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## INTERACTIVE BIOINFORMATICS BROWSER.

### Abstract

We are an interdisciplinary group of Biologists, Computer Scientists, and Information Designers collaborating on building an Integrated Bioinformatic Visualization System (IBVS), which will allow a biologist to interactively explore and annotate many types of biological information and to create biological knowledge. The IBVS will allow the scientist to freely interact with data describing the genetic structure of any known organism, and trace the relationships between homologous sequences and the file. The mode of this interaction is by visual query, which induces visual thinking that has proved quite useful in many areas of information and data visualization. Visual query is a model where navigation through the data and manipulation of data features automatically produce queries to the data structure. As one zooms in on a particular region of the data, for example, the system brings forth and displays new detail for that region. Such a model is especially useful for exploration and discovery in large data which has multiple scales and, perhaps, many different features. Our initial work in this area has been to build a prototype that permits one to visually query an entire genome. The prototype allows the user to perform a semantic zoom, starting from any point in the genome and zooming in or out.

### User Interface Style

Our style of interface is **Semantic Zoom**. User actions on the data allow zooming in on the underlying data.

**Details on Demand:** When the user needs more info, click on the item and a new window appears in the layout.

New windows can be zoomed in for more detail. Previous windows are shifted around by the system.

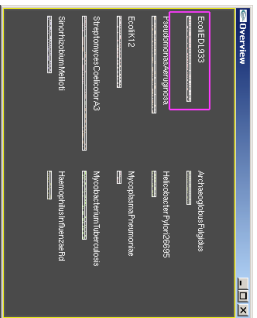
### Overview of Prototype

Current zoomable prototype starts with three windows:  
 One Overview window  
 Two Detail Windows

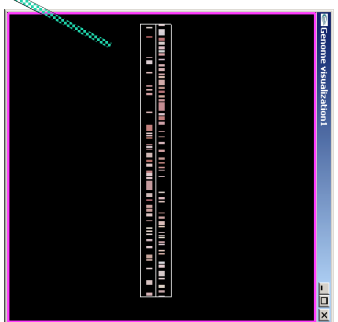
Users select the area of interest with the mouse to zoom in or out of the chromosome.

User rapidly zooms and pans around the space of the genomes of interest

#### Overview Window:

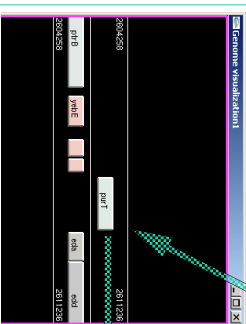


#### Detail Window 1 (Copied):



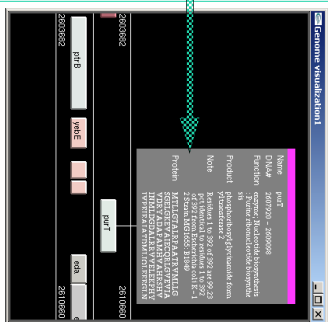
#### Zooming In:

Detail Window 1 (Copied):



#### Gene Box Detail Pops Up:

Detail Window 1 (Copied):



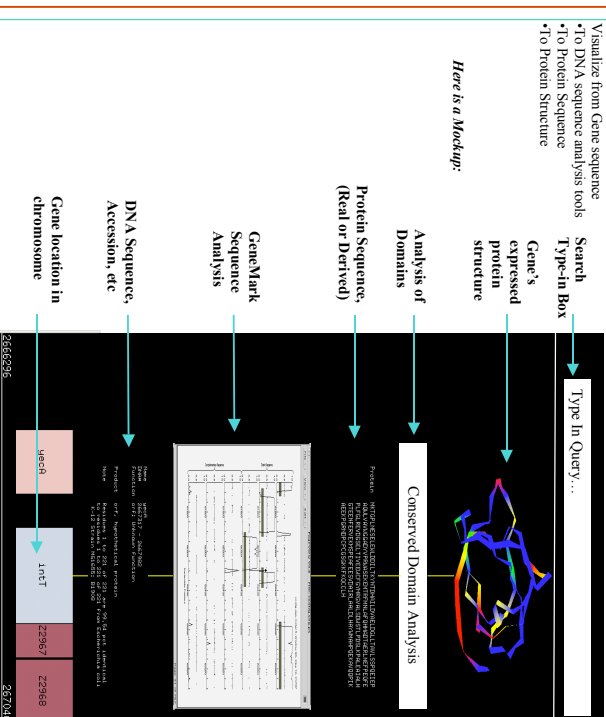
Selecting a **Gene Box** pops up a window to view gene sequence, Protein sequence, Accession numbers, Accession versions, authors of sequence, etc

### Future Work

#### Interconnections From Gene to Protein

Visualize from Gene sequence  
 -to DNA sequence analysis tools  
 -to Protein Sequence  
 -to Protein Structure

Here is a Mockup:



#### Interconnections Across Genomes

Not just visualizing a single gene or its expressed protein!  
 Visualizing homologs of other types of relationships within the organism or between organisms.

Our challenge: develop methods for managing and presenting this complexity:  
 -O-locate homologous genes/subsequences  
 -Outline box surrounds the homologous gene from other organism  
 -Zoom in to show more

Here is a Mockup:

