Homework 3
1.264, Fall 2013
UML model for the aircraft parts distributor
Due: Friday, September 27

A. UML models

You must have installed Visual Paradigm-Community Edition before starting this homework. The Web site and office hours provide support for installing it and using it.

Based on your requirements narrative from homework 2, create UML diagrams as follows. You are using UML as a sketch tool for requirements, so you may use less formally than in design or implementation. (You may use UML more precisely in later spirals, but in a first spiral, you use it to capture and assess basic requirements.)

1. Use case diagram. Create a diagram for the use cases associated with items B.2 through B.8 from homework 2. Just draw one use case diagram for all these cases.
    a. Create a diagram for items B.2 through B.8 from homework 2.
    b. Indicate the actors/roles involved. Use the actor symbol for both, but distinguish people and system by using descriptive names.
    c. Use the 'includes' relationship to model variations
    d. Use the 'generalize' relationship as needed to relate more specific actors or use cases to general ones.
    e. Use the 'system' box if appropriate to identify use cases within the software system.

    The recommended steps to create the use case diagram are:
    a. Identify major actors by reading your requirements document.
    b. Identify the major use cases. This is done from an external perspective, in this case, the customer of the aircraft parts distributor. Use the following information to help define the use cases:
        a. What are the main tasks done by each actor (people or system)?
        b. Which actor has the data needed?
        c. What does each actor want to achieve?
        d. What problems must be overcome to do this?
    c. Create the use case diagram as we did in lecture.
    d. Compare the use case diagram to your requirements document for consistency, completeness and correctness

Hints:
a. Use case diagrams are a communications tool. They should be clear and intuitive.
b. Focus on the goals and what needs to be done, not on the process of how to do it. Use cases are not processes or data flows or activity diagrams.
c. Good use cases should be observable, using measurable outputs and well defined actors.

d. Choose the right level of detail. The diagram should fit on one page.

2. Component diagram. Create a component diagram. Include the distributor, customers, carriers, their Web servers, databases, etc., but focus on the aircraft parts distributor, since that's the entity for which you're building the system. Use the component and association symbols. (If you have programming experience, you may optionally use other symbols.)

3. Activity diagram. Create an activity diagram showing the process for validating an order. Focus on the issues of choosing a mode and carrier that can serve the customer, and on checking that the quantity is in stock. Model the logic of what happens if an infeasible choice is made.

4. State diagram. Create a state machine diagram showing the possible states that an order can have. Focus on how you handle back orders, split shipments (one order in two or more shipments), and combined shipments (one shipment with two or more orders). You do not have to model order states with invalid payment, changes or cancellations.

5. Sequence diagram. (Optional-extra credit) Create a diagram capturing the sequence of messages between the customer, order, order detail (line items), aircraft part (inventory), carrier and other entities, if needed, for your system. Use the exercise we did in class as an example. Model:
    a. Whether your warehouse has sufficient product quantities to fulfill the order in this diagram
    b. Carrier constraints, based on what modes a customer can accept or what modes can handle a given part. (You can't ship some hazardous parts by air; some very large parts must go by rail; etc.)

You should have made some decisions on how to handle all of these issues in questions 1-5 above in homework 2. If you change your mind, update your homework 2 solution using 'track changes' mode in MS Word, but don't resubmit it on course Website (yet).

Make sure your diagrams are consistent with each other and with your narrative requirements. You will duplicate the handling of issues or cases in more than one diagram, in part because the system is small and in part so you can see which diagram styles you prefer.

Make sure that you handle the overall process your Web site must implement: customer creation, customer login, customer creation of an order with all checks: back order, valid mode and carrier, valid quantities, split shipment rules, etc. Think about how customers will browse your product catalog and build an order: can they click on hyperlinks; do they enter part numbers or names directly, etc.? Do you check what parts they can handle, based on the aircraft types they service, and not display others? When does the customer choose a mode and carrier? What does your system do if a part cannot be shipped by that mode or carrier?

You do not need to handle certain cases: invalid payment or other payment problems, invalid login, password resets or similar error conditions. Focus on the issues having to do with the aircraft parts distributor and its customers, not general IT issues.

B. Assignment

Hand in the UML diagrams electronically on the course Web site.

a. Please make each model fit on one page if possible, no more than two pages otherwise.
b. Put all your models in a single Visual Paradigm project.

Place the Visual Paradigm project and Word document into a single zip file and upload it to the course Web site.

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