



Module 2 Day 4

CUD

What makes an application?

- Program Data

- ✓ Variables & .NET Data Types
- ✓ Arrays
- ✓ More Collections (list, dictionary, stack, queue)
- ✓ Classes and objects (OOP)

- Program Logic

- ✓ Statements and expressions
- ✓ Conditional logic (if)
- ✓ Repeating logic (for, foreach, do, while)
- ✓ Methods (functions / procedures)
- ✓ Classes and objects (OOP)
- ❑ Frameworks (MVC)

- Input / Output

- User

- ✓ Console read / write
 - ❑ HTML / CSS
 - ❑ Front-end frameworks (HTML / CSS / JavaScript)

- Storage

- ✓ File I/O
 - ❖ Relational database
 - ❑ APIs

Inner vs. Outer Joins

- INNER JOIN is default (when only JOIN is specified)

- Only rows that match both tables
- Display capital cities and the country of which it is the capital

```
SELECT c.name AS capital, ctry.name AS country  
FROM country ctry JOIN city c ON ctry.capital = c.id
```

- LEFT OUTER JOIN / RIGHT OUTER JOIN

- All rows from the Left (First) table, even if there is no match on the Right (Second) table
- Display all cities and the country of which it is the capital, or NULL if it is not

```
SELECT c.name AS city, ctry.name country  
FROM city c LEFT OUTER JOIN country ctry ON c.id = ctry.capital
```

- CROSS JOIN (RARE)

- Relates every row in one table to every row in the other table (Cartesian product)

Union

- Combines two or more queries into a single result set
- The number and data type of columns must be identical
- Columns will be named based on the first query
- “Union” removes duplicate rows, “Union All” does not
- Order By is allowed on the last query only

```
SELECT expression1, expression2, ... expression_n  
FROM tables  
[WHERE conditions]  
UNION  
SELECT expression1, expression2, ... expression_n  
FROM tables  
[WHERE conditions]
```

Insert

- **INSERT INTO** table_name (column1, column2, ...) **VALUES** (value1, value2, ...)
- Column-list is optional but highly recommended
- Same number of items in the column-list as the value-list
 - Values line up positionally
- IDENTITY columns must not be specified
- There are other forms of INSERT but this is the most common

Update

- **UPDATE** table_name
 SET column1 = value1,
 column2 = value2, ...
 WHERE column = value
- Don't forget the **WHERE!!!!**
 - Unless it is your desire to update every row in the table
- One or more column-value pairs can be listed
 - Other columns will remain untouched
- There are other forms of UPDATE but this is the most common

Delete

- **DELETE FROM** table_name
WHERE column = value
- Don't forget the WHERE!!!!!!
 - Unless it is your desire to delete every row in the table

Constraints

- Defined when the table is defined
- Constrain in some way the data that may be stored in the table
- **NOT NULL** – null values are not allowed in this column
- **UNIQUE** – the same value cannot exist in this column on multiple rows.
- **Check** – additional rule checking to ensure a column value is acceptable. E.g., and acceptable range of integer values
- **Default** – if an INSERT does not supply a value for the column, this value will be stored by default

Referential Integrity (RI) Constraints

- **PRIMARY KEY** – Defines the column(s) to be a PK.
 - Automatically enforces **UNIQUE** and **NOT NULL** constraints
- **FOREIGN KEY** – “Points” to a PK of some table
 - Constrains INSERT and UPDATE such that invalid references may not be stored
 - Constrains the DELETE on the PK table such that you cannot delete a PK value that is referenced elsewhere

Transactions

- **A**tomic – a single unit of work; entirely succeeds or entirely fails
- **C**onsistent – database is in a valid state before and after the transaction. No constraints are violated.
- **I**solated – transaction is independent from other transactions. Outsiders cannot see “partial” results.
- **D**urable – Once completed, the transaction is saved even if there is a crash.

Transactions

- **BEGIN TRANSACTION**

-- Do some work here....

INSERT ...

UPDATE ...

DELETE ...

yada yada...

COMMIT TRANSACTION

- If **ROLLBACK TRANSACTION** is used instead of COMMIT, the entire transaction is abandoned



Let's
Code

Schema Information

- ISO standard views for getting information about a db schema
 - `SELECT * FROM INFORMATION_SCHEMA.TABLES`
 - `SELECT * FROM INFORMATION_SCHEMA.COLUMNS`
 - `SELECT * FROM INFORMATION_SCHEMA.TABLE_CONSTRAINTS`
 - `SELECT * FROM INFORMATION_SCHEMA.CONSTRAINT_COLUMN_USAGE`
 - `SELECT * FROM INFORMATION_SCHEMA.REFERENTIAL_CONSTRAINTS`
- <https://docs.microsoft.com/en-us/sql/relational-databases/system-information-schema-views/system-information-schema-views-transact-sql?view=sql-server-2016>