

가
가

Gene Ontology
GO Guide
Gene Ontology

Consortium, SGD(Saccharomyces Genome Database),
MGD(Mouse Genome Informatics)
Gene
Ontology Consortium
RNA (gene product)
(term)

[3].

가

Language)

SeRQL[5]
OWL[4](Web Ontology

Gene Ontology
Consortium Molecular function, Biological
Process, Cellular component Gene
Ontology

Gene Ontology
Ontology

2 OWL
Gene

3

4

Gene Ontology Consortium

Gene Ontology

5

Gene Ontology term

6

gene product

Gene Ontology

2.

OWL

2.1 OWL

```
<owl:Class rdf:ID="GO_0016209">
  <go:name>antioxidant activity</go:name>
  <rdfs:comment>Inhibition of the reactions brought about by
  dioxygen (O2) or peroxides. Usually the antioxidant is
  effective because it can itself be more easily oxidized than
  the substance protected. The term is often applied to
  components that can trap free radicals, thereby breaking the
  chain reaction that normally leads to extensive biological
  damage.
</rdfs:comment>
  <rdfs:subClassOf rdf:resource="#GO_0003674" />
  <go:dbxref>
    <owl:Restriction>
      <go:database_symbol>SP_KW</go:database_symbol>
      <go:reference>Antioxidant</go:reference>
    </owl:Restriction>
  </go:dbxref>
  <go:association>
    <owl:Restriction>
      <go:evidence>
        <owl:Restriction>
          <go:evidence_code>ISS</go:evidence_code>
          <go:dbxref>
            <owl:Restriction>
              <go:database_symbol>MGI</go:database_symbol>
              <go:reference>MGI:2429377</go:reference>
            </owl:Restriction>
          </go:dbxref>
        </owl:Restriction>
      </go:evidence>
    </owl:Restriction>
  </go:association>
  <go:gene_product>
    <owl:Restriction>
      <go:name>4930414C22Rik</go:name>
      <go:dbxref>
```

가
[6].

W3C(World Wide Web Consortium)

가
Object 가 Subject, Predicate,
[7]

Description Framework) RDF[7](Resource
RDF

가 W3C RDF
OWL

OWL RDF

가

XML

가

2.2 Gene Ontology

Gene Ontology Consortium 1998 FlyBase

```

<owl:Restriction>
  <go:database_symbol>mgi</go:database_symbol>
  <go:reference>MGI:2444701</go:reference>
</owl:Restriction>
</go:dbxref>
</owl:Restriction>
</go:gene_product>
</owl:Restriction>
</go:association>
</owl:Class>

```

1. Gene Ontology

```

<owl:Class
  rdf:ID="GO_0016209">
  ID가 GO_0016209
  GO
  <rdfs:comment>
<rdfs:subClassOf
  rdf:resource="#GO_0003674" />
  GO_0003674 subClassOf
  <go:dbxref>

```

```
<go:association>
```

가

2.3

Gene Ontology

, term term
term

AmiGO[8] GoView[9] GoGet[9]
AmiGO Gene Ontology consortium

BDGP(Berkeley Drosophila Genome Project)
Gene Ontology

AmiGO

term

가

가

Gene Ontology database exploration
project(Macalester college, Data exploration
laboratory) GoView

GoGet . GoView Gene Ontology DAG
visualization tool
term highlight

term

highlight

term

Ontology . GoGet Gene
gene product가 tool term

GoGet 'common ancestor',
'part Of' term
term gene product가

가

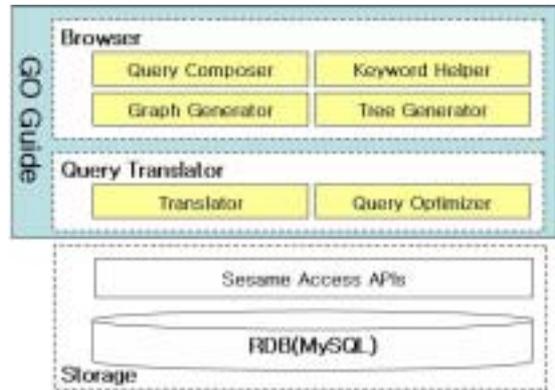
GO Guide
가

3.

GO Guide

OWL

Sesame[10] API
2 GO Guide



2. GO Guide

MySQL RDB

Sesame
Ontology

OBO format[11], XML, MySql dump
. XML OWL

OWL
MySQL

Sesame API
Gene Ontology

600MB 1 7

term 1 30

가

OWL

RDB

Sesame
European IST project On-To-Knowledge
research prototype . RDF

OWL RDFS
inference

RDQL[12], RQL[13]
RQL

query language

SeRQL

memory-based

RDBMS

SOAP
Guide
GO Guide
Translator)

access interface

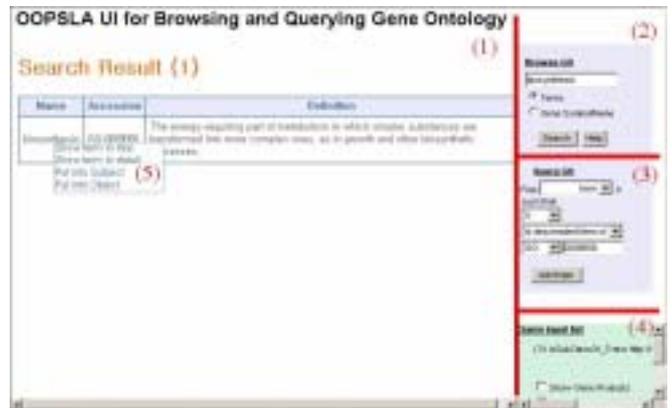
HTTP, RMI,

(Query

Gene Ontology

Tree generator,
Graph generator
가
keyword helper

Query Composer가



3. GO Guide

Translator
OWL
SeRQL
SeRQL
Query Optimizer
SeRQL

GO Guide
가
(1)
(2)
(3)
(4)
'biosynthesis' term
(2) 'bio'
Help 'bio'

4. GO Gguide

4.1

가
,
가
가
가

'biosynthesis'
Search
'biosynthesis' term
Name Association
term . GO guide

'Show term in detail' term
4 'biosynthesis' term
가 (1)

GO Guide



4. term

가

term 'Show term in tree' 'biosynthesis' tree가 (1) , tree 가



5. tree

5 'Graphical View' 6 가 , 가 () 3 가



6.

(1)

가

'Put into Subject', 'Put into Object' 가 'Put into Subject' term Subject , 'Put into Object' Object (3)

(3)

가 가 , RDF Subject, Object, Predicate , Predicate

5 Gene Ontology 4가 Predicate . (3) Add triple (4) 가 (3)

(4) term 'a' term 'b' 'c' term term

(4) send query 가 GO Guide (1) 가

가

(term or gene product)

가

helper term

term

가

GO Guide

Gene Ontology

4.2

4.2.1 SeRQL

GO Guide

Sesame

가

. Sesame

RDF

RDQL, RQL,

SeRQL

. GO Guide

SeRQL

Sesame

SeRQL

가 , RQL
[14]. SeRQL



7. SeRQL

7 SeRQL
Subject "John" 가
Subject Predicate pre1 pre2
가 Object Obj1, Obj2
SELECT 가
FROM 가 가
WHERE
가 namespace가 FROM
expression 가 가

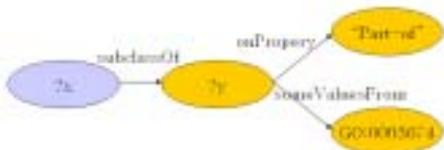
4.2.2 GO SeRQL



8. is-a SeRQL

Gene Ontology 3가
term term is-a , part-of
gene_product term
SeRQL
is-a 2
molecular function term
term 가
8 GO:0016209가
Serql:directSubClassOf
Predicate rdfs:subClassOf Predicate

Predicate Part-of OWL
Restriction term 가
9 part-of
GO:0003674 term part-of
term

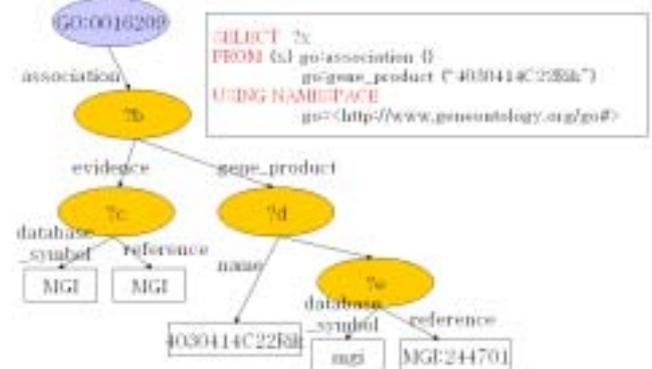


```

SELECT ?x
FROM {x} rdfs:subClassOf (y)
owl:onProperty ("Part-of");
owl:someValuesFrom ()
USING NAMESPACE rdfs=<http://www.w3.org/rdfs#>.
owl=<http://www.w3.org/owl#>
    
```

9. part-of

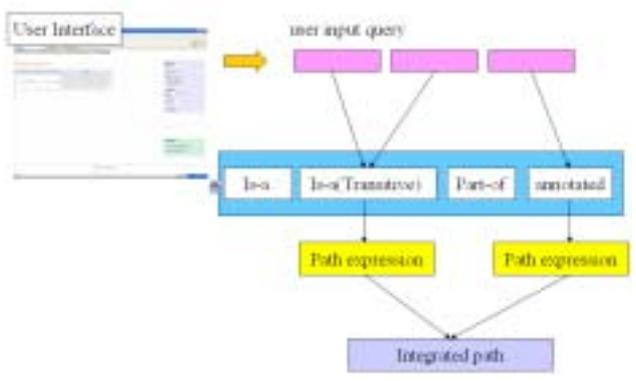
gene_product term 10
term
gene_product
10 "4030414C22Rik" gene_product
term 가



10. term gene_product

4.2.3 GO Guide

GO Guide Gene Ontology
UI
SeRQL UI
가
OWL-QL
must-binding
가
SeRQL 11



11.

11 (UI)
Predicate part-of
SeRQL part-of
SeRQL
가 SeRQL
SeRQL
SeRQL must-binding

SeRQL

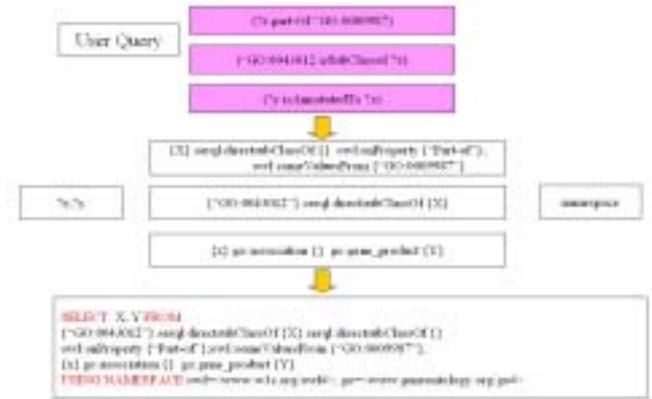
12

SeRQL FROM

```

Algorithm : Integrated path
Require : Input : triple statement (Subject, Property, Object)
While (Input)
{
  /* find pattern
if (property is " is-a" ) predicate = is-a pattern
  else if (property is " part-of" ) predicate = part-of
  pattern
  else if (property is " annotated" ) predicate = annotated
  pattern
  /* build path expression
if (input is first) path_expression = predicate
  else
  { /* find common matching string
    matching_string = find (path_expression, predicate)
    /* integrate path expression
    if (path_expression starts matching_string)
    path_expression = path_expression + " ,"
    + predicate' s unmatching string
    if (path_expression ends matching_string)
    path_expression = path_expression
    + predicate' s unmatching string
    else path_expression =
    path_expression + " ," +predicate
  }
}
  
```

12.



13. GO Guide

5.

Gene Ontology

AmiGO GoView GoGet RDB
Gene Ontology , RDB
GO Guide
Sesame

OWL

RDB

Gene Ontology

가

GO Guide
Sesame

, GO Guide

가

가 가

1 Gene Ontology

GO Guide

SeRQL

SeRQL 가

Sesame

SeRQL

13

가

SeRQL

is-a , part-of , annotated(term
gene_product)

13

is-a

, part-of
annotated

가

가 must-binding

13

가 term "GO:0009987" ID
"GO:0043012" term
gene_product

User Query가 SeRQL

3

가

	Go Guide	AmiGO	GoView & GoGet
	OWL format	RDB format	RDB format
	,	,	,
	SeRQL		
	가		,
	가	가	가

1.

Gene Ontology

Guide

GO

6.

가

SeRQL

가

가

Gene Ontology

Gene Ontology

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