BPMN - IV

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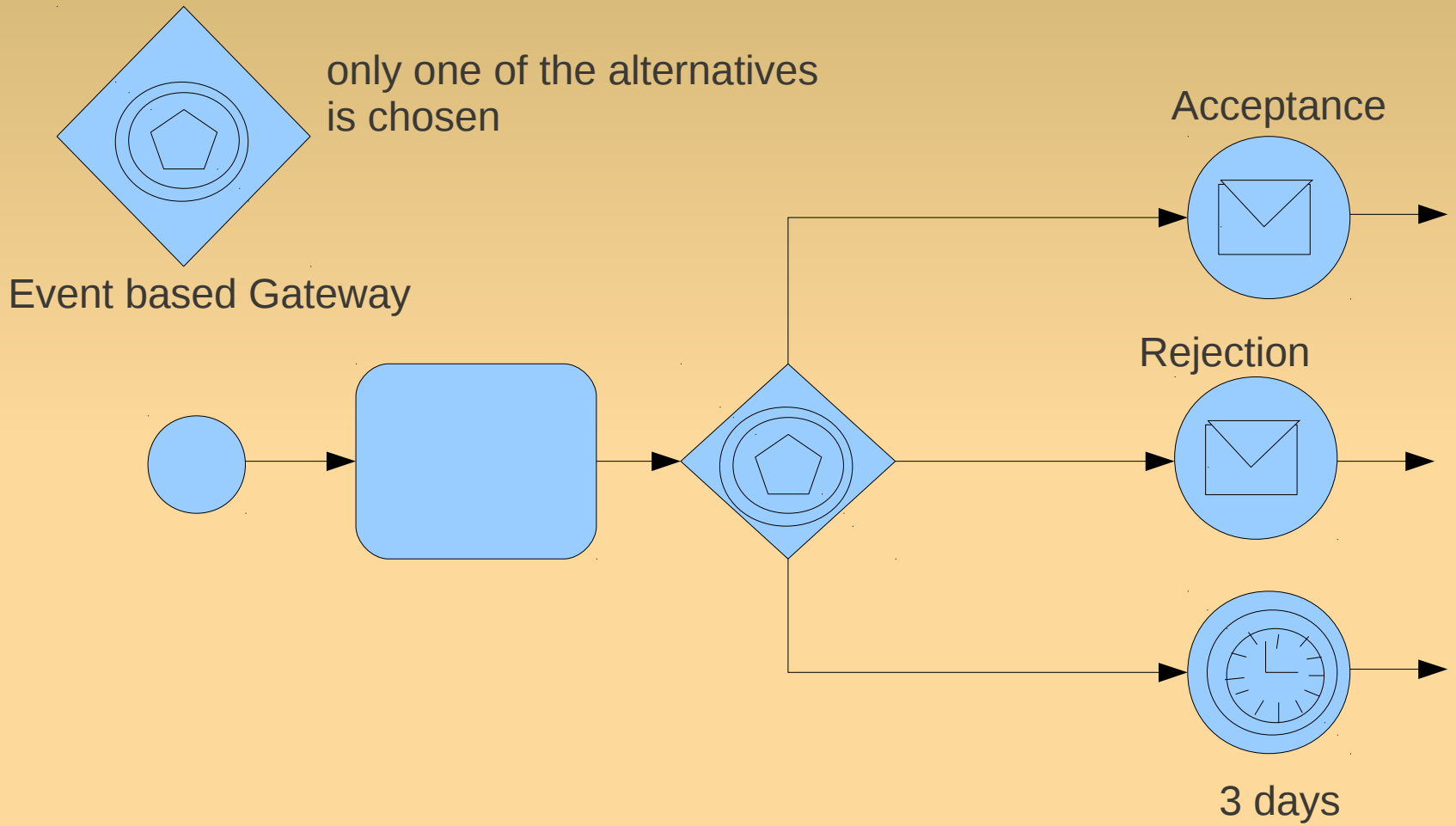
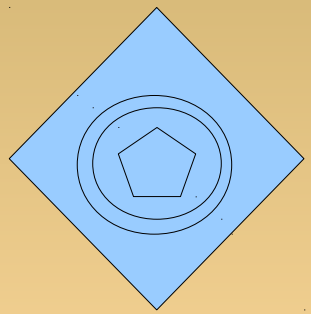
Event based Gateways: Use of intermediate events

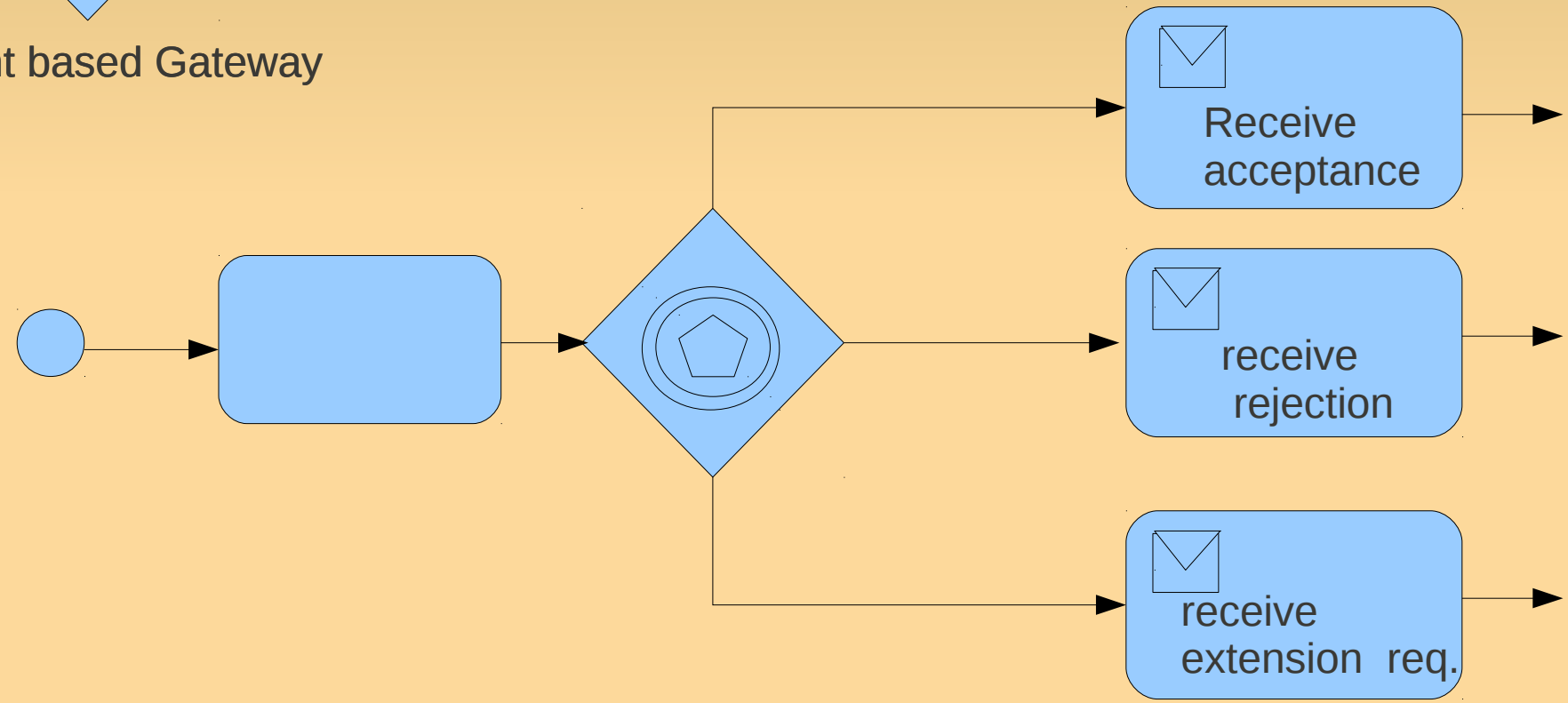


Event based Gateways: Use of Receive tasks



only one of the alternatives is chosen

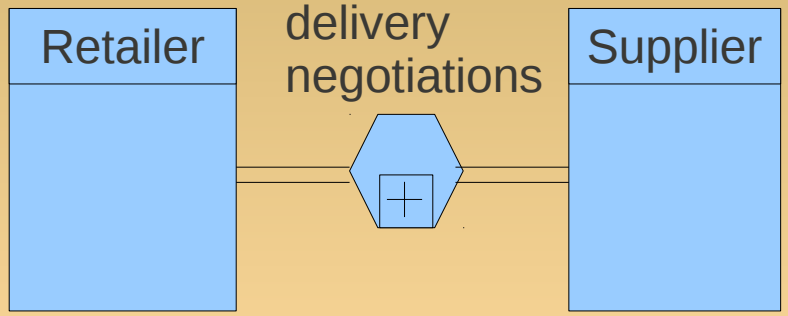
Event based Gateway



Sub-Conversations

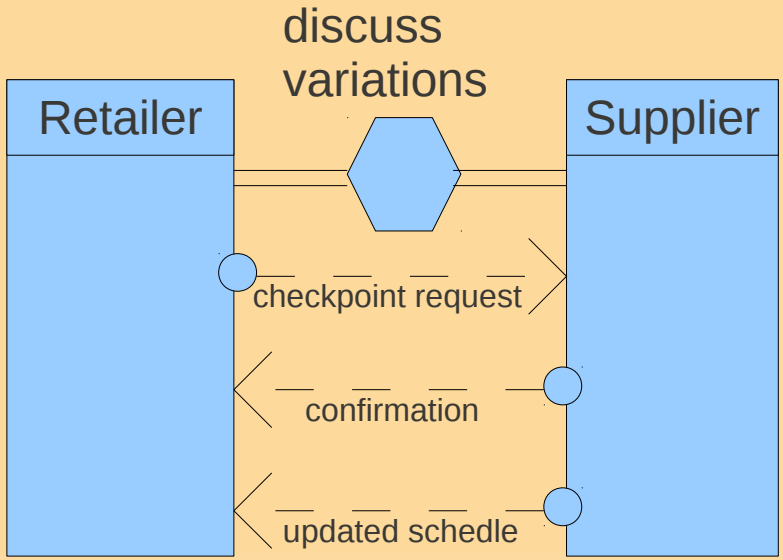
- sub-conversation
  - a higher level conversation which has an expansion

    (compound conversation)



- sub-conversation expanded
  - a lower level conversation

    (can be further expanded)
  - message flows

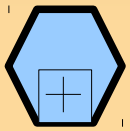


Call Conversations

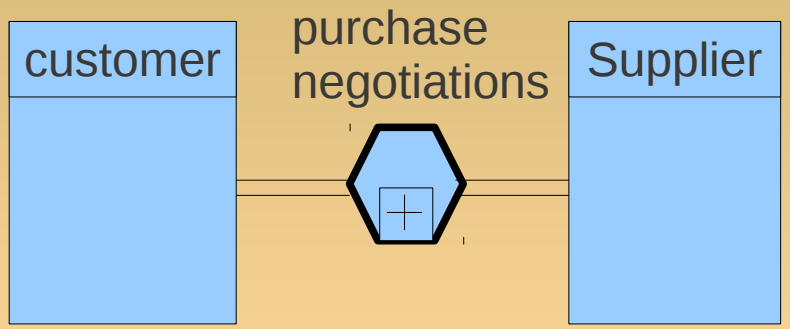
- call conversation
  - call global conversation

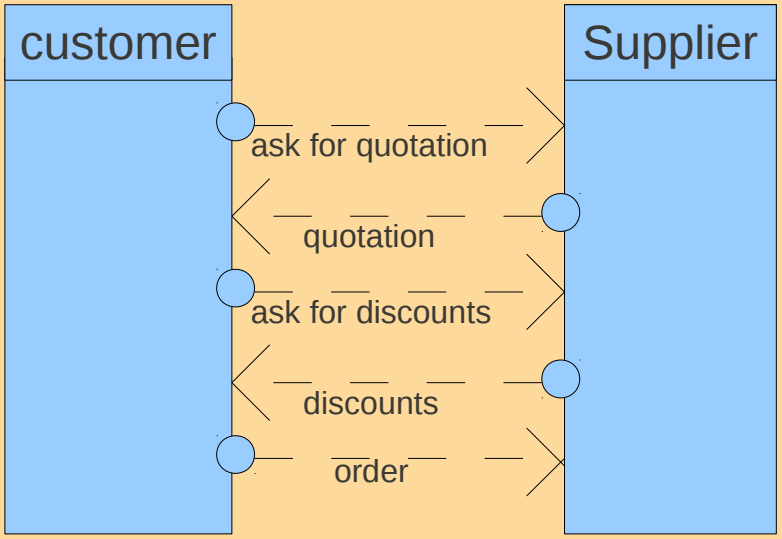
    

    - reusable
    - atomic
  - call collaboration

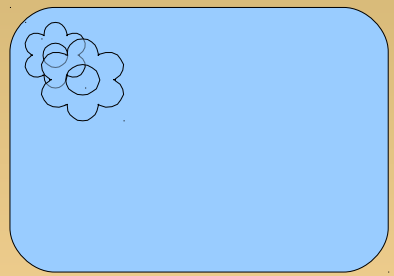
    - expanded



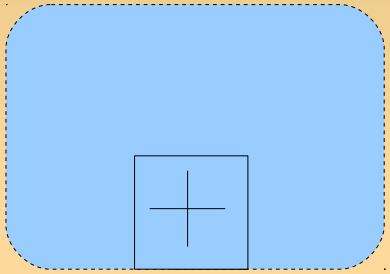


More Markers

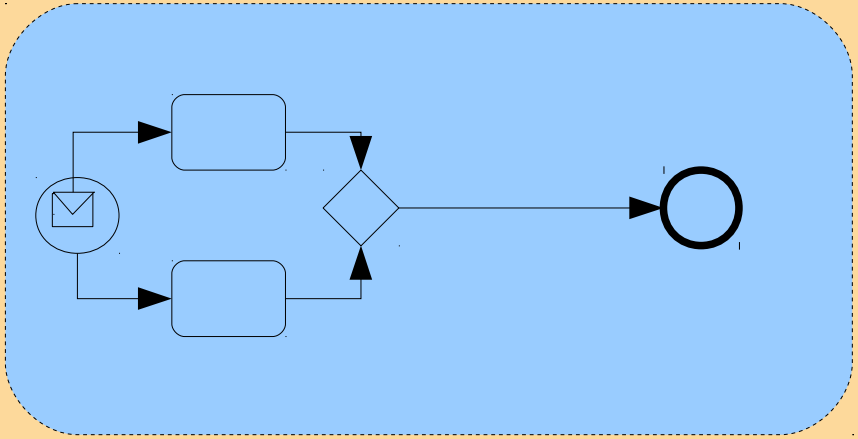
- Service



- Event subprocesses

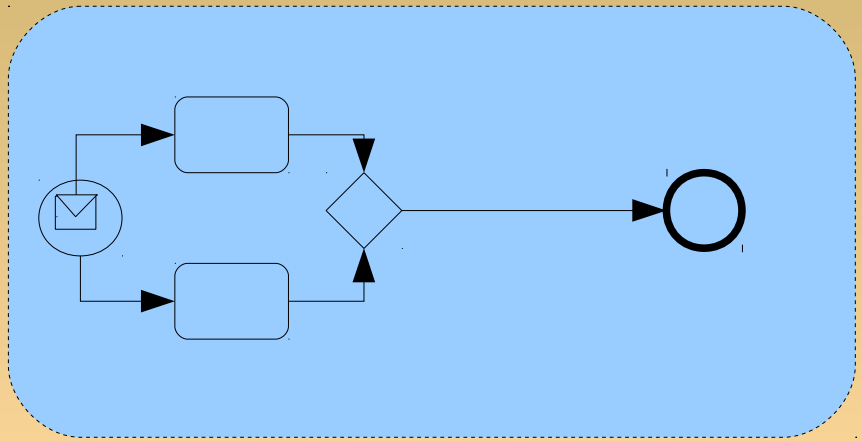


- Event subprocess expanded

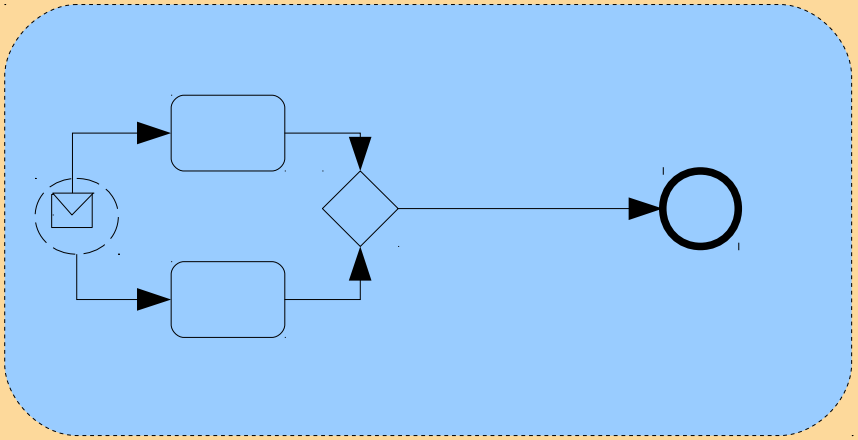


Event subprocesses

- Interrupting subprocess
  - parent process is interrupted
  - an interrupting start event is used
  - boundary of the event is solid

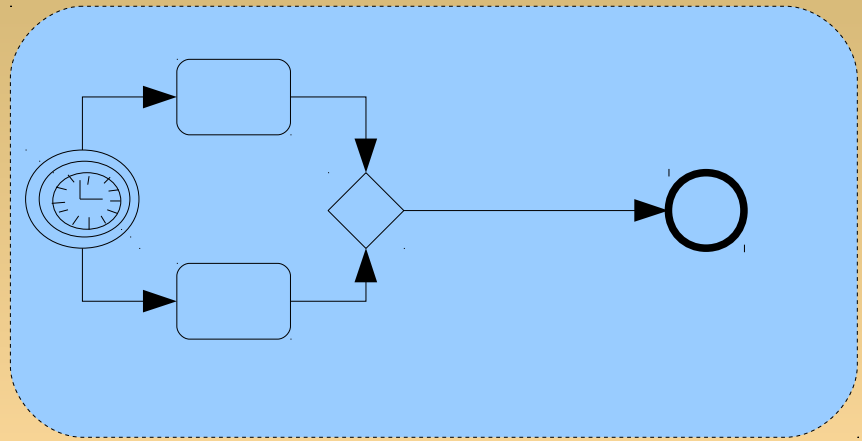


- Non-interrupting subprocesses
  - parent process continues after the completion of the subprocess
  - a non-interrupting start event is used
  - boundary of the event is dashed

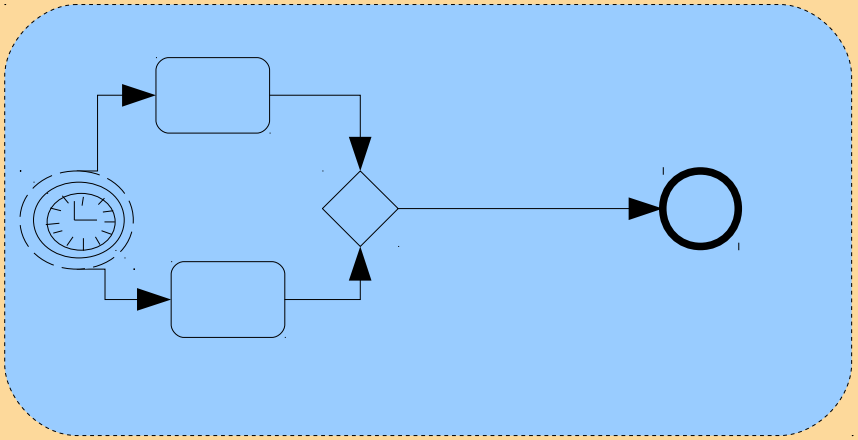


Use of various types of start events for event sub-processes

- Interrupting timer start event



- Non-interrupting timer start event



Use of various types of start events for event sub-processes

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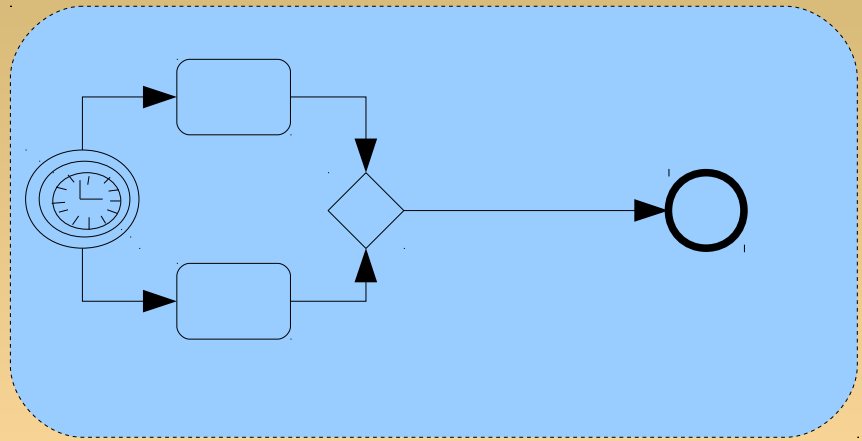
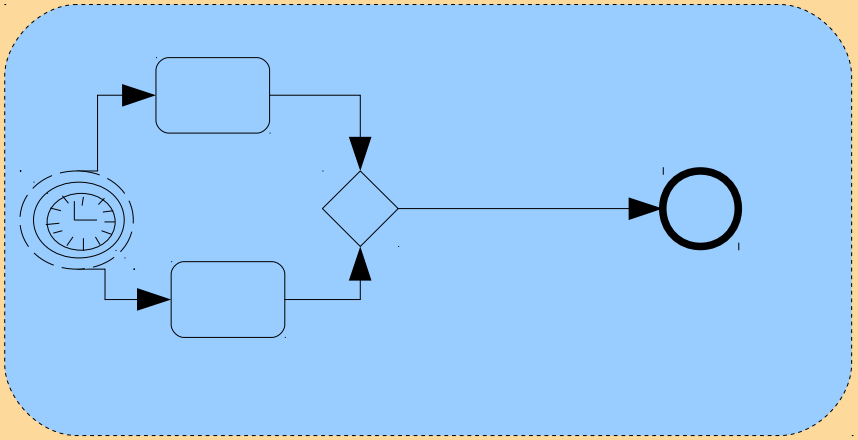


- Non-interrupting timer start event



Events

- Something that happens during flow
- e.g. start of an activity, end of an activity, a message that arrives, change in data state
- Event driven processes can be described
- **Start events** indicate where a process will start
- **End events** indicate where a process will end
- **Intermediate events** indicate something happening during a process execution

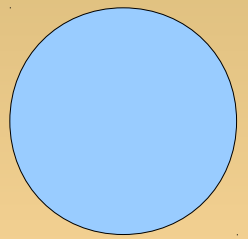
Events

- **Catching Events**
  - Some events catch a trigger
  - all start events, some intermediate events
- **Throwing Events**
  - Some events throw a result
  - all end events, some intermediate events throw a result
  - a thrown result may be caught by another event
    - trigger carries the information from throwing scope into catching scope

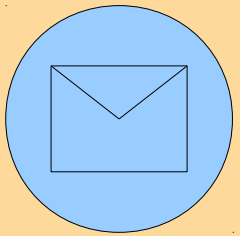
Start Events

Start Events for top level processes

- None Event
  - does not have a defined trigger
  - only such a process can be called from a call activity
  - processes using other types of start event cannot be called by call activities

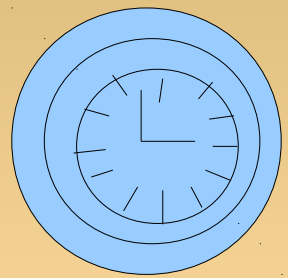


- Message Event
  - arrives from a participant and triggers the start of a process

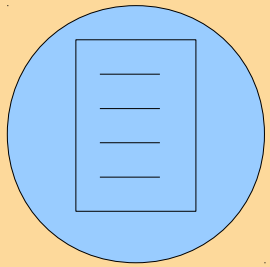


Start Events for top level processes

- Timer Event
  - a specific time, or period can be set to trigger the start of a process

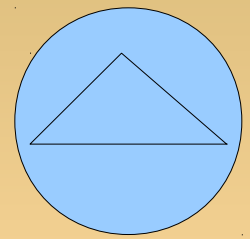


- Conditional
  - based on conditions such as “arrival rate crosses 120/min threshold”
  - to trigger the event once again, the condition must become false and then true again.
  - it cannot use instance context variables since process instance is not created yet
  - can refer to static attributes in processes, or states of environment entities (how?: not defined in the standard)

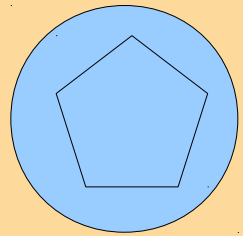


Start Events for top level processes

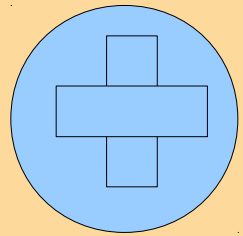
- Signal Event
  - arrival of a signal event that is broadcast from another process
  - signal is not a message
  - multiple processes can use the same signal as start event



- *Multiple* Start Event
  - multiple ways of triggering the Process
  - only one is required

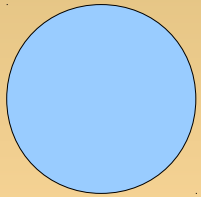


- Multiple Parallel Start Event
  - multiple events are required to trigger the start
  - all events must be triggered



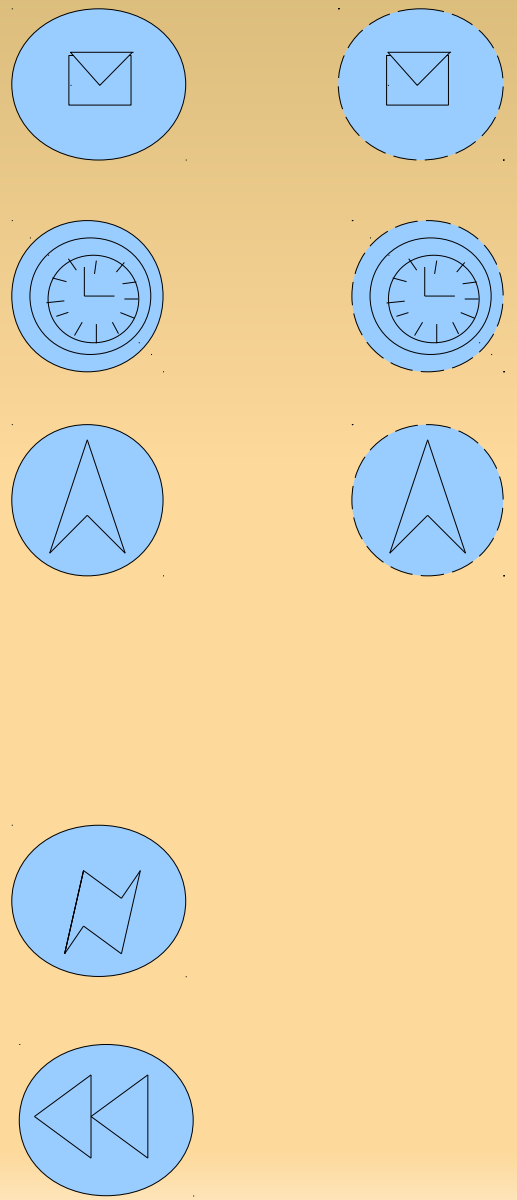
Start Events for sub-processes

- only one type of start event can be used for sub-processes, which is the None Event.
- this is the case for both embedded and called sub-processes
- even if a sub-process has other types of start event along with a none event, the other events will not trigger the subprocess (they may however trigger it as a top level process)



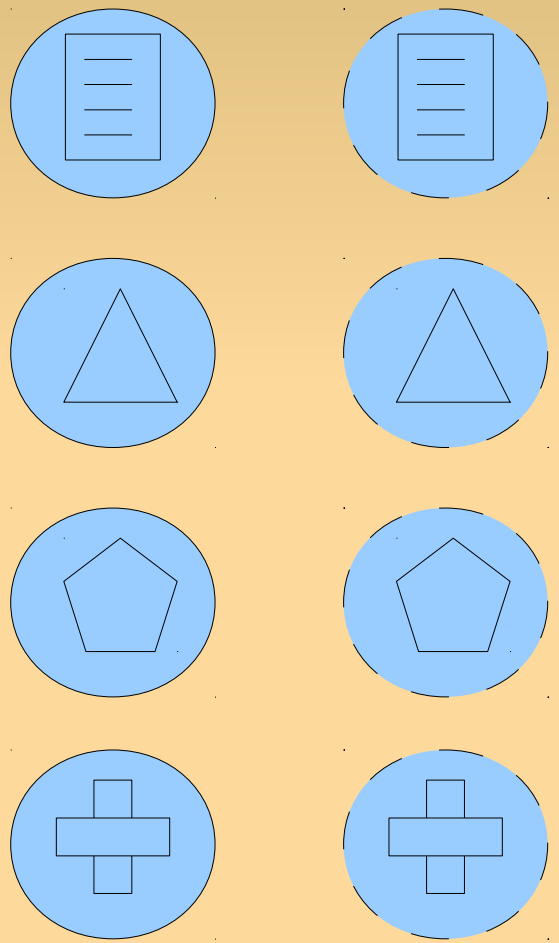
back to event subprocesses..
Start events for event sub-processes

- interrupting and non-interrupting Message event
- interrupting and non-interrupting timer event
- interrupting and non-interrupting escalation event
  - escalation sub-process expedites an activity for which an execution constraint (e.g. deadline) is not satisfied.
- Error start event: interrupting
- compensation start event: interrupting



Start events for event subprocesses..

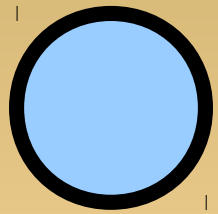
- interrupting and non-interrupting conditional event
- interrupting and non-interrupting signal event
- interrupting and non-interrupting multiple event
- interrupting and non-interrupting parallel multiple event



End Events

End Events: they generate end event results

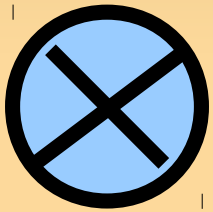
- none
  - no defined result
- message
  - message sent to a participant at the end of flow
  - show the participant through a connection
- error
  - named error is generated
  - all active threads in the subprocess are terminated
  - error gets caught by a catch error intermediate event (if it is specified) on the boundary of the nearest enclosing parent activity of this subprocess



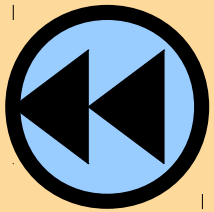
End Events: they generate end event results

- escalation
  - triggers an escalation
  - other active threads continue
  - escalation event is caught by an catch escalation intermediate event on the boundary of the surrounding parent

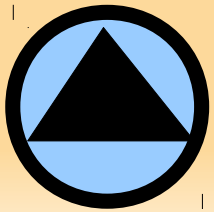
- cancel
  - used in transaction sub-processes
  - it triggers cancel intermediate event attached to the transaction boundary



- compensation
  - indicates that a comensation is necessary

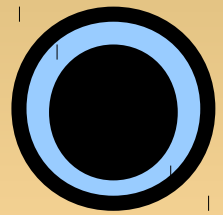


- signal
  - a signal event is broadcasted which can be received by any process that can receive the signal

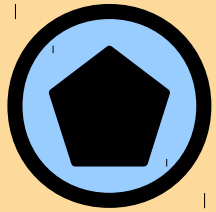


End Events: they generate end event results

- terminate
  - all activities must be ended immediately
  - no compensation etc.



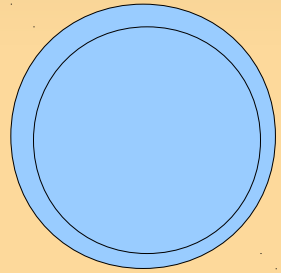
- multiple
  - means multiple consequences of ending
  - all of them will occur



Intermediate Events

Intermediate Events

- Event happens somewhere in between start and end of a process
- It does not directly end or start a process
- Purposes:
  - To show where messages are expected
  - To show where messages are sent
  - To show delays
  - Generate exceptions and disrupt normal flow
  - Compensation: place an intermediate event on the boundary of a task/subprocess, and use an outgoing flow from there



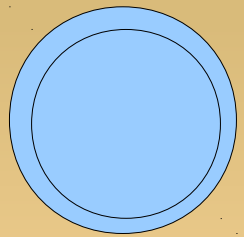
Placement of Intermediate events

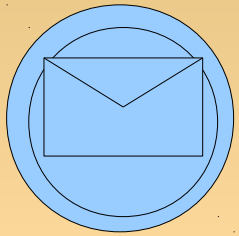
- In the flow
  - To catch event trigger
    - Token stays at event till the trigger occurs (e.g. Message recd.) and then the token moves down the outgoing sequence flow
  - To throw event trigger
    - The trigger of event immediately happens (e.g. message gets sent) and then the token moves down the outgoing sequence flow
- On the boundary
  - To catch the event trigger
- Circles are drown using double thin line

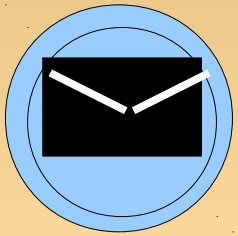
Intermediate Events in normal flow

- None
  - No specific trigger, indicates a point in flow
  - Cannot be used on boundary
- message
  - Catch, Throw messages
  - With catch, process flow continues
  - With throw, the exception handling path is followed
- error” Not used as intermediate event
- Timer Catch
  - Acts as delay
- Escalation

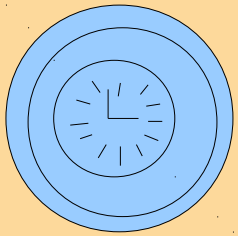
  throws an escalation

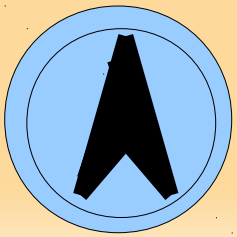






Catch throw

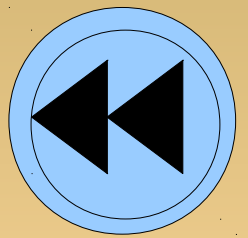




Intermediate Events in normal flow

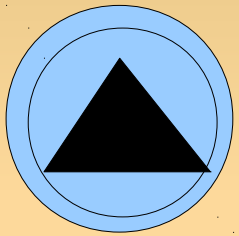
- compensation
  - Throws compensation
  - if the activity is identified, and it successfully completed, it

    will be compensated. The activity must be visible from compensation event
    - compensation intermediate event is contained in normal flow at the same level of subprocess
    - compensation intermediate event is contained in a compensation event subprocess which is contained in subprocess containing the activity.
  - if no activity is identified, all successfully completed activities visible to the compnesation event will be compensated in reverse flow direction
    - those which occur in the same subprocess as that of the compensation event
    - those that occur in the same subprocess that contains the event subprocess in which the compensation event occurs
  - to be compensated, an activity must have
    - a boundary compensation OR
    - a compensation event sub-process

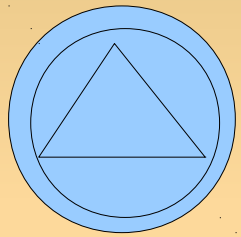


Intermediate Events in normal flow

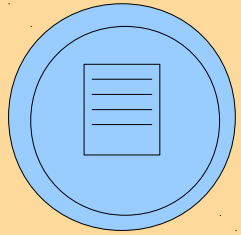
- signal
  - Communication across pools, diagrams
  - Catch and throw type
  - Received by an activity only when attached to boundary
- Conditional
  - Catch event when a condition becomes true



Throw



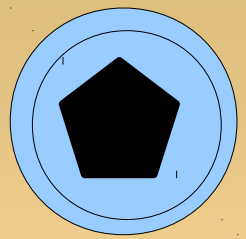
catch



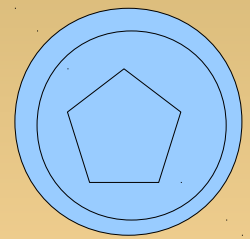
catch

Intermediate Events in normal flow

- Multiple
  - Catch and throw
  - Catch when attached to boundary
    - Only one of the assigned triggers is required
  - When used for throwing, all assigned triggers are thrown

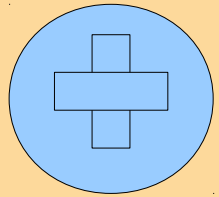


Throw



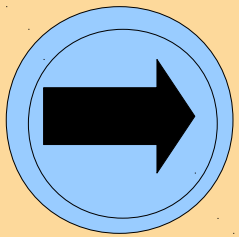
catch

- Parallel Multiple
  - It can only catch the triggers
  - All assigned triggers are required for it to trigger

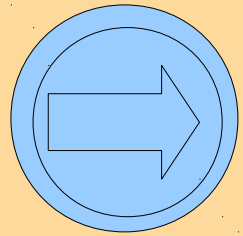


catch

- Link
  - Mechanism for connecting two sections of a process
  - Valid in normal flow only (not used on the boundary)



Throw

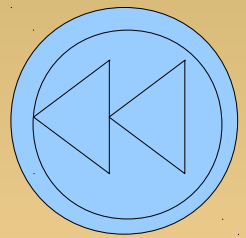


catch

Intermediate events on the boundaries

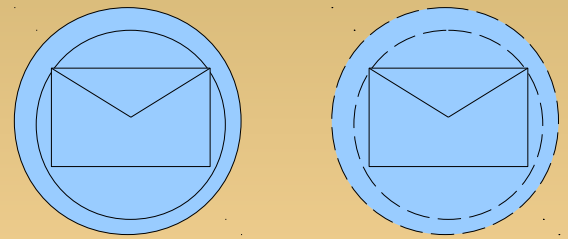
- On the boundary of an activity, an intermediate event can only catch a trigger
- Interrupting event interrupts the flow, and exception path is followed
- Non-interrupting event resumes the flow
- Both interrupting and non-interrupting
  - Message, timer, escalation, conditional, signal, multiple, parallel multiple
- Only interrupting
  - Error, cancel, compensation

intermediate events on actvity boundaries



- compensation
  - catches compensation
  - the event will be triggered by a thrown compensation targeting this activity
  - when event is triggered, the associated compensation activity is performed
  - compensation is triggered only after the activity is completed, thus they donot interrupt an activity.. so the aspect of interruption vs. non-interruption is not applicable. (they cannot interrupt the activity)

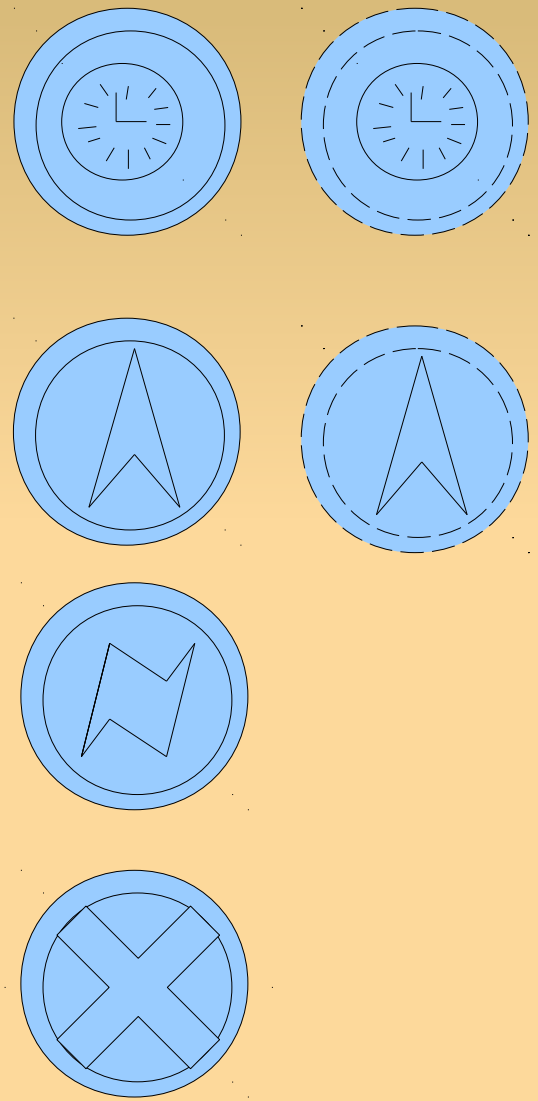
intermediate events on actvity boundaries



- Message
  - arrives from a participant and triggers the event
  - after the trigger, the flow changes to exception flow
  - can be interrupting the activity or it can also be non-interrupting

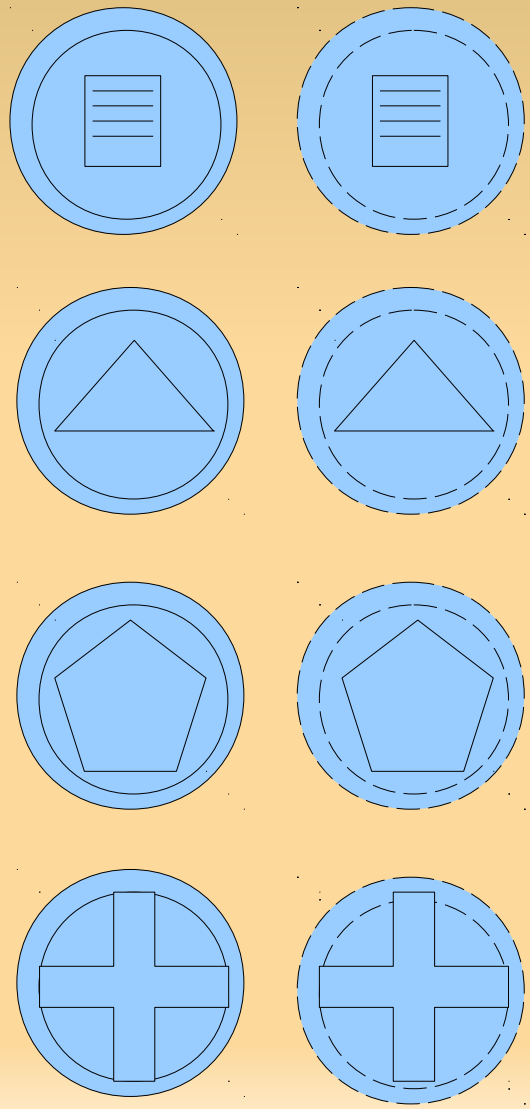
intermediate events on actvity boundaries

- Timer
- Escalation: assumed not to abort the activity, but an interrupting version exists
- Error
  - always interrupts the activity
- Cancel
  - used with a transaction subprocess
  - triggered when a cancel end event is reached within the transaction subprocess
  - it always interrupts the activity



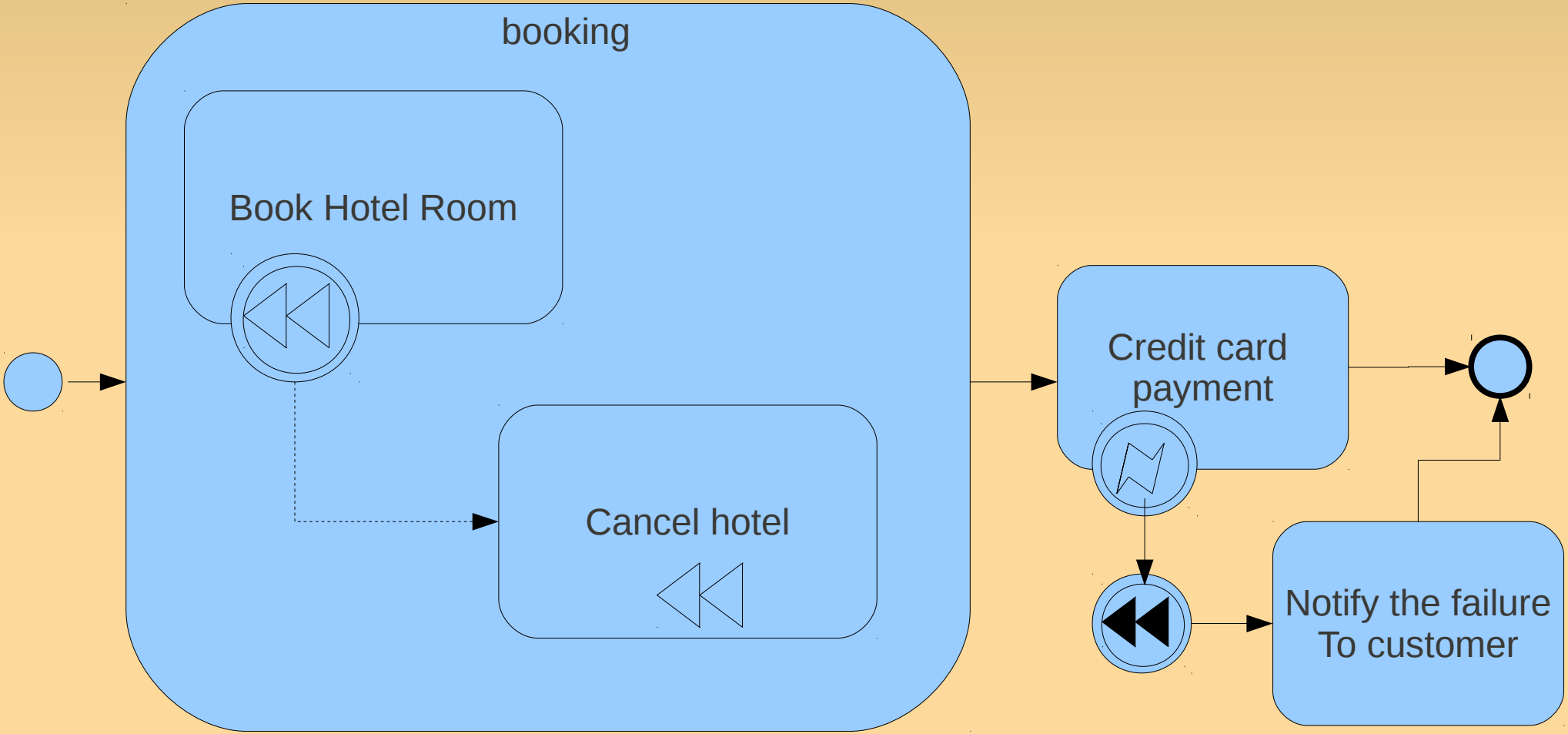
intermediate events on actvity boundaries

- Conditional
  - based on a conditional expression
- Signal
  - non-error condition
- Multiple
  - only one of the assigned triggers is required
- Parallel Multiple
  - all the assigned triggers are required

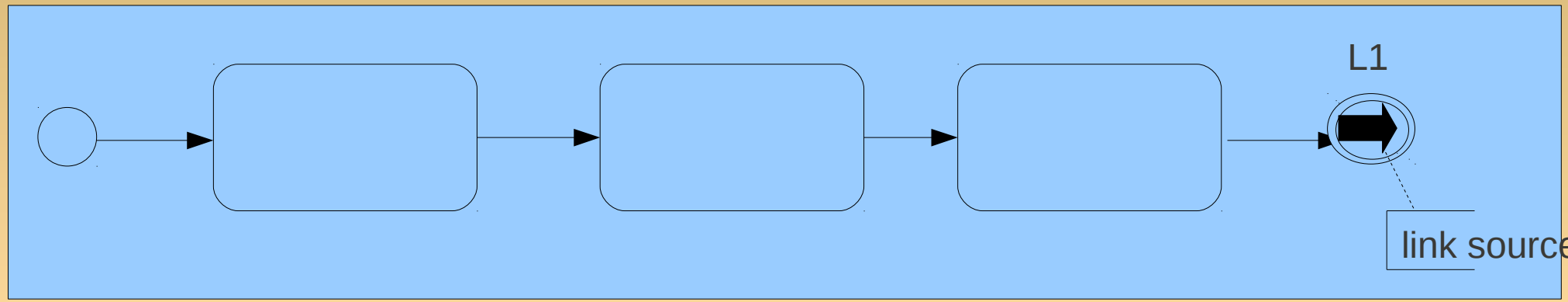


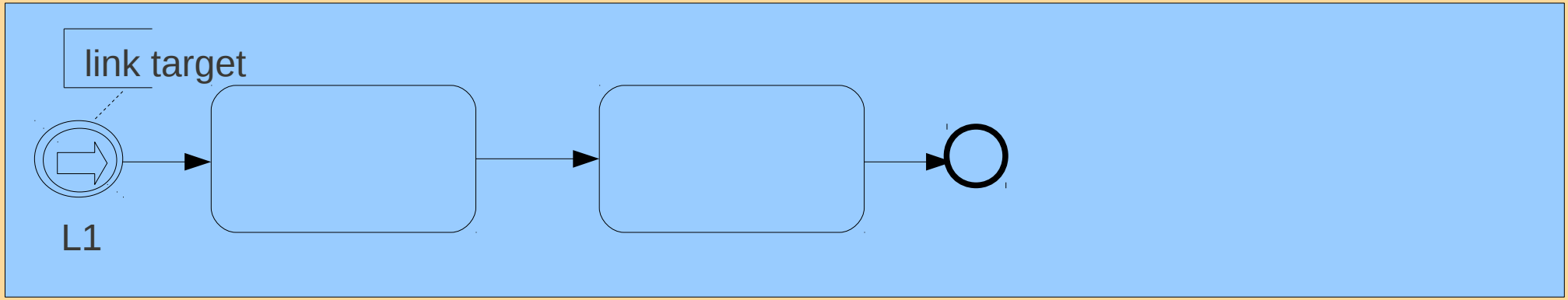
Examples

An example

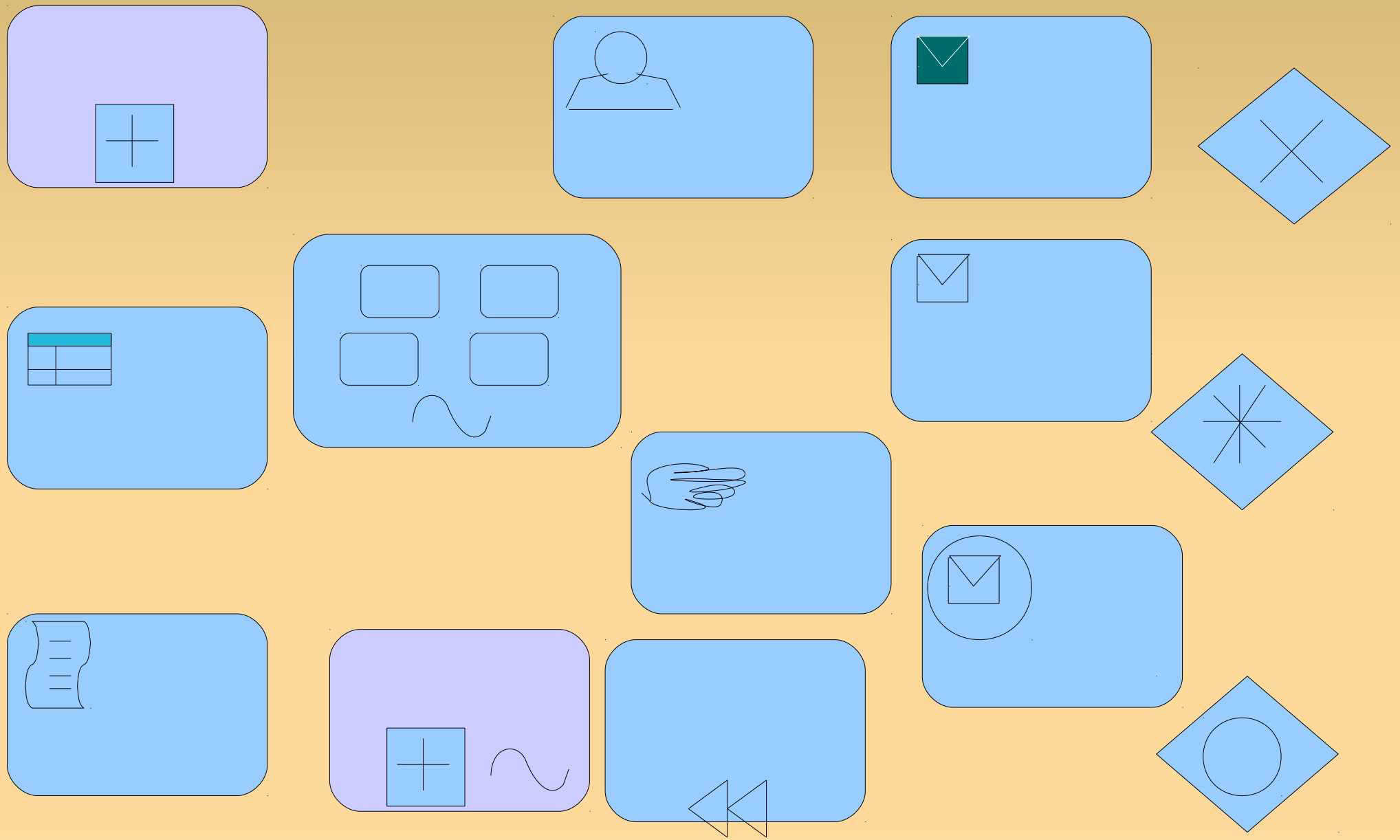

booking
Book Hotel Room
Cancel hotel
Credit card payment
Notify the failure To customer

Linking events





Markers



Strategies to forward thrown result from throwing events into catching events

- Publication
- Direct resolution
- Propogation
- Cancellation
- Compensation