Exercises

Concurrency and Distributed Systems

January 2023

Contents

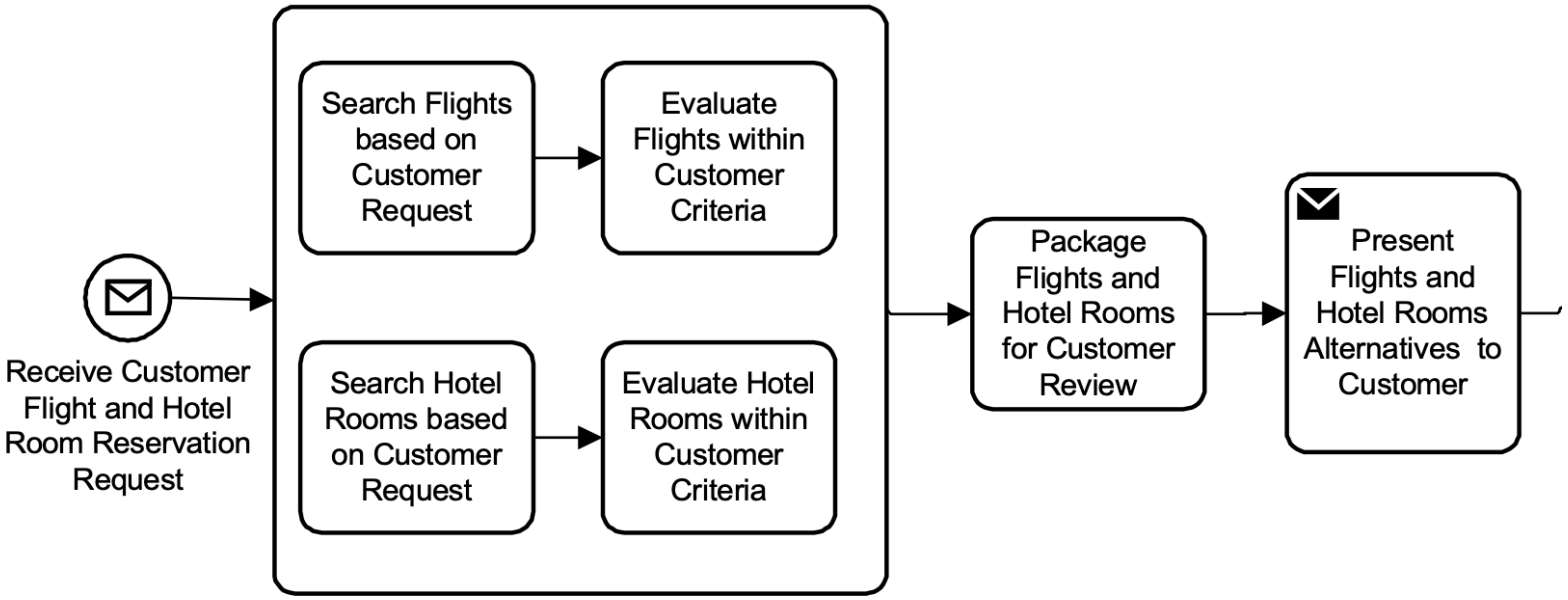
- You can’t argue with BPMN
- Formal methods
- Process calculi

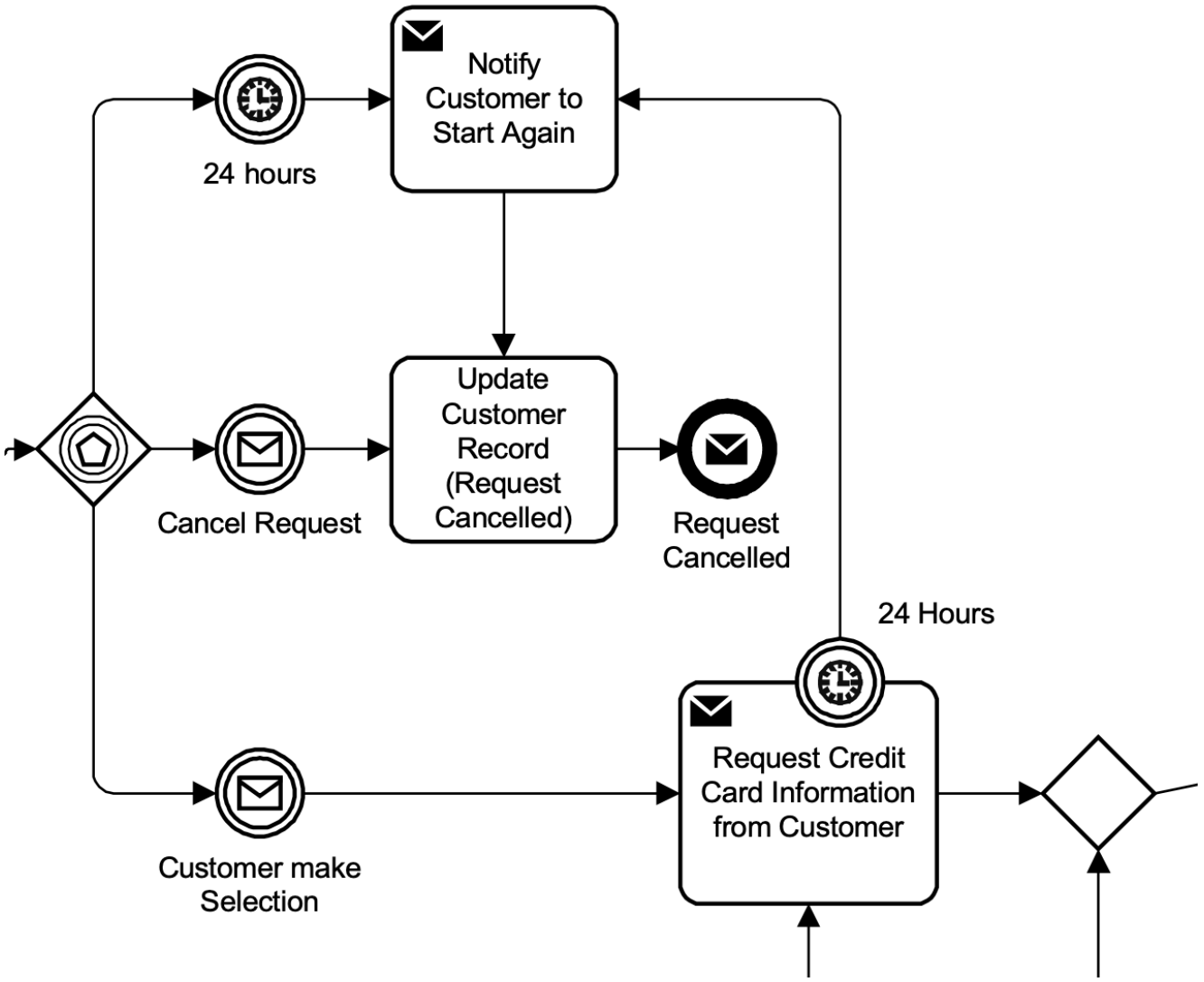
You can't argue with BPMN

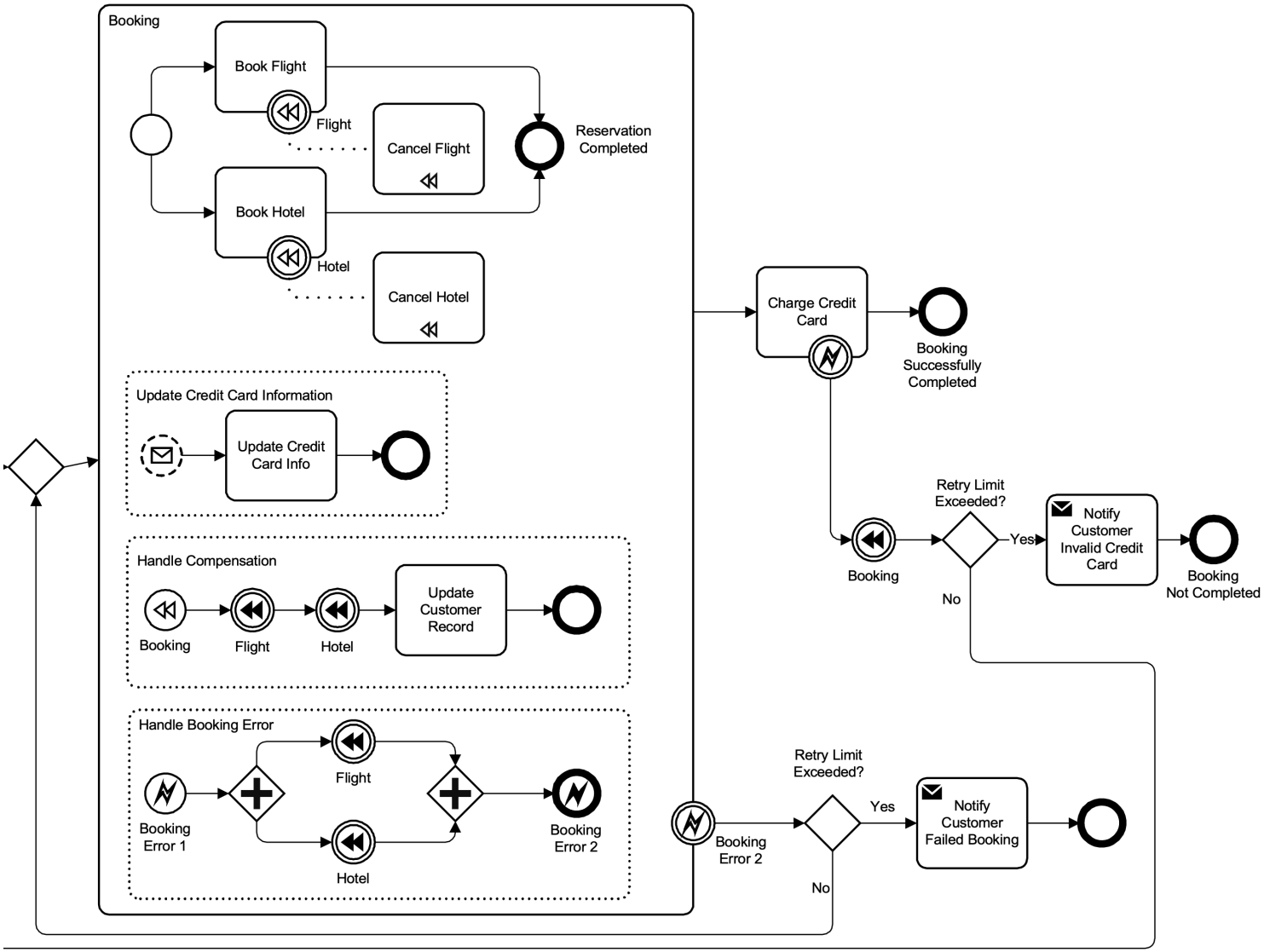
Consider the BPMN diagram that is spread across the next three slides.

What is good about the diagram? What is not so good?

What is good about BPMN? What is not so good?


Receive Customer Flight and Hotel Room Reservation Request
Search Flights based on Customer Request
Evaluate Flights within Customer Criteria
Search Hotel Rooms based on Customer Request
Evaluate Hotel Rooms within Customer Criteria
Package Flights and Hotel Rooms for Customer Review
Present Flights and Hotel Rooms Alternatives to Customer


Notify Customer to Start Again
24 hours
Update Customer Record (Request Cancelled)
Cancel Request
Request Cancelled
24 Hours
Request Credit Card Information from Customer
Customer make Selection


Booking
Book Flight
Flight
Cancel Flight
Reservation Completed
Book Hotel
Hotel
Cancel Hotel
Update Credit Card Information
Update Credit Card Info
Handle Compensation
Booking
Flight
Hotel
Update Customer Record
Handle Booking Error
Booking Error 1
Flight
Hotel
Booking Error 2
Charge Credit Card
Booking Successfully Completed
Booking
Retry Limit Exceeded?
Yes
No
Notify Customer Invalid Credit Card
Booking Not Completed
Booking Error 2
Retry Limit Exceeded?
Yes
No
Notify Customer Failed Booking

Formal methods

What is the difference between testing and proof? What is Edsgar getting at?

When might we wish to prove that an implementation meets a specification?

If the specification is complex, it may not mean what we think it means. We may have to test it to be sure. Does this make the whole idea of proof somewhat redundant?

Process calculi

Many alternative theories of process calculi have been proposed since Tony's book on CSP was published.

You might think that these would be improvements upon the CSP approach, and that we should learn about them instead.

However, none of these theories work well in practice, and some do not work at all.

In particular, they are not compositional, and cannot be used for the analysis of complex patterns of behaviour.

So how did they come about? Why have people spent so much time developing and promoting them?