BioSpectrum the business of Bio & Health Sciences

Bioinformatics in India: Can it take a quantum leap?

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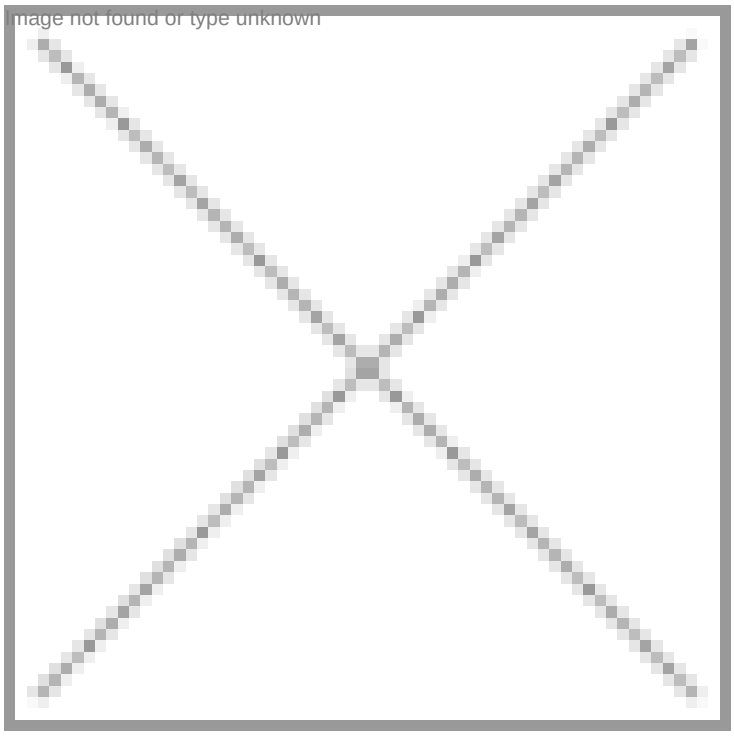


According to IDC, an IT market research agency, the addressable global market for opportunities in bio-IT solutions is pegged at $25 billion and is growing at 20 per cent annually. In India, it predicts, the market will grow to $120 million by 2006 from $15 million in 2002-03. For this to happen, the sector has to grow at 65 per cent a year.

At the heart of this potentially huge market for bio-IT is India's emerging positioning as a back-office operations and low-cost R&D destination. It offers proven capabilities in specific stages in the drug discovery cycle. Especially enticing to the global pharmaceutical majors and investors is the expertise in bioinformatics, cheminformatics and data integration.

Though India's biotech industry is quite a while from developing it's own IP-based (intellectual property or patented) products for the global market, it is set to boom with the expiry of patents of a large number of popular branded drugs in the US and other developed markets.

Indian companies including Max, Ranbaxy, Dr Reddy's and others have thrived on their 'reverse engineering' capabilities. Even as they make investments to move up the value chain by developing their own products, these companies may be able to leverage their drug manufacturing facilities in the short term.However, surivival in the long term will depend on having their own product pipelines. To develop these products, IT will be a crucial input in many stages of the drug development process.

Sensing the emerging opportunities in this space, leading IT companies have hitched onto the bioinformatics bandwagon. The movement started in a small way in 2001-02 when the Internet-based economy crumbled and the dotcom boom bust forced them to look for alternate revenue sources. The investment phase in this sector by IT companies will continue for

some more time. Experts say that many of these companies may reap the rewards in the near future.

BioSpectrum presents a ring side view of the happenings in the bioinformatics divisions of Indian IT majors.

Building services capability

Wipro

Wipro Healthcare & Life Science division has an ambitious goal: to be among the top 3 solution providers in this segment globally. For the quarter ended March 2003, Wipro's revenue from the health sciences sector is approximately $2.5 million. The company which almost single handedly lifted India's bio-IT solutions business in the last two years hopes to cross $500 million in the next ten 10 years.

In the life science segment, Wipro's focus is to offer pharma companies IT solutions that will reduce drug discovery and approval time. In the drug discovery stage, for example, it will work as a technology partner for a consortium of life science equipment vendors like Beckam Coulter, GE Medical Systems, Agilent, Fujinon and Cemer who supply equipment that aid genetic drug discovery process.

Infosys

The software bellweather's foray into the field of bioinformatics and life sciences was revealed in August 2002, when Infosys opened its life sciences division. Although the company has been keeping mum about its progress in the life sciences and pharmaceutical markets, it is recording client wins by the quarter. In JFM 2003, the company announced client wins of a global leader in contract research, a European biotechnology leader and an emerging India-based global pharmaceutical company. Further, Infosys is working with the US division of a global pharmaceutical leader on a performance management dashboard for their senior executives.

Cognizant Technologies

The US software services major, Cognizant, is a major player servicing the healthcare sector across the world. Today, the company boasts of possessing a dedicated team of over 800 professionals globally for the healthcare sector.

The company's healthcare practice has contributed approximately 22 percent of its $229 million revenue. In the pharma space, Cognizant works with large pharma and biopharma companies providing Sales Force Automation and CRM integration solutions, enabling 21CFR11 compliance (a US pharma regulatory standard), pre-clinical and clinical trial management software and internalization solutions. Its customers include marquee names such as UnitedHealthcare, John Deere Healthcare, Blue Cross of North Eastern Pennsylvania, Sierra Health Services, IMS Health and Fletcher Allen Healthcare.

"The importance of information and technology has never been greater in the life sciences industry than today. The rapid development of biotechnology over the past decade has opened up the opportunity for developing drugs that could be targeted at specific diseases and human population, thereby leading to a potential explosion in new drug discovery", says Mohan Narayanan, VP, Healthcare and Life Sciences, Cognizant. "Cognizant is at the forefront of this bio-information revolution and is playing a key role in drug development and commercialization informatics."

Cognizant's healthcare and life sciences solutions combine deep industry knowledge, methodologies and proprietary tools for IT-intensive healthcare and bioinformatics organizations.

Satyam Computers

In 2001, Satyam threw its hat in to the bioinformatics ring and entered in to a five-year agreement with the Center for Cellular and Molecular Biology (CCMB, Hyderabad, to develop software tools to sift and search through large volumes of genetic material for vital DNA fragments. Satyam believes that the convergence of two technological revolutions â€" information technology and biotechnology helps in "time compression".

Satyam has a strategic business unit which will draw the competencies of CCMB, one of the world's leading genetics research centers, in the global market. The solutions offered by Satyam include IT manpower services (to biotech companies), database value-added services and pharma-cum-database value added services.

Tata Consultancy Services (TCS)

Another major player in the Indian bioinformatics market is the country's largest IT company, Tata Consultancy Services. Based at the company's Advanced Technology Center (ATC) in Hyderabad, the bioinformatics practice is working to provide services such as automated genome analysis, protein structure prediction and high throughput molecular modeling, rational drug design and creation and integration of relational databases from proprietary, unstructured pharmaceutical and clinical data.

Currently, TCS is developing an end-to-end bioinformatics software package "Biosuit" on the Linux platform with domain knowledge from 20 leading Indian institutions. The Biosuit project, in collaboration with the Council for Scientific and Industrial Research (CSIR) and supported by the Department of Biotechnology (DBT) will roll out the alpha version soon with the full product expected to hit the market in 2004.

TCS also has a research agreement with the Center for DNA Fingerprinting and Diagnostics (CDFD) of DBT. The TCS Life Sciences Practice aims to offer end-to-end solutions, services and products to life sciences and healthcare institutions worldwide. The services range from application development management, outsourcing, systems integration and embedded systems.

Building research capability in bio-IT

IBM India

IBM has invested $40 million on Blue Gene, a supercomputer that can simulate protein structure. It has also spent another $ 100 million to build its Life Sciences unit in August 2000. The Big Blue recently touted the progress that its Life Science unit had made: more than 30 analytical instrument and tools companies are basing their products on IBM middleware, server platforms and services. The company says its life sciences division is its fastest-growing unit. IBM's strategy is to team up with companies selling to the life sciences marketplace.

Buoyed by the rapid strides, IBM has now more than doubled the investments in the division and has over 1,000 employees in the unit.The IBM Research Lab in India has come up with a biochip technology that enables the simultaneous study of expressions of thousands of genes or proteins by using a single experiment in the laboratory. Such experiments generate a huge volume of data which is expected to help understand the genetic basis of diseases. The IBM Research Lab is also developing a solution to facilitate browsing, querying and analysis of data.

Intel

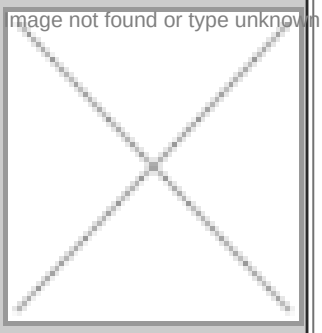
Intel India's research work in the biotech field is aimed at revolutionizing the future with "chips that can tell someone they are at the earliest stages of a life-threatening disease, such as cancer". Intel's CTO (chief technology officer) Pat Gelsinger says, "we envision a future in which every piece of silicon will include computing technologies but also connect to multiple wireless networks and roam between them.Your socks could tell if you are going to get a blister... you could have your mirror looking back at you and tell you if you have the onset of
skin cancer."

Intel's biotechnology head, Andy Berlin, dreams of creating "a chip that tells someone they are at the earliest stages of a life-threatening disease, such as cancer".

The growing popularity of clusters is part of a worldwide trend which has seen a dramatic increase in the number of Intel-based systems being used for high performance computing deployments.

Bioinformatics inside Intel

Intel believes that silicon-based technologies with integrated computing and communication functions will help to expand Moore's Law into new areas. Ketan Sampat, President, Intel India outlines the company's plans in the biotech sector.



How does Intel's research contribute to improving existing methods in bioinformatics?

Current research in Intel includes a microfluidic chip that mines molecules in a single file, allowing things like blood cells to be analyzed one at a time. A precise laser anchors one end of a strand of DNA so that the remaining portion of the helical coil rebounds like a spring, tossing the structure from one location to another. By sculpting silicon nano-structures in a way that will cause molecules to march single-file past sensors that classify them, Intel researchers hope to detect unique molecular-scale signatures associated with diseases such as cancer someday. These types of future capabilities would dramatically lower the cost and increase the reach of life-saving diagnostic tools throughout the world.

Elaborate on Intel's initiatives in Precision Biology.

Intel's Precision Biology research team is exploring ways to apply Intel technologies to the analysis of biological molecules such as DNA and proteins, with the goal of inventing new types of diagnostic instrumentation that could lead to improvements in human health. As part of Intel's leading silicon manufacturing capabilities, the company has developed an extensive set of molecular analysis capabilities that permit it to detect trace contaminants that enter the semiconductor fabrication process. Intel has also developed the capability to view, create, and modify nano-scale physical structures and devices.

What other applications is Intel looking at in life sciences?

Intel is working on applications in the area of diagnostic instrumentation which involves the creation of handheld devices that make medical scans on the molecular scale and disease detection which involves using microfluidics to analyze DNA or other proteins-on-chip. Single molecules, as well as individual cells, can reveal early signs of disease.

A number of organizations including the Indian Institutes of Technology(IITs) and the Council for Scientific and Industrial Research laboratories use Intel-based servers and clusters for research work in the life sciences area. Some of the research efforts are based on clusters that link multiple desktop or server computers to harness their collective computing power. "Intel is looking at building life sciences applications in diagnostic instrumentation and disease detection", says Ketan Sampat, President, Intel India.

Intel's research and development labs around the globe are developing silicon radios and "context aware" computing. Intel is pursuing the development of radios based on the company's low-power CMOS silicon manufacturing process. Intel says it is closer to realizing its goal of developing "reconfigurable radios" that would automatically identify and connect to a number of wireless networks - including the 802.11 standard, Bluetooth and Ultra Wideband - enabling any device powered by one of these chips.

Sun Microsystems

Sun Microsystems is actively involved in bioinformatics research and has set up a group to support the development of Java and XML tools for the Life Sciences industry. Sun says. "Bioinformatics can undo the damage caused by the loss of the dotcom revenue," is its standard line.

Satyam Computers

The Satyam's core group is working on the development of new database methods to store genomic information, computational software methods to process genomic information, evaluation of experimental data, improvement of molecular biological techniques to investigate genomic information, high-throughput techniques to gather genomic information and combined chemistry.

Kshema Technologies

In March 2002, Kshema Technologies accelerated its foray into the bioinformatics industry with the opening of an R&D center. Kshema Technologies has developed some solutions in the areas of ultra-trace chemical detection based on mass

spectrometry techniques.

It has also sponsored a chair at PES Institute of Technology in Bangalore in partnership with Canadian biosciences equipment manufacturing firm MDS Sciex.

SERC

Researchers at the Supercomputing Education Research Center (SERC), India's leading center for high-performance computing (HPC) at the Indian Institute of Science (IISc) in Bangalore are working on gene sequencing and gene mapping.

SERC recently purchased India's first SGI Altix 3000 system, powered by 32 Intel Itanium 2 processors. The SGI system will provide a powerful shared supercomputing resource for SERC researchers, helping to further discoveries in the areas of gene sequencing, gene mapping, computational fluid dynamics and other cutting-edge research projects. Intel will also support IISc with Intel(R) processor-based compilers and tools to enhance the performance of various applications developed by SERC.

Oracle

Oracle provides technology solutions to help access, manage, query, mine and share the valuable information hidden in life sciences data. Oracle claims it has emerged as the leading platform in life sciences with an estimated 85 percent market share. Oracle offers the "Discovery platform" for life sciences and provides tools and APIs to help build applications that can manage life sciences data. Oracle's life sciences platform consists of a set of features in Oracle 9i Database and Oracle 9i Application Server that address issues in life sciences including finding patterns and insights, securing collaboration, managing vast quantities of data and integrating a variety of data types and data sources.

Bio-IT Vendors

Sun Microsystems

To target the biotech sector which requires high-performance and highly productive computing, Sun Microsystems has launched the Sun Fire Superclusters based on the Sun Fire 6800, Sun Fire 12K and Sun Fire 15K server platforms. Sun Superclusters are touted as being capable of delivering a compute powerplant that scales up to two Teraflops.

"In order to improve public health, there is an urgent need to accelerate the time and lower the cost associated with drug discovery and development. Life sciences companies are just beginning to discover the power of IT, and Sun is the partner of choice to lead this industry transformation â€" from developing best-in-class solutions that help speed product discovery, to enterprise solutions that streamline corporate functions", says Vishal Dhupar, Director, Sales, Sun Microsystems, India.

IBM India

The industry segments that IBM Life Sciences plans to address in India includes pharmaceuticals, biotechnology, academia and government research. IBM Life Science solutions aims to provide the IT infrastructure that researchers in biotechnology, pharmaceutical research, genomics, proteomics, and healthcare need to turn data into scientific discovery and new treatments for disease.

Acer India

One of the major players in the enterprise services in India, Acer is in the business of making boxes for the high-performance computing sector. This includes servers for both the mid and the high-end computing needs.

The bottomline

The bioinformatics opportunity has been a much talked about phenomenon in recent times. However, there are a few issues be addressed in this area â€" the usual suspects - lack of trained manpower, need for more industry-academia partnerships, regulatory environment and lack of proper intellectual property protection. While bioinformatics was just a promise in earlier years, the last three years saw India capitalizing on the opportunity, offering the hope of a bright future in this sunrise industry.

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