Atos Origin

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SPEEDING UP GENOMIC RESEARCH WITH GRID TECHNOLOGY »

CIC bioGUNE

Biozientzietako Ikerkuntza Kooperatiboko Zentroa

Centro de Investigación Cooperativa en Biociencias

Performance boost by making the most of hardware capacity

"Using grid Technology, we have reduced the computing time 25 fold without buying new hardware. It has also allowed us to spend less time monitoring the analysis launched into the computers, and consequently has reduced the whole experiment time"

CIC bioGUNE

SPEEDING UP GENOMIC RESEARCH WITH GRID TECHNOLOGY

CIC bioGUNE

CIC bioGUNE was first opened in January 2005. By attracting talented researchers from all over the world and setting up joint projects with other scientific institutions, it has become a center of excellence for biomedical research. The mission of CIC bioGUNE is to carry out research at an international level, focused on strategic objectives of global interest, at the same time supporting the development of the biotechnology industry in the Basque Country.

CIC bioGUNE's Functional Genomics Unit uses genetic analysis to understand the fundamental mechanisms that underlie hereditary diseases. This will allow the development of therapeutic strategies and diagnostic systems, both for hereditary diseases and to predict individual sensitivity to particular drugs.

Most of the research lines of Laboratory 2 of this unit include the analysis of SNPs (Single Nucleotide Polymorphisms). SNPs are variants of the genome that appear by mutation in some individuals, are transmitted to the descendants and acquire certain frequency in the population after multiple generations.

The study of this sort of mutations is used to find genetic differences between human populations (European, African, Asian, etc.) and to study causes of hereditary diseases (association studies).

CHALLENGES

The main challenge for CIC bioGUNE is to deal with the increasing computing power they require to analyse huge amounts of genetic data, to find patterns and compare between case and control groups within an acceptable processing time and cost.

Therefore, scalability and optimisation of their IT system are a necessity.

SOLUTIONS

Atos Origin designed a grid-based solution that fulfilled CIC bioGUNE expectations (see table).

The solution initially employed Innergrid V middleware, from Gridsystems, because it completely fulfilled CIC bioGUNE's needs and in preparation of FURA, the open-source version, that had not at that time been released. FURA was going to have all the characteristics of the commercial version and migration from Innergrid V is straightforward.

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BENEFITS

> Performance boost 25x with the same departmental hardware: from 3 hours to 7 minutes thanks to:
  - Extra computing power coming from unused CPU cycles.
  - Reduction of non processing time thanks to automation of task execution provided by grid middleware instead of manual control of task execution.

> Scalability: easily add nodes to the grid to deal with computing peaks.

> Human effort reduction thanks to improved user interaction.

> Shorter time to achieve research objectives thanks to higher rate of results.

> Maintain IT budget.

Requirement	Solution
Minimise solution cost to keep to IT annual budget.	Grid-enabled Haploview application (Barret et al.,2005) to integrate it with an open-source grid middleware, saving licenses cost.
Obtain maximum performance with available department hardware.	Take advantage of under-used departmental servers and desktop computers when not used (idle day times, nights, week-ends).
Optimize human operations to save effort when launching processes and retrieving results.	Users can launch and retrieve results from their processes, wherever they run, from a central point. This is customised for the user, by means of the web-based interface provided by the grid middleware, which: > automatically distributes tasks to the most appropriate nodes. > automatically centralises results. > allows scheduling configuration of node availability and properties.

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