

# Power-ups requirements

## Concept

Power-ups are items that are picked up that change properties of the character (usually as an improvement). These power-ups will spawn during the course of the game, giving the player an edge for a certain period of time.

## Ideas

Power-ups will have different effects that affect different aspects of the game. These are some ideas for power-up effects

- Invincibility, character will not lose a life or die when hit by a ball.
- Character speed increase, the movement speed of the character is increased.
- Projectile speed increase, projectile will move faster towards the ceiling
- Projectile speed decrease, projectile will move slower towards the ceiling
- Extra life, the player will gain an extra life if the player has less than 3 lives left.
- Ball falling speed decreased, powerful effect that causes every ball currently in the level to move slower

## Implementation

There will be an interface that specifies all methods needed to make the powerup work. An abstract class named PowerUp will implement the interface and thus the methods specified by the interface to create basic functionality of the power-up. A subclass of PowerUp will be created for each individual power-up effect.

This design will ensure that new power-up effects can be added with ease. Changes to existing power-up effects will only change code in the subclass and will not affect other classes or code. All subclasses can be tested individually.

For this to work properly, all properties that can be influenced by power-ups must be easily accessible.

# Functional requirements

## Must have

- A power-up must have only one effect
- There must be a power-up that improves the character speed
- Power-ups must have a chance to spawn when a ball is split
- Power-ups must fall down to the ground
- Power-ups must appear as a floating object
- Power-ups must spawn at the original position of the split ball
- Power-ups must disappear after a certain time limit
- Power-ups must disappear when it collides with the character
- Effects of the power-up must apply to the character after collision
- Effects of the power-up will only last a certain time

## Should have

- Power-ups should appear as a floating icon
- There should be a power-up that gives the player an extra life
- There should be an effect that increases the projectile speed
- There should be an effect that decreases the projectile speed
- There should be an effect that decreases the falling speed of the balls
- Power-ups should spawn based on how powerful the effect is, more powerful effects should spawn less frequently and less powerful effects more frequently
- The currently applied power-up effect should be displayed in the UI

## Could have

- Multiple power-up effects could be attained
- There could be an effect that makes the character invincible (e.g. star power in super mario)
- There could be an effect that increases game difficulty (negative effect)

## Won't have

- There won't be an effect that changes or affect the level layout
- Power-ups won't affect the score calculation
- Power-ups won't cause an effect that instantly wins a level

## Non-functional requirements

- All implemented classes must be tested with 75% coverage if possible
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