Object-Oriented Design
In-Class Problem Set for Module 2

1. Concordance Generator. This problem is to create a program that generates a concordance. A concordance is an alphabetized list of all the unique words that appear in a body of text along with the location of their occurrence. The user can enter the name of a text file (stored on a disk) for which a concordance is to be created and the name of the output file (created on disk) containing the concordance on the command line. The concordance program will pull words from the text, edit them, and produce a file which contains the concordance. Editing of the words is necessary in at least two cases:

a. If a word begins with a capital letter because it occurs at the beginning of a sentence, the first letter will be changed to lowercase.

b. If a word is hyphenated because it occurs at the end of a line, the hyphen will be removed in the concordance entry.

Each line of input text will be numbered as the concordance is created and a record kept of the line numbers where each unique word occurs. In addition, a running count of the total number of occurrences of each word will be kept.

2. The Non-Credit Courses Office. This problem is to create a system which automates an office in the continuing education college of some university. The office of non-credit courses handles courses such as cooking, arts and crafts, and recreational pastimes that might be offered to anyone in the community on a non-credit basis. A small fee is charged for participation in the courses. The non-credit courses office handles all matters, including registration of students, cancellations, inquiries from students or potential students, and payments. The automation of this office is supported by a workstation which is tied into the other offices of the university via a LAN, so paper which was once mailed from one office to another can be transmitted electronically instead. This workstation has local LASER printing capability as well. The office operates as follows:

a. The receptionist, Mr. T, processes all incoming mail and all telephone calls. The incoming mail can include registrations, cancellations, inquiries, or payments. Registrations, cancellations, and inquiries can also come over the telephone. Mr. T routes all inquiries, registrations, and cancellations to the non-credit courses coordinator, Ms. S.

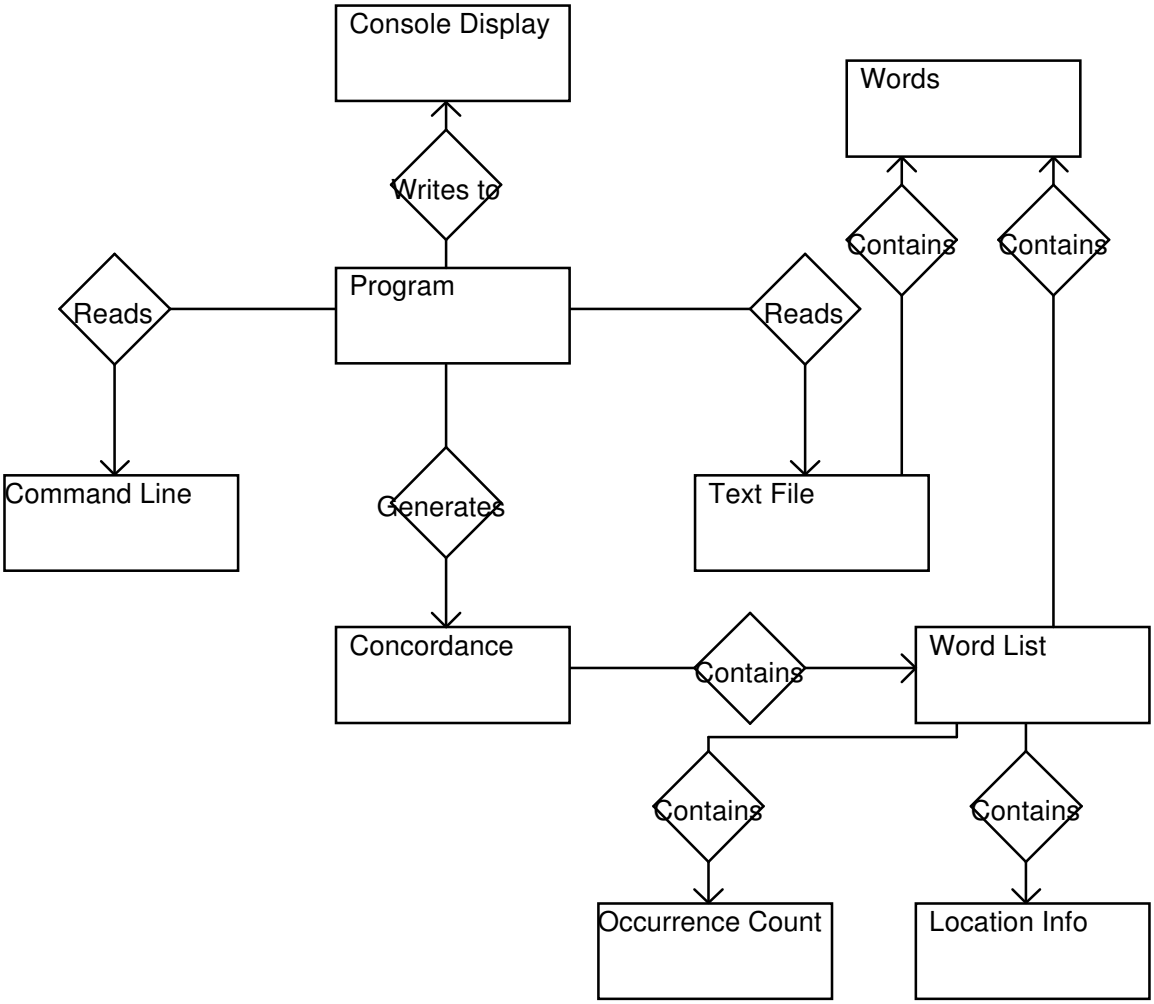
b. Ms. S answers all inquiries. Registrations are recorded on a blue registration form (in duplicate) that can be mailed in by a student or filled in by Mr. T when a student enrolls by telephone. The blue forms are passed on to Ms. S. Ms. S keeps one copy of these forms in a file, sorted by course (the Course File). She also checks to see if the student has a record in the Student File. If not, they are added to the Student File. In addition, Ms. S sends the duplicate copy of the blue form to the accounting office.

c. Accounting produces an invoice from the blue form and sends the invoice back to Mr. T, who mails the invoice to the student along with further information about the course. A copy of the invoice is sent to Ms. S, who files it in an Invoice File.

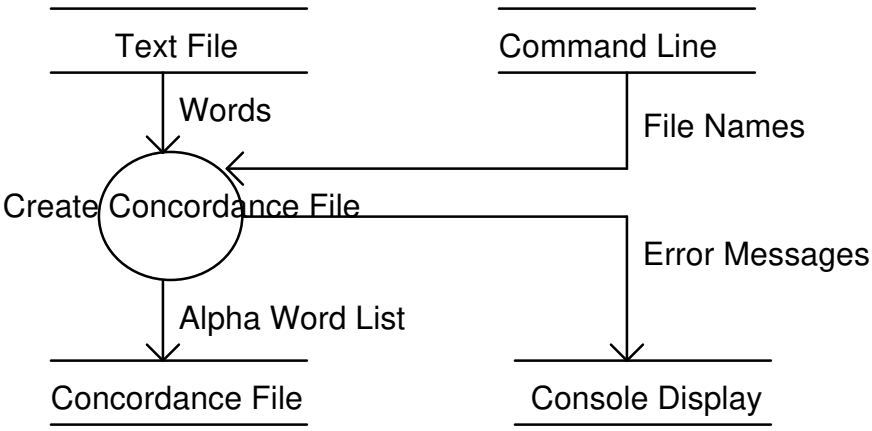
d. When Ms. S receives a cancellation, she pulls the blue enrollment slip from the Course File and the invoice from the Invoice File, and fills out a cancellation form in duplicate. The cancellation form and the invoice are sent to accounting. Accounting credits the student's account using one copy of the cancellation form. The other copy goes to Mr. T, who sends it to the student.

e. Payments come in to Mr. T, who pulls the student's invoice from the file and sends the payment and the invoice to accounting. Accounting credits the student and makes out a receipt. The receipt is given to Mr. T to be mailed to the student.

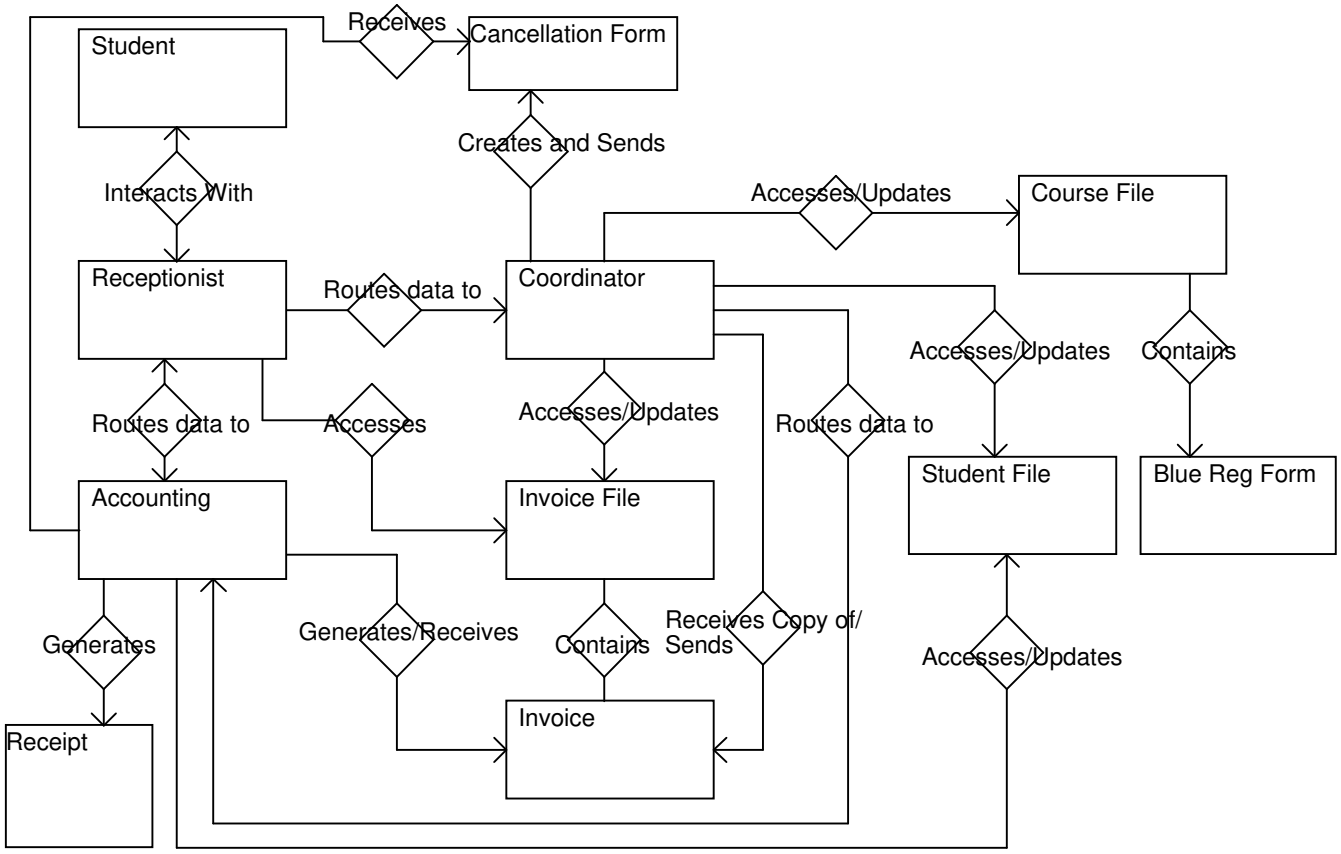
1.1. Concordance Generator Entity Relationship Diagram



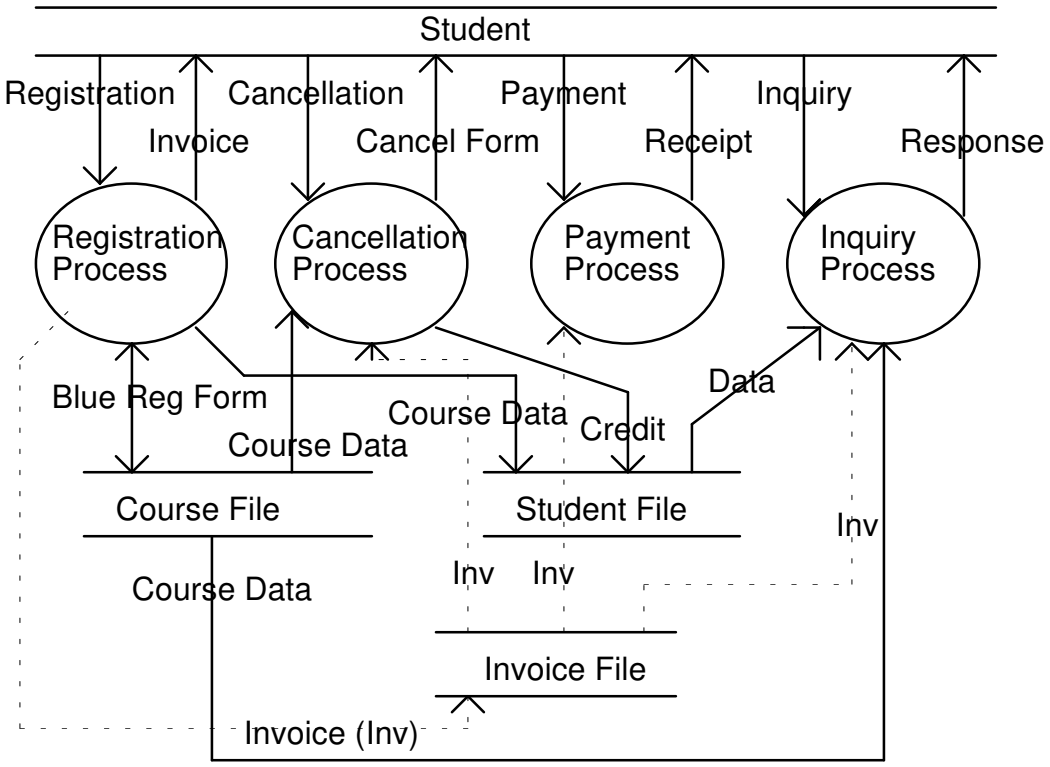
1.2. Concordance Generator Data Flow Diagram



2.1. Non-Credit Courses Office Entity Relationship Diagram



2.2. Non-Credit Courses Office Data Flow Diagram



Note: Dotted data flows are data flows just like the solid lines. Dotted lines are used to distinguish data flows associated with the Invoice File in order to reduce confusion.