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Present and Future Uses of Technology in Mortgage Banking

The Impact of Hardware Developments on the Home Lending Industry

Chicago
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Super fast and super powerful

- **Moore's Law - The real quote:** "The complexity for minimum component costs has increased at a rate of roughly a factor of two per year ... Certainly over the short term this rate can be expected to continue, if not to increase. Over the longer term, the rate of increase is a bit more uncertain, although there is no reason to believe it will not remain nearly constant for at least 10 years. That means by 1975, the number of components per integrated circuit for minimum cost will be 65,000. I believe that such a large circuit can be built on a single wafer." "Cramming more components onto integrated circuits", *Electronics Magazine* 19 April 1965

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Moore's Law In a Form We Can Use

- Translation: Moore's Law states that circuit density or capacity of semiconductors doubles every eighteen months or quadruples every three years.
- In English: Super fast personal computers and super powerful servers capable of processing humongous amounts of data instantly and supporting multiple input and output streams of content and analyzing data that our brains are incapable of handling.
- As a reference, in 1978, the first PC CPU (Intel 8088) had 29,000 transistors. In 2006, the Intel Core 2 Duo chip has 291,000,000 transistors. (Source: Wikipedia <http://en.wikipedia.org>)

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Moore's Law – Getting to *Petaflops*

- A teraflop is a measure of a computer's speed and can be expressed as:
 - » A trillion floating point operations per second floating point operations per second (*FLOPs*)
 - » A teraflop is the equivalent of calculating 10 billion checkbook balances in a second (assuming 100 arithmetic operations per balance).
- Today's fastest parallel computing operations are capable of teraflop speeds. Scientists have begun to envision computers operating at petaflop speeds.
- A petaflop is the ability of a computer to do one quadrillion *FLOPs*. Additionally, a petaflop can be measured as “one thousand teraflops”.



Moore's Law – The Practical Uses

How do we use all this processing power?

- Decisioning engines to customize products, determine credit and interest rate risk and personalize price
- Delivery of information through multiple media formats simultaneously (e.g. voice, video and streaming data)
- Incredibly fast searches of huge amounts of data
- Blazingly fast and detailed simulations and analyses at the individual and portfolio levels
- In reality, mostly to run spell check on memos and letters and to browse shopping web sites and read email

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Storage: Finally, Unlimited Capacity

Virtually unlimited capacity at increasingly lower prices

- In 1996, a 1GB PC drive cost \$1,000. In 2006, a 750GB drive costs \$590.
- 750 times more storage for almost ½ the cost.

Server storage configurations measured in megabytes, gigabytes, terabytes, petabytes and exabytes.

- A terabyte is a measure of computer storage capacity and is 2 to the 40th power or approximately a thousand billion bytes (that is, a thousand gigabytes).
- A petabyte is a measure of memory or storage capacity and is 2 to the 50th power bytes or, in decimal, approximately a thousand terabytes
- An exabyte (EB) is the largest unit of computer data storage in use today, two to the sixtieth power bytes. An exabyte is approximately one quintillion bytes. In decimal terms, an exabyte is a billion gigabytes.

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Storage: All the Words Ever Spoken by Humans

| Information Object | How Many Bytes |
|--|----------------|
| A single text character | 1 byte |
| A typical text word | 10 bytes |
| A typewritten page | 2 kilobytes |
| A short novel | 1 megabyte |
| A high resolution photograph | 2 megabytes |
| The complete works of Shakespeare | 5 megabytes |
| One minute of high fidelity sound | 10 megabytes |
| The contents of a CD-ROM | 500 megabytes |
| A pickup truck filled with books | 1 gigabyte |
| The contents of a DVD | 17 gigabytes |
| A collection of the complete work of Beethoven | 20 gigabytes |
| A college research library | 2 terabytes |
| The print collections of the Library of Congress | 10 terabytes |
| All US academic research libraries | 2 petabytes |
| All printed material in the world | 200 petabytes |
| All words ever spoken by human beings | 5 exabytes |

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Storage: Good Bye To Paper, CD's and DVD's

- Vast quantities of digital data available for research and validation
- Enormous quantity of data for analytical and decision engines
- Elimination of paper (*Hah! At least a significant reduction of paper.*)
- Perpetual availability – never off-line or archived
- Bandwidth opens doors to accessing everything from everywhere
- Portability of data raises security and privacy concerns
 - » How much can you afford to spend to protect important data that you want to carry with you on portable devices?
 - » Linking seemingly unrelated data can provide unique and potentially damaging insights into individuals



Miniaturization: Got A Rocket in My Pocket

George Gilder's *Law of the Microcosm*

- “Rather than pushing decisions up through the hierarchy, the power of microelectronics pulls them remorselessly down to the individual.”
Breakthroughs in Computing Technology - International Engineering Consortium
- Miniaturization provides massive computing power to the individual, reducing barriers to entry and allowing small entrants to level the technological playing field. (e.g. YouTube)



Miniaturization: Power to the People

- Miniaturization empowers all industry participants to be individually more productive
 - » Realtors
 - » Loan Officers
 - » Back Office Operations Personnel
 - » Customer Service Staff
 - » Investors
 - » Risk Managers
- Technology at your fingertips that goes with you everywhere and keeps you electronically chained to your job



Device Convergence: Ubiquity Unchained

- Ubiquitous content delivery via wireless or hard wired internet connectivity:
 - » Home buying via internet “live” tours delivered on PDA’s, wide screen HDTV screens and PC’s
 - » Self service customer service over the internet with live video/voice chats to complete session in one visit (“one and done”) via cell phone, PC or integrated home computing/video center
 - » Home and rate alerts with text and image content delivered to portable phone/computing device
- It’s not just for the office anymore
 - » Cultural acceptance of TV’s and PC’s in bedroom, kitchen and family room.
 - » Portability and continual availability with portables
 - » Why not one device used throughout the house and one device when you are mobile?
- You’re never out of touch or unable to access information



Inhibitors: The Glass is Half Full

- The pieces are in place:
 - » Software
 - » Network
 - » Hardware
- What's the problem? Where's Nirvana? There are working parts!
 - » Web portals with engines and data (Zillow.com, Overture)
 - » Custom and package analytic engines for credit and interest rate risk analysis
 - » Virtual loan offices – LOS platforms that enable LO's to deliver packages right to a virtual e-closing sessions
 - » E-vault solutions for e-closings
 - » Powerful self service origination and servicing platforms reducing the need for back office staff
 - » Product customization
 - » Work portabilty

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Inhibitors: Driving with Miss Takes (apologies to Jessica Tandy)

Real roadblocks

- Massive amounts of hard copy data requiring conversion to digital format
- Lending industry culture adverse to radical, disruptive change (the best kind) and to technology
- High cost and lack of timely delivery of software with new features and functionality
- Privacy firewalls preventing open exchange of data
- Bandwidth concentration mainly in major metropolitan areas
- Lack of universally adopted standards



Stranger Than Fiction: What Life Might Be Like

- E-mail alert from realtor about dream house on Wednesday
- Simultaneous viewing on your PDA and spouse's PC of live video and audio tour of property by realtor and homeowner
- Call to mortgage representative who retrieves on line property profile from government and commercial portals and your personal financial data from a secure portal.
- Feeding property and financial information into a product, pricing and risk model, your mortgage representative presents you with three customized products.
- You tell her you'll only be in the house for three years before you will be relocated and she recycles your data and presents you with three new product offers with the best available pricing



Stranger Than Fiction: What Life Might Be Like

- You and your spouse electronically sign an offer to buy the house and a mortgage application
- Because the house is vacant, you schedule a virtual closing for Friday, in between your morning meeting and your afternoon vacation flight
- Data is sent to your office for you, your home for your spouse, the seller, the seller's attorney, your lawyer, the title company and your home inspector. All the reviews are completed the next day, including a quick physical inspection.
- The electronic closing goes off without a hitch and you're off to Hawaii on Friday
- Your loan data zips through the mortgage company systems and is transmitted to the e vault and the end investor



Stranger Than Fiction: What Life Might Be Like

- A three day sale to closing to investor sale with a customized and personalized loan product, a paperless transaction and almost no human intervention to collect data or evaluate data.
- Made possible by:
 - » Bandwidth and intelligent network connectivity
 - » Powerful processors to drive models and customize products
 - » Gargantuan databases to extract vast quantities of data
 - » Intelligent software to link disparate functions together
 - » Data standards
 - » Intelligent software
 - » Lenders and industry associates with vision, deep pockets and courage