



Web Based Application for Protein Modeling

Modeling of native and site-directed disulphide bonds for thermally stable proteins

About Infosys

Infosys, a world leader in consulting and information technology services, partners with Global 2000 companies to provide business consulting, systems integration, application development and product engineering services.

Infosys enables its clients to fully leverage technology for business transformation. Clients leverage Infosys' Global Delivery Model to achieve higher quality, rapid time-to-market and high-Rol solutions.

Life Sciences Practice

The Life Sciences Practice helps companies in pharmaceutical, biotechnology and related industries leverage information technology to drive productivity across their business processes. Through custom designed solutions, the LS Practice partners clients in realizing value from technology investments in discovery, development, manufacturing, sales and marketing, core IT and other enabling functions.

The Practice brings together specialists in software engineering, quality processes, quantitative methods, drug development, manufacturing, regulation, life science informatics and related areas. A key thrust is to deploy in-depth domain expertise on concept-to-implementation engagements, through both in-house capabilities and alliances.

Summary

Proteins found to be stable in normal conditions tend to denature at higher temperatures. However, it has been found that proteins with disulphide bonds have high thermal stability making them potentially more useful in industrial applications. The solution developed by Infosys, DSDBASE, provides a database of native disulphide bonds and also of those disulphide bonds that are stereo-chemically possible by mutation between pairs of residues in a protein. The DSDBASE application helps design site-directed mutants in order to enhance the thermal stability of the protein. The key feature of this application is that the disulphide bonds are designed in the stereo-chemically optimal region of the protein, so that a disulphide bond can be introduced without any strain on the protein structure.

Background

Disulphide bonds in a protein structure enhance the thermal stability of the protein. These bonds can either occur natively or can be introduced by designing site-directed mutants. The possibility of formation of disulphide bonds in a protein molecule is determined by various factors, such as inter-atomic distances between the corresponding atoms of the amino acids like Cystine (which contain the Sulphur atom) and the bond & torsion angles between them.

For developing thermally stable proteins, it is important for the user to determine the exact presence of native disulphide bonds, as well as where and how can a disulphide bond be introduced by site-directed mutations. These parameters are called the loop size and loop proximity. Loop size gives the sequential length between the amino acids in a disulphide bond. Loop proximity gives the sequential distance between two disulphide bonds. These two criteria are critical for the introduction of disulphide bonds in a protein.

The Solution

The DSDBASE database contains modeled as well as native disulphides in proteins. The modeling is done using the stereo-chemical properties of the atoms constituting the protein. The disulphide bonds are designed in the stereo-chemically optimal region of the protein, so that one can introduce a disulphide bond without straining the protein.

Modeling of disulphide bonds takes into account the sequence distance between Cystines or the mutant amino acids (loop distance) and the sequence distance between two disulphides (loop proximity).

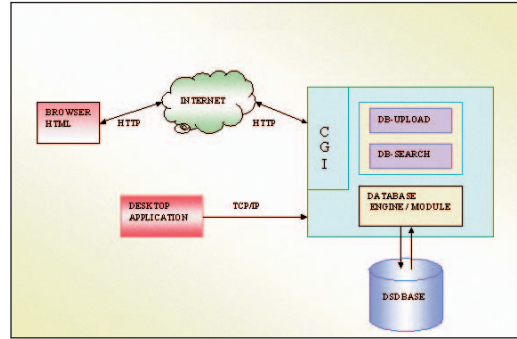
DSDBASE helps the researcher accurately model disulphide bonds in protein structures. The site directed mutants can be used in a judicious way to design thermally stable proteins.

Solution Portfolio

The solution offerings of the Life Sciences Practice include the following

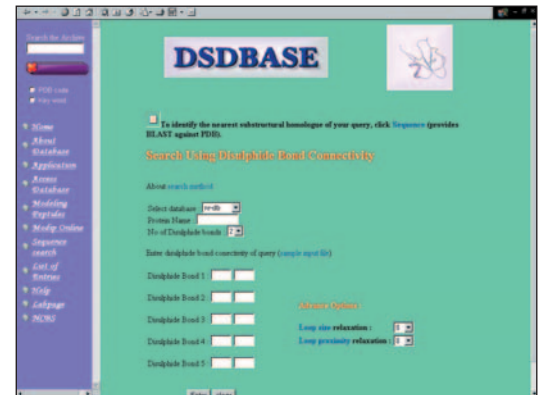
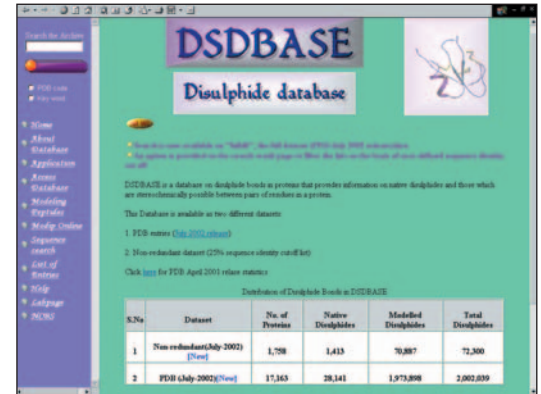
- Life science informatics
- Technology consulting
- Business process consulting
- Application development and life cycle support
- Software product co-development
- Data integration and analytics
- Regulatory compliance
- Knowledge management and collaborative R&D
- Document / content management
- Package implementation
- Pre-clinical and clinical trial management
- Laboratory management
- Manufacturing solutions
- Sales force automation and CRM solutions

Architecture Overview and Technologies

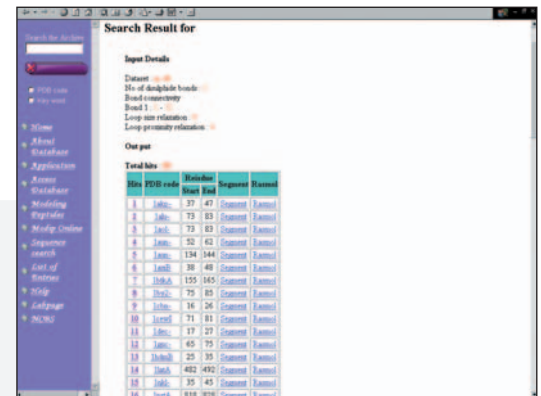


Platform : Sun Solaris 5.8
 Web server : Apache 1.3.19
 Scripting : Perl 5.0
 Database : Oracle 8i

Solution Snapshots and Output



Web-based query tool



For more information about Infosys' Life Sciences Practice, please contact:

US (East)

Sriram Chandrasekaran
 sriram_c@infosys.com
 Ashu Tandon
 ashu_tandon@infosys.com

US (West)

Sanjay Deshpande
 sanjay_deshpande@infosys.com

Europe

Sudarshan Roongta
 sudarshan_roongta@infosys.com

Asia Pacific

Thillai Rajan Annamalai
 thillai_annamalai@infosys.com