http://htsql.org/

HTSQL — A Database Query Language

HTSQL is a comprehensive navigational query language for relational databases.

HTSQL is designed for data analysts and other *accidental programmers* who have complex business inquiries to solve and need a productive tool to write and share database queries.

HTSQL is *free and open source* software.

An Example

HTSQL directly maps common business inquiries onto a syntax parsable and excutable by a computer.

A business inquiry

Show me for each school:

- its name, its location,
- number of programs and departments,
- and the average number of courses across each of its departments?

Translation to HTSQL

```
/school{
    name, campus,
    count(program),
    count(department),
    avg(department.
      count(course))}
```

HTSQL License

HTSQL is *free software*. We offer support services, feature development, and sells license exceptions for use of HTSQL in combination with proprietary databases.

- For open source database systems (SQLite, PostgreSQL, and MySQL), HTSQL is released as free software under the terms of the AGPLv3. We also offer HTSQL with a non-free, but otherwise permissive license so that proprietary applications may use HTSQL in combination with open source database systems.
- For proprietary database systems (Oracle and Microsoft SQL Server), we offer HTSQL under an evaluation and a proprietary license.

HTSQL is a Python Library

```
>>> from htsql import HTSQL
```

```
>>> demo = HTSQL("pgsql:///htsql_demo")
>>> rows = demo.produce("/school")
>>> for row in rows:
...     print row
...
school(code=u'art',
       name=u'School of Art & Design',
       campus=u'old')
[...]
```

Download and install from PyPI:

```
$ pip install HTSQL
```

HTSQL is a Relational Database Gateway

HTSQL queries are translated to SQL. HTSQL has backends for *SQLite*, *PostgreSQL*, *MySQL*, *Oracle*, *MS SQL Server*.

An HTSQL query

```
/school
```

Translation to SQL

```
SELECT
    "school"."code",
    "school"."name",
    "school"."campus"
FROM "ad"."school"
ORDER BY 1 ASC
```

HTSQL is an Advanced Query Language

HTSQL is a complete query language featuring automated linking, aggregation, projections, filters, macros, a compositional syntax, and a full set of data types & functions.

An HTSQL query

```
/school{
    name,
    count(program),
    count(department)}
```

Translation to SQL

```
SELECT "school"."name",
 COALESCE("program"."count", 0),
 COALESCE("department"."count", 0)
FROM "ad"."school"
LEFT OUTER JOIN
(SELECT COUNT(TRUE) AS "count",
        "program"."school_code"
 FROM "ad"."program"
 GROUP BY 2) AS "program" ON
  ("school"."code" = "program"."school_code")
LEFT OUTER JOIN
(SELECT COUNT(TRUE) AS "count",
        "department"."school_code"
 FROM "ad"."department"
 GROUP BY 2) AS "department" ON
  ("school"."code" = "department"."school_code")
ORDER BY "school"."code" ASC
```

HTSQL is a WSGI Web Service

HTSQL is a web service that accepts queries as URLs, returning results formatted as HTML, JSON, CSV or XML. With HTSQL, databases can be accessed, secured, cached, and integrated using standard web technologies.

HTTP request

```
GET /school HTTP/1.1
```

HTTP response

```
{
  "school": [
    {
      "code": "art",
      "name": "School of Art & Design",
      "campus": "old"
    },
    {
      "code": "bus",
      "name": "School of Business",
      "campus": "south"
    },
    [...]
  ]
}
```

HTSQL Syntax: Basics

Literal values

```
/{3.14159, 'Hello World!'}
```

Algebraic & predicate expressions

```
/{(3+4)*6, (7<13)&(1=0|1!=0)}
```

Schema navigation

```
/school
```

```
/school.department
```

HTSQL Syntax: Filtering, Sorting, & Truncating

Filtering rows

```
/school?campus='south'

/school.filter(campus='south')
```

Sorting rows

```
/school.sort(campus)
```

Truncating rows

```
/school.limit(3)
```

HTSQL Syntax: Selection

Selecting output columns

```
/school{name, campus}

/school{name,
        count(department) :as '# of Dept'}
```

Calculated attributes

```
/school
  .define(num_dept:=count(department))
  {code, num_dept}?num_dept>3
```

HTSQL Syntax: Aggregates & Projections

Aggregates

```
/{count(department),
  avg(school.count(department))}

/department{name,
    max(course.credits),
    avg(course.credits)}?exists(course)
```

Projections

```
/(school^campus){campus, count(school)}

/school{name, count(program^degree)}
```

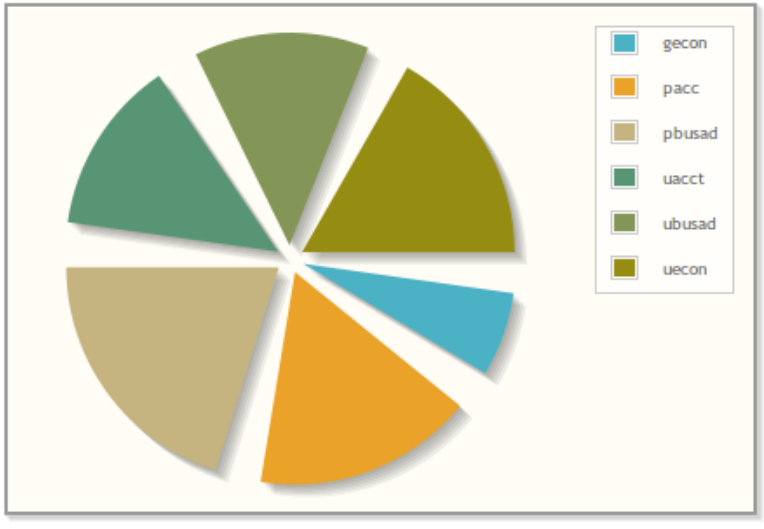
HTRAF Toolkit — Embedding Data into HTML

Demo

Select a School

School of Business

Students by Program



Programs

title	degree
Master of Arts in Economics	ma
Graduate Certificate in Accounting	ct
Certificate in Business Administration	ct

HTML

```
<h3>Select a School</h3>
<select id="school"
  data-htsql="/school{code, name}">
</select>

<div style="width: 400px;
            height: 350px;"
  data-htsql="/program{code,
                       count(student)}
                  ?exists(student)
                  &school.code=$school"
  data-ref="school"
  data-widget="chart"
  data-type="pie"
  data-title="Students by Program">
</div>

<h3>Programs</h3>
<table style="width: 400px"
  data-htsql="/program{title, degree}
                  ?school.code=$school"
  data-ref="school">
</table>
```

HTRAF: A Table Widget

HTML

```
<table data-htsql=
    "/program{title,
              degree}">
</table>
```

Demo

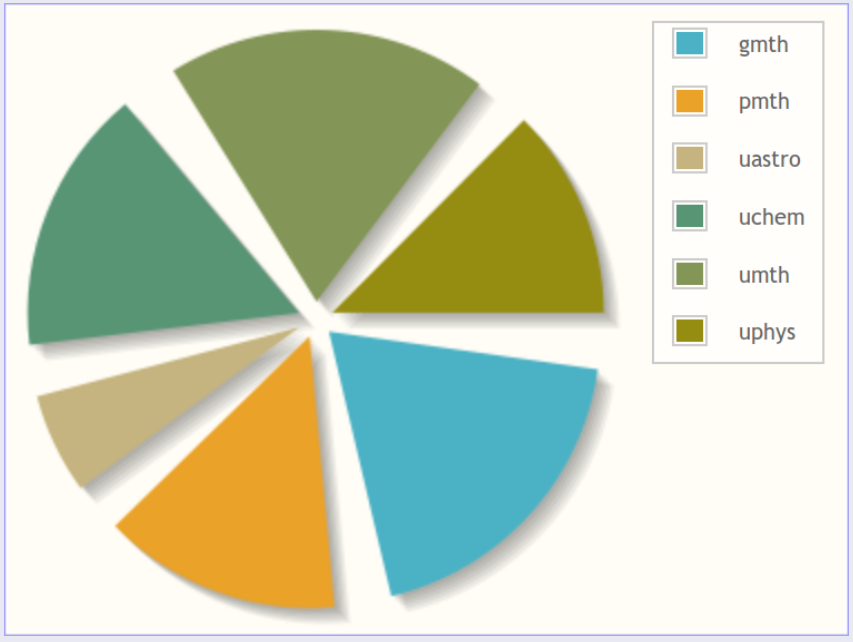
title	degree
Post Baccalaureate in Art History	pb
Bachelor of Arts in Art History	ba
Bachelor of Arts in Studio Art	ba
Master of Arts in Economics	ma
Graduate Certificate in Accounting	ct
Certificate in Business Administration	ct
B.S. in Accounting	bs
Bachelor of Business Administration	bs
Bachelor of Arts in Economics	ba
Master of Arts in Education Leadership	ma

HTRAF: A Chart Widget

HTML

```
<div
  style="width: 450px;
         height: 350px;"
  data-htsql=
    "/program{
       code,
       count(student)}
      ?school.code='ns'"
  data-widget="chart"
  data-type="pie">
</div>
```

Demo



HTRAF: Linking Widgets

HTML

```
<select id="sc"
  data-htsql=
    "/school{code,
             name}">
</select>

<table
  data-htsql=
    "/program{title,
              degree}
      ?school.code=$sc"
  data-ref="sc">
</table>
```

Demo

School of Natural Sciences

title	degree
Masters of Science in Mathematics	ms
Doctorate of Science in Mathematics	ph
Bachelor of Science in Astronomy	bs
Bachelor of Science in Chemistry	bs
Bachelor of Science in Mathematics	bs
Bachelor of Science in Physics	bs