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Walkthrough Oblig 1

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2 a) Events I

Q. What are the first events of Figure 1?

A. ?(Call-for-proposals, Peter, syst:System)

- Explanation:
  - Causality
    - a message can never be received before it has been sent
  - Weak sequencing
    - events from the same lifeline are ordered in the trace in the same order as on the lifeline
  - Only the lifeline Peter starts with a reception message

2 a) Events II

Q. What are the last events of Figure 1?

A. !(Reject, syst:System, Paul),
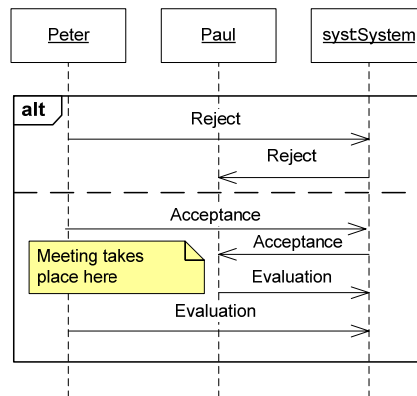?(Evaluation, Peter, syst:System)

- Explanation:
  - Causality
  - Weak sequencing
  - Semantics of alt
    - Union of traces obtained from sequencing upper fragment with set of traces from each operand
  - Only the lifeline syst:System ends with a reception message in both cases

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2 b) I Counting the traces

First operand:
<!peres, ?peres, !srepa, ?srepa>

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peres = (Reject,Peter, syst:System)   srepa = (Reject, syst:System,Paul)
peas = (Accept,Peter, syst:System)   sapa = (Accept, syst:System,Paul)
pees = (Evaluation,Peter, syst:System)   paes = (Evaluation,Paul, syst:System)

2 b) I Counting the traces

Second operand:

```
Peter        Paul        syst:System
```

alt

Reject

Reject

Acceptance

Acceptance

Meeting takes place here

Evaluation

Evaluation

Has no formal meaning

```
                       !peas
                      /     \
                  !pees      ?peas
                    |        /    \
                 ?peas    !pees   !sapa
                    |       |      /    \
                 !sapa   !sapa  !pees   ?sapa
                    |       |     |      /    \
                 ?sapa  ?sapa  ?sapa !pees   !paes
                    |       |     |     |     /    \
                 !paes   !paes  !paes !paes !pees  ?paes
                    |       |     |     |     |      |
                 ?paes   ?paes  ?paes ?paes ?paes  !pees
                    |       |     |     |     |      |
                 ?pees   ?pees  ?pees ?pees ?pees  ?pees
```

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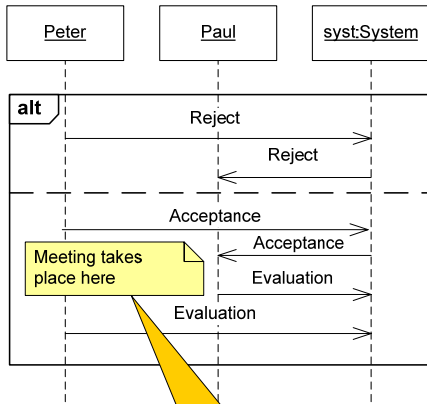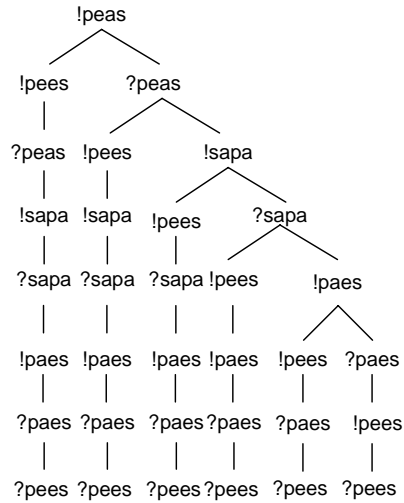
2 b) II

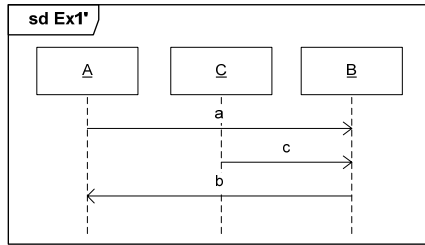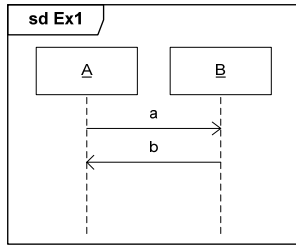Q. How many traces are negative with respect to *Negotiation*?

A. None

- Explanation
  - The sequence diagram uses no constructs for specifying negative behaviour, such as refuse, veto, assert or guards

2 c) I Supplementing

sd Ex1

| A | B |

a

b

sd Ex1'

| A | C | B |

a

c

b

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- $[[Ex1]]=\{(\{<!a,?a,!b,?b>\},\varnothing)\}$
- $[[Ex1']]=\{(\{<!a,?a,!c,?c,!b,?b>,<!a,!c,?a,?c,!b,?b>,<!c,!a,?a,?c,!b,?b>\}, \varnothing)\}$
- Supplementing means
  - recategorizing inconclusive trace as either positive or negative
  - NB: all of the original positive traces must remain positive, and all of the original negative traces must remain negative
  - $(p,n) \rightsquigarrow_s (p',n') \stackrel{\text{def}}{=} p \subseteq p' \wedge n \subseteq n'$
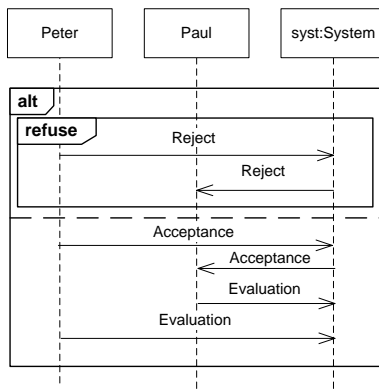- *Ex1'* is not a supplementing of *Ex1*

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2 c) I Supplementing

- *Negotiation2* relates to *Negotiation* as *Ex1'* relates to *Ex1*
- It is not a supplementing of *Negotiation*

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2 c) II Narrowing

Peter	Paul	syst:System

alt

refuse
    Reject

    Reject

Acceptance

Acceptance

Evaluation

Evaluation

- Narrowing means redefining positive traces as negative

- $(p,n) \rightsquigarrow_n (p',n') \stackrel{\text{def}}{=} p' \subseteq p \wedge n' = n \cup (p \backslash p')$