# Chapter Two: Design

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## 2.1 Introduction

The design objectives for my game will be based upon the interviews conducted on the stakeholders and are similar to the requirements already specified. I will create a list of design requirements that will be implemented into the game. For the general design of the game, all of the stakeholders were fine with it being a 2D shooter and most liked the space theme. The game will be designed in Python, using the pygame module for the game and tkinter for the login window.   
To demonstrate the interfaces to the users, I will design them digitally and show it to them. I will then collect feedback from this and implement the feedback.

## 2.2 Decomposition of the problem

I have decided to split my project into four main sections, the login window, the login database, the main game screen and the scoring system. I will later expand upon this main decomposition diagram by going into more depth with each of these sections and give them each a more detailed diagram.   
I have broken the problem down into a top-down design because it will allow me to develop each of the sections as separate modules or functions. This will make testing easier later on.

### 2.2.1 Decomposition Diagram

1. Main top-down diagram:

Space Game

Login

Scoring system

Actual game

Database

1. Login diagram:

Login

Admin login window

User login window

1. Game diagram:

Actual game

Settings

2-player Gameplay

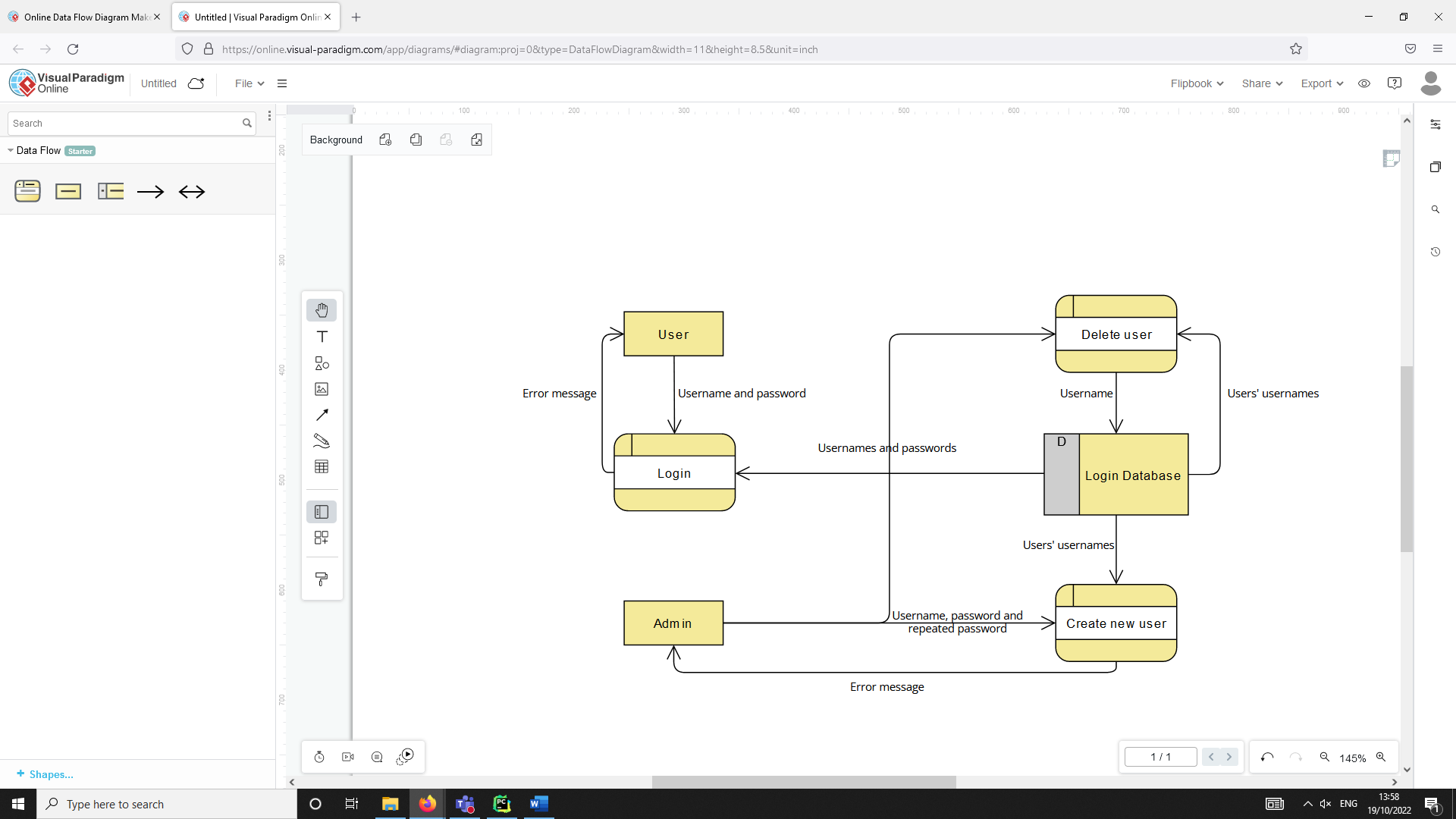
Game over screen

Main menu

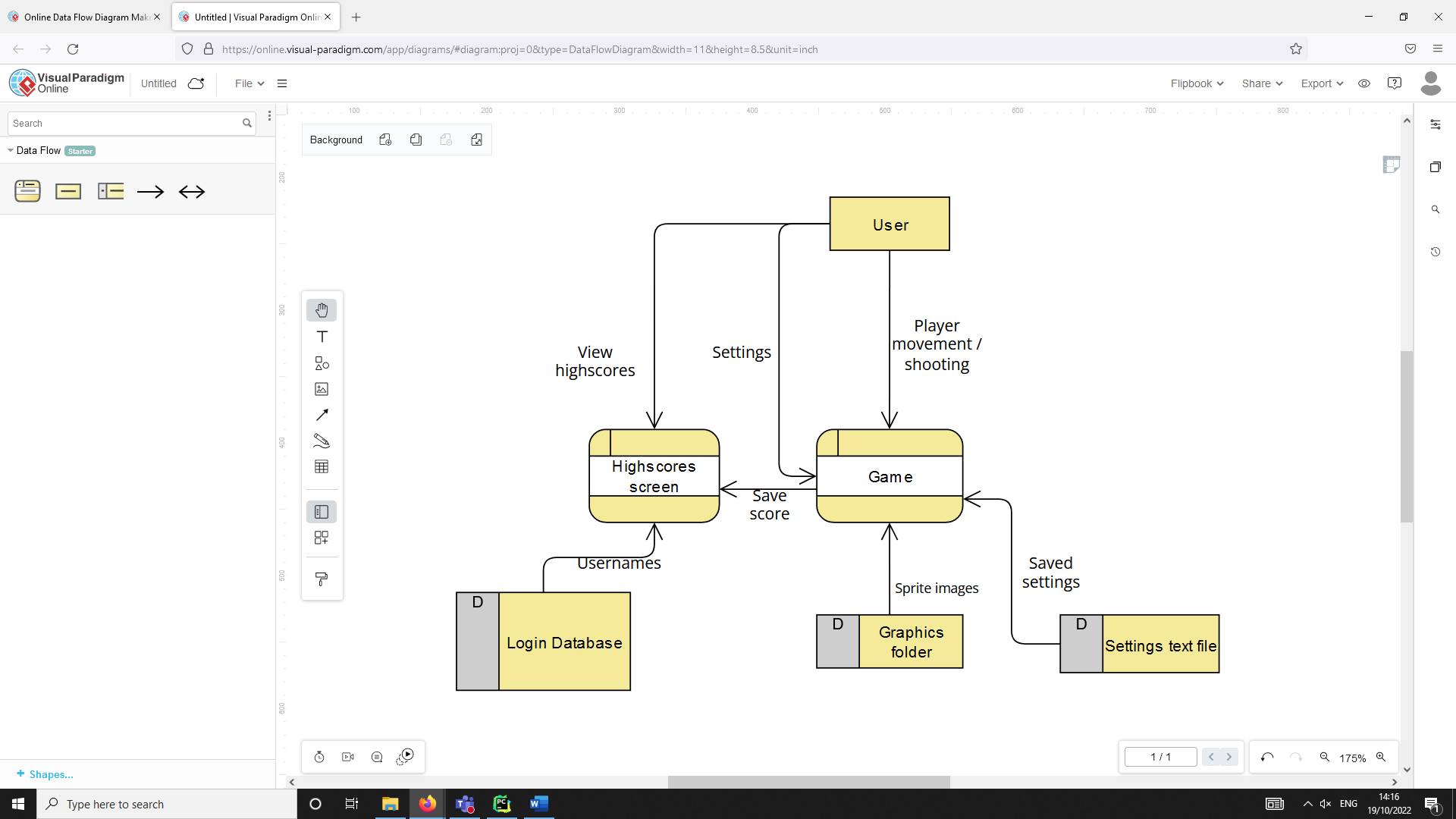
Single-player Gameplay

### 2.2.2 Data Flow Diagram

Login data flow diagram:



Game data flow diagram:



### 2.2.3 Input Process Output

Login:

|  |  |  |
| --- | --- | --- |
| Input | Process | Output |
| Username | If logging in, checks the username exists in the database and the corresponding password is correct. If creating a user, checks the username doesn’t already exist in the database and the username is valid (is between 3 and 18 characters in length and only contains alphanumeric characters and underscores). | Error or success message |
| Password | When creating a new user, checks the password is valid (8 or more characters long and is a string). When logging in, checks the password matches user’s password. | Error or success message |
| Repeat password | When creating a new user, checks if the repeat password is equal to the password. If they aren’t a new user will not be created. | “Passwords do not match” error message if the passwords don’t match. |

Actual game:

|  |  |  |
| --- | --- | --- |
| Input | Process | Output |
| Main menu navigation | If enter is pressed, the corresponding menu option happens. | Change of current menu option selected (indicated by arrows). Screen changed when an option is clicked. |
| Movement | During gameplay, check if the player is not at the edge of the screen before moving in the corresponding direction. Update the ship’s position. | Draws the ship moving on screen. |
| Shooting | Check that the player has not already fired recently. This cooldown | Draws lasers fired by the player. |
| Settings | Update settings text file to the new values specified. | Current settings shown as highlighted in settings menu. |

## 2.3 How All Solution Parts are Linked

### 2.3.1 State Diagram of the different forms/parts

For the login system:



For game:



### 2.3.2 How different functions /classes are connected

|  |
| --- |
| Login Window |
| title:string geometry:string icon:.ico file  hidden:boolean  (buttons) (entry boxes) |
| toggle\_pass() log\_in() cancel() |

|  |
| --- |
| Admin window |
| (re-enter password box) |
| create\_user()  delete\_user() go\_back() |

## 2.4 Database Design

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### 2.4.1 Normalisation

### 

### 2.4.2 Data Dictionary

### 2.4.3 Entity Relationship Diagram

### 2.4.4 SQL Pseudocode

## 2.5 Design of Main Parts of the Solution

2.5.1 Part ONE:

### 

### 2.5.1.2 Form Design and Layout

### 2.5.1.2 Justification of Validation rules

### 2.5.1 .3 Algorithms and PseudoCode

### 2.5.1.4 Key Variables/Data Structures /Classes

### 2.5.1.5 Test Plan for PART ONE

2.5.2 Part TWO:

### 2.5.2.1 Form Design and Layout

### 2.5.2.2 Justification of Validation rules

### 2.5.2. 3 Algorithms and PseudoCode

### 2.5.2.4 Key Variables/Data Structures /Classes

### 2.5.1.5 Test Plan for PART TWO

2.5.3 Part THREE:

### 2.5.3.1 Form Design and Layout

### 2.5.3.2 Justification of Validation rules

### 2.5.3. 3 Algorithms and PseudoCode

### 2.5.3.4 Key Variables/Data Structures /Classes

### 2.5.1.5 Test Plan for PART THREE

2.5.4 Part FOUR:

### 2.5.4.1 Form Design and Layout

### 2.5.4.2 Justification of Validation rules

### 2.5.4. 3 Algorithms and PseudoCode

### 2.5.4.4 Key Variables/Data Structures /Classes

### 2.5.1.5 Test Plan for PART FOUR

## 2.6 Stakeholders involvement

## 2.7 Testing plan to inform evaluation