

CS 107 Fall 2006

Lecture 12: Computers in Business

1 Business Areas

Here are some of the business areas that have seen rapid and radical change since the beginning of the age of computers.

1.1 Banking.

A general observation is that the banking industry was originally based on manual labor and has now converted almost completely to reliance on computers. Manual labor = simple services, while computers = unending complexity.

Then: (From the time of Charles Dickens until 1960)

- Banks existed to serve businesses and affluent people.
- There were savings accounts and checking accounts.
- Many people did not have bank accounts.
- Interest was calculated infrequently and credited to the accounts quarterly.
- The closing and balancing at end of day was done manually
- Withdrawals happened in person or by signed, paper check.
- Checks, when deposited, were held for several days until they cleared. This allowed the physical paper to be transported to another city.

Now: (rapid change started in the late 60's)

- Banks exist to distribute profits to shareholders
- Banks offer a variety of types of accounts and types of interest
- Almost everyone has a credit card or a checking account or both.
- Interest is compounded daily or continuously
- Withdrawals can be made automatically by a creditor.
- Checks, when deposited, are still held for several days before the money is "available" to the account holder. This allows the bank to make profits. There is no reasonable excuse for it, since the money is withdrawn from the payer's account on the day the check is deposited.

The current situation is that

1.2 Credit Cards

Then:

- To get a credit card, you needed to prove that you had the ability to pay the bills: if you were not wealthy, you at least needed a steady job.

- If you lost your card, or it was stolen, you were responsible for charges made on it until you cancelled the card.
- Card companies did not charge annual fees for the cards. They made their money by taking a small percentage of every amount charged on it.

Now:

- Half a dozen companies are out there eager to give multiple credit cards to every college student. This is a form of entrapment: they expect the students to charge up to their credit limits, then be unable to pay the entire bill. So interest and service charges build up to the point the student is deeply in debt and cannot get out. College students are the ideal audience because they are new adults and have little experience with debt, and because they will (someday) have good jobs. The presence of huge computer databases enables the card companies to implement this strategy without too much risk. Store charges must be approved by an online service; those that exceed the credit limit are not approved.
- Laws have been passed to protect the consumer. In the case of a lost or stolen credit card, the card owner is only responsible for the first \$50 of charges, and all responsibility is ended the moment the lost card is reported. This is possible because of the online credit-checks done at sales outlets.
- Debit cards have now been introduced and are not covered by the credit card laws. If you lose a debit card, a thief can use it to clean out your bank account. It is clear why banks like debit cards, but why would any consumer want one?
- Card companies charge annual fees for the cards. It is a great way to extract money from the public.

1.3 Stock Brokerages

programmed trading and the market crash it caused.

1.4 Manufacturing

”lean manufacturing” requires keeping minimal inventory of parts on hand.

This is done by automated monitoring of supply levels and automated ordering of supplies and parts

1.5 Consumer-to-consumer business

Craig’s list,
eBay,
textbook exchange

1.6 Business-to-Consumer transactions

There are a variety of problems and challenges here:

Getting the information to the consumer. With relative ease and little investment, a business can create a simple website that contains information about the business and its products. In small businesses, such websites are often static, that is, the web pages display the same thing to everybody and are not changed or tailored for the consumer who is viewing them.

Identification: Who are you, who am I? Before a business transaction can be made, the two parties must decide to trust each other. This is not a problem with in-person transactions, but is a huge problem when you cannot see the other party and have little reliable information about it.

On one side, the credit card companies and PayPal provide customer accounts and (in a sense) verify that the customer is a person with the ability to pay for services.

On the other side, the consumer must be given a reason to trust that the merchant will actually send out the products that are purchased. A customer must believe that the business is real, and that it is who it says it is. We all know that Amazon is real; we still need to know that something that APPEARS to come from Amazon does, actually, come from Amazon.

To address this problem, certificates and certificate authorities (companies like VeriSign) were developed. A certificate is an encrypted ID number. When you use https (the secure version of the web protocol) your browser will ask the merchant's server for a certificate. This will be sent to a certificate authority for verification. The authority will decrypt the number and then send an answer to your browser. It can verify that the merchant is who it says it is, and that the merchant has supplied a certificate that is current (has not expired). A businesses can buy such a certificate for \$450 –\$1500. This is a big stumbling block for a small business or a nonprofit organization.

Carrying out Transactions. A business doing e-commerce must either provide a custom client program (like SAM) that must be installed on the customer's computer, or use the web protocols for 2-way communication.

To do the latter, a business provided dynamic web pages; these are pages that are made by combining a form with information from the database and/or from the remote user. Some forms are simple, others are backed by complex logic to check for errors and verify availability of products. Creating systems of this sort requires a substantial amount of training and is done by computer programmers. The more skill the programmer has, the less likely it is that the system will fail because of concurrency conflicts or database problems. Maintaining customer privacy is also a problem.

Fulfillment and Accountability. Once the transaction is complete, the money and merchandise must change hands and both must be traceable. Thus, a completed transaction must feed information into a tracking system in the shipping department and into an accounting system in the financial department. Of course, all the information could be printed on paper, then re-entered into the computer in another department. This is error prone! The modern way to handle the matter is to have a single company-wide system that integrates accounting, shipping, and the web-based transaction application. These systems are large, complex, and costly. In another 20 years they will be universal.

Privacy. Usually, a business customer is asked to create an account and supply a password before exchanging any confidential data. This is important, and simple, but it does not address all of the problems.

- The transactions made by one customer must not be mixed up with another person's data.
- They must not be public information. A customer has a legal right to privacy.
- Transaction data and identification data must be protected from hackers and identity thieves.
- People forget passwords; there must be a way to regain access to an account afterward.

Automated systems of password “hints” helps with the last problem. Encrypting sensitive information goes a long way toward addressing the hacker issues. Laws regulating the sale of customer lists have helped considerably. Even so, confidentiality issues remain, involving the storage of, maintenance of, and access to business data. Appropriate non-computerized business systems must be established to close this loophole.

Robustness.

- Database reliability. To be reliable, a database must contain correct and consistent data. Even when the data is entered into the database automatically, some human being needs to be there to make corrections.
- Both the database and the commercial website must be available when you need them. This means that a company that operates on a 40-hour work week cannot run its own system.
- Commercial services such as DreamHosts run server farms that host websites for businesses. A server farm is a collection of fast machines with fast disks (probably RAID disks) and a 24/7 attendant to address hardware and power problems when they arise.
- Any business that relies on a database must have provision for making backup copies of the data. An accepted practice is daily (incremental) backups of any new material plus weekly or monthly full backups onto a medium that is stored off site. Storing the backup in the same office or same building as the original data does not help much when there is a fire. Similarly, annual archive copies need to be kept.
- Crashes. When an application crashes during a transaction, for any reason, the customer has a big problem. If he does not repeat the transaction, he may not get the product he needs. If he repeats the transaction, he may end up getting (and paying for) two copies of his purchase. How is he to know what happened at the server end?

In a well-programmed system, nothing will happen until the final “completion” message is given: no message = no purchase. In less well-designed systems, you just don’t know. How does a consumer cope with this uncertainty? call the company’s service representative!