

# APEX Legends: Database System Design and Implementation

## 1. Database Objectives And Scope

The objective of the database for the game Apex Legends is to help gamers better understand the game on a statistical standpoint so they may be able to make better in game decisions that would better help their playstyle and maximize their in game positive output. The database will cover all aspects of the game: Characters, Special Abilities, Damage, Weapons, Attachments, etc.

## 2. User Requirements

- Each user must have an eligible gaming console(Personal Computer, Xbox One Console, Playstation 4 Console)
- PC Requirements
  - Operating System: Windows 7 64-bit or Windows 10 64-bit
  - Processor: Intel Core i3-6300 3.8 GHz / AMD FX-4350 4.2 GHz Quad Core
  - RAM: 6GB
  - Video Card: 1 GB NVIDIA GeForce GT 640 / Radeon HD 7730
  - Free Disk Space: 22 GB
- User must have a monitor compatible with console
- User must have a compatible controller with console
- User must have an internet connection with speeds of 1-3 Mb per second

## 3. Business Rules

*Every HeroID can have one to many ItemID*

*Every ItemID can have zero to one HeroID*

*Every HeroID can have zero to many WeaponID*

*Every WeaponID can have zero to one HeroID*

*Every HeroID can have one and only one AbilityID*

*Every AbilityID can have zero to one HeroID*

*Every WeaponID can have one to many ScopeID*

*Every ScopeID can have zero to one WeaponID*

*Every WeaponID can have zero to many GunID*

*Every GunID can have zero to one WeaponID*

*Every GunID can have one and only one FireModeID*

*Every FireModeID can have one and only one GunID*

*Every ItemID can have zero to many VestID*

*Every VestID can have zero to one ItemID*

*Every ItemID can have zero to many ShieldID*

*Every ShieldID can have zero to one ItemID*

*Every ItemID can have zero to many HelmetID*

*Every HelmetID can have zero to one ItemID*

*Every ItemID can have zero to many ExtendedMagID*

*Every ExtendedMagID can have zero to one ItemID*

*Every ItemID can have zero to many StockID*

*Every StockID can have zero to one ItemID*

*Every ItemID can have zero to many BarrelStabilizerID*

*Every BarrelStabilizerID can have zero to one ItemID*

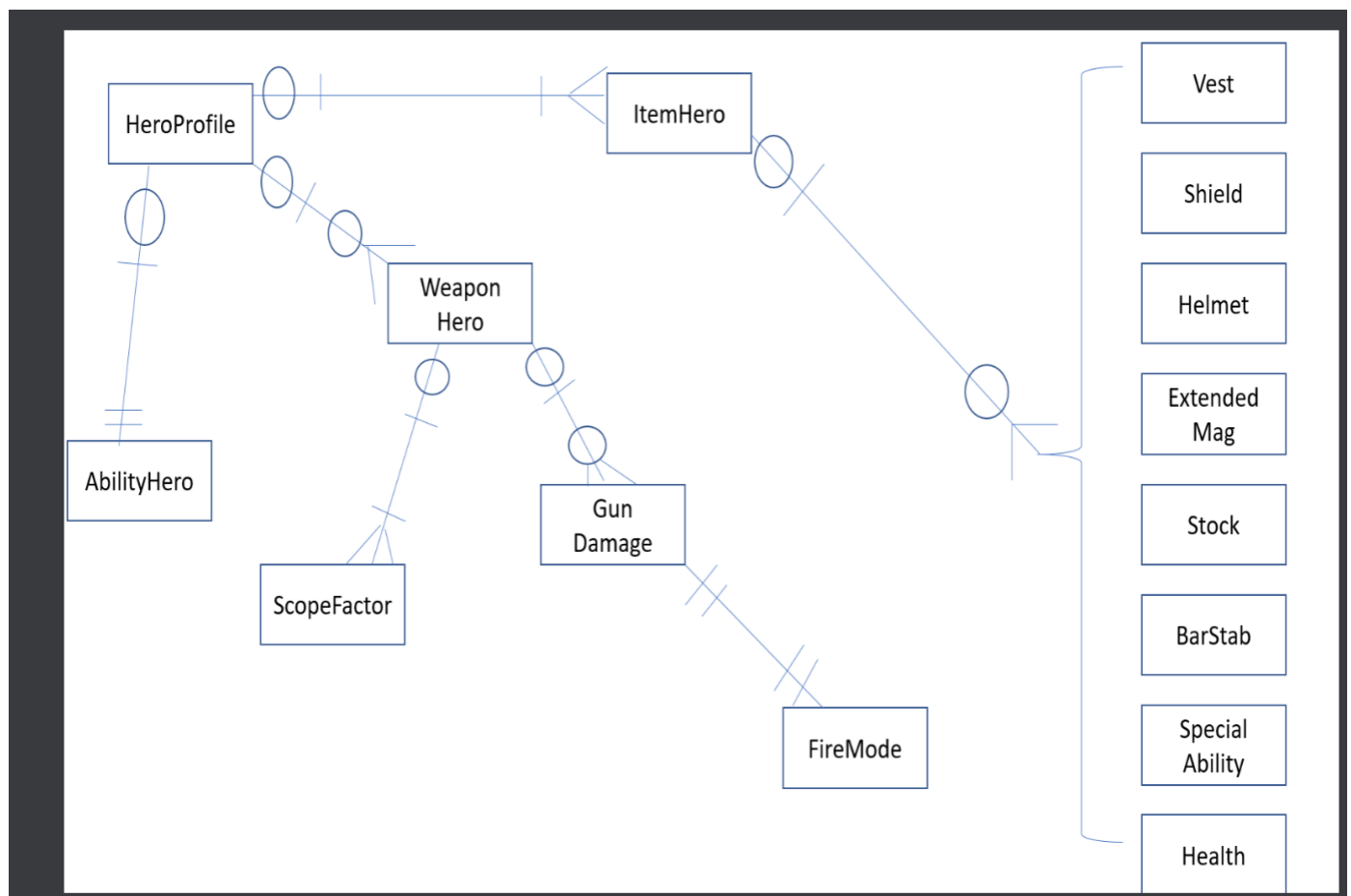
*Every ItemID can have zero to many SpecialAbilityID*

*Every SpecialAbilityID can have zero to one ItemID*

*Every ItemID can have zero to many HealthID*

*Every HealthID can have zero to one ItemID*

#### 4. Entity Relationship Diagram



Due to the scope of the ERD not being able to fit in one page, the properties of the entities and the identification of the FK and the PK will be listed below.

#### HeroProfile Table:

- Primary Key: HeroID(INT, NOT NULL)
- Hero Name(VarChar(50), NOT NULL)
- Finisher(VarChar(50), NOT NULL)
- Legend Type(VarChar(50), NOT NULL)

Foreign Keys:

- AbilityID(INT, NOT NULL) (REF AbilityHero)
- WeaponID(INT, NOT NULL) (REF WeaponHero)
- ItemID(INT, NOT NULL) (ItemHero)

### **ItemHero Table**

PrimaryKey : ItemID(INT, NOT NULL)

GradeDesc(VarChar(50), NOT NULL)

Foreign Keys:

- HelmetID(INT, NOT NULL) (REF Helmet)
- ShieldID(INT, NOT NULL) (REF Shield)
- VestID(INT, NOT NULL) (REF Vest)
- ExtendedMagID(INT, NOT NULL) (REF ExtendedMag)
- StockID(INT, NOT NULL) (REF Stock)
- BarrelStabilizerID(INT, NOT NULL) (REF BarStab)
- SpecialAbilityID(INT, NOT NULL) (REF SpecialAbility)
- ShieldRechargeID(INT, NOT NULL) (REF ShieldRecharge)

- HealthID(INT, NOT NULL) (REF Health)

### **Vest Table**

- Primary Key: VestID(INT, NOT NULL)
- VestGauges(VarChar(50), NOT NULL)
- VestGrade(VarChar(50), NOT NULL)

### **Helmet Table**

- Primary Key: HelmetID(INT, NOT NULL)
- HelmetGrade(VarChar(50), NOT NULL)
- HelmetGauges(VarChar(50), NOT NULL)

### **Shield Table**

- Primary Key: ShieldID(INT, NOT NULL)
- ShieldGauges(VarChar(50), NOT NULL)
- ShieldGrade(VarChar(50), NOT NULL)

### **ExtendedMag Table**

- Primary Key: ExtendedMagID(INT, NOT NULL)
- ExtendedMagGrade(VarChar(50), NOT NULL)

### **Stock Table**

- Primary Key: StockID(INT, NOT NULL)

- StockGrade(VarChar(50), NOT NULL)

### **BarStab Table**

- Primary Key: BarrelStabilizerID(INT, NOT NULL)
- BarStabGrade(VarChar(50), NOT NULL)

### **SpecialAbility Table**

- Primary Key: SpecialAbilityID(INT, NOT NULL)
- SpecialAbilityName(VarChar(50), NOT NULL)
- SpecialAbilityProperty(VarChar(50), NOT NULL)
- SpecialAbilityGrade(VarChar(50), NOT NULL)

### **ShieldRecharge Table**

- Primary Key: ShieldRechargeID(INT, NOT NULL)
- ShRechGrade(VarChar(50), NOT NULL)
- ShRechProp(VarChar(50), NOT NULL)

### **Health Table**

- Primary Key: HealthID(INT, NOT NULL)
- HealthItemGrade(VarChar(50), NOT NULL)
- HealthItemProperty(VarChar(50), NOT NULL)
- HealthItem(VarChar(50), NOT NULL)

**AbilityHero Table**

- Primary Key: AbilityID(INT, NOT NULL)
- AbilityName(VarChar(50), NOT NULL)

**WeaponHero Table**

- Primary Key: WeaponHeroID(INT, NOT NULL)
- WeaponType(VarChar(50), NOT NULL)
- Foreign Key:
  - GunID(INT, NOT NULL) (REF GunDamage)
  - ScopeID(INT, NOT NULL) (REF ScopeFactor)

**GunDamage Table**

- Primary Key: GunID(INT, NOT NULL)
- AmmoType(VarChar(50), NOT NULL)
- GunName(VarChar(50), NOT NULL)
- MagSize(VarChar(50), NOT NULL)
- BodyShot(VarChar(50), NOT NULL)
- HeadShot(VarChar(50), NOT NULL)
- BodyShotPerMag(VarChar(50), NOT NULL)
- HeadShotPerMag(VarChar(50), NOT NULL)
- Pattern(VarChar(50), NULL)
- BodyPerHead(VarChar(50), NULL)
- Foreign Keys:

- FireModeID(INT, NOT NULL) (REF FireMode)
- WeaponID(INT, NOT NULL) (REF WeaponHero)

#### ScopeFactor Table

- Primary Key: ScopeID
- ScopeDesc
- Reticle
- Grade

#### FireMode Table

- Primary Key: FireModeID
- FireModeType

### 5. Data Dictionary



	A	B	C	D	E	F	G	H
1	Table	Column	Data Type	PK	FK	Nullable	References	Description
2	HeroProfile	HeroID	INT	Y		Not Null		Hero's Unique ID
3	HeroProfile	HeroName	VARCHAR(50)			Not Null		Name of Hero
4	HeroProfile	Finisher	VARCHAR(50)			Not Null		Hero's Ultimate Finisher
5	HeroProfile	LegendType	VARCHAR(50)			Not Null		Hero's Classification
6	HeroProfile	AbilityID	INT		Y	Not Null	AbilityHero	Hero's Ability ID
7	HeroProfile	WeaponID	INT		Y	Not Null	WeaponHero	Hero's Weapon ID
8	HeroProfile	ItemID	INT		Y	Not Null	ItemHero	Hero's Item Set ID
9	ItemHero	ItemID	INT	Y		Not Null		Hero's Item Set ID
10	ItemHero	VestID	INT		Y	Not Null	Vest	Vest Item ID
11	ItemHero	HelmetID	INT		Y	Not Null	Helmet	Helmet Item ID
12	ItemHero	ShieldID	INT		Y	Not Null	Shield	Shield Item ID
13	ItemHero	ExtendedMagID	INT		Y	Not Null	ExtendedMag	Extended Mag Item ID
14	ItemHero	StockID	INT		Y	Not Null	Stock	Stock Item ID
15	ItemHero	BarrellStabilizerID	INT		Y	Not Null	BarStab	Barrell Stabilizer Item ID
16	ItemHero	SpecialAbilityID	INT		Y	Not Null	SpecialAbility	Special Ability Item ID
17	ItemHero	ShieldRechargeID	INT		Y	Not Null	SpecialRecharge	Shield Recharge Item ID
18	ItemHero	HealthID	INT		Y	Not Null	Health	Health Item ID
19	ItemHero	GradeDESC	VARCHAR(60)			Not Null		Description of Grades
20	Vest	VestID	INT	Y		Not Null		Vest Item ID
21	Vest	VestGrade	VARCHAR(50)			Not Null		Grade of Vests
22	Vest	VestGauges	VARCHAR(50)			Not Null		Different Vest Gauges
23	Helmet	HelmetID	INT	Y		Not Null		Helmet Item ID
24	Helmet	HelmetGrade	VARCHAR(50)			Not Null		Grade of Helmets
25	Helmet	HelmetGauges	VARCHAR(50)			Not Null		Different Helmet Gauges
26	Shield	ShieldID	INT	Y		Not Null		Shield ID
27	Shield	ShieldGrade	VARCHAR(50)			Not Null		Grade of Shields
28	Shield	ShieldGauges	VARCHAR(50)			Not Null		Different Shield Gauges
29	ExtendedMag	ExtendedMagID	INT	Y		Not Null		Extended Mag Item ID
30	ExtendedMag	ExMagGrade	VARCHAR(50)			Not Null		Grade of Extended Mags For Guns
31	Stock	StockID	INT	Y		Not Null		Stock Item ID
32	Stock	StockGrade	VARCHAR(50)			Not Null		Grade of Stock Attachments For Guns
33	BarStab	BarrellStabilizerID	INT	Y		Not Null		Barrell Stabilizer Item ID
34	BarStab	BarStabGrade	VARCHAR(50)			Not Null		Grade of Barrel Stabilizers for Guns
35	SpecialAbility	SpecialAbilityID	INT	Y		Not Null		Special Ability Item ID
36	SpecialAbility	SpecialAbilityName	VARCHAR(50)			Not Null		Name of Item Special Ability
37	SpecialAbility	SpecialAbilityProperty	VARCHAR(50)			Not Null		Special Item Ability Property
38	SpecialAbility	SpecialAbilityGrade	VARCHAR(50)			Not Null		Grade of Item Special Ability
39	ShieldRecharge	ShieldRechargeID	INT	Y		Not Null		Special Recharge ID
40	ShieldRecharge	ShRechGrade	VARCHAR(50)			Not Null		Grade of Shield Recharge
41	ShieldRecharge	ShRechProp	VARCHAR(50)			Not Null		Property of Shield Recharge

42	Health	HealthID	INT	Y	Not Null		Health Item ID
43	Health	HealthItem	VARCHAR(50)		Not Null		Health Item Name
44	Health	HealthItemGrade	VARCHAR(50)		Not Null		Grade of Health Item
45	Health	HealthItemProperty	VARCHAR(50)		Not Null		Property of Health Item
46	AbilityHero	AbilityHeroID	INT	Y	Not Null		Ability Hero ID
47	AbilityHero	AbilityName	VARCHAR(50)		Not Null		Name of Ability
48	WeaponHero	WeaponHeroID	INT	Y	Not Null		Hero's Weapon ID
49	WeaponHero	WeaponType	VARCHAR(50)		Not Null		Weapon Classification
50	WeaponHero	GunID	INT	Y	Not Null	GunDamage	Gun ID
51	WeaponHero	ScopeID	INT	Y	Not Null	ScopeFactor	Scope ID
52	ScopeFactor	ScopeID	INT	Y	Not Null		Scope ID
53	ScopeFactor	ScopeDESC	VARCHAR(50)		Not Null		Description of Scope
54	ScopeFactor	Reticle	VARCHAR(50)		Not Null		Reticle of Scope
55	ScopeFactor	Grade	VARCHAR(50)		Not Null		Grade of Scope
56	GunDamage	GunID	INT	Y	Not Null		Gun ID
57	GunDamage	AmmoType	VARCHAR(50)		Not Null		Type of Ammo For Gun
58	GunDamage	GunName	VARCHAR(50)		Not Null		Name of Gun
59	GunDamage	MagSize	VARCHAR(50)		Not Null		Size of Mag
60	GunDamage	BodyShot	VARCHAR(50)		Not Null		Body Shot Damage Per Shot
61	GunDamage	HeadShot	VARCHAR(50)		Not Null		Head Shot Damage Per Shot
62	GunDamage	BodyShotPerMag	VARCHAR(50)		Not Null		Body Shot Damage With Mag Equipped
63	GunDamage	HeadShotPerMag	VARCHAR(50)		Not Null		Head Shot Damage With Mag Equipped
64	GunDamage	Pattern	VARCHAR(50)		Null		Spray Patterns For Some Weapons
65	GunDamage	BodyPerHead	VARCHAR(50)		Null		Body Head Damage Distribution For Some Guns
66	GunDamage	FireModeID	INT	Y	Not Null	FireMode	Fire Mode ID
67	GunDamage	WeaponID	INT	Y	Not Null	WeaponHero	Hero's Weapon ID
68	FireMode	FireModeID	INT	Y	Not Null		Fire Mode ID
69	FireMode	FireModeType	VARCHAR(50)		Not Null		Type of Fire Mode

## 6. SQL Created and Insert Values Tables Screenshots

### HeroProfile Table

HeroID	HeroName	Finisher	LegendType	AbilityId	WeaponId	ItemID
1	Bangalore	Reversal of Fortune	Offensive	1	1	1
2	Bloodhound	With honor	Recon	2	3	2
3	Lifeline	D.O.C Shock	Support	3	2	9
4	Gibraltar	Force of Gravity	Defensive	4	3	4
5	PathFinder	Iron Haymaker	Support	5	4	5
6	Caustic	Strike Three	Defensive	6	5	3
7	Wraith	Into The Light	Offensive	7	6	7
8	Mirage	Pound It Bro	Offensive	8	3	8
9	Wattson	Electrical Contact	Defensive	9	2	4
10	Crypto	Drone Scan	Recon	10	1	3
11	Octane	Full Throttle	Offensive	11	4	8

ItemHero Table

ItemID	VestId	HelmetId	ShieldId	ExtendedMagId	StockId	BarrelStabilizerId	SpecialAbilityId	ShieldRechargeId
1	1	3	2	3	2	4	1	1

Vest Table

VestId	VestGrade	VestGauges
1	White	1
2	Blue	3
3	Purple	4
4	Gold	4 (Full Recharge)

Helmet Table

HelmetId	HelmetGrade	HelmetGauges
1	White	1
2	Blue	3
3	Purple	4
4	Gold	4 (Full Recharge)

Shield Table

ShieldId	ShieldGrade	ShieldGauges
1	White	2
2	Blue	3
3	Purple	4
4	Gold	4 (Full Recharge)

ExtendedMag Table

ExtendedMagId	ExMagGrade
1	White
2	Blue
3	Purple
4	Gold

Stock Table

StockId	StockGrade
1	White
2	Blue
3	Purple
4	Gold

BarStab Table

BarrelStabilizerId	BarStabGrade
1	White
2	Blue
3	Purple
4	Gold

SpecialAbility Table

SpecialAbilityId	SpecialAbilityName	SpecialAbilityProperty	SpecialAbilityGrade
1	Ultimate Accelerant	35% Taken Off Cooldown Time	Blue

ShieldRecharge Table

ShieldRechargeId	ShRechGrade	ShRechProp
1	White	1 Guage
2	Blue	All Guages

Health Table

HealthId	HealthItem	HealthItemGrade	HealthItemProperty
1	Health Package	White	20%
2	Health Kit	Blue	100%
3	Phoenix Kit	Purple	All Shield

AbilityHero Table(On Page Below)

AbilityId	AbilityName
1	Rolling Thunder
2	Beast of the Hunt
3	Care Package
4	Defensive Bombardment
5	Zipline Gun
6	Nox Gas Grenade
7	Dimensional Rift
8	Vanishing Act
9	Interception Pylon
10	Drone EMP
11	Launch Pad

WeaponHero Table

WeaponID	WeaponType	GunID	ScopeID
1	SHOTGUN	1	3
2	PISTOL	6	5
3	SMG	9	1
4	ASSUALT RIFLE	15	7
5	LMG	18	4
6	SNIPER RIFLE	5	9

ScopeFactor Table

ScopeId	ScopeDesc	Reticle	Grade
1	1X	Red Dot	White
2	1X	Arrow	Blue
3	1/2X	Pinpoint	Blue
4	2/4X	Pinpoint	Purple
5	6X	CrossBar	Blue
6	4/8X	Pinpoint	Purple
7	4/8/10X	CrossBar	Gold
8	1X	Pinpoint	White
9	1X	Infrared	Gold

GunDamage Table

GunID	AmmoType	GunName	MagSize	BodyShot	HeadShot	BodyShotPerMag	HeadShotPerMag	Pattern	BodyPerHead	FireModeId	WeaponID
1	Shotgun	EVA-8 Auto	8	63	90	504	720	Numeral	7/10	1	1
2	Shotgun	Peacekeeper	6	110	175	660	990	Star	10/15	2	1
3	Shotgun	Mozambique	3	45	66	135	198	Triangle	15/22	3	2
4	Unique	Mastiff	6	144	288	576	1152	Horizontal Line	18/36	3	1
5	Unique	Kraber .50-Cal	8	125	250	1000	2000	null	23/46	5	6
6	Light	RE-45 Auto	15	11	16	165	240	null	null	1	2
7	Light	P2020	10	12	18	120	180	null	null	3	2
8	Light	R-99	18	12	18	216	324	null	null	1	3
9	Light	Alternator	16	13	19	208	304	null	null	1	3
10	Light	RE-301	18	12	18	216	324	null	null	1	4
11	Light	G7 Scout	10	30	60	300	600	null	null	3	6
12	Heavy	Wingman	6	45	90	270	540	null	null	3	2
13	Heavy	Hemlok	18	18	24	324	432	3 Round Burst	54/72	4	4
14	Heavy	Prowler	20	14	21	280	420	5 Round Burst	70/105	4	3
15	Heavy	VK-47 Flatline	20	16	32	320	640	null	null	3	4
16	Heavy	M600 Spitfire	35	20	40	700	1400	null	null	1	5
17	Heavy	Longbow	5	55	110	275	550	null	null	3	6
18	Energy	Devotion	44	17	34	748	1496	Ramp-Up	null	1	5
19	Energy	Triple Take	5	69	138	345	690	Horizontal Line	23/46	3	6

## FireMode Table

FireModeId	FireModeType
1	Auto
2	Lever Action
3	Semi-Auto
4	Burst
5	Bolt Action

## 7. SQL Queries

### SQL Query #1(Who are the Heroes And Their Respective Finishers for Class Support?)

Number of Records: 2

HeroName	Finisher
PathFinder	Iron Haymaker
Lifeline	D.O.C Shock

### SQL Query #2(What are the different Weapon Types, Gun Types, And Ammo Types in the Database?)

Number of Records: 19

WeaponType	GunName	AmmoType
SHOTGUN	EVA-8 Auto	Shotgun
SHOTGUN	Peacekeeper	Shotgun
PISTOL	Mozambique	Shotgun
SHOTGUN	Mastiff	Unique
SNIPER RIFLE	Kraber .50-Cal	Unique
PISTOL	RE-45 Auto	Light
PISTOL	P2020	Light
SMG	R-99	Light
SMG	Alternator	Light
ASSUALT RIFLE	RE-301	Light
SNIPER RIFLE	G7 Scout	Light
PISTOL	Wingman	Heavy
ASSUALT RIFLE	Hemlok	Heavy
SMG	Prowler	Heavy
ASSUALT RIFLE	VK-47 Flatline	Heavy
LMG	M600 Spitfire	Heavy
SNIPER RIFLE	Longbow	Heavy
LMG	Devotion	Energy
SNIPER RIFLE	Triple Take	Energy

### SQL Query #3(What specific Item Combination Grades does a Hero have at right now?)

Number of Records: 1

VestGrade	HelmetGrade	ShieldGrade	ExMagGrade	StockGrade	BarStabGrade	SpecialAbilityGrade	ShRechGrade	HealthItemGrade	GradeDesc
White	Purple	Blue	Purple	Blue	Gold	Blue	White	Purple	White: Common, Blue: UnCommon, Purple: Rare, Gold: Legendary

### SQL Query #4(What are the minimum, maximum, and average HeadShot

Number of Records: 5

AmmoType	Minimum Head Shot	Maximum HeadShot	ROUND(AVG(HeadShot), 2)
Energy	34	138	86
Heavy	21	110	52.83
Light	16	60	24.83
Shotgun	66	175	110.33
Unique	250	288	269

SQL Query #5(What WeaponTypes have a BodyShotPerMag over 500 and HeadShotPerMag over 700?)

Number of Records: 3

WeaponType
SHOTGUN
LMG
SNIPER RIFLE