Structured Query Language (SQL)

- Data Definition Language (DDL)
  - CREATE, DROP, ALTER
- Data Manipulation Language (DML)
  - SELECT, INSERT, DELETE, UPDATE
- Data Control Language (DCL)
  - GRANT, REVOKE
  - COMMIT, ROLLBACK, SAVEPOINT

Sample Schema

<table>
<thead>
<tr>
<th>Table</th>
<th>Columns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Products</td>
<td>product_id, category, description, price</td>
</tr>
<tr>
<td>Customers</td>
<td>customer_id, first_name, last_name, address</td>
</tr>
<tr>
<td>Order</td>
<td>order_id, customer_id, date_ordered, date_shipped</td>
</tr>
<tr>
<td>Order_Details</td>
<td>order_id, product_id, quantity</td>
</tr>
</tbody>
</table>

Constraints

- Column and table constraints
- Constraints w/o names
- Use `ALTER` statement to add or remove constraints

Sequence, Index, and View

- Sequence
  - MINVALUE, MAXVALUE
  - nextval, currval
- Index
  - UNIQUE
  - Function-based index
- View
  - CREATE OR REPLACE VIEW

Simple Selections

- SELECT
  - LIKE, REGEXP_LIKE
  - BETWEEN
  - IN
  - IS NULL
- DISTINCT
- ORDER BY
- dual
- Joins
  - INNER JOIN
  - OUTER JOIN
  - LEFT
  - RIGHT
  - FULL
  - (*)
Query Results

- Column alias
  - w/o AS
  - Use double quotes to preserve case and white spaces
- Concatenate columns with ||
- SQL*Plus
  - COLUMN column_name FORMAT
    - column description format a16
    - column price format 9999.9

Date and Time

- Default date format: DD-MMM-YYYY
- TO_DATE( x [, format] )
- TO_CHAR( x [, format] )
- EXTRACT
- INTERVAL

Aggregation Queries

- Aggregation functions
  - COUNT, SUM,
  - MAX, MIN
  - AVG, MEDIAN
  - VARIANCE, STDDEV
- GROUP BY
- HAVING

Set Operations

- UNION, UNION ALL
- INTERSECT
- MINUS

Subqueries

- Subquery that returns
  - Scalar
  - Relation
- Correlated subquery

CASE: switch style

```sql
SELECT product_id,
CASE category
WHEN 'MB' THEN 'Motherboard'
WHEN 'CPU' THEN 'Processor'
ELSE 'ERROR!' END
FROM products;
```
CASE: if-else style

```sql
SELECT product_id,
    CASE
        WHEN Price > 200 THEN 'Expensive'
        ELSE 'Cheap'
    END
FROM products;
```

Transactions

- COMMIT
- ROLLBACK
- SAVEPOINT and ROLLBACK TO SAVEPOINT

Start and End of A Transaction

- **Start**
  - First DML statement after connection or the end of last transaction
- **End**
  - First DDL or DCL statement (except SAVEPOINT) after a transaction starts
  - Failed DML statements are automatically rolled back
  - Disconnect

Advanced Topics

- Transaction Isolation Level
- Recursive queries
- Stored procedures and triggers
- Objects and collections
- Analytic functions
- LOB and full text search
- XML data

Exercises

- Read about the Human Resources (HR) sample schema in Oracle Documentation at http://sun.calstatela.edu/~cysun/documentation/oracle/server.101/b10771/toc.htm. You’ll use this schema for Lab 1.