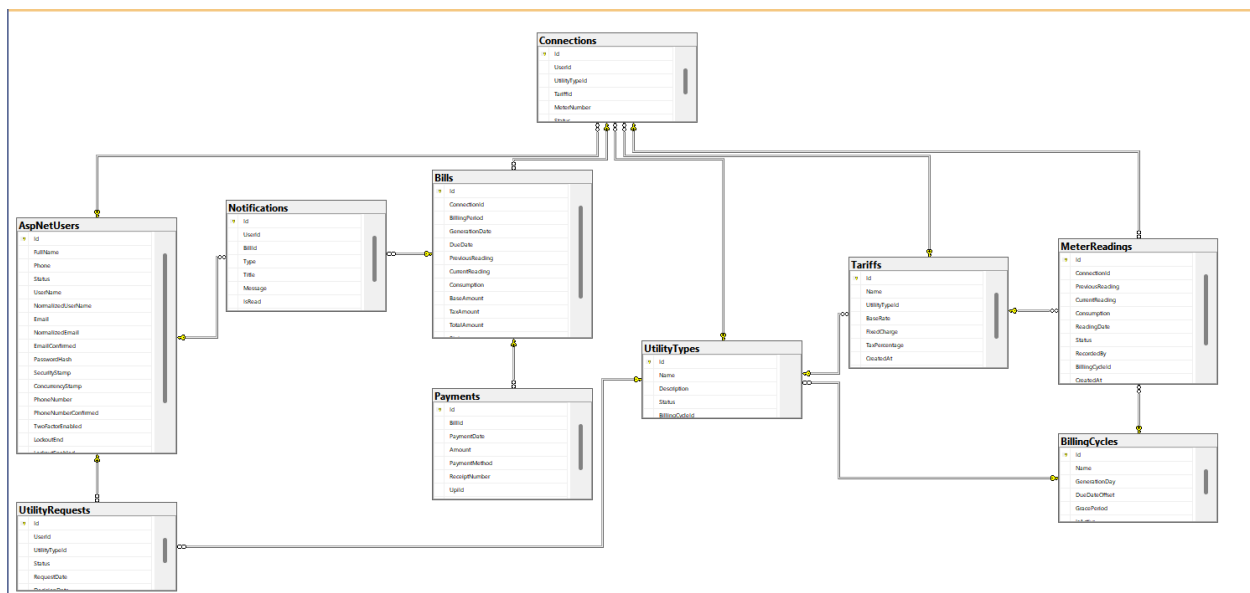




Database Schema

Database Schema

Utility Billing System



Database Schema Diagram

Table Definitions

1. AspNetUsers (User)

Base Table: Inherits from ASP.NET Core Identity **IdentityUser**

Column Name	Data Type	Constraints	Description
Id	string (GUID)	PK	Primary key (inherited from IdentityUser)
UserName	string	Required, Unique	Username for login

Column Name	Data Type	Constraints	Description
Email	string	Required, Unique	Email address
EmailConfirmed	bool		Email confirmation status
PasswordHash	string		Hashed password
PhoneNumber	string		Phone number
PhoneNumberConfirmed	bool		Phone confirmation status
TwoFactorEnabled	bool		Two-factor authentication status
LockoutEnabled	bool		Account lockout status
AccessFailedCount	int		Failed login attempts
LockoutEnd	DateTimeOffset?		Lockout end time
FullName	string(200)	Required	Full name of the user
Status	string(20)	Default: "Active"	User status: Active, Inactive, Deleted
DeletedAt	DateTime?	Nullable	Soft delete timestamp

Navigation Properties:

- **Connections** → Collection of Connection entities
- **UtilityRequests** → Collection of UtilityRequest entities

2. UtilityType

Column Name	Data Type	Constraints	Description
Id	string (GUID)	PK	Primary key
Name	string(100)	Required	Name of the utility type (e.g., "Electricity", "Water")
Description	string(500)		Description of the utility type
Status	string(20)	Default: "Enabled"	Status: Enabled, Disabled
BillingCycleId	string (GUID)	FK, Nullable	Reference to BillingCycle

Navigation Properties:

- **BillingCycle** → BillingCycle entity (nullable)
- **Tariffs** → Collection of Tariff entities
- **Connections** → Collection of Connection entities
- **UtilityRequests** → Collection of UtilityRequest entities

3. BillingCycle

Column Name	Data Type	Constraints	Description
Id	string (GUID)	PK	Primary key
Name	string(200)	Required	Name of the billing cycle
GenerationDay	int	Required, Check: 1-28	Day of month when bills are generated
DueDateOffset	int	Required	Days after generation date for due date
GracePeriod	int	Required	Days after due date before penalty applies
IsActive	bool	Default: true	Whether the billing cycle is active

Navigation Properties:

- **UtilityTypes** → Collection of UtilityType entities

Constraints:

- Check constraint: **GenerationDay BETWEEN 1 AND 28**

4. Tariff

Column Name	Data Type	Constraints	Description
Id	string (GUID)	PK	Primary key
Name	string(200)	Required	Name of the tariff plan
UtilityTypeId	string (GUID)	FK, Required	Reference to UtilityType
BaseRate	decimal(18,2)	Required, Range: ≥0	Rate per unit of consumption

Column Name	Data Type	Constraints	Description
FixedCharge	decimal(18,2)	Required, Range: ≥ 0	Monthly fixed charge
TaxPercentage	decimal(5,2)	Required, Range: 0-100	Tax percentage applied
CreatedAt	DateTime	Required, Default: UtcNow	Creation timestamp
IsActive	bool	Default: true	Whether the tariff is active

Navigation Properties:

- `UtilityType` → UtilityType entity
- `Connections` → Collection of Connection entities

5. Connection

Column Name	Data Type	Constraints	Description
Id	string (GUID)	PK	Primary key
UserId	string (GUID)	FK, Required	Reference to User (AspNetUsers)
UtilityTypeId	string (GUID)	FK, Required	Reference to UtilityType
TariffId	string (GUID)	FK, Required	Reference to Tariff
MeterNumber	string(50)	Required, Unique	Unique meter number
Status	string(20)	Default: "Active"	Status: Active, Inactive

Navigation Properties:

- `User` → User entity
- `UtilityType` → UtilityType entity
- `Tariff` → Tariff entity
- `Bills` → Collection of Bill entities

Indexes:

- Unique index on `MeterNumber`

6. UtilityRequest

Column Name	Data Type	Constraints	Description
Id	string (GUID)	PK	Primary key
UserId	string (GUID)	FK, Required	Reference to User
UtilityTypeId	string (GUID)	FK, Required	Reference to UtilityType
Status	string(20)	Default: "Pending"	Status: Pending, Approved, Rejected
RequestDate	DateTime	Required, Default: UtcNow	Date when request was made
DecisionDate	DateTime?	Nullable	Date when request was approved/rejected

Navigation Properties:

- **User** → User entity
- **UtilityType** → UtilityType entity

7. MeterReading

Column Name	Data Type	Constraints	Description
Id	string (GUID)	PK	Primary key
ConnectionId	string (GUID)	FK, Required	Reference to Connection
PreviousReading	decimal(18,2)	Range: ≥0	Previous meter reading value
CurrentReading	decimal(18,2)	Range: ≥0	Current meter reading value
Consumption	decimal(18,2)	Range: ≥0	Calculated consumption (Current - Previous)
ReadingDate	DateTime	Required	Date when reading was taken
Status	string(20)	Default: "ReadyForBilling"	Status: ReadyForBilling, Billed
RecordedBy	string(200)	Required	User who recorded the reading
BillingCycleId	string (GUID)	FK, Nullable	Reference to BillingCycle
TariffId	string (GUID)	FK, Required	Reference to Tariff (snapshot at reading time)

Column Name	Data Type	Constraints	Description
CreatedAt	DateTime	Required, Default: UtcNow	Creation timestamp

Navigation Properties:

- `Connection` → Connection entity
- `BillingCycle` → BillingCycle entity (nullable)
- `Tariff` → Tariff entity

Indexes:

- Unique composite index on `(ConnectionId, BillingCycleId)` with filter `Status = 'ReadyForBilling'`
- Index on `ReadingDate`
- Index on `Status`

8. Bill

Column Name	Data Type	Constraints	Description
Id	string (GUID)	PK	Primary key
ConnectionId	string (GUID)	FK, Required	Reference to