Microarray Informatics

Client Overview

The Client is one of the world's premier research and teaching institutions for modern genetics, gene therapy, molecular evolution, statistical genetics, application of model organisms to problems in biology and medicine, and computational and experimental approaches to genome biology. The client has achieved milestones in Genome sequencing of various model organisms, and was one of the first centers to generate maps of the Human Genome (Human Genome Project - an International collaborative effort to identify, map and sequence all the genes of Homo sapiens).

Problem Statement

Scientists and researchers use the available public repository of microarray and other high-throughput data. It's difficult to reuse the data since established gene identifiers, change as annotations for the underlying sequences change.

It's necessary to periodically reevaluate microarray results with the latest probe annotations. The client wanted to build a web application which re-annotates all gene expression /proteomics data from the repository by relating all probe IDs to Entrez Gene IDs once per month, which enables researchers to find data from the repository, and compare them from different platforms and species.

The client had the following challenges when it approached Optra Systems:

- Interacting with multiple databases and huge data with optimum performance.
- Exposing all functionalities involved in the web site as a web service - The challenge was to write code in

- R statistical package to call / consume these web services.
- Writing a module to compare old and new databases of annotations.
- Large file processing operations

Solution

Optra Systems developed web services for all functionalities involved in the web application which can be consumed from R statistical package. The code was written in R statistical package which sends necessary data in array format as an input to web service and retrieves the result data in the form of array.

The project involved:

- Design
- Implementation
- Deployment and maintenance

To optimize performance below mentioned techniques are used

- Table designs are based on RDBMS concepts
- Used appropriate indexes
- De-normalizing frequently accessed computational data

As a part of comparison, the module checks platform record to check whether changes occurred in the data. If there are changes, these changes are notified and recorded in a respective file. This file is sent as an email attachment to users who are interested in tracking changes in that particular platform record. This comparison is done as a batch process to optimize the performance.

Benefits

The developed web applications benefit was manifold:

- Optra Systems technology proficiency and domain expertise assisted the client to reduce the time and cost of operations.
- The web application enabled quick search, efficient and reliable analysis.
- User could upload as well as get output of huge data set through file.

- Scientists and Researchers with the knowledge of R (statistical analysis package) but without knowledge of Perl, PHP can call the web service

Technologies

The web application is built using PHP and Perl as front end and MySQL as a backend database. Perl modules were used from readily available set of functions to optimize the code.

- To consume the web services programs are written using "R" package (statistical analysis package), Perl and PHP.
- The programs use SSOAP protocol and RCurl to exchange the information between web service and its consumer.

About Optra Systems

Optra Systems is an ISO-certified global organization with deep domain expertise in medical devices, lab automation, life science informatics and healthcare IT solutions. The company provides a fully-scalable, cost-effective OptiShore™ delivery model. This enables customers to choose the optimal balance between on-site, on-shore, and off-shore development that will best address their budget and collaboration requirements. With Optra Systems, customers are able to shrink their time-to-market by leveraging practical, building-block based solutions. Committed to clear communication and total transparency, the company consistently meets or exceeds its clients' expectations. Offering a full complement of expert engineering and consulting services, Optra Systems is aligned to real business needs applied over the entire product development lifecycle. The robust, scalable and efficient IT infrastructure of the company, together with its outstanding project management team, consistently ensures superior results. Optra Systems 's global delivery model helps its customers cut costs by about 50% without compromising on quality and realize a 200% improved production cycle.

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