



LAB 5: Interaction Diagram - UML Communication Diagram

OBJECTIVES

- To understand the role of dynamic models in requirement analysis by reading and constructing UML Communication Diagram.
-

INTRODUCTION

Communication Diagram (a.k.a. Collaboration Diagram)

- Communication Diagram provides another way to model a scenario. Essentially is a part of Interaction Diagram (just like Sequence Diagram).
- Each object is represented by an object icon, and links are used to indicate communication paths on which messages are transmitted.
- Messages presented in the same way as those in sequence diagram.
- Formerly known as Collaboration Diagram in UML 1.x specification.
- Communication Diagram represents a combination of information taken from Use Case, Class and Sequence Diagrams describing both the static structure and dynamic behavior of the system.

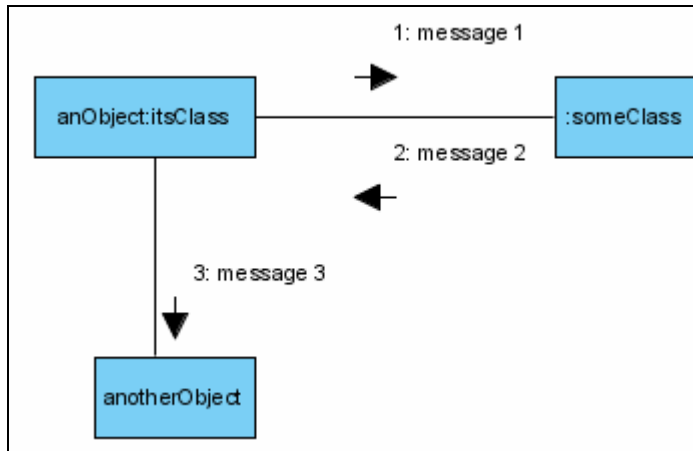
Comparing and Contrasting: Collaboration and Sequence

- Both diagrams show the same information:
 - Objects/classes
 - Messages
 - Sequence
 - Conditional
 - Repetition
 - Messages to self
- Sequence Diagram and Communication Diagram are two views of the same scenario.
- Collaboration diagrams emphasize who-is-talking-to-who.
 - But the time-ordering of the messages who gets obscured.
- Sequence diagrams emphasize time-ordering.
 - But the who-is-talking-to-who gets obscured.
- Use the diagram that you are most comfortable with.

Structure and Notation of Communication Diagram

- Objects are named <an object name>:< its class> .

- Either <an object name> or <a class name> can be removed.
- Collaborations / communications are shown by lines between objects.
- Communication is made up of messages. Labeled in a chronological order.
- Messages are shown as labeled arrows.
- Numbers show sequence.




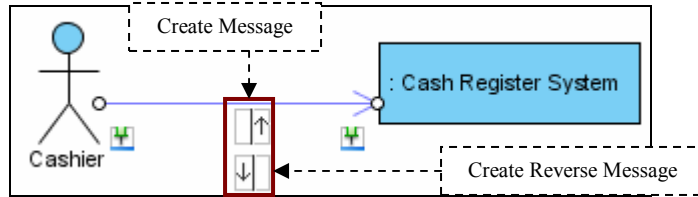
- It is common to model the communication sequences in the form of x.y.z. (e.g. 4.1.1 or 5.2.1). This is especially true with a large / complex diagram in place.

GENERAL STEPS FOR CREATING COMMUNICATION DIAGRAM

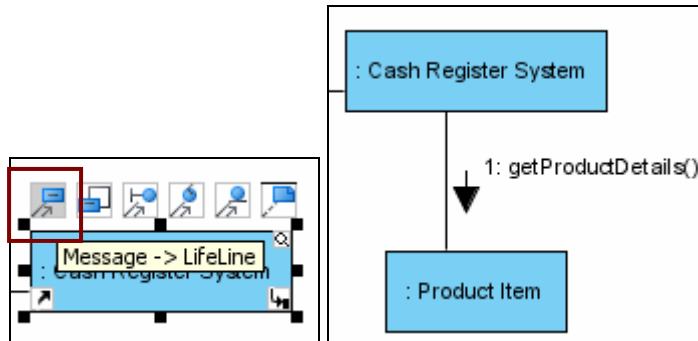
Creating and Filling in Objects in Communication Diagram

To illustrate how to operate within Communication Diagram, refer to the case study of “Make New Sale” scenario in Lab 4 (page 7).

- Begin by creating an actor called Cashier. Do this by clicking on the Actor icon in the Communication Diagram toolbar.
- To create a linked message between an actor and object, 2 ways are possible:
- First Method:
 - Create a lifeline called “Cash Register System”.
 - Next, link the 2 object “Cash Register System” and actor “Cashier” by using the link icon under the Diagram toolbar.

 - Now create a message on the created link. Do this by clicking on the created link. 2 icons will appear. Choose one that represents the flow intended.



- Second Method:
 - Using the Resource Centric option available as usual.

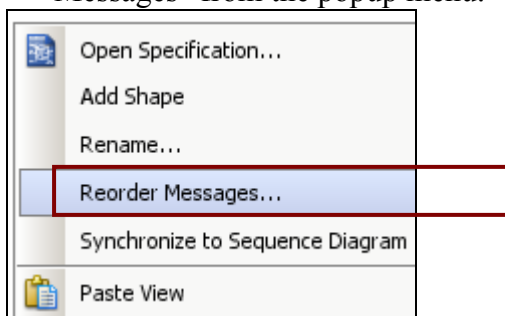


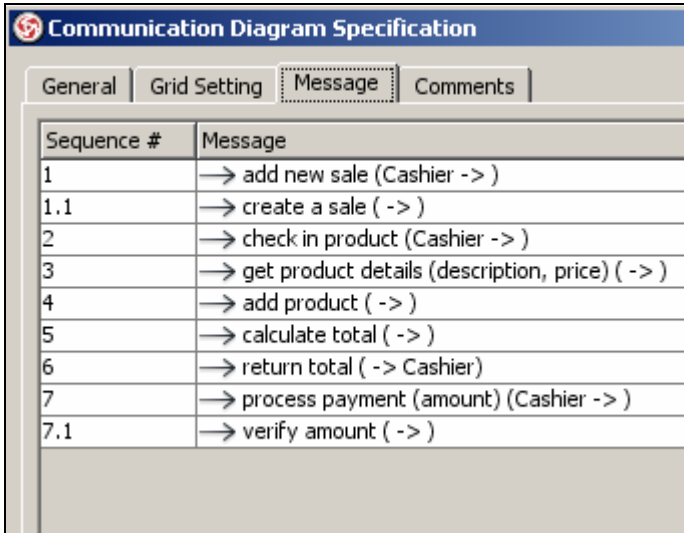
The message is automatically created, but can be edited / added for later revisions.

Editing Sequence Number of Messages

The steps below show how to edit sequence number of messages:

- Right click anywhere on the diagram (not any object or link), select “Reorder Messages” from the popup menu.





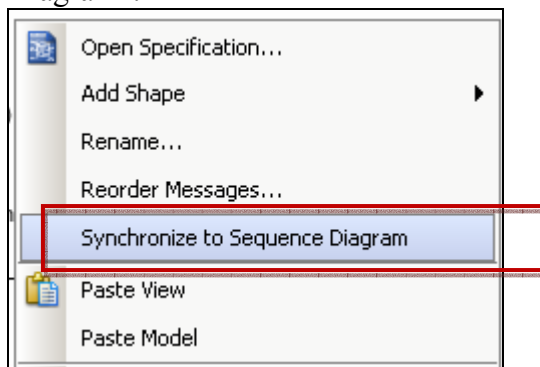
Sequence #	Message
1	→ add new sale (Cashier ->)
1.1	→ create a sale (->)
2	→ check in product (Cashier ->)
3	→ get product details (description, price) (->)
4	→ add product (->)
5	→ calculate total (->)
6	→ return total (-> Cashier)
7	→ process payment (amount) (Cashier ->)
7.1	→ verify amount (->)

Reorder Message Dialog

Quick Conversion to Sequence Diagram

In case the user requires modeling of a Sequence Diagram, VP-UML allows for instant conversion from and to (Sequence Diagram and Communication Diagram). Follow the steps below:

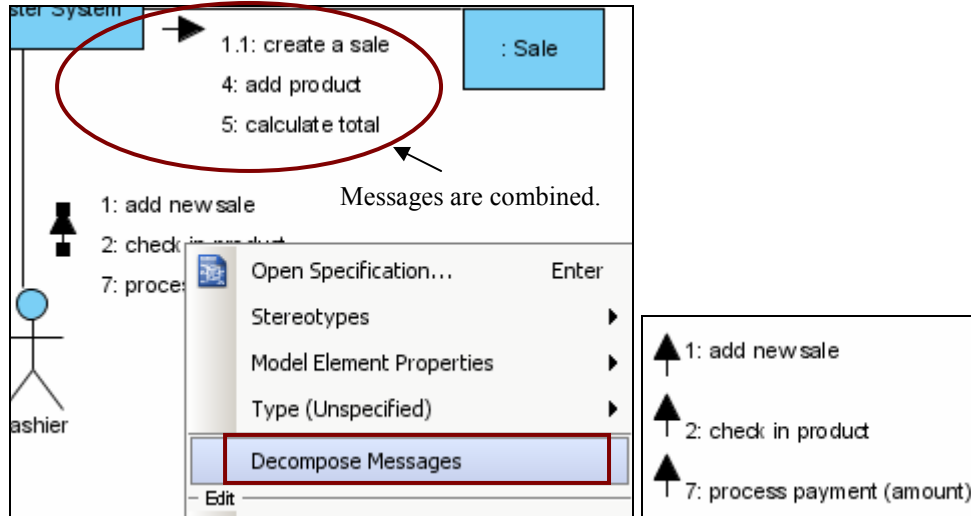
- Right click anywhere on the diagram and choose “Synchronize to Sequence Diagram”.



A new Sequence Diagram is now created, although usually most of the items / elements need to be rearranged correctly.

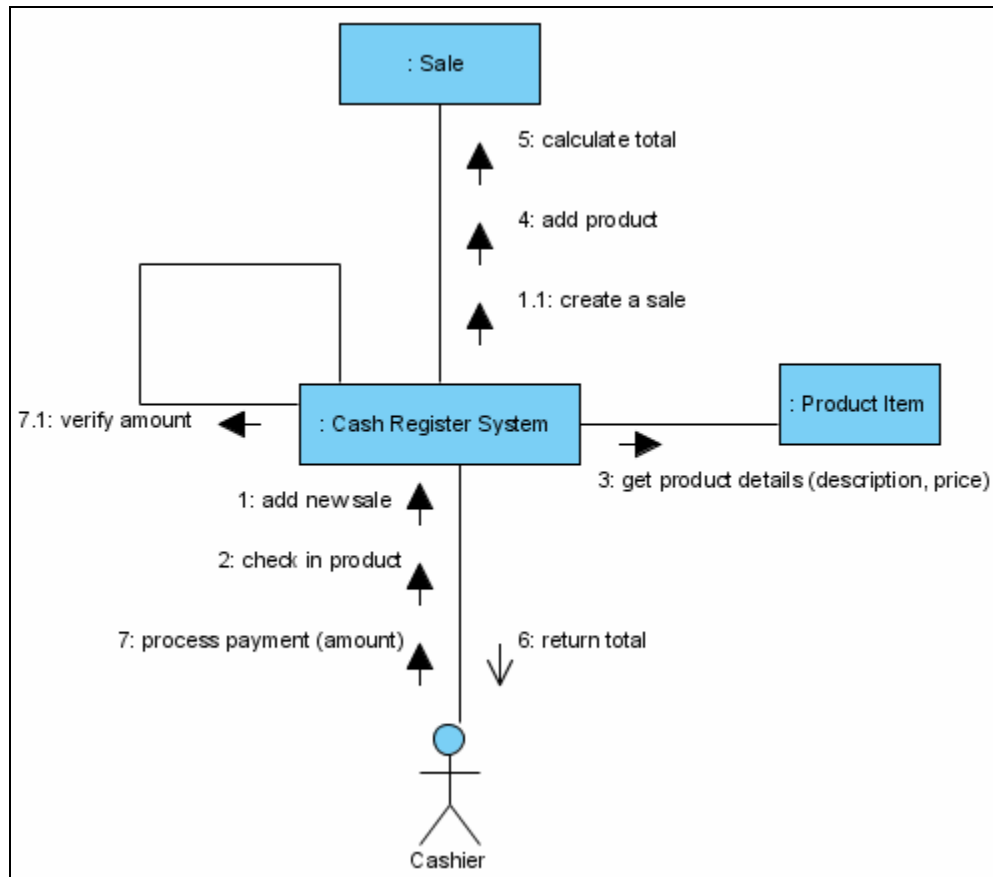
Notice that some messages are unified under an arrow display when they have the same destination and origin. We can separate them into individual messages display by:

- Select the Arrow display with the unified messages.
- Right click and choose “Decompose Messages”.



Unified Messages Display

After Message Decomposition



Communication Diagram for Make New Sale Scenario after Quick Conversion from Sequence Diagram (Lab 4 page 8)



<<In-Class Exercise on Communication Diagram>>

Let's revisit the ATM machine "Withdraw Money" case study we encountered in Lab 4 (Lab 004 – Sequence Diagram.pdf). The Use Case Scenario for this has thoroughly been discussed. The main task is to model it in a dynamic (sequential) order.

Use Case Analysis for "Withdraw Money" of an ATM System shown below:

Identified Actors / Objects:

Customer, ATM System, Cash Dispenser, Card Controller, Bank, Account

Identified Main Flow:

1. User arrives at the ATM machine and inserts a bank card.
2. The card is verified by the Card Controller.
3. The issuing bank is contacted to verify its validity.
4. The ATM system issues pin request to user.
5. User enters pin number.
6. ATM system verifies account with issuing bank.
7. ATM system prompts for service.
8. User request withdrawal with amount indicated.
9. Withdrawal request forwarded to issuing bank.
10. ATM system indicates successful withdrawal.
11. ATM system ejects card and dispense cash.

Construct a new Collaboration Diagram based on the information above. If you have your completed Sequence Diagram from the last lab (Lab 4), you may opt to quickly synchronize your Sequence Diagram to Communication Diagram.