Insert

Insert

- **Insert Tuple**
  - Insert a single tuple with implicit or explicit attribute assignment

```
INSERT INTO Students (SID, Lname, Fname, MTime, DoB)
   VALUES (7,'Boehm','Matthias','2002-10-01','1982-06-25');
```

  - Insert attribute key-value pairs to use auto increment, defaults, NULLs, etc

```
INSERT INTO Students (Lname, Fname, DoB)        SERIAL SID,
   VALUES ('Boehm','Matthias','1982-06-25'),    DEFAULT MTime
          (...), (...);
```

- **Insert Table**
  - Redirect query result into INSERT (append semantics)

```
INSERT INTO Students
   SELECT * FROM NewStudents;
```

Analogy Linux redirect (append):

```
cat NewStudents.txt >> Students.txt
```

Update and Delete

Update and Delete

- **Update Tuple/Table**
  - Set-oriented update of attributes
  - Update single tuple via predicate on **primary key**

```
UPDATE Students
   SET MTime = '2002-10-02'
   WHERE LName = 'Boehm';
```

- **Delete Tuple/Table**
  - Set-oriented delete of tuples
  - Delete single tuple via predicate on **primary key**

```
DELETE FROM Students
   WHERE extract(year
      FROM mtime) < 2010;
```

- **Note: Time travel and multi-version concurrency control**
  - Deleted tuples might be just **marked as inactive**
  - See lecture 09 Transaction Processing and Concurrency

Select Template

- **Basic Query Template**
  - Select-From-Where
  - Grouping and Aggregation
  - Having and ordering
  - Duplicate elimination

```
SELECT [DISTINCT] <column_list>
   FROM [<table_list> |
     <table1> [RIGHT | LEFT | FULL] JOIN
     <table2> ON <condition>]
  [WHERE <predicate>]
  [GROUP BY <column_list>]
     [HAVING <grouping predicate>]
  [ORDER BY <column_list> [ASC | DESC]]
```

Distinct

- **Distinct and All**
  - Distinct and all alternatives
  - Projection w/ **bag semantics** by default

```
SELECT DISTINCT
    FROM Students
```

Sorting

- **Sorting**
  - Convert a bag into a **sorted list** of tuples; order lost if used in other ops
  - Single order: `(Lname, Fname)` **DESC**
  - Evaluated last in a query tree

```
SELECT * FROM
    ORDER BY Ln
             Fn
```

Set Operations

- **Set Operations**
  - See 04 Relational Algebra and Calculus → **UNION, INTERSECT, EXCEPT**
  - Set operations **set semantics** by default → **DISTINCT** (set) vs **ALL** (bag)

```
(SELECT Firstnam
FROM Participant
  UNION DISTINCT
(SELECT Firstnam
FROM Participant
```

[[SQL]]