# DB Architecture, Constraints, Relational Algebra

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**3-Tier architecture:**

Database: MariaDB

Middle Tier: ASP.NET, C#, .NET Connector, IIS

Top Tier: HTML, CSS, Javascript

**Constraints:**

Purchase:

Security number can only be 3 digits long and contain only digits

Expiration date must be a date of MM/YYYY format

Card number must be all digits

Create Player:

Username, password and display name cannot be longer than 20 characters

Username must be unique

Password must be more than 6 characters

Email cannot be longer than 40 characters

Username, password, email and display name cannot be empty or null

Create Game:

Title can only be 50 characters in length and must be unique

Genre can only be 50 characters in length

Description can only be 2000 characters

Price must be a decimal of (10,2)

Price must be converted to USD from whichever currency selected

Create Dev:

Username must be unique.

Password must be more than 6 characters

Email/Company Email accept valid characters

Company Name can be only 50 characters in length

About can only be 2000 characters

Phone number must be in XXX-XXX-XXX format with only numbers

Bank field must have a number of 9 digits in length

Account must be a number of 16 digits in length

Web Link must be a valid link.

Create Sale:

Game must be in system

Date must be a date of MM/DD/YYYY format

Date must be unique

Discount must be given in as an integer

Create Stream:

Game must be in system

Players must be in system

Link must be a valid link

Player cannot be associated with another stream

Create Competition:

Title can only be 50 characters in length and be unique

Date must be in this format MM/DD/YYYY

Game can only be 100 characters in length and must be in system

Description can only be 2000 characters in length

**Relational Algebra:**

**Dev Homepage:**

Get Dev Info: ΠDevAbout,DevEmail,DevPhone,DevLink(σDevName=@Username(DEVELOPER))

Get Dev Game: ΠGameTitle(GAME⋈GAME.GameID=DEVELOPS.GameID

(DEVELOPS⋈DEVELOPS.DevID=DEVELOPER.DevID(σDevName=@UserName(DEVELOPER))))

Delete Game: GAME ← GAME – σGameTitle = @GameTitle(GAME)

Delete account: DEVELOPER ← DEVELOPER – σDevName = @Username(DEVELOPER)

**Player Homepage/Info:**

Get player name: ΠPlayerDisplayName(σPlayerUsername=@Username(PLAYER))

Get Purchased Games: ΠGameTitle(GAME⋈ GameID=PurchaseGameID(σPurchaseName=@Username(PURCHASE)))

Get Friends: ΠPlayerDisplayName (PLAYER⋈PLAYER.PlayerUsername= FriendUsername(σPlayerUsername=@Username(FRIEND)))

Get followed streams: ΠTitle,Link(STREAM⋈STREAM.StreamID=FOLLOWER.StreamID(σPlayerUsername=@Username(FOLLOWER)))

Get wishlist: ΠGameTitle,GamePrice(GAME⋈GameID=WishlistGameID(σWishlistUsername=@Username(WISHLIST)))

Remove account: PLAYER ← PLAYER – σPlayerUsername=@Username(PLAYER)

**Search:**

Get game list: ΠGameTitle,GamePrice,GameGenre(GAME)

Get competition list: ΠCompName,CompDate,GameTitle(GAME⋈GameID=CompGameID(COMPETITION))

Get player list: ΠPlayerUsername,PlayerDisplayName(σPlayerPermission = 0(PLAYER))

Get sales list: ΠGameTitle,SaleDate,SalePercent( GAME⋈GameID=SaleGameIDSALE)

Get developer list: ΠDevName(DEVELOPER)

Get stream list: ΠStreamTitle,StreamLink(STREAM)

Get admin list: ΠPlayerUsername,PlayerDisplayName (σPlayerPermission = 2(PLAYER))

**Game Info:**

Get Game Info: ΠGameTitle,GamePrice,GameGenre,GameDesc(σGameID=@GameID(GAME))

Get Sale: ΠSaleDate,SalePercent(σSaleGameID=@GameID(SALE))

Get Devs: ΠDevName(DEVELOPER⋈DEVELOPER.DevID=DEVELOPS.DevID(σGameID=@GameID(DEVELOPS)))

Get Forums: ΠForumLink(σGameID=@GameID(FORUM))

Wishlist: WISHLIST ← WISHLIST ∪ {(@GameID, @PlayerUsername)}

Remove Game: GAME ← GAME – σGameID=@GameID(GAME)

**Competition Info:**

Get comp Info: ΠCompName,CompDate,CompDesc(GAME⋈GameID=CompGameID(σCompID=@CompID(COMPETITION)))

Get entered players: ΠPlayerDisplayName(PLAYER⋈EnterPUsername=PlayerUsername(σEnterCompID=@CompID(ENTER)))

Enter comp: ENTER ← ENTER ∪ {(@Username, @CompID)}

**Dev Info:**

Get Dev Info: ΠDevName,DevAbout,DevEmail,DevLink,DevPhone(σDevID=@DevID(DEVELOPER))

Get Dev Game: ΠGameTitle(GAME⋈GAME.GameID=DEVELOPS.GameID(σDevID=@DevID(DEVELOPS)))

Delete account: DEVELOPER ← DEVELOPER – σDevID=@DevID(DEVELOPER)

**Stream Info:**

Follow Stream: FOLLOWER ← FOLLOWER ∪ {(@Username, @StreamID)}

Unfollow Stream: FOLLOWER ← FOLLOWER – σPlayerUsername=@Username(FOLLOWER)

Is Followed: 𝔍COUNT StreamID(σPlayerUsername=@Username AND StreamID=@StreamID(FOLLOWER))

Get other players: ΠPlayerDisplayName(PLAYER⋈PLAYER.PlayerUsername=HOSTS.PlayerUsername(σStreamID=@StreamID(HOSTS)))

Get stream Info: ΠStreamTitle,StreamLink,GameTitle(GAME⋈GAME.GameID=STREAM.GameID(σStreamID=@StreamID(STREAM)))

Remove from Stream: HOSTS ← HOSTS - σPlayerUsername=@Username(HOSTS)

**Purchase:**

Get Game Info: ΠGameTitle,GamePrice,SaleDate,SaleDiscount(GAME⋈GameID=SaleGameID(σSaleGameID=@GameID(SALE)))

Create Purchase: PURCHASE ← PURCHASE ∪ {(@Date,@Price,@CardNum,@CardName,@CardExp,

@CardSecurity,@Username,@SaleID,@GameID)}

**Create Player:**

Create Player: PLAYER ← PLAYER ∪ {(@Username, @DisplayName, 0, @Password, @Email)}

**Create Game:**

Create Game: GAME ← GAME ∪ {(@Title, @Description, @Genre, @Price)}

Add game to Dev: DEVELOPS ← DEVELOPS ∪ {(@GameID, @DevID)}

Add forum to Game: FORUM ← FORUM ∪ {(@GameID, @ForumLink)}

**Create Dev:**

Create Dev: DEVELOPER ← DEVELOPER ∪ {(@DevName,@About, @Email, @Phone, @Link, @Routing#, @Account#, @Username)}

Create Dev Account: PLAYER ← PLAYER ∪ {(@Username, @DisplayName, 1, @Password, @Email)}

**Create Sale:**

Create Sale: SALE ← SALE ∪ {(@Date, @Discount, @GameID)}

**Create Stream:**

Create Stream: STREAM ← STREAM ∪ {(@Title, @GameID, @StreamLink)}

Add Player to stream: HOSTS ← HOSTS ∪ {(@StreamID,@ Username)}

**Create Competition:**

Create Competition: COMPETITION ← COMPETITION ∪ {(@Title, @Date, @Description, @GameID)}

Is a game: 𝔍COUNT GameID(σGameTitle=@GameTitle(GAME))

**Developer Statistics:**

Game purchases and total:

GameTitle𝔍COUNT PurchaseID, SUM PurchasePrice(PURCHASE⋈PurchaseGameID=GAME.GameID

(GAME⋈GAME.GameID=DEVELOPS.GameID(σDevID=@DevID(DEVELOPS))))

Genre purchases and total:

GameGenre𝔍COUNT PurchaseID, SUM PurchasePrice(PURCHASE⋈PurchaseGameID=GAME.GameID

(GAME⋈GAME.GameID=DEVELOPS.GameID(σDevID=@DevID(DEVELOPS))))

**Admin Statistics:**

Game purchases and total:

GameTitle𝔍COUNT PurchaseID, SUM PurchasePrice (PURCHASE⋈PurchaseGameID=GameID(GAME))

Genre purchases and total:

GameGenre𝔍COUNT PurchaseID, SUM PurchasePrice (PURCHASE⋈PurchaseGameID=GameID(GAME))

Developer purchases and total:

DevName𝔍COUNT PurchaseID, SUM PurchasePrice (DEVELOPER⋈DEVELOPER.DevID=DEVELOPS.DevID

(DEVELOPS⋈DEVELOPS.GameID=GAME.GameID(PURCHASE⋈PurchaseGameID=GameID(GAME))))