Operation Contracts

CSE 3311 & 5324
Christoph Csallner
University of Texas at Arlington (UTA)

Overview

- Operation contract = (pre- and) **postcondition** of an SSD operation
  - Details one step of a use-case scenario
    - (As we inferred SSD operation from a use-case scenario step)
  - Part of use-case modeling
    - CL, Chapter 11

- **State change in terms of the domain model**
  - How domain model contents (sets, relations) change after taking one step of the use case
  - Write post-condition in past tense
    - Observation about state change that arose from an operation

***Important*: Use SSD + Domain Model**

- Name of SSD operation + parameters

- Precondition
  - State of objects in domain model before operation
- **Postcondition**
  - ***State of objects in domain model*** after operation

- Pre- and post-conditions may be expressed in
  - Natural language: Quick and informal
  - Object Constraint Language (OCL) or other formal lang.
  - Hybrid

***Important*: Possible State Changes**

- Contents of sets (recall: Set shown as box)
  - Who exists?
  - **Objects may be added to / deleted from a set**

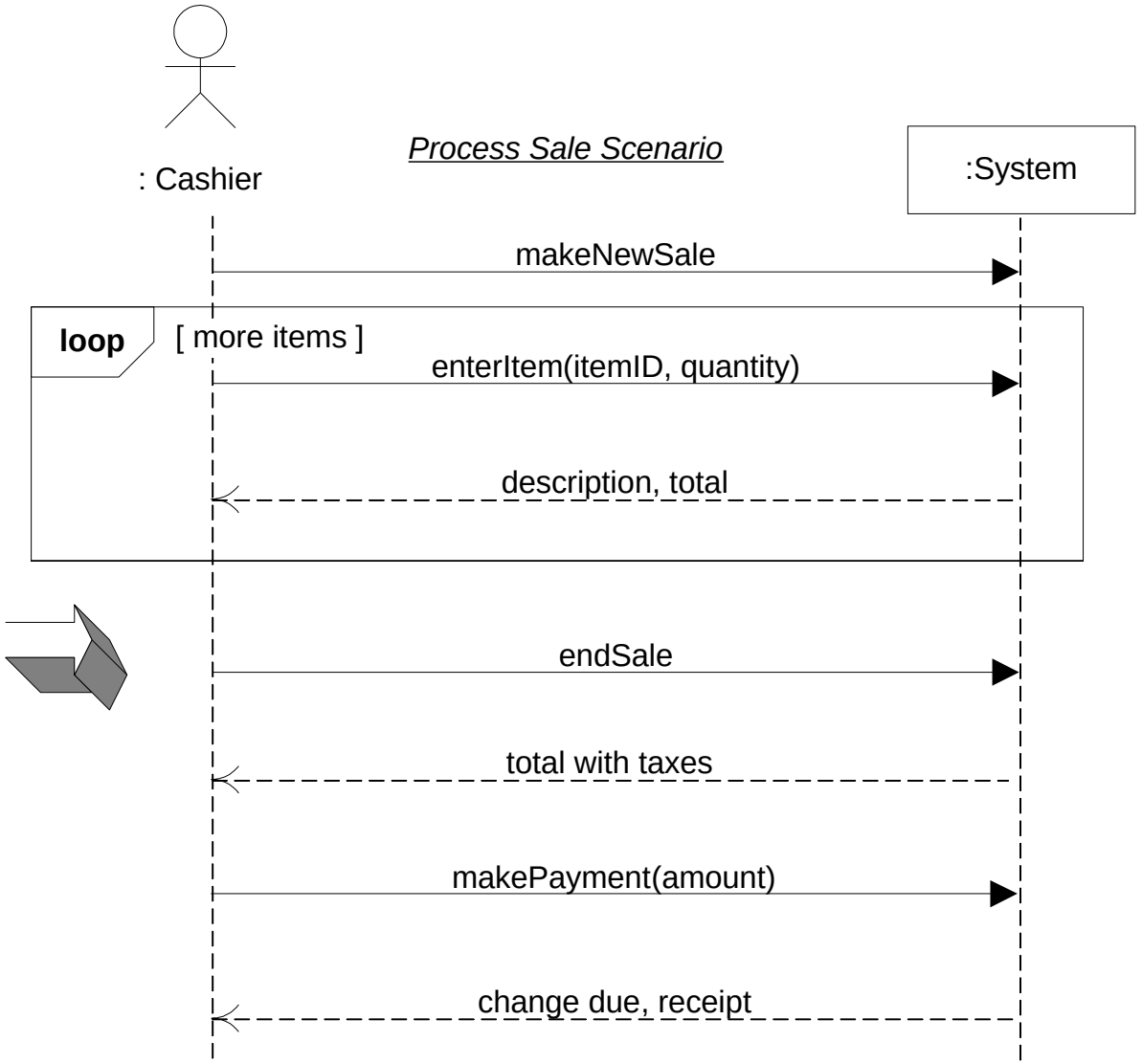
- Contents of relations (Relation = set of tuples)
  - Who is associated with whom?
  - **Tuples may be added to / deleted from a relation**

- State of object attributes
  - **Value of attributes may change**

Example: POS SSD

Simple cash-only *Process Sale* scenario:

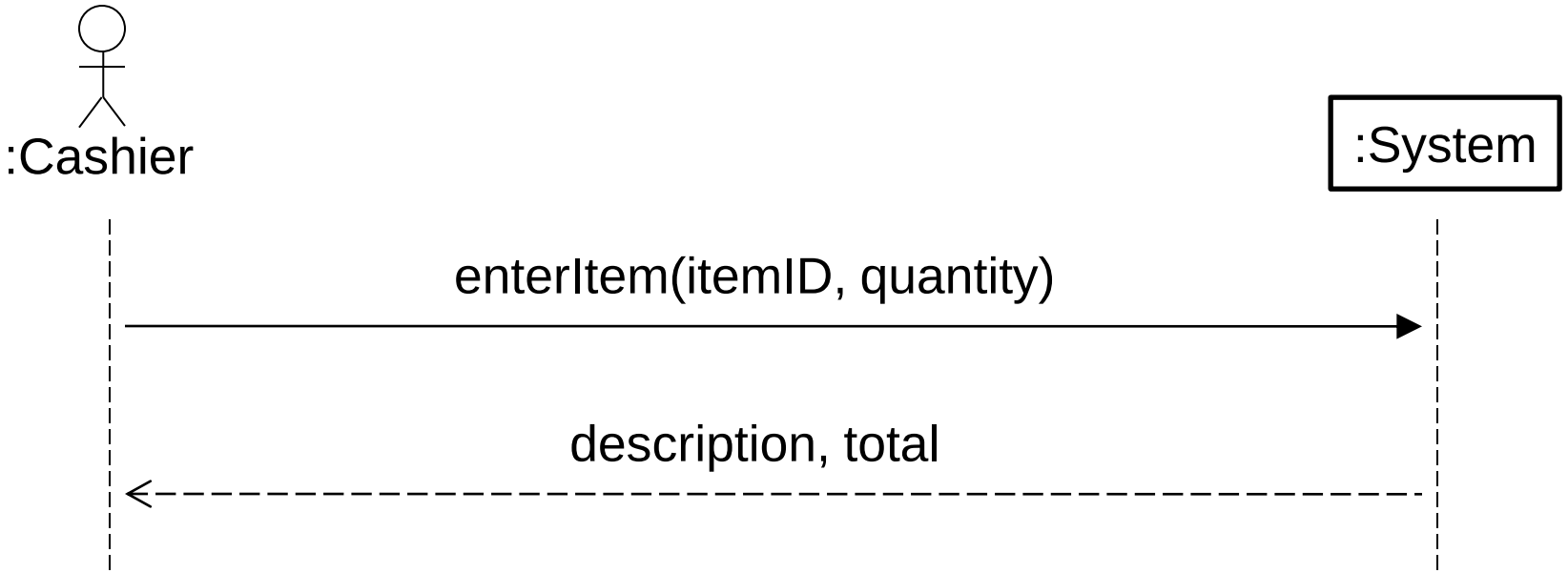
1. Customer arrives at a POS checkout with goods and/or services to purchase.
2. Cashier starts a new sale.
3. Cashier enters item identifier.
4. System records sale line item and presents item description, price, and running total.
Cashier repeats steps 3-4 until indicates done.
5. System presents total with taxes calculated.
6. Cashier tells Customer the total, and asks for payment.
7. Customer pays and System handles payment.
...



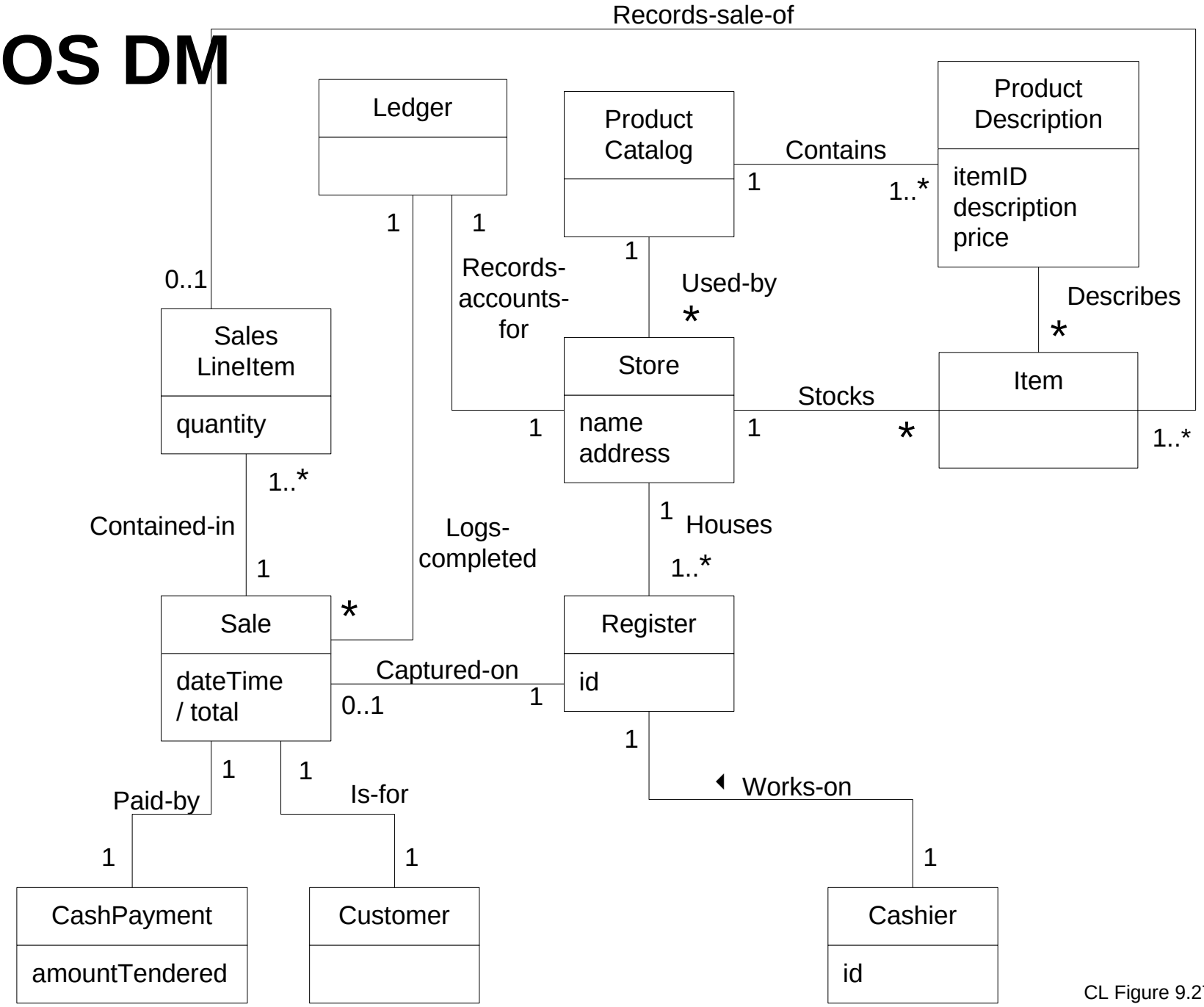
CL Figure 10.3

Example: One POS SSD Step

- Excerpt of system sequence diagram:



POS DM

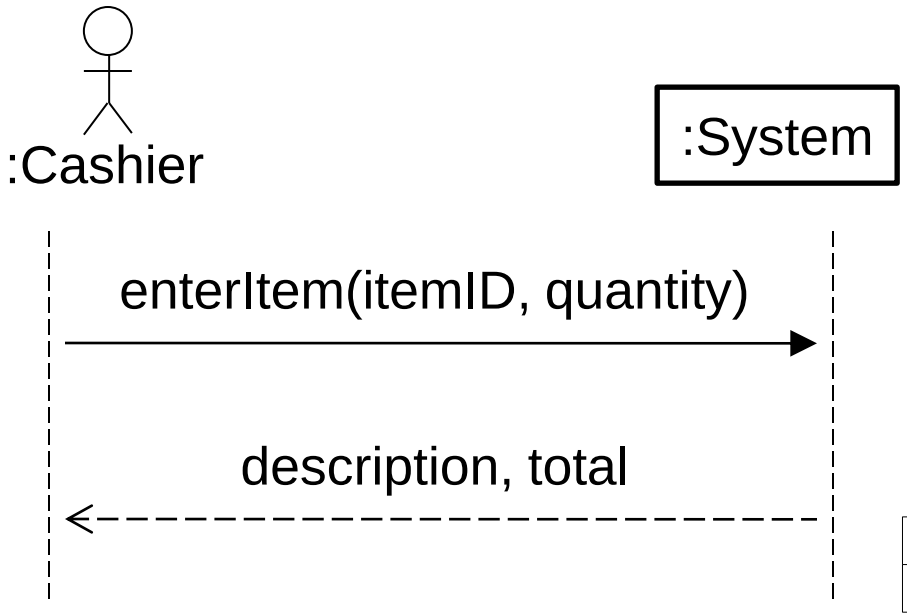


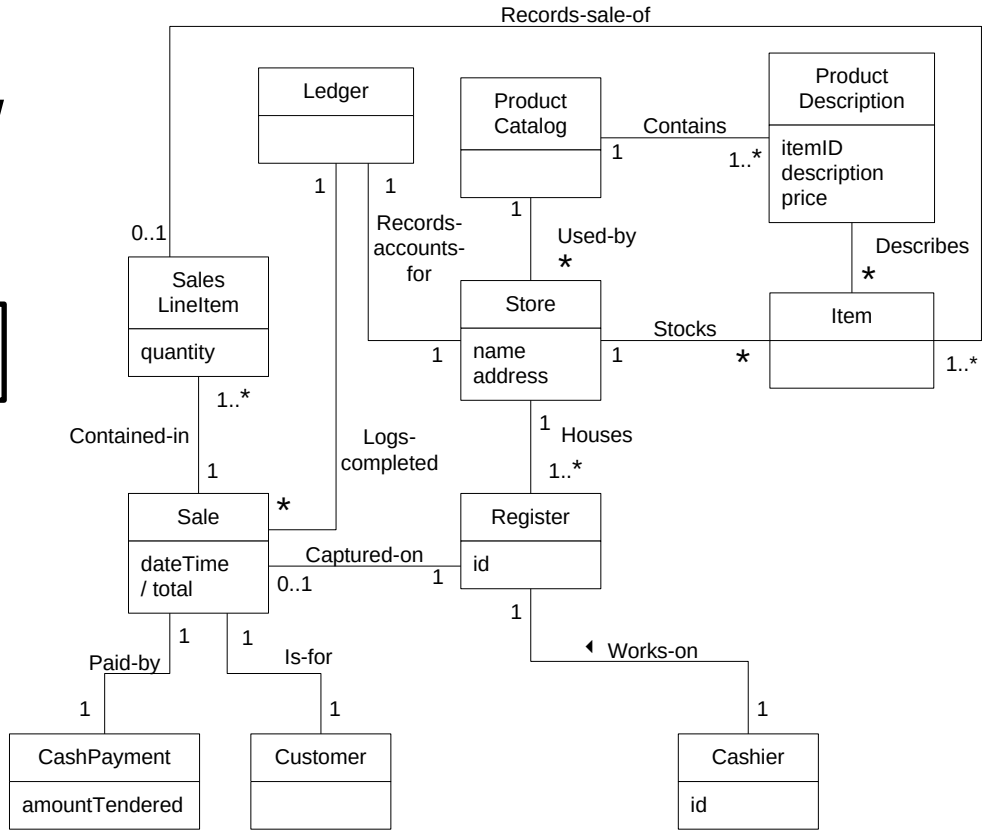
CL Figure 9.27

Example Operation Contract

- enterItem(itemID, quantity)
- In use-cases: Process Sale
- Precondition
  - There is a sale underway
- Postcondition
  - Created new SalesLineItem instance **sli** and added it to SalesLineItem set
  - Created new tuple (**sli**, current Sale) & added it to Contained-in relation
  - Changed attribute (**sli.quantity** := quantity)
  - Created new tuple (**sli**, sli's item) and added it to Records-sale-of relation

Example Overview





- Postcondition of enterItem(itemID, quantity):
  - Created new SalesLineItem instance **sli** and added it to SalesLineItem set
  - Created new tuple (**sli**, current Sale) & added it to Contained-in relation
  - Changed attribute (**sli.quantity** := quantity)
  - Created new tuple (**sli**, sli's item) and added it to Records-sale-of relation

IN-CLASS EXERCISE: OPERATION CONTRACT POST-CONDITIONS

Operation Contract Post-conditions

- Get together with your team
  1. Pick a use cases & convert its main success scenario into a system sequence diagram (SSD)
  2. Add post-conditions to each SSD step (in terms of how each step affects the domain model contents):
     1. Added / deleted object from a domain model set
     2. Added / deleted tuple from a domain model relation
     3. Added value of a domain model object attribute

- Post your results in the Teams chat

UML Terminology

- **UML** **vs.** **Object-oriented languages**
  - Operation -- Method signature: Name, param types
  - Method -- Method body: Code / implementation
  - Event -- Method invocation: Method call