

IBM Çözümler Zirvesi 2012

Swissotel the Bosphorus, İstanbul / 15 Şubat 2012

Delivering New Insights through High Performance Computing

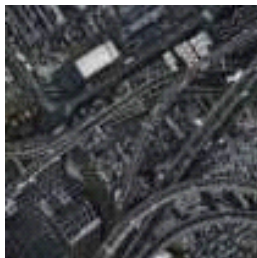
Maciej Remiszewski

Deep Computing Sales Manager

IBM Central & Eastern Europe

The World is getting **smarter**

More instrumented, interconnected, intelligent...



Smart traffic systems



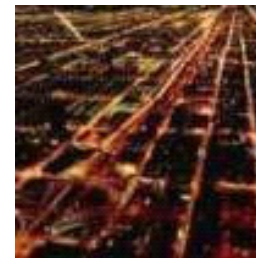
Intelligent oil field technologies



Smart food systems



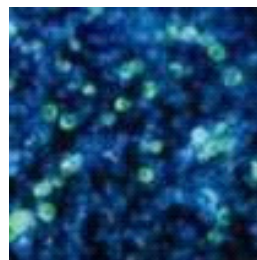
Smart healthcare



Smart energy grids



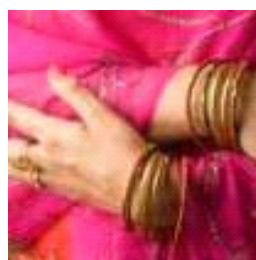
Smart retail



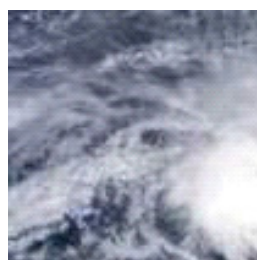
Smart water mgmt



Smart supply chains



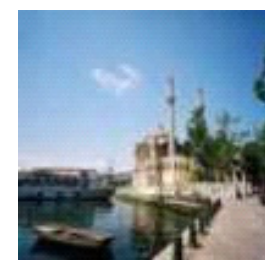
Smart countries



Smart weather



Smart regions



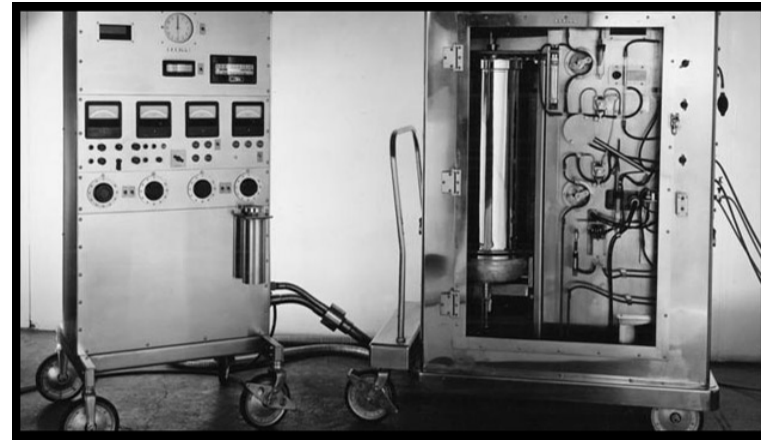
Smart cities

A History of Innovation

1950s... 1960s... 1970s...



1950s: Fighting Polio with Punch Cards



1953: A Heart on Wheels



**1960s: Taking on Leukemia with
Blood Cell Separator**



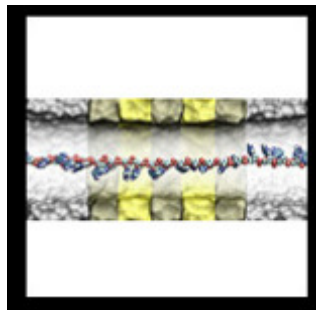
**1976: IBM & World Health Organization
Map Smallpox Outbreaks**

A History of Innovation

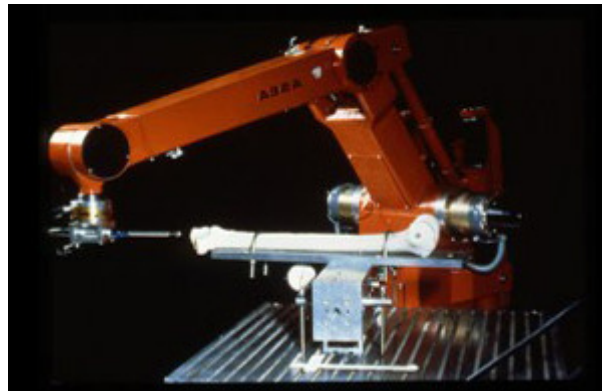
1990s... 2000s... 2010s...



1990s: 3D Medical Imaging
IBM & Univ. of Washington



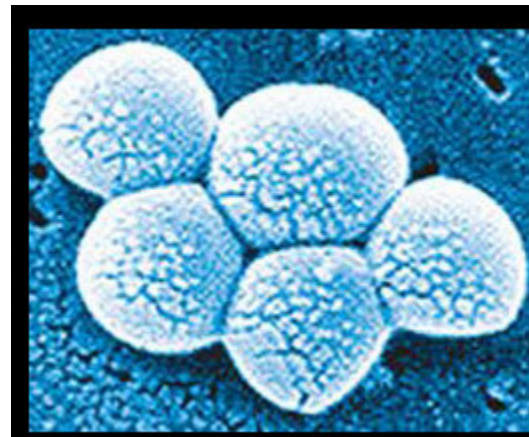
2010: IBM & Roche: DNA Sequencing



1992: Surgical Robot
IBM & Univ. of California



2008: IBM & Univ. of Edinburgh
Fight Spread of HIV

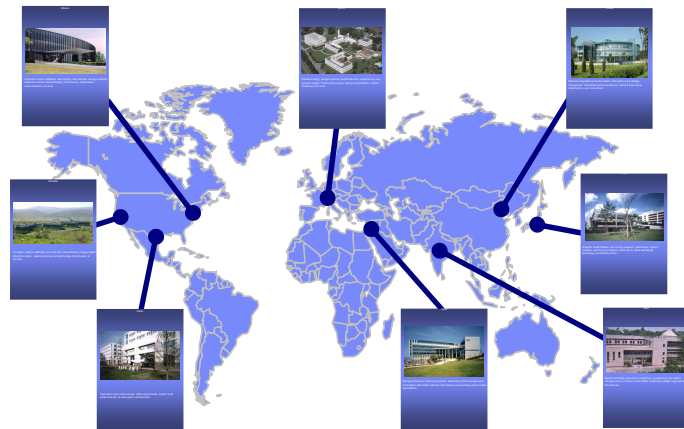


2011: IBM & Singapore's
Institute of Bioengineering
and Nanotechnology:
Using Semiconductor
Nanotechnology to
Fight Bacteria

IBM Deep Computing

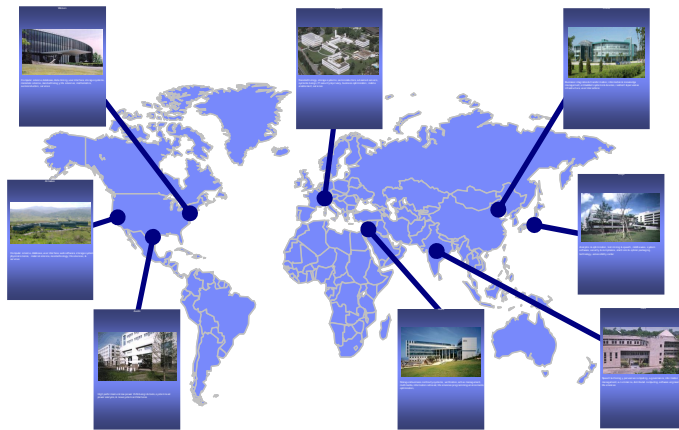
...deriving scientific and business value from information

- Experience & Expertise
- Solutions & Platforms



IBM Research

Science vs Industry | Theoretical vs Applied Science



IBM Research - Zurich Member of a global research community

Lab overview

IBM has maintained a research laboratory in Switzerland since 1956, located on its own campus in Rüschlikon near Zurich since 1962. As the European branch of IBM Research, the mission of the IBM Research - Zurich lab — in addition to pursuing cutting-edge research for tomorrow's information technology — is to cultivate close relationships with academic and industrial partners, be one of the premier places to work for world-class researchers, to promote women in IT and science, and to help drive Europe's innovation agenda.

Nanotechnology Center



→ IBM Research and ETH Zurich team up to establish ultramodern facility

Internal and external collaboration

Worldwide interaction and collaboration with internal partners in research, development, industry sectors, and with IBM customers play a vital role in the laboratory's activities. At the same time, IBM researchers are active members of the international scientific community by participating in seminars, conferences, and professional associations in a variety of functions. IBM Research - Zurich is also involved in [many joint projects](#) with universities throughout Europe, in research programs established by the European Union and the Swiss government, and in cooperation agreements with research institutes of industrial partners.

Members of IBM Research - Zurich

IBM Research - Zurich employs a steady stream of postdoctoral fellows, PhD candidates, and summer students who pass through the laboratory. More than 30 nationalities, primarily from European countries, are represented among the research staff members, including such specialists as computer scientists, mathematicians, electrical engineers, physicists, and chemists. They often work together on an interdisciplinary basis.

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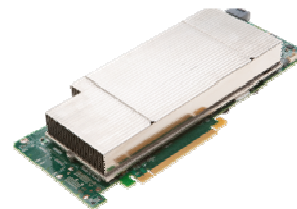
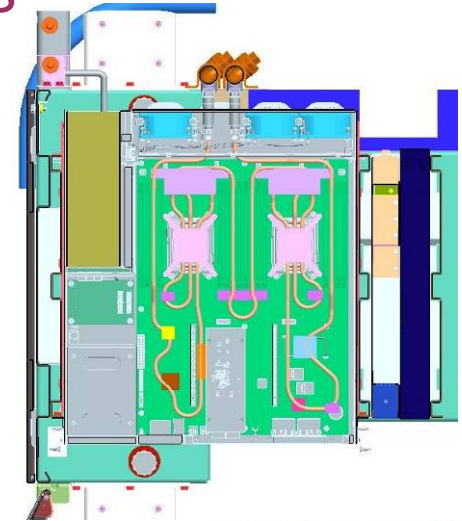
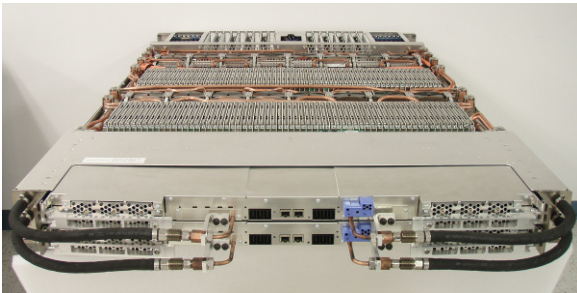
IBM Research brochure

IBM Research - Zurich leaflet



Breakthrough Technology

...state of the art tools for Grand Challenges

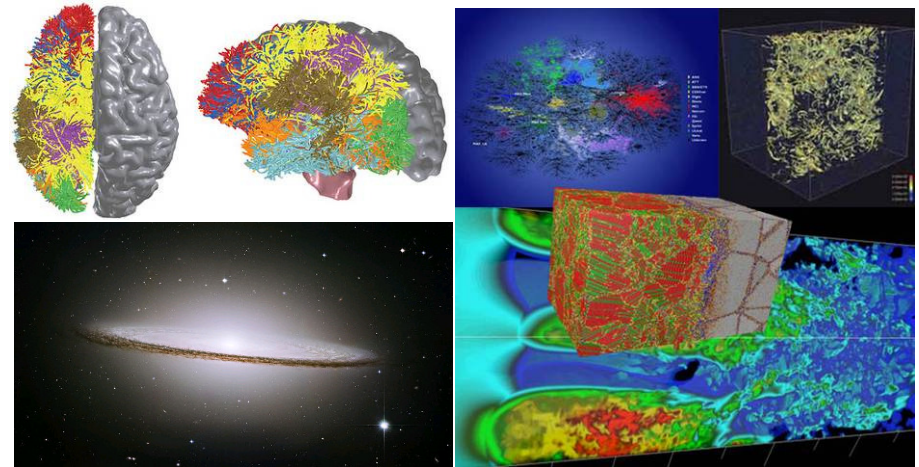


Breakthrough Technology

...the only way to deliver required performance

Breakthrough Science

- Role of simulations in Research
- Explosion of data for study
- Time to discovery / innovation
- **...there are still lots of questions!**

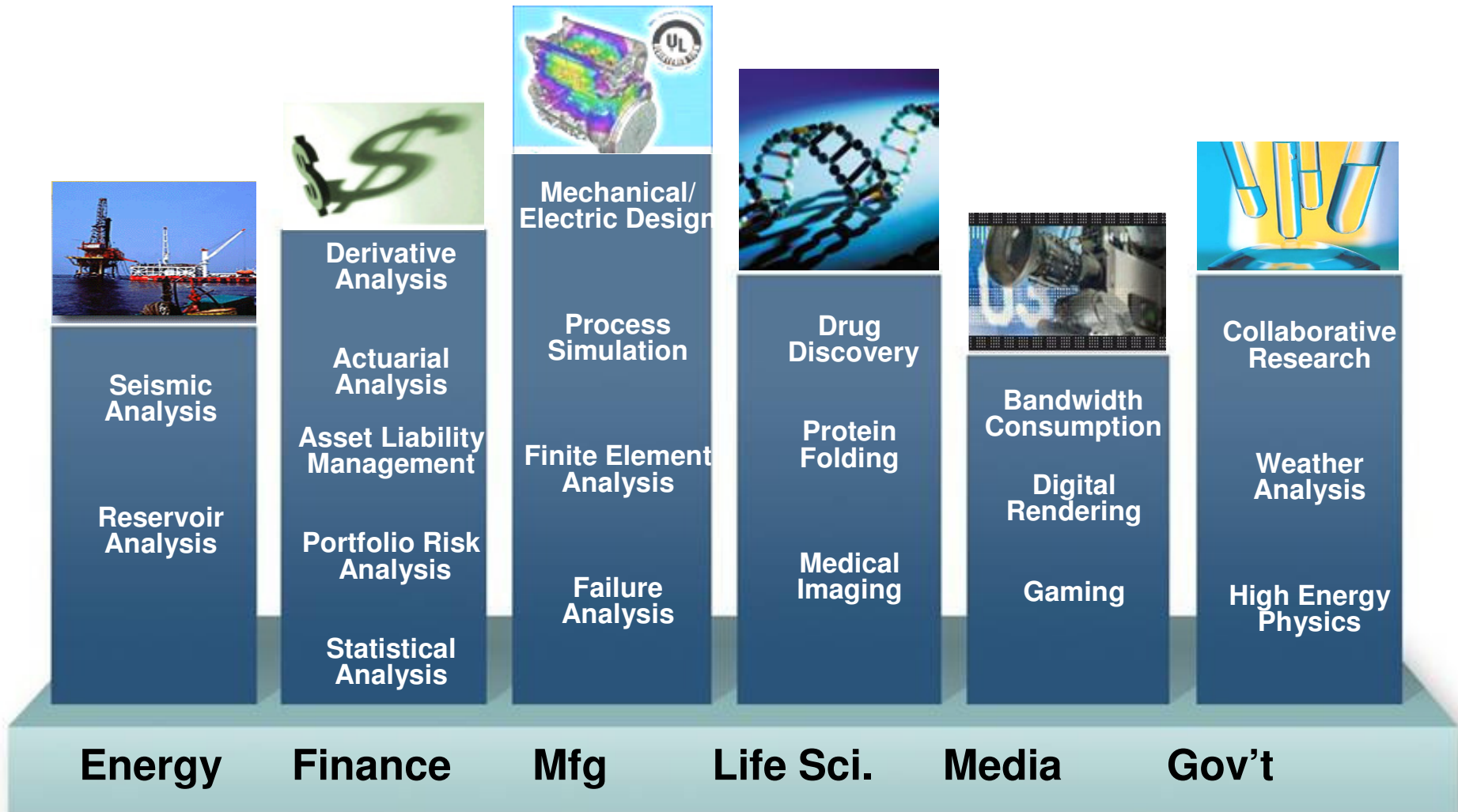


Technological Limitations

- Science is ahead of technology
- Systems are becoming complex
- No escape from parallelism
- **...it will only become weirder!**

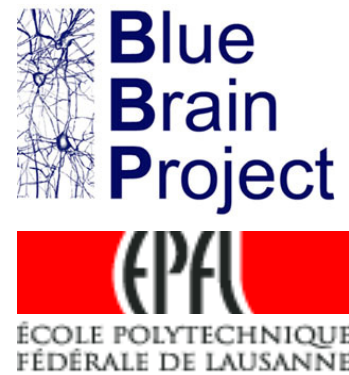
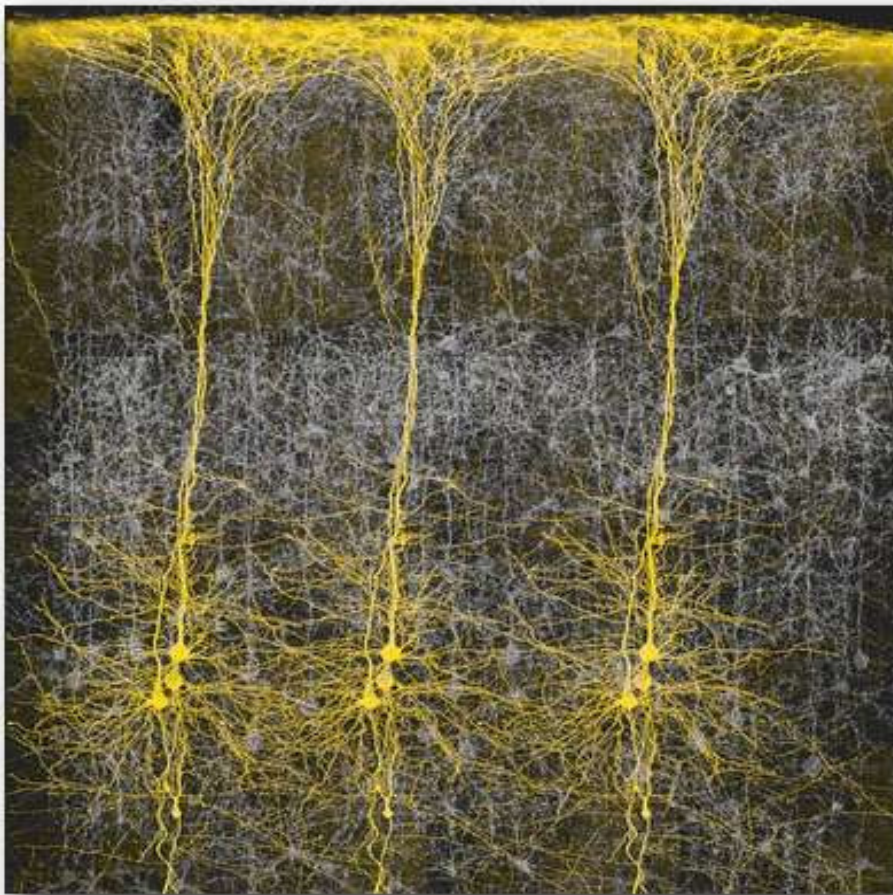
Solution & Market Segments

“including, but not limited to...”



How can this matter to **Science**?

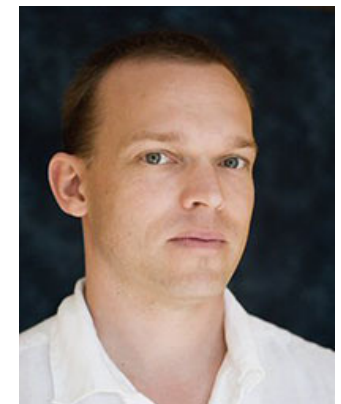
Blue Brain and the Human Brain Project (HBP)



Henry Markram



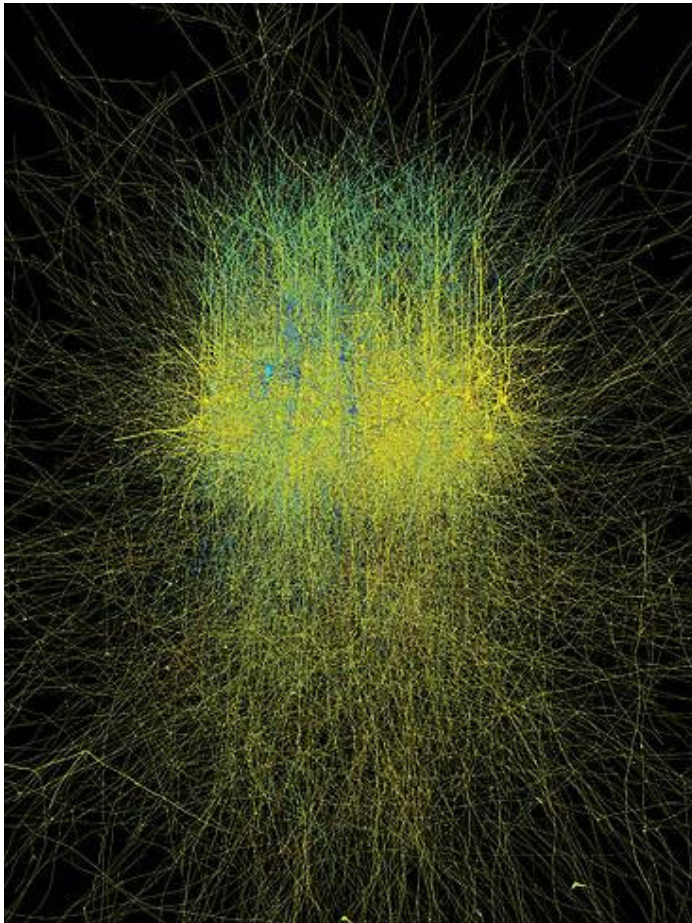
Felix Schürmann



Sean Hill

Prof. Henry Markram's vision

... "The Next Decisive Years" are ahead.



Henry Markram: Simulating the Brain — The Next Decisive Years [1/3]

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ISC'11 Keynote Talk

Prof. Dr. Henry Markram
Director Brain Mind Institute, EPFL

**Simulating the Brain –
The Next Decisive Years**

ISC'11 | Hamburg, Germany | June 19 – 25, 2011 | www.isc11.org

Henry Markram
Brain Mind Institute, EPFL

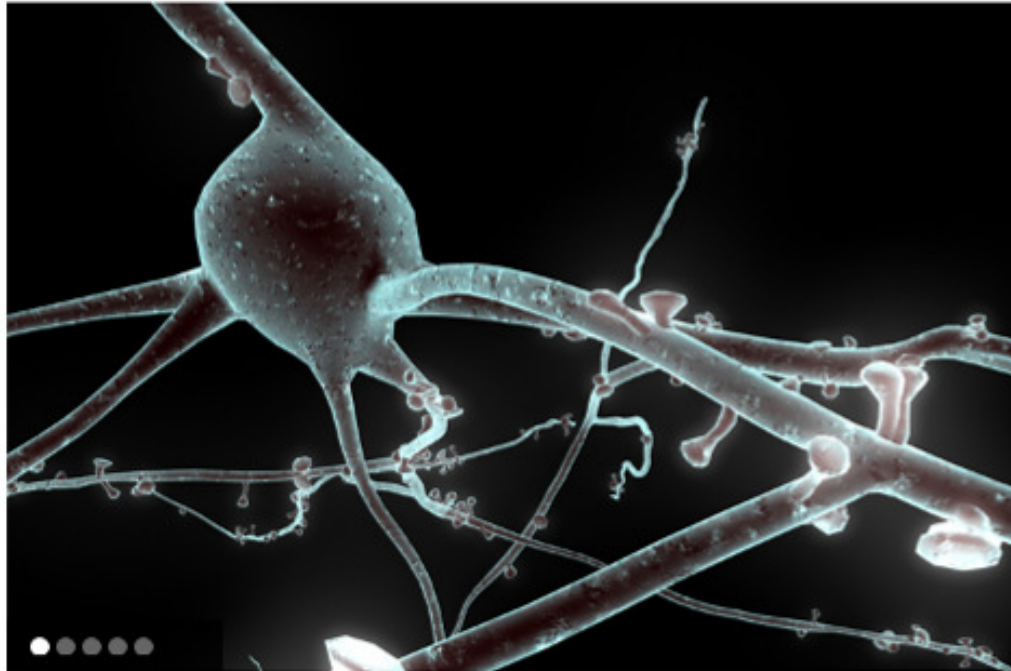
Simulating the Brain – The Next Decisive Years

[International Supercomputing Conference / 20.06.2011]

Universität Hamburg
100 Jahre 1910-2010

00:00 / 14:37

http://www.youtube.com/watch?v=_rPH1Abuu9M
<http://www.youtube.com/watch?v=wDY4cFJauls>
<http://www.youtube.com/watch?v=h06lgyES6Oc>



EUROPEAN PARTNERS/



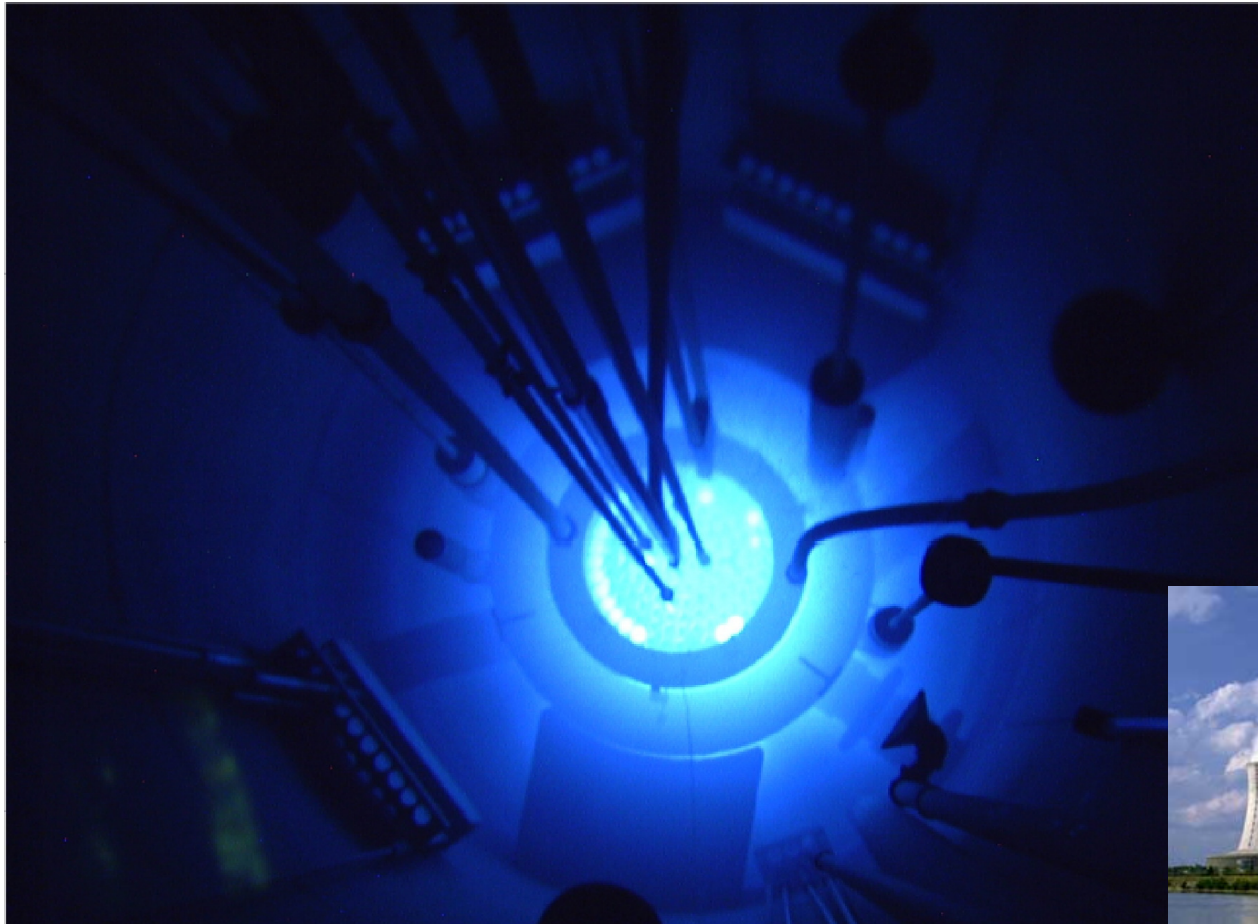
LINKS/

▶ HBP Consortium



How can this matter to **Industry?**

Électricité de France (EDF)

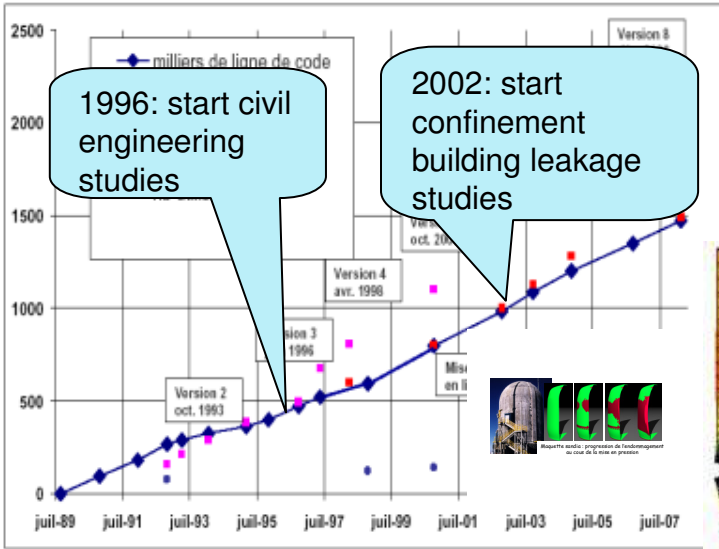


Simulation program at EDF

...50 years of structural mechanics simulation



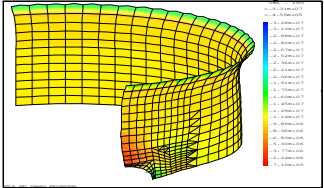
1970-80: design studies, on type of FE, linear, specific limit conditions



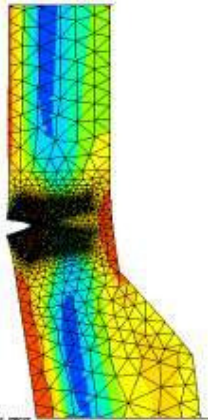
2002: start confinement building leakage studies

1960-70: First dam linear FE simulation (EDF apps then ASKA)
Pylon Optimization (OPSTAR)

1980: 3D non linear breaking simulation: vessel damage surface detection



Now: Civil Engineering, Steel Thermal Fatigue Damage, Lifetime, Earthquake resistance Coupled Thermal – hydraulic – mechanical Material



60

70

80

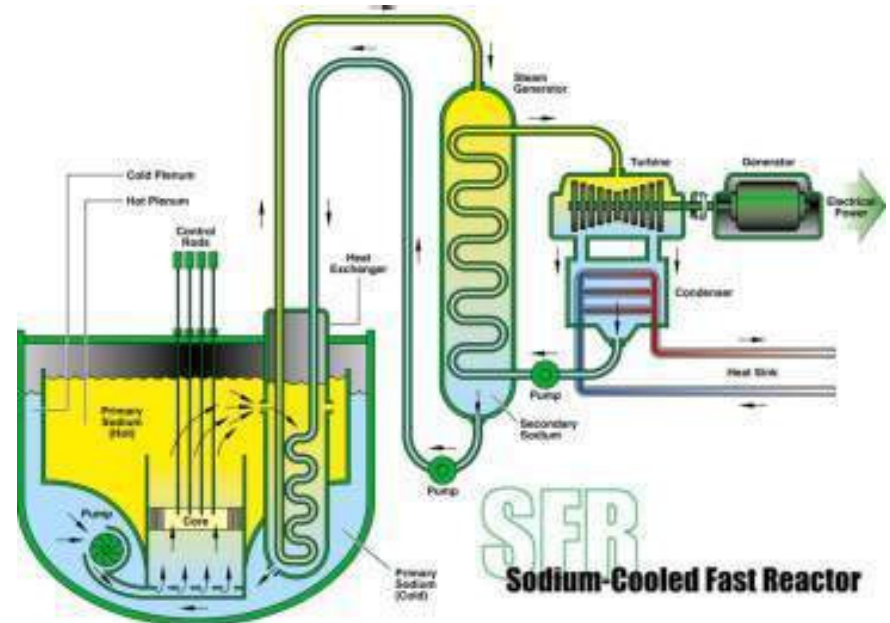
90

2000

2010

HPC Simulations for Nuclear Energy

Electricite de France (EDF)



- Safely extend lifetime of existing reactors from 40 to 60-100 years
- Increase reactor power output

- Design of new more efficient and safer reactors which produce less nuclear waste

So where is the problem?

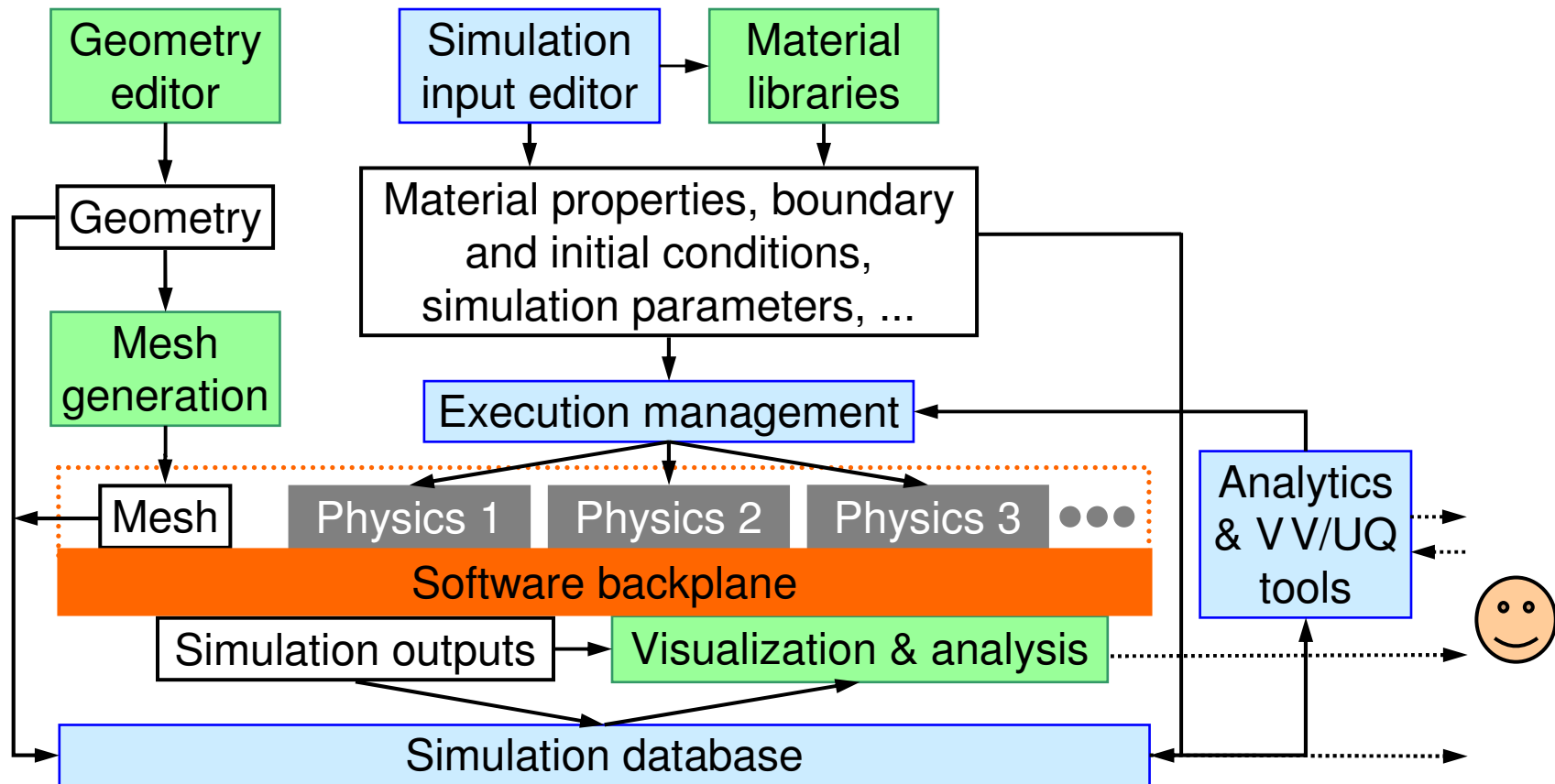
Impediments to Broader Use of HPC Simulations

- **Difficult to create and manage meshes**
- **Difficult or impossible to couple multiple analysis codes**
- **No “plug-and-play” software capability**
- **Manual, multi-step modeling process**
- **Requires intimate familiarity with many pieces of software**
- **Difficult to store or query inputs or results, to do V V&UQ, or to perform analytics**
- **No easy user interfaces**

Need a comprehensive HPC simulation framework

Example Simulation Framework

...developed in collaboration with IBM Research



Framework categories:

Software backplane

Services

Data management, workflow, analytics, and user interface

Development framework
(not shown) used to develop analysis and framework codes

How can this matter to **Business?**

NYSE Technologies and “Trading-in-a-box”

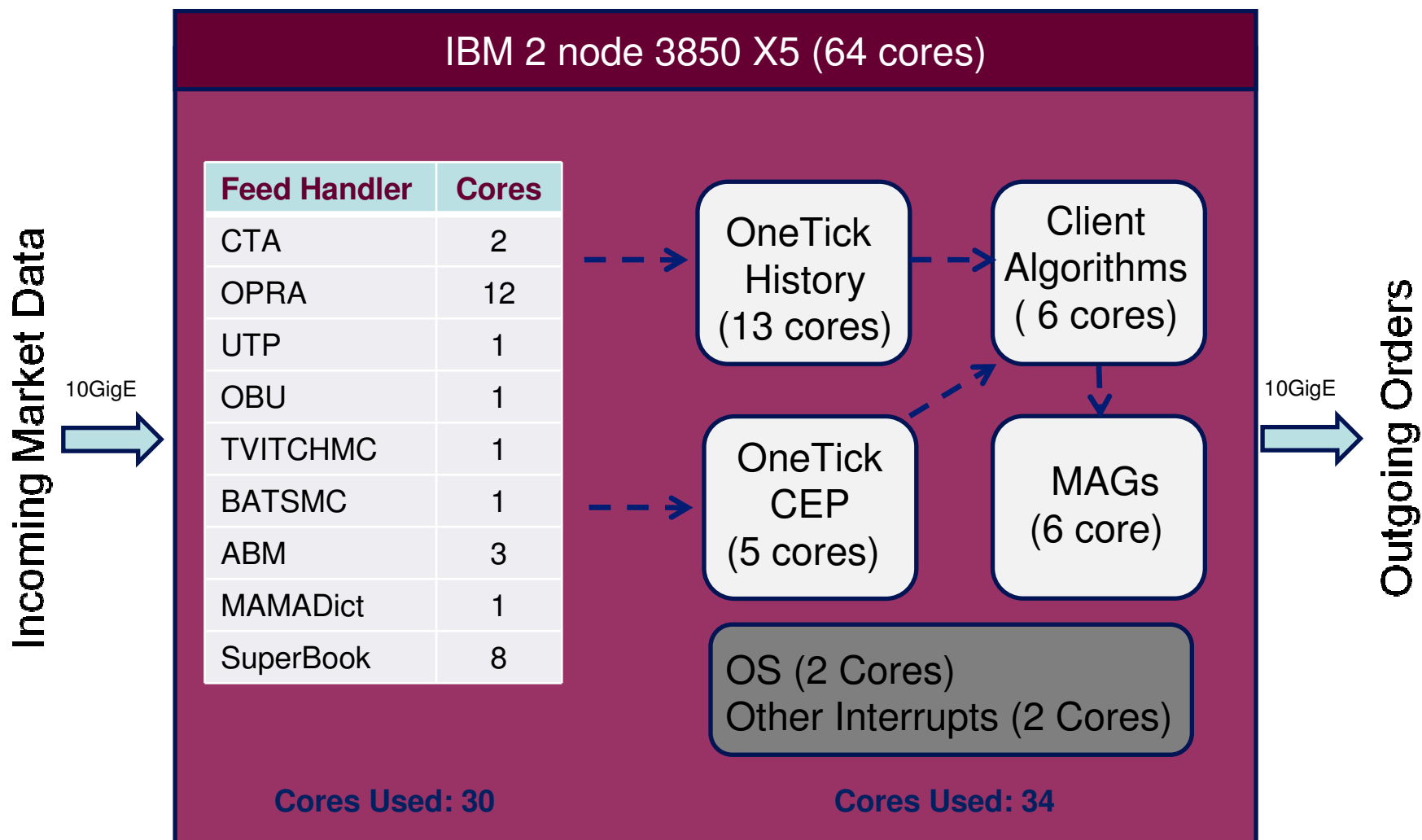


“Getting all of our components on a 32-core box reduced latency by nearly an order of magnitude while simultaneously reducing data center footprint and hardware costs.

Large multi-core boxes are clearly the future for our deployments,”

NYSE Technologies client.

“Trading-in-a-Box™”




More information available

“Reducing Complexity for Trading Speed and Efficiency” Case Study


CASE STUDY

Reducing Complexity for Trading Speed and Efficiency



▶ NYSE Technologies' single-server Trading-in-a-Box™ solution uses Intel Xeon Processor 7500 Series in an IBM System x3850 X5 system to drive down latency and complexity, while boosting the ability to find new market opportunities through real-time analytics.

Sponsored by



▶ Reducing Complexity for Trading Speed and Efficiency

NYSE Technologies' Trading-in-a-Box runs on IBM's System x3850 X5 servers, which are capable of scaling from four to eight sockets with memory, storage and processing capacity to meet the demands of a business now and into the future. The x3850 X5 is the fifth generation portfolio of IBM industry-leading technology in enterprise x86 computing. It expands Enterprise X Architecture IBM BladeCenter and provides two times the memory capacity of competitive offerings, lowering software costs by up to two-thirds. The x3850 X5 offers lower management and administrative costs and is the market share leader in scalable x86 servers.

"NYSE Technologies' use of the 64 high-performance cores in the IBM System x3850 X5 server is a new model for algorithmic trading. The x3850 X5 has been engineered to provide enterprise-class reliability, and compute and memory scalability, and we're excited to have NYSE Technologies create a new reference platform within," says Dave Weber, Program Director, IBM Wall Street Center of Excellence.

NYSE Technologies' Trading-in-a-Box enables financial firms to devise additional strategies that they might not have come up with while they're running one server to serve, which can optimize trader performance and provide a competitive edge.

"What's great about this platform is that it's all there," O'Sullivan says. "On a single machine, you're running feed handlers for all the sources of data and you're storing the history of that data so you can compare in real time. You're running analytics, which are doing value-added calculations to decide what trends are in effect and which way share prices are going. You can compare the history with the real-time analytics to determine if it's a good time to buy or sell, all on one machine. It does it all, and it does it much faster than ever before."


About NYSE Technologies
A division of NYSE Euronext/NY, NYSE Technologies provides comprehensive transaction, data and infrastructure services, and managed solutions for financial services firms requiring high availability performance and expertise for mission-critical and value-added client services.

With offices across the U.S., Europe and Asia, NYSE Technologies offers advanced integrated solutions for the global capital markets community, enabling the ability to power trading operations for many other world-class financial institutions and exchanges. For additional information visit www.nyse.com/technologies.

About Intel
Intel is the world leader in silicon innovation and collaborates with the financial services industry to deliver low latency, energy efficient solutions to meet the compute performance demands for information and growth. For additional information visit www.intel.com/financialservices.

About IBM
IBM System x enterprise servers represent the best of IBM X Architecture™ technology, leveraging decades of mainframe server design to deliver an open and affordable, industry-standard server platform that can help tackle your most demanding workloads. For additional information visit www.ibm.com/systems/business/ibm/processors/23105.

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Wall Street, New York City, USA

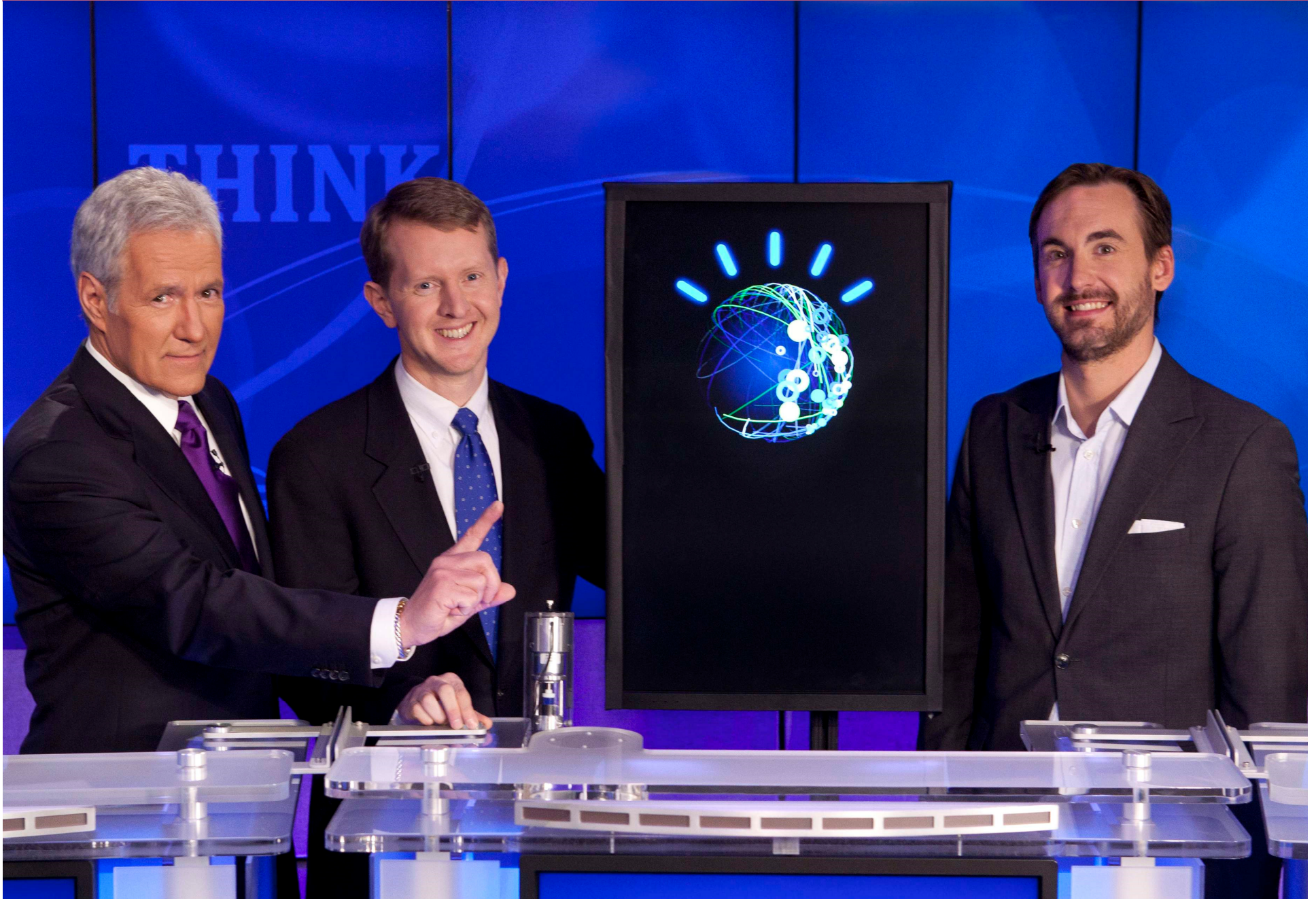
590 Madison Avenue, 12th floor New York, NY 10022 | Tel: 212-745-2101

Who we are

The IBM Wall Street Center of Excellence in New York City provides in-depth technology briefings, product demonstrations, solution workshops and hosts events for IBM clients and IBM Business Partners focusing on solutions for Financial Markets clients utilizing IBM's Systems and Storage products. These valuable services are provided at no charge to IBM clients.

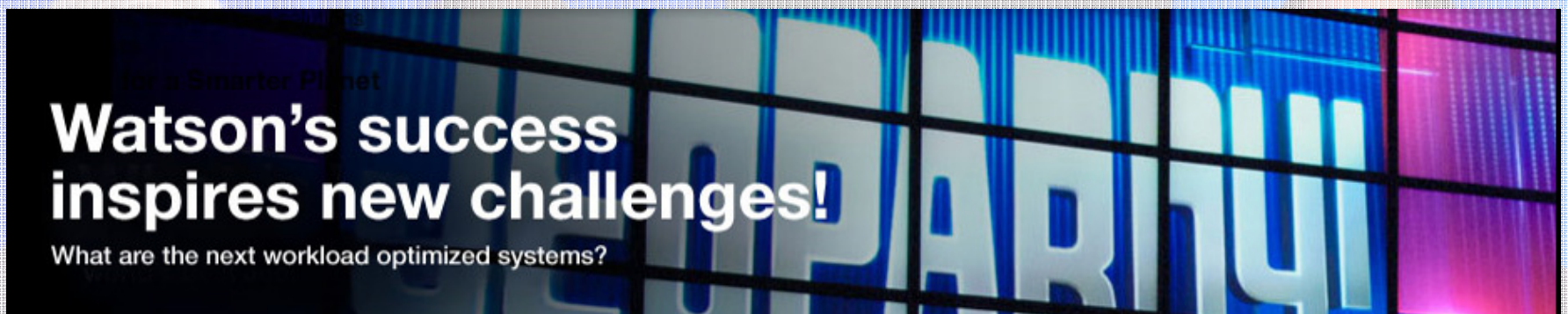
Our value to you

We bring together the IBM team across Servers, Storage, Software, Services and Research to innovate with our clients and business partners to solve their most challenging business objectives relating to low latency trading and scale-out computing utilizing a cost-effective dynamic infrastructure to build a smarter planet. We are especially interested in the intersection of server, storage, networking and virtualization technologies.



IBM Watson

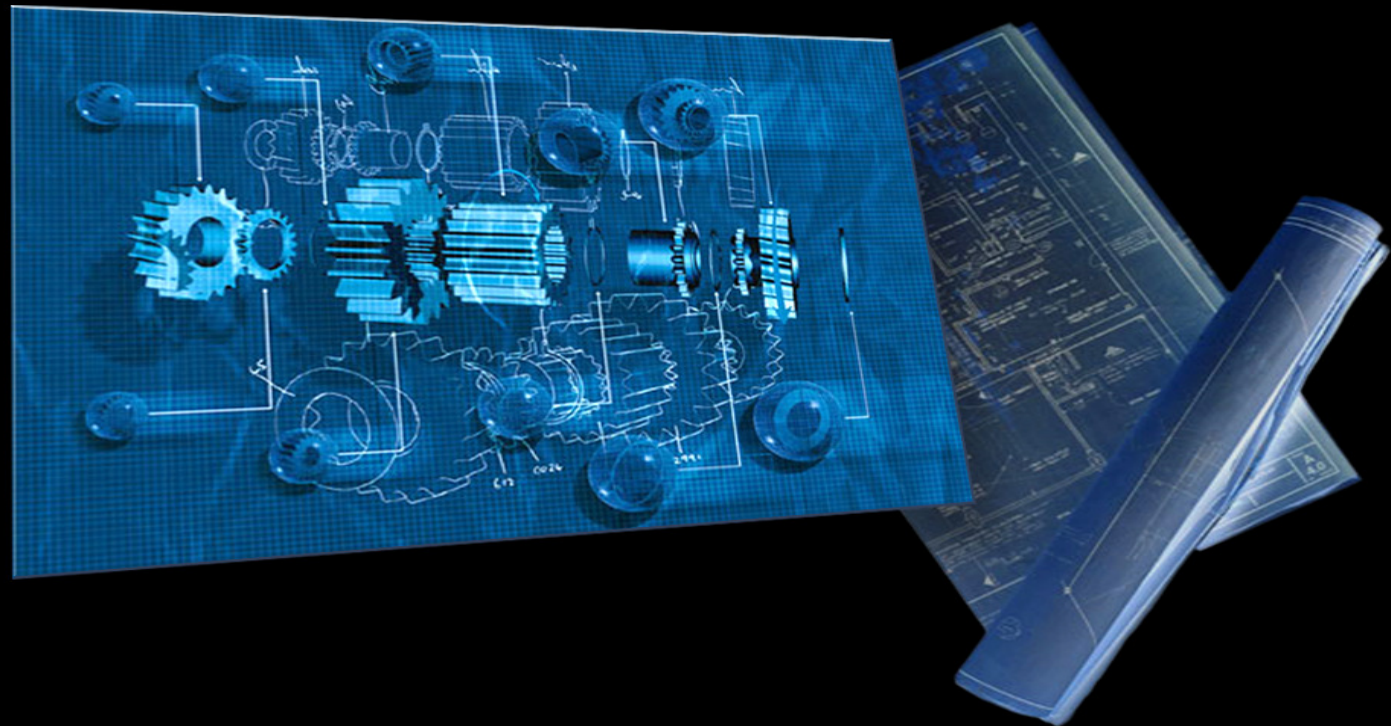
...a Grand Challenge in natural language and data analysis



<http://www.ted.com/webcast/archive/event/ibmwatson>

IBM's vision for Deep Computing

Leverage technology, science, management and innovation to make major improvements in business and society – in the very way the world works

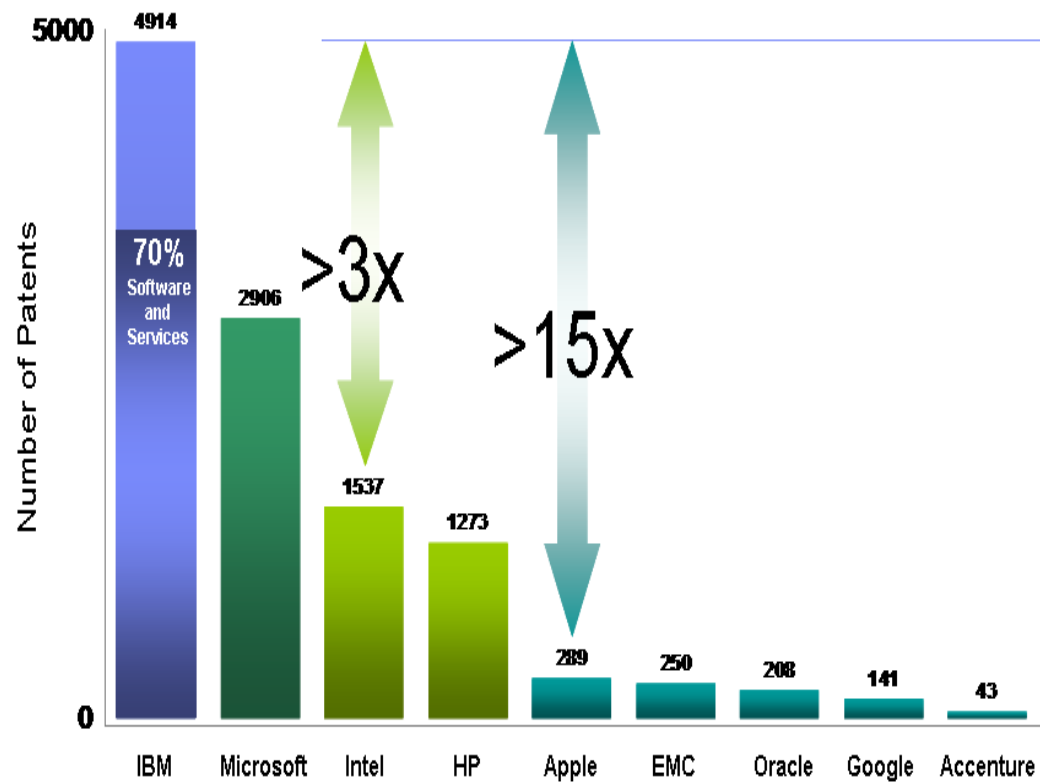




Thank You!


Patents

...from problem, via invention and innovation, to new solutions...



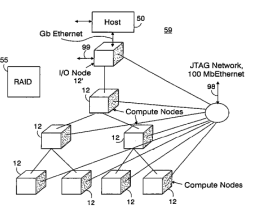
IBM Blue Gene

How do you build a machine performing 10^{15} operations every second?



US007555566B2


<p>(12) United States Patent Blumrich et al.</p> <p>(54) MASSIVELY PARALLEL SUPERCOMPUTER</p> <p>(75) Inventors: Matthias A. Blumrich, Ridgefield, CT (US); Dong Chen, Croton-On-Hudson, NY (US); George L. Chin, Cross River, NY (US); Thomas M. Cipolla, Cross Katonah, NY (US); Paul W. Coteus, Yorktown Heights, NY (US); Alan G. Gara, Mount Kisco, NY (US); Mark E. Giampapa, Irvington, NY (US); Philip Heidelberger, Cortlandt Manor, NY (US); Gerard V. Kapesay, Yorktown Heights, NY (US); Lawrence S. Mok, Brewster, NY (US); Todd E. Takken, Mount Kisco, NY (US)</p> <p>(73) Assignee: International Business Machines Corporation, Armonk, NY (US)</p> <p>(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1263 days.</p> <p>(21) Appl. No.: 10/468,993</p> <p>(22) PCT Filed: Feb. 25, 2002</p> <p>(86) PCT No.: PCT/US02/05571</p> <p>§ 371 (c)(1), (2), (4) Date: Aug. 22, 2003</p> <p>(87) PCT Pub. No.: WO02/084509</p> <p>PCT Pub. Date: Oct. 24, 2002</p> <p>(65) Prior Publication Data US 2004/0103218 A1 May 27, 2004</p> <p>Related U.S. Application Data</p> <p>(60) Provisional application No. 60/271,124, filed on Feb. 24, 2001.</p>	<p>(10) Patent No.: US 7,555,566 B2</p> <p>(45) Date of Patent: Jun. 30, 2009</p> <p>(51) Int. Cl. G06F 15/16 (2006.01)</p> <p>(52) U.S. Cl. 709/249; 709/200; 709/220; 712/1; 712/10</p> <p>(58) Field of Classification Search 709/201; 709/205; 220; 245; 249; 250; 200; 1; 712/1; 712/10</p> <p>See application file for complete search history.</p> <p>(56) References Cited</p> <p>U.S. PATENT DOCUMENTS</p> <p>5,553,412 A * 10/1994 Douglas et al. 709/243 6,486,227 B1 * 10/2002 Pflister et al. 345/619</p> <p>OTHER PUBLICATIONS</p> <p>Lakshminarayanan, et al., "Ring, torus and 1-9 hypercube architectures/ algorithms for parallel computing," Parallel Computing, Elsevier Publishers, Amsterdam, NL, vol. 25, No. 11-14, Dec. 1, 1999, pp. 1877-1906, XP00453665, ISSN: 0167-8191.</p> <p>* cited by examiner</p> <p><i>Primary Examiner</i>—Aro Etienne <i>Assistant Examiner</i>—El Hadji M Sall</p> <p>(74) <i>Attorney, Agent, or Firm</i>—Scully, Scott, Murphy & Presser, P.C.; Daniel P. Morris, Esq.</p> <p>(57) ABSTRACT</p> <p>A novel massively parallel supercomputer of hundreds of teraOPS-scale includes node architectures based upon System-On-a-Chip technology, i.e., each processing node comprises a single Application Specific Integrated Circuit (ASIC). Within each ASIC node is a plurality of processing elements each of which consists of a central processing unit (CPU) and plurality of floating point processors to enable optimal balance of computational performance, packaging density, low cost, and power and cooling requirements. The plurality of processors within a single node may be used individually or simultaneously to work on any combination of computation or communication as required by the particular algorithm being solved or executed at any point in time. The system-on-a-chip ASIC nodes are interconnected by multiple independent networks that optimally maximizes packet com-</p>
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University of Ontario – neonatology

How do you track the health of tiniest and sickest patients in real time?



US 20090313614A1

(19) **United States**
 (12) **Patent Application Publication** (10) **Pub. No.: US 2009/0313614 A1**
 Andrade et al. (43) **Pub. Date: Dec. 17, 2009**

(54) **METHOD FOR HIGH-PERFORMANCE DATA STREAM PROCESSING**

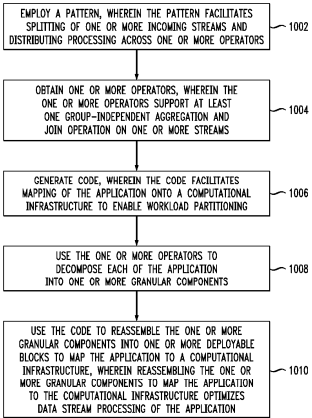
(75) Inventors: **Henrique Andrade**, Croton-on-Hudson, NY (US); **Roger Goethl**, White Plains, NY (US); **Kun-Lung Wu**, Yorktown Heights, NY (US)

Correspondence Address:
Ryan, Mason & Lewis, LLP
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(73) Assignee: **International Business Machines Corporation**, Armonk, NY (US)

(21) Appl. No.: 12/139,651
 (22) Filed: Jun. 16, 2008

Publication Classification
 (51) **Int. Cl.** *G06F 9/45* (2006.01)
 (52) **U.S. CL.** 717/151
 (57) **ABSTRACT**
 Techniques for optimizing data stream processing are provided. The techniques include employing a pattern, wherein the pattern facilitates splitting of one or more incoming streams and distributing processing across one or more operators, obtaining one or more operators, wherein the one or more operators support at least one group-independent aggregation and join operation on one or more streams, generating code, wherein the code facilitates mapping of the application onto a computational infrastructure to enable workload partitioning, using the one or more operators to decompose each of the application into one or more granular components, and using the code to reassemble the one or more granular components into one or more deployable blocks to map the application to a computational infrastructure, wherein reassembling the one or more granular components to map the application to the computational infrastructure optimizes data stream processing of the application.




OMRON Corp – logistics

How do you approach lowering CO2 in transport on a global scale?



US 20050096837A1

(19) **United States**
 (12) **Patent Application Publication** (10) **Pub. No.: US 2005/0096837 A1**
 Yoshizumi (43) **Pub. Date: May 5, 2005**

(54) **TRANSPORTATION PROBLEM SOLVING DEVICE, TRANSPORTATION PROBLEM SOLVING METHOD, AND PROGRAM AND RECORDING MEDIUM THEREFOR** (52) **U.S. CL. 701/200**
 (76) **Inventor: Takayuki Yoshizumi, Yamato-shi (JP)** (57) **ABSTRACT**

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ANNAPOLIS, MD 21401 (US)

(21) **Appl. No.: 10/936,410**
 (22) **Filed: Sep. 8, 2004**

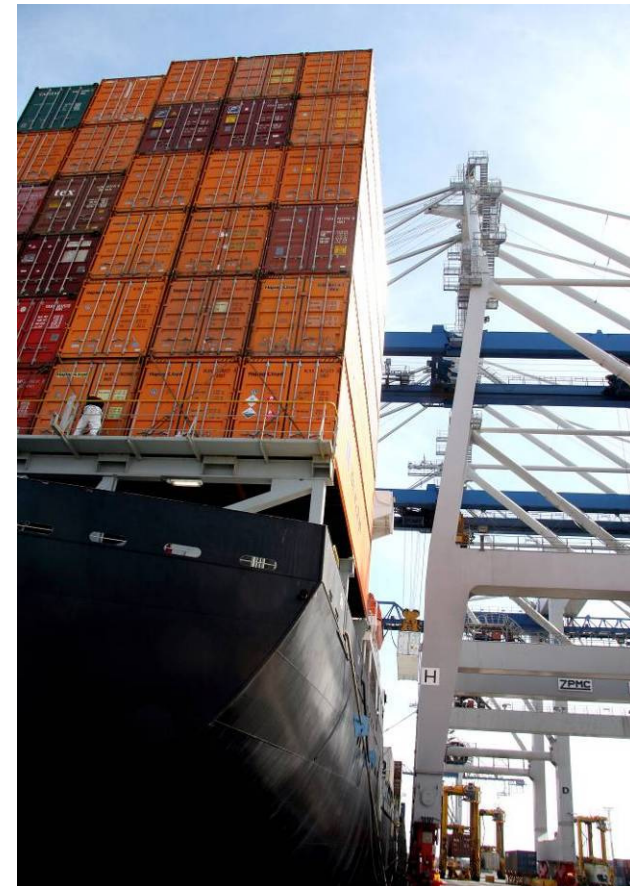
(30) **Foreign Application Priority Data**
 Oct. 31, 2003 (JP) 2003-372249

Publication Classification
 (51) **Int. Cl. G01C 21/26**

A transportation problem solving device for solving a transportation problem to optimize the end-to-end physical distribution consisting of a regional transportation and an inter-depot transportation, comprising a transformation section for adding a regional representative node representing a plurality of collection and delivery spots belonging to a depot to a model of inter-depot transportation, and incorporating the regional transportation between each of the plurality of collection and delivery spots belonging to the depot and the depot into a part of the model of inter-depot transportation as the inter-depot transportation between the depot and the regional representative node, an inter-depot transportation computing section for solving the transportation problem, based on a transformation model in which the regional transportation is incorporated into the inter-depot transportation, and computing a transportation plan for each delivery order in an inter-depot transportation portion, when a plurality of transport requests are input, and an output section for outputting the transportation plan computed by the inter-depot transportation computing section.

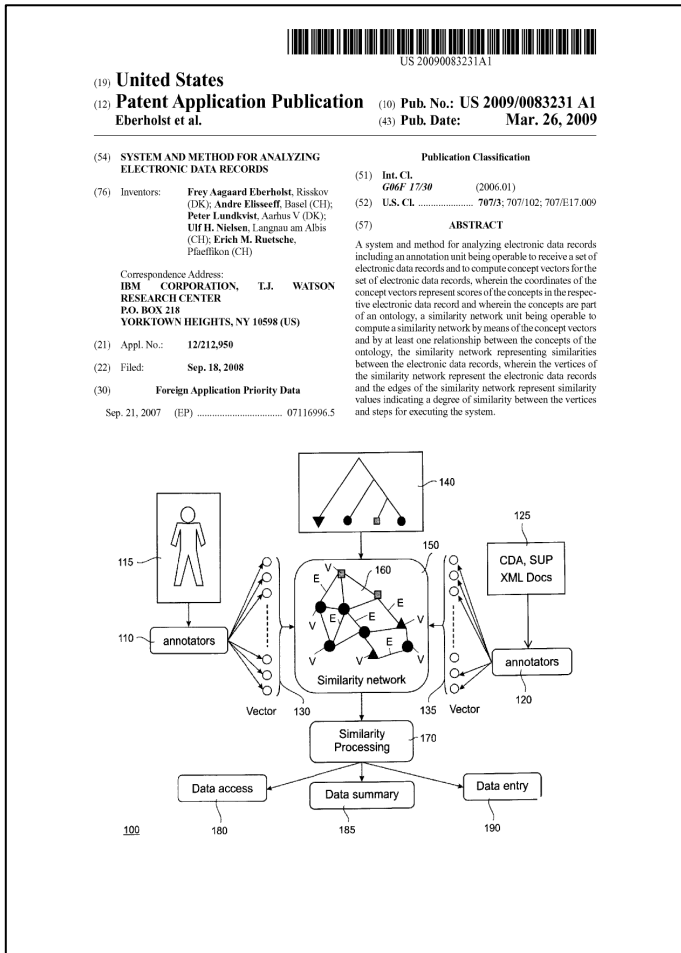
```

graph TD
    Start([Start]) --> S100[Input a transport request set for end-to-end physical distribution problems, a transport means set for regional transportation and a transport means set for inter-depots]
    S100 --> S101[Create a transformation model for representing regional transportation, employing regional representative nodes and intermediate nodes]
    S101 --> S102[Create a part of transport means set for inter-depot transportation from transport means set for regional transportation]
    S102 --> S104[Generate a transport request set for inter-depot transportation problem having the regional transportation end-to-end physical distribution problem]
    S104 --> S106[Solve a inter-depot transportation problem with regional transportation portion incorporated]
    S106 --> S108[Compare a solution of inter-depot transportation portion and time window for regional transportation portion]
    S108 --> S110[Solve a regional transportation problem concerning each region, employing the obtained time window]
    S110 --> S112[Solve the inter-depot transportation problem again]
    S112 --> S114[Solve the regional transportation problem again]
    S114 --> S116[Output transportation plan]
    S116 --> End([End])
  
```




Medical Information Hub

How do you help doctors exchange knowledge from case to case?



IBM DIOS – Inventory Management

How do you take client behavior into account running a warehouse?


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(54) **METHOD FOR STOCK KEEPING, COMPUTER SYSTEM AND COMPUTER PROGRAM** (51) **Int. Cl. G06Q 10/00 (2006.01)** (705/10)

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The present invention relates to a method, computer system and computer program for stock keeping. An embodiment of the invention determines forecast values of quantities to be consumed of a stock keeping unit for at least two different forecast time spans depending on a historical consumption data. The invention further determines order values of order quantities for each forecast value depending on a respective forecast value, stock keeping costs and ordering costs. The invention further determines an associated order quantity time span for each order value. The invention further determines a respective pair of forecast value and order value with the least deviation between forecast time span and order quantity time span from forecast values, forecast values respective forecast time spans, the order values and the order values respectively associated with order quantity time spans. The invention further processes the determined pair of forecast value and determined order value.

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