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Object-Oriented Modeling with UML

Sequence Diagram

Explanation of Exercise Examples

Christian Huemer and Marion Scholz

Presented by Nicholas Bzowski

Sequence Diagram

Example: Find the Message Sequence

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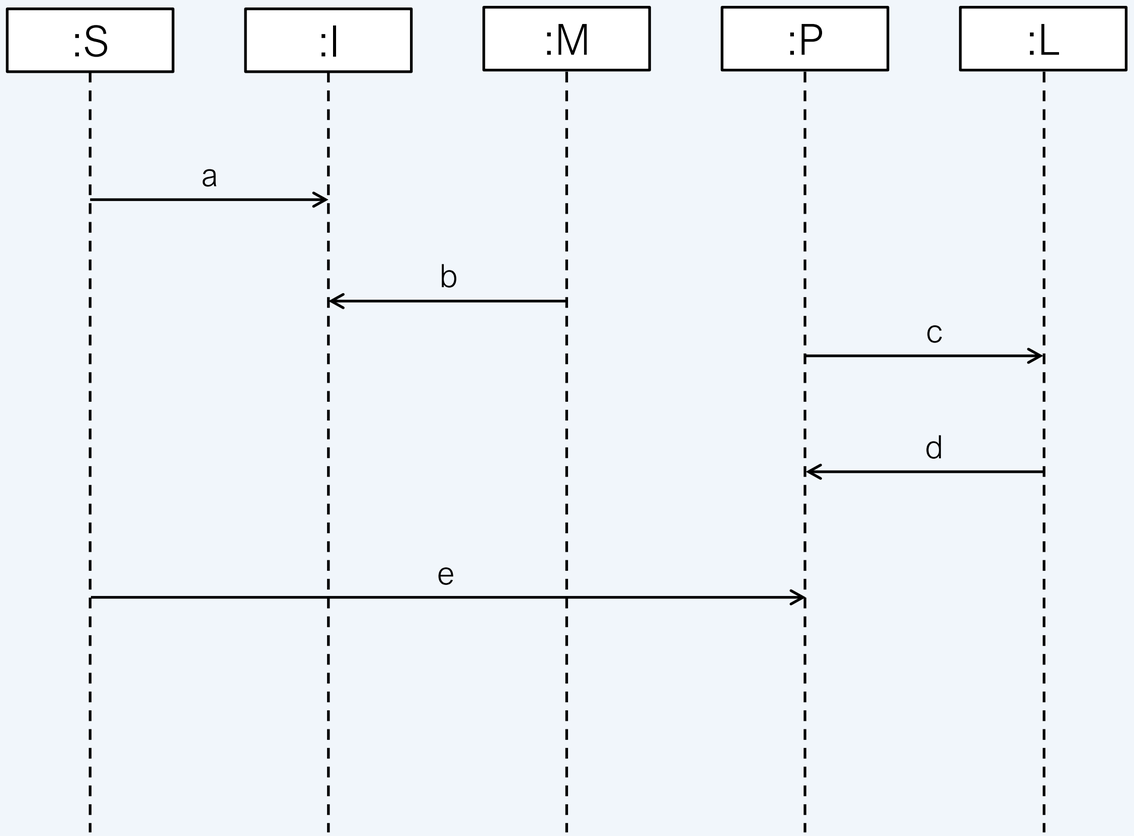
Example: Find the Message Sequence

Which message sequences (traces) are possible based on the following sequence diagram?



Sequence Diagram

Example: Class Diagram from Sequence Diagram

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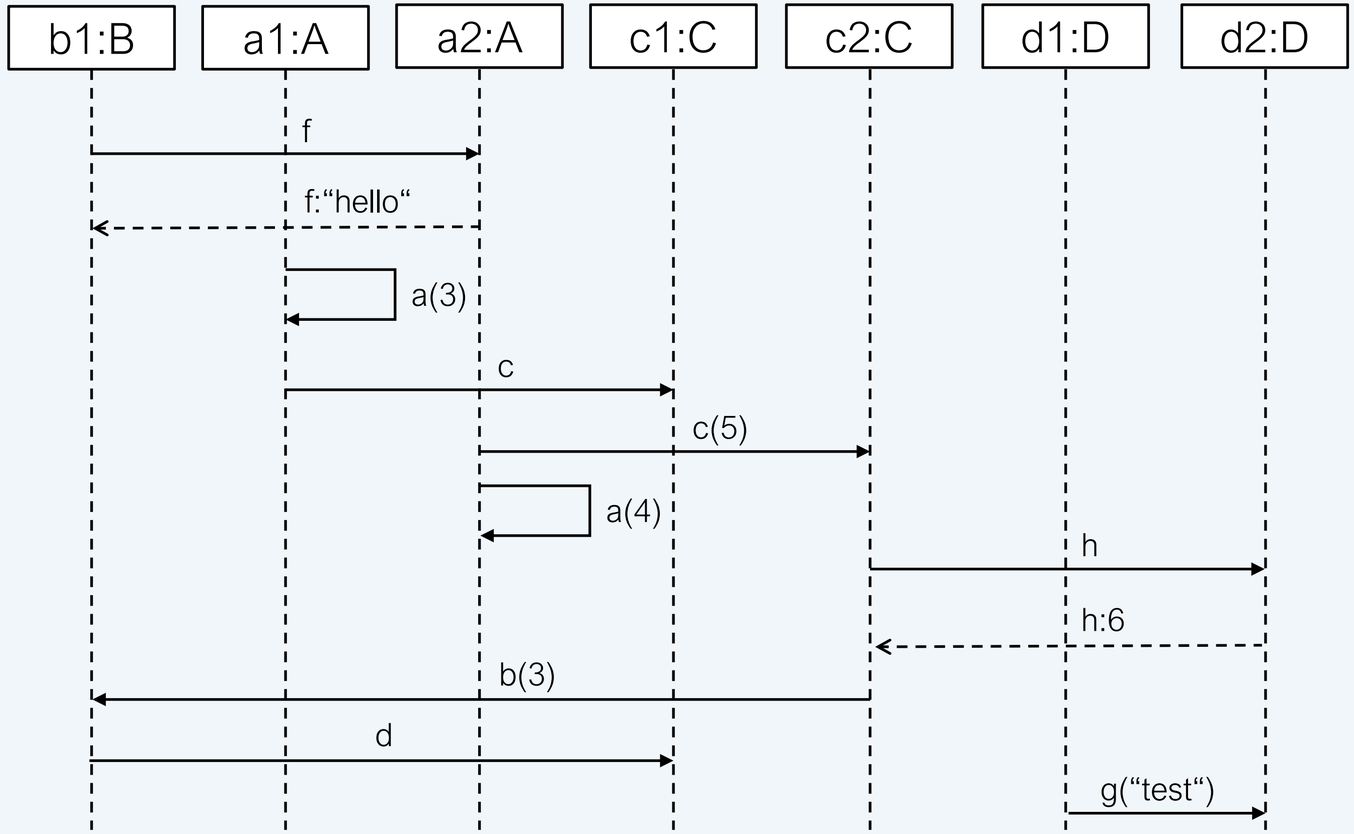
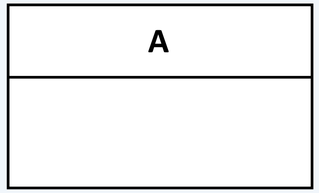
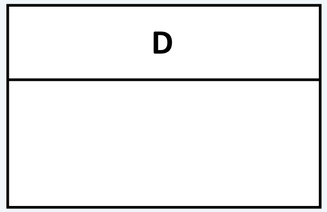
Example: Class Diagram from Sequence Diagram

Complete the following class diagram by using the sequence diagram.

- Use operation definitions with type specifications, where applicable.
- Draw relationships between classes in the form of navigable associations, but only draw navigation directions that are evident from the given sequence diagram.







Sequence Diagram

Example: Transfer Object Assembler Pattern

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Example: Transfer Object Assembler Pattern

With this approach, the client requires knowledge of the business objects in order to access the necessary data. This means that the client is strongly coupled to the business objects, which is generally not desirable.

The transfer object assembler pattern is used to resolve these dependencies. A separate assembler is introduced here. The client only communicates with this assembler, which assembles the data from several business objects in a transfer object. The assembler then returns this transfer object to the client. In this way, the client receives the data it requires in an encapsulated form.

In concrete terms, the pattern is implemented as follows: The client requests the required information from the TransferObjectAssembler using getData(). This first creates a DataTransferObject and fills it with the data from the required BusinessObjects. The data of a BusinessObject can also be queried using getData(). Finally, the TransferObjectAssembler returns the DataTransferObject to the client.

Model the transfer object assembler pattern.

Sequence Diagram

Example: Bank Account

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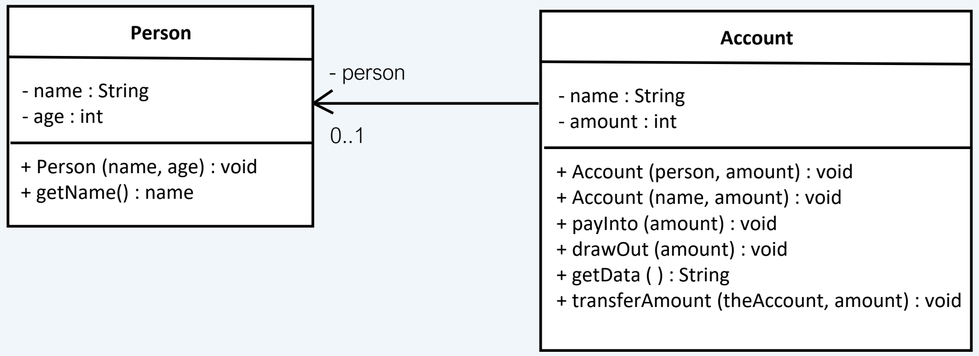
Example: Bank Account

Given the following class diagram of the Person class and the Account class, create a sequence diagram containing the following: The AccountClient creates two accounts (one object of the Person class and one object of the Account class).

First, an amount is to be deposited into the second account.

An amount is then to be transferred from the second account to the first account.

The name of the account owner and the account balance are then to be printed from both accounts.



Sequence Diagram
Example: Patterns

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Example: Patterns

How can you illustrate the following facts in a sequence diagram? Model the situations described.

(a) The client sends message A to the server at 9:05 and does not expect a response.

(b) The client sends message B to the server. The server responds after 40 seconds.

(c) The server must send a reply message to the client within 20 seconds if the client has sent message C.

(d) A person presses the “Decrease volume” button on a tablet. In what volume state must the tablet be in for this to be possible? Illustrate this situation using the concept of “state invariant”.

Sequence Diagram

Example: Program Sequences

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Example: Program Sequences

Illustrate the sequences of the following program using a sequence diagram. Also model any response messages. You can assume that all variables that are not explicitly declared are already declared and initialized.

```
class Main {
  ...
  Worker w = s1.getConnection(user, pw);
  if (w == null) {
   print ("Error");
   exit; // Program will terminate
  }
  do {
   m = w.getMail();
   print(m);
  } while (m != null);
  status = w.sendMail("abc", "test");
  ...
  private void print (String m) {
   ...
  }
}
```

```
class Server {
  public Worker getConnection(String user , String pw) {
    Worker w = new Worker();
    w.start();
    return w;
  }
}

class Worker extends Thread {
  public void start() { }
  public boolean sendMail(String msg, String receiver) {
    ...
  }
  public String getMail() { ... }
}
```

Sequence Diagram

Example: Understanding Message Sequences

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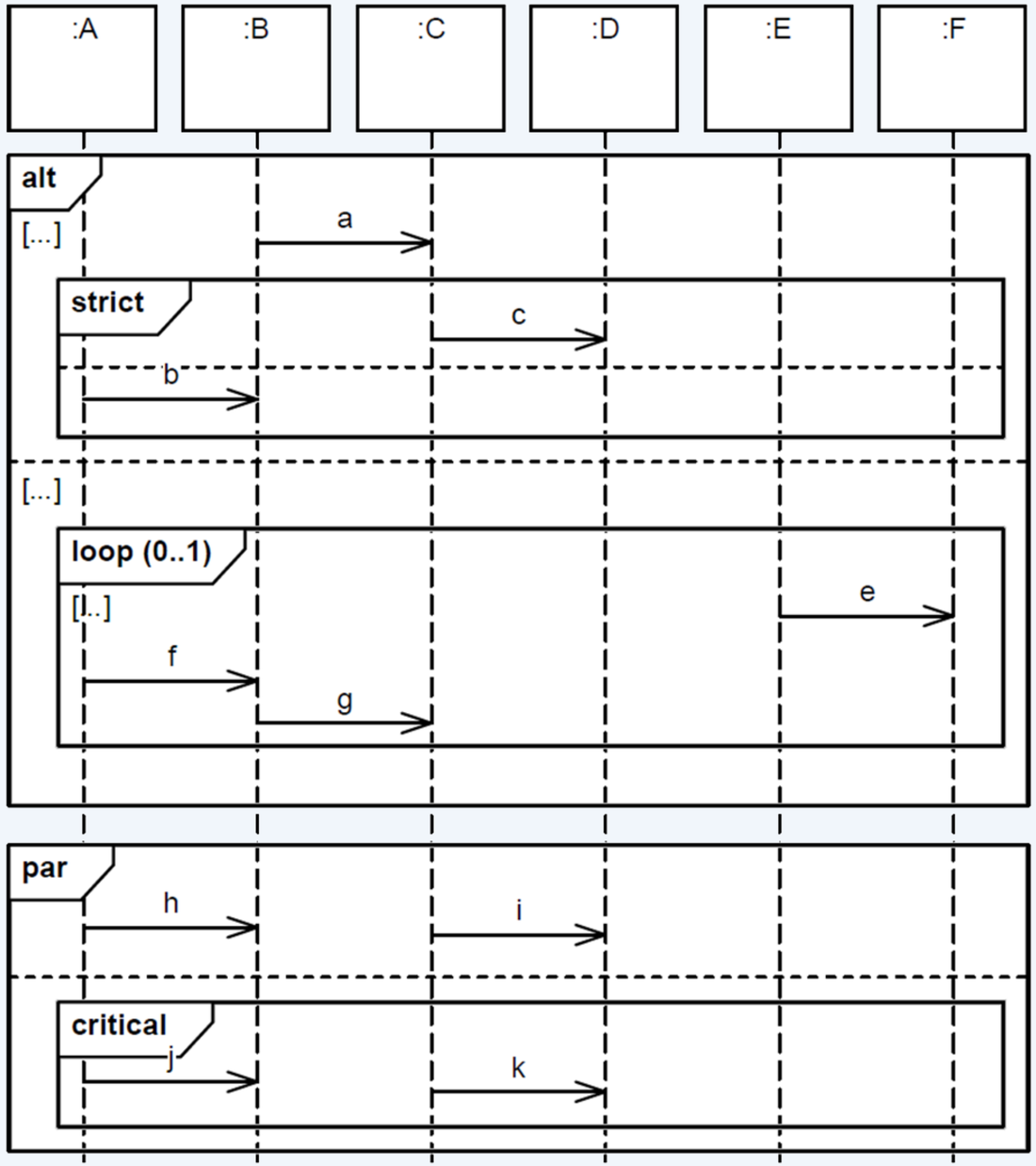
Example: Understanding Message Sequences



Do the following message sequences match the sequence diagram?

a – b – c – h – i – j – k

a – c – b – h – i – k – j

a – c – b – h – j – k – i

a – c – b – h – j – i – k

a – c – b – h – k – j – i

h – i – j – k

e – f – g – h – i – j – k

f – e – g – h – i – j – k

h – i – j – k – a – c – b