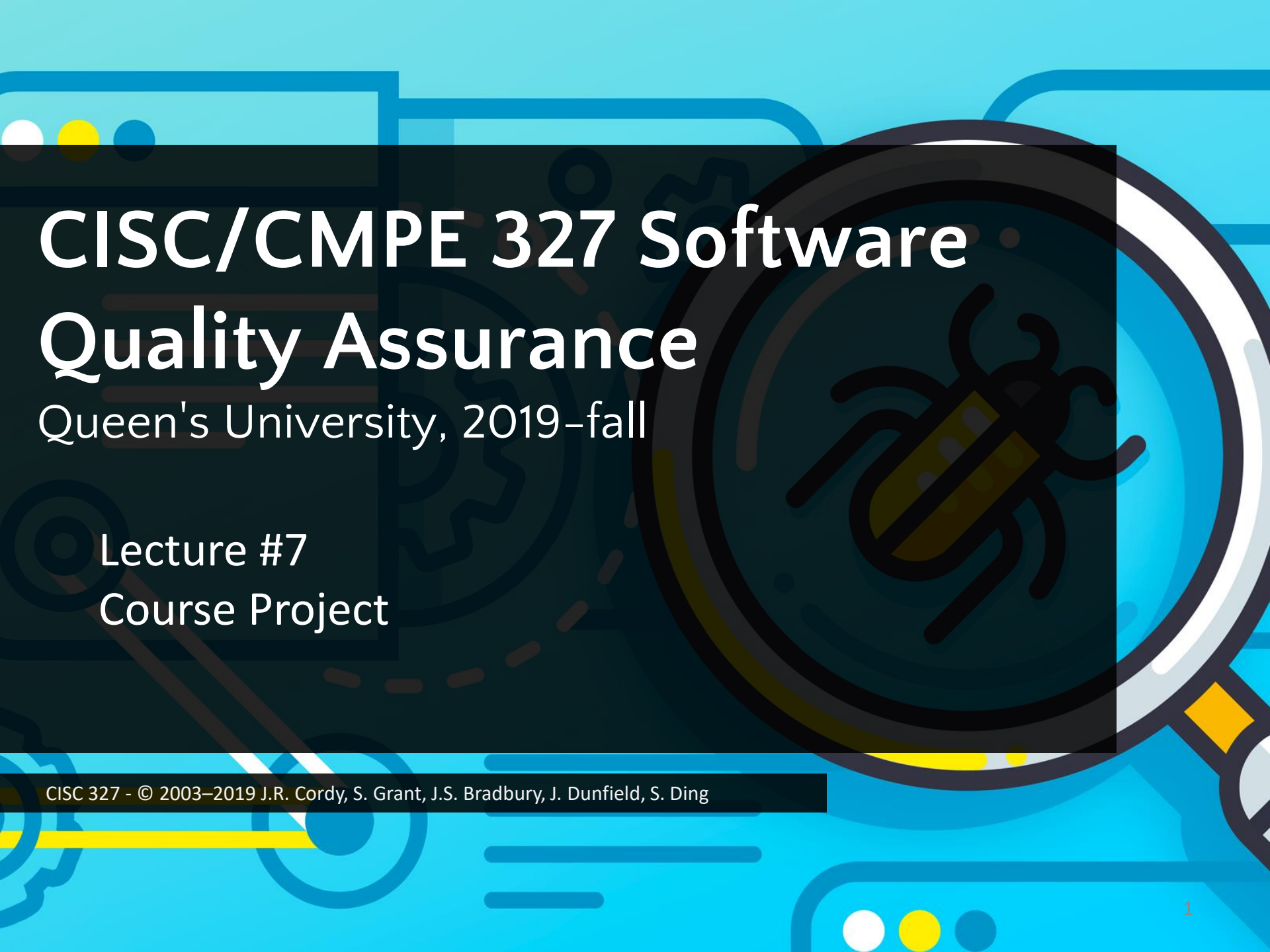


CISC/CMPE 327 Software Quality Assurance

Queen's University, 2019-fall

Lecture #7
Course Project

Course Information

- Mini-Exams
  - This year, in place of a final examination, there will be four in-class mini-exams, worth 12.5% each
  - Subject to lecture scheduling slips, mini-exams scheduled according to the course website

Course Information

- Course Project
  - The course project will consist of six assignments, with handouts for each one
  - Assignment handouts will be early whenever possible, so that you may work ahead at any time
  - Subject to scheduling slips, assignments due according to the course website

Course Information

- Tutorials and Advising
  - Project advising
    - Advising times will be informal, designed to provide you with practical and technical advice on your project
  - Online resource through the course web page for:
    - Linux command line programming and shell scripting
    - Windows command line programming and batch scripting if you prefer

Course Information

- Assignment Submission
  - Assignments will be handed in through GitHub and onQ, by 23:59pm on the due date at latest
    - **We are working on the exact instructions!**
  - Be sure to indicate clearly your team name and student names and numbers on **every** submission!
  - This is a course in **quality** – neatness counts!
  - Think of your submission as a professional paper report, with appropriate titling, sectioning, paging
  - Marked assignments will be returned in OnQ

Course Project

- Project Phases
  - The project will be done in several 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, prototyping, testing, integration, and analysis of the product you are building
  - You can always work ahead on the next assignment in advance to manage your time

Course Project

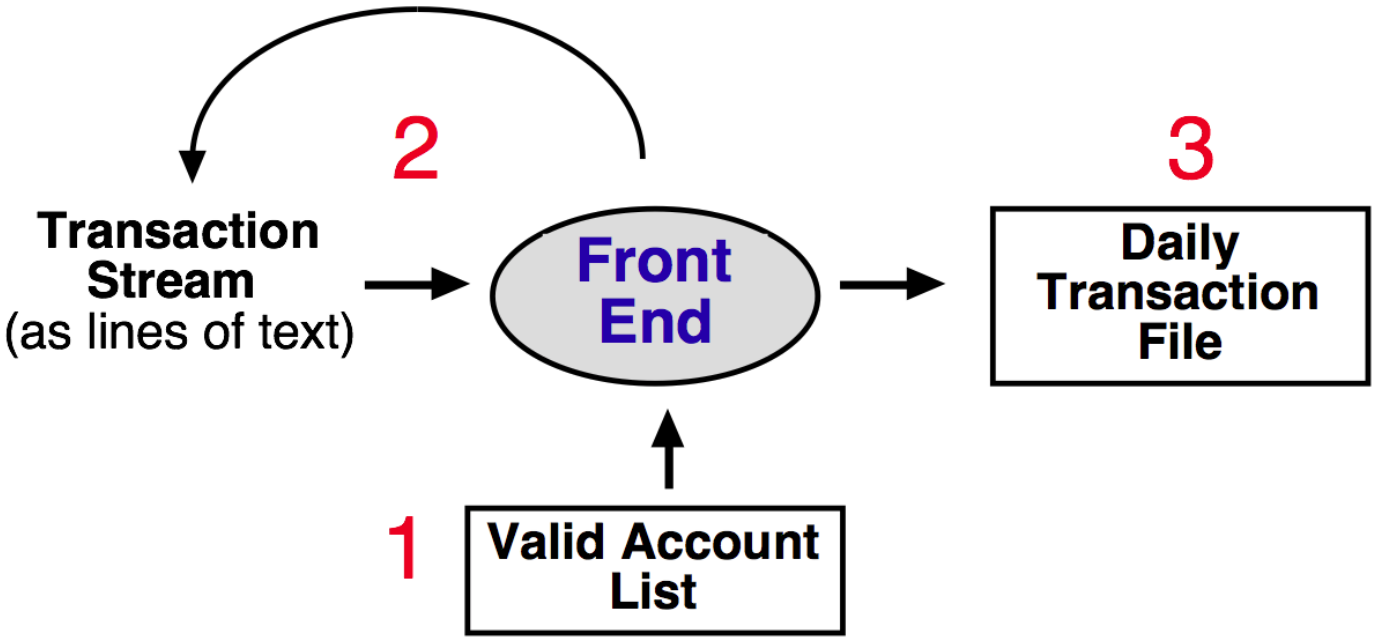
- Project Phases
  - Assignments should always use the simplest possible solution
  - Assignments must be done exactly as the assignment specification says - no exceptions!
  - You can ask the customer (TAs) for clarifications about the requirements or expectations any time
  - TAs and I will respond and post answers quickly

Quinterac

- **Queen's Old-Fashioned Interactive Banking System**
- Consists of a Front End and a Back Office
  - The Front End is a standalone retail banking terminal for pseudo-ATM banking transactions
    - login, logout, deposit, withdraw, transfer, plus account creation and deletion when possible
  - The Back Office is an overnight batch processor to maintain and update a master events file
    - Aggregate the information from the campus-wide set of Front End terminals

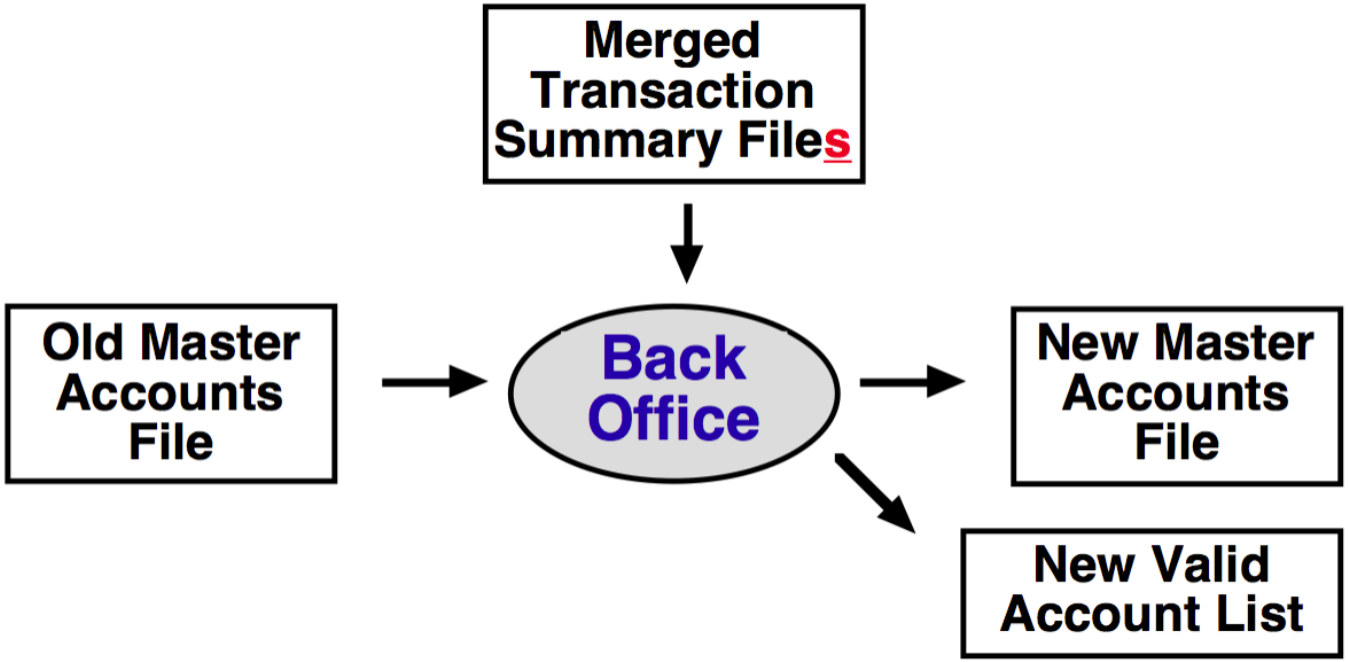
Quinterac

- The Front End
  - Reads in a file of valid account numbers, processes a stream of transactions one at a time, and writes out a summary file of transactions at the end of the day



Quinterac

- The Back Office
  - Reads in the previous day's master accounts file and applies all of today's transactions from a set of transaction files to produce new master accounts and valid accounts files



Quinterac Front End Requirements

- 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 transactions :
    - login — start a Front End session (processing day)
    - logout — end a Front End session
    - createacct — create a new account (privileged)
    - deleteacct — delete an existing account (privileged)
    - deposit — deposit to an account
    - withdraw — withdraw from an account
    - transfer — transfer between accounts

Quinterac Front End Requirements

- What does a sample session look like?
  - Let's say on a given day, only one customer visits a Front End ATM and transfers $1000 from one account to another, then withdraws $50 of it

```
login
atm
transfer
1000223
1000327
100000
withdraw
1000327
5000
logout
```

QBASIC Front End Requirements

- login: start a Front End session
  - should ask for the type of session, which can be either
    - atm, which means ATM terminal mode
    - agent, which means privileged (teller) mode
  - after type is accepted, reads in the valid accounts file (see requirements) and begins accepting other transactions

QBASIC Front End Requirements

- 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 an ATM login, only unprivileged transactions are accepted
  - after an agent (privileged) login, all transactions are accepted

QBASIC Front End Requirements

- logout: end a Front End session
  - should write out the transaction summary file (see requirements for the file) 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

QBASIC Front End Requirements

- createacct: create a new account
  - should ask for the new account number and name (as text lines)
  - should save this information for the transaction summary file, but no transactions on the new account should be accepted in this session

QBASIC Front End Requirements

- Constraints:
  - privileged transaction, only accepted when logged in to agent mode
  - new account number is exactly seven decimal digits not beginning with 0
  - new account number must be different from all other current account numbers
  - new account name is between 3 and 30 alphanumeric characters, possibly including spaces but not beginning or ending with a space

QBASIC Front End Requirements

- deleteacct: delete an existing account
  - should ask for the account number and account name (as text lines)
  - should check that the account number is valid, and save the account number and name in the transaction summary file
  - Constraints:
    - privileged transaction, only accepted when logged in to agent mode
    - no further transactions should be accepted on a deleted account

QBASIC Front End Requirements

- deposit: deposit to an account
  - should ask for the account number and the amount to deposit in cents (as text lines)
  - should check that the account number and amount are valid
  - should save info for the transaction summary file
  - Constraints:
    - Transaction amount limits – see instruction

QBASIC Front End Requirements

- withdraw: withdraw from an account
  - should ask for the account number and the amount to withdraw in cents (as text lines)
  - should check that the account number and amount are valid
  - should save info for the transaction summary file
  - Constraints:
    - Transaction amount limits – see instruction

QBASIC Front End Requirements

- transfer: transfer from one account to another
  - should ask for the from account number, the to account number, and the amount to transfer in cents (as text lines)
  - should check that the account numbers and amount are valid
  - should save info for the transaction summary file
  - Constraints:
    - Transaction amount limits – see instruction

QBASIC Front End Requirements

- Transaction Summary File
  - At the end of each session (processing day), when the logout transaction is processed, a transaction summary file for the day is written, listing every transaction made in the session
  - Contains transaction messages (text lines) of the form:

CCC AAAA MMMM BBBB NNNN

QBASIC Front End Requirements

- Transaction Summary File

  CCC AAAA MMMM BBBB NNNN

  - CCC is a three-character transaction code, where DEP = deposit, WDR = withdrawal, XFR = transfer, NEW = create account, DEL = delete account, EOS = end of session
  - AAAA is the first (to) account number
  - MMMM is the amount, in cents (e.g., 123 = $1.23)
  - BBBB is the second (from) account number
  - NNNN is the account name

QBASIC Front End Requirements

- Constraints:
  - each line is at most 61 characters (plus newline)
  - the transaction code is always the first three characters of the line
  - items are separated by exactly one space
  - account numbers are always exactly seven decimal digits, not beginning with 0 (e.g., 1000327, 9379210)
  - monetary amounts are between 3 and 8 decimal digits, 000 to 99999999, representing $0.00 to $999,999.99
  - account names are between 3 and 30 alphanumeric characters (A-Z, a-z, 0-9), possibly including spaces, but not beginning or ending with a space (e.g., XYZ, ThisAcct, My 3rd account, …)
  - unused numeric fields are filled with zeros (e.g., 0000000 for account numbers, 000 for monetary amounts)
  - unused account name fields are filled with three asterisks: ***
  - the file ends with an end of session (EOS) transaction code

QBASIC Front End Requirements

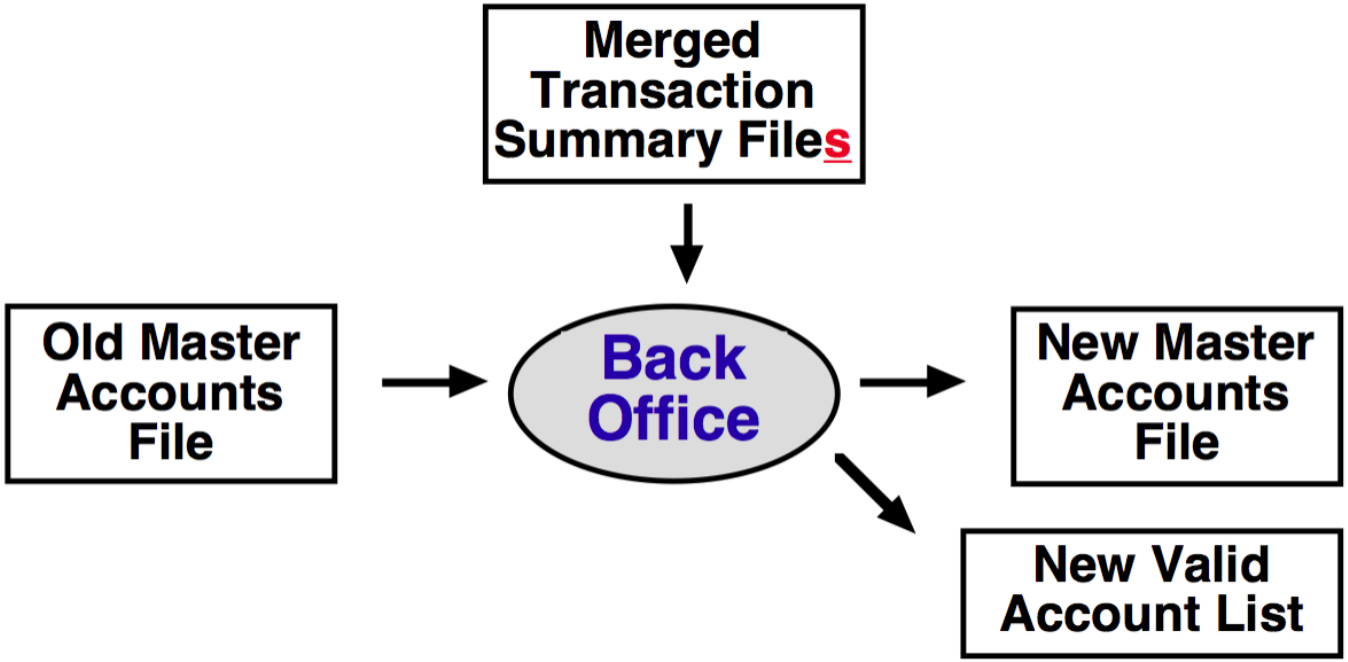
- Valid Accounts List File
  - Consists of text lines each containing only an account number
  - Constraints:
    - each line is exactly 7 characters (plus newline)
    - account numbers are always exactly seven decimal digits, not beginning with 0 (e.g., 1000327)
    - the file ends with the special (invalid) account number 0000000
    - Comes from the Back End, so you can assume it is well-formed

QBASIC Front End Requirements

- General Requirements for the Front End
  - The Front End should never crash, and should never stop except as directed by transactions
  - The Front End cannot depend on valid (terminal) input – it must gracefully and politely handle bad input of all kinds
    - But: you can assume that input is at least lines of text!

Quinterac

- The Back Office
  - Reads in the previous day's master accounts file and applies all of today's transactions from a set of transaction files to produce new master accounts and valid accounts files



QBASIC Back Office Requirements

- Informal Customer Requirements for the Back Office
  - The Back Office reads the Master Accounts File and the Merged Transaction Summary Files (see below)
  - It applies all transactions to the master accounts to produce the New Master Accounts File and the New Valid Accounts List File

QBASIC Back Office Requirements

- The Back Office enforces the following business constraints, and produces a failed constraint log on the terminal as it processes transactions
  - Constraints:
    - No account should ever have a negative balance
    - A deleted account must have a zero balance
    - A newly created account must have a new unused account number
    - The account name given in a delete transaction must be the same as the name associated with the deleted account number

QBASIC Back Office Requirements

- The Master Accounts File
  - The Master Accounts File consists of text lines of the form:

    AAA MMM NNN

    where:
    - AAA is the account number
    - MMM is the account balance, in cents
    - NNN is the account name
  - Constraints:
    - each line is at most 47 characters (plus newline)
    - items are separated by exactly one space
    - account numbers, balances and names are as described for the Transaction Summary File
    - the Master Accounts File must always be kept in ascending order by account number

QBASIC Back Office Requirements

- The Merged Transaction Summary File
  - The concatenation of any number of Transaction Summary Files output from Front Ends, ended with an empty one (one containing no real transactions, just a transaction with an EOS transaction code and unused other fields)
- The New Valid Accounts List File
  - A file containing every active account number in the New Master Accounts File, in the format described for the Front End

QBASIC Back Office Requirements

- General Requirements for the Back Office
  - The Back Office uses only internal files, so it can assume correct input format on all files
  - However, the values of all fields should be checked for validity, and the Back End should stop immediately and log a fatal error on the terminal if any value is invalid

CISC 327 Course Project

- Assignment 1: Front End Requirements Tests
  - Due Thursday, October 5th
    - Create and organize a complete set of requirements tests for the Front End of QBASIC to test for every required behaviour
    - Bonus for discovering missing or erroneous requirements (if customer TA agrees)
  - Hand in as a PDF file through (instruction coming soon!)
  - You are encouraged to work ahead and hand in assignments early! *(...once we post them)*

CISC 327 Course Project

- You should hand in:
  1. An organized list of all your test cases and what they are intended to test (a table of test names and intentions, in English)
  2. For each test case, the actual test input file and expected output file (as text file printouts)
  3. A test plan document, outlining how your tests are organized (in directories or whatever), how they will be run (as shell scripts, Windows batch files, or whatever), and how the output will be stored and organized for reporting and comparison with later runs (make text file printouts of any directory structures and script files created)

CISC 327 Course Project

- What does a test case look like?

Test T1: login command, ATM case
Purpose: check that login is accepted
Input t1in.txt:
    login
    atm
    logout
Input files: valid accounts file with no accounts
Output files: transaction summary file with no transactions
Terminal output t1out.txt:
    empty, or possibly information messages in response to commands

CISC 327 Course Project

- But first: Assignment #0!
  - Choose teammates to pair program with
  - Think about the programming language and environment you want to work in
  - Sign the team agreement, due Tomorrow on OnQ
  - If you haven't yet found teammates, email TAs