

University of Pisa

MSc in Computer Engineering

# Systems for Strategic Management and Support

## LECTURE 7

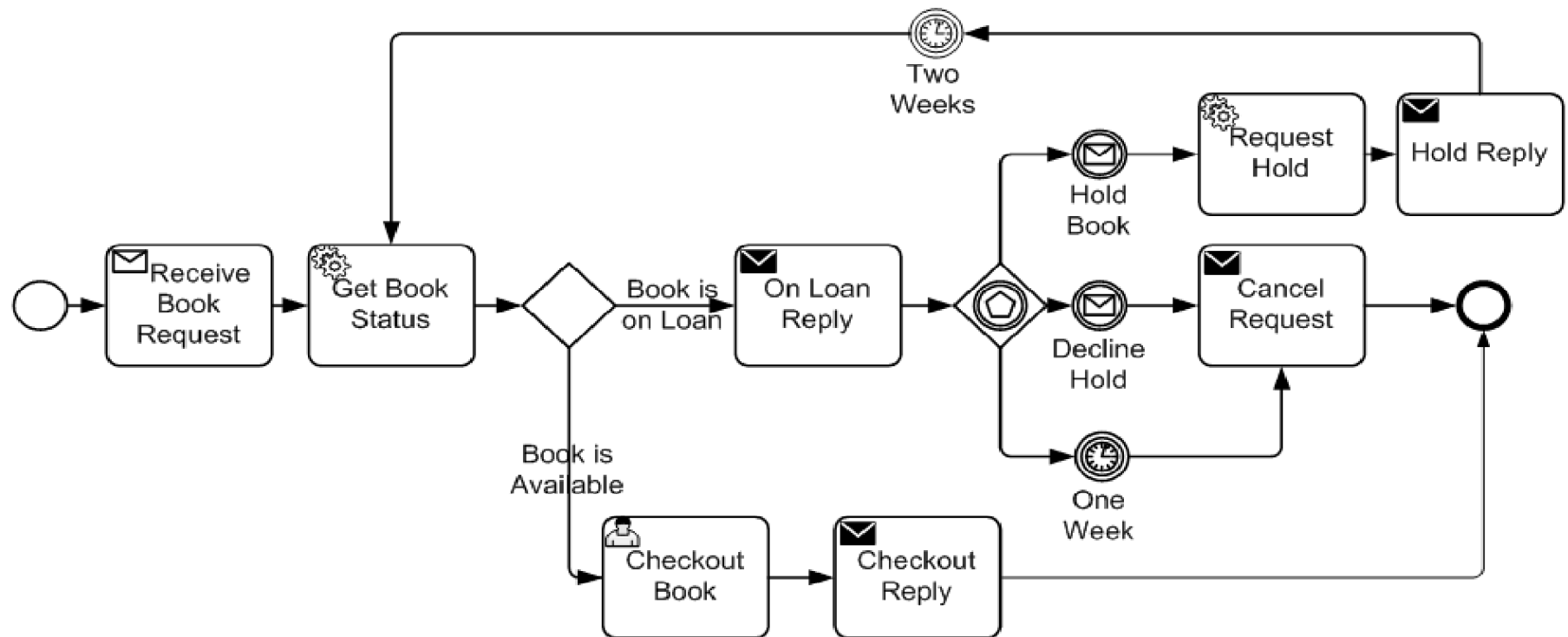
<http://www.iet.unipi.it/m.cimino/pdis/>

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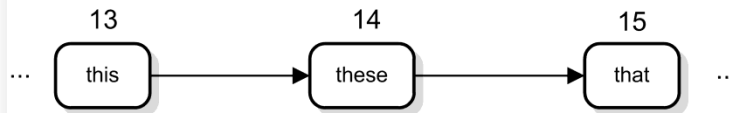
## Library

- ❑ Describe in semi-formal natural language the following orchestration, concerning the book lending process managed by a library.
- ❑ Given 100 starting tokens, determine the number of ending tokens for each scenario (path), considering the following branching proportions at each gateway: book is available (60%), hold book (25%), decline hold (25%).

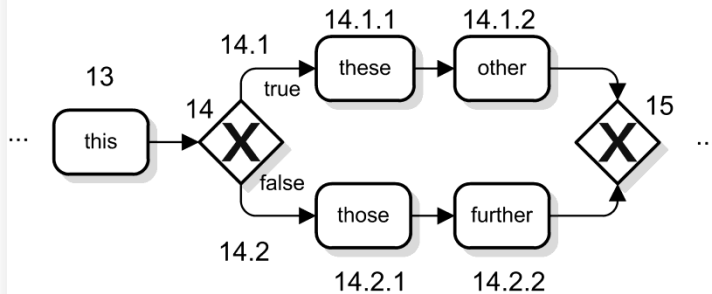


- ❑ The semi-formal notation is made of short sentences, numbered so as to allow the specification of the control flows with BPMN 2. It resembles detailed use cases in UML.

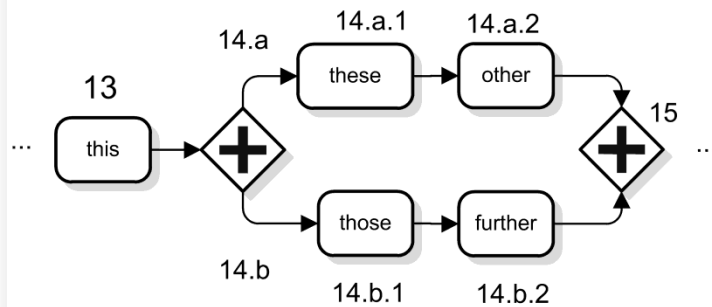
## MAPPING FROM SEMI-FORMAL TEXTUAL DESCRIPTION TO BPMN MODEL (AND VICE-VERSA)




13. *this*  
14. *these*  
15. *that*



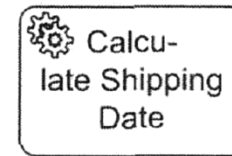
13. *this*  
14.1. If it is true ...  
14.1.1. *these*  
14.1.2. *other* → 15  
14.2. If it is false...  
14.2.1. *those*  
14.2.2. *further*  
15. ...



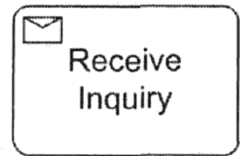
13. *this*  
14.a.1. *these*  
14.a.2. *other* → 15  
14.b.1 *those*  
14.b.2 *further*  
15. Wait for the end of 14.a and 14.b  
...

Note: In case of  : 15. Wait for the end of the ongoing activities in 14.a and 14.b

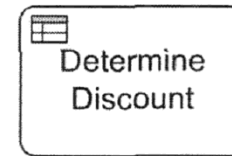
## TASK TYPES



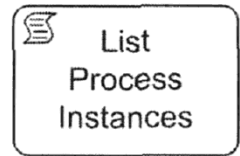
Service Task



Receive Task



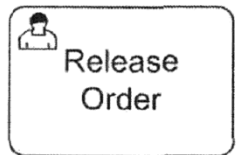
Business Rule Task



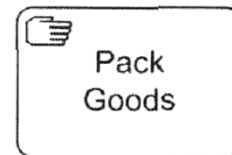
Script Task



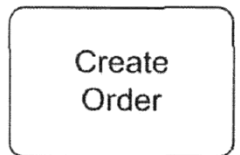
Send Task



User Task



Manual Task



Abstract Task

## Semi-formal notation

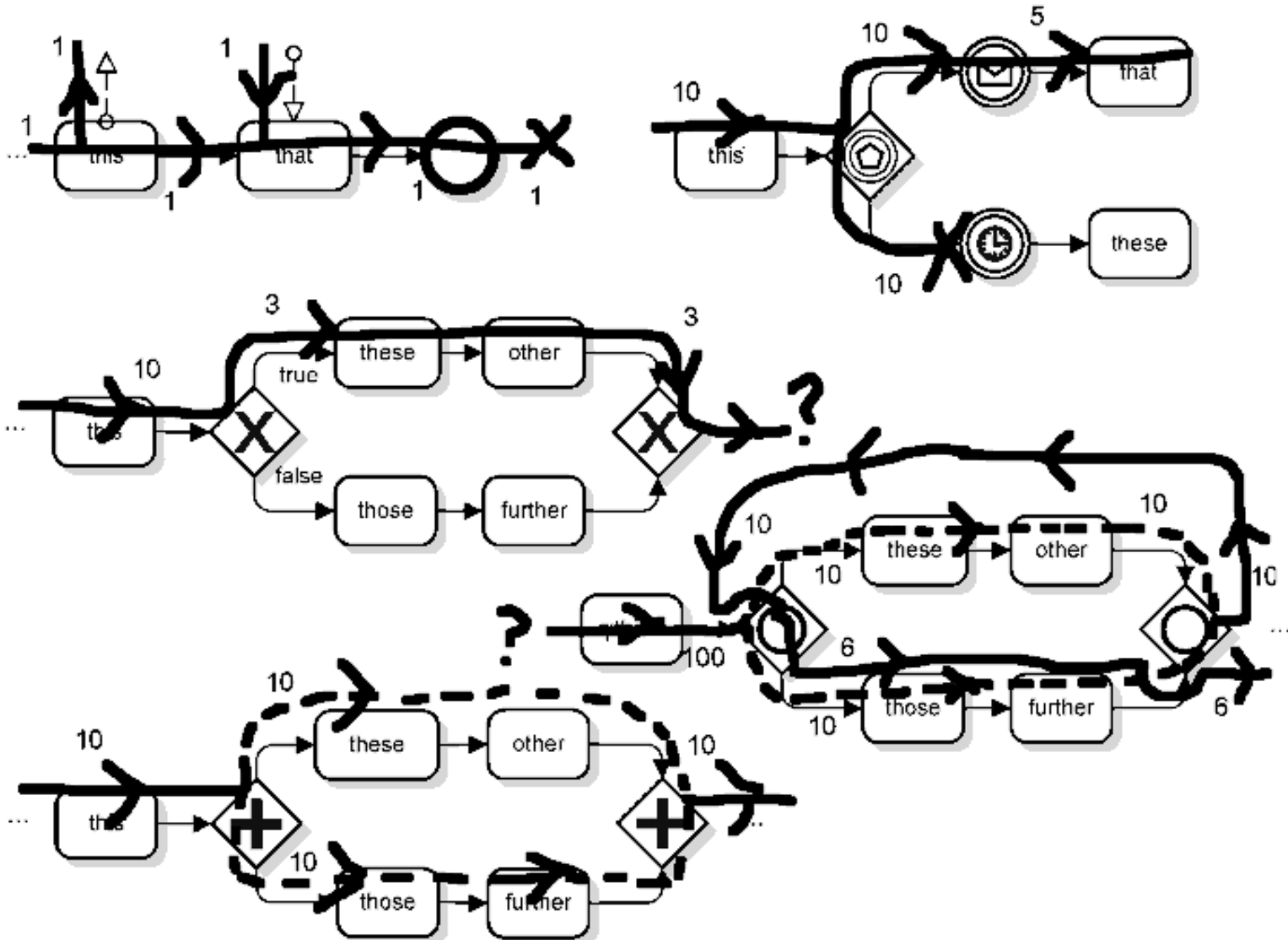
- I. A *sequential* numbering is used to express a sequential order of execution.
- II. A new *level of numbering* is used to express a flow internal to some branch of the control flow.
- III. A new *decimal numbering* level is used to express exclusive branches (e.g. \*.1 and \*.2). In this case, each branch starts with the if keyword.
- IV. A new *alphabetic numbering* level is used to express parallel or inclusive branches (e.g. \*.a and \*.b).
- V. A joining parallel gateway is described as *wait for the end of* \*.a and \*.b
- VI. A joining inclusive gateway is described as *wait for the end of the ongoing activities in* \*.a and \*.b
- VII. A jump to a specific sentence is denoted by an arrow followed by the number of the sentence: → 14
- VIII. The End of the process is mandatory, and denoted by “→ End” (local End) or by a jump to the global end.
- IX. The task type is reported between brackets at the end of the sentence.

## Semi-formal notation

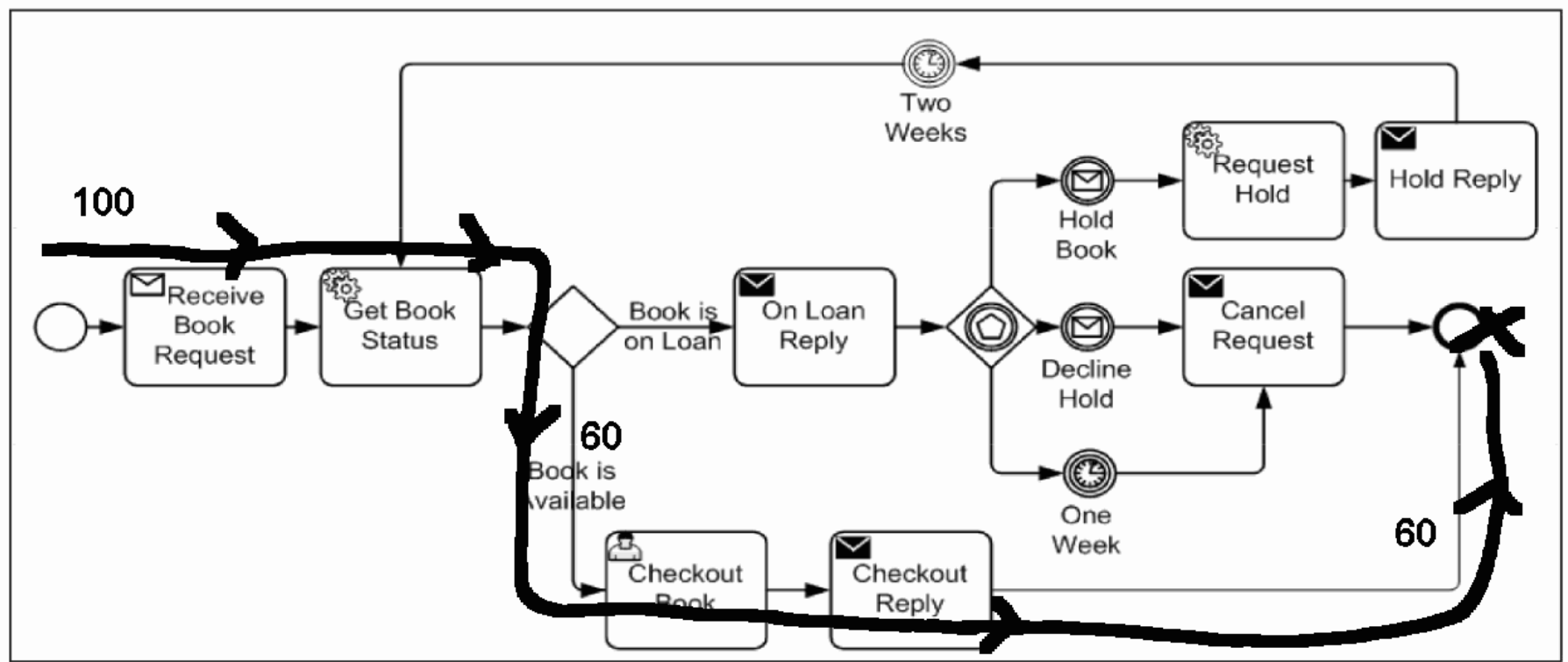
- 1 The System receives a book request (receive task)
- 2 The System gets the book status (service task)
- 3.1 If the book is available:
  - 3.1.1 The librarian checks the book out (user task)
  - 3.1.2 The System sends a checkout-reply message (send task) → 4
- 3.2 If the book is on loan:
  - 3.2.1 The System sends an on-loan-reply message (send task)
  - 3.2.2 The system waits for an event:
    - 3.2.2.1 When a decline-hold message is received by the system, or  
When a week lapsed without answer:
      - 3.2.2.1.1 The System cancels the request and sends a related message → 4
      - 3.2.2.2 When a hold-book message is received by the System:
        - 3.2.1.2.1 The System holds the request (service task)
        - 3.2.1.2.2 The System sends a hold-reply message (send task)
        - 3.2.1.2.3 The System waits for two weeks
        - 3.2.1.2.4 → 2
- 4 End

- Scenarios are represented by a solid directed arrow. A dashed arrow means parallel (“twins”) flows.

SAMPLE REPRESENTATION OF SCENARIOS

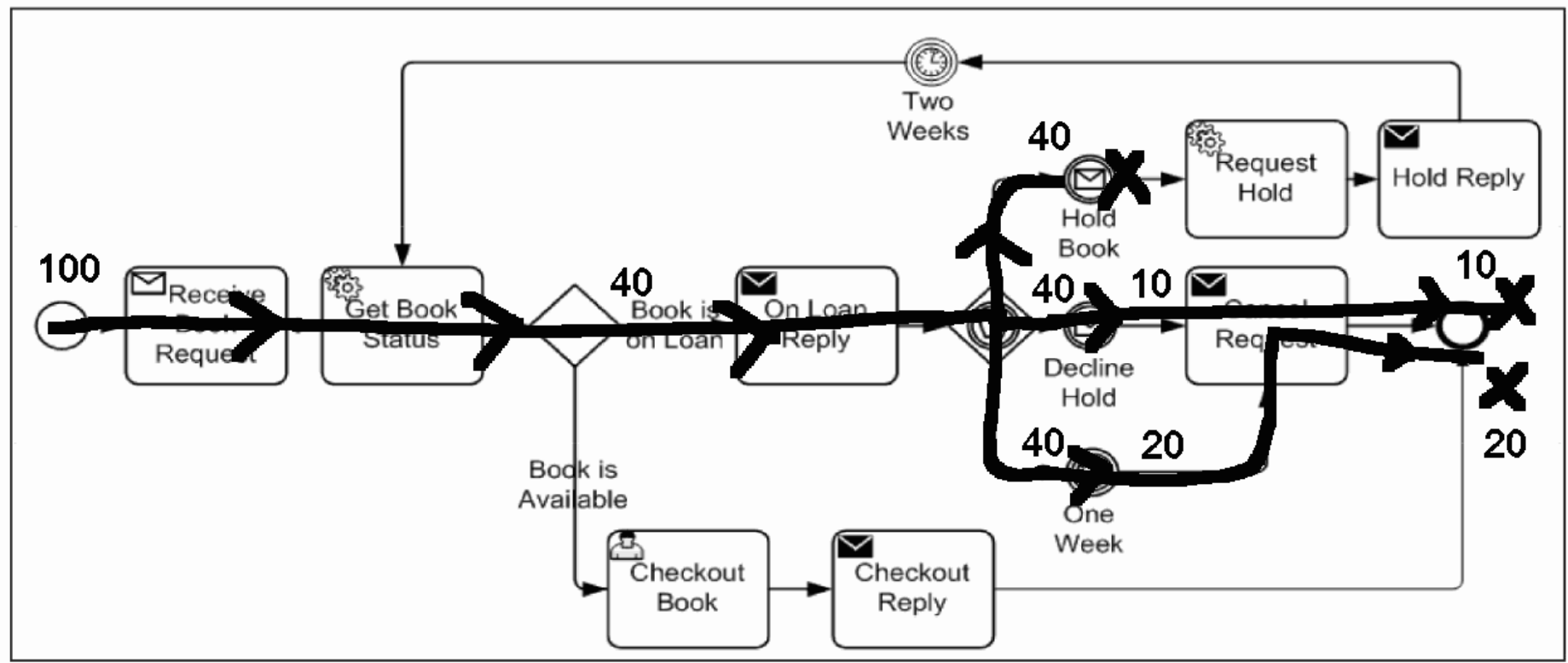


S1) AVAIL:  $100 \times 0.6 = 60$ .



S2) NO AVAIL & ONE WEEK:  $100 \times 0.4 \times 40 \times 0.5 = 20$ .

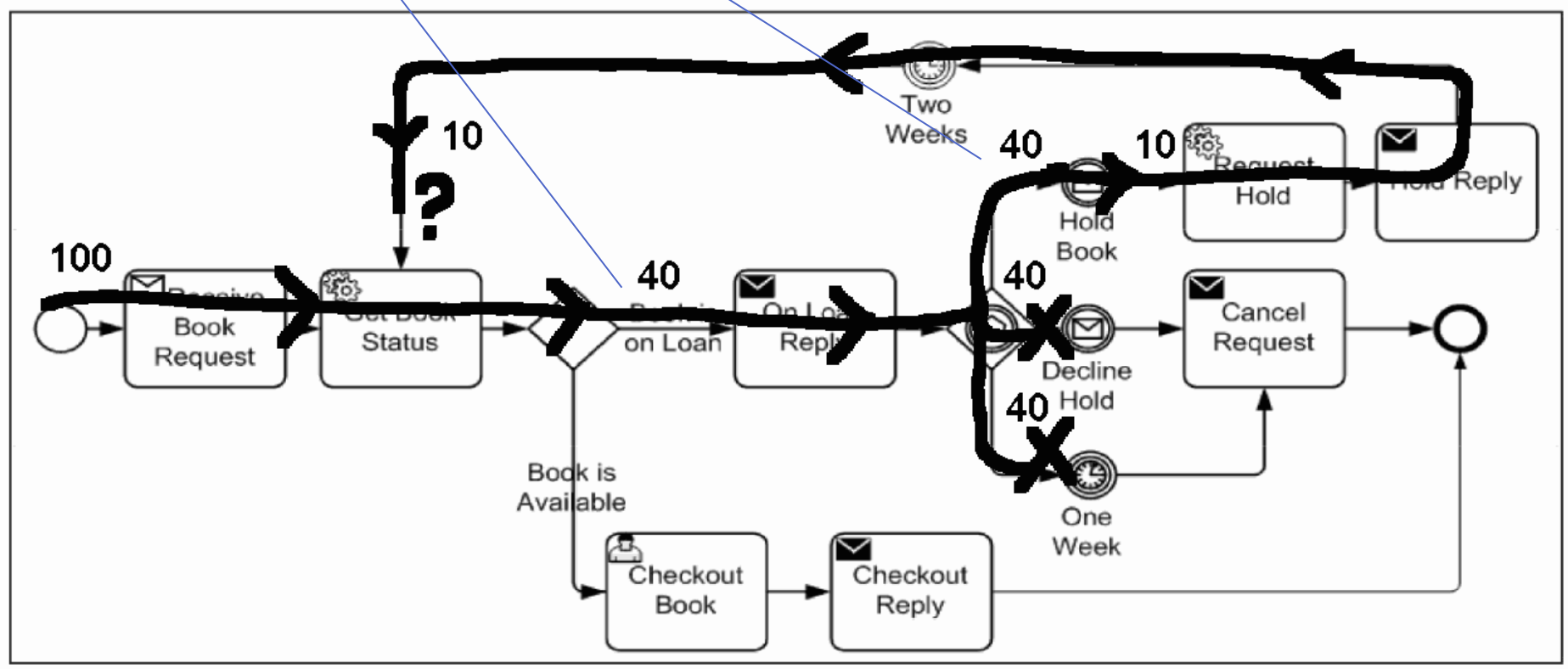
S3) NO AVAIL & DECLINE:  $100 \times 0.4 \times 40 \times 0.25 = 10$ .



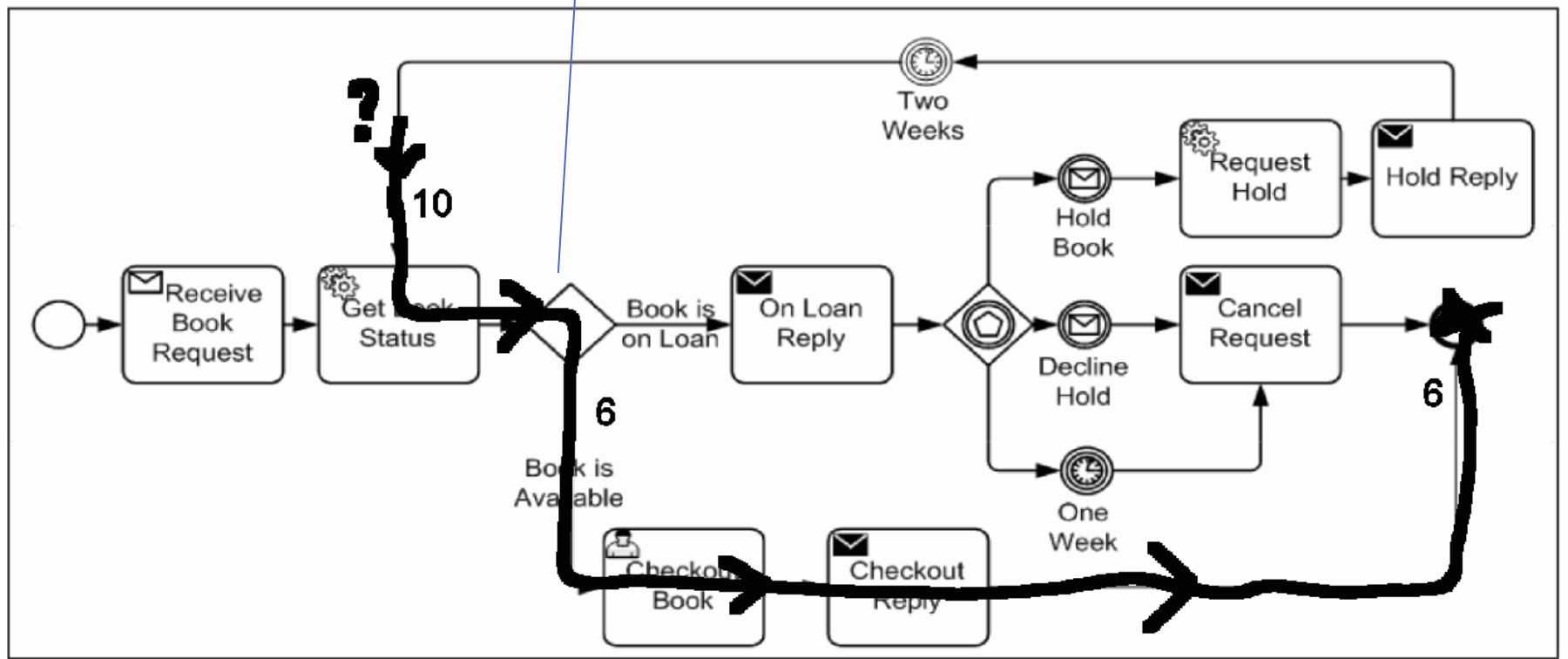
For a better clarity, at the exam represent each scenario (S2, S3) on a different sheet.



S4) NO AVAIL & HOLD & AVAIL:  $100 \times 0.4 \times 0.25 \times 10 \times 0.6 = 6$ .



S4) NO AVAIL & HOLD & AVAIL:  $100 \times 0.4 \& 40 \times 0.25 \& 10 \times 0.6 = 6$ .



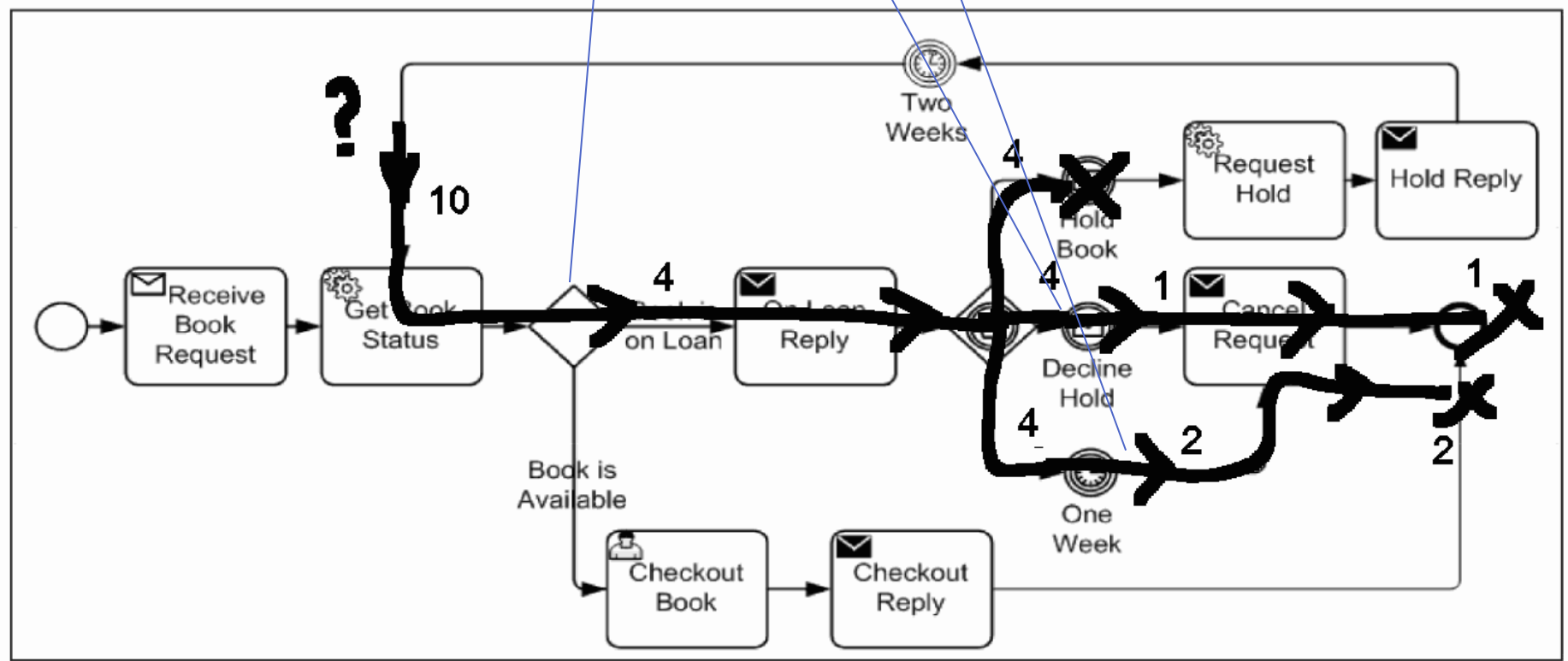
S5) NO AVAIL & HOLD & NO AVAIL & ONE WEEK:

$$100 \times 0.4 \& 40 \times 0.25 \& 10 \times 0.4 \& 4 \times 0.5 = 2.$$

S6) NO AVAIL & HOLD & NO AVAIL & DECLINE:

$$100 \times 0.4 \& 40 \times 0.25 \& 10 \times 0.4 \& 4 \times 0.25 = 1.$$

The first picture of S5,S6 is the same as the first picture of S4. In the following, only the second picture is represented

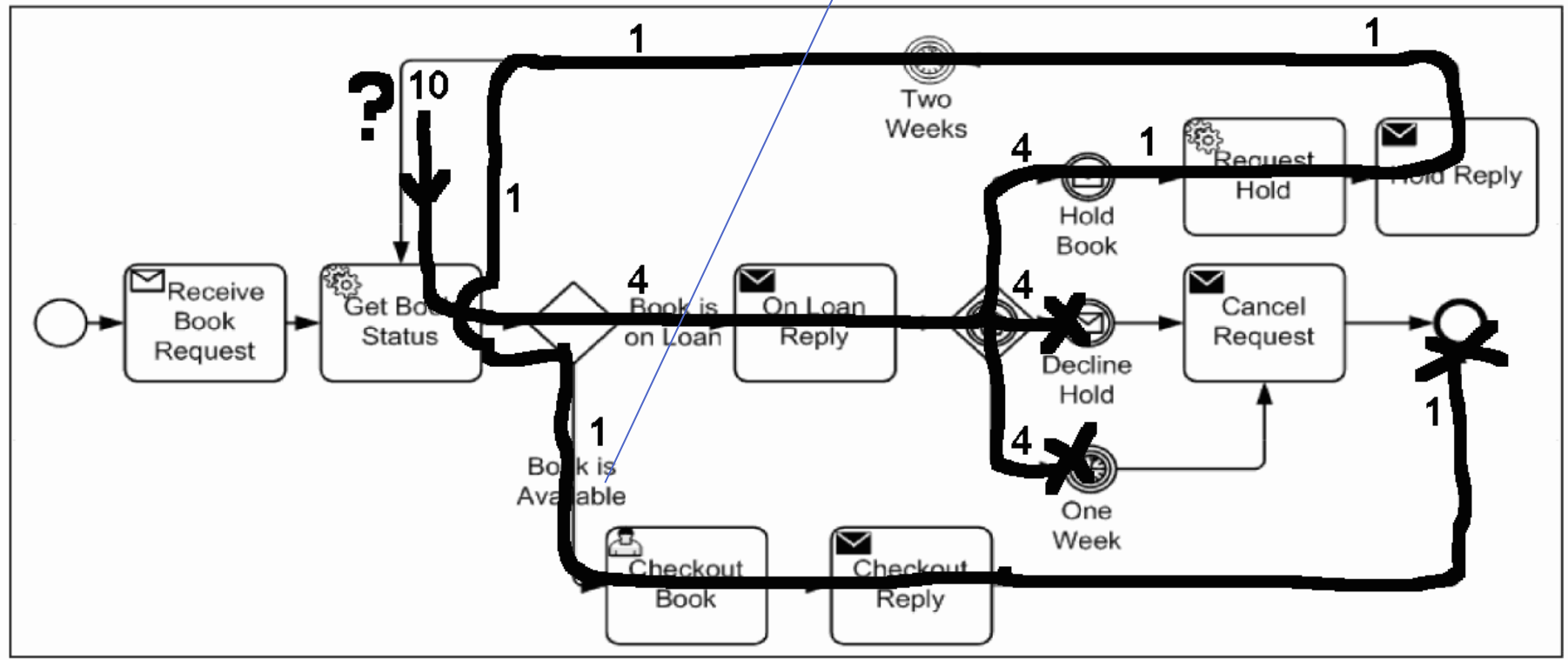


For a better clarity, at the exam represent each scenario (S5, S6) on a different sheet.

S7) NO AVAIL & HOLD & NO AVAIL & HOLD & AVAIL:

$$100 \times 0.4 \& 40 \times 0.25 \& 10 \times 0.4 \& 4 \times 0.5 \& 1 \times 0.6 = 1.$$

The first picture of S7 is the same as the first picture of S4. In the following, only the second picture is represented



TOTAL TOKENS:  $S1+S2+S3+S4+S5+S6+S7 = 60 + 20 + 10 + 6 + 2 + 1 + 1 = 100$ .

## Questions

1. When a hold-book message is sent, no other emails are due by the Customer to have the book in hand.  
☐ true ☐ false
2. When the book is on-loan, more than 5 messages (sent or received) are due to have the book in hand, provided that it is made available by two weeks.  
☐ true ☐ false
3. When the book is still on-loan after two weeks since the hold-book message was sent, it is possible to rethink the initial choice by sending a decline-hold message.  
☐ true ☐ false
4. While the book is on-loan, the Customer can control the system in causing a get-book-status every about three weeks instead of two weeks.  
☐ true ☐ false

## Answers

1. **False:** the hold-book message must be repeated every two or three weeks to keep the book request. If not, the request will be canceled.
2. **False:** the number of messages is exactly 5. ↓ receive book request, ↑ on-loan reply, ↓ hold book, ↑ hold reply, ↑ checkout reply.
3. **True:** after two week, the System will send another on-loan-reply message, and the Customer can answer with a decline-hold message.
4. **True:** After the on-loan-reply message, the Customer can wait a little less than one week to send the hold-book message. This way, the loop for a get-book-status lasts a little less than three weeks: two weeks + a little less than one week.