Database Part IV
Querying with SQL

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What is SQL?

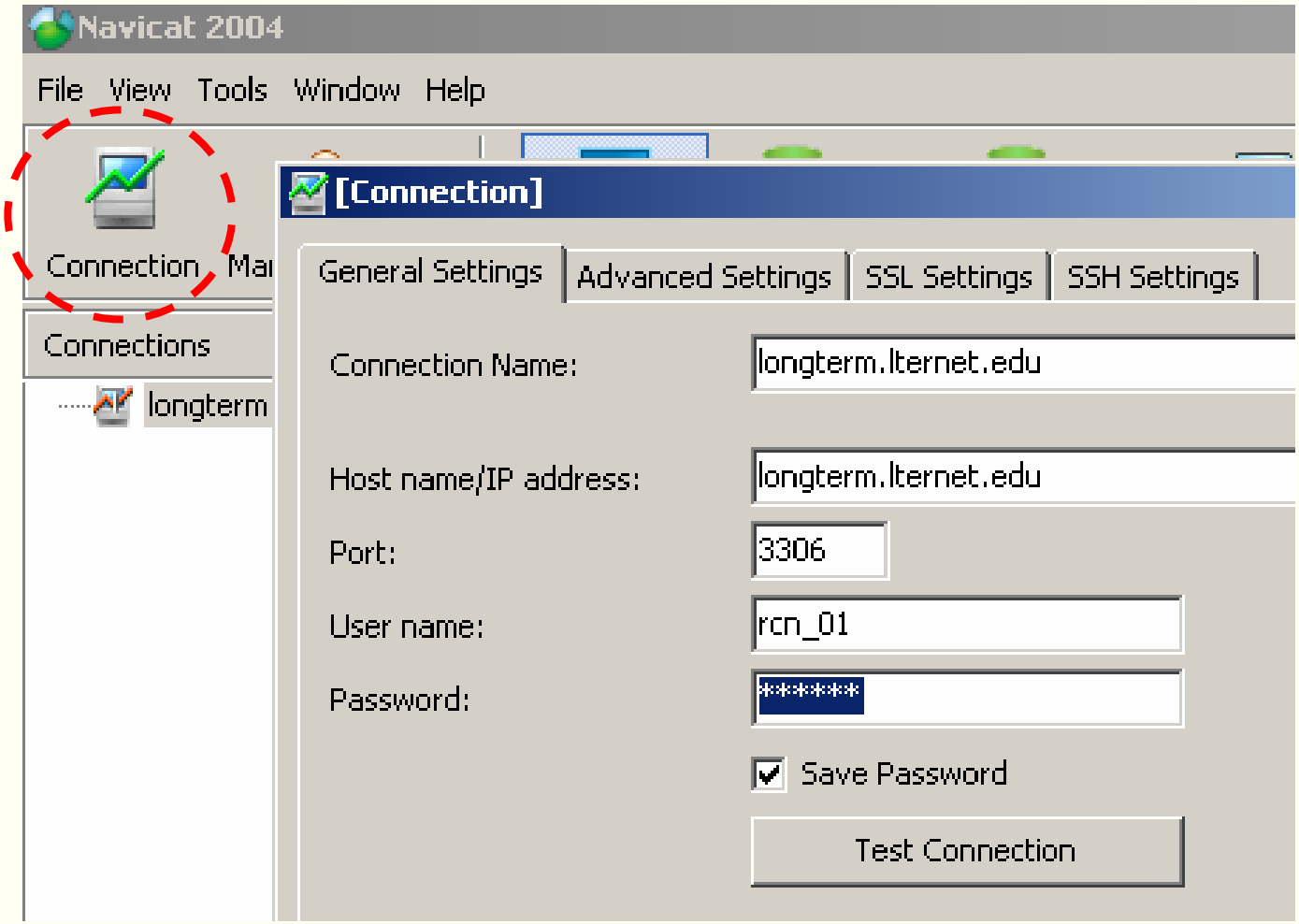
- **S**tructured **Q**uery **L**anguage
- ANSI standard computer language, yet many variants
- Can retrieve data from a database
- Can insert new records in a database
- Can delete records from a database
- Can update records in a database
- SQL is easy to learn, hard to master

What is SQL?

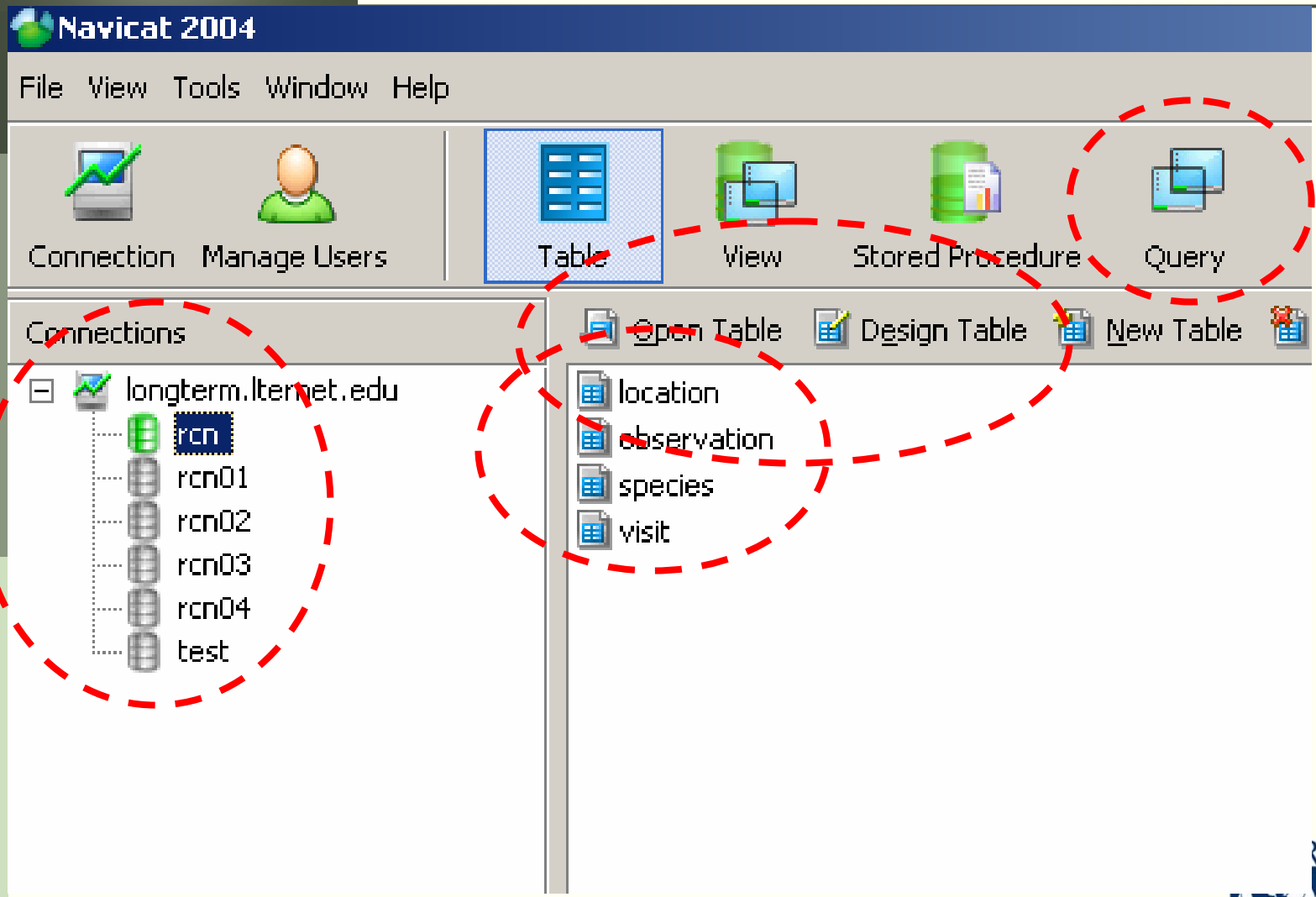
- "Syntax" = grammar for computer commands
- "Keywords" = words reserved & understood by a computer language
- Manual: http://www.mysql.com/documentation/
- A query = well-formed command. Can retrieve or manipulate (e.g., insert, update, delete).
- Query -> result -> rethink -> revise

Detour: Navicat

- Navicat = Another tool for administering.



Detour: Navicat



4 Basic Queries:

- **SELECT** - retrieves data from a database table
- **INSERT** - inserts new data into a table
- **UPDATE** - updates data in a database table
- **DELETE** - deletes data from a database table

SELECT

1) SELECT cover FROM observation

2) SELECT cover FROM observation LIMIT 5

3) SELECT cover, height, count FROM observation LIMIT 5

4) SELECT * FROM observation LIMIT 5

SELECT (continued)

1) **SELECT * FROM observation WHERE height > 10 and height < 20**

2) **SELECT * FROM observation WHERE height > 10 and height < 20 ORDER BY height**

3) **SELECT * FROM species WHERE species = “baaba”**

4) **SELECT * FROM species WHERE species LIKE “bo%”**

JOINS (finally!)

SELECT * FROM observation

SELECT * FROM *table1* **LEFT JOIN** *table2*
ON *match up two fields*

SELECT * FROM observation LEFT JOIN species
ON species_id = species_id

SELECT * FROM observation LEFT JOIN species
ON observation.species_id = species.species_id

LEFT OUTER JOIN aka LEFT JOIN

SPECIES_ID	OBS	COVER	HEIGHT	COUNT
4	1	0.5	4	13
2	2	0.1	2	16
4	1	0.01	4	2
4	2	0.1	5	1
1	3	0.5	12	1
3	1	0.25	15	1

SPECIES_ID	NAME
0	LATR2
1	ERPU8
3	LEFE
4	GUSA2

SPECIES_ID	OBS	COVER	HEIGHT	COUNT	SPECIES_ID	NAME
4	1	0.5	4	13	4	GUSA2
2	2	0.1	2	16		
4	1	0.01	4	2	4	GUSA2
4	2	0.1	5	1	4	GUSA2
1	3	0.5	12	1	1	ERPU8
3	1	0.25	15	1	3	LEFE

INNER JOIN

SPECIES_ID	OBS	COVER	HEIGHT	COUNT
4	1	0.5	4	13
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3	1	0.25	15	1	3	LEFE

INSERT

Basic syntax:

INSERT INTO *table (list of fields)* **VALUES** *(list of values)*

INSERT INTO species (species) VALUES ('alin')

INSERT INTO location (site, web, plot, quad) VALUES ('P', 2, 'E', 1)

UPDATE

Basic syntax: **UPDATE** *table* **SET** *field* **=** *value*

```
SELECT * FROM VISIT

UPDATE visit SET date = curdate()

SELECT comments FROM observation
    WHERE comments LIKE “never%”

UPDATE observation
    SET comments = concat(“Cannot identify as of “,
    curdate())
    WHERE comments LIKE “never%”
```

DELETE

Basic syntax:

DELETE FROM *table* **WHERE** *(condition)*

INSERT INTO species (species) VALUES ('acer saccharum')

DELETE FROM species WHERE species = 'acer saccharum'

Aggregate Functions

You can use function in place of plain column names.

SELECT height FROM observation
SELECT AVG(height) FROM observation

AVG(), STDDEV(), VARIANCE(), MAX(), MIN()

```
SELECT AVG(height) FROM observation
      LEFT JOIN species ON observation.species_id = species.species_id
      WHERE species.species = 'MUAR2'
```

REVIEW

1) SQL basic commands:
   SELECT, INSERT, UPDATE, DELETE

2) LEFT JOIN vs. INNER JOIN

3) Aggregate functions, string comparisons & functions.

4) Navicat

EXERCISES

1) Insert a new species row into the species database.

2) Update an observation so that its species_id matches with the species row you inserted.

3) Select a sampling location. Find the mean & std dev of the cover of one species occurring at that location.