Comp250PSD: Principles of Software Development
Classroom Exercise 1  Answer
Systems Engineering, Requirements, and Design
Fall 2012

In lecture we have studied the five major parts of the waterfall process. One key to being an effective software engineer is the ability to separate details that are systems engineering, requirements, and design. The problem is that the client doesn't know this and doesn't care. Thus creating appropriate descriptive documents is a matter of sorting customer concerns into several categories that can then be acted upon.

Below are three copies of a typical client description of a software project. The information for the three phases of Systems Engineering, Requirements, and Design are all mixed up.

1. In the following copy of the description, underline parts that describe Systems Engineering.

   I want a debit card reader that allows retail purchases. It should be able to do this for both ATM cards and credit cards. The reader should have a keyboard, card reader, and pen-based signature pad. The software for the reader should be written in C. The reader should be connected both to a cash register and to the Internet via a firewalled network connection. Subroutines should handle interaction between the reader and cash register.

   To use the reader, a cashier enters the purchase into an accompanying cash register, which informs the reader of the purchase amount. The customer then swipes his/her ATM card in the reader. The reader responds by asking for a Personal Identification Number(PIN) code. The customer can type the PIN code or press a "F1" button, which means to ask for a signature instead. Pressing "F1" invokes a special subroutine that processes exceptions. Pressing "F1" for a debit card ends the transaction, while pressing "F1" for a credit card skips the PIN input for credit cards without PIN numbers and asks for a signature instead. Once "F1" or a PIN is pressed, the reader contacts the credit authorization system on the internet and asks for verification of the PIN or purchase. If the purchase is valid, then the reader calls a subroutine that asks for a signature.
only if "F1" is pressed for a credit card.

2. In the following copy of the description, underline parts that describe requirements.

I want a debit card reader that allows retail purchases. It should be able to do this for both ATM cards and credit cards. The reader should have a keyboard, card reader, and pen-based signature pad. The software for the reader should be written in C. The reader should be connected both to a cash register and to the Internet via a firewalled network connection. Subroutines should handle interaction between the reader and cash register.

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3. In the following copy of the description, underline parts that describe design.

I want a debit card reader that allows retail purchases. It should be able to do this for both ATM cards and credit cards. The reader should have a keyboard, card reader, and pen-based signature pad. The software for the reader should be written in C. The reader should be connected both to a cash register and to the Internet via a firewalled network connection. Subroutines should handle interaction between the reader and cash register.

To use the reader, a cashier enters the purchase into an accompanying cash register, which informs the reader of the purchase amount. The customer then swipes his/her ATM card in the reader. The reader responds by asking for a Personal Identification Number (PIN) code. The customer can type the PIN code or press a "F1" button, which means to ask for a signature instead. Pressing "F1" invokes a special subroutine that processes exceptions. Pressing "F1" for a debit card ends the transaction, while pressing "F1" for a credit card skips the PIN input for credit cards without PIN numbers and asks for a signature instead. Once "F1" or a PIN is pressed, the reader contacts the credit authorization system on the Internet and asks for verification of the PIN or purchase. If the purchase is valid, then the reader calls a subroutine that asks for a signature only if "F1" is pressed for a credit card.

To help with this, recall that:

- **Systems Engineering** describes attributes of the environment in which software will execute.
- **Requirements** describe what software will do, but not how.
- **Design** describes how software will accomplish requirements.