# An Extreme Course Project

## CSCI 3060U – Winter 2020

### Project Teams

You are to form a team of two or three people to design, implement, document and deliver a two-part software product. All phases to follow Extreme Programming philosophy as much as it applies – in particular,

- continuously maintained test suites as requirements and quality control
- pair programming of all code
- simplest possible solution to every problem
- continuous redesign and re-architecting
- automation in testing and integration
- frequent integration and complete releases

Every two weeks (or so, see the schedule below) you will deliver concrete evidence of your team's progress as required by project assignments.

### Project Phases

The project will be done in six phases, each of which will be an assignment. Phases will cover steps in the process of creating a quality software result in the context of an Extreme Programming process model.

Assignments will be on the quality control aspects of requirements, rapid prototyping, design, coding, integration and analysis of the product you are building. Throughout the project, you should keep records of all evidence of your product quality control steps and evolution, to make the marketing case that you have a quality result at the end of the course.

Your final products will be tested and evaluated.

**Project Schedule**

The course project consists of six assignments, with separate handouts for each one. Assignments are scheduled to be due as follows:

- Phase #1: Front End Requirements

  Date Due: Friday, January 31, 2020

- Phase #2: Front End Rapid Prototype

  Date Due: Friday, February 14, 2020

- Phase #3: Front End Requirements Testing

  Date Due: Friday, February 28, 2020

- Phase #4: Back End Rapid Prototype

  Date Due: Friday, March 13, 2018

- Phase #5: Back End Unit Testing

  Date Due: Friday, March 27, 2020

- Phase #6: Integration and Delivery

  Date Due: Monday, April 6, 2020

**Assignment/Phase Hand-Ins – GitHub & Blackboard**

While working on a given assignment/phase of the project you are expected to maintain a GitHub project and regularly commit updates to source code, tests and all project documents. Your GitHub project must be non-public and should include your teaching assistant as a team member.

Unless otherwise specified, all assignments/phases *must* be handed in through Blackboard by 11:59pm on the due date. For all submissions indicate clearly your team name and all member names and on every hand in.

Late assignments/phases will be accepted through Blackboard during the first 24 hours after the submission deadline with a 20% penalty. After 24 hours, late assignments/phases will not be accepted. Exceptions to this policy may be made for valid reasons (e.g., medical).

As part of the assessment of each assignment/phase, your teaching assistant will review your submitted Blackboard materials as well as review your GitHub project activity.

**Project Requirements**

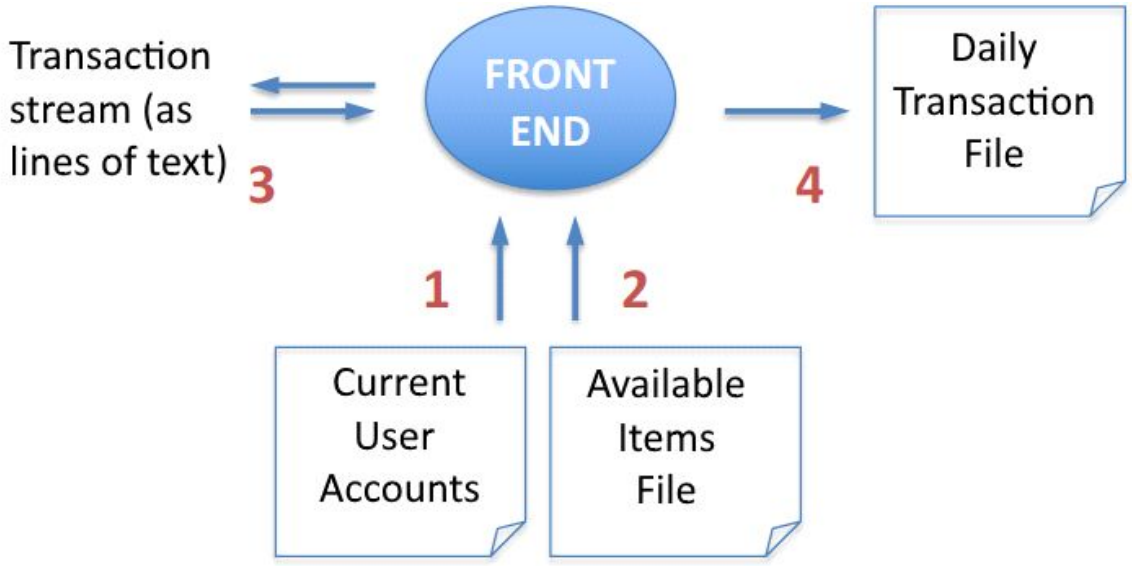
The product you are to design and build is an Auction-Style Sales Service. The system consists of two parts:

- the Front End, a point of purchase terminal for bidding and advertising items (written in C++)
- the Back End, an overnight batch processor to maintain and update a master auctions file (written in Java)

Both parts will be run as console applications, that is, they are to be invoked from a command line and use text and text file input/output only (this is an important requirement for assignments later in the project, so don't ask for exceptions).

## THE FRONT END

The Front End reads in a file of items available for auction (1) and a file containing information regarding current user accounts in the system (2), it processes a stream of item bidding and advertising transactions one at a time (3), and it writes out a file of item bidding and advertising transactions at the end of the session.



**Informal Customer Requirements for the Front End**

The Front End handles a sequence of transactions, each of which begins with a single transaction code (word of text) on a separate line. The Front End must handle the following transaction codes:

| | |
|---|---|
| login | - start a Front End session |
| logout | - end a Front End session |
| create | - add a user with the ability to bid/advertise items (privileged transaction) |
| delete | - remove a user (privileged transaction) |
| advertise | - put an item up for auction |
| bid | - make a bid on an item available for auction |
| refund | - issue a credit to a buyer's account from a seller's account (privileged transaction) |
| addcredit | - add credit into the system for the purchase of accounts |

**Transaction Code Details**

login - start a Front End session

- before processing a login transaction, the Front End reads in the current user accounts file.
- should ask for the username
- after the username is accepted, reads in the available tickets file (see below) and begins accepting transactions
- Constraints:
  - no transaction other than login should be accepted before a login
  - no subsequent login should be accepted after a login, until after a logout
  - after a non-admin login, only unprivileged transactions are accepted
  - after an admin login, all transactions are accepted

logout - end a Front End session

- should write out the daily transaction file (see below) and stop accepting any transactions except login
- Constraints:
  - should only be accepted when logged in
  - no transaction other than login should be accepted after a logout

create – creates a new user with bidding and/or selling privileges.

- should ask for the new username (as a text line)
- then should ask for the type of user (admin or full-standard, buy-standard, sell-standard)
- should save this information to the daily transaction file
- Constraints:
    - privileged transaction - only accepted when logged in as admin user
    - new user name is limited to at most 15 characters
    - new user names must be different from all other current users
    - maximum credit can be 999,999

delete - cancel any outstanding items for sale and remove the user account.

- should ask for the username (as a text line)
- should save this information for the daily transaction file
- Constraints:
    - privileged transaction - only accepted when logged in as admin user
    - username must be the name of an existing user but not the name of the current user
    - no further transactions should be accepted on a deleted user's available inventory of items for sale.

advertise – put up an item for auction

- should ask for the item name (as a text line)
- should ask for a minimum bid for the tickets in dollars (e.g. 15.00)
- should ask for the number of days until the auction ends
- should save this information to the daily transaction file
- Constraints:
    - Semi-privileged transaction - only accepted when logged in any type of account except standard-buy.
    - the maximum price for an item is 999.99
    - the maximum length of an item name is 25 characters
    - the maximum number of days to auction is 100
    - no further transactions should be accepted on a new ticket for sale until the next session.

bid – make a bid on an item available for auction

- should ask for the item name and the seller's username
- should display the current highest bid and ask for a new bid amount.
- should add the new bid to the item's record
- should save this information to the daily transaction file
- Constraints:
    - Semi-privileged transaction - only accepted when logged in any type of account except standard-sell.
    - item name must be an existing item
    - new bid must be greater than the previous highest bid
    - new bid must be at least 5% higher than the previous highest bid (this restriction does not apply in privileged mode)

refund - issue a credit to a buyer's account from a seller's account (privileged transaction)

- should ask for the buyer's username, the seller's username and the amount of credit to transfer.
- should transfer the specified amount of credit from the seller's credit balance to the buyer's credit balance.
- should save this information for the daily transaction file
- Constraints:
    - Buyer and seller both must be current users

addcredit - add credit into the system for the purchase of accounts

- In admin mode, should ask for the amount of credit to add and the username of the account to which credit is being added.
- In a standard account, should ask for the amount of credit.
- should save this information to the daily transaction file
- Constraints:
    - In admin mode, the username has to be an existing username in the system.
    - A maximum of $1000.00 can be added to an account in a given session.

**General Requirements for the Front End**

The Front End should never crash or stop except as directed by transactions.

The Front End cannot depend on valid input - it must gracefully and politely handle bad input of all kinds (note: but you can assume that input is at least lines of text).

**Daily Transaction File**

At the end of each session, when the logout transaction is processed, a daily transaction file for the day is written, listing every transaction made in the session.

Contains variable-length text lines of the form:

```
XX_UUUUUUUUUUUUUUU_TT_CCCCCCCCC
```

Where:

XX
: is a two-digit transaction code: 01-create, 02-delete, 06-addcredit, 00-end of session

UUUUUUUUUUUUUUU
: is the username (buyer if two users in transaction)

TT
: is the user type (AA=admin, FS=full-standard, BS=buy-standard, SS=sell-standard)

CCCCCCCCC
: is the available credit

_
: is a space

```
XX_UUUUUUUUUUUUUUU_SSSSSSSSSSSSSSS_CCCCCCCCC
```

Where:

XX
: is a two-digit transaction code: 05-refund

UUUUUUUUUUUUUUU
: is the buyer's username

SSSSSSSSSSSSSSS
: is the seller's username

CCCCCCCCC
: is the refund credit

_
: is a space

```
XX_IIIIIIIIIIIIIIIII_SSSSSSSSSSSS_DDD_PPPPPP
```

where:

`XX`
: is a two-digit transaction code: 03-advertise.

`IIIIIIIIIIIIIIIII`
: is the item name

`SSSSSSSSSSSSS`
: is the seller's username

`DDD`
: Is the number of days to auction

`PPPPPP`
: is the minimum bid

`_`
: is a space

```
XX_IIIIIIIIIIIIIIIII_SSSSSSSSSSSSS_UUUUUUUUUUUUU_PPPPPP
```

where:

`XX`
: is a two-digit transaction code: 04-bid.

`IIIIIIIIIIIIIIIII`
: is the item name

`SSSSSSSSSSSSS`
: is the seller's username

`UUUUUUUUUUUUUU`
: is the buyer's username

`PPPPPP`
: is the new bid

`_`
: is a space

Constraints:

- numeric fields are right justified, filled with zeroes (e.g., 007 for a one week auction)
- alphabetic fields are left justified, filled with spaces (e.g. John_Doe_____ for account holder John Doe)

- unused numeric fields are filled with zeros
  (e.g., 0000)
- In a numeric field that is used to represent a monetary value, ".00" is appended to the end of the value
  (e.g. 00110.00 for 110)
- unused alphabetic fields are filled with spaces (blanks)
  (e.g., _____ )
- the sequence of transactions ends with an end of session (00) transaction code

**Current User Accounts File**

Consists of fixed length (28 characters) text lines in the form:

```
UUUUUUUUUUUUUUU_TT_CCCCCCCCC
```

where:

UUUUUUUUUUUUUUU
: is the username

TT
: is the user type (AA=admin, FS=full-standard, BS=buy-standard, SS=sell-standard)

CCCCCCCCC
: is the available credit

_
: is a space

Constraints:

- every line is exactly 28 characters (plus newline)
- alphabetic fields are left justified, filled with spaces
  (e.g., User001_____ for username "User001")
- unused numeric fields are filled with zeros
  (e.g., 0000)
- in a numeric field that is used to represent a monetary value, if the value is only in dollars, then ".00" is appended to the end of the value
  (e.g. 110.00 for 110)
- unused alphabetic fields are filled with spaces (blanks)
  (e.g., _____ )
- file ends with a special user named END with an empty user type and the credit field empty.

**Available Items File**

Consists of fixed length (62 characters) text lines in the form:

```
IIIIIIIIIIIIIIIIII_SSSSSSSSSSSSSSS_UUUUUUUUUUUUUU_DDD_PPPPPP
```

where:

`IIIIIIIIIIIIIIIIII`
: is the item name

`SSSSSSSSSSSSSSS`
: is the seller's username

`UUUUUUUUUUUUUU`
: Is the name of the user with the current winning bid

`DDD`
: is the number of days remaining in the auction.

`PPPPPP`
: is the current highest bid.

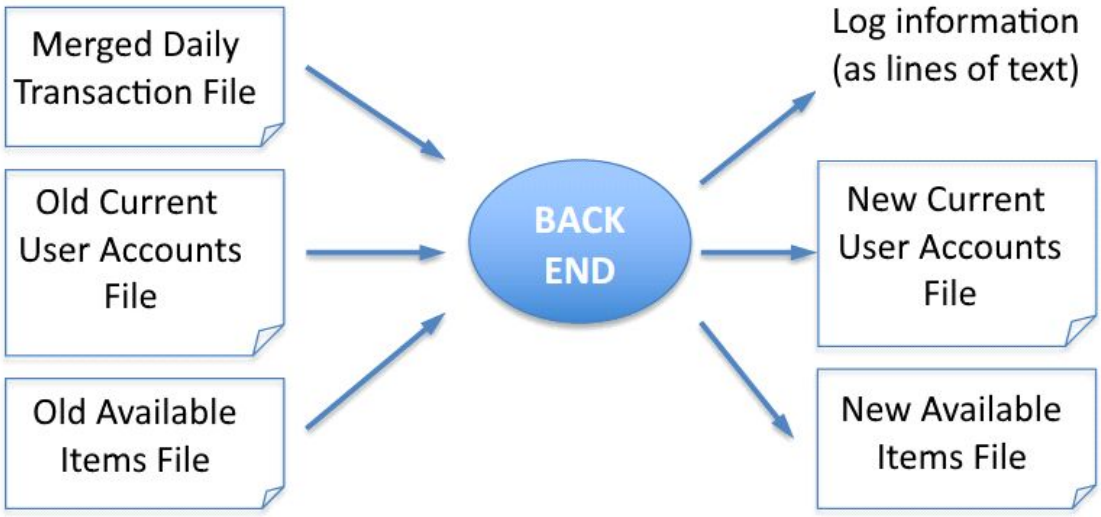
`_`
: is a space

Constraints:

- every line is exactly 62 characters (plus newline)
- alphabetic fields are left justified, filled with spaces (e.g., Les_Paul_Guitar____ for item "Les Paul Guitar")
- unused numeric fields are filled with zeros (e.g., 0000)
- in a numeric field that is used to represent a monetary value, if the value is only in dollars, then ".00" is appended to the end of the value (e.g. 110.00 for 110)
- unused alphabetic fields are filled with spaces (blanks) (e.g., _____ )
- file ends with a special item for sale named END with all other fields empty.

## THE BACK END

The Back End reads in the previous day's User Accounts File and Available Items File and then applies all of the daily transactions from a merged set of daily transaction files to these files to produce a new Current User Accounts File and new Available Items File for tomorrow's Front End runs.




**Informal Customer Requirements for the Back End**

The Back End reads the Merged Daily Transaction File (see below) and applies all transactions to the Old Current User Accounts File and Old Available Items File to produce the New Current User Accounts File and the New Available Items File.

The Back End enforces the following business constraints, and produces a failed constraint log on the terminal as it processes transactions from the merged daily transaction file.

Constraints:

- no item should ever have a negative number of days left
- a newly created user must have a name different from all existing users

### General Requirements for the Back End

The Back End should assume correct input format on all files, and need not check for bad input. However, if by chance it notices bad input, it should immediately stop and log a fatal error on the terminal.

### Back End Error Recording

All recorded errors should be of the form: `ERROR: <msg>`

- For failed constraint errors, `<msg>` should contain the type and description of the error and the transaction that caused it to occur.
- For fatal errors, `<msg>` should contain the type and description and the file that caused the error.

### The Merged Daily Transaction File

The Merged Daily Transaction File is the concatenation of any number of Daily transaction files output from Front Ends, ended with an empty one (one containing no real transactions, just a line with a 00 transaction code).