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Chapter 10
Tutorial-style Review and Reinforcement

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Topics

- *Use case modeling*
- *Activity modeling*
- *Class modeling*
- *Interaction modeling*
- *Statechart modeling*
- *Implementation models*
- *Object collaboration design*
- *Window navigation design*
- *Database design*

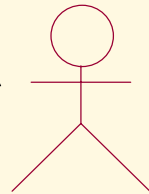
Tutorial – OnLine Shopping

- *Buying computers over Internet using the manufacturer's web page.*
- *Computers classified into servers, desktops and portables.*
- *Customer can select standard configuration or can configure his/her own configuration.*
 - *For each new configuration, the system can calculate price.*
- *To place order, the customer must fill out the shipment and payment information.*
- *The system sends a confirmation e-mail message to the customer with details of the order.*
- *Customer can check the order status online at any time.*
- *Moreover, the system needs to*
 - *verify the customer's credentials and payment method,*
 - *request the ordered configuration from the warehouse,*
 - *print an invoice, and*
 - *request the warehouse to ship the computer to the customer.*

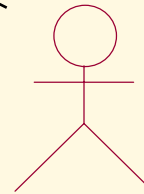
Use case modeling - actors

Consider the following requirements:

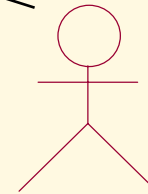
3. The customer may choose to order a computer online or may request that the salesperson contact him/her to explain order details, negotiate the price, etc. before the order is actually placed.
7. The warehouse obtains the invoice from the salesperson and ships the computer to the customer.



Customer



Salesperson

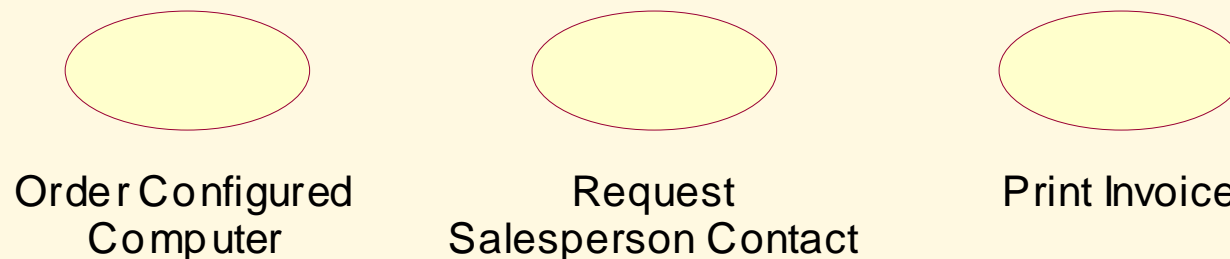


Warehouse

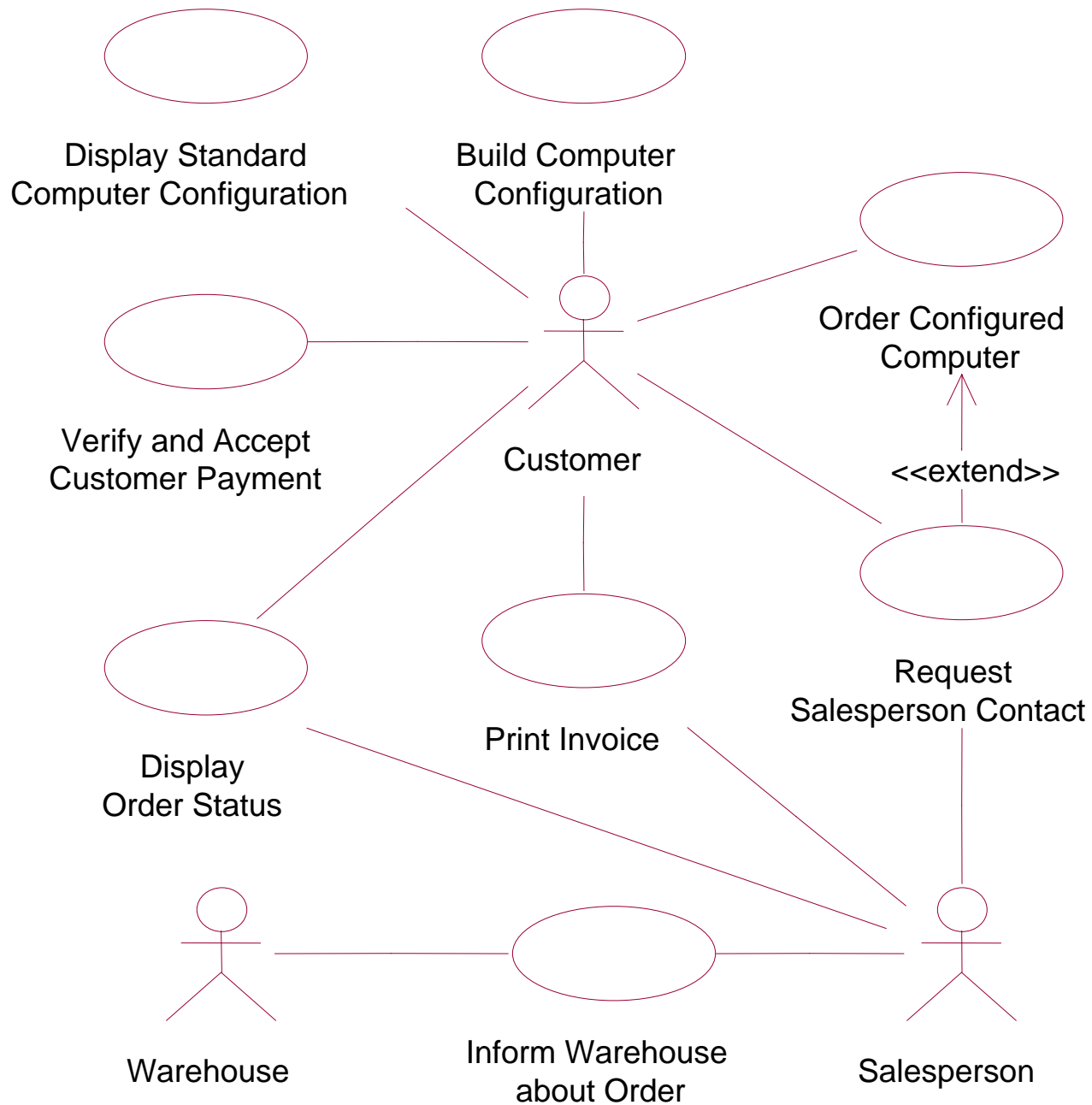
Use case modeling – use cases

Consider the following requirements:

3. The customer may choose to order a computer online or may request that the salesperson contact him/her to explain order details, negotiate the price, etc. before the order is actually placed.
7. The warehouse obtains the invoice from the salesperson and ships the computer to the customer.



Use case diagram



Documenting use cases



Order Configured
Computer

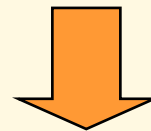
Use case	Order configured computer
Brief description	This use case allows a Customer to enter a purchase order. This includes providing a shipment and invoice address as well as payment details.
Actors	Customer
Preconditions	Customer points Internet browser to the computer manufacturer's order entry web page. The page displays the details of a configured computer together with its price.
Main flow	The use case begins when the Customer decides to order ... The system requests that the Customer enters ... The Customer chooses the Purchase function ... The system assigns a unique order number ... The system e-mails the order number and ...
Alternative flows	The Customer activates the Purchase function before ... The Customer chooses the Reset function to revert to ...
Postconditions	If the use case was successful, the purchase order is recorded in the system's database. Otherwise, the system's state is unchanged.

Activity modeling - actions



Order Configured
Computer

- | | | |
|---|--|----------------------|
| 3 | The Customer chooses the Purchase (or similarly named) function to send the order to the manufacturer. | Get Purchase Details |
| 4 | The system assigns a unique order number and a customer account number to the purchase order and it stores the order information in the database. | Store Order |
| 5 | The system e-mails to the Customer the order number and the customer number, together with all order details, as the confirmation of the order's acceptance. | Email Order Details |

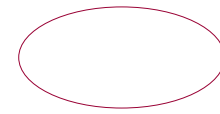


Get Purchase
Details

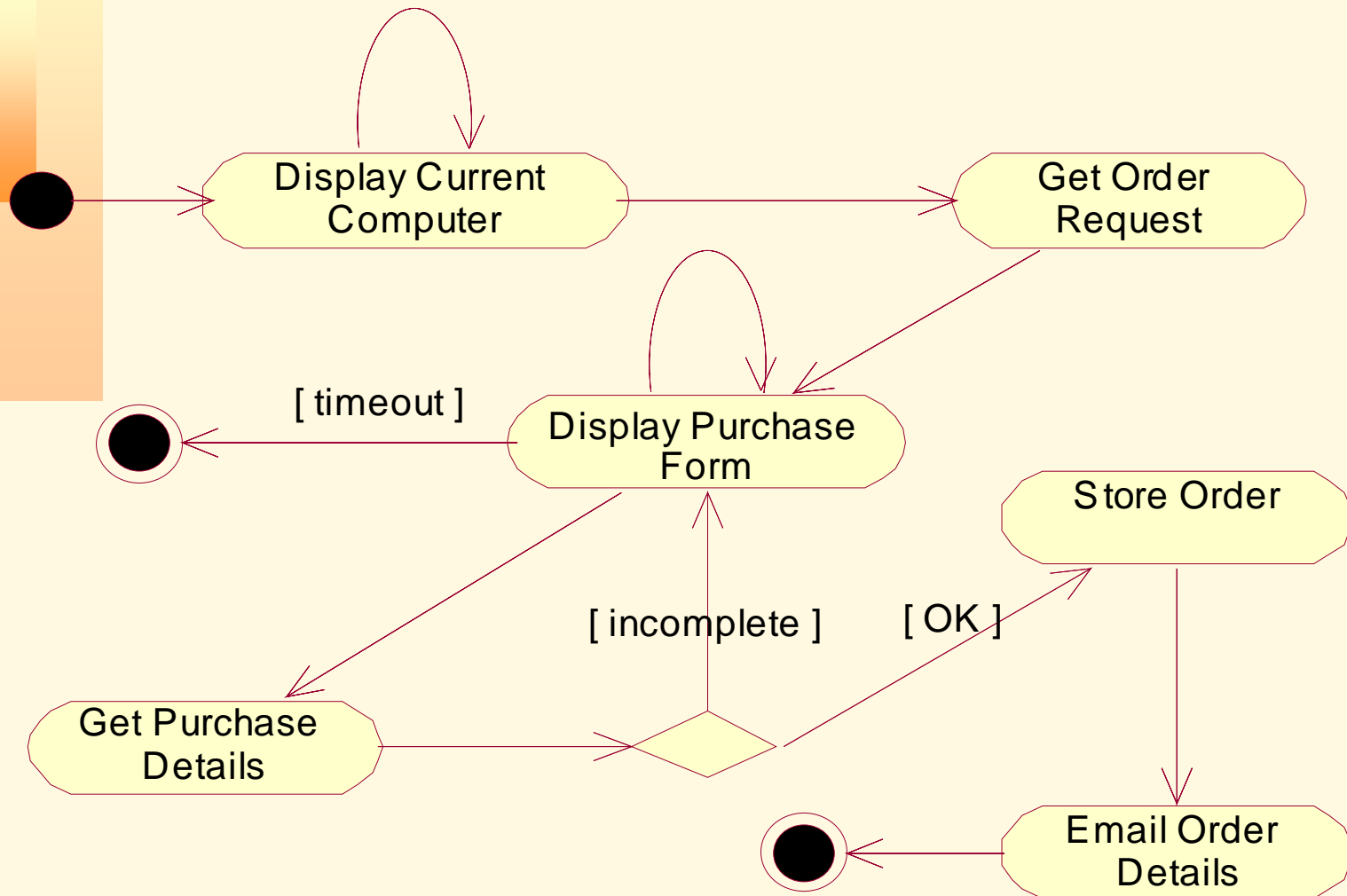
Store Order

Email Order
Details

Activity diagram

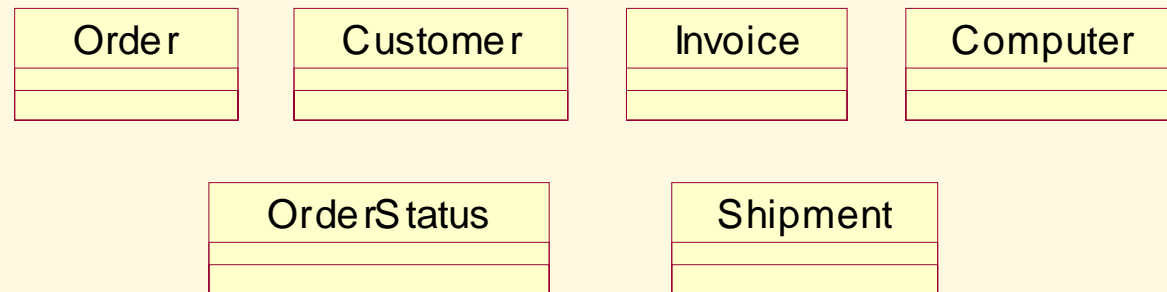


Order Configured
Computer



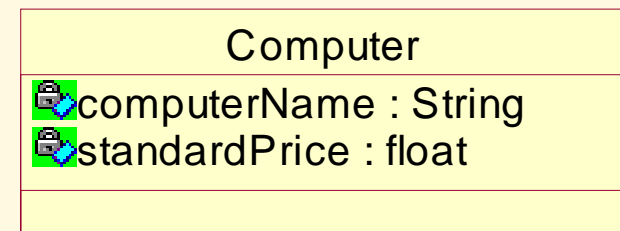
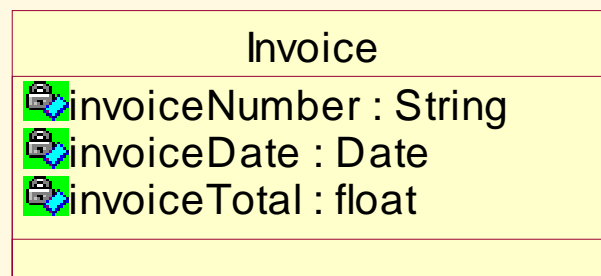
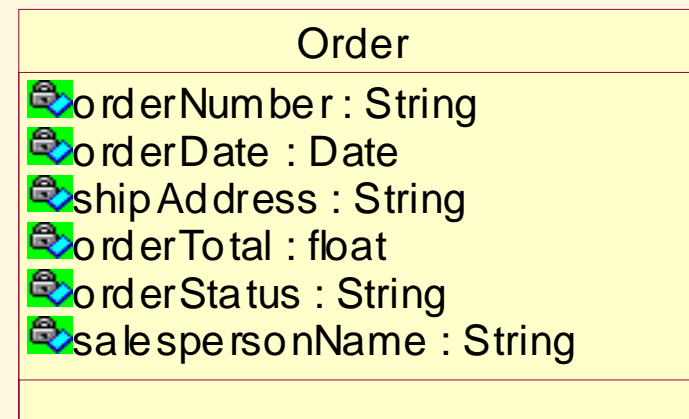
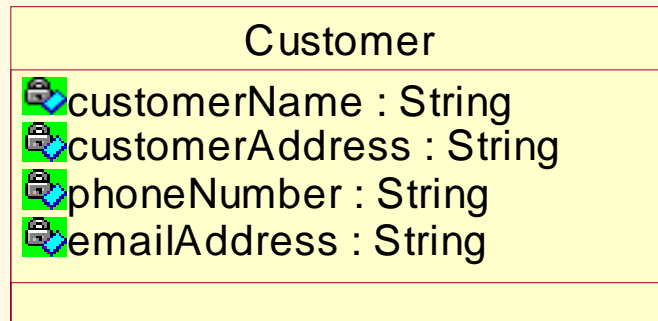
Class modeling – classes

6	The details of the <u>transaction</u> , including an order number and a customer account number, are emailed to the <u>customer</u> , so that the customer can check the <u>status</u> of the <u>order</u> online.	Order, Customer, (OrderStatus)
7	The warehouse obtains the <u>invoice</u> from the <u>salesperson</u> and <u>ships</u> the <u>computer</u> to the <u>customer</u> .	Invoice, (Salesperson), (Shipment), Computer, Customer

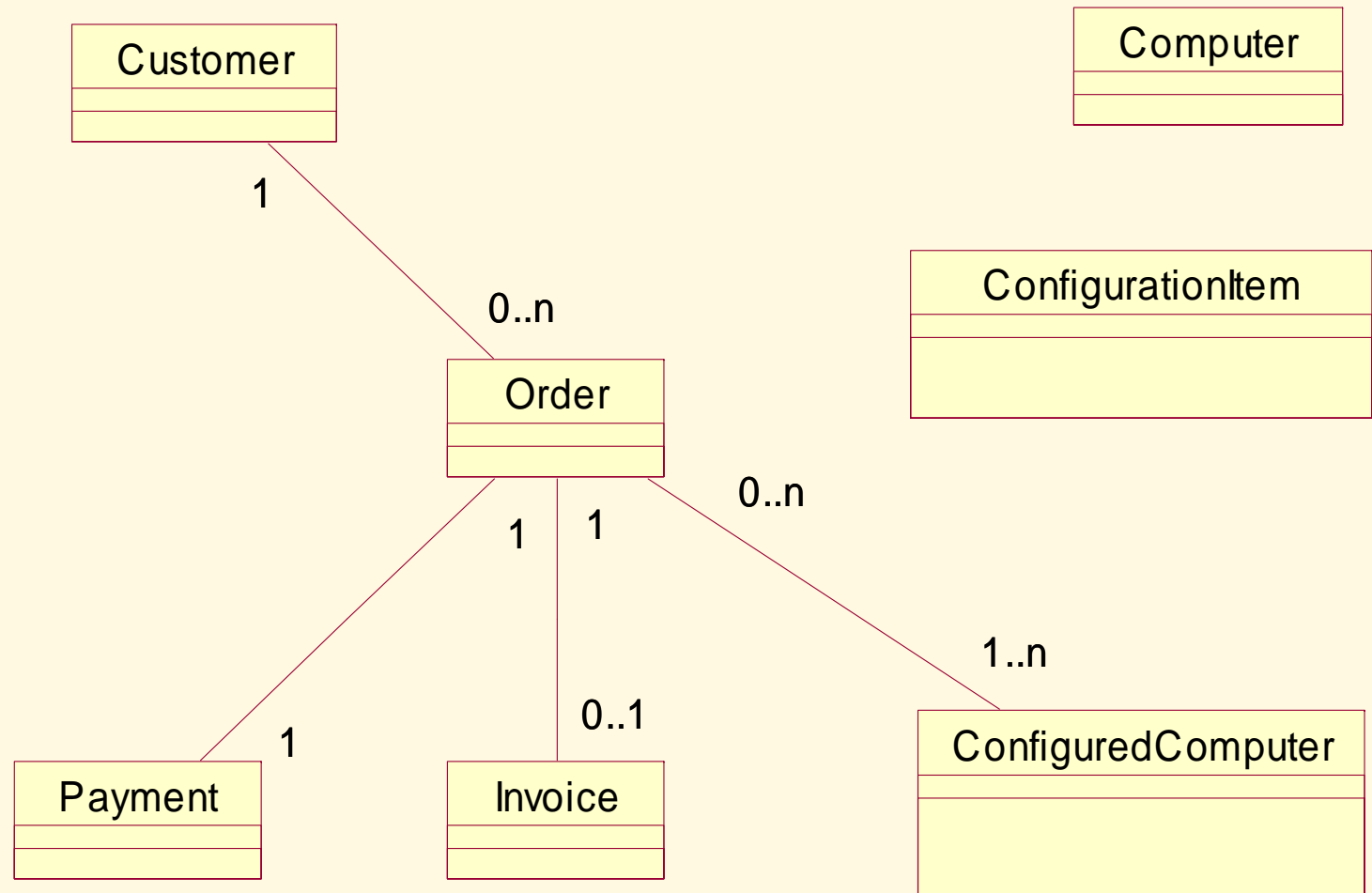


- Do we need the **Shipment** class if we know that the shipment is the warehouse responsibility and it is therefore out of the scope?
- Is **OrderStatus** a class or an attribute of Order?
- Is **Salesperson** a class or an attribute of Order and Invoice?

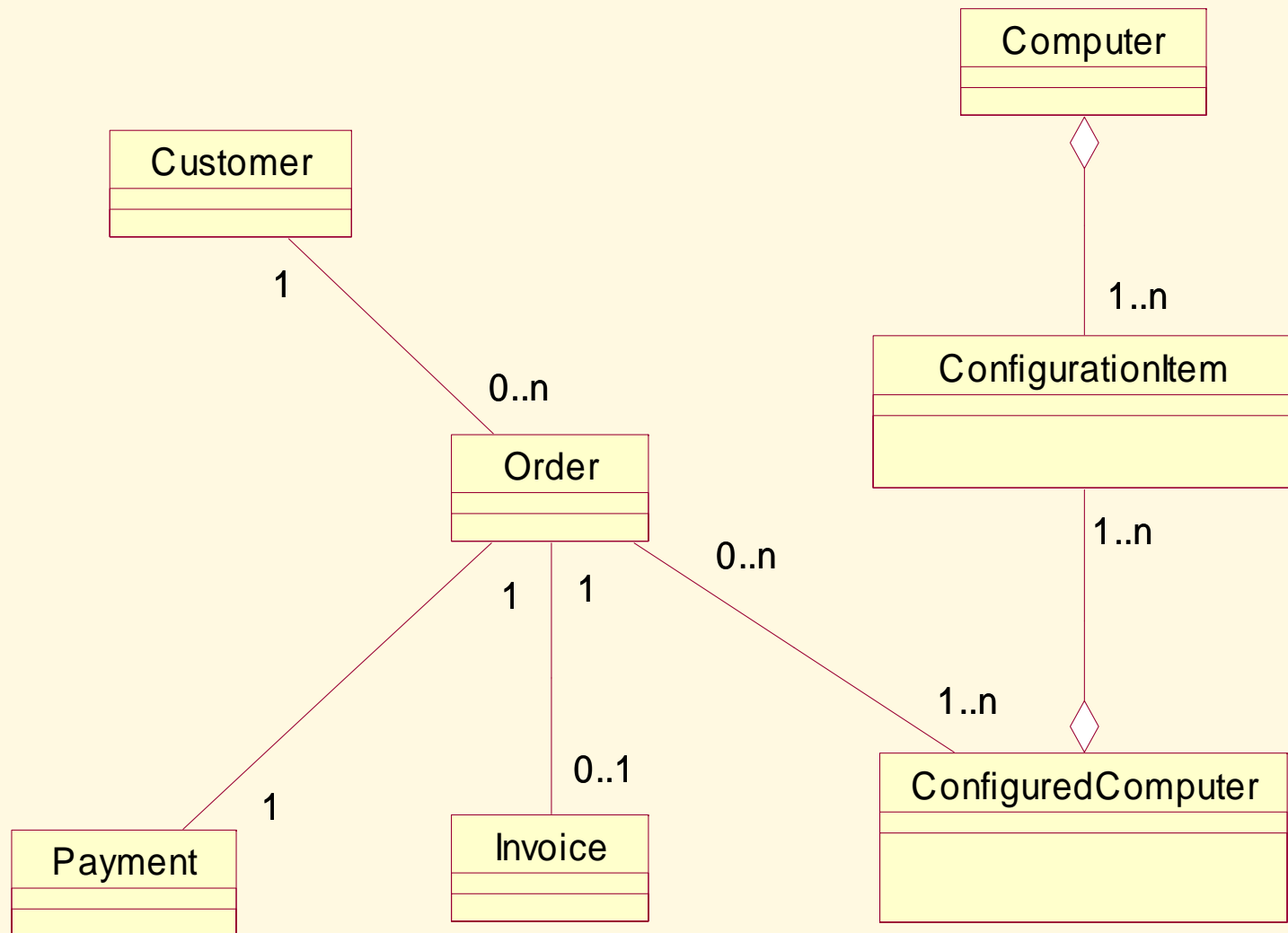
Class modeling – attributes



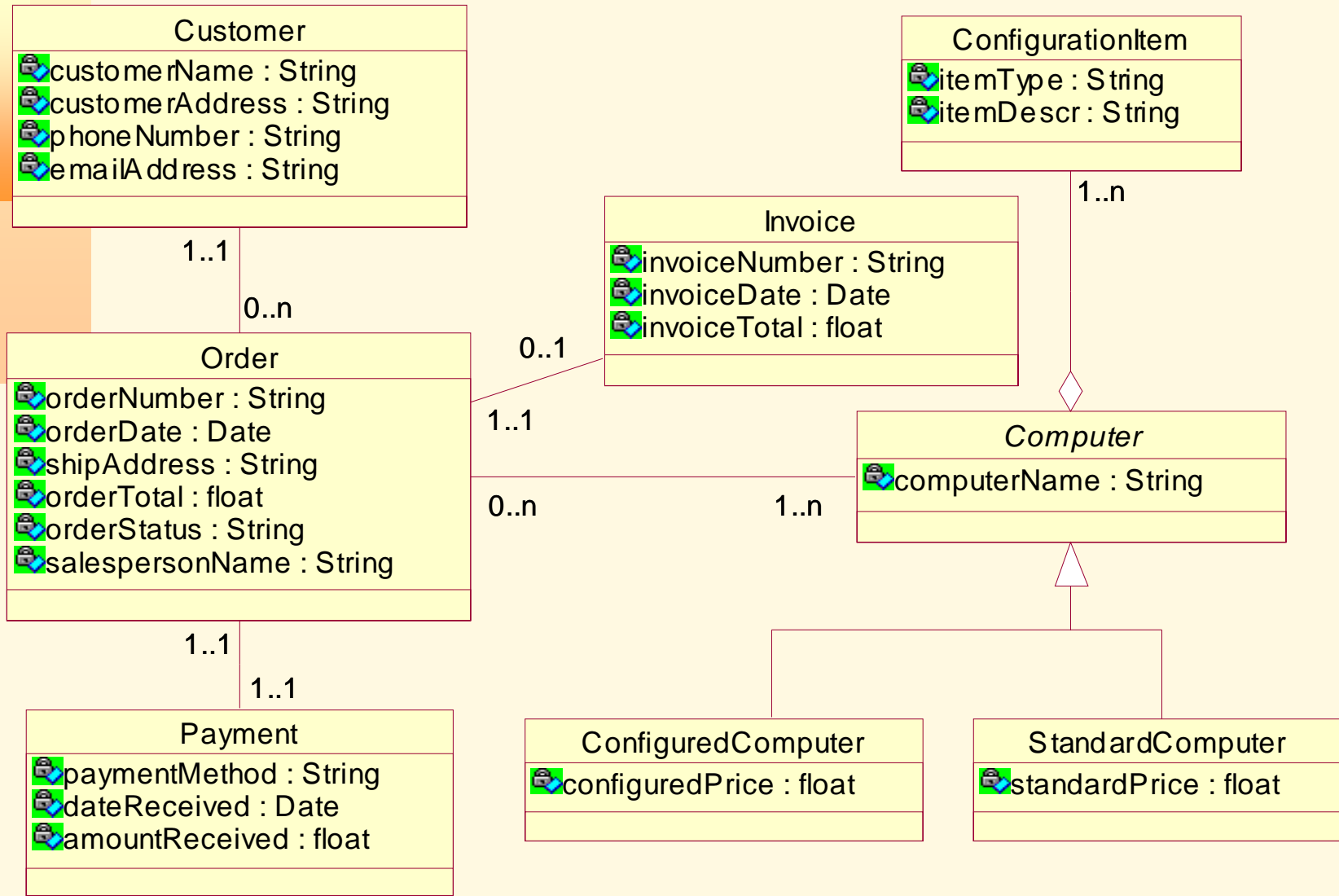
Class modeling – associations



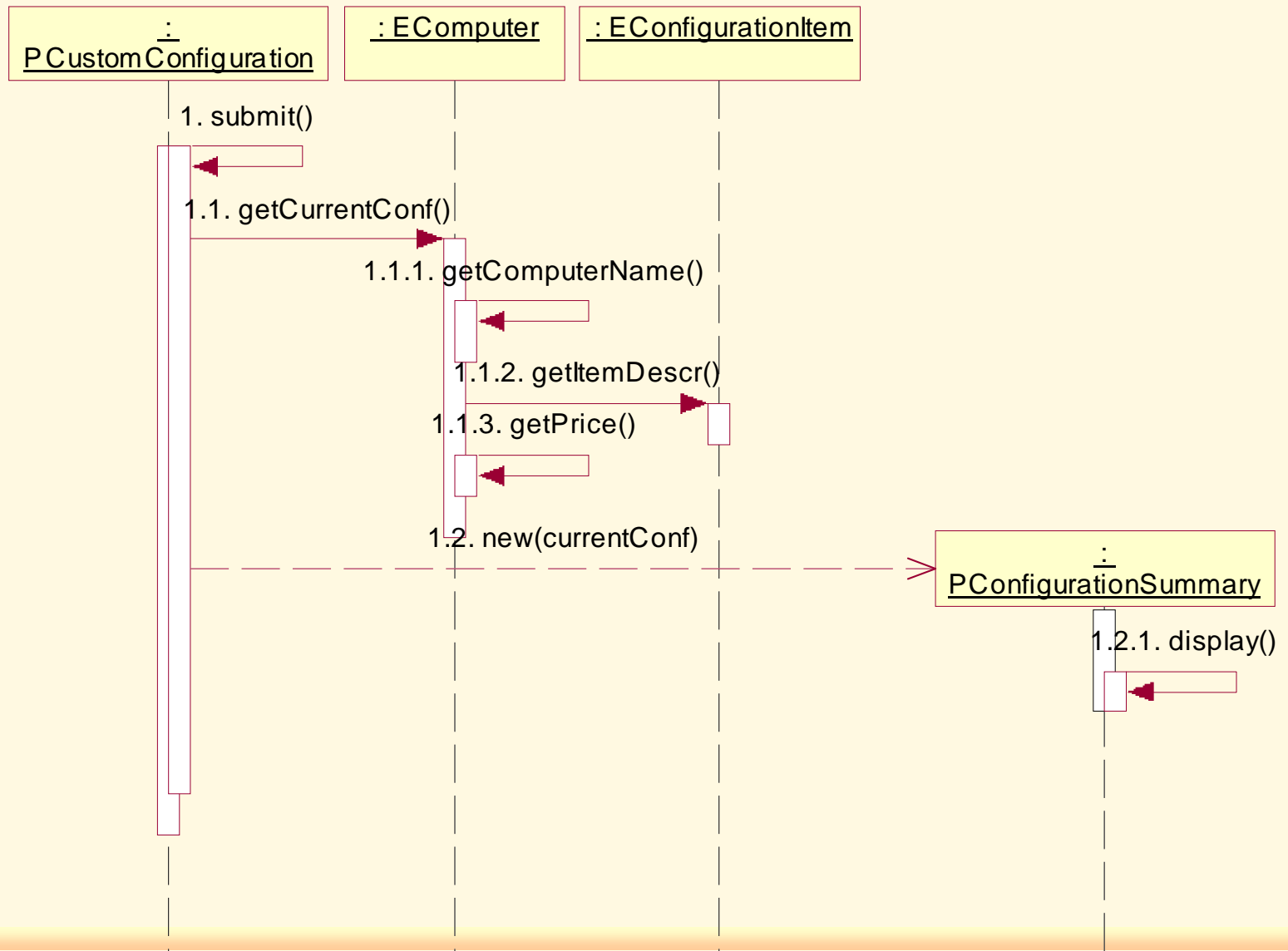
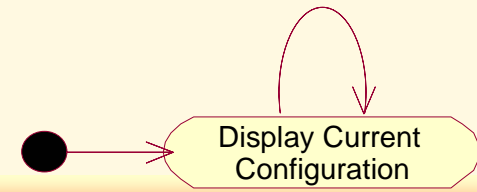
Class modeling – aggregations



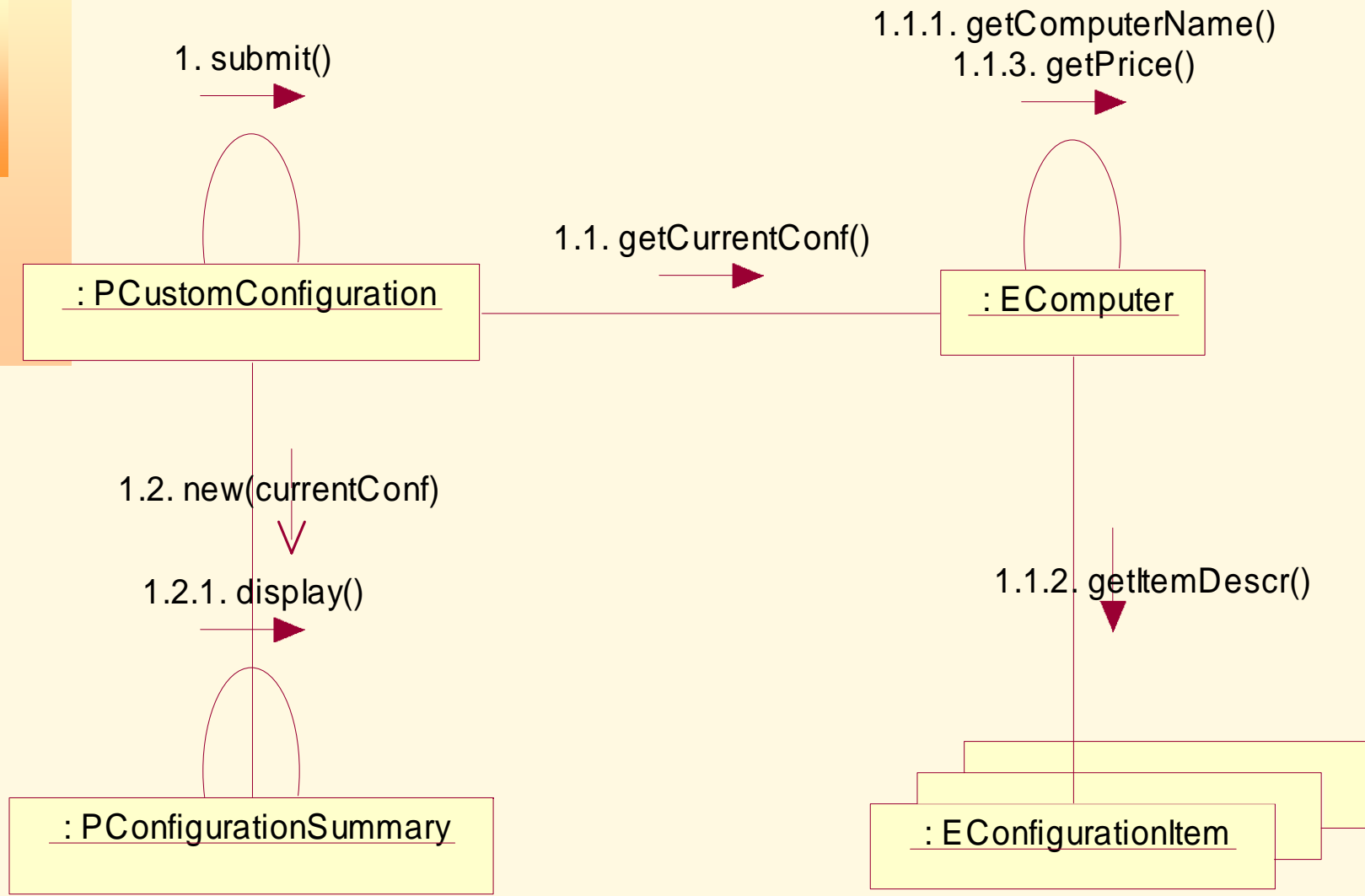
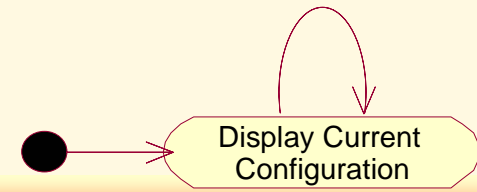
Class diagram



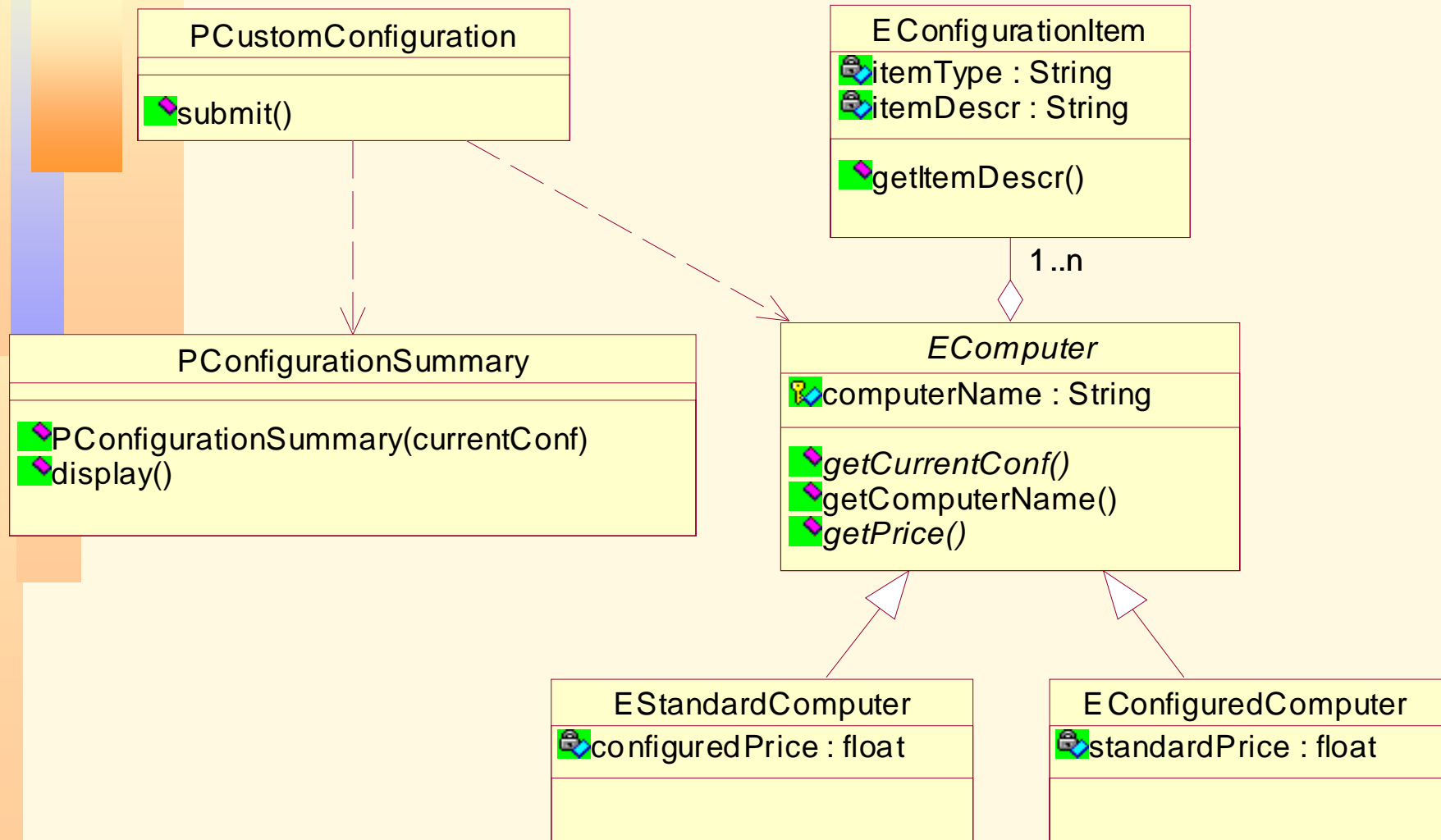
Sequence diagram



Collaboration diagram

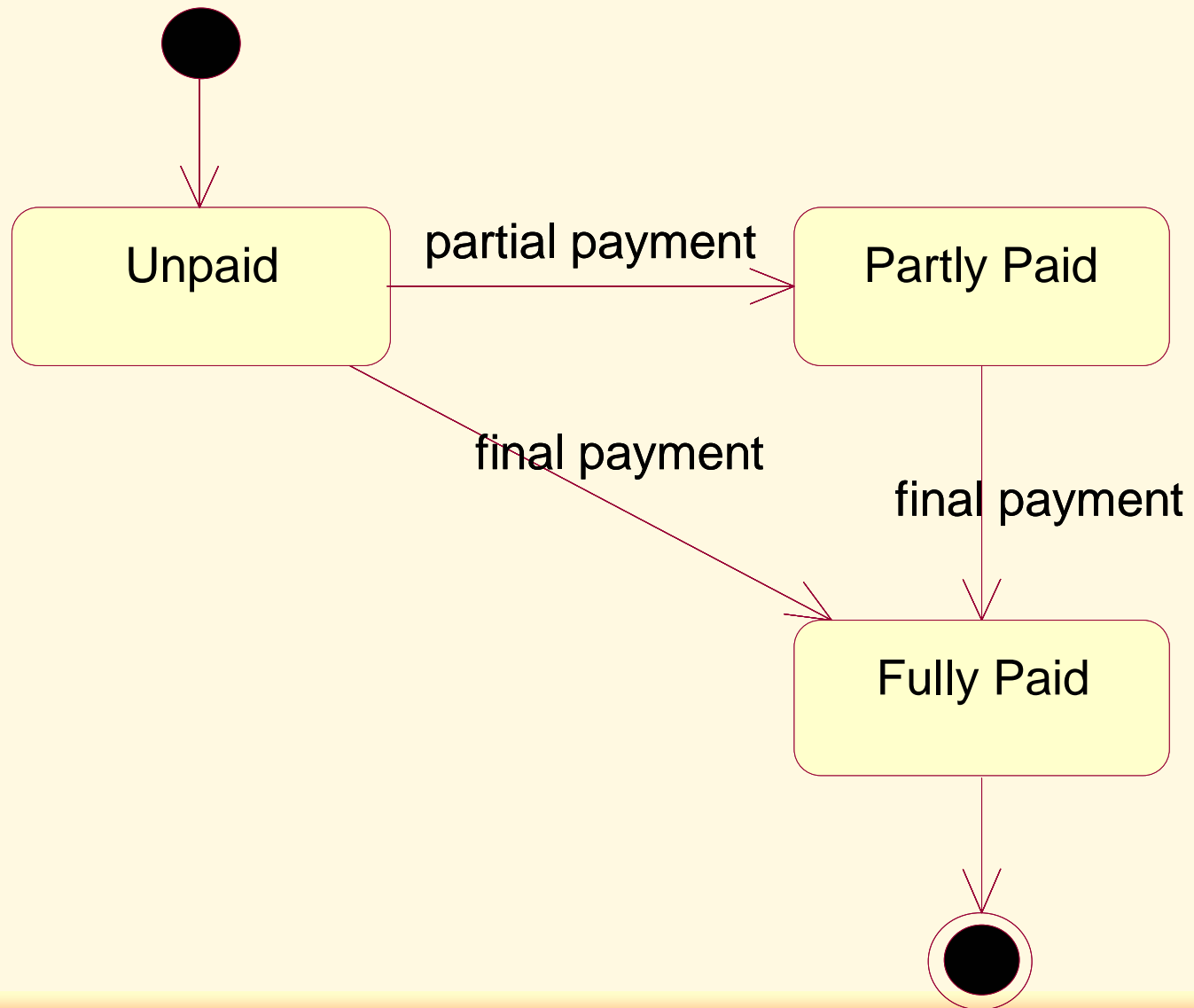


Class methods



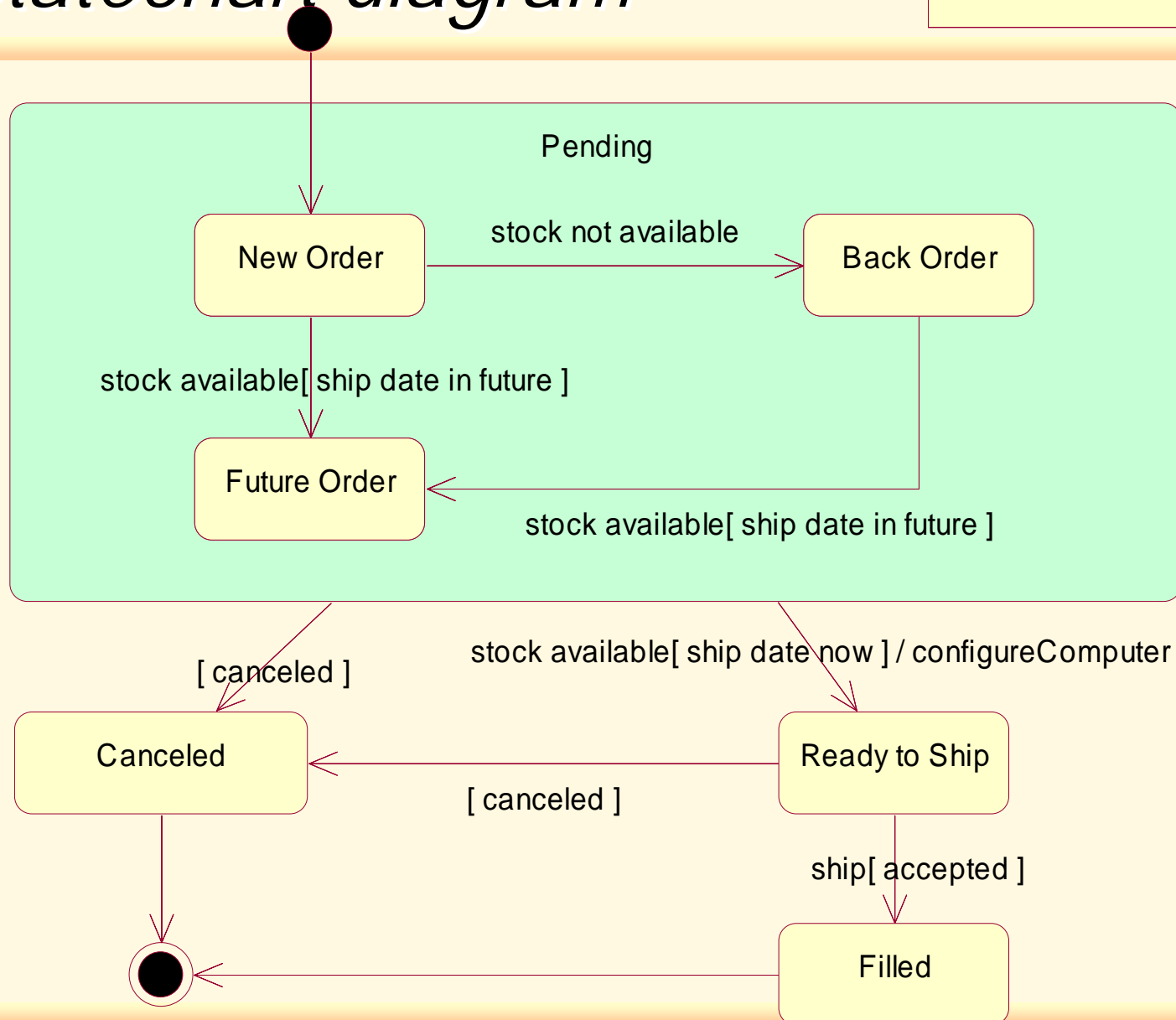
States and transitions

E Invoice

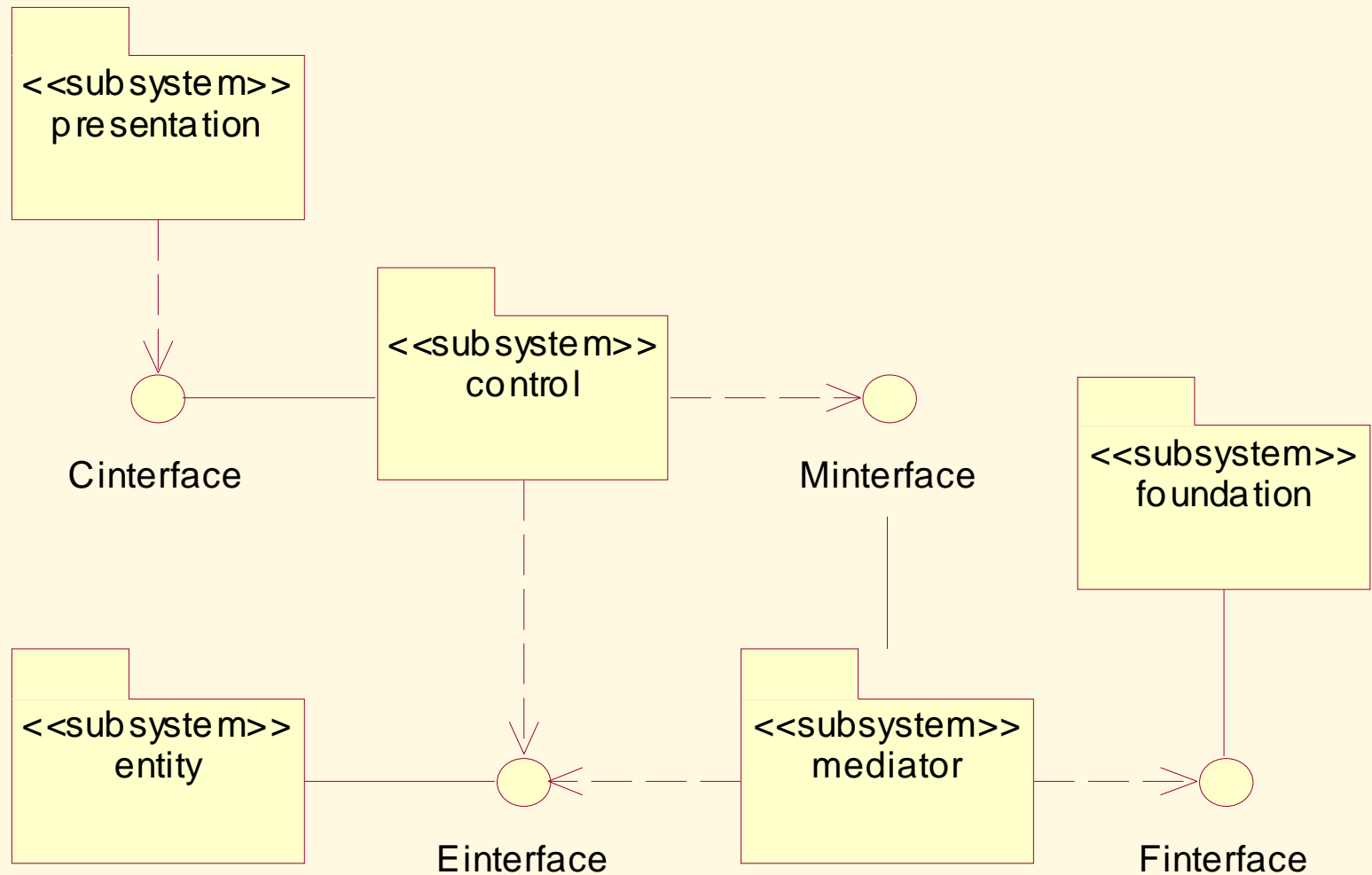


Statechart diagram

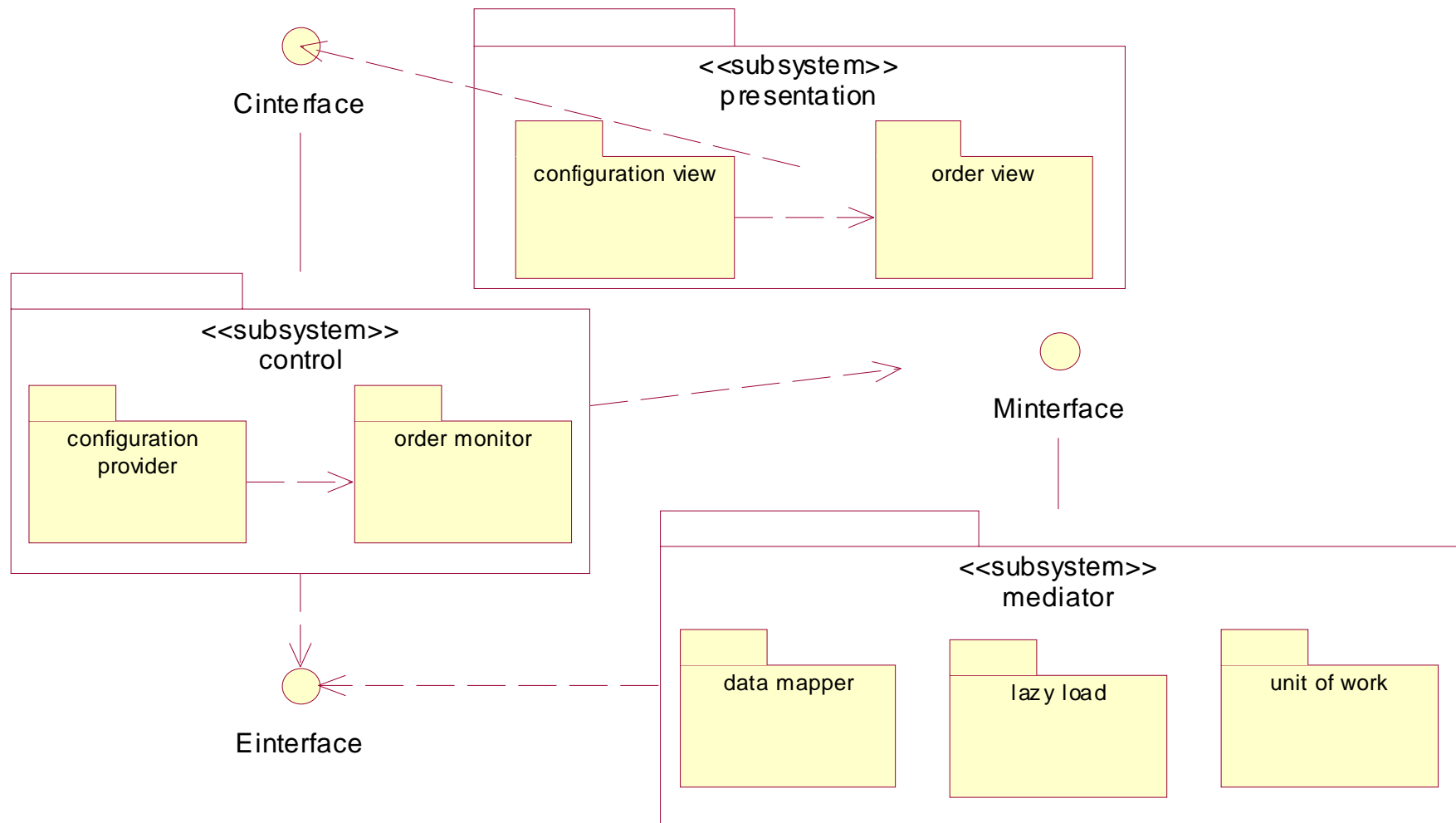
EOrder



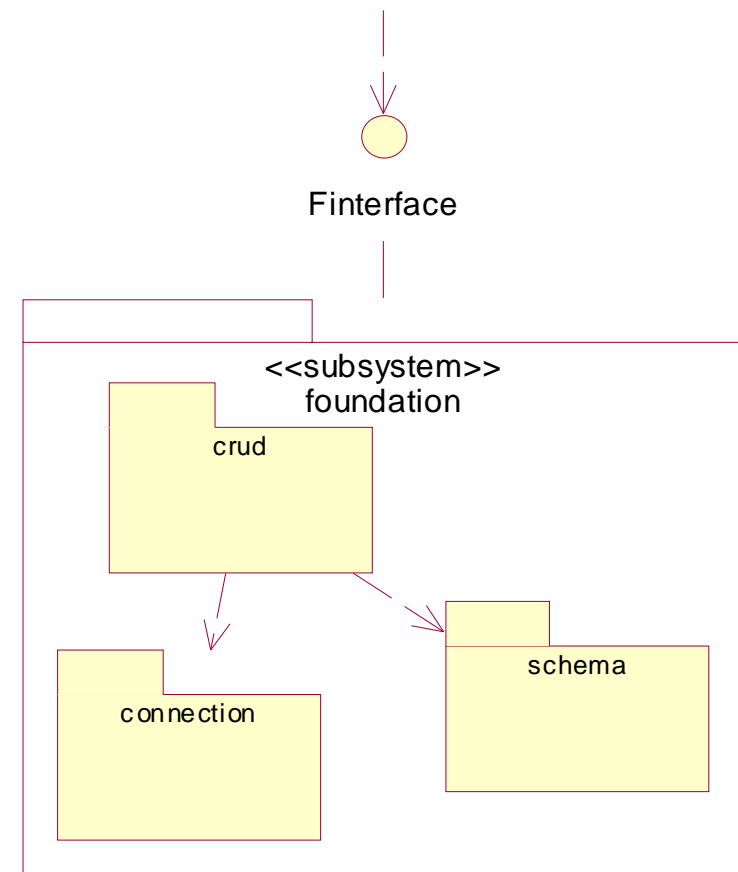
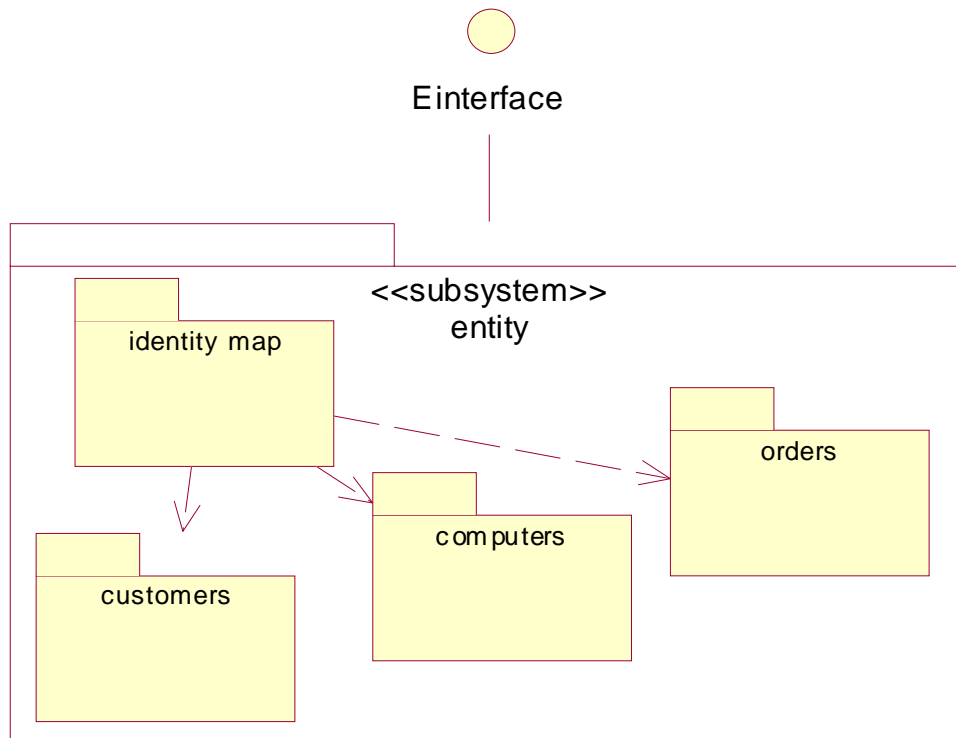
Subsystems



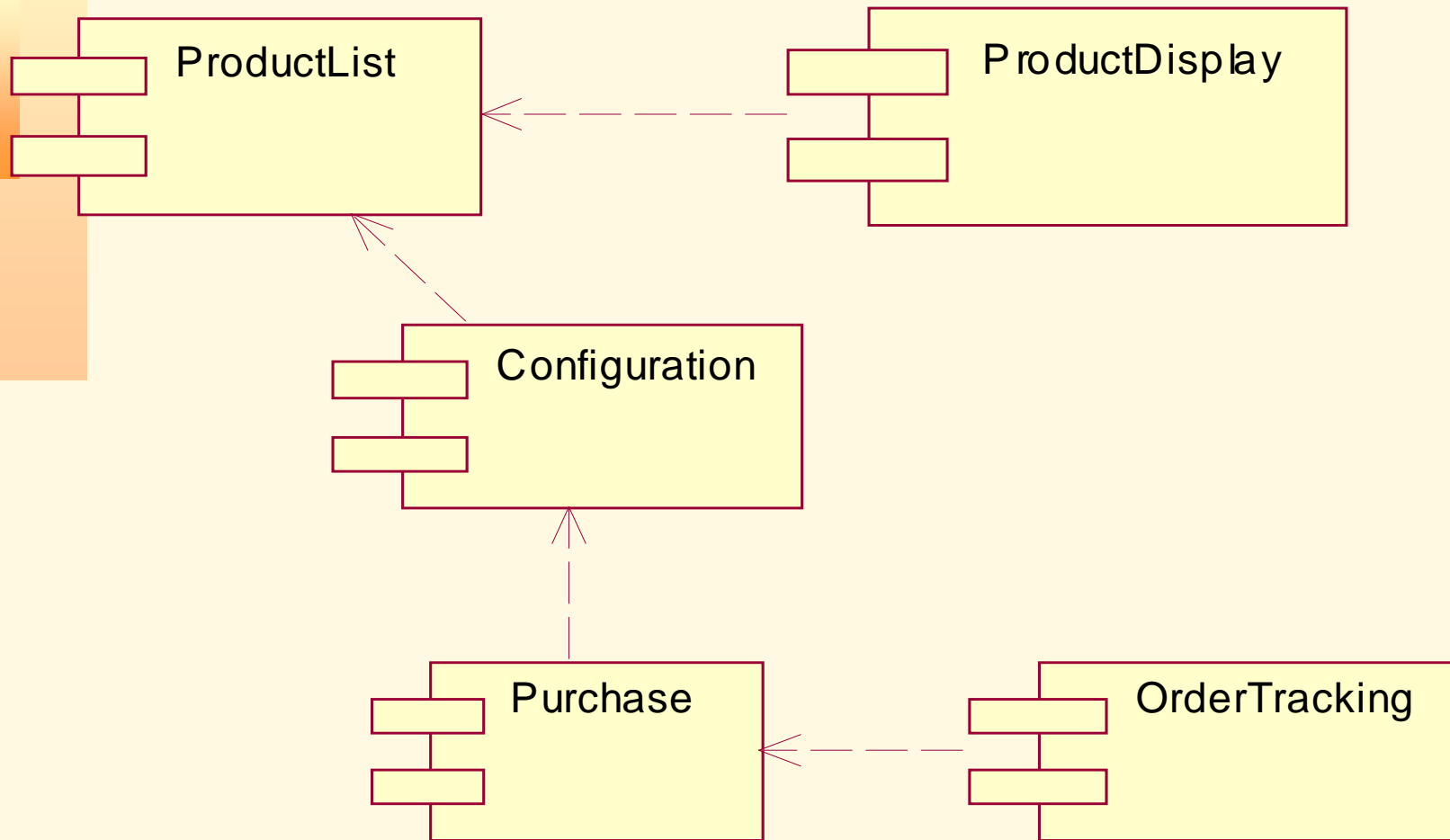
Packages



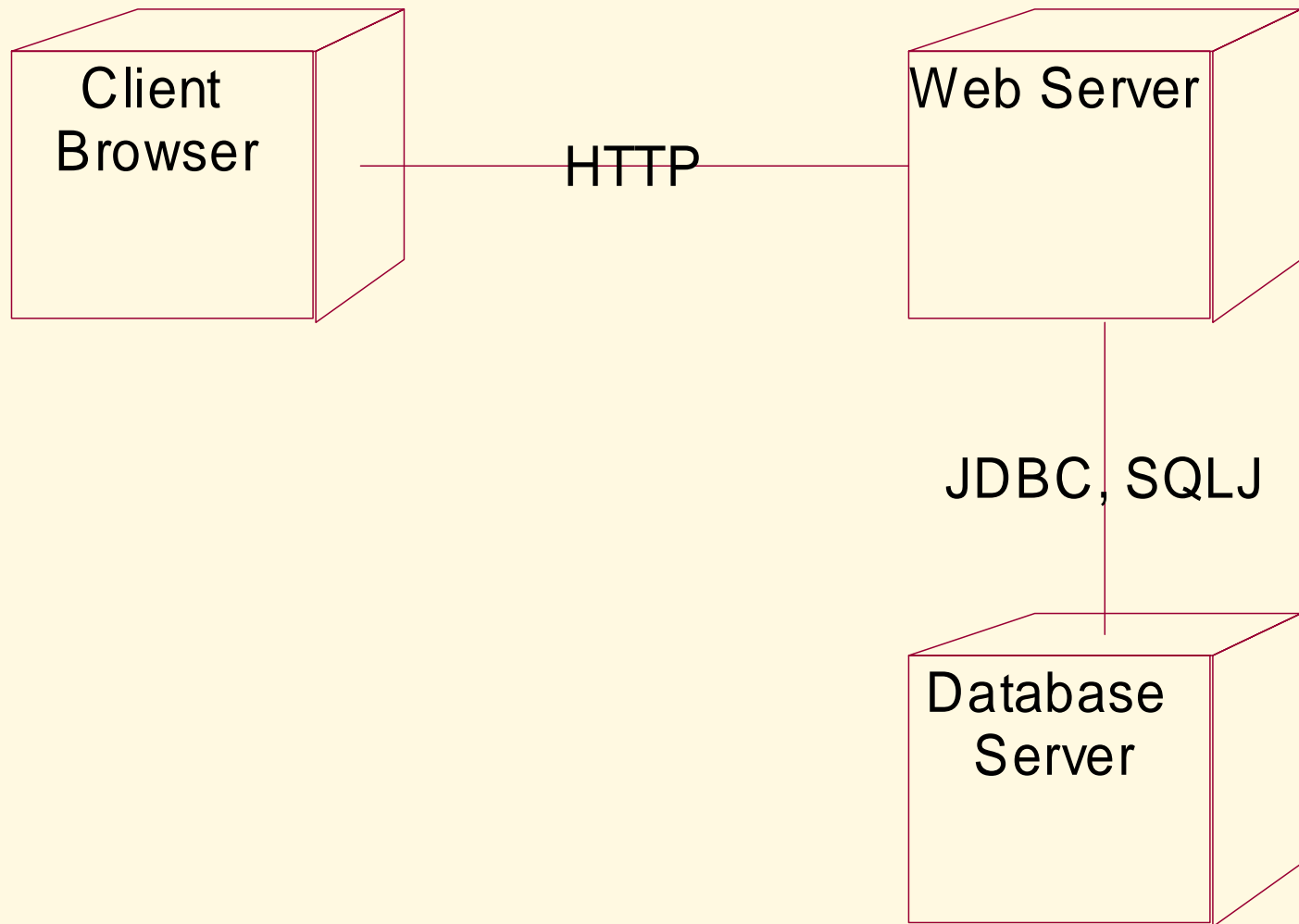
Packages



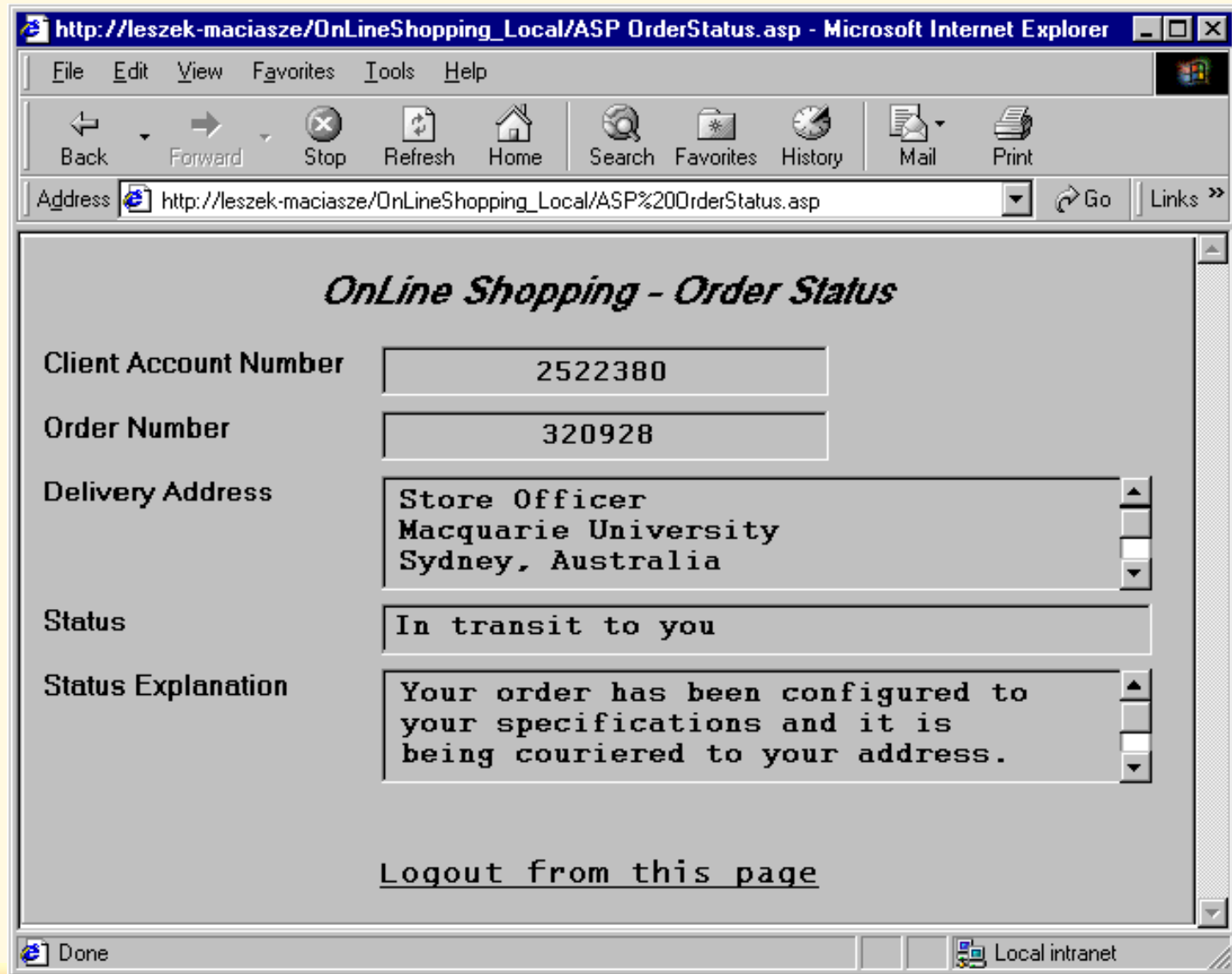
Components



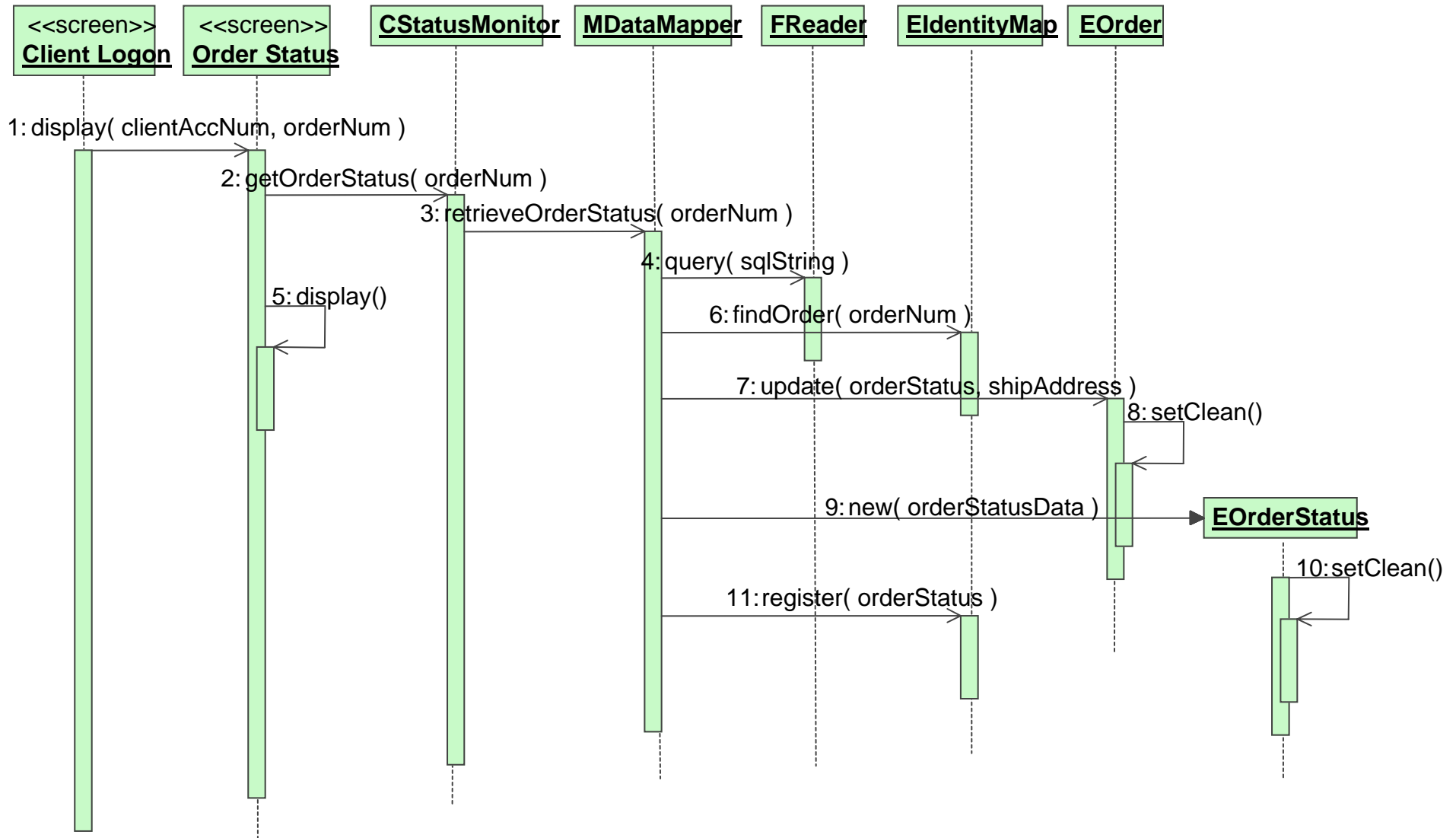
Nodes – deployment diagram



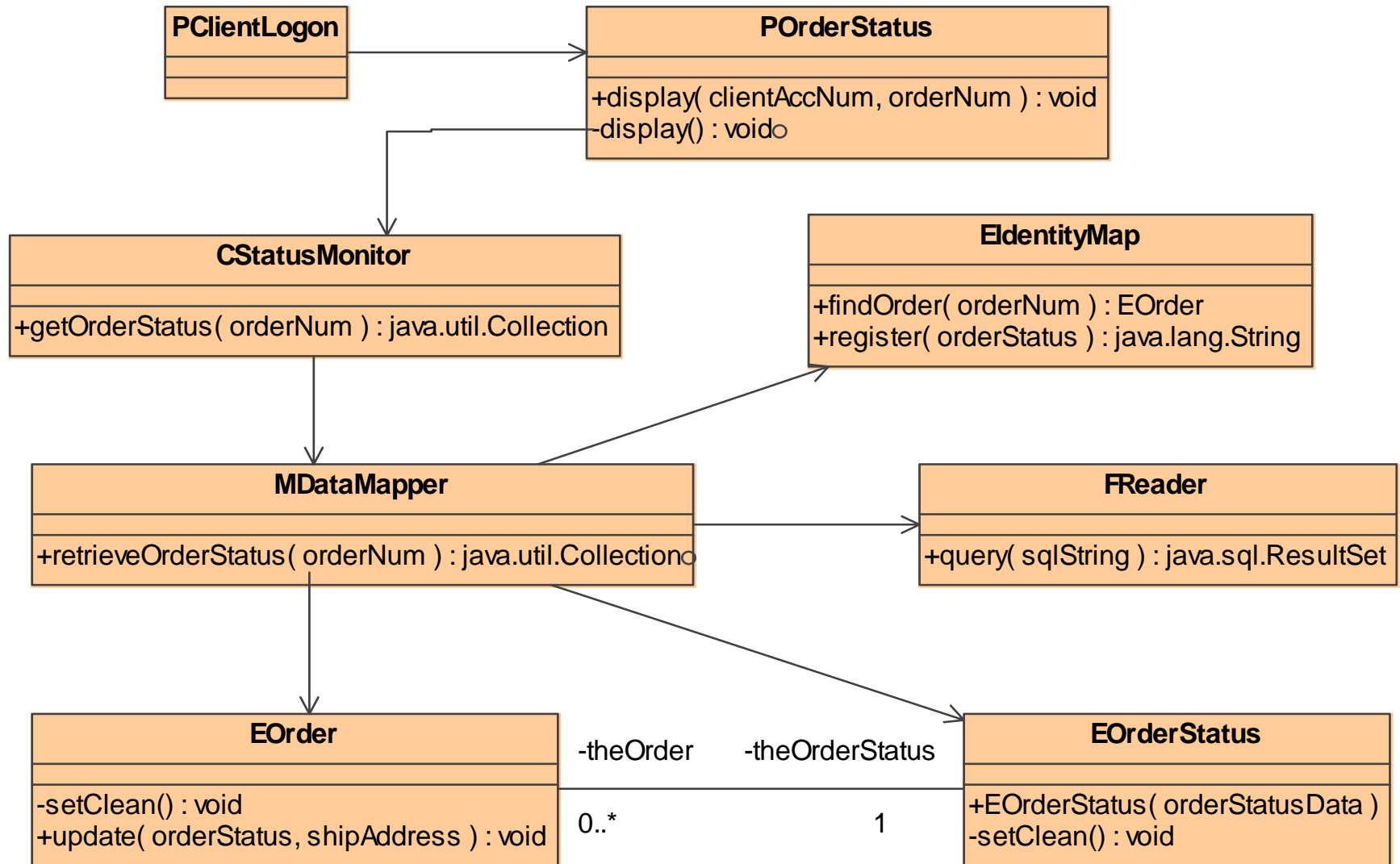
Prototype for a web page



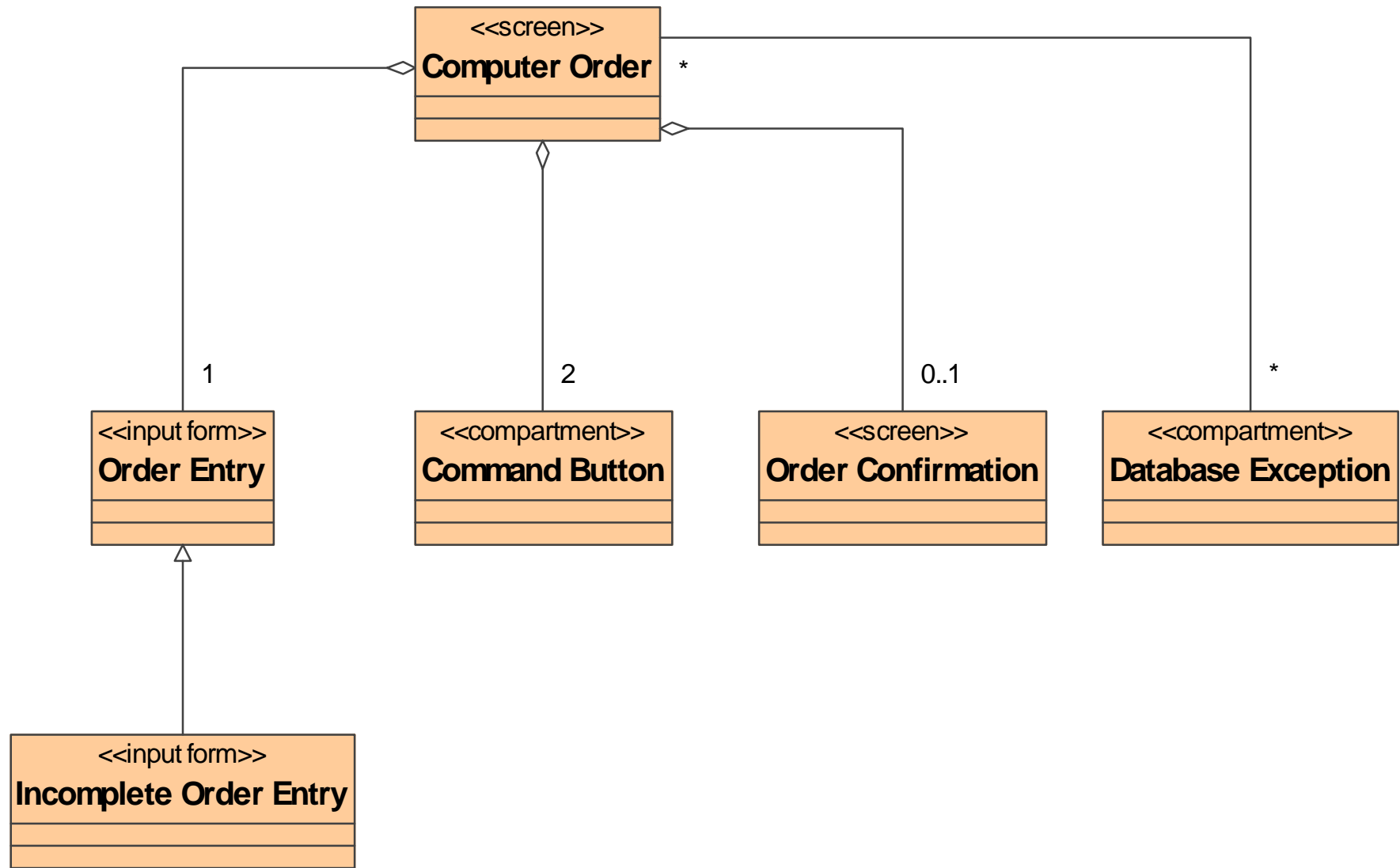
Behavioral collaboration



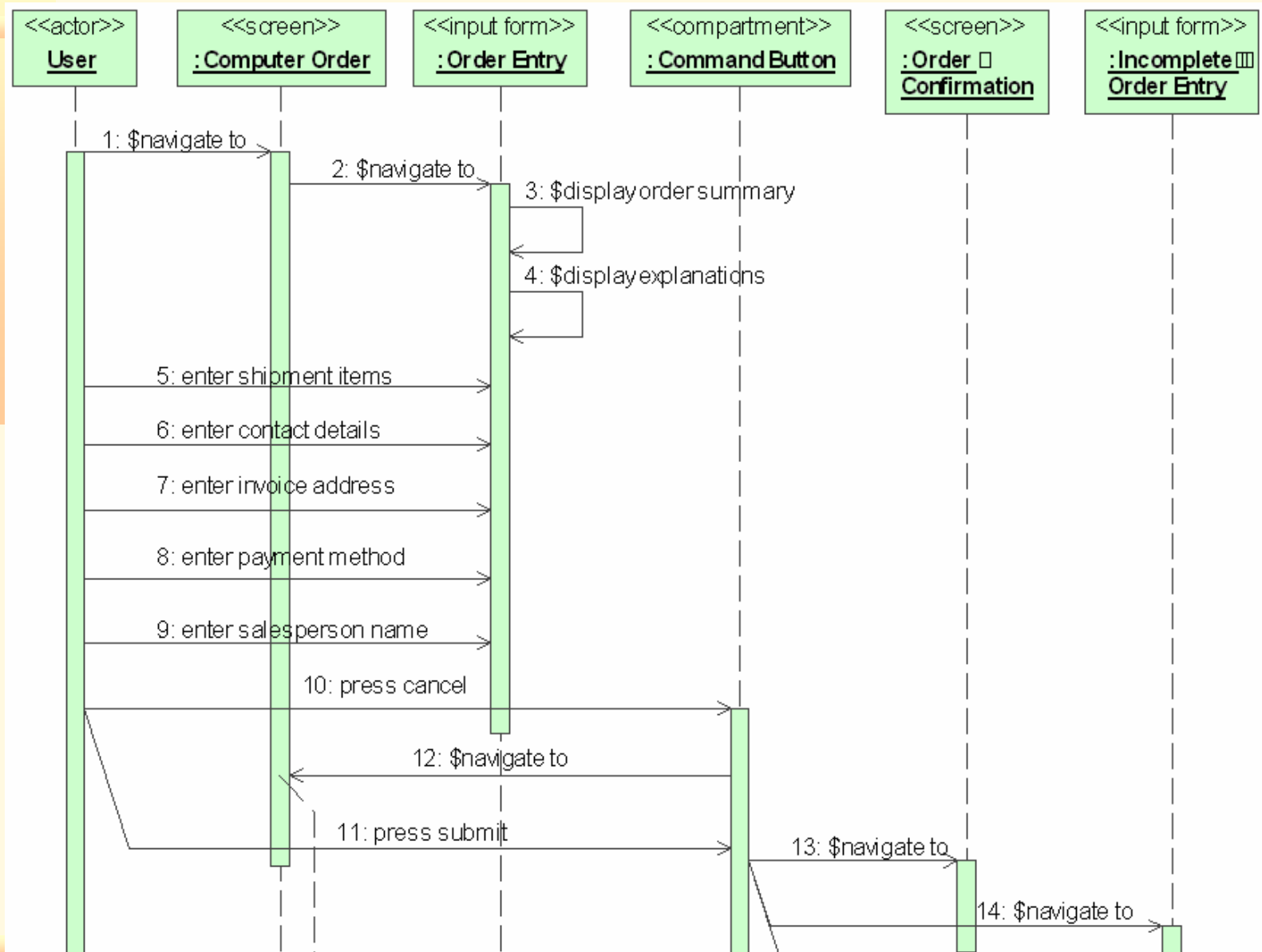
Structural collaboration



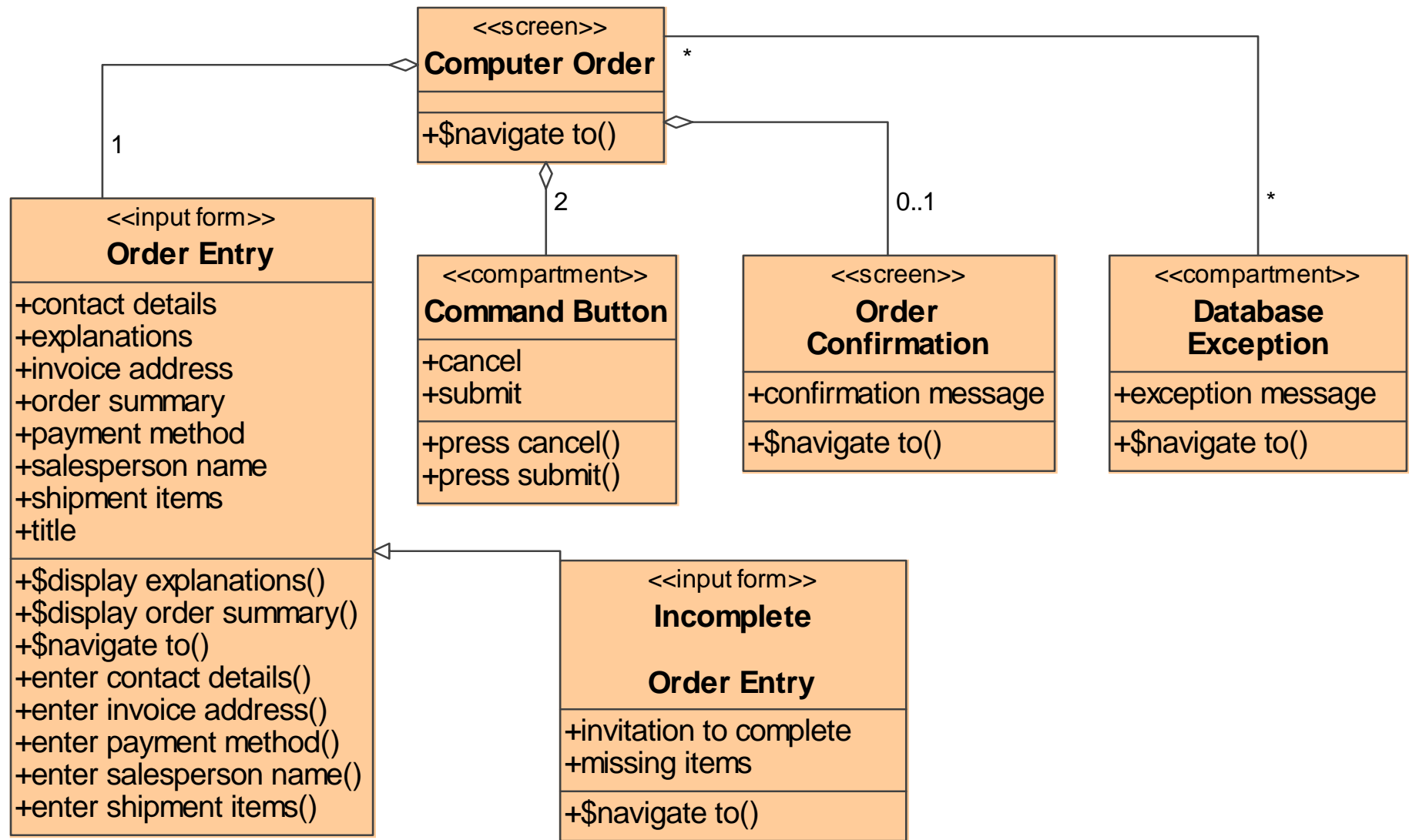
User experience (UX) elements



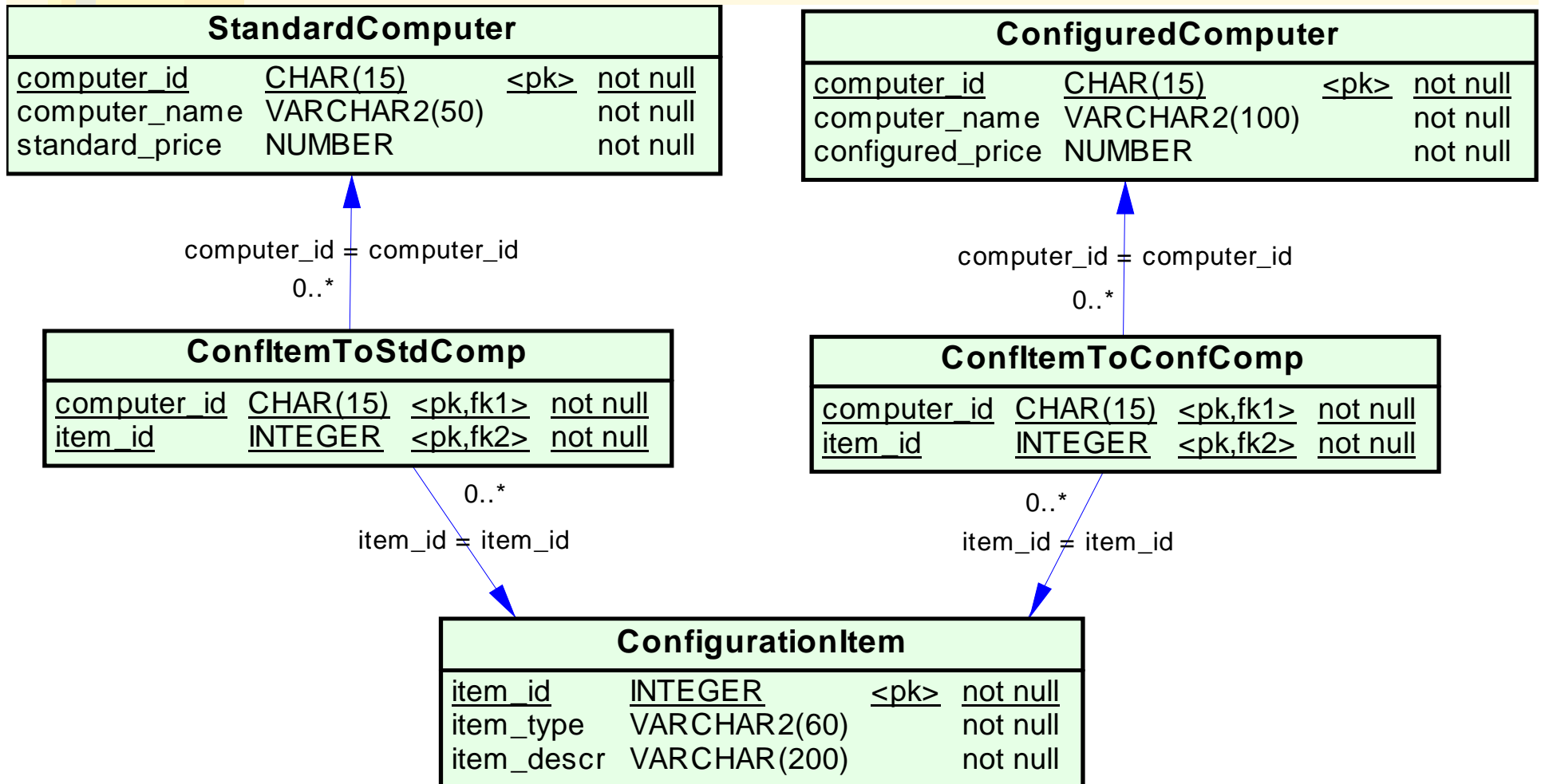
Behavioral UX collaboration



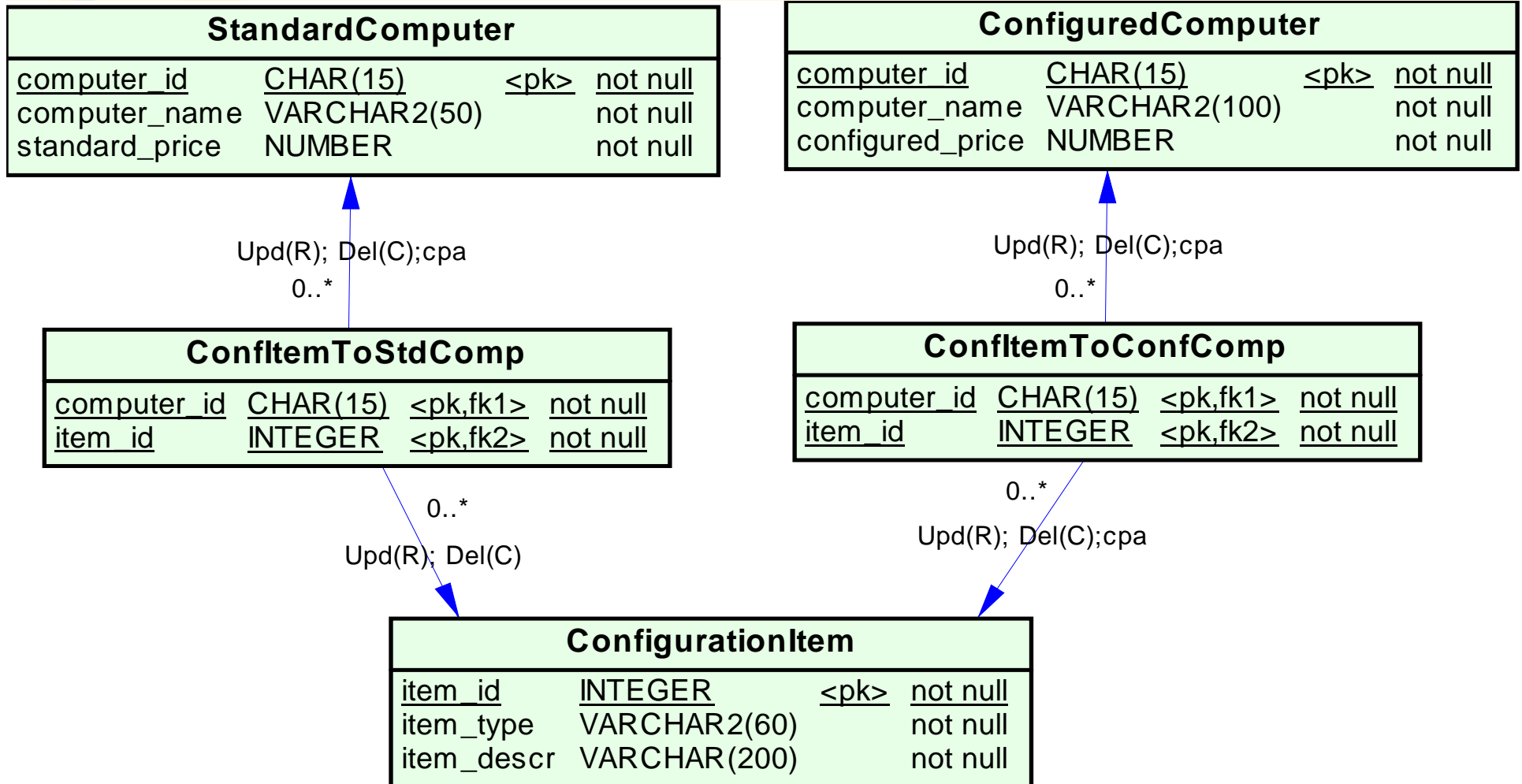
Structural UX collaboration



Object-relational mapping



Referential integrity design



Referential integrity design

Payment			
<u>payment_id</u>	CHAR(12)	<pk>	not null
payment_method	VARCHAR(40)		not null
date_received	DEC		not null
amount_received	NUMBER(8,2)		not null

Invoice			
<u>invoice_number</u>	CHAR(12)	<pk>	not null
invoice_date	DATE		not null
invoice_total	NUMBER		not null

Upd(R); Del(R)

1..1

Upd(R); Del(N)

1..1

Order			
<u>order_number</u>	CHAR(12)	<pk>	not null
customer_number	CHAR(15)	<fk1>	not null
status_id	CHAR(2)	<fk2>	not null
payment_id	CHAR(12)	<fk3>	not null
invoice_number	CHAR(12)	<fk4>	null
order_date	DATE		not null
ship_address	VARCHAR2(120)		null
order_total	NUMBER		not null
salesperson_name	VARCHAR2(30)		null

Summary

- *use case modeling*
- *activity modeling*
- *class modeling*
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- *implementation models*
- *object collaboration design*
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- *database design*