

## Key Assignment

CS251-1603B-05: Fundamentals of Database Systems

*GRYMWAR* Online [MMORPG DBMS]

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18 September 2016

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## Project Outline

### *GRYMWAR* Online

*GRYMWAR* Online is a fictional fantasy based massively multiplayer online role playing game, also known as a *MMORPG*. The game will require a database management system to store, track, process, and output all player information as well as their game characters.

*GRYMWAR* Online uses a relational database management system, *RDBMS*, which requires multiple tables for data storage. Tables such as `LoginHistory`, `PlayerInfo`, `CharacterInfo`, `CharacterInventory`, and `PlayerPaymentInfo` will be utilized to manage the player's data.

#### `LoginHistory`

This will contain fields that track the player's current and overall time playing the game.

#### `PlayerInfo`

This table will store all the player's required information that allows them to register and log in to play.

#### `CharacterInfo`

Because the game allows each player to have up to eight characters to play with, each character will require a table that will hold its basic statistics.

#### CharacterInventory

Each player's character will be given access to an inventory to store items collected throughout gameplay. The inventory will allow up to 250 item slots per character. Duplicate items can be stacked in totals up to 99 items.

#### PlayerPaymentInfo

The player's credit card information will be stored in this table. Name on the card, credit card number, expiration date, CVV would be included here to allow for more ease in in-game purchases.

## Description of the Database Design Life Cycle

### Seven Steps of the Database Design Lifecycle

#### Process Identification and Selection

During this step of the process, an overview of the database, its purpose, and the types of data that the database will contain is identified. (Professor Tricic, 2016) The *GRYMWAR* Online database stores, tracks, processes, and outputs various player and character information in a relational database. The purpose of the database is to manage player, character, game inventory, and player payment data for in-game statistics tracking as well as player registration information for efficient server organization.

#### Project Initiation and Planning

In this phase, client requirements for the database are captured and plans for the design of the system are documented. (Professor Tricic, 2016) The *GRYMWAR* database's tables will be designed during this phase. Currently, `LoginHistory`, `PlayerInfo`, `CharacterInfo`, `CharacterInventory`, and `PlayerPaymentInfo` have been identified.

#### Analysis

During the analysis stage, a blueprint of the database is created and the data to be included is analyzed and linked. (Professor Tricic, 2016) Entity-relationship (ER) diagrams are used to visually represent attributes of the database's structure such as tables, their relationships, and relational characteristics. (Hernandez, 2013) In this step, the data that will be linked to the system will be fleshed out. The required keys, indexes, fields, etc. will be analyzed and graphically represented within the ER diagram.

## Logical Design

In the logical design step, the relationships between tables are determined. (Professor Tricic, 2016) During this phase, the GRYMWAR Online database's tables will be normalized in order to ensure all tables are in Third Normal Form (3NF) and that the design structure is sound. (Hernandez, 2013)

## Physical Design

The physical design step of building a database entails moving from the conceptual into the actual construction of the database. (Professor Tricic, 2016) For the *GRYMWAR* Online database, Microsoft Access will be utilized to create the DBMS.

## Implementation

The Implementation stage will be where queries are built to test the design and functionality of the database. (Professor Tricic, 2016) Commands from the SQL language will be used in order to query the project database for various data. Issues and lessons learned during this phase will be documented in order to improve the system during the next iteration.

## Maintenance

In the maintenance step, the DBMS will be tuned for increased efficiency and to account for changes in technology. (Professor Tricic, 2016) Lessons learned during implementation will be used for changes to the structure and/or functionality of the GRYMWAR database during this step of the lifecycle.

## The Three Steps of Database Creation

The three steps of database creation serve as concepts that encapsulate and simplify the seven detailed steps of the database design lifecycle. The three steps move from a conceptual stage, into a logical design paradigm, and, finally, into the modeling of the physical data.

### Conceptual

The conceptual step will capture steps one and two of the DDLC. The GRYMWAR Online database's purpose and types of information it will contain have been identified. Documentation is currently being created to flesh out a detailed plan of the system's requirements. Further research into similar database designs will also take place and sources will be included in the bibliography.

### Logical

The logical step in the design of the database encompasses both the analysis and logical design steps of the DDLC. A blueprint of the database will be finalized and the data to be linked to it analyzed and represented using an ER diagram. The relationships between all the tables will be determined as well.

### Physical Data Modeling

This stage includes the final three steps of physical design, implementation, and maintenance of the DDLC. First, the GRYMWAR Online database will be constructed based on the blueprint using Microsoft Access. Next, queries using SQL will be built and run against the database in various ways during its implementation. Finally, issues with the structure of the database will be documented and corrected as well as further improvements made to increase database efficiency.

## The Entity Relationship Diagram

### One to One Relationships

The *GRYMWAR* Online database possesses only one 1:1 relationship. The entity `LoginHistory` will be related the entity `PlayerInfo` due to the fact that log-in history will only require tracking as it relates to the player's basic information. The other entities do not require log-in/log-out information for functionality.

### One to Many Relationships

Currently, no 1: M relationships have been planned during the database design.

### Many to Many Relationships

There are several M: M relationships that exist within the *GRYMWAR* Online database. The entity `PlayerInfo` proved to be the most important entity within the design. `PlayerInfo` relates to the entity `CharacterInfo` through the attributes of `accountID` and `userName` due to the necessary link between a player and the characters that are associated with their account. `PlayerInfo` is also related to `PlayerPaymentInfo` through the attributes of `userID` and `accountID` for tracking online purchases related to each player's account. Lastly, `CharacterInventory` relates to entity `CharacterInfo` through attributes `characterID` and `characterMoney`.

# ***GRYMWAR*** Online

## ERD

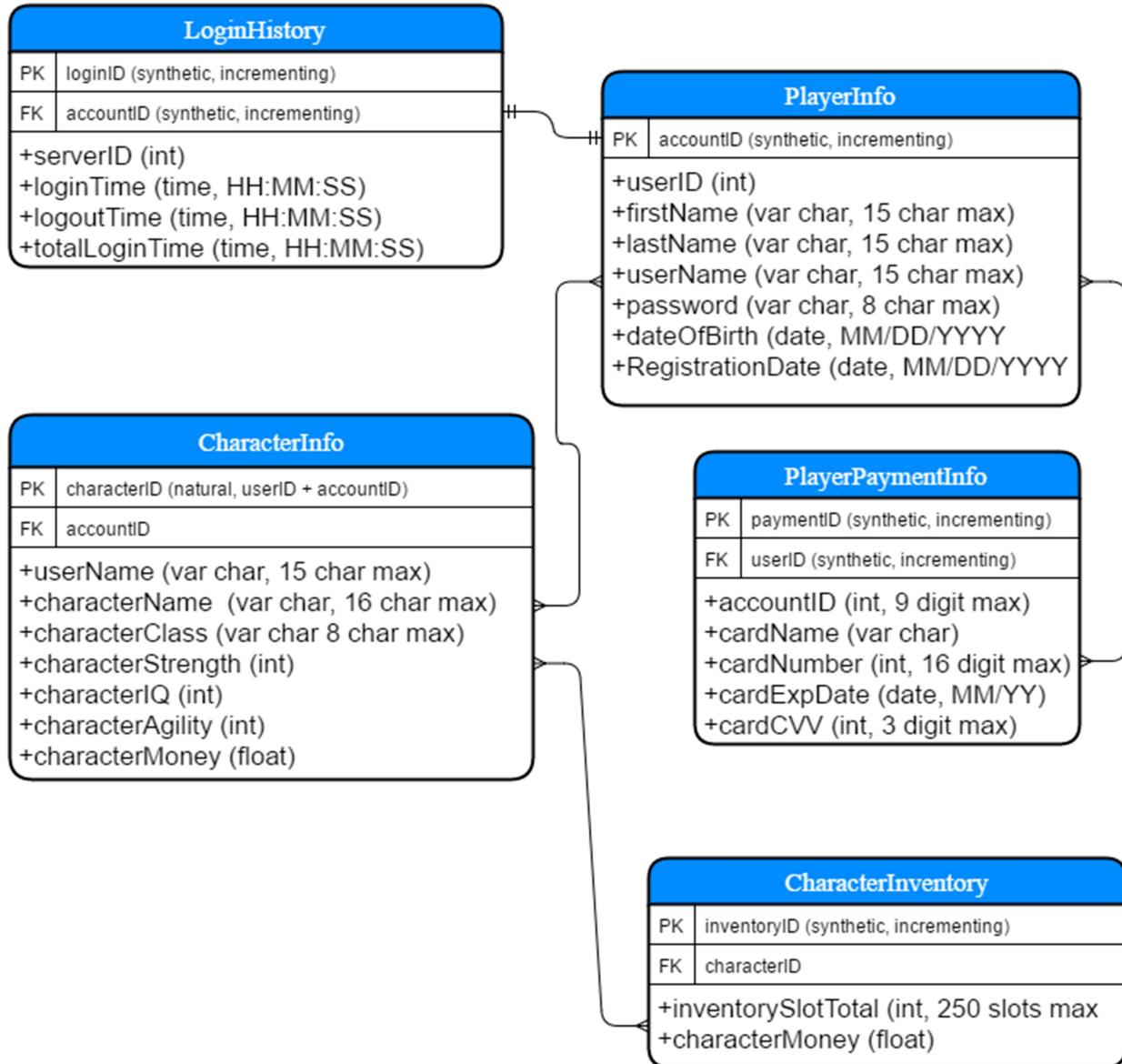


Figure 1 - Entity Relationship Diagram

## The Logical Model and Normalization

### PlayerInfo

The PlayerInfo table was normalized to 1NF by assigning `userName` as the primary key and redundant columns `accountID` and `userID` removed or consolidated. The table met 2NF form after meeting 1NF and the determination that the column `password` should be removed from PlayerInfo for security reasons, a new table called PlayerPassword established, and the foreign key `userName` related back. PlayerInfo was normalized to 3NF after meeting 1NF and 2NF and all columns being fully dependent upon the primary key `userName`.

### LoginHistory

LoginHistory was placed in 1NF after changing the primary from `loginID` to `serverID`, which will be predetermined according to the specific server that a player logs into, and no redundant columns found. The table reached 2NF after meeting 1NF and the removal of the column `totalLoginTime`, which can be calculated on the fly to increase overall performance. During 3NF, after checking that LoginHistory met 1NF and 2NF, it was determined that the columns `loginTime` and `logoutTime` were not fully dependent upon the primary key `serverID`. A new table call LoginInfo was created with the primary key called `loginID` and the foreign key `userName` related from the PlayerInfo table.

### PlayerPaymentInfo

PlayerPaymentInfo table met 1NF after the original primary key, paymentID, was changed to transactionID, cardName broken into cardFirstName and cardLastName, and no duplicate columns found. The table met 2NF after meeting 1NF and the determination that all credit card information was not fully dependent upon the primary key transactionID. All card information was broken into a separate table called CardPaymentInfo and cardNumber made into the primary key as well as transactionID related back as a foreign key. PlayerPaymentInfo met 3NF after meeting 1NF, 2NF, and no dependency issues found.

### CharacterInfo

This table met 1NF after the assignment of characterID as the primary key and the characterMoney column removed because it is tracked within the CharacterInventory table. It was normalized to 2NF after meeting 1NF and no further break outs were required and userName assigned as a foreign key to the table PlayerInfo. It reached 3NF after meeting 1NF, 2NF, and no further normalization was required.

### CharacterInventory

CharacterInventory was normalized to 1NF by assigning the primary key called inventoryID and no redundant columns found. It reached 2NF after meeting 1NF and no further break outs required. The table met 3NF after meeting 1NF, 2NF, and all columns determined to be fully dependent upon the primary key.

Figure 2 shows the *GRYMWAR* Online database after full normalization to 3NF.

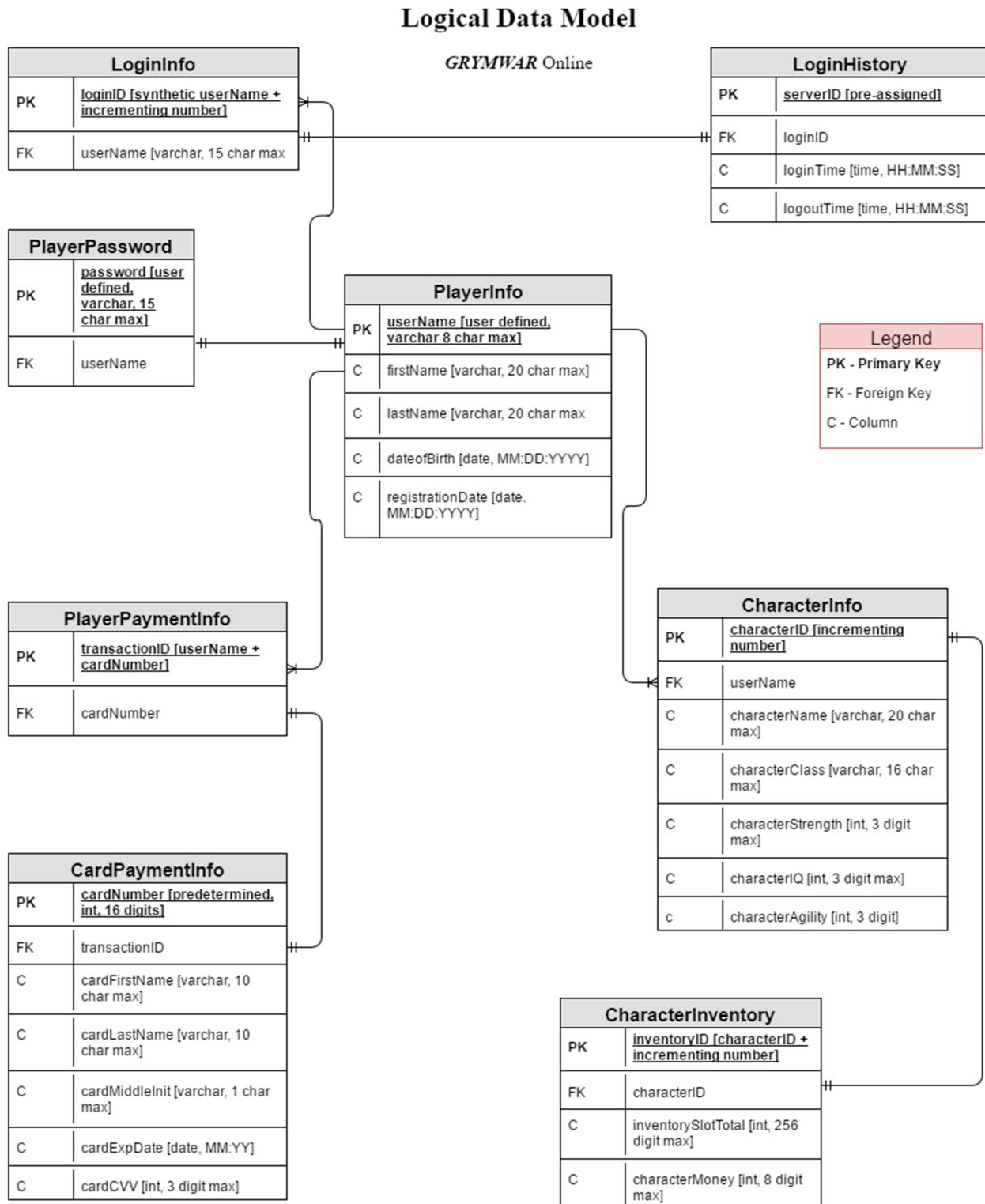


Figure 2 - GRYMWAR Online Logical Data Model

# The Microsoft Access Database

## GRYMWAR Online: TABLES

PlayerInfo

The screenshot shows the Microsoft Access application interface. The ribbon at the top has tabs: FILE, HOME, CREATE, EXTERNAL DATA, DATABASE TOOLS, FIELDS, and TABLE. The TABLE tab is selected. The status bar indicates the database is 'GRYMWAR Online : Database- C:\Users\Michael\Documents\'.

The left pane shows a list of tables: CharacterInfo, CharacterInventory, CardPaymentInfo, LoginHistory, LoginInfo (which is selected and highlighted in red), PlayerInfo, and PlayerPassword. The main area displays the 'PlayerInfo' table with the following data:

	userName	firstName	lastName	dateOfBirth	registrationDate	Action
[+]	GMAN1010	Guillermo	Castillo	12/27/1979	8/19/2015	
[+]	Immortalboxer	Michael	Davis	2/11/1975	9/11/2016	
[+]	LoneWolf81	Andre	Tully	8/24/1981	5/15/2013	
[+]	MEGAGAMER	Allen	Williams	8/10/1977	5/19/2015	
[+]	princessAKIRA	Marci	Cho	4/17/1989	1/5/2013	
[+]	PwnzU2	Simon	Saez	11/26/1990	6/30/2014	
[+]	reaverOne	Mohinder	Surresh	9/29/1985	4/22/2016	
*	WiLdKaT281	Jason	Henderson	7/13/1992	2/24/2014	

Figure 3-Player Information

## CharacterInfo

The screenshot shows the Microsoft Access interface with the 'CharacterInfo' table open in Datasheet view. The table has 16 records. The columns are: characterID, userName, characterName, characterLevel, characterClass, characterStrength, characterIQ, characterAgility, and characterDexterity. The record for characterID 16 is highlighted with a yellow background.

characterID	userName	characterName	characterLevel	characterClass	characterStrength	characterIQ	characterAgility	characterDexterity
1	GMAN1010	Doctor No	6	Engineer	10	15	9	10
2	Immortalboxer	Ionia	30	Assassin	10	6	18	12
3	LoneWolf81	Merklin	50	Wizard	14	20	16	14
4	MEGAGAMER	StickyFingaz	25	Thief	13	11	14	10
5	princessAKIRA	Wonderia	1	Druid	7	10	9	8
6	PwnzU2	Gemli Da Great	13	Warrior	20	12	7	11
7	reaverOne	Sir Reaver	42	Knight	20	10	10	10
8	WiLdKaT281	Mystique	9	Summoner	5	15	13	10
9	Immortalboxer	Tenshi	49	Techno Mage	10	19	6	14
10	GMAN1010	Fro-Garr	22	Warrior	10	13	11	10
11	LoneWolf81	War'Gon	7	Techno Mage	3	8	10	9
12	MEGAGAMER	Naxxil	28	Summoner	11	15	14	13
13	princessAKIRA	Zersees	28	Wizard	13	16	18	15
14	PwnzU2	Aulerian	50	Knight	19	13	16	14
15	reaverOne	Kelrinn	3	Thief	5	7	12	11
16	WiLdKaT281	Lyndell	42	Druid	16	17	11	10
*	(New)							

Figure 4-Character Information

## CharacterInventory

The screenshot shows the Microsoft Access application interface with the 'CharacterInventory' table selected. The table has columns: inventoryID, characterID, inventorySlotTotal, characterMoney, and a 'Click to Add' button.

**Access ribbon:**

- FILE
- HOME (selected)
- CREATE
- EXTERNAL DATA
- DATABASE TOOLS
- TABLE TOOLS
- FIELDS
- TABLE

**CharacterInventory Table Data:**

inventoryID	characterID	inventorySlotTotal	characterMoney	
1	1	16	\$1,000	
2	2	8	\$3,000	
3	3	64	\$2,000,000	
4	4	32	\$5,673	
5	5	8	\$300	
6	6	128	\$98,633	
7	7	64	\$325,732	
8	8	256	\$30,000	
9	9	32	\$3,883	
10	10	16	\$293,233	
11	11	128	\$25,000	
12	12	64	\$72,943	
13	13	8	\$13,363	
14	14	8	\$500,000	
15	15	128	\$3,237	
16	16	32	\$74,903	
*	(New)		\$0	

Figure 5-Character Inventory

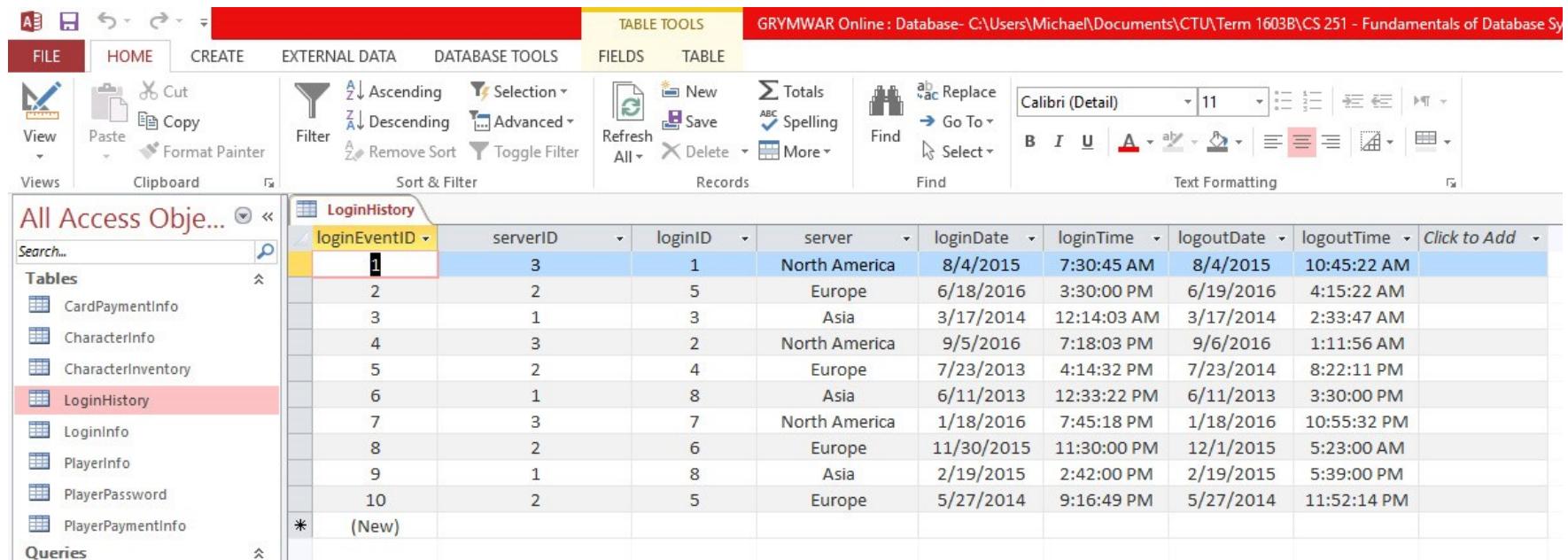
## LoginInfo

The screenshot shows the Microsoft Access application interface. The ribbon at the top has tabs: FILE, HOME, CREATE, EXTERNAL DATA, DATABASE TOOLS, FIELDS, and TABLE TOOLS. The TABLE TOOLS tab is selected, highlighted in yellow. The HOME tab is also visible. The left pane displays a list of tables: CardPaymentInfo, CharacterInfo, CharacterInventory, LoginHistory, LoginInfo, PlayerInfo, PlayerPassword, and PlayerPaymentInfo. The 'LoginInfo' table is currently selected and highlighted with a red background. The main workspace shows the 'CharacterInfo' table with the following data:

	loginID	userName	Action
	1	ImmortalBoxer	
	2	WiLdKaT281	
	3	princessAKIRA	
	4	MEGAGAMER	
	5	PwnzU2	
	6	LoneWolf81	
	7	GMAN1010	
*	8	reaverOne	
	(New)		

Figure 6-Login Information

## LoginHistory



The screenshot shows the Microsoft Access application interface. The ribbon at the top has tabs: FILE, HOME, CREATE, EXTERNAL DATA, DATABASE TOOLS, FIELDS, and TABLE. The TABLE tab is selected. The status bar at the bottom indicates: GRYMWAR Online : Database- C:\Users\Michael\Documents\CTU\Term 1603B\CS 251 - Fundamentals of Database Sy.

The main area displays the 'LoginHistory' table. The table has the following columns:

loginEventID	serverID	loginID	server	loginDate	loginTime	logoutDate	logoutTime	Click to Add
1	3	1	North America	8/4/2015	7:30:45 AM	8/4/2015	10:45:22 AM	
2	2	5	Europe	6/18/2016	3:30:00 PM	6/19/2016	4:15:22 AM	
3	1	3	Asia	3/17/2014	12:14:03 AM	3/17/2014	2:33:47 AM	
4	3	2	North America	9/5/2016	7:18:03 PM	9/6/2016	1:11:56 AM	
5	2	4	Europe	7/23/2013	4:14:32 PM	7/23/2014	8:22:11 PM	
6	1	8	Asia	6/11/2013	12:33:22 PM	6/11/2013	3:30:00 PM	
7	3	7	North America	1/18/2016	7:45:18 PM	1/18/2016	10:55:32 PM	
8	2	6	Europe	11/30/2015	11:30:00 PM	12/1/2015	5:23:00 AM	
9	1	8	Asia	2/19/2015	2:42:00 PM	2/19/2015	5:39:00 PM	
10	2	5	Europe	5/27/2014	9:16:49 PM	5/27/2014	11:52:14 PM	
*	(New)							

The left pane shows the navigation pane with tables: CardPaymentInfo, CharacterInfo, CharacterInventory, LoginHistory (selected), LoginInfo, PlayerInfo, PlayerPassword, and PlayerPaymentInfo. The queries section is also visible.

Figure 7-Login History

## PlayerPaymentInfo

The screenshot shows the Microsoft Access application interface with the following details:

- Title Bar:** GRYMWAR Online: Database- C:\Users\Michael\Documents\CTU\Term 1603B\CS 251 - Fun
- Menu Bar:** FILE, HOME (selected), CREATE, EXTERNAL DATA, DATABASE TOOLS, FIELDS, TABLE
- Toolbar:** Includes icons for View (Ruler, Paste, Format Painter), Clipboard (Cut, Copy, Paste), Filter (Ascending, Descending, Remove Sort, Advanced, Toggle Filter), Records (New, Save, Refresh, All, Delete, More), Find (Find, Go To, Select), and Text Formatting (Font, Size, Bold, Italic, Underline, Alignment).
- Table View:** Shows the "PlayerPaymentInfo" table with the following columns: transactionID, cardNumber, transactionDate, transactionTime, transactionAmount.
- Data:** The table contains 10 rows of data:
 

transactionID	cardNumber	transactionDate	transactionTime	transactionAmount
1	1556-3865-6220-5456	10-May-16	12:30:00 PM	\$25.00
2	2067-9775-4056-2686	17-Feb-15	3:00:56 PM	\$15.00
3	3714893400122593	12-Aug-14	2:34:11 PM	\$40.00
4	3900-0092-1794-4732	12-Jan-16	9:45:37 AM	\$75.00
5	5869-1030-6745-7351	07-Oct-13	7:44:32 PM	\$250.00
8	7806-5540-9403-1590	22-Feb-14	8:19:11 AM	\$18.00
9	8912-7763-2450-9141	30-Jun-15	4:45:42 PM	\$20.00
10	9371-2067-8000-1260	25-Dec-13	5:29:11 AM	\$90.00
*	(New)			\$0.00
- Table Selector:** Shows the current table is "PlayerPaymentInfo". Other tables listed are CharacterInfo, CharacterInventory, CardPaymentInfo, LoginHistory, PlayerInfo, PlayerPassword, and PlayerPaymentInfo.
- Search Bar:** Search... with a magnifying glass icon.
- Tables List:** A list of tables: CardPaymentInfo, CharacterInfo, CharacterInventory, LoginHistory, LoginInfo (highlighted in red), PlayerInfo, PlayerPassword, and PlayerPaymentInfo.

Figure 8-Player Payment Information

## CardPaymentInfo

The screenshot shows the Microsoft Access application interface. The title bar reads "GRYMWAR Online: Database- C:\Users\Michael\Documents\CTU\Term 1603B\CS 251 - Fund". The ribbon menu is visible with tabs: FILE, HOME (selected), CREATE, EXTERNAL DATA, DATABASE TOOLS, FIELDS, and TABLE. The left pane displays the navigation bar with "All Access Obj..." and a search bar. Below it is the "Tables" section, where "CardPaymentInfo" is listed and highlighted with a red background. Other tables listed include CharacterInfo, CharacterInventory, LoginHistory, PlayerInfo, PlayerPassword, and PlayerPaymentInfo. The main workspace shows the "CardPaymentInfo" table with the following data:

	cardNumber	cardFirstName	cardLastName	cardMiddleInit	cardExpDate	cardCVV	Click to Add
[+]	1556-3865-6220-5456	Guillermo	Castillo	M	03/18	490	
[+]	2067-9775-4056-2686	Mohinder	Surresh	V	11/16	219	
[+]	3714-8934-0012-2593	Michael	Davis	J	06/19	026	
[+]	3900-0092-1794-4732	Andre	Tully	E	03/19	005	
[+]	5869-1030-6745-7351	Jason	Henderson	R	11/17	630	
[+]	7806-5540-9403-1590	Marci	Cho	C	04/17	111	
[+]	8912-7763-2450-9141	Simon	Saez		12/16	323	
[+]	9371-2067-8000-1260	Allen	Williams	Q	01/18	591	
*							

Figure 9-Card Payment Information

## PlayerPassword

The screenshot shows the Microsoft Access application interface. The ribbon is visible at the top with tabs: FILE, HOME, CREATE, EXTERNAL DATA, DATABASE TOOLS, TABLE TOOLS, FIELDS, and TABLE. The GRYMWAR Online: tab is also present. The main area displays the 'PlayerPassword' table in Datasheet view. The table has four columns: passwordID, userName, password, and Click to Add. The 'Click to Add' column is highlighted with a yellow background. The data rows are as follows:

passwordID	userName	password	Click to Add
1	ImmortalBoxer	BrokenArrow75	
2	WiLdKaT281	2Good4aLL188	
3	princessAKIRA	missPRETTYgood	
4	MEGAGAMER	ultimatePRO999	
5	PwnzU2	SS2tricky4U	
6	LoneWolf81	wOlFpAcK81	
7	GMAN1010	dAtRueGAMER	
8	reaverOne	187MurcDaGame	
*	(New)		

The 'LoginInfo' table in the navigation pane is currently selected and highlighted with a red background.

Figure 10-Player Passwords

## GRYMWAR Online: RELATIONSHIPS

### Complete Relationships

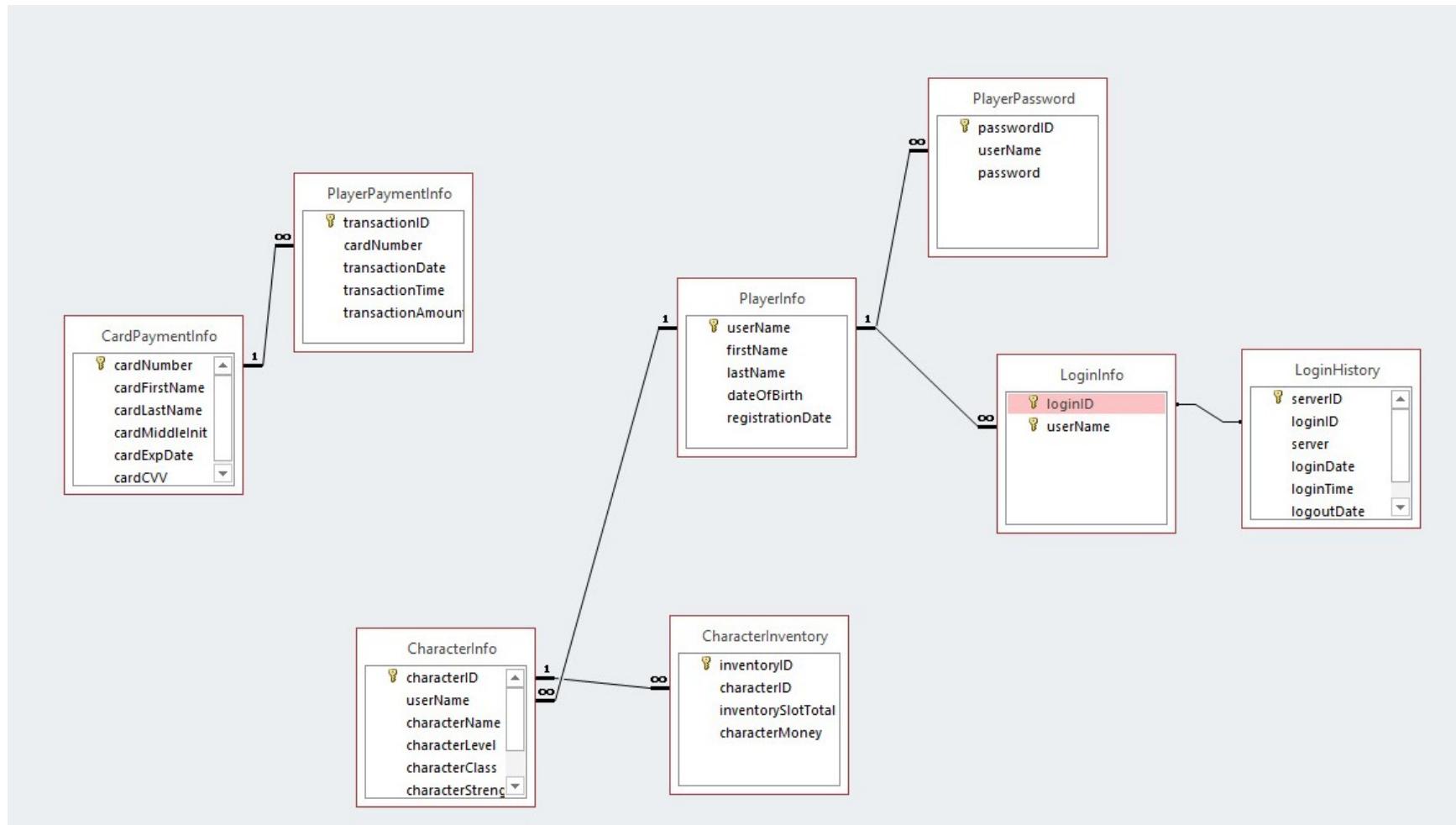


Figure 11-Complete Relationships

## Many to Many Relationship

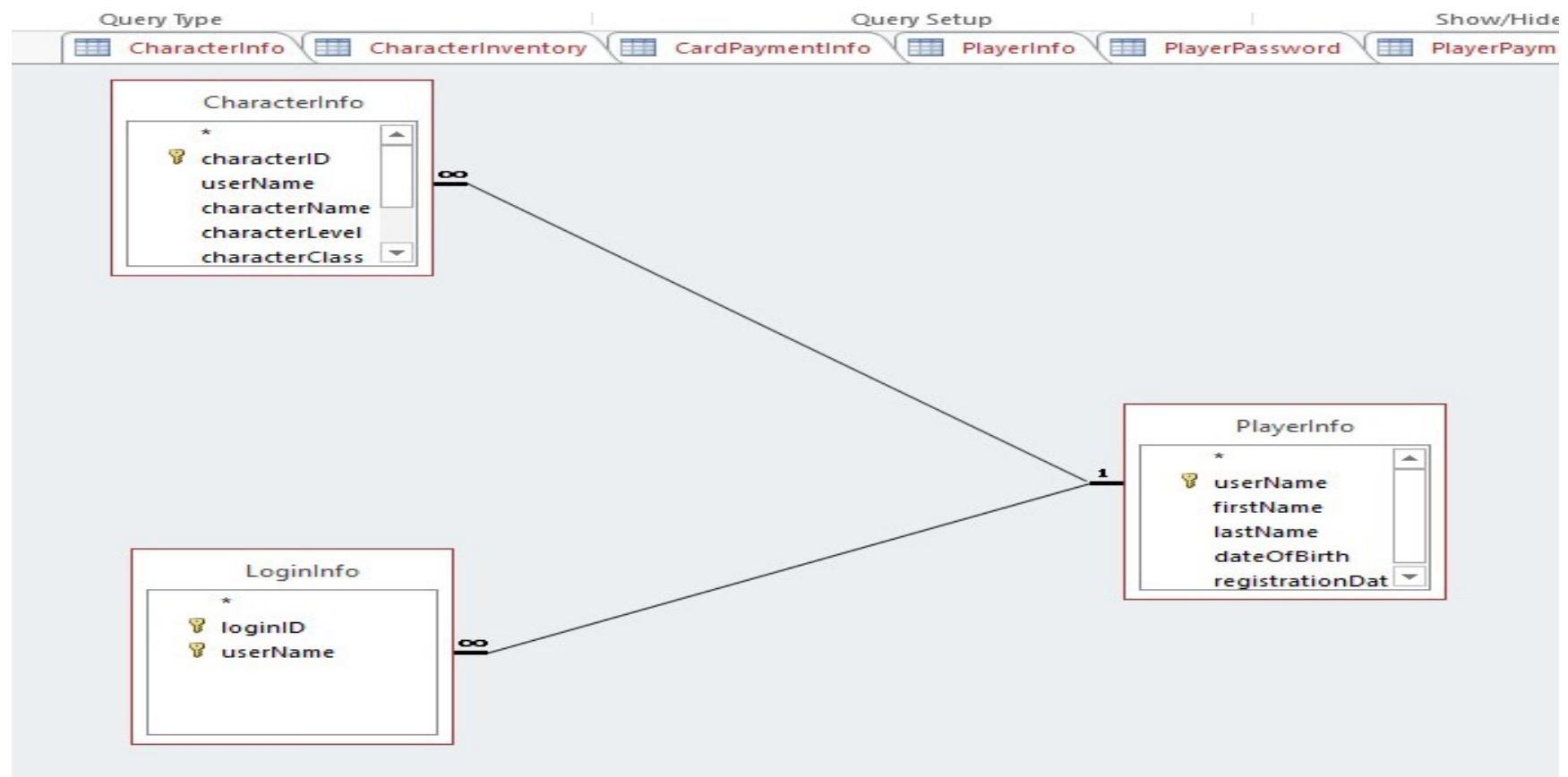


Figure 12-Three Table Relationship

## One to Many Relationships

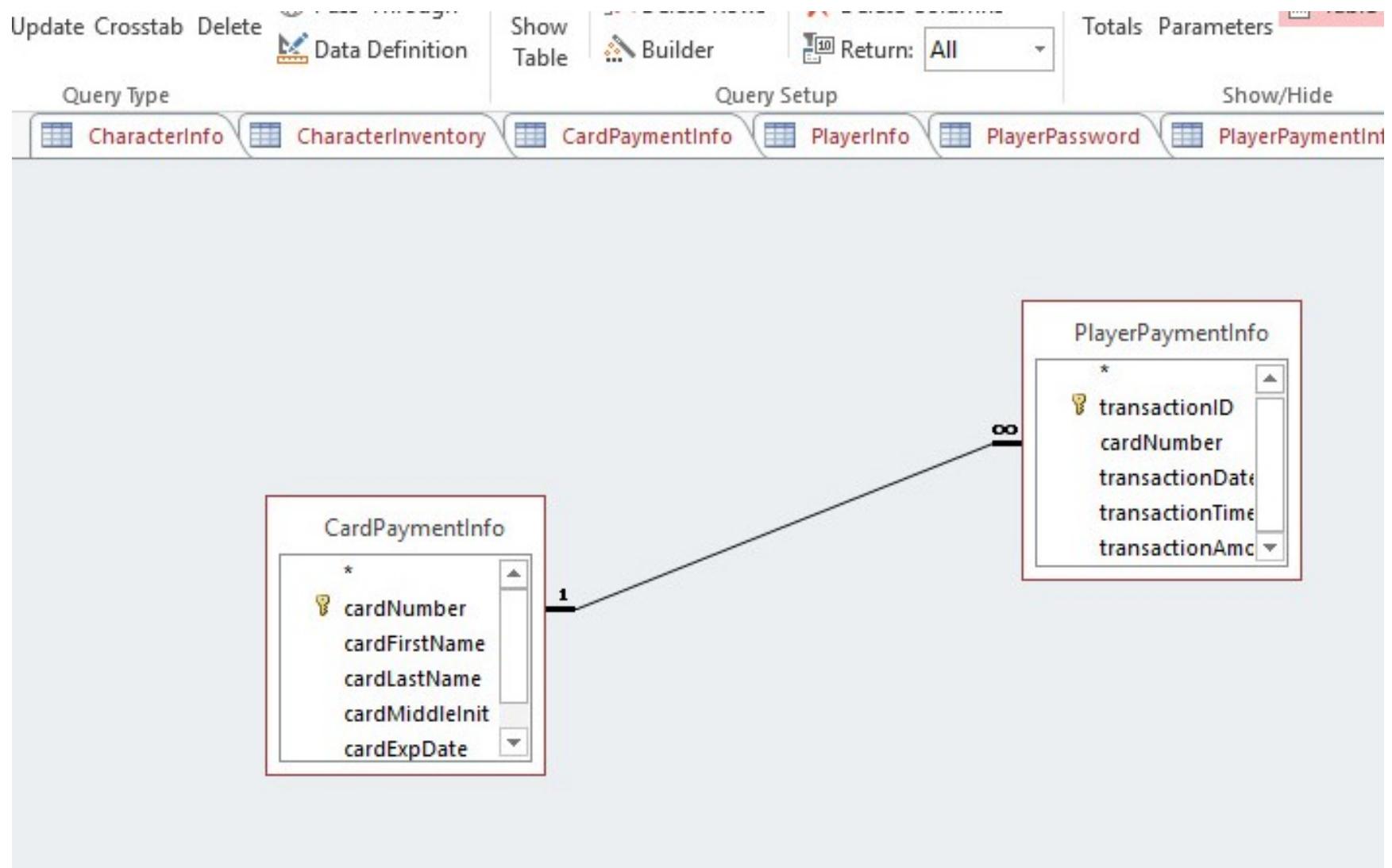


Figure 13-Two Table Relationship (1)



Figure 14-Two Table Relationship (2)

## GRYMWAR Online: SAMPLE QUERIES

### Query by Highest Character Level

The screenshot shows a Microsoft Access database window. The ribbon menu is visible at the top, featuring sections for Home, Insert, Design, etc. The Home tab is selected, displaying various toolbar icons for operations like Cut, Copy, Paste, Filter, Sort & Filter, Refresh, Find, and Text Formatting.

The main area of the window is a grid-based table view titled "CharacterInfo". The table has eight columns: firstName, lastName, userName, loginID, characterID, characterName, characterClass, and characterLevel. The data in the grid is as follows:

firstName	lastName	userName	loginID	characterID	characterName	characterClass	characterLevel
Andre	Tully	LoneWolf81	6	3	Merklin	Wizard	50
Simon	Saez	PwnzU2	5	14	Aulerian	Knight	50
Michael	Davis	Immortalboxer	1	9	Tenshi	Techno Mage	49
Mohinder	Surresh	reaverOne	8	7	Sir Reaver	Knight	42
Jason	Henderson	WiLdKaT281	2	16	Lyndell	Druid	42
Michael	Davis	Immortalboxer	1	2	Ionia	Assassin	30
Allen	Williams	MEGAGAMER	4	12	Naxxil	Summoner	28
Marci	Cho	princessAKIRA	3	13	Zersees	Wizard	28
Allen	Williams	MEGAGAMER	4	4	StickyFingaz	Thief	25
Guillermo	Castillo	GMAN1010	7	10	Fro-Garr	Warrior	22

The "characterLevel" column is sorted in descending order, with the highest value of 50 highlighted in blue. The left sidebar lists other tables in the database: CharacterInventory, CardPaymentInfo, PlayerInfo, PlayerPassword, PlayerPaymentInfo, LoginInfo, and Relationships. The "CharacterInfo" table is currently selected.

Figure 15-Highest Character Level

Query by transactions over \$20

The screenshot shows a Microsoft Access interface with a query results grid. The grid displays five columns of data: cardLastName, cardFirstName, cardNumber, transactionDate, and transactionAmount. The transactionAmount column is highlighted with a yellow background. The data consists of five rows of transactions:

cardLastName	cardFirstName	cardNumber	transactionDate	transactionAmount
Castillo	Guillermo	1556-3865-6220-5456	10-May-16	\$25.00
Davis	Michael	3714-8934-0012-2593	12-Aug-14	\$40.00
Henderson	Jason	5869-1030-6745-7351	07-Oct-13	\$250.00
Tully	Andre	3900-0092-1794-4732	12-Jan-16	\$75.00
Williams	Allen	9871-2067-8000-1260	25-Dec-13	\$90.00

The sidebar on the left lists various tables: CharacterInfo, CharacterInventory, CardPaymentInfo, PlayerInfo, PlayerPassword, and PlayerPaymentInfo. The 'PlayerPaymentInfo' table is currently selected. The status bar at the bottom shows the text 'Figure 16-Transaction over \$20'.

Figure 16-Transaction over \$20

Query by logged in from Asia or North America

The screenshot shows a Microsoft Access query interface. The top menu bar includes 'Copy', 'Format Painter', 'Filter', 'Advanced', 'Refresh All', 'Save', 'Spelling', 'Find', 'Go To', 'Select', and 'Text For'. Below the menu is a toolbar with icons for Sort & Filter, Records, Find, and Text For. The main area displays a table with columns: 'CharacterInfo' (disabled), 'CharacterInventory' (disabled), 'CardPaymentInfo' (disabled), 'PlayerInfo' (disabled), 'PlayerPassword' (disabled), and 'PlayerPaymentIn' (disabled). The table has six rows of data:

userN	loginID	server	serverID	loginDate
GMAN1010	7	North America	3	1/18/2016
ImmortalBoxer	1	North America	3	8/4/2015
princessAKIRA	3	Asia	1	3/17/2014
reaverOne	8	Asia	1	2/19/2015
reaverOne	8	Asia	1	6/11/2013
WiLdKaT281	2	North America	3	9/5/2016

Figure 17-Logged in from Asia or North America

# The Microsoft Access Database Application

*GRYMWAR* Online (Main Menu)

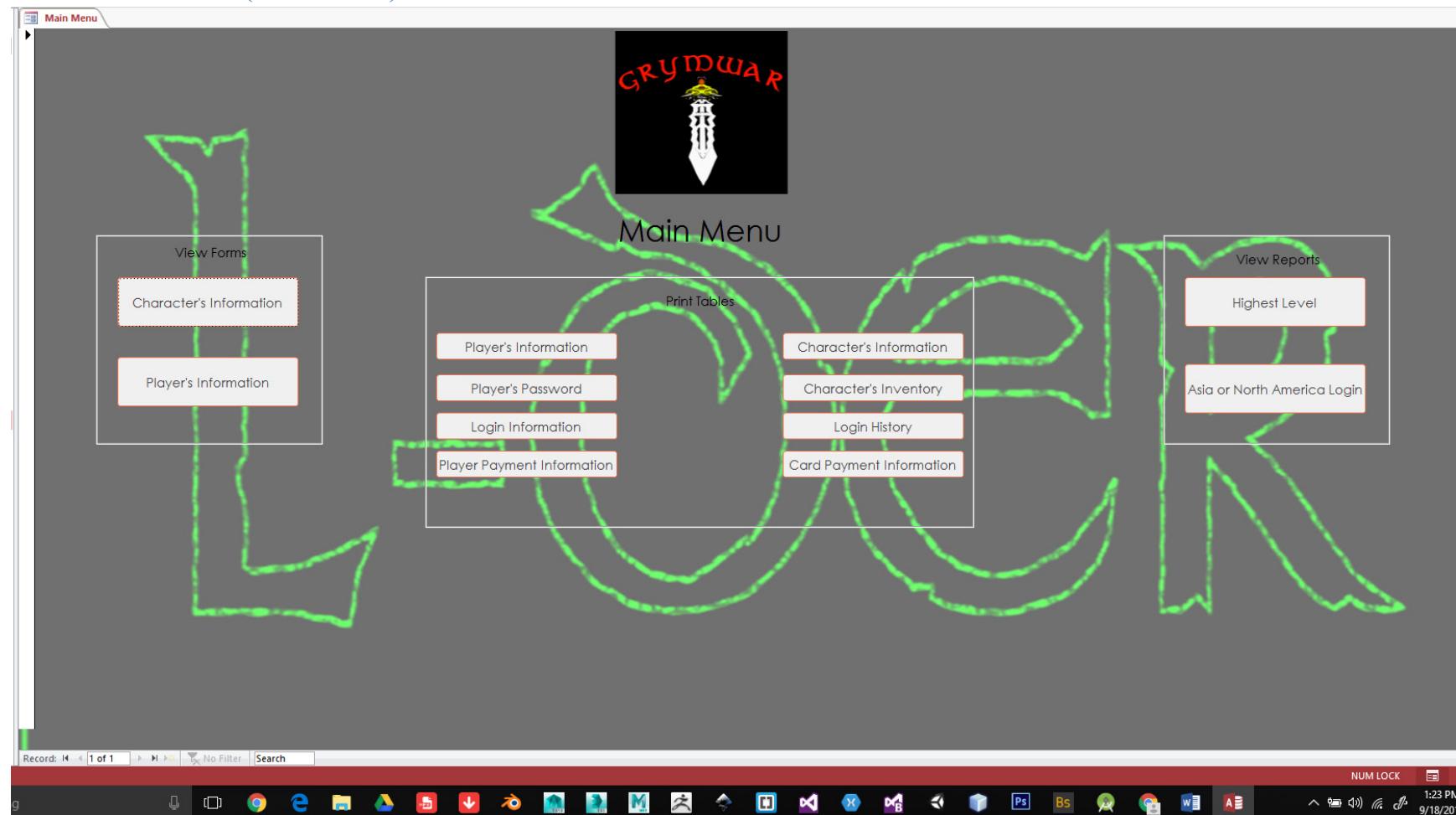


Figure 18-Navigation Menu

## GRYMWAR Online (Forms-part 1)

Main Menu | Character Information

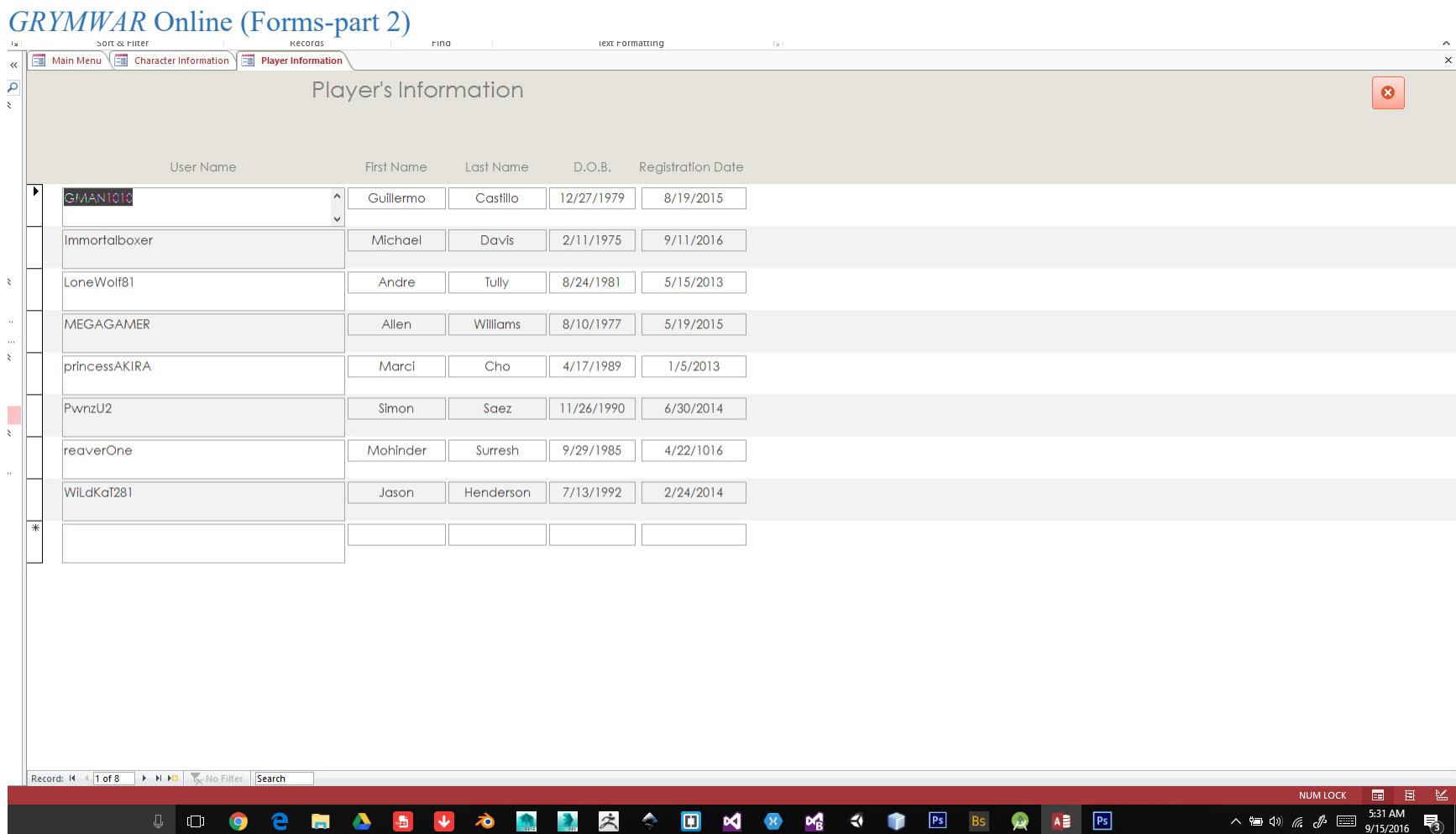
### Character's Information

Character Name	Character ID	User Name	Character Level	Character Class	Strength	IQ	Agility
Doctor No	1	princessAKIRA	6	Engineer	10	15	9
Ionia	2	Immortalboxer	30	Assassin	10	6	18
Merklin	3	LoneWolf81	50	Wizard	14	20	16
StickyFingaz	4	MEGAGAMER	25	Thief	13	11	14
Wonderia	5	princessAKIRA	1	Druid	7	10	9
Gemli Da Great	6	PwnzU2	13	Warrior	20	12	7
Sir Reaver	7	reaverOne	42	Knight	20	10	10
Mystique	8	WiLdKaT281	9	Summoner	5	15	13
Tenshi	9	Immortalboxer	49	Techno Mage	10	19	6
Fro-Garr	10	GMAN1010	22	Warrior	10	13	11
War'Gon	11	LoneWolf81	7	Techno Mage	3	8	10
Naxxil	12	MEGAGAMER	28	Summoner	11	15	14
Zersees	13	princessAKIRA	28	Wizard	13	16	18
Aulerian	14	PwnzU2	50	Knight	19	13	16
Kelrinn	15	reaverOne	3	Thief	5	7	12
Lyndell	16	WiLdKaT281	42	Druid	16	17	11
*	(New)						

Record: 1 of 16 | No Filter | Search

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Figure 19-Character's Information Form



*Figure 20-Player's Information*

## GRYMWAR Online (Reports-part 1)

The screenshot shows a Microsoft Access report window titled "Highest Level". The report displays a table of character information for players who have reached level 20 or higher. The columns include Character Level, First Name, Last Name, User Name, Login ID, Character ID, Character Name, and Character Class. The data is as follows:

Character Level	First Name	Last Name	User Name	Login ID	Character ID	Character Name	Character Class
50	Simon	Saez	PwnzU2	5	14	Aulerian	Knight
50	Andre	Tully	LoneWolf81	6	3	Merklin	Wizard
49	Michael	Davis	Immortalboxer	1	9	Tenshi	Techno Mage
42	Jason	Henderson	WiLdKat281	2	16	Lyndell	Druid
42	Mohinder	Surresh	reaverOne	8	7	Sir Reaver	Knight
30	Michael	Davis	Immortalboxer	1	2	Ionia	Assassin
28	Marci	Cho	princessAKIRA	3	13	Zersees	Wizard
28	Allen	Williams	MEGAGAMER	4	12	Naxil	Summoner
25	Allen	Williams	MEGAGAMER	4	4	StickyFingaz	Thief
22	Guillermo	Castillo	GMAN1010	7	10	Fro-Garr	Warrior

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Figure 21-Character > Level 20 Report

## GRYMWAR Online (Reports-part 2)

The screenshot shows a Microsoft Access report window. At the top, there are tabs for Main Menu, Sort & Filter, Records, Find, and Text Formatting. Below the tabs, the report title is "Logged In From Asia or North America". The report displays a table with the following data:

Server	User Name	Login ID	Server ID	Login Date
North America	GMAN1010	7	3	1/18/2016
North America	WiLdKat281	2	3	9/5/2016
North America	ImmortalBoxer	1	3	8/4/2015
Asia	reaverOne	8	1	2/19/2015
Asia	reaverOne	8	1	6/11/2013
Asia	princessAKIRA	3	1	3/17/2014

At the bottom left, the date is Thursday, September 15, 2016. At the bottom right, it says Page 1 of 1. The taskbar at the bottom shows various open application icons.

Figure 22-Logged in from Asia or North America Report

## References

Hernandez, M. J. (2013). *Database Design for Mere Mortals* (3rd ed.). Upper Saddle River, NJ, USA: Addison-Wesley. Retrieved August 21, 2016

Professor Tricic, S. (2016, August 17). Seven Steps of SDLC/DDLC. Colorado Springs, CO, USA: Colorado Technical University. Retrieved August 21, 2016