# Data Model

BioNetDB models biology data as a network of nodes and relations.Biology data comes from different formats and sources it comprises system biology data from Reactome, annotation data from CellBase and human genetic variations from healthcare centers' clinical data. BioNetDB relies on Neo4j graph database that allows users to access biological data using the Cypher query language (similar to SQL in relational databases).

The figure below shows BioNetDB nodes with their labels. for clarity, some labels have been shortened:
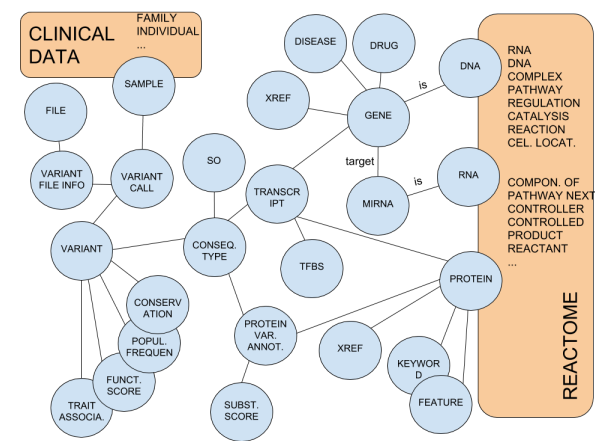
Shortened labes in the previous figure:

Shortened label	Node label
[1] POPUL. FREQUEN	POPULATION_FREQUENCY
[2] FUNCT. SCORE	FUNCTIONAL_SCORE
[3] TRAIT ASSOCIA.	TRAIT_ASSOCIATION
[4] CONSEQ. TYPE	CONSEQUENCE_TYPE
[5] PROTEIN VAR. ANNOT.	PROTEIN_VARIANT_ANNOTATION
[6] SUBST. SCORE	SUBSTITUTION_SCORE
[7] KEYWORD	PROTEIN_KEYWORD
[8] FEATURE	PROTEIN_FEATURE

Modelling

This section lists the main nodes of the BioNetDB network data model and for each of them, its properties and relationships are shown.
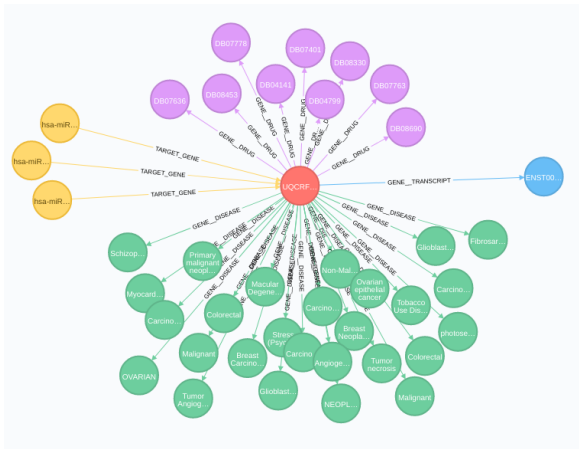
Genes

Gene node properties:

- uid
- id
- name
- chromosome
- start
- end
- strand
- biotype
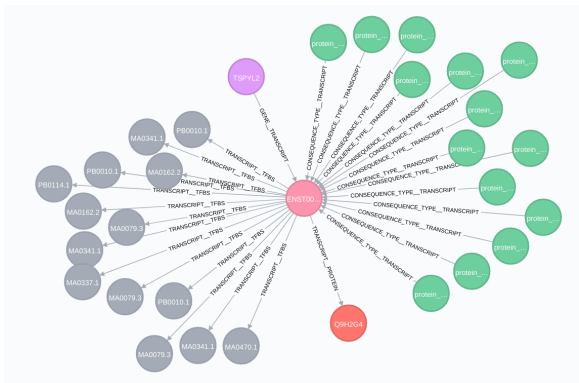
- description:
- source
- status

Gene relationships:

Transcripts

Transcript node properties:

- uid
- id
- name
- biotype
- chromosome
- start
- end
- strand
- proteinId
- genomicCodingEnd
- genomicCodingStart
- annotationFlags
- cdnaCodingEnd
- cdnaCodingStart
- cdsLength
- description
- status

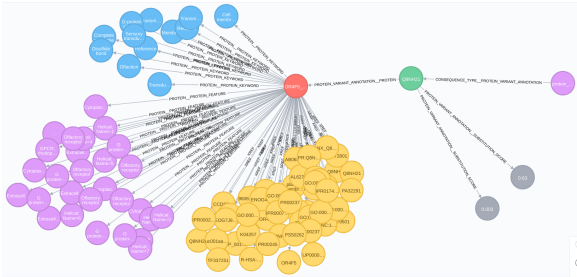Transcript relationships (transcript node in pink):
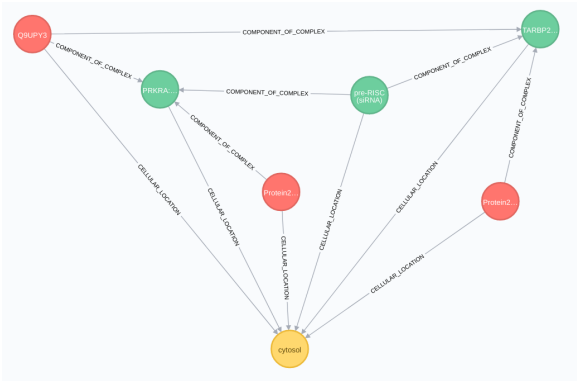

Proteins

Protein node properties:

- uid
- id
- name
- accession
- dataset

- evidence
- proteinExistence

Protein relationships:
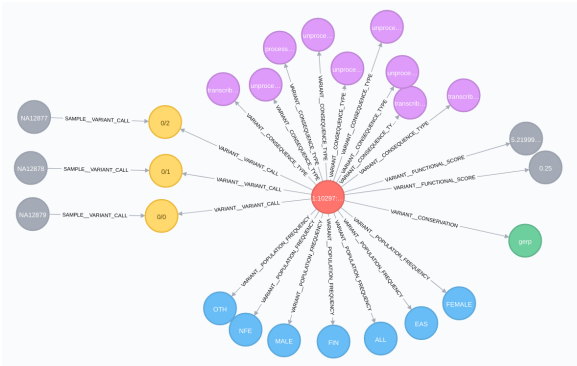

Protein complex

Variants

Variant node properties:

- uid
- id
- name
- chromosome
- start
- end
- strand
- type
- alternate
- reference
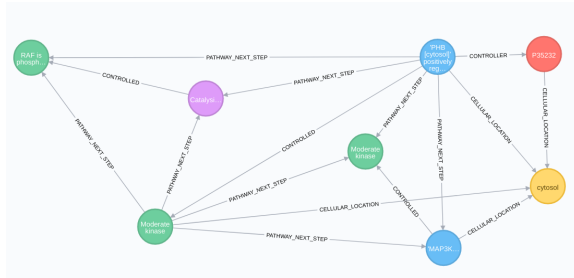- alternativeNames

Variant relationships:

Regulation

Regulation node properties:

- uid
- id
- name

Regulation relationships:

Pathway

Pathway node properties:

- uid
- id
- name

Pathway relationships (pathway nodes in yellow):