JBrowse
A next-generation genome browser
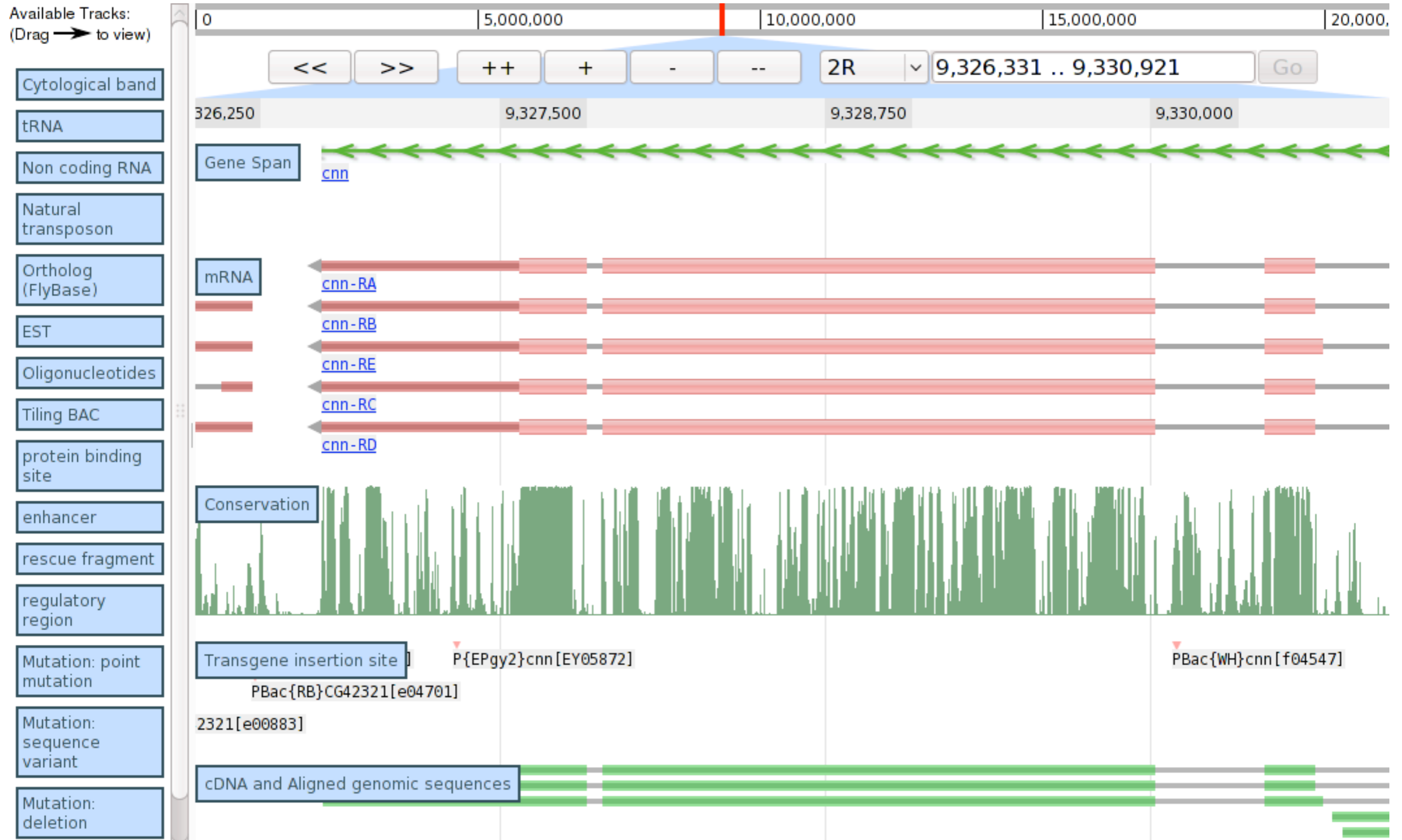
Skinner, Uzilov, Stein, Mungall, Holmes

http://jbrowse.org/

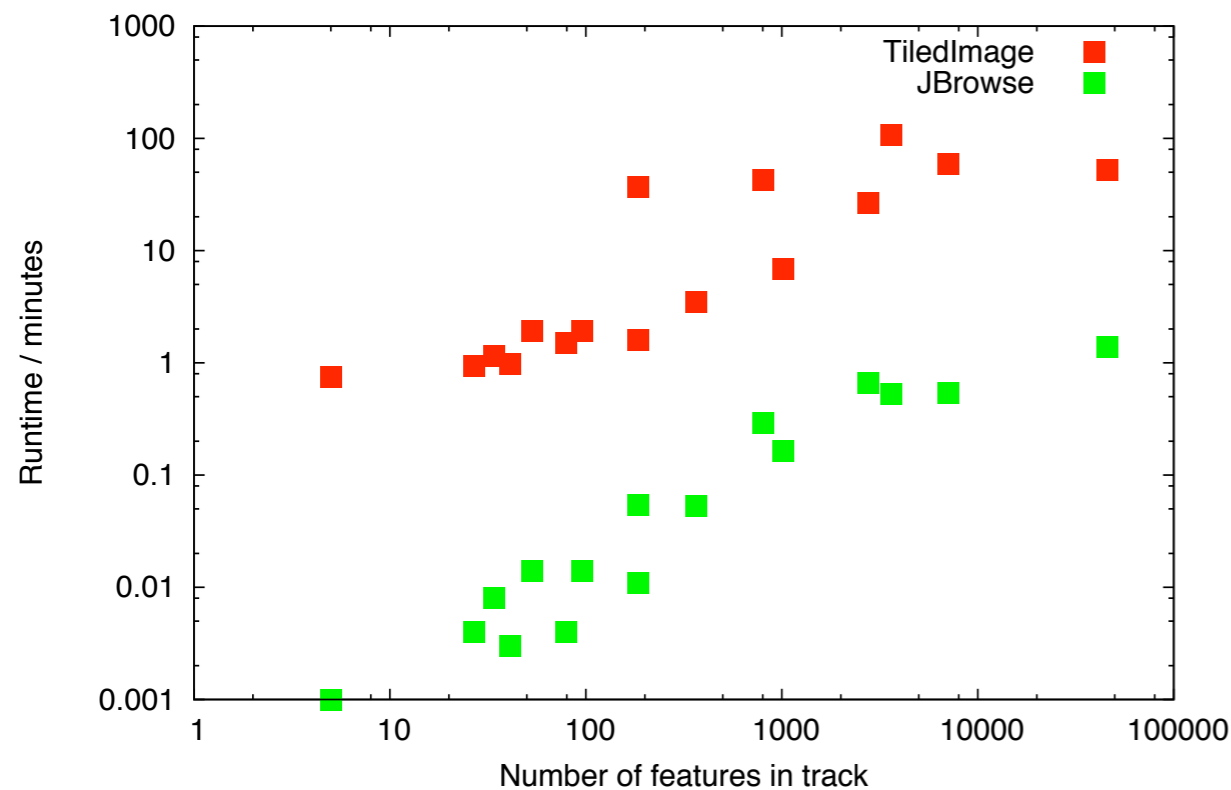# A Javascript genome browser: http://jbrowse.org/

History

- Prototype (TiledImage)

  - Server-side rendering (c.f. Google Maps, Genome Projector, X:Map)

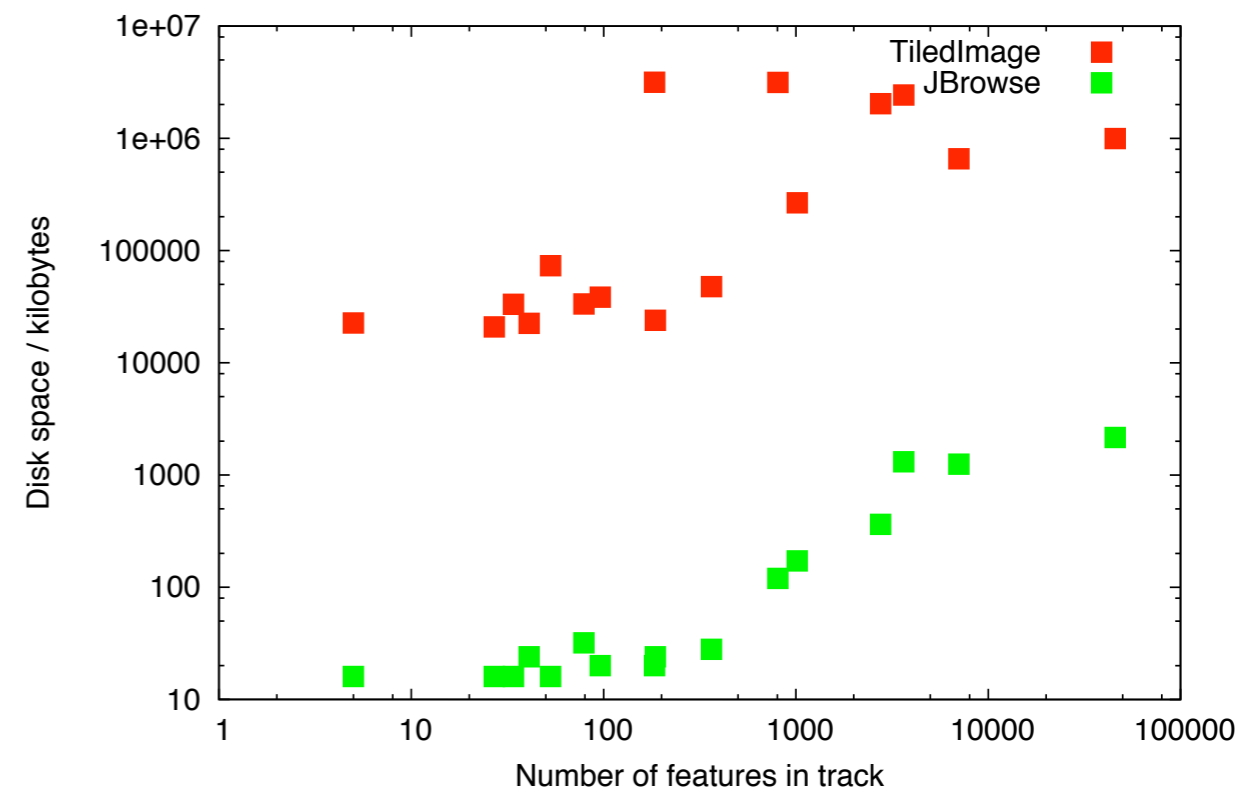- Current version (JBrowse)

  - Client-side rendering

Pre-rendering does not scale

D.melanogaster at pixel resolution is an order of magnitude wider than the continental US
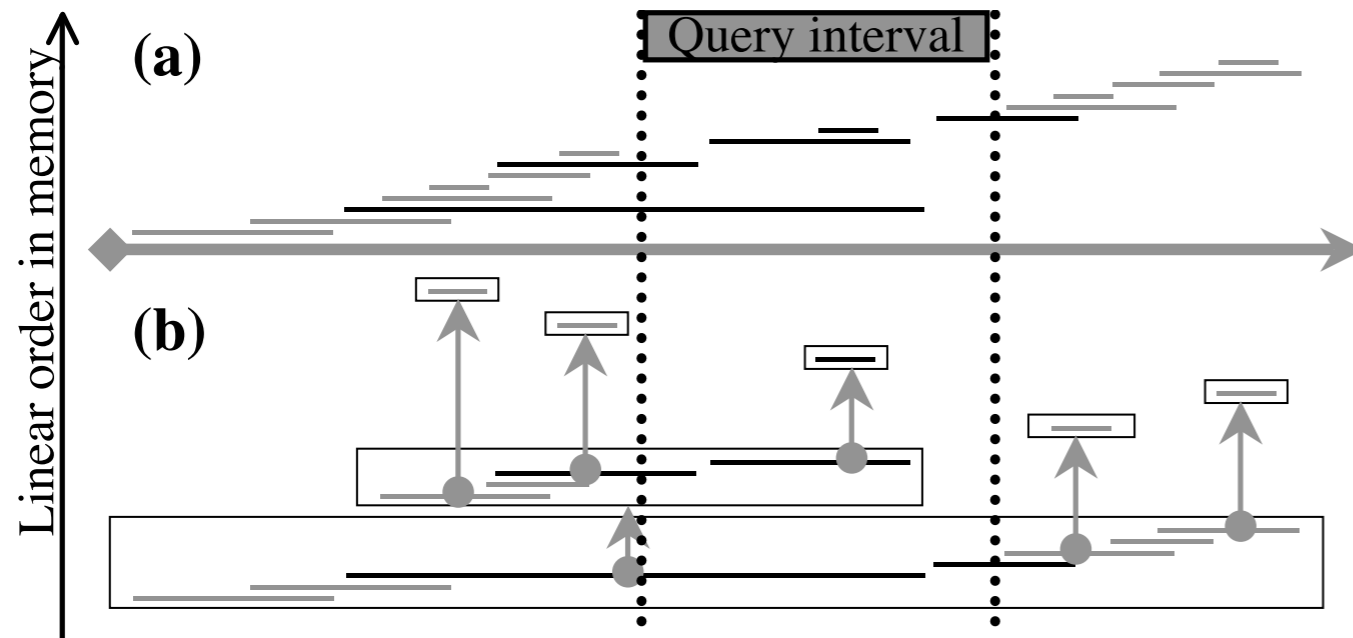

Figures compare server-side rendering (TiledImage) to client-side rendering (JBrowse)

Nested Containment Lists

Fig. 1. Storage and querying for interval overlap. In (a), we demonstrate that using conventional sorting of interval database by start, end coordinates the interval overlap query cannot halt at first non-qualifying interval (see text), but has to continue until the end/start of the database, scanning on average half of the stored intervals. In NCList (b), however, the result set intervals (in black) are located back to back in each of the sublists (each sublist is shown in a separate box) and sublists potentially containing more results are linked to each other by containment links. Therefore, the scanning problem is eliminated in this case, resulting in lower query complexity.
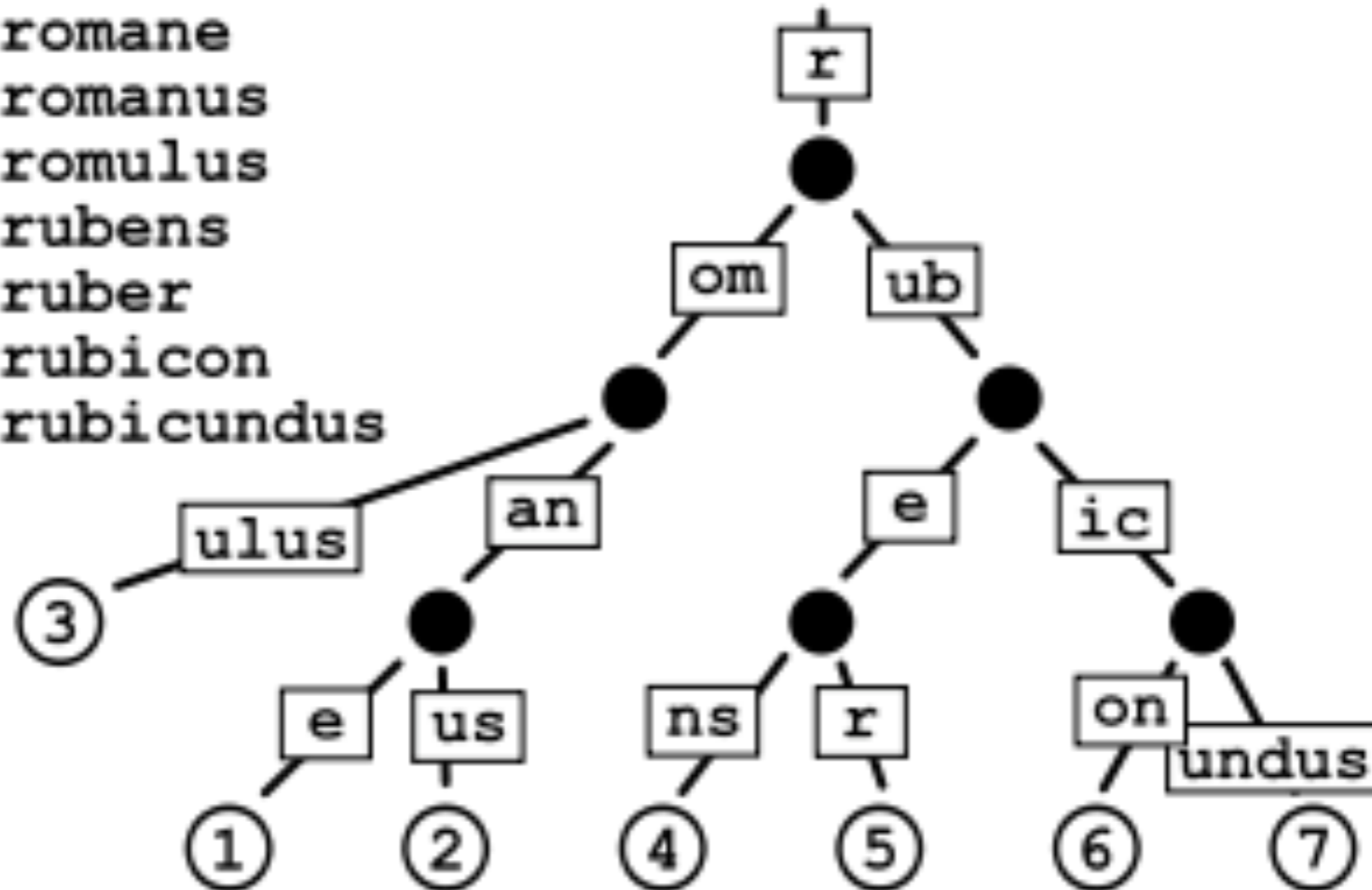
Query: **$O(n+logN)$**

N=database

n=number of results

5-500x faster than
R-trees, MySQL B-trees
(indexing/binning),
Ensembl, UCSC...

Construction: **$O(N\ logN)$**

Within each sublist, there are no containments
Sorting by startpoint leaves endpoints sorted too

Alekseyenko & Lee
Bioinformatics, 2007

Lazily-loaded Patricia Tries

1 romane
2 romanus
3 romulus
4 rubens
5 ruber
6 rubicon
7 rubicundus

TWiki plugin

Imminent developments

- Lazily-loaded NCLists

- Text autocompletion; "proper" search

- **Nextgen sequence data**

  - Start with basic summarization, then custom tracks

- **Community annotation**

  - Persistent upload & sharing of tracks

  - Editing/curation over the web (ackles...)

- Documented image-track API

- Synteny browser (c.f. GBrowse-syn)

- Much more at jbrowse.lighthouseapp.com

Mitch Skinner