**Application Engineering**

# Exam II

# Fall 2012

**(Two Hours)**

**Prof K. Bugrara**

The purpose of this exam is to assess your software engineering skills and determine how much you have learned working on homework assignments.

Please answer the exam questions to the best of your abilities. **If something is not clear to you then make whatever reasonable assumptions you see appropriate and be sure to clearly explain your assumptions.** The exam proctor will not answer any exam questions whatsoever.

Please be clear and concise. Follow the same format you used for the homework exercises.

1. We have used our own unique methodology for engineering complex applications quickly. The approach highlights all essential components for the step by step construction of complex system.
   1. Explain the structure of this methodology and how it works. Draw diagrams to illustrate your ideas
   2. Define the logical steps for building a complete application.
   3. What are the essential components (classes) that must exist in any application domain for this methodology to work?
2. The model below provides a hint at an application to help a business run efficiently.
   1. Use your answers to question 1 to specify all use-cases (work responsibilities) necessary to build a useful and complete application. In programming is needed here.
   2. Show how to extend this model to support a complete business based on the network model.
   3. In addition, state at least 5 critical business intelligence questions that can help the business manage their stores? Your answers here must be focused to the model given.
3. Walmart is a retailer bringing sellers and buyers together. Walmart makes money by attracting customers to its local stores. Customers buy products on display and its stores and pay in cash or on credit.
   1. Draw a complete model for Walmart and its network of suppliers, customers, and employees. Your model must enable the capture of orders in each of its local stores (Each store is responsible for managing its orders and its product inventory.) Make sure that orders are out of the inventory and not the general product catalog.
4. Continuing with previous question, Walmart exposes its inventory to the suppliers in real-time. A supplier monitors the inventory in each store and when the inventory reaches a certain lower limit, the supplier initiates an order to that store. How what changes (if any) to the model to support this kind of doing business? Will there be new use-cases to support this? What are they?
5. What is the difference between abstract and concrete classes? Explain your answer with an example.
6. Consider the following inheritance relation between organization and the associated specialized business units (subclasses). Each unit has a set of activities (a statement as a string) that represent its work responsibilities. Assume Organization is an abstract class and define the business unit classes so to they capture their associated work responsibilities. Write the complete java classes and give examples of how to instantiate and initialize the subclasses with their specialized responsibilities. Als