Architecture

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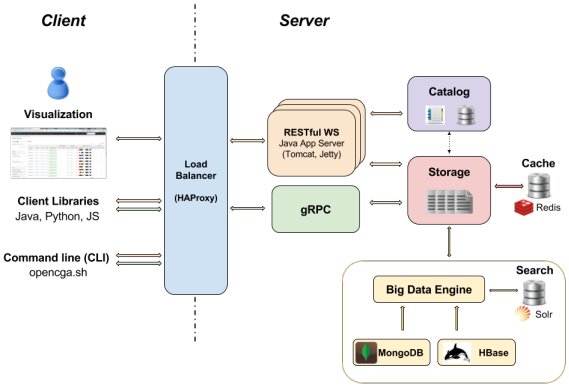
Client-Server Model

HGVA is implemented following a Client-Server architecture. The *server* uses **OpenCB OpenCGA** project to load and index variant datasets (VCF and gVCF files), OpenCGA server provides a complete REST API to query metadata and variants. The *client* side implements three different user interfaces. First, a rich web-based data mining application based on **OpenCB IVA** project. Second, three client libraries for Java, Python and Javascript. Third, a command-line interface. Client libraries and command-line can query both metadata and variants and are part of OpenCGA project.



OpenCGA Server

OpenCGA is an open-source project that aims to provide a *Big Data* storage engine and analysis framework for genomic scale data analysis of hundreds of terabytes. It implements different components:

- Catalog to store metadata
- Variant storage engine to provide real-time queries to big data in genomics. This can use MongoDB or HBase together with Solr. A Redis server is also used to cache queries.
- A complete RESTful API and gRPC for variant and alignment (BAM) streaming
- Client libraries and command-line to query data

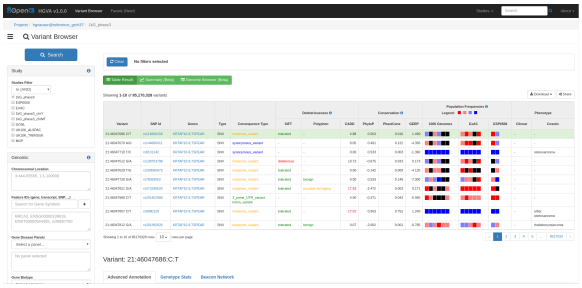
HGVA uses a small cluster for OpenCGA installation. This consist of three servers for MongoDB and a single Solr server. HAProxy is used to balance queries to two Tomcat servers.

Client User Interfaces

Client user interfaces to HGVA include a rich web application based on IVA, client libraries in Java, Python and JavaScript, and a Command Line Interface. All of these make intensive use of HGVA's RESTful web services (taken from OpenCGA), which are accessible through an HAProxy load balancer.

OpenCB IVA

IVA is a highly customisable web application for Interactive Variant Analysis (IVA). It consists of several tools, HGVA activates two of them: *Variant Browser* and *Facets*. You can execute complex queries in IVA using any variant annotation including full-text search for disease descriptions.



With Facets you can perform different aggregations of data: