

DASGenExp: an interactive web-based DAS client with client-side rendering

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DASGenExp: <http://gralgggen.lsi.upc.edu/recerca/DASgenexp>

Source Code: <http://www.lsi.upc.edu/~bgel/dasgenexp/dasgenexp.tar.gz>

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The Distributed Annotation System (DAS) offers access to a great number of annotation sources worldwide in a seamless and integrated way. DAS is a client-server protocol designed around the “dumb servers and smart clients” paradigm so anyone with a network connected machine can easily set up a new DAS source. There are more than four hundred DAS servers currently active providing annotations for either genomic or protein sequences for tens of organisms.

As the amount of genomic data grows, the need of better visualisation tools increases. Although web-based DAS browsers exist both for genomic and protein DAS data, genomic oriented browsers generally lack direct interaction capabilities.

DASGenExp is a web based visualisation tool with client-side rendering designed to interactively explore the genomic data and genome based annotations available via DAS. DASGenExp is easy to use and intuitive and has a user interaction scheme similar to that of Google Maps. The user can explore the data by simply dragging and zooming with the mouse. It also offers some unique functions not found in other DAS clients: multiple and independent genomes at the same time, multiple zoom views, representation customization... DASGenExp can integrate annotations from any DAS server and create a graphical representation of the genomic features along with the reference sequence. A preliminary version of DASGenExp can be freely accessed at <http://gralgggen.lsi.upc.edu/recerca/DASgenexp/>. DASGenExp has been released under the GNU General Public License version 3 and its source code can be obtained from <http://www.lsi.upc.edu/~bgel/dasgenexp/dasgenexp.tar.gz>.

In contrast to other web based genomic browsers which display server created images, DASGenExp moves the rendering process to the client side. Raw data is transferred to the client machine and cached. Any further representation of that data does not trigger any network activity and so the overall responsiveness when zooming or panning is greatly increased. Client-side rendering also offers a good opportunity for the customization of data representation and DASGenExp allows the user to easily change colours, shapes, order and visibility of data tracks.

The DASGenExp client is pure javascript and takes advantage of some of the newest browser technologies like the canvas element in order to produce its data representation. Tracks are rendered in independent canvasses and redrawn every time any of the drawing parameters change. Due to the use of optimized data structures and some zoom dependant data preprocessing on the server, data rendering is fast and mostly unappreciable. When the rendering is finished, a canvas is treated like an image by the browser, so panning can be done without jumps or glitches. When dealing with potentially thousands of elements, the fully procedural API offered by canvas is much more convenient than the object oriented one offered by technologies like SVG, since it avoids most of its overhead.

Client-side rendering may be slow and resource intensive for some very dense data tracks but javascript is getting faster and lighter everyday and some big companies are working on it. Due to the use of the canvas element, at the moment, DASGenExp works in Firefox 2 and above but may have some problems in other browsers, mostly in old or non standards compliant browsers.

Due to its inherently highly-multiscale nature, genomic annotation data greatly benefits from zoomable interfaces able to produce zoom dependant representations which maximize the information given to the user. DASGenExp offers such an interface and uses client-side rendering techniques to produce informative, interactive and customizable representations of genomic DAS data.

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