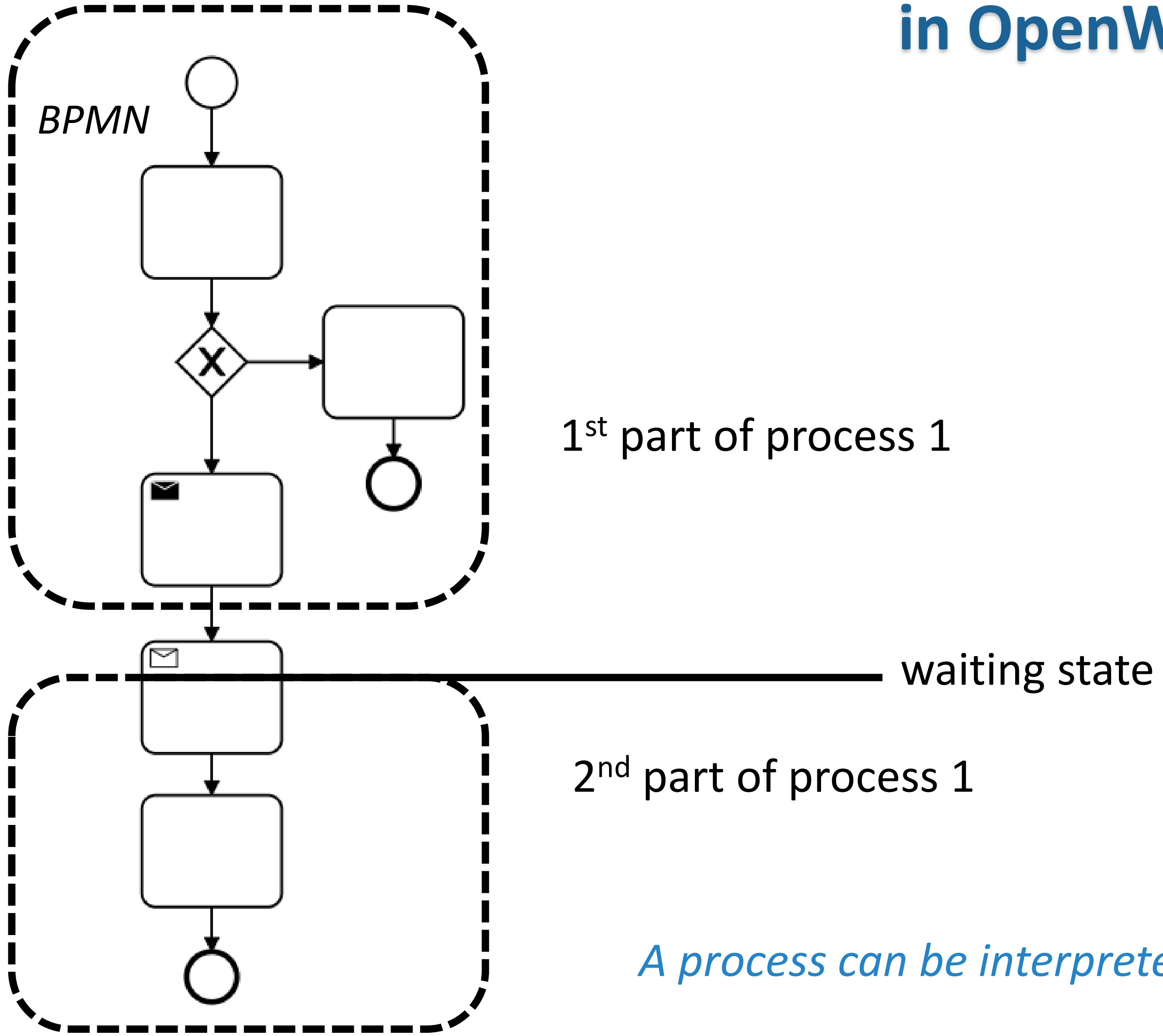
Challenge 1: BPMN blocking vs FaaS event-driven

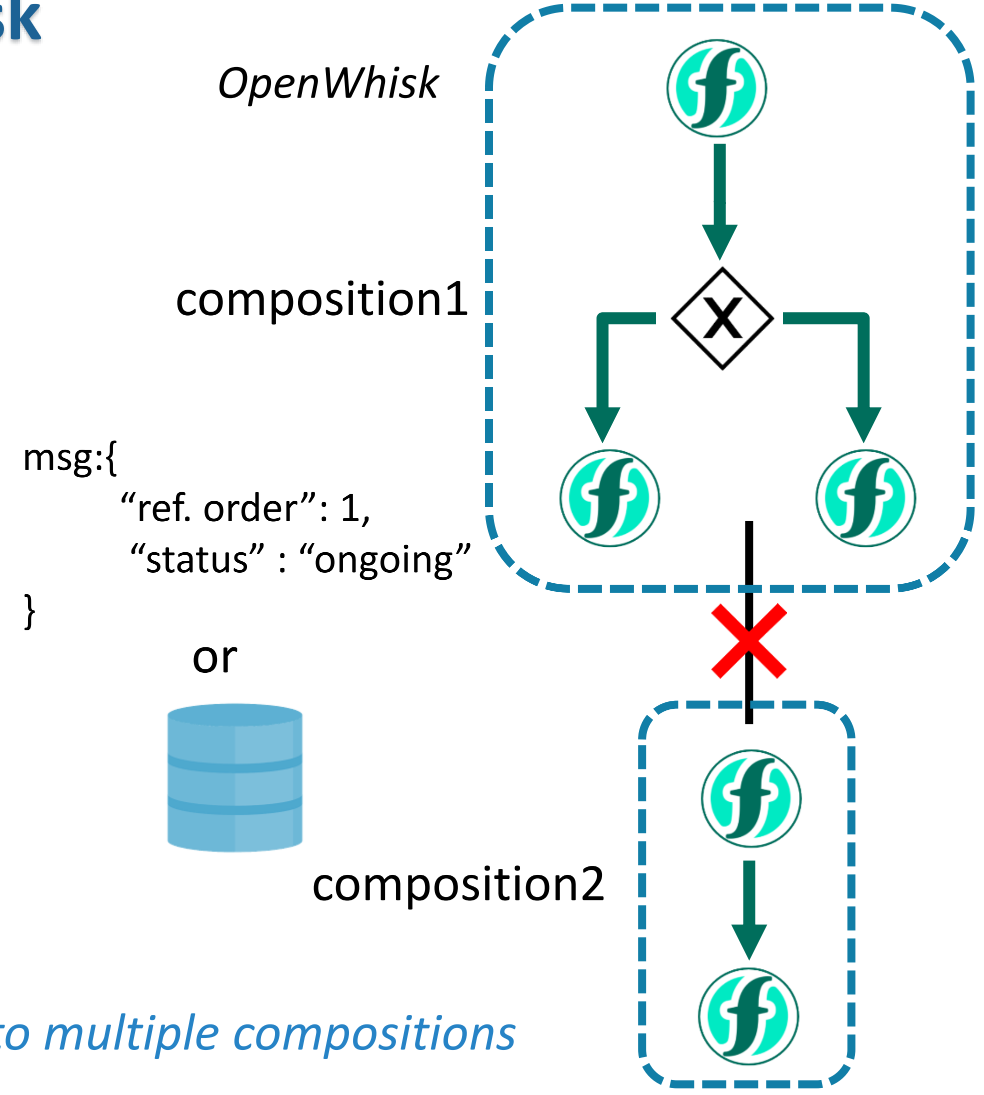


msg:{
"ref. order": 1,
"sendTask": "completed",
"status" : "ongoing"
}



Implementing BPMN waiting states in OpenWhisk



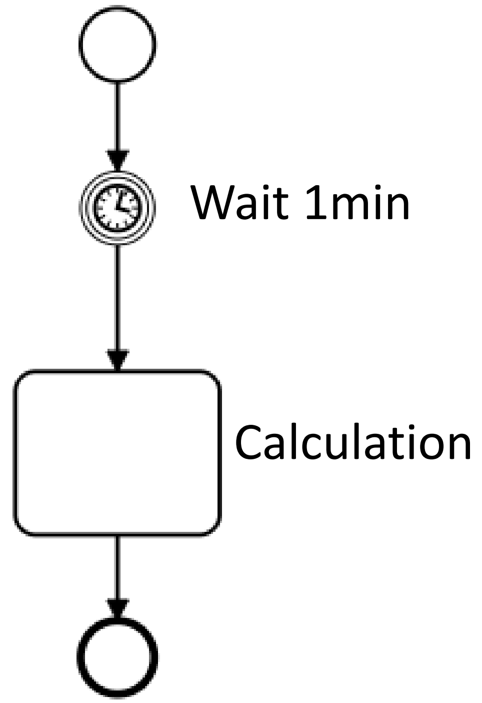


```
msg:{
        "ref. order": 1,
         "status" : "ongoing"
}
```

A process can be interpreted into multiple compositions

Challenge 2 : Implementing BPMN delays in FaaS

BPMN



orchestration definitions

```
Sequence(
          Function( (input) =>{const date = Date.now();
                    let now = null;
                    do { now = Date.now(); }
                    while (now - date < 1000);
                    return input; } ),
          Action('Task')
)
```

Timeout limit of 6min

Burns our CPU

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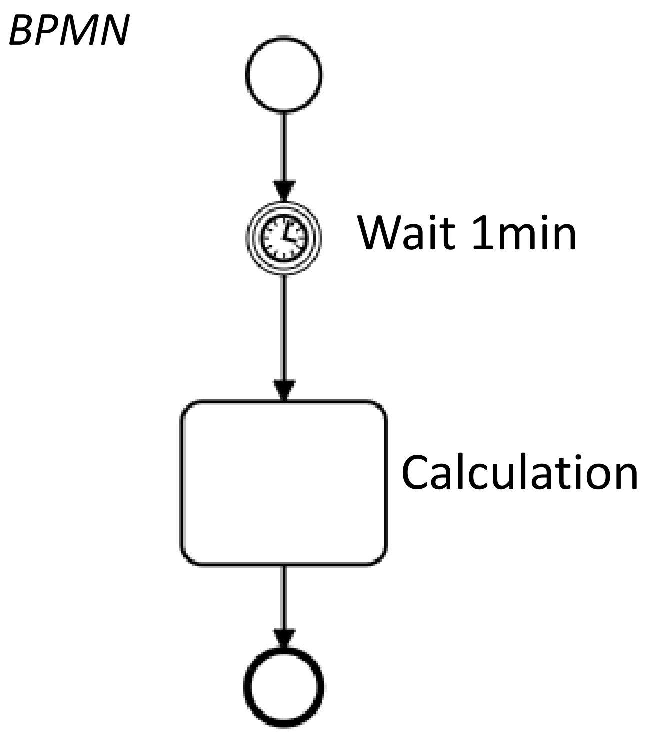
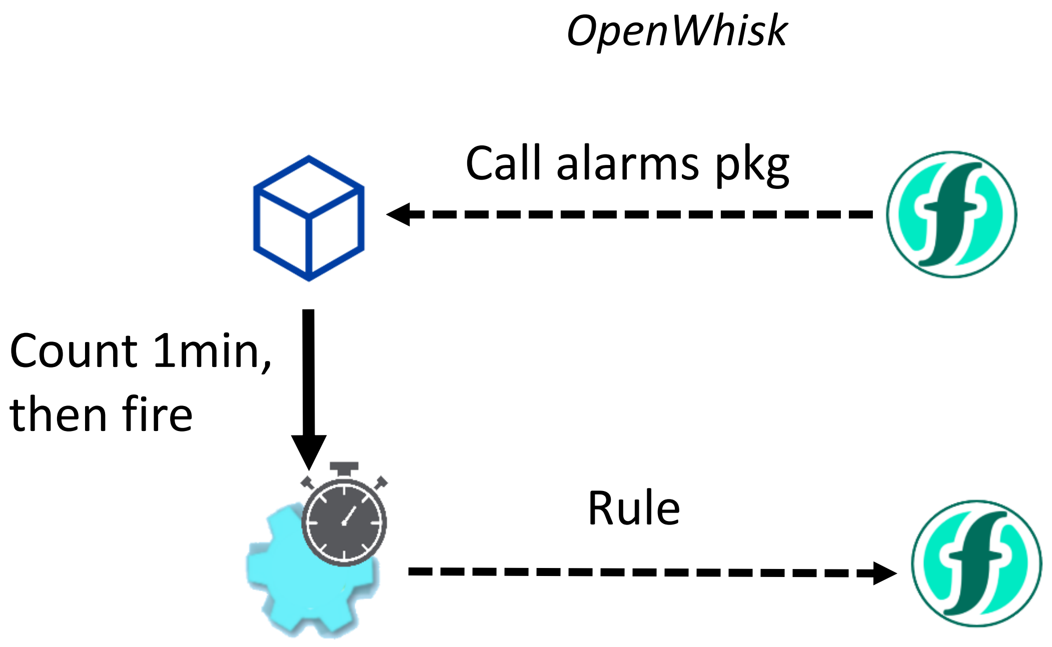
Implementing Delay: Use a timed event cloud-native service





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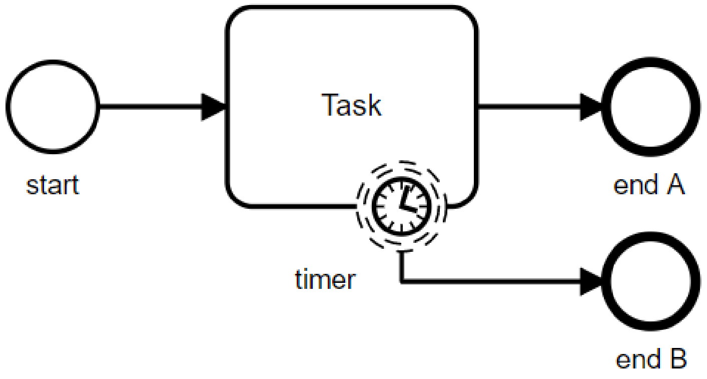
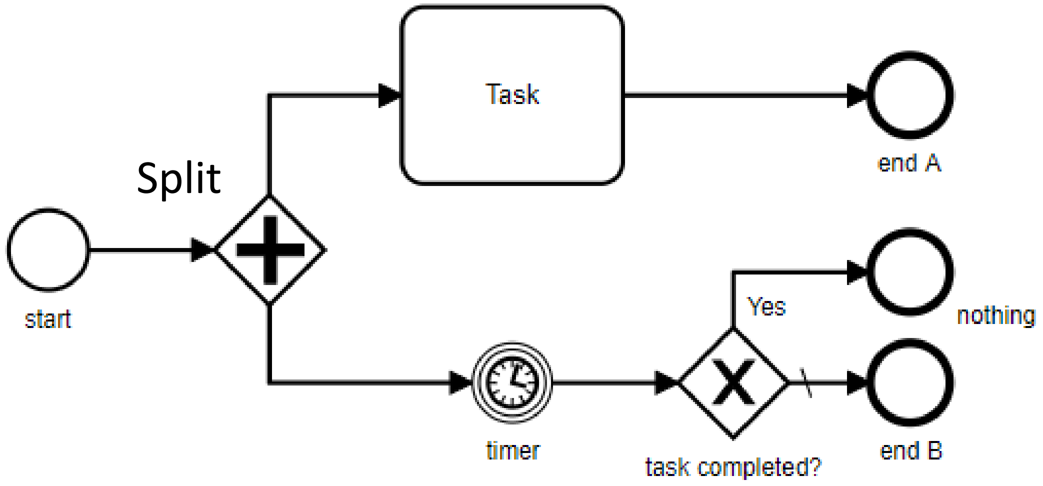
Challenge 3: Boundary Timers

Non-interrupting boundary timer



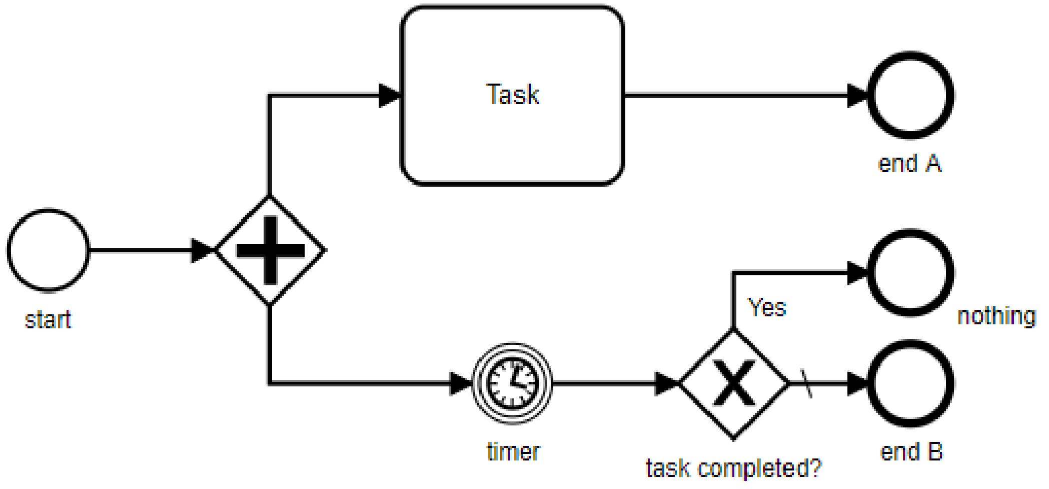
BPMN

Think algorithmically
(reduction to a problem with known solution)

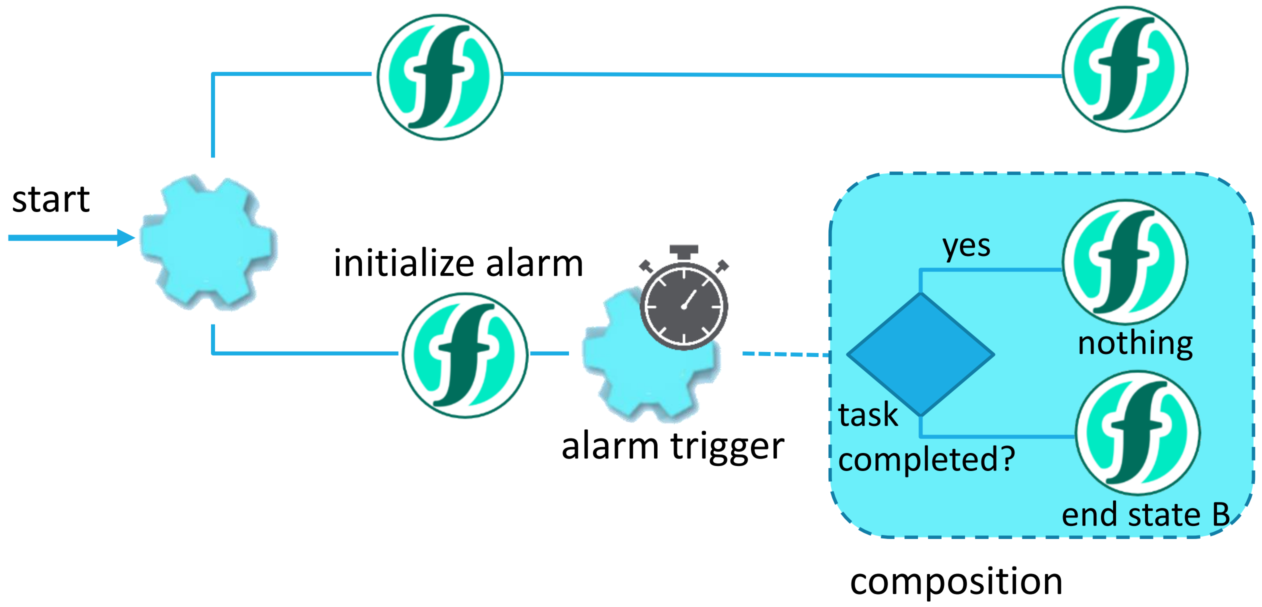


BPMN

Transformation of boundary timer to OpenWhisk

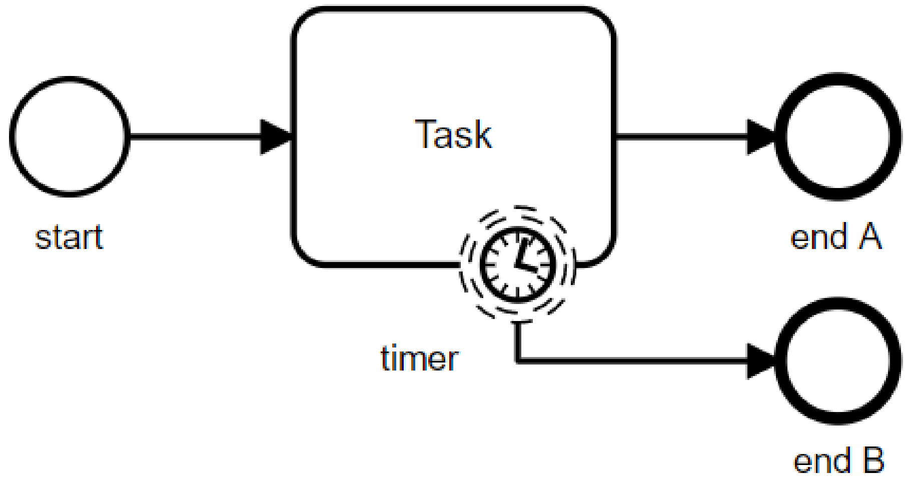


BPMN

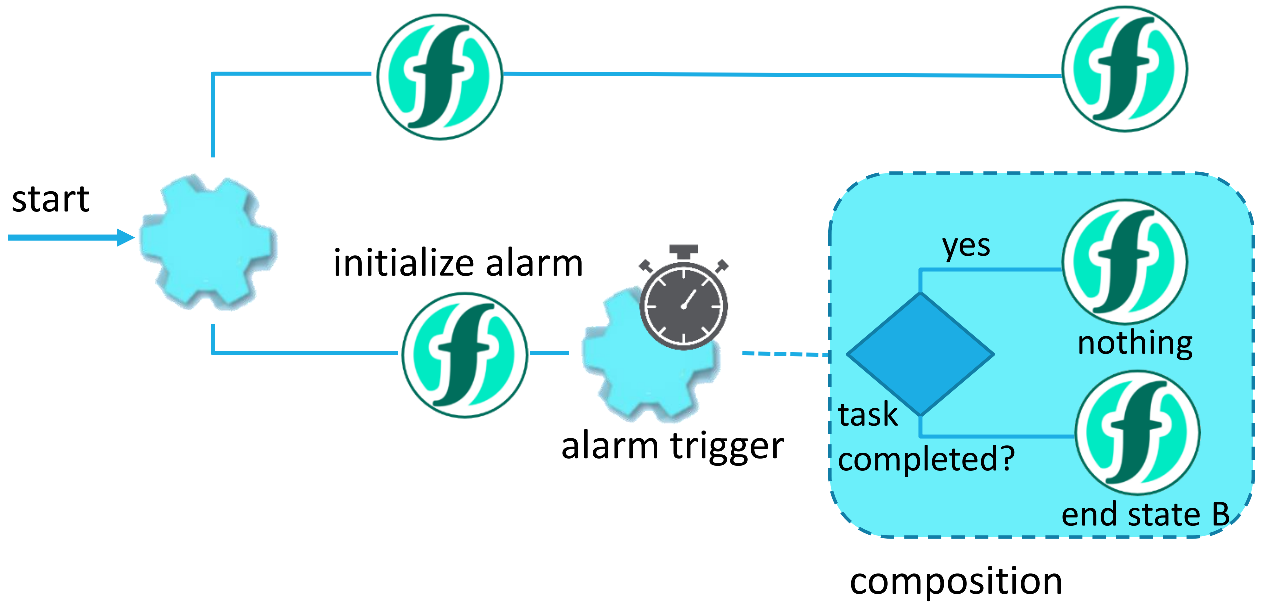


OpenWhisk

Transformation of boundary timer to OpenWhisk

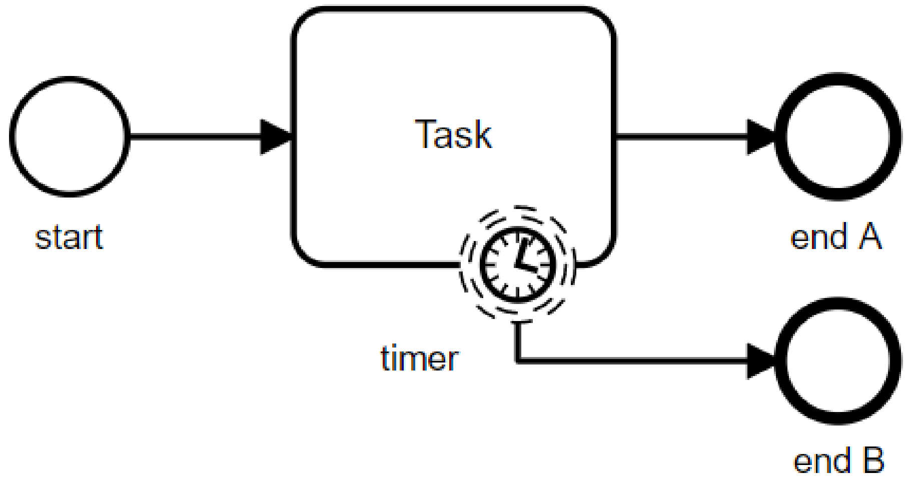


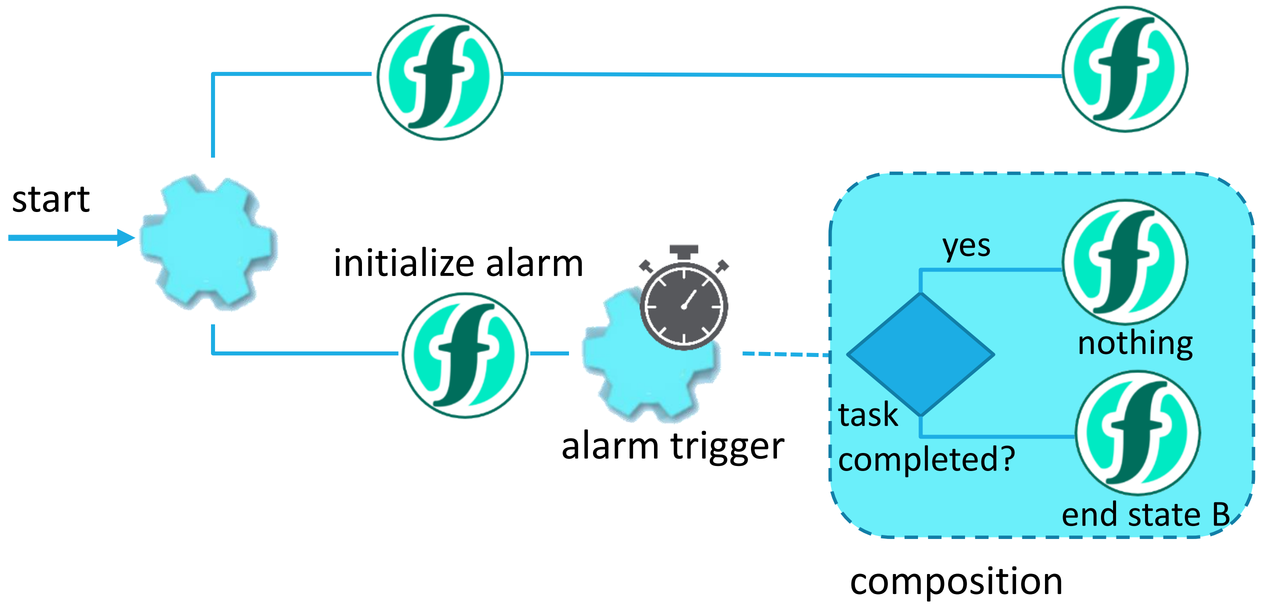
BPMN



OpenWhisk

Observation: FaaS is structurally more complex





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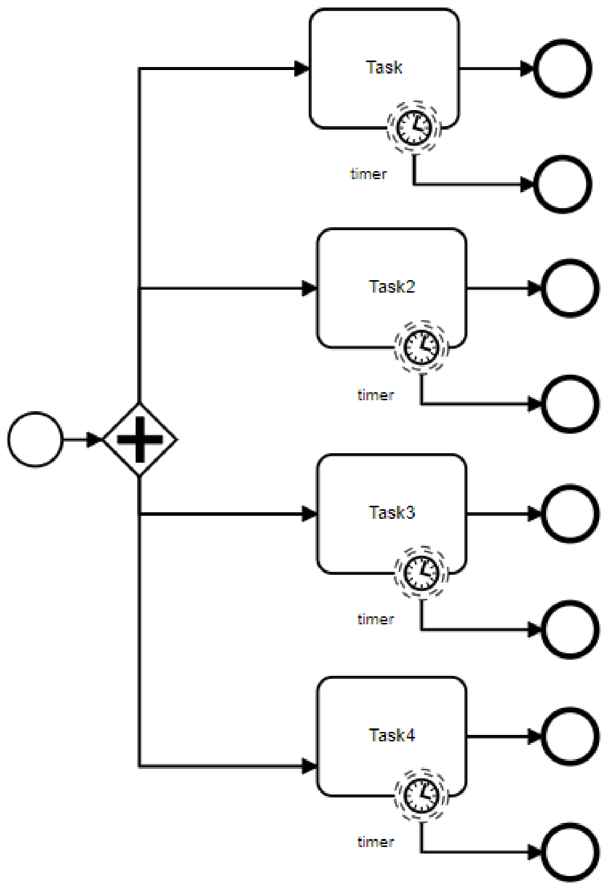

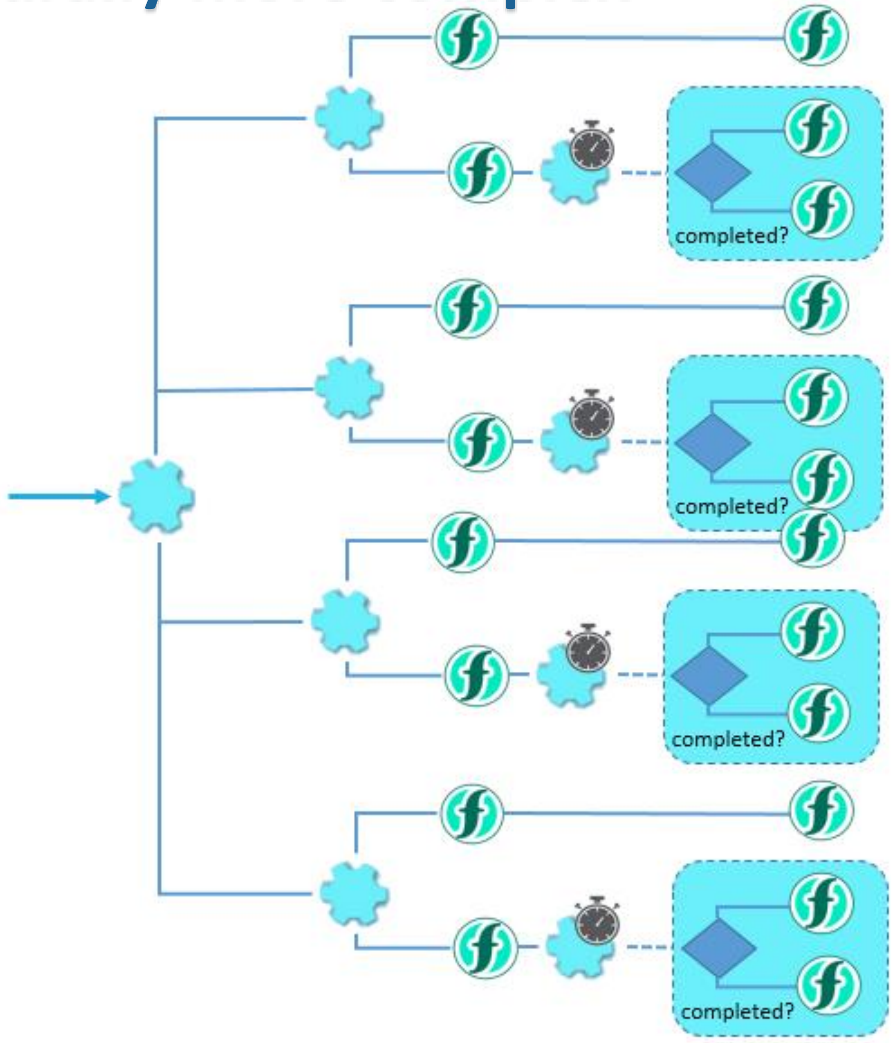

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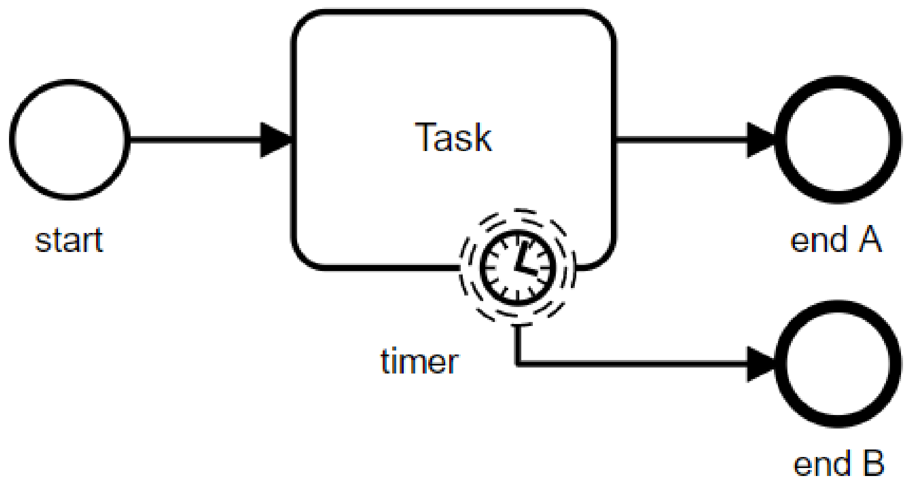

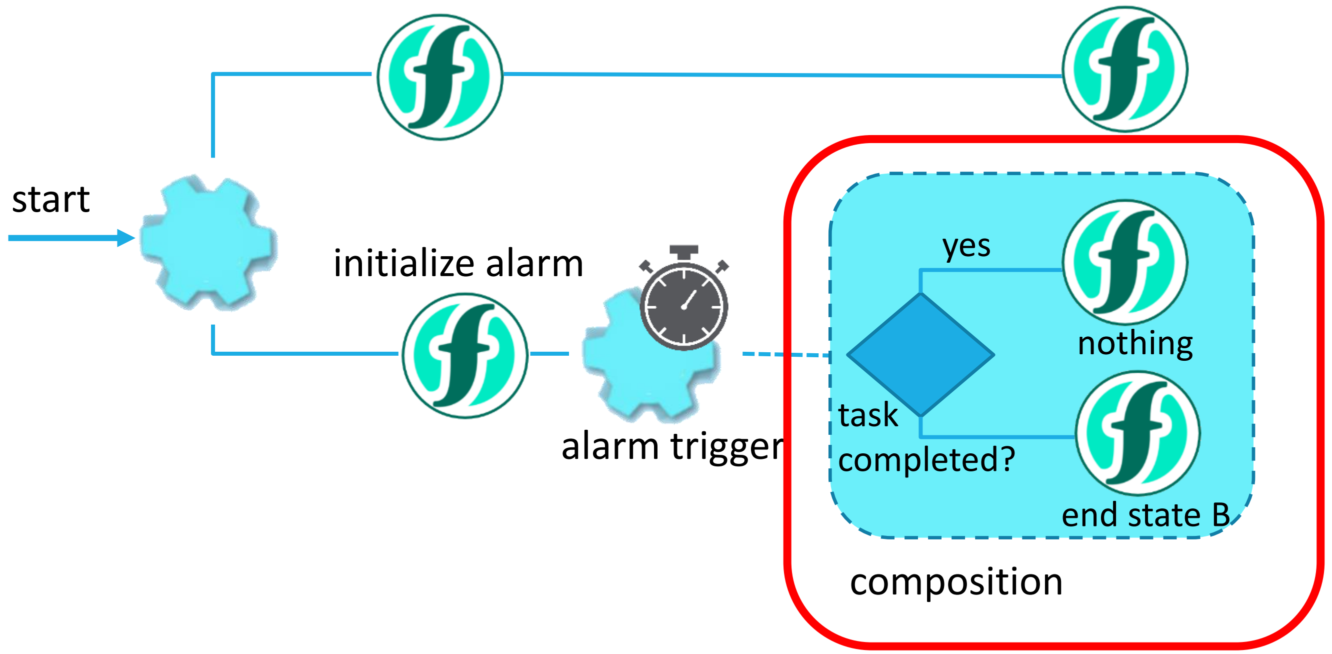

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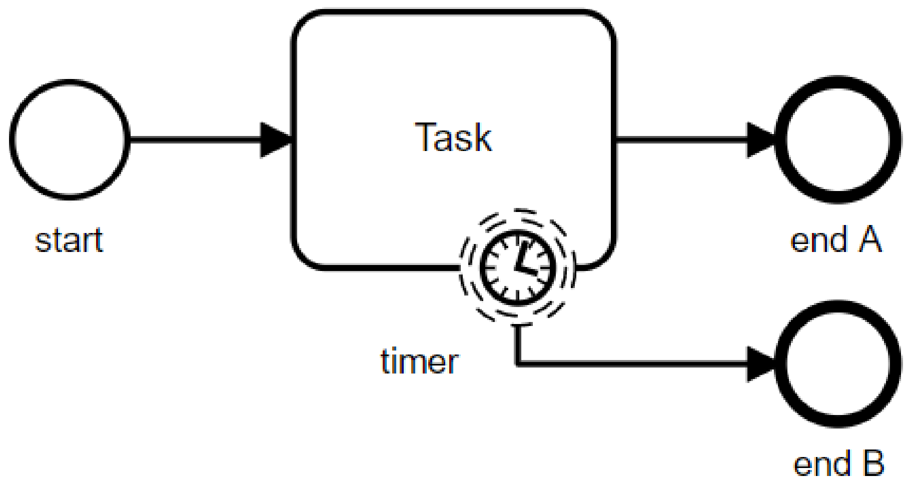

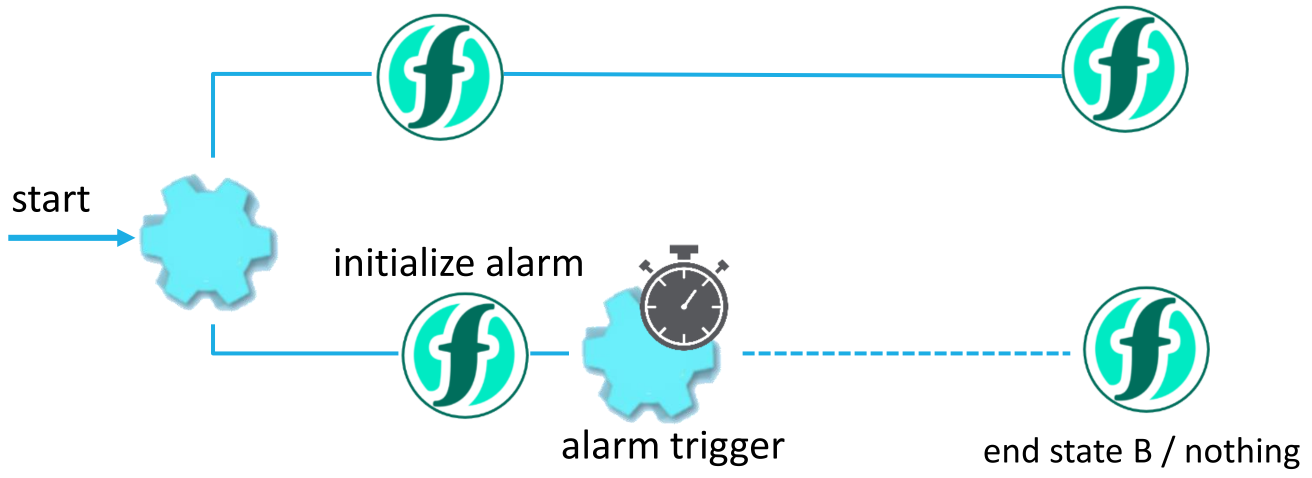

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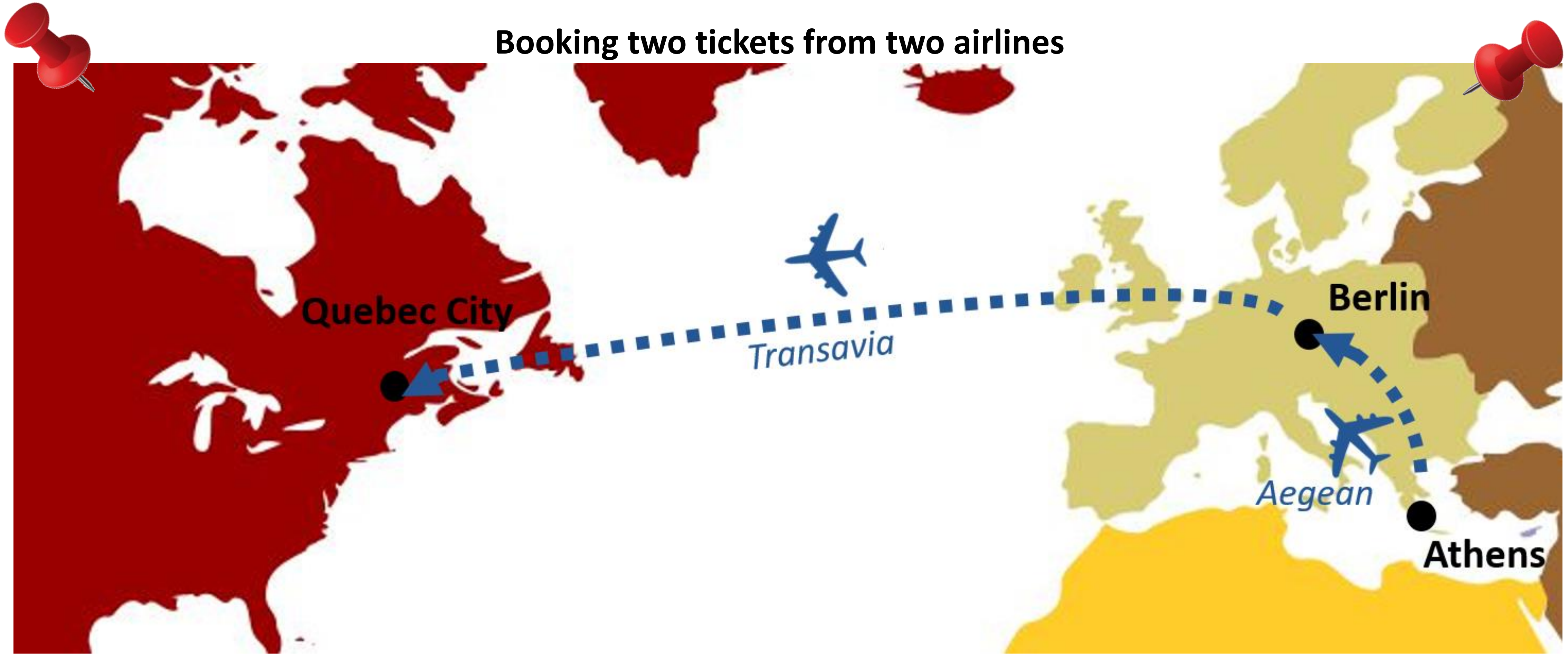
Expressing Transactions in BPMN

- Traditionally **BPMN2.0** is used to describe such **transactional** applications
- Since the majority uses saga → **BPMN2.0 supports sagas**
- BPMN2.0 has high expressive power (**semantically strong**)
- Let’s implement an **airline example** using BPMN2.0

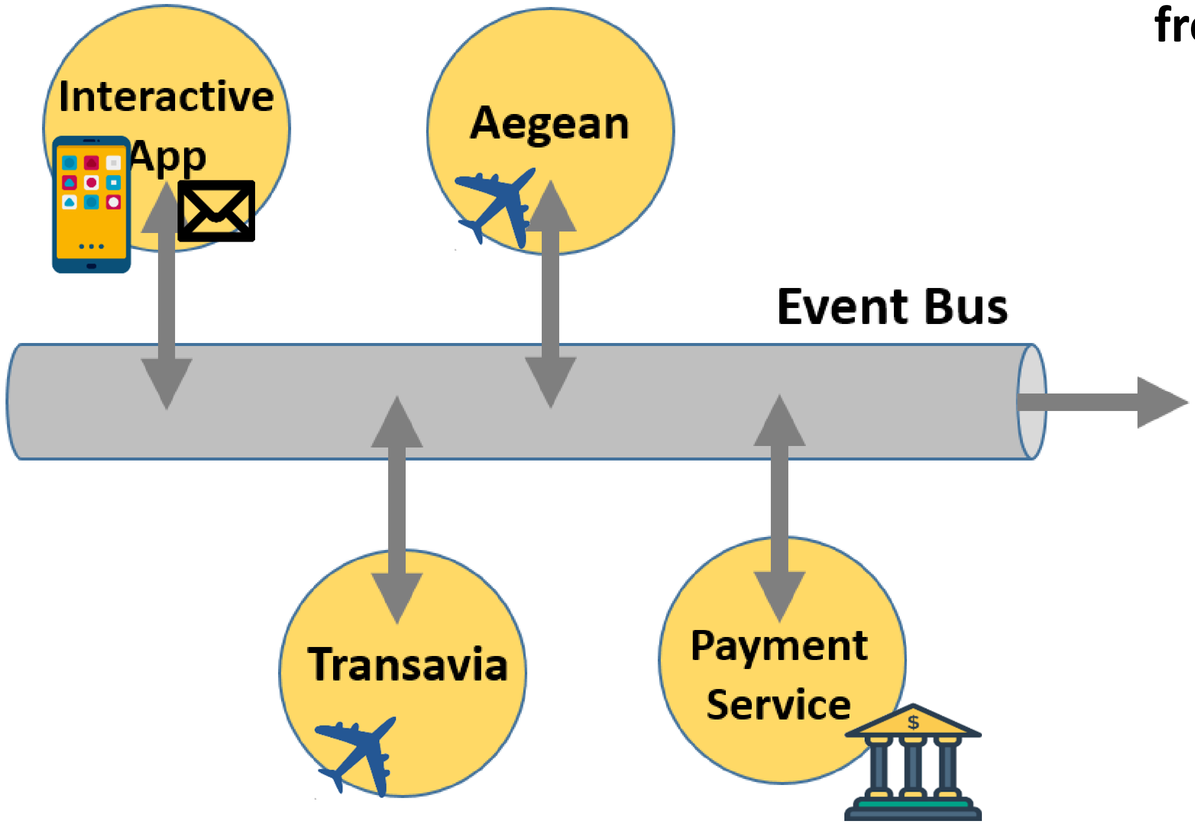
Airline paradigm explanation

Booking two tickets from two airlines



Possible Implementation, multiple participants

Booking two tickets from two airlines



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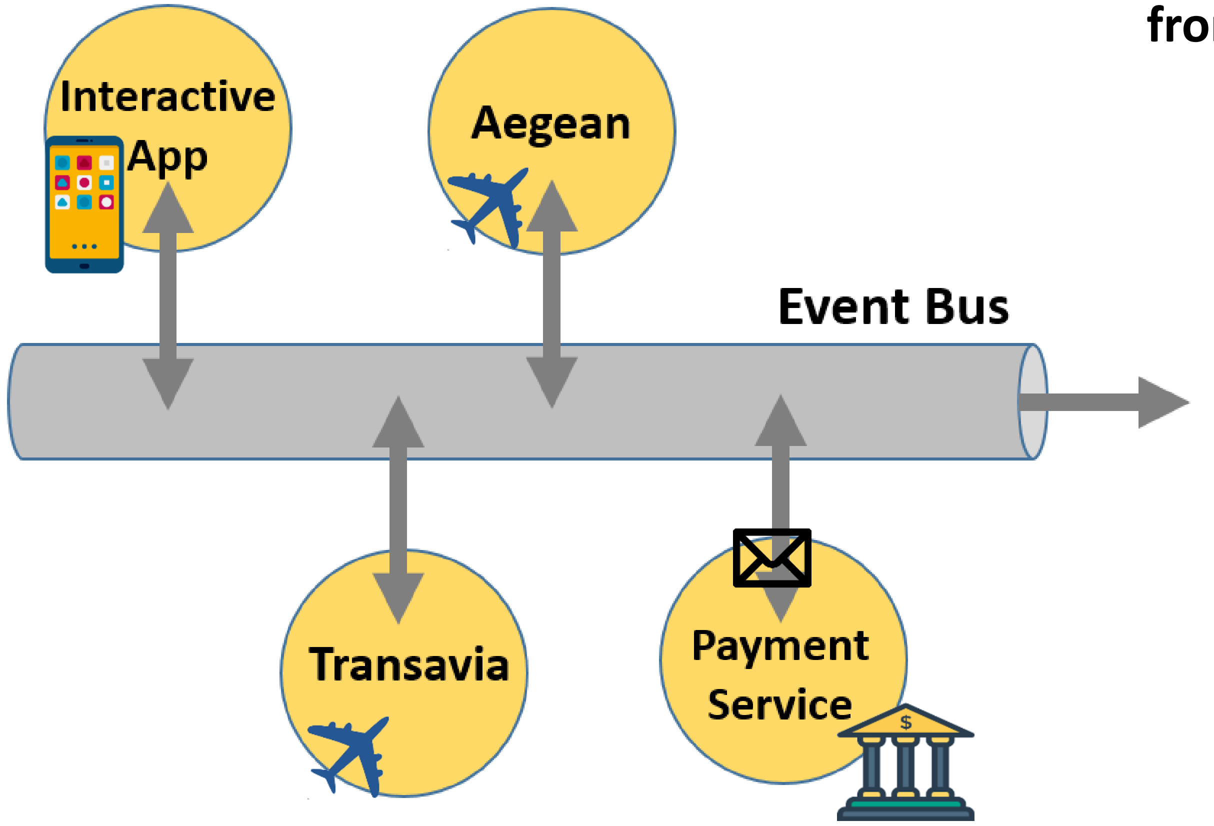
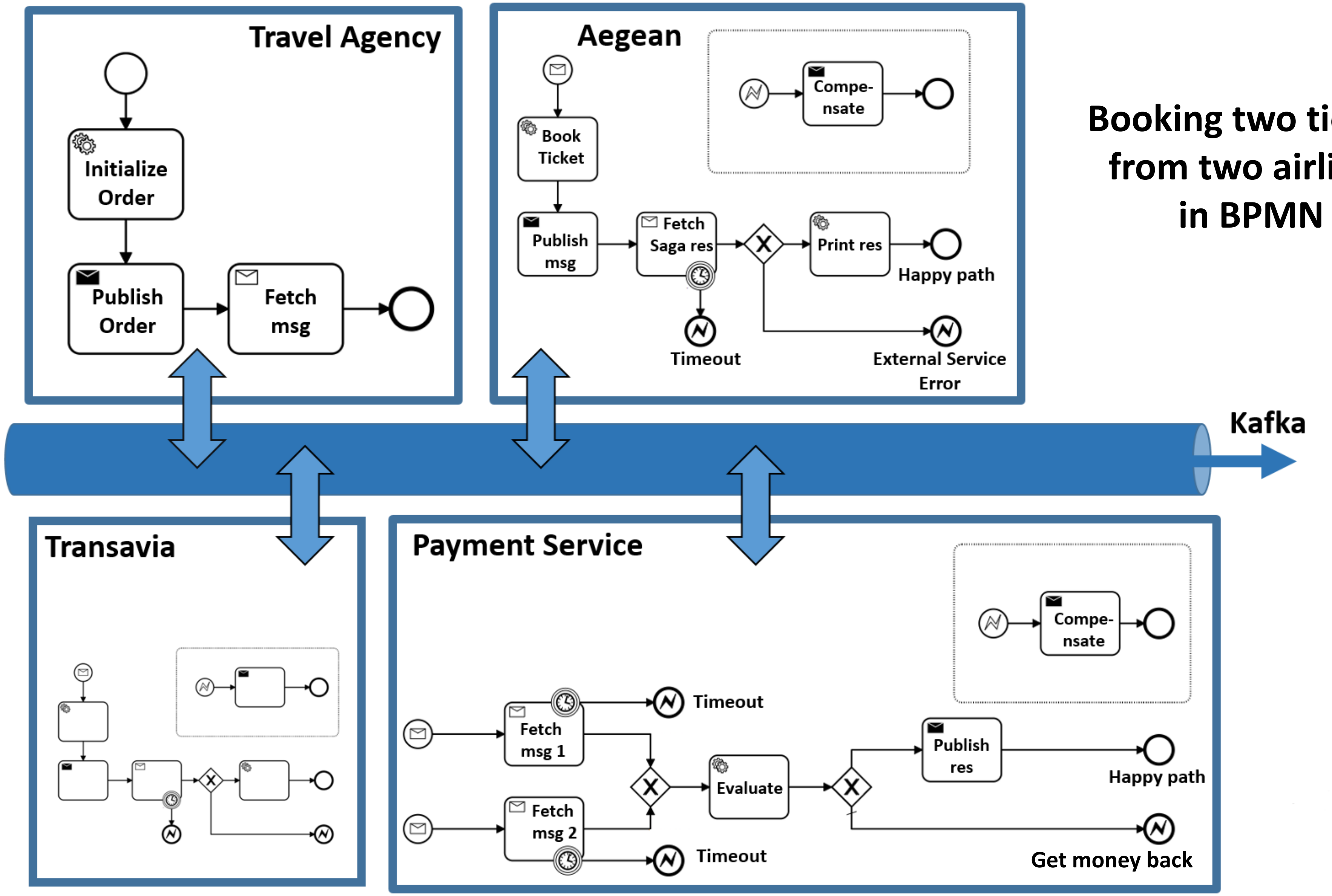
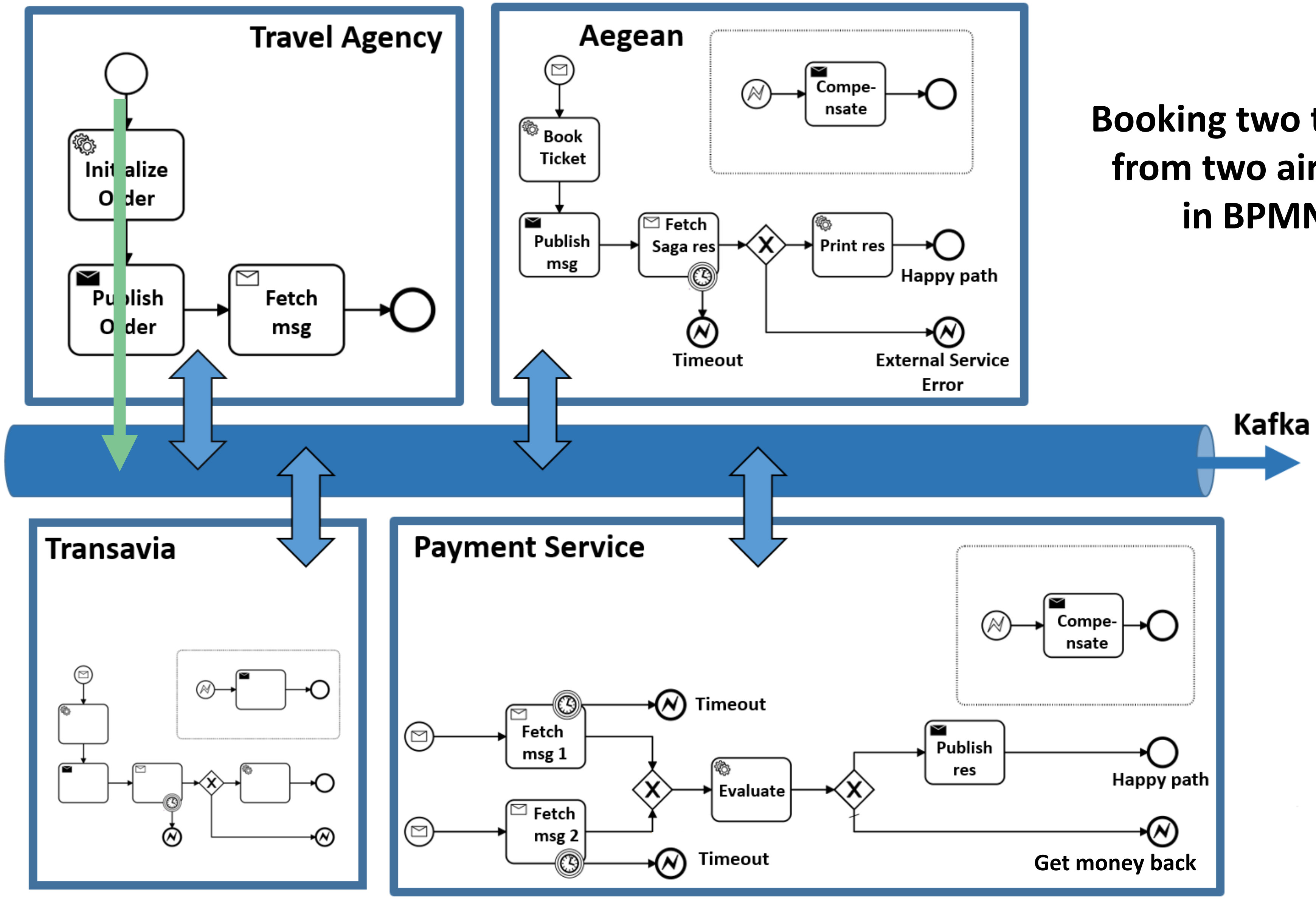




Booking two tickets from two airlines in BPMN



Booking two tickets from two airlines in BPMN

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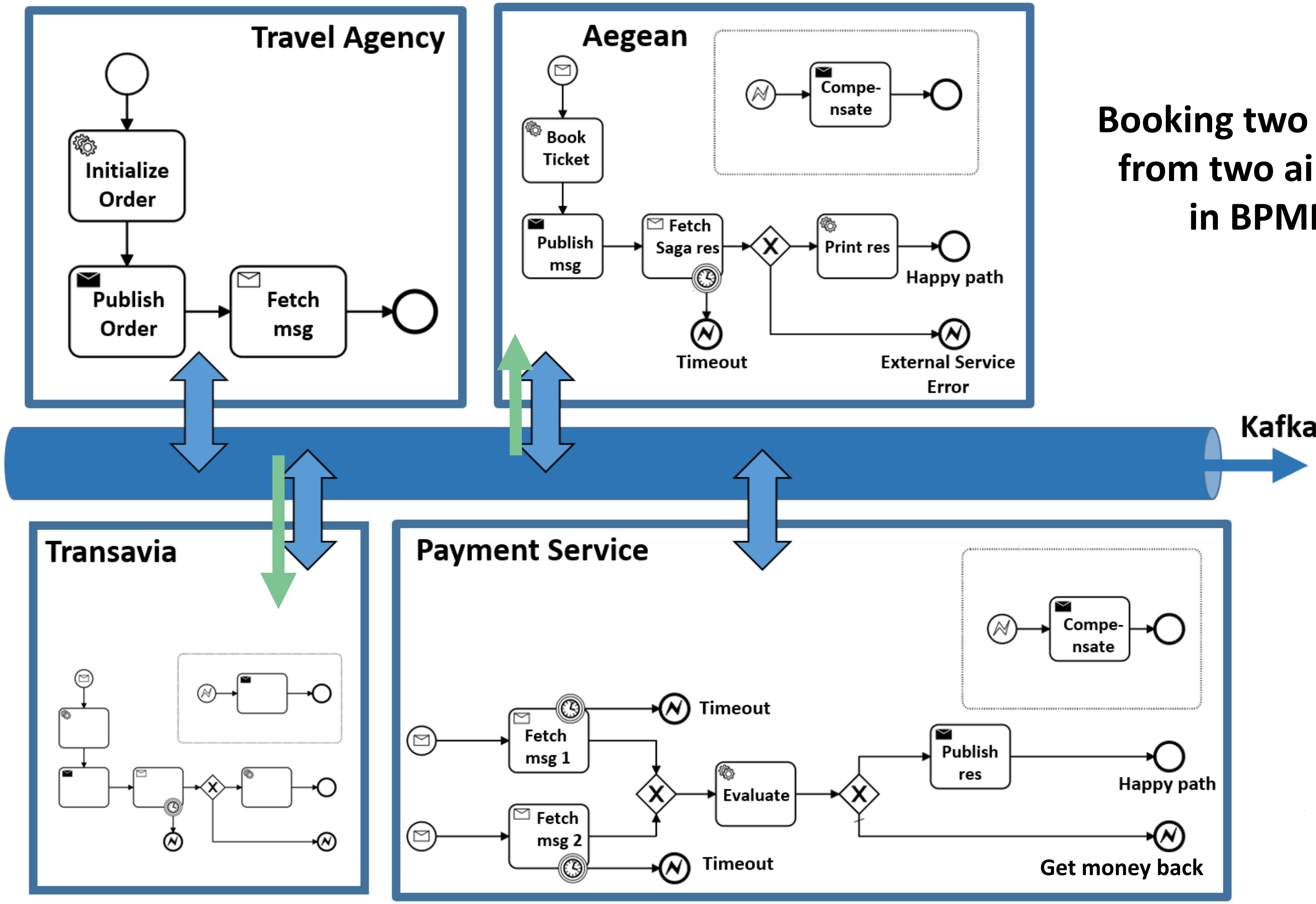

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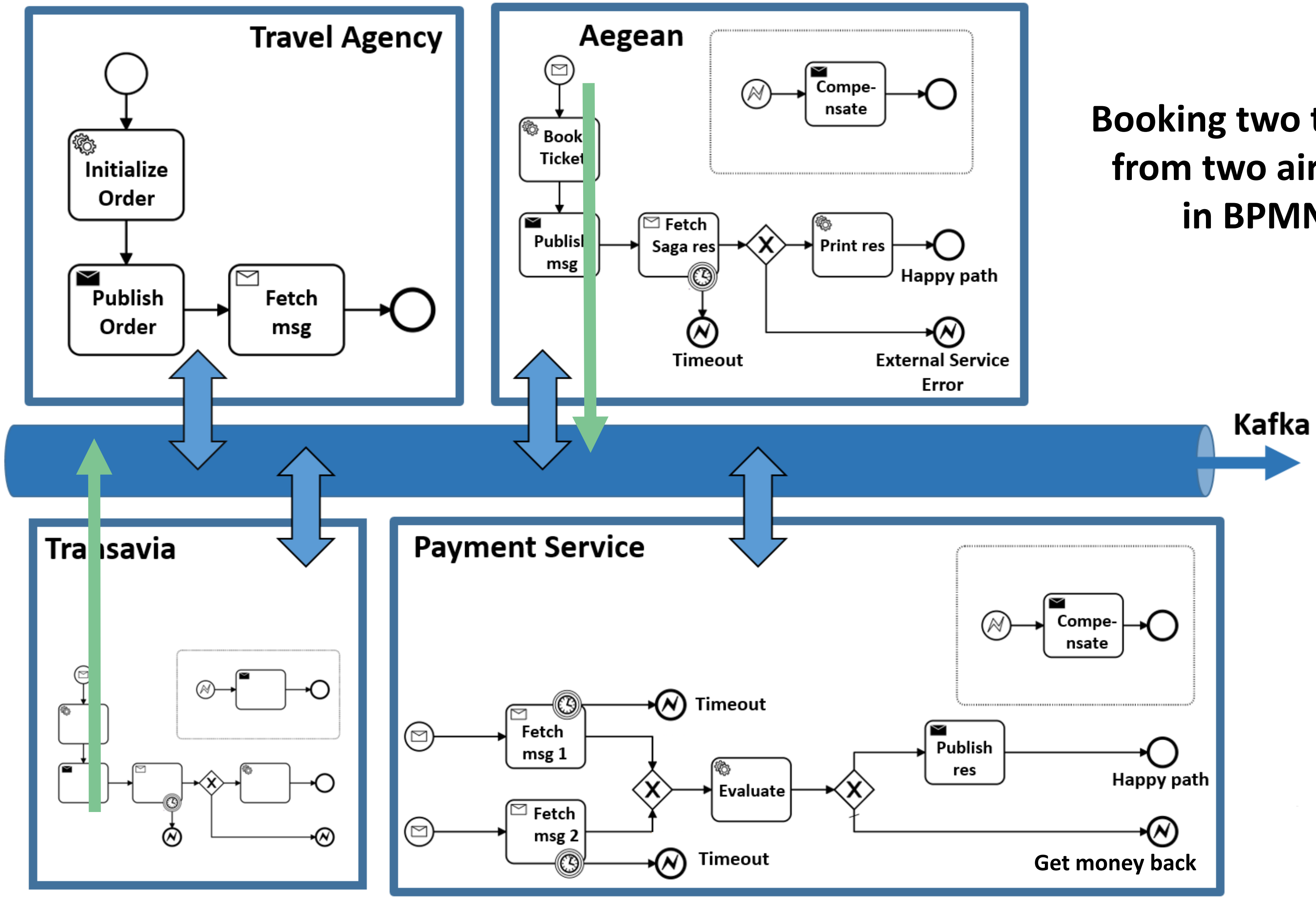

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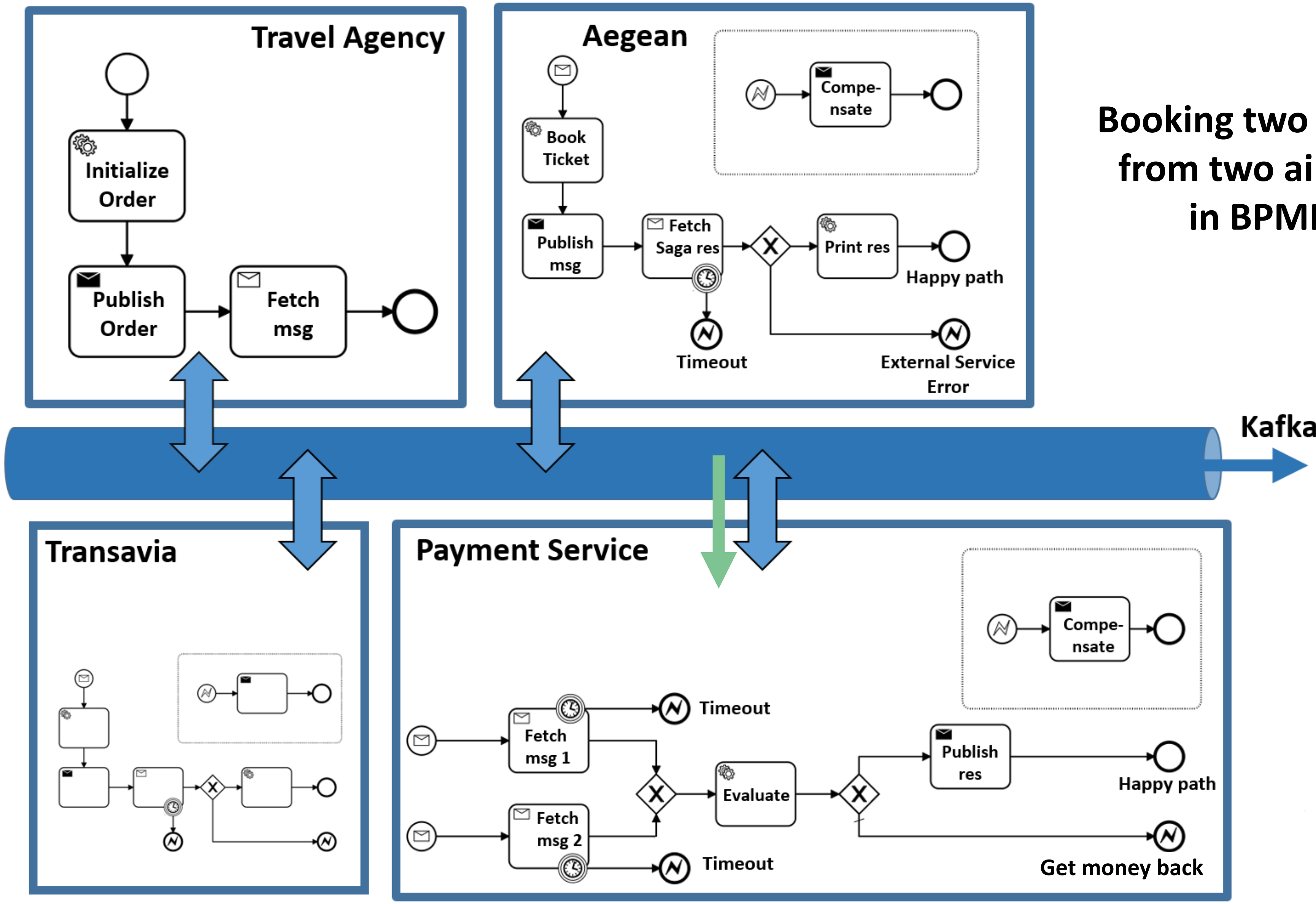

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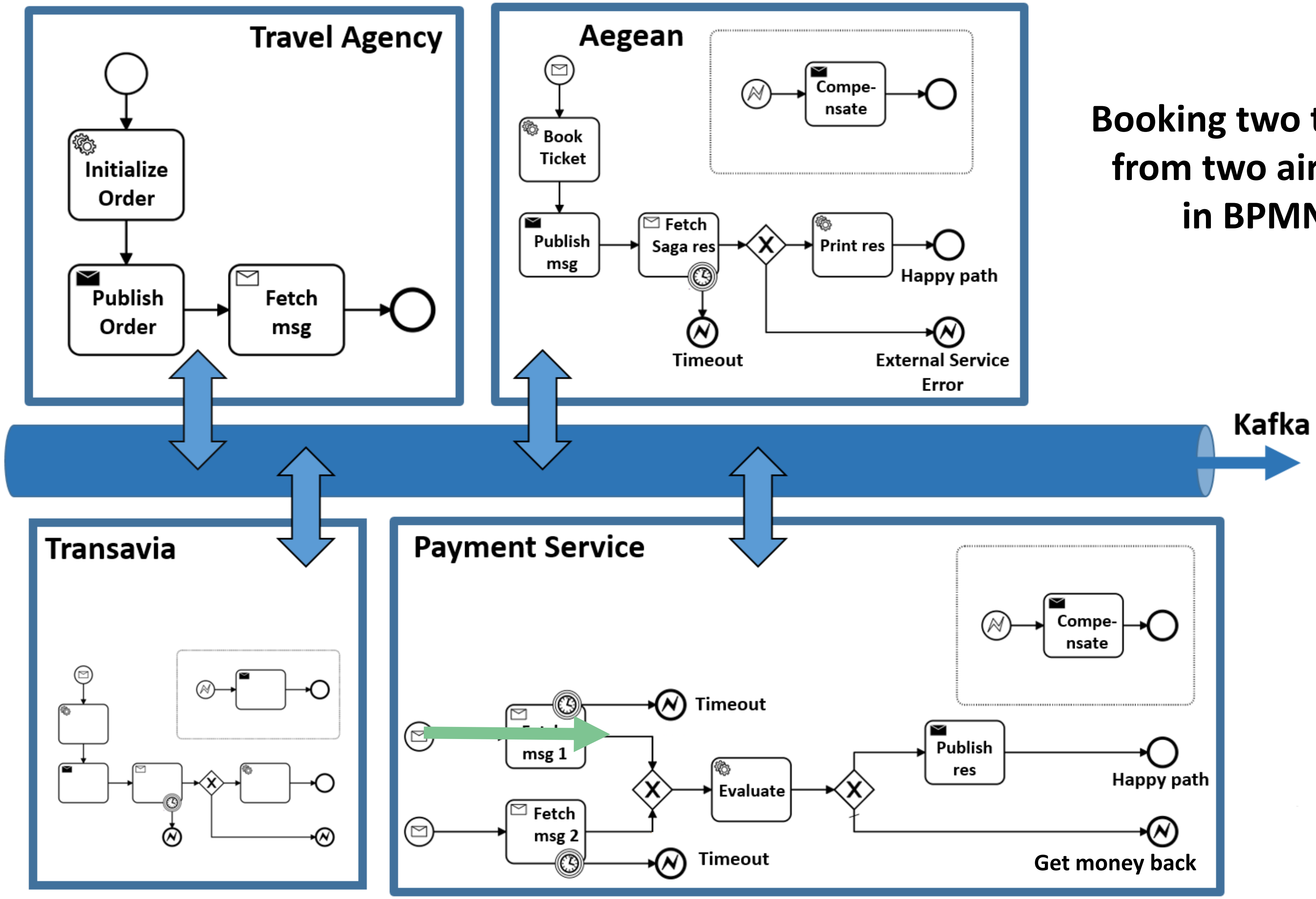

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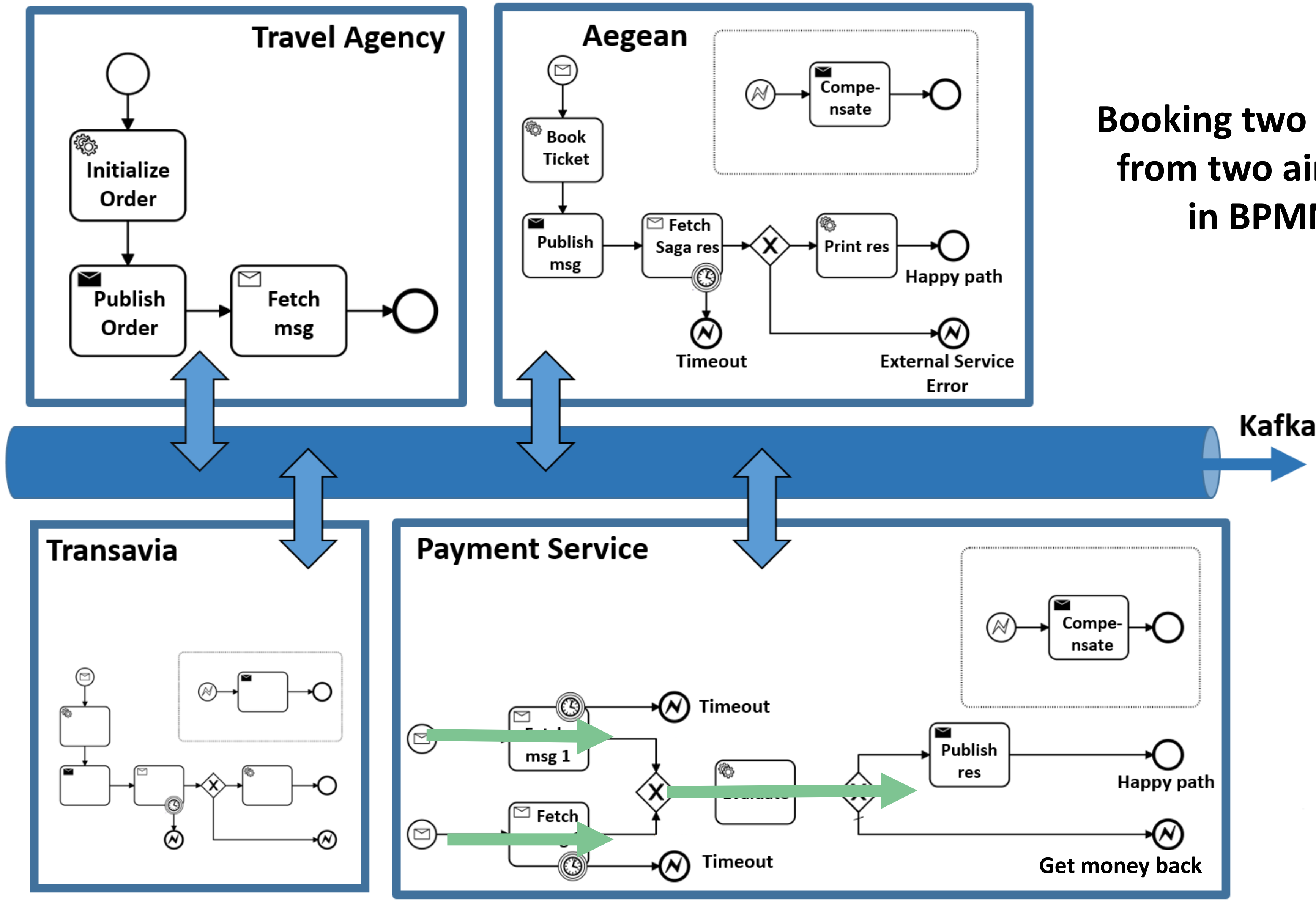

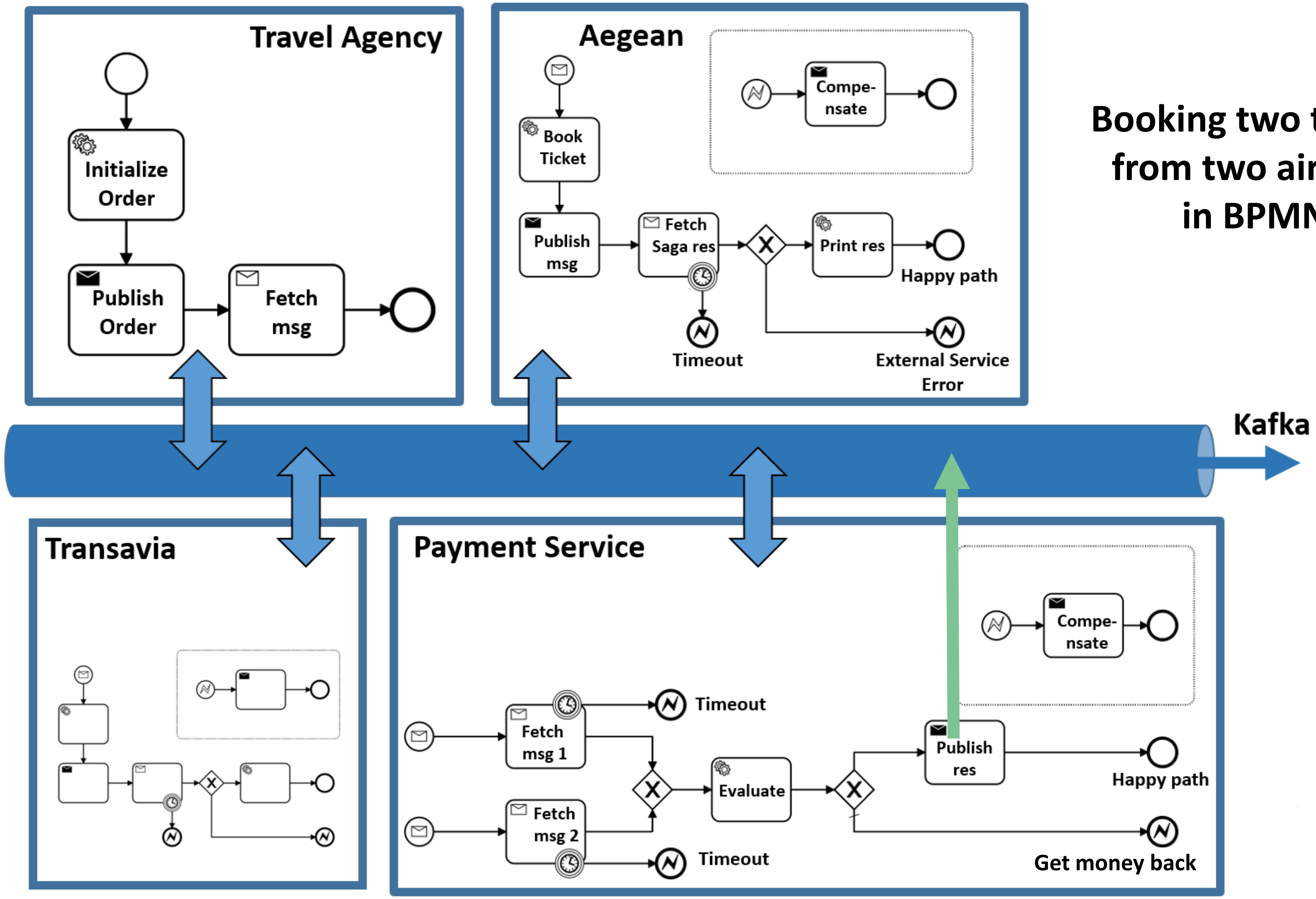

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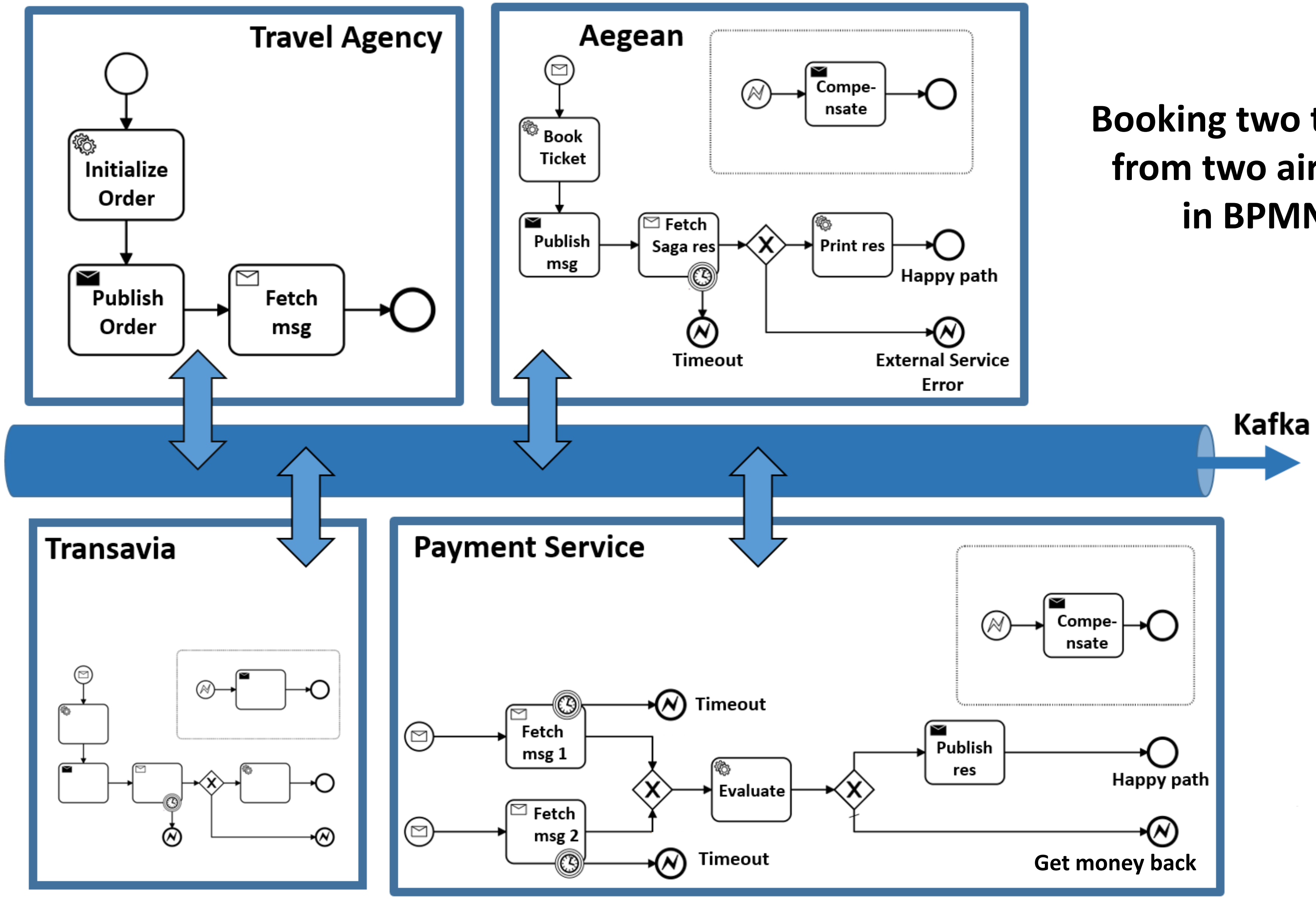

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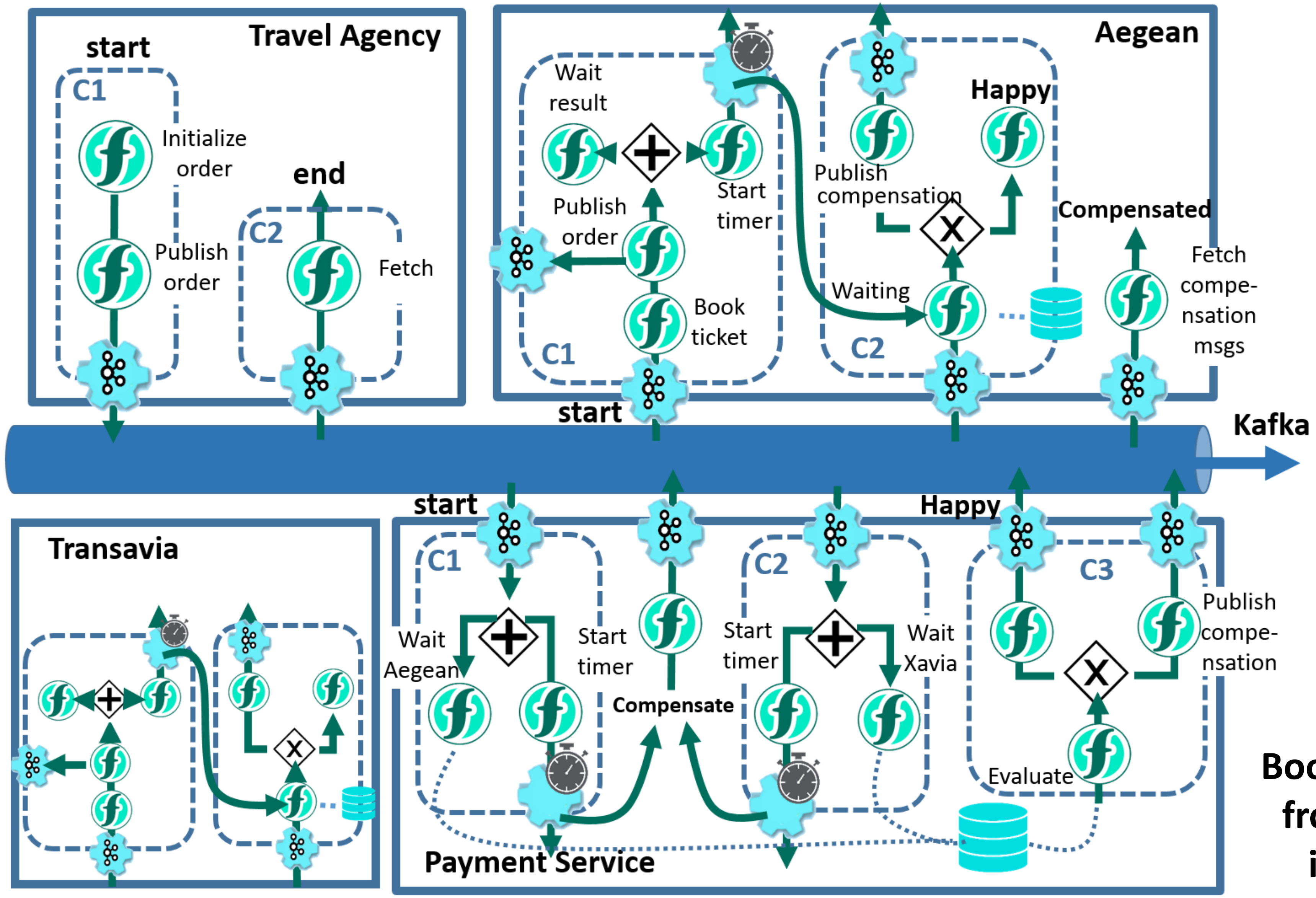
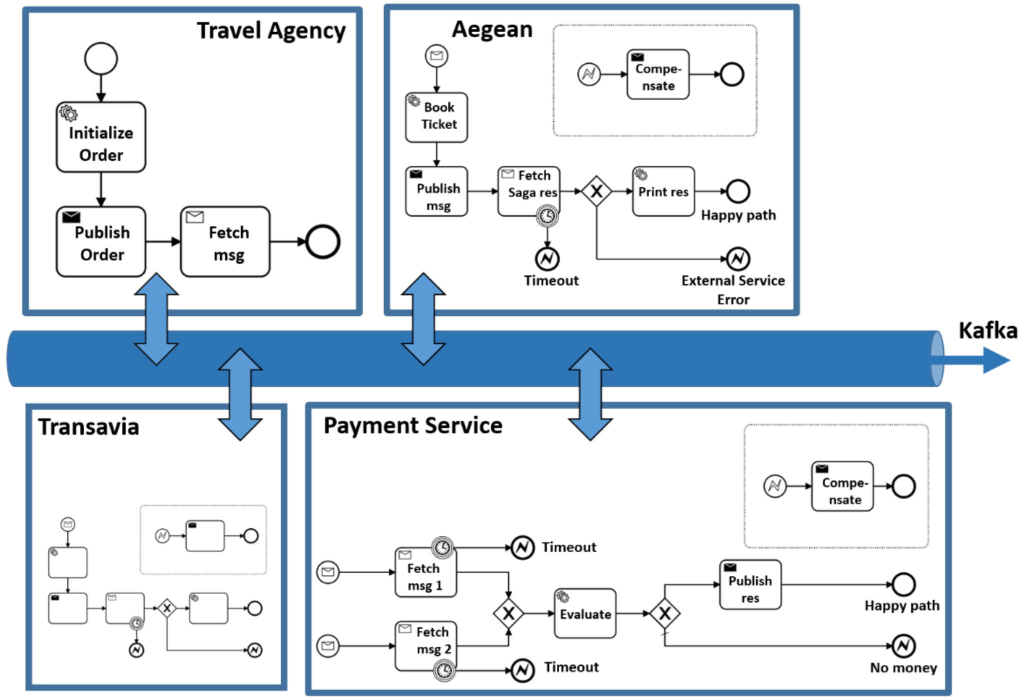


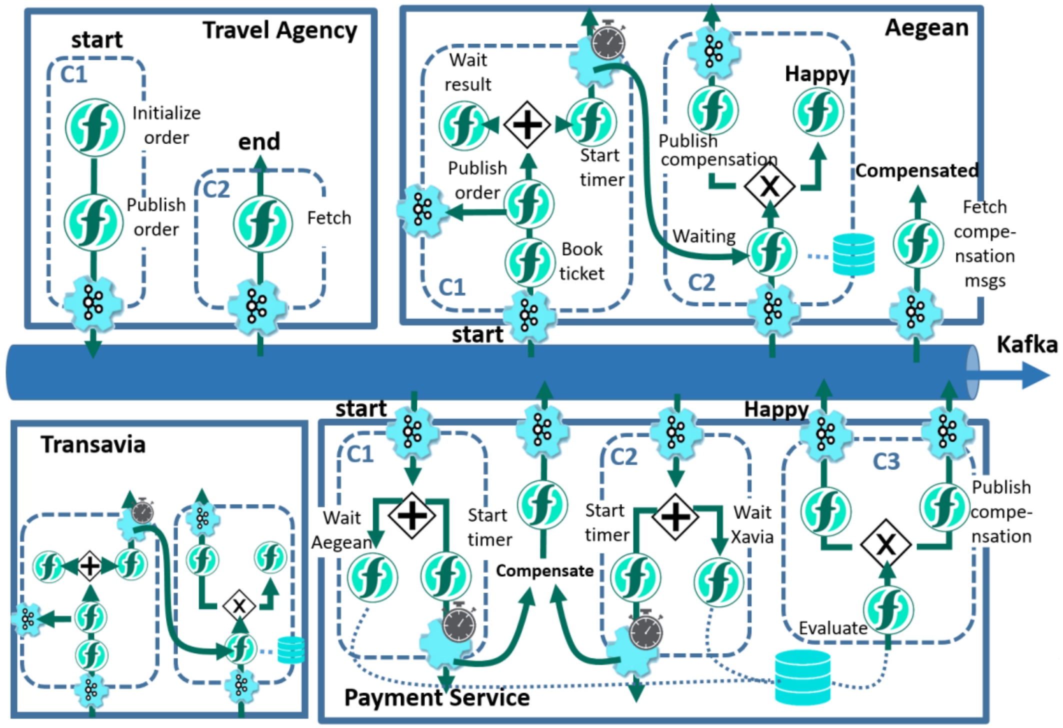
Booking two tickets from two airlines in OpenWhisk

FaaS workflow is typically more complex

BPMN



FAAS



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Conclusions

- **Addressed** challenges in **mapping** BPMN2.0 to OpenWhisk
- **Saga** transactions expressed in BPMN **straightforwardly** carry over to OpenWhisk
- This enables business analysts to express processes in a simpler BPMN format compared to the more complex OpenWhisk workflows
- Bridges simplicity of BPMN to ubiquity and power of FaaS platforms

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QUESTIONS ?