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| UAS Software Development Project 1 |
| Ninja Game |
| Software Design Document |

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# Introduction

## Scope of the Project

We are making a mini game for entertainment purposes. Ninja game is a simple web based 2D endless running game[1] with a database system that allows player to track top scores. The game is using currently top popular internet technologies and is capable to be played by people all over the world.

## Document Overview

This document describes the main design basis of our project. Our team consists of motivated students diving into a software development process for the first time. The interactive mini-games are easy way to connect with people and they rely hardly on the social interests and age groups, which makes the product universal and unrestricted.

## Reference Material

[1] — en.wikipedia.org/wiki/Platform\_game

[2] — en.wikipedia.org/wiki/Ninja

## Definitions and Acronyms

This section is optional.

Provide definitions of all terms, acronyms, and abbreviations that might exist to properly

interpret the SDD. These definitions should be items used in the SDD that are most likely not

known to the audience.

# User Interface

## Site Map

Describe how do the pages in the site link to each other.

## Page Layout and Design

Describe the layout(s) of the page design(s) used in your site.

# Database

Describe and illustrate the whole database design of your site. All tables, table structures and relations should be presented.

We have one table, displaying player names and scores.

# Client Side SW Design

Here you can list and name the classes that you are going to have. For each class you can list their attributes (data fields) and member functions (methods).

If you are not going to have any classes, you can list the (JavaScript) functions that you know that you will have. You can describe the purpose of each function with a few lines of text.

Functions could be described with the following points, but it is not absolutely necessary to describe functions so accurately in the design phase.

* General description of the function and what it is used for.
* The name of the function.
* The return type.
* Ranges of return values and their meanings.
* Parameter names, types, whether the parameter is input, output or both and under what circumstances it is read or written.
* Assumptions on the parameter values.
* Assumptions on other conditions, such as global data or system state.
* Input validations that the function performs.
* Side effects of the function.
* Exceptions the function might throw and under what conditions.
* Non-trivial algorithms used.
* Non-trivial data structures used and for what purpose.
* Other non-trivial functions that the function calls.
* If the software has a layer structure, or some other inner partitioning, then to which part or layer this function belongs (this information should be evident from the naming convention).

Describe here also which global variables, arrays, or other data items you will need.

After couple of experiments of using the native HTML rendering and animation techniques, we found out that in order to make the game playable, we should use some rendering *Javascript* framework. Our choice fell on modern **p5.js** framework and using it makes such nuances as smooth animation, easy controllers, audio background etc. not exceedingly complicated.

The framework’s main script requires some preloading and setup methods to handle variable declaration, assets attachment and assignment operations. The next *draw()* function is autonomously called once per rendered frame and it keeps tracking of all the processes and occurrences in code with possible *if* constructs. This helps us to concentrate on actually making game mechanics and loop flow work properly and with no extra exceptions or errors.

Classes:

**Ninja** is the main controllable player-object.

Data fields:

*height (px), width (px), x-position, y-position, health (int), score (int)*

Member functions:

*move()* and *show()* functions are called in main loop and are respectively responsible for moving the coordinates according to player inputs and displaying the corresponding animation of ninja. The move function also sets the boundaries to the movement of player, illusion of ground and gravity imitation.

**Collider** is an abstract class created for being extended by class **Enemy** and **Pickup**. The reason for doing so is to optimize code by not repeating similar functions. When created it first randomizes the position of object.

Data fields:

x-position, y-position, speed

Member functions:

move() — simple arithmetic function for changing the *x* coordinate according to speed ;

crash( Ninja ) — takes the *Ninja* object as a parameter, checks for collision to occur and performs actions for any of particular case by checking the type of an object with ‘*instanceof’* command. Therefore, if player have crashed into a *Coin*, his score is increased, if crashed into *Katana* his health is decreased by a certain value.

**Enemy** (inherits Collider) is used for imitating obstacles and decreasing Ninja object’s health field when colliding.

Data fields:

All data fields inherited from super class *Collider.* The new data field *damage* is an integer value which is decremented from the player’s health when crash appears.

Member functions:

All functions inherited from super class *Collider*.

**Pickup** (also inherits *Collider*) is used for rising the score/health of the object Ninja when colliding with it.

Data fields:

All data fields inherited from super class *Collider.* The new data field *value* of type integer describes the increase of health/score.

Member functions:

All functions inherited from super class *Collider*.

Classes **Shuriken, Katana** and **Kunai** inherit class *Enemy.*

Classes **Health** and **Coin** inherit class *Pickup.*

Data fields:

All data fields inherited from super class *Collider.*

Member functions:

All functions inherited from super class *Collider*.

# Server Side SW Design

Describe here the design of server side software. For server side, you can describe similar things as for the client side.