
The leading edge of computer technologies and applications
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Objective of presentation

- Capture picture of fast moving computer technology and applications
- Presentation gives the highlights; important to go to the paper itself for details; also book is in the works

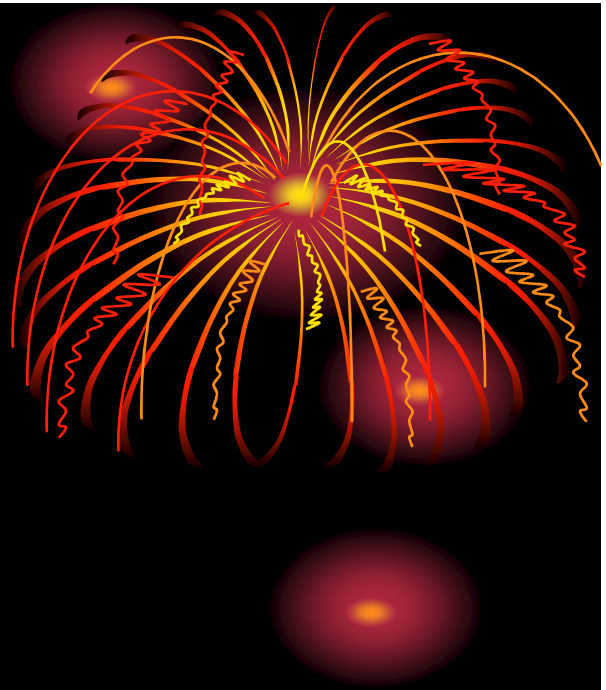
A compilation paper

- Uses available original sources; the originality is in the selection mix
- Provides the links for more exploration
- Computer experts both scholars and practitioners were consulted

The listing of the topics

- **Does not reflect a rank order since they are all of importance and in fact many of them interrelate/overlap**

The list, part one



- Mobile computing
- Cloud computing
- Super-web; web streaming, Internet TV
- Virtualization; big data; virtual reality
- Blade server technology and beyond

The list, part two

- Super PC; laptops; tablets; smart phones; phablets; Chromebooks
- Mainframe breakthrough
- High performance computing/ super computers
- CAM,CIM, Robotics
- Robotic surgery

The list, part three

- Satellite communication
- Algo trading
- eCommerce, mCommerce
- eBus, eMgt, eLeadership
- BYOD
- Online education, eBooks
- eGov
- Cyber security, hacking

Ubiquitous computing will enable diverse wireless applications, including monitoring of pets and houseplants, operation of appliances,

Mobile computing

Credit: www.wordpress.com

Mobile computing

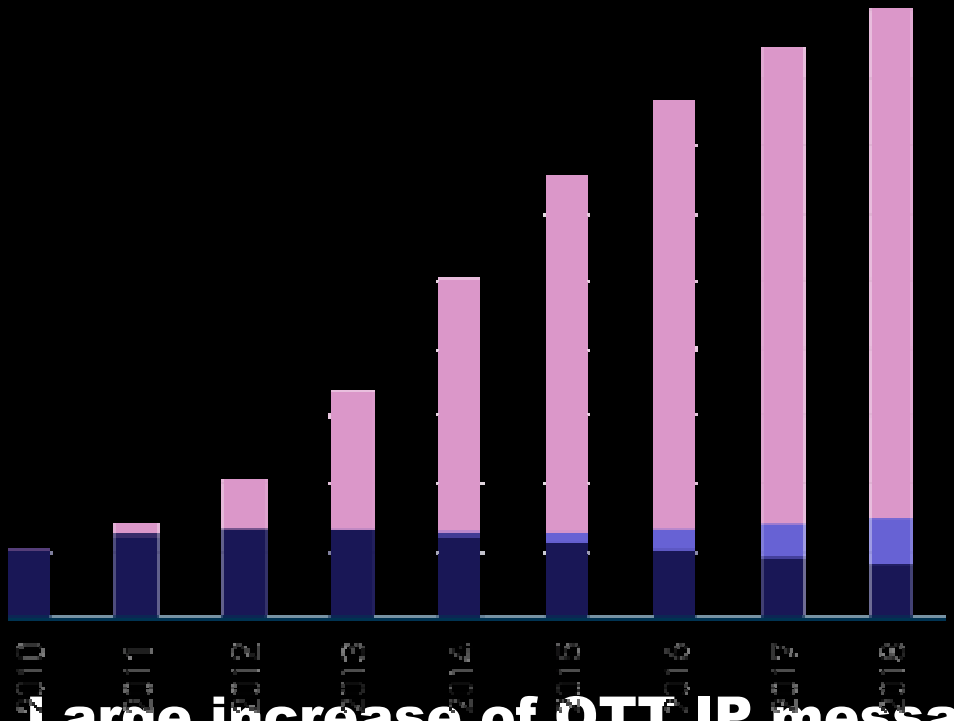
- We've lived in the wired age a long time, now wireless technologies dominate computing and communicating; large number of apps keep growing e.g. work on the go, mobile payments, instant news
- Even Microsoft getting into mobile, partnering with Nokia

Mobile messaging: explosive growth

- People spend growing amount of time on mobile devices; A2P messaging overtaking P2P SMS
- Growth of service enabling messages: SMS, MMS and push notifications are in the mainstream; multichannel messaging becoming the norm; over the top messaging (OTT) vs SMS
- Credit: OpenMarket

Significant developments: free is good

- WhatsApp Messenger is a cross-platform instant messaging application that allows iPhone, BlackBerry, Android, Windows Phone and Nokia smartphone users to exchange text, image, video and audio messages for free; has grown to half billion users.
- Growing use of KakaoTalk (free messaging) acquiring Daum Communications to boost its web presence



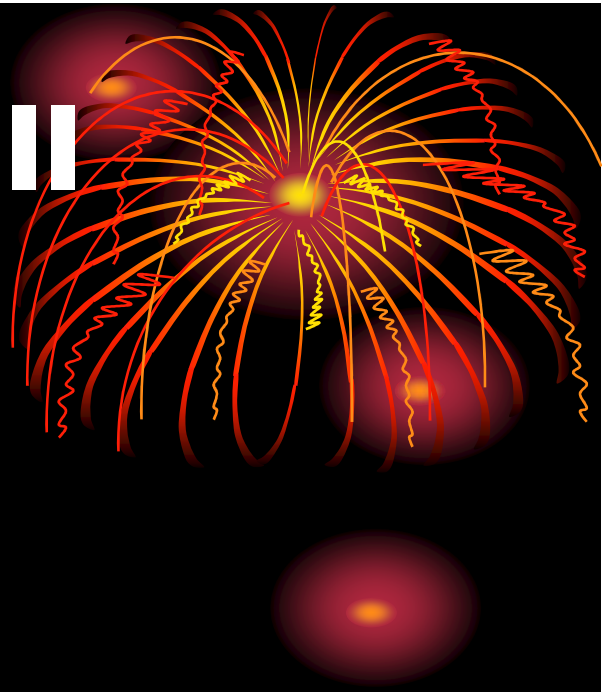
Large increase of OTT IP messaging, significant increase of IP messaging, decrease of SMS

Source: http://www.analysysmason.com/About-Us/News/Insight/OTT-messaging-volumes-Jan2014-RDMV0/

Mobile computing

- Wi-fi, wi-fi everywhere even on commercial airlines
- Mobile banking keeps growing
- Amazon opens ‘wearable’ tech store
- People like gadgets: Leapband, Apple iWatch, blue tooth ring, Google glass, Google contact lens, wrist communicator, GPS implants …

Wired apps are still there



- VOIP apps
- Legacy apps

Cloud computing

Credit: www.vizzeco.com

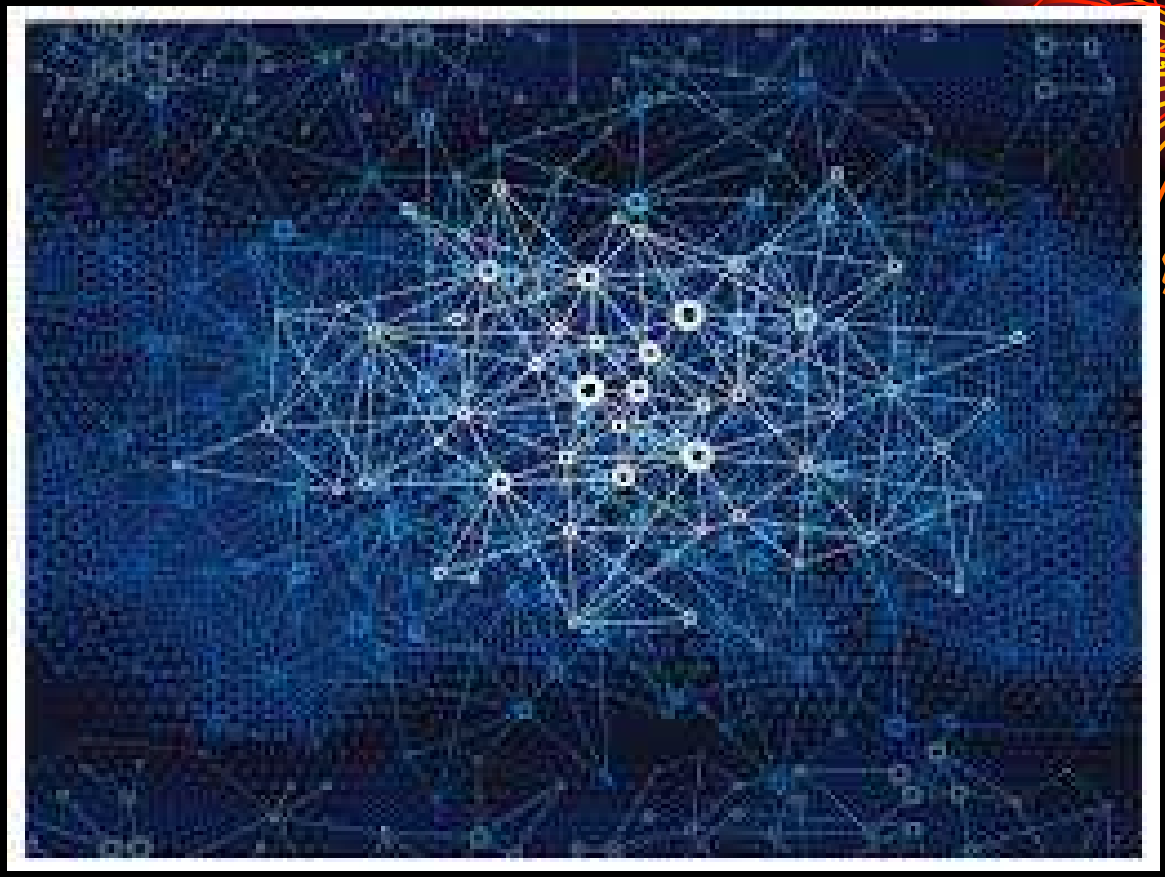
Cloud computing

- Big deal with all the big players in the game competing to reach out to the ‘clouds’
- IBM launched its new cloud marketplace: aggressive approach for cloud portfolio expansion

Social networking in a nutshell (credit EY)

Social networking

- Do not forget to send your selfie with your friends at the conference to your family and friends back home
- Work gets done in this electronic context



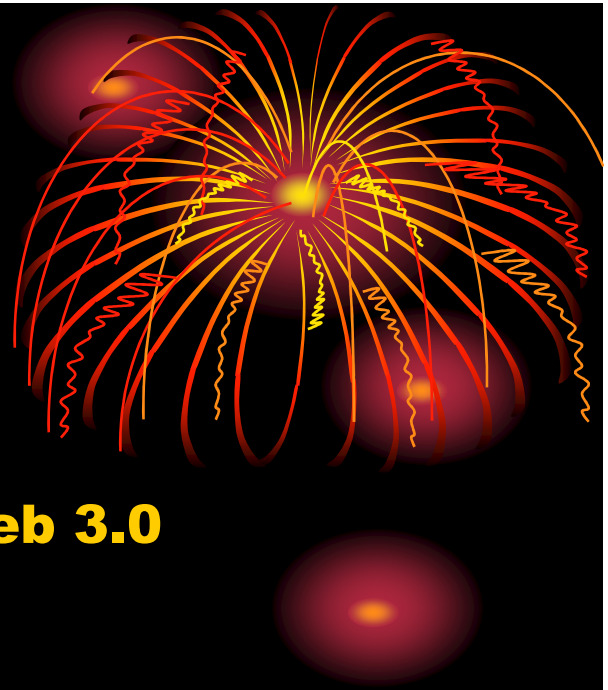
The amazing World Wide Web keeps growing

Source: www.europeanceo.com

Google powerhouse: its web server farm

http://www.engadget.com/2012/10/17/google-inside-data-centers/

Super web



- From hypertext a generation ago to multifaceted/multimedia: Web 2.0, Web 3.0 semantic web
- Growing use of webconferencing
- Web streaming: music streaming (decline of iTune), game streaming; Internet TV
- Netflix, Hulu, Chromecast, Apple TV, Amazon Fire, etc
- Network TV companies offer programming on the web; Cable facing tough competition; Google launching Android TV
- Newspapers and Magazines all have online versions and extensions

SEO (Webopedia)

- Search engine optimization is a methodology of strategies, techniques and tactics used to increase the amount of visitors to a website by obtaining a high-ranking placement in the search results page of a search engine (SERP) -- including Google, Bing, Yahoo and other search engines.
- SEO helps to ensure that a site is accessible to a search engine and improves the chances that the site will be found by the search engine.

Webby awards

- **A Webby Award is an award for excellence on the Internet presented annually by The International Academy of Digital Arts and Sciences. Categories include websites, interactive advertising, online film and video, and mobile. ...**
- **http://en.wikipedia.org/wiki/Webby_awards**

Webby awards 2014

- **Winners include Netflix for Best User Experience, airbnb for Best Travel App and Kickstarter for the Webby Breakout of the Year award.**

The world of TV streaming

http://www.cnn.com/2014/04/25/tech/gaming-gadgets/web-streaming-devices/

Virtualization, virtual reality

- Virtualization has been constantly expanding
- Virtual reality is now for real; applications range from film making (Gravity, Her) to gaming to growing range of computer animated movies
- Michael Jackson live at the Billboard Award via computer animation; computer holograms becoming common
- Google glass; Google contact lens

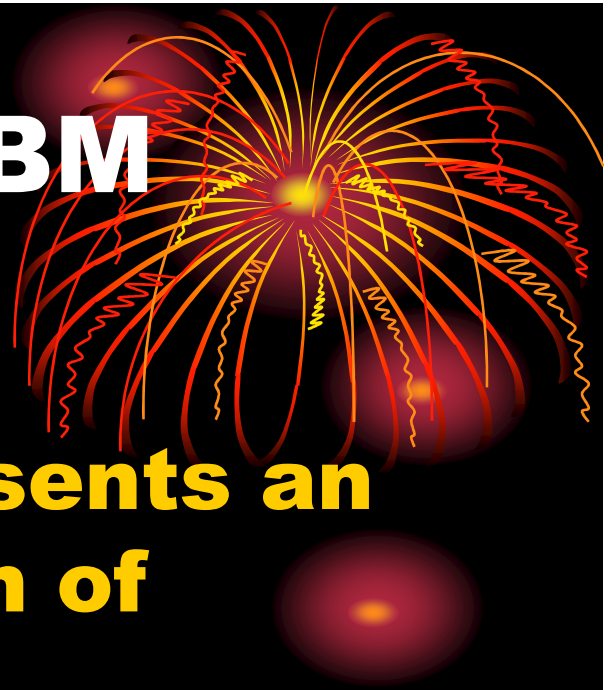
Big data

- Big data keeps growing with ultra high storage capacity
- High power analytics= major factor in business; we have transited from the Information Technology era to the Knowledge Technology era: drawing knowledge from data
- White House warns of possible big data abuse; concern for privacy

Blade server technology and beyond: hardware is a factor

- Technology that enabled the web to grow as it did: A blade server is a server chassis housing multiple thin, modular electronic circuit boards, known as server blades. Each blade is a server in its own right, often dedicated to a single application. The blades are literally servers on a card, containing processors, memory, integrated network controllers, an optional Fiber Channel host bus adaptor (HBA) and other input/output (IO) ports.

Blade technology: IBM going further



- **IBM Flex System represents an entirely new generation of technology, with more performance and bandwidth, true integrated enterprise SAN storage, and far more capability to consolidate and virtualize than previous systems. A game changer.**

IBM Flex System

- Businesses around the world have a timely opportunity to move forward beyond blade servers, transforming the data center by bringing together servers, networking, and storage – all under integrated management – with IBM Flex System.

Super PCs, laptops, tablets, smart phones, Chromebooks

- Multi-device environment
- The capacity of PCs and laptops keeps growing; touch screen computing is here
- There is a whole gamut of tablets; IPAD remains the ‘standard’
- Smart phones keep getting smarter
- Phablets are here and there’s a whole bunch of them
- Chromebooks open up a new world of computing; Google apps competing with MS Office apps

3D enabled desktops & laptops

- Fujitsu has an all-in-one desktop PC that packs a 3D LCD and a built-in 3D camera that captures 3D images and video that can be viewed with the included 3D glasses. Lenovo is following closely and so other PC/laptop makers

3D printer

- 3D printing is a process of making three dimensional solid objects from a digital model. 3D printing is achieved using additive processes, where an object is created by laying down successive layers of material.

Office apps crossover

- PC to Apple apps
- Now also available on IPADs; this is highly significant: Microsoft going after sizeable software gains?

Mainframe computing

- The IBM 360 breakthrough (50 years ago) to modern mainframe computing (multitasking, multiprocessing, virtual memory)
- Mainframe computing complementing web computing
- Mainframes make it possible to handle large databases with instant computing e.g. multi-faceted travel reservations

IBM mainframe

- **Makeover platform for mobile and cloud era**
- **Bluemix: open platform for developers of Enterprise apps**

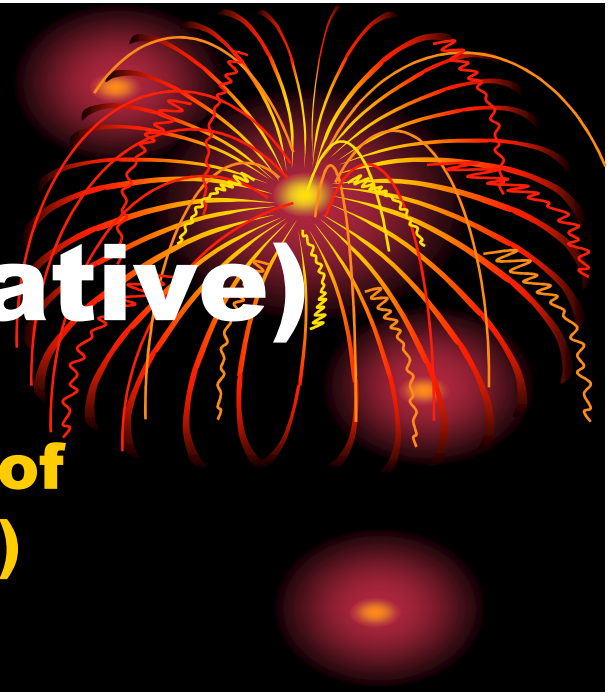
High performance computing/supercomputers

- The supercomputers are getting ever more powerful
- They are used to dealing with a vast array of complex problems facing society

Top ten supercomputers

- 1. Tianhe-2 (China)
- 2. Titan (US)
- 3. Sequoia (US)
- 4. K Computer (Japan)
- 5. Mira (US)
- 6. Piz Daint (Switzerland)
- 7. Stampede (US)
- 8. Juqueen (Germany)
- 9. Vulcan (US)
- 10. SuperMuc (Germany)

Supercomputer applications (illustrative)



- Recreating the big bang/origin of humankind (e.g. Illustris Model)
- Understanding earthquakes
- Understanding proteins
- Mapping the blood stream
- Testing nuclear weapons
- Forecasting hurricanes
- Predicting climate change
- Building brains
- Playing Jeopardy against humans

CAM: computerization of manufacturing

- **Computer-aided manufacturing (CAM) is the use of computer software to control machine tools and related machinery in the manufacturing of work pieces. CAM may also refer to the use of a computer to assist in all operations of a manufacturing plant, including planning, management, transportation and storage.**

CIM

- **Computer-integrated manufacturing is the manufacturing approach of using computers to control the entire production process. This integration allows individual processes to exchange information with each other and initiate actions. ...**
- **http://en.wikipedia.org/wiki/Computer-integrated_manufacturing**

Robotics in manufacturing

- Large number of manufacturing tasks performed by industrial robots
- With more companies looking for lean manufacturing solutions, industrial manufacturing robots provide many benefits that companies require to stay competitive. The speed, repeatability, and efficiency that industrial robots provide can increase productivity and profits, reduce costs.

Robotic surgery

- **Robotic surgery is a method to perform surgery using very small tools attached to a robotic arm. The surgeon controls the robotic arm with a computer.**

Robotic surgery

- With the *da Vinci* Surgical System, surgeons operate through a few small incisions. Its magnified 3D high-definition vision system and tiny wristed instruments bend and rotate far greater than the human wrist. It enables the surgeon to operate with enhanced vision, precision, dexterity and control. Minimally invasive it uses the latest in surgical and robotics technologies.
- Beneficial for routine and complex surgery.

Telemedicine and eHealth

- Providing medical services electronically
- Promoting good health

Satellite communication

- High and low orbit satellites have opened up a whole gamut of communication possibilities
- Think of the transmission of an important event worldwide live
- Satellite TV competes with cable TV
- AT&T buying DirectTV

Algo trading becoming dominant form of trading; computer trading/platform in wide use

- Computerized trading system that utilizes mathematical models for making transaction decisions in the financial markets. The rules built into the model attempt to determine the optimal time (high speed) for an order to be placed to buy or sell. Large blocks of shares are usually purchased by dividing the large share block into smaller lots and allowing the complex algorithms to decide when specific blocks are to be purchased.

eCommerce, mCommerce

- Super big when you think of Amazon; here again all the retailers albeit eTailers are in
- eBay continues to grow

eBusiness, eManagement, eLeadership

- **All the managerial functions are heavily impacted by computer technologies and applications**

BYOD

- **Bring your own device (BYOD)—also called bring your own technology (BYOT), bring your own phone (BYOP), and bring your own PC (BYOPC)—refers to the policy of permitting employees to bring personally owned mobile devices (laptops, tablets, and smart phones) to their workplace, and to use those devices to access privileged company information and applications.**

BYOD - more

- BYOD is making significant inroads in the business world. BYOD may help employees be more productive. It may also increase employee morale and convenience by using their own devices and makes the company look like a flexible and attractive employer. BYOD may even be a means to attract new hires, pointing to a survey that indicates 44% of job seekers view an organization more positively if it supports their device.

Online education1

- Education has been revolutionized. Even MIT provides education online (eLearning)
- Even onsite education has changed with many more classes conducted in computer labs or if in class impacted by BYOD i.e. the practice of allowing students to use personally owned devices in education settings.

Online education2

- The world of eBook has been expanding, both for formal education and informal education (devices (eReaders), online databases, books online)

Last but not least: eGov apps

- Increase in gov services (G2C) at the federal, state and local levels provided online
- Mega portal: www.usa.org
- Increase in (a) gov to gov (G2G)
- (b) gov to business (G2B)

Obamacare delivered via complex computer systems

- The technical nightmare: rush of users that the original system could not handle
- Answer: segmented systems; scalability

Cyber security, hacking

- This is a major problem area as we rely more and more on computing; cybercrime
- Altogether most systems work rather well but hackers are out there looking for security gaps
- IPv6; encryption gaining ground
- Big companies working together to stay ahead of the curve

Conclusion1: competition as driving force

- We have been looking at an exciting field with many interesting things happening; many more are on the horizon; competition spurs technological progress, e.g. AT&T competing with the other players for gigabit broadband Internet

Conclusion2: Net neutrality

- **FCC: most lanes continue to be ‘free’ but now some fast lanes with ‘toll’ introduced**

Conclusion3: Quantum computing on horizon

- **2014: quantum computing is still in its infancy but experiments have been carried out in which quantum computational operations were executed on a very small number of quantum bits. Research, practical and theoretical, continues; many national governments and military agencies support quantum computing research to develop quantum apps for civilian and national security purposes**

Conclusion4: Nano technology

- **Major impact; versatility**

Conclusion5: trends

- Expect more ubiquitous computing; ‘The Internet of things’: all devices, objects, systems are web connected and share information
- more voice command (you talk to the computer and it does what you ask): back to the original world of Alibaba!