



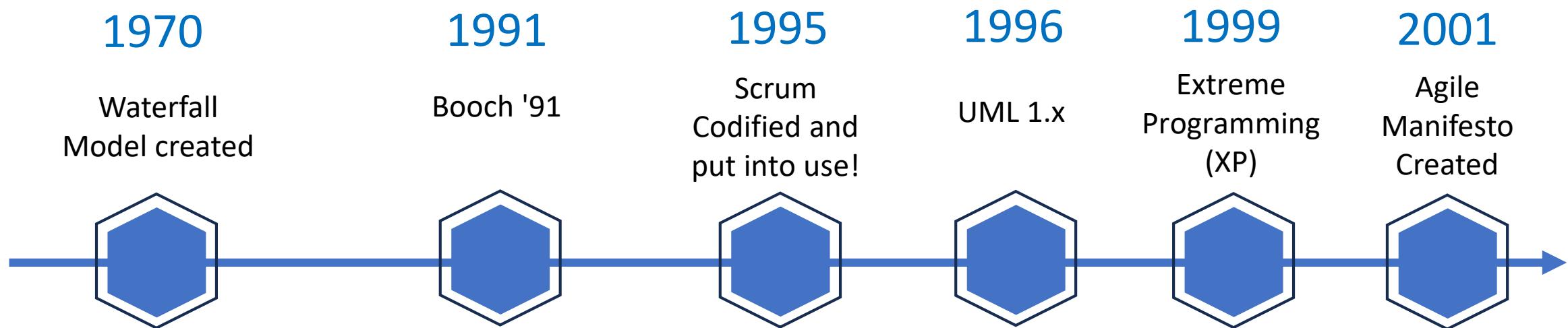
Design

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**UNIFIED  
MODELING  
LANGUAGE**™



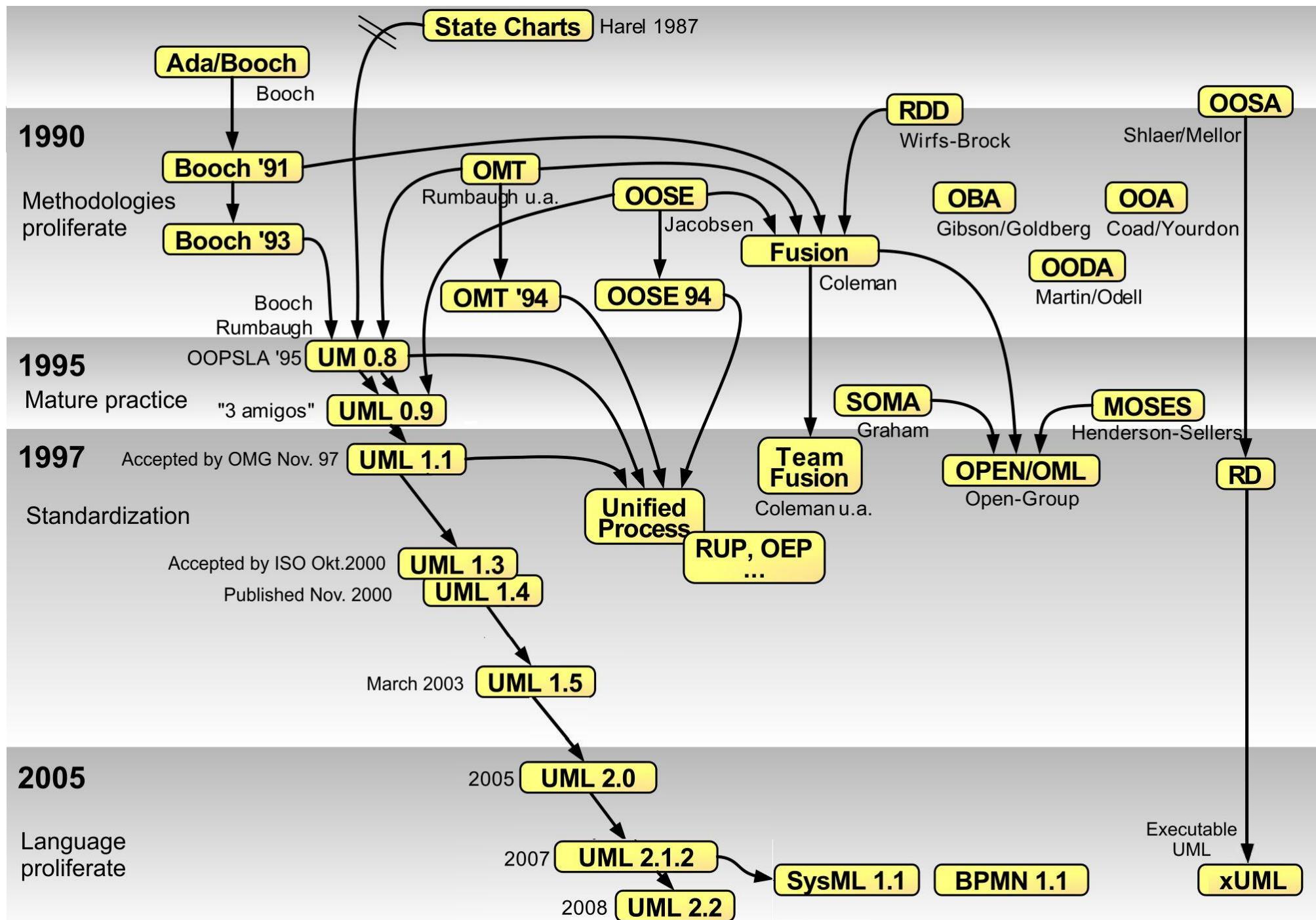
# Waterfall to Agile



# Unified Modelling Language

- UML developed throughout the 1990s, with UML 1.x published in 1996
- Introduced to standardise the variation in quality of designs in the industry.
- UML provides standard notation, roughly divided into three groups:
  - Behavioural diagrams (e.g. Use Case Diagram)
  - Interaction diagrams (e.g. Sequence Diagram)
  - Structure diagrams (e.g. Class Diagram)
- 1997: UML adopted as a standard by the Object Management Group (OMG)

U



# Use Case Diagrams



# Use Case Diagram

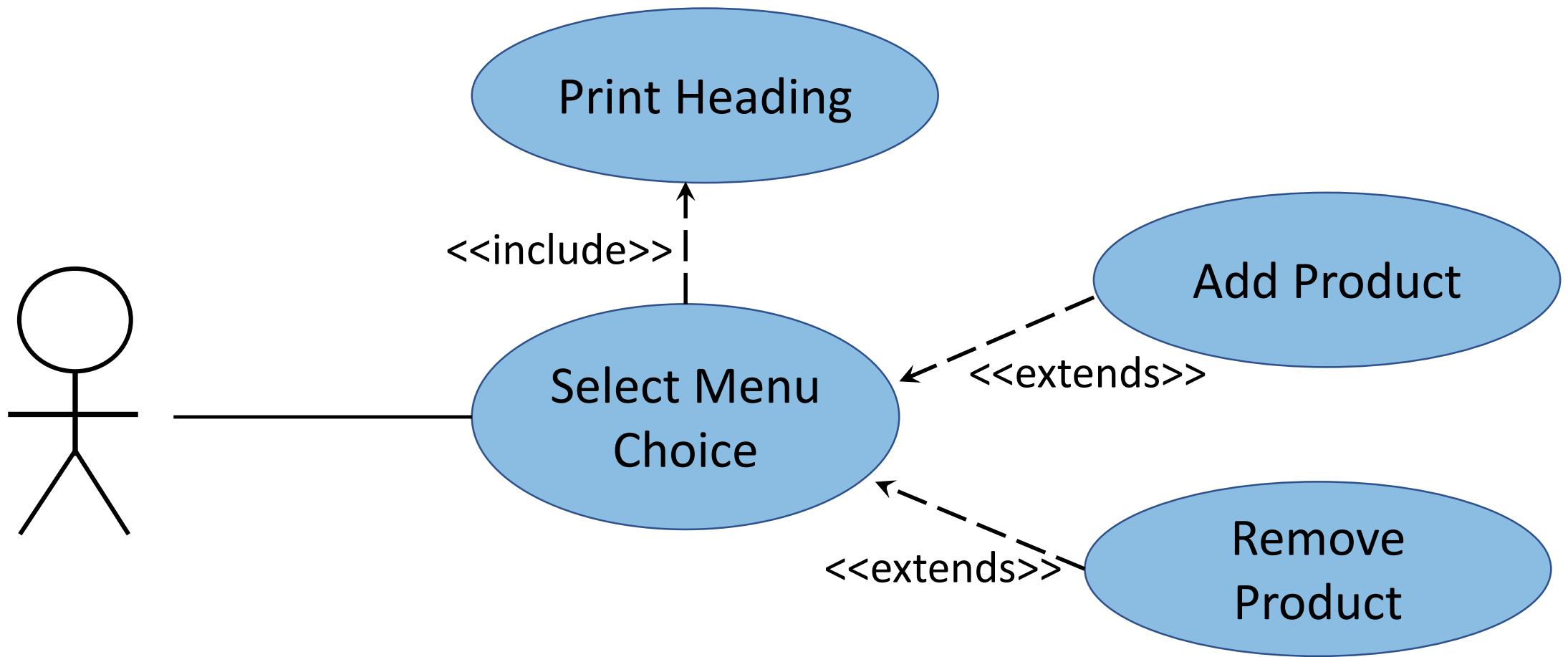
Use Case Diagrams can be used to represent users of a system (actors), and what behaviours they have (methods) in relation to the system (the ‘use cases’).

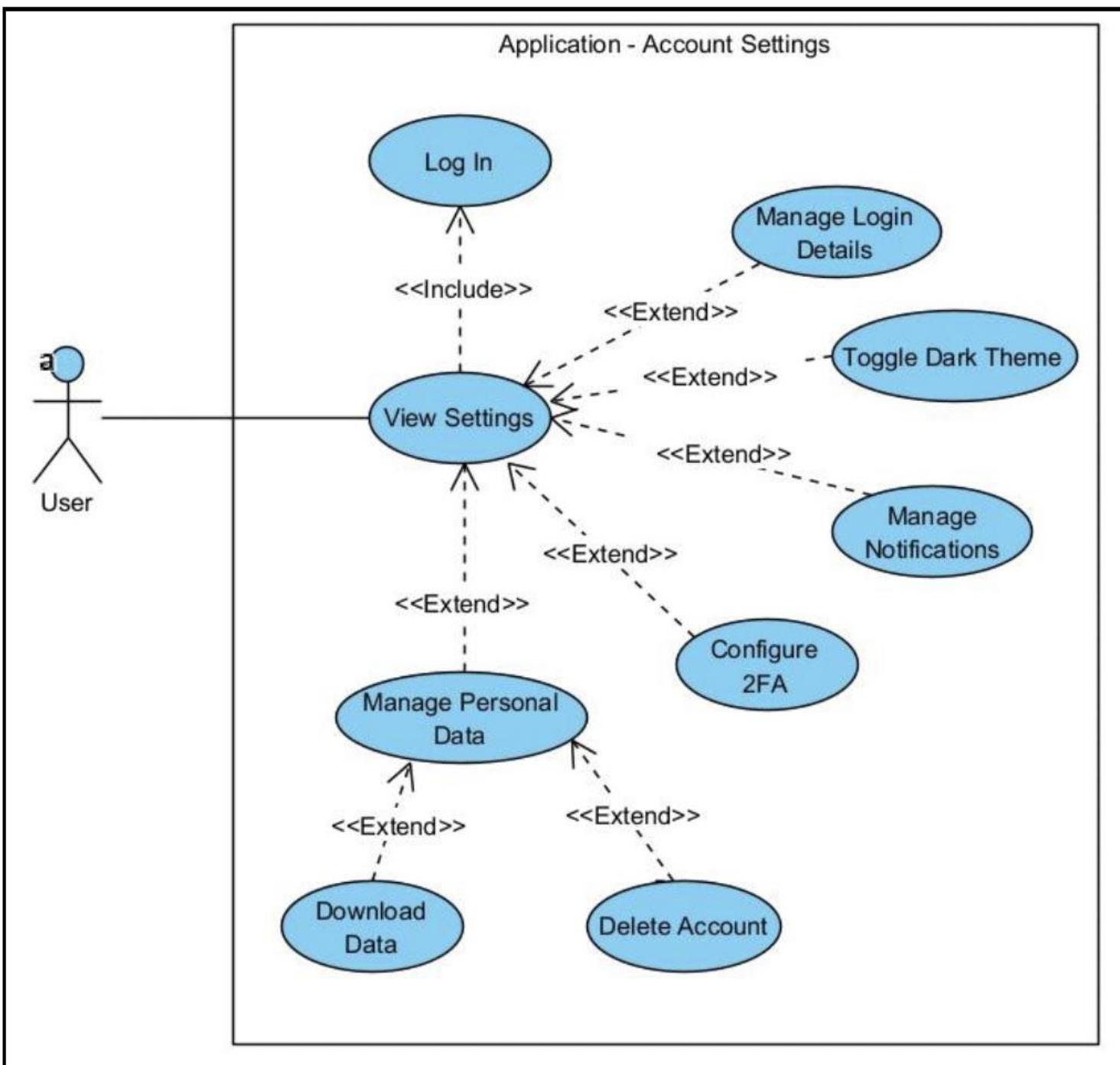
Use Cases (ovals) start with a verb (as methods should do).

**<<include>>** is a mandatory Use Case (will always happen)

**<<extend>>** is an optional Use Case (may not happen)

# Use Case Diagram





# What ‘functionality’ (doing words) can you pick out?

<> Code    ⚙ Issues    ⛵ Pull requests    ⏴ Actions    📁 Projects    📖 Wiki    🛡 Security    🛠 Insights    ⚙ Se

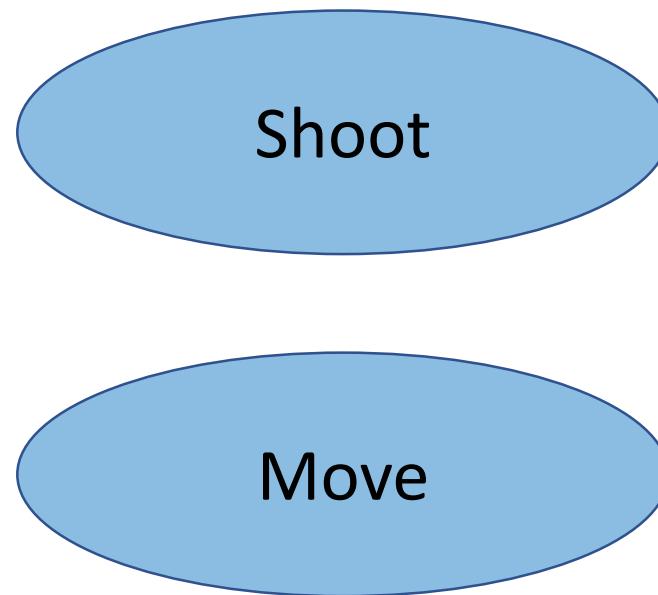
## Space Invaders

Nicholas Day edited this page now · 1 revision

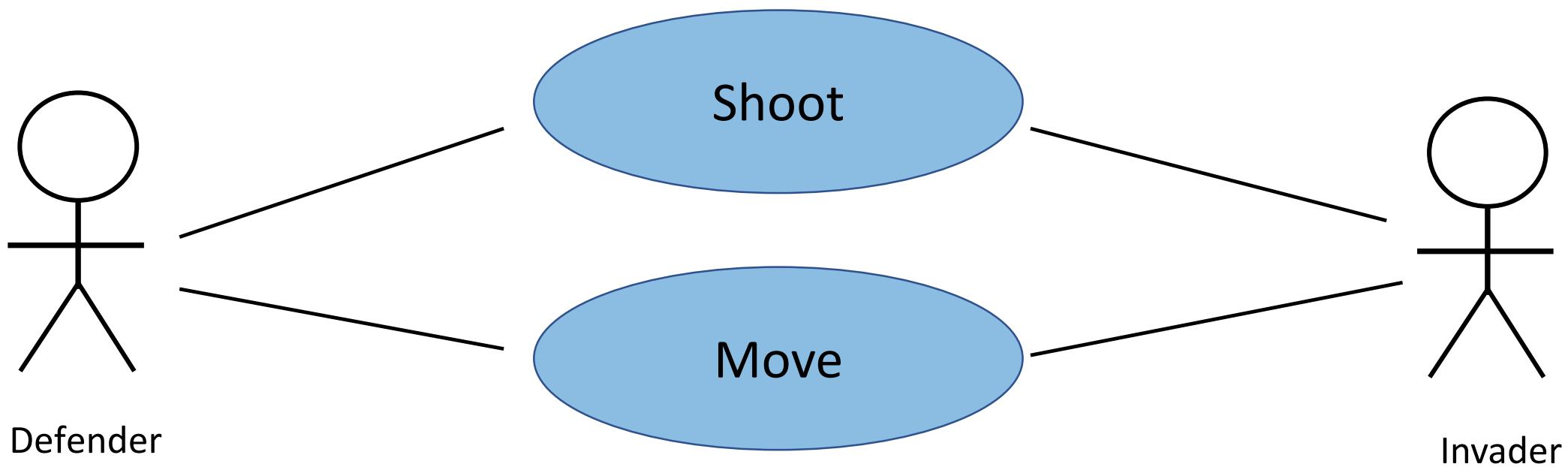
### Requirements

- The Defender should move left and right and be able to fire bullets
- Invaders must alternate direction as they move down the screen
- Invaders speed of travel should increase as fewer remain and levels progress
- Shields should crumble as they shot by both the Invader and the Defender

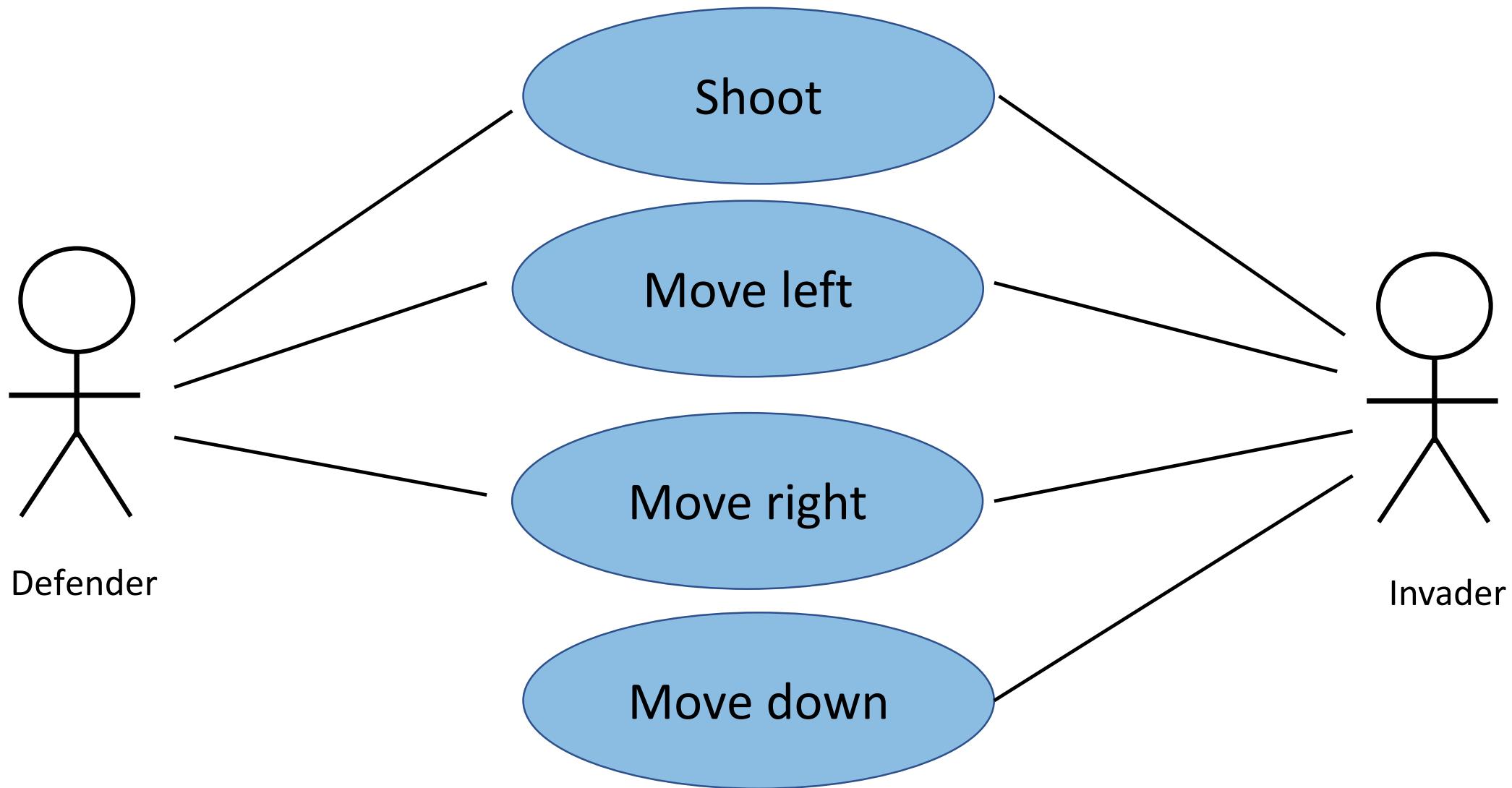
# Use Case Diagram - Starting with functions



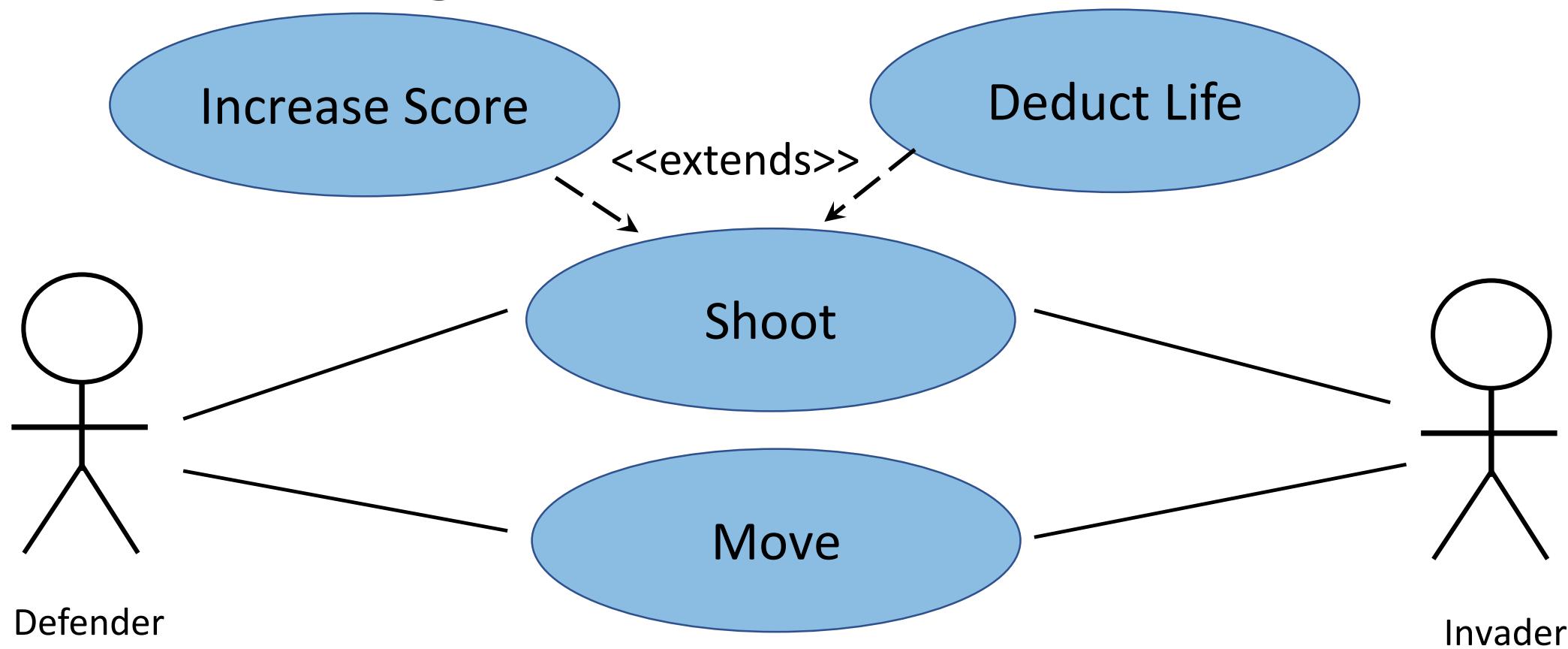
# Use Case Diagram – Adding ‘Actors’



# Use Case Diagram – Specialist movement



# Use Case Diagram – Extension actions



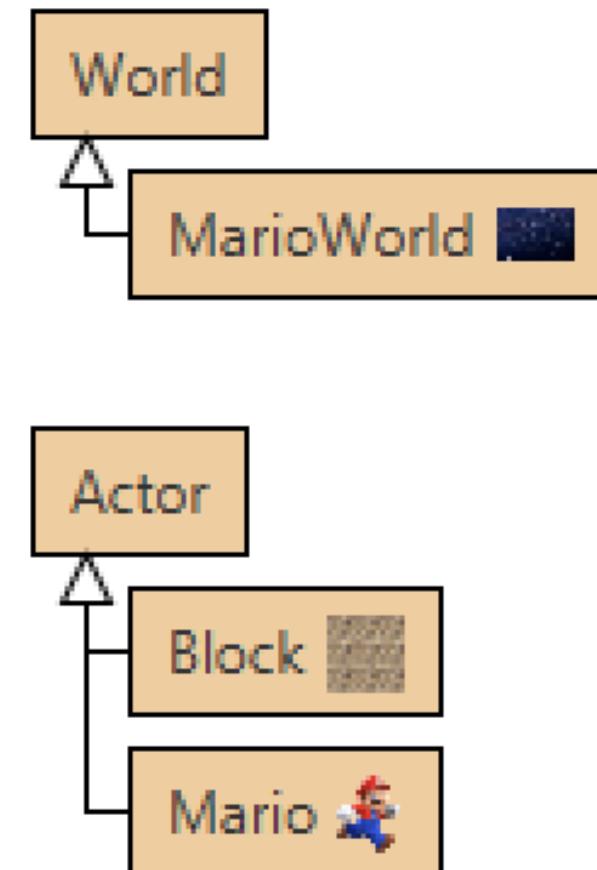
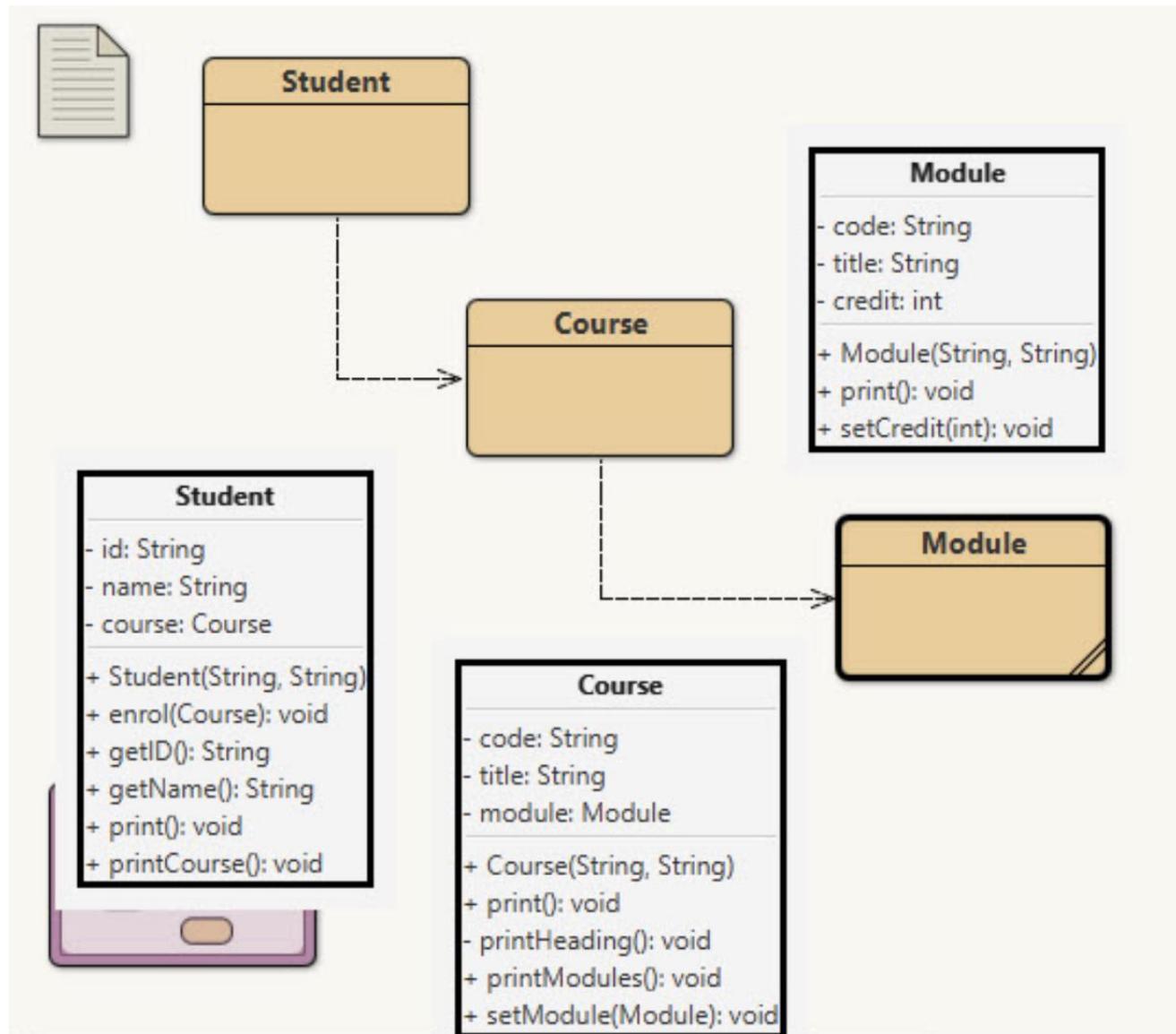
# Class Diagrams

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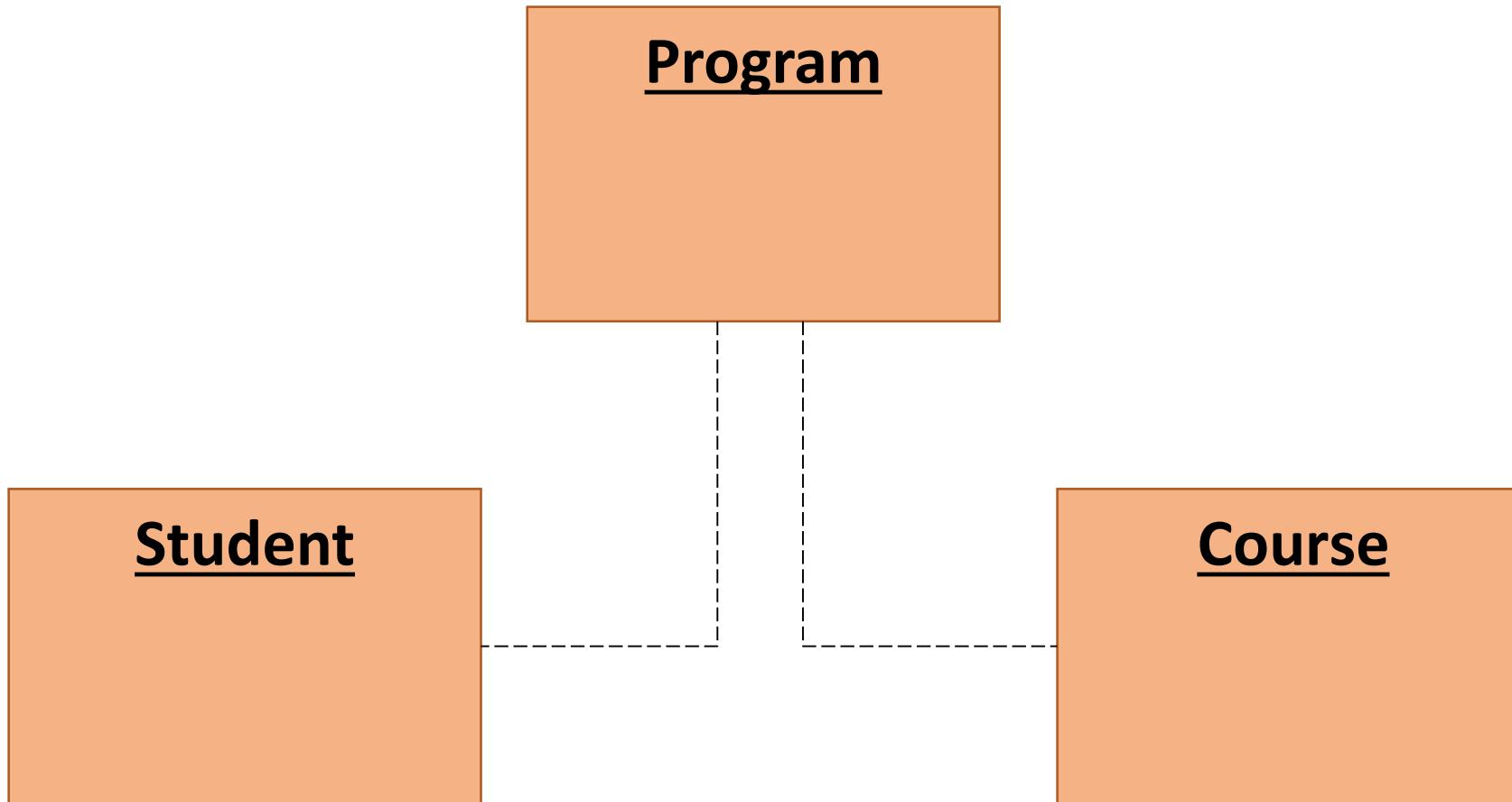
# Class Diagrams

- The BlueJ/Greenfoot interface provides a basic version of a Class Diagram because it shows the classes of an application and any associations between them.
- A more detailed Class Diagram would show the **variables** and **methods** written in each class.

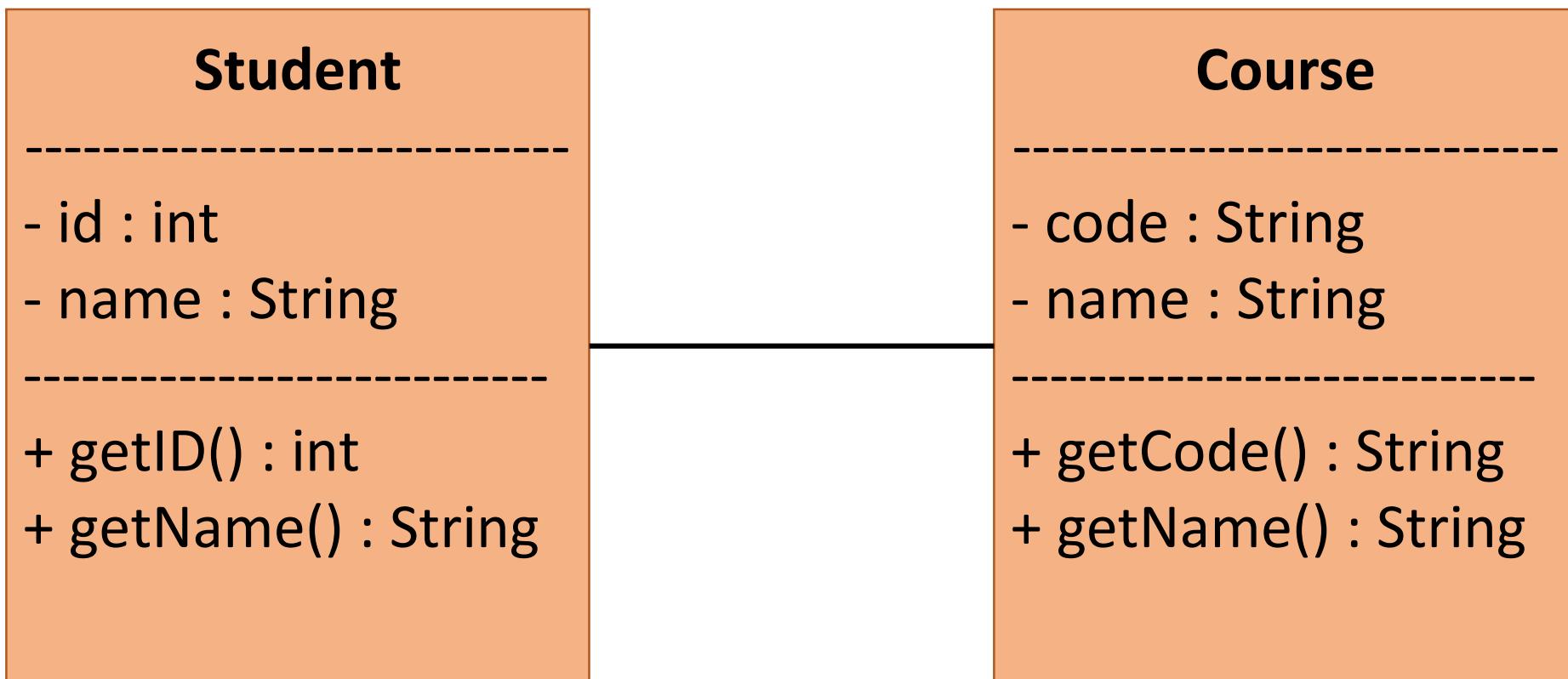
# BlueJ / Greenfoot

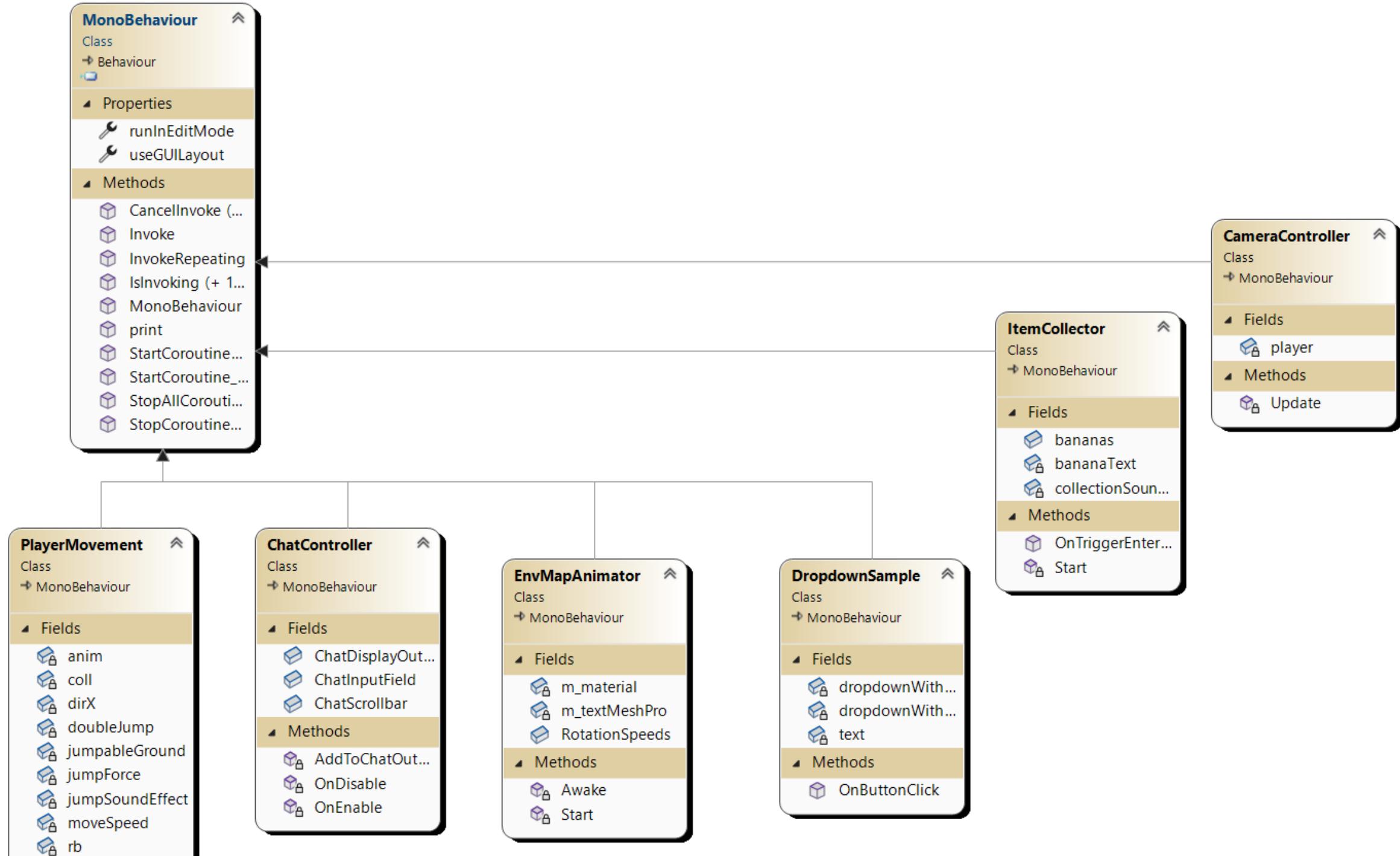


# Class View in BlueJ/Greenfoot



# UML Class Diagram





# How many classes can you pick out?

<> Code    ⚡ Issues    🛡 Pull requests    ⏴ Actions    📁 Projects    📖 Wiki    🛡 Security    🛠 Insights    ⚙ Se

## Space Invaders

Nicholas Day edited this page now · 1 revision

### Requirements

- The Defender should move left and right and be able to fire bullets
- Invaders must alternate direction as they move down the screen
- Invaders speed of travel should increase as fewer remain and levels progress
- Shields should crumble as they shot by both the Invader and the Defender

# Class View – What Entities are there?

**Defender**

**Invader**

# Class View – attributes?

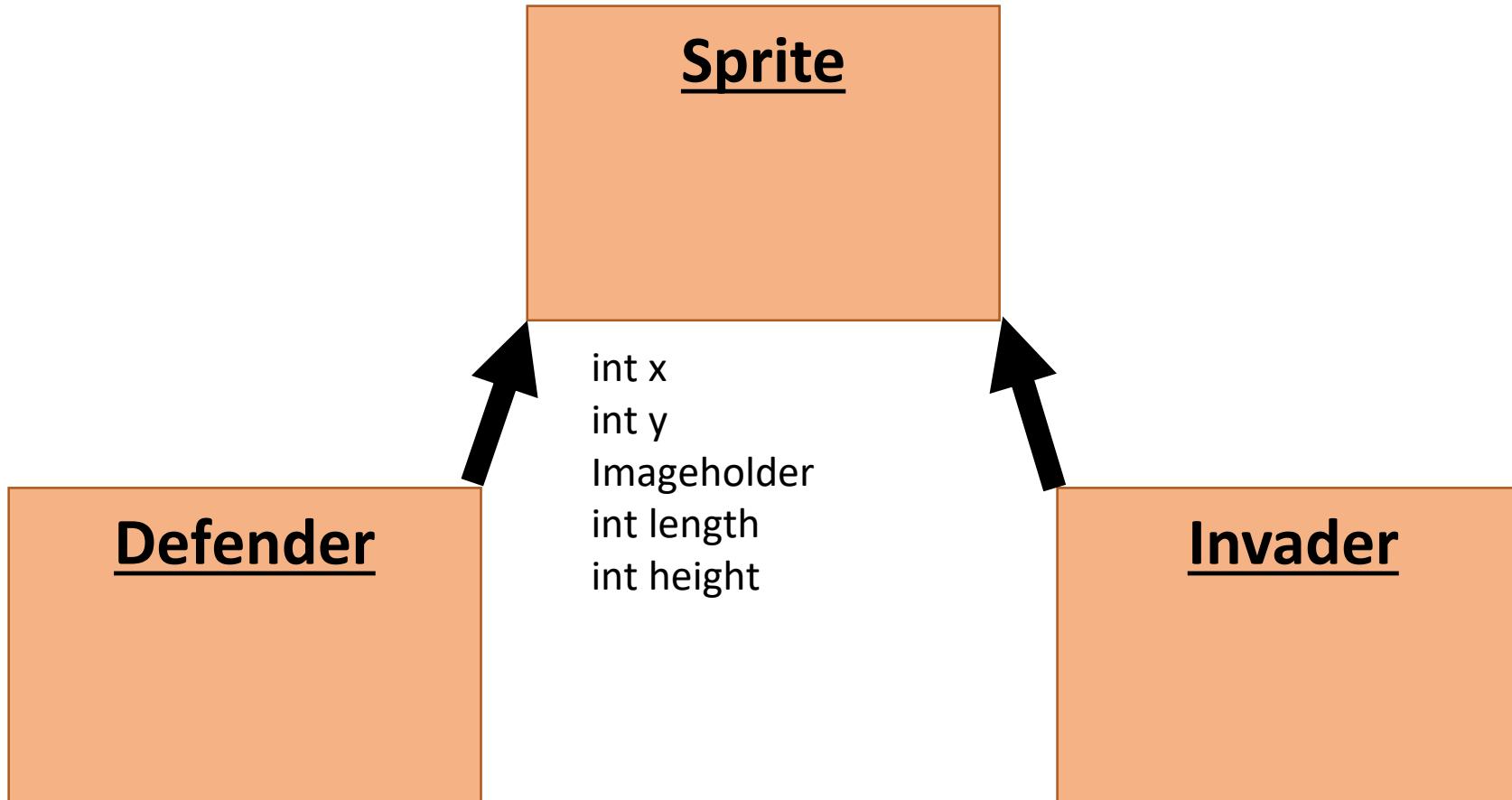
## Defender

int x  
int y  
Imageholder  
int length  
int height

## Invader

int x  
int y  
Imageholder  
int length  
int height

# Class View – Added a ‘parent’ class



# Inheritance?

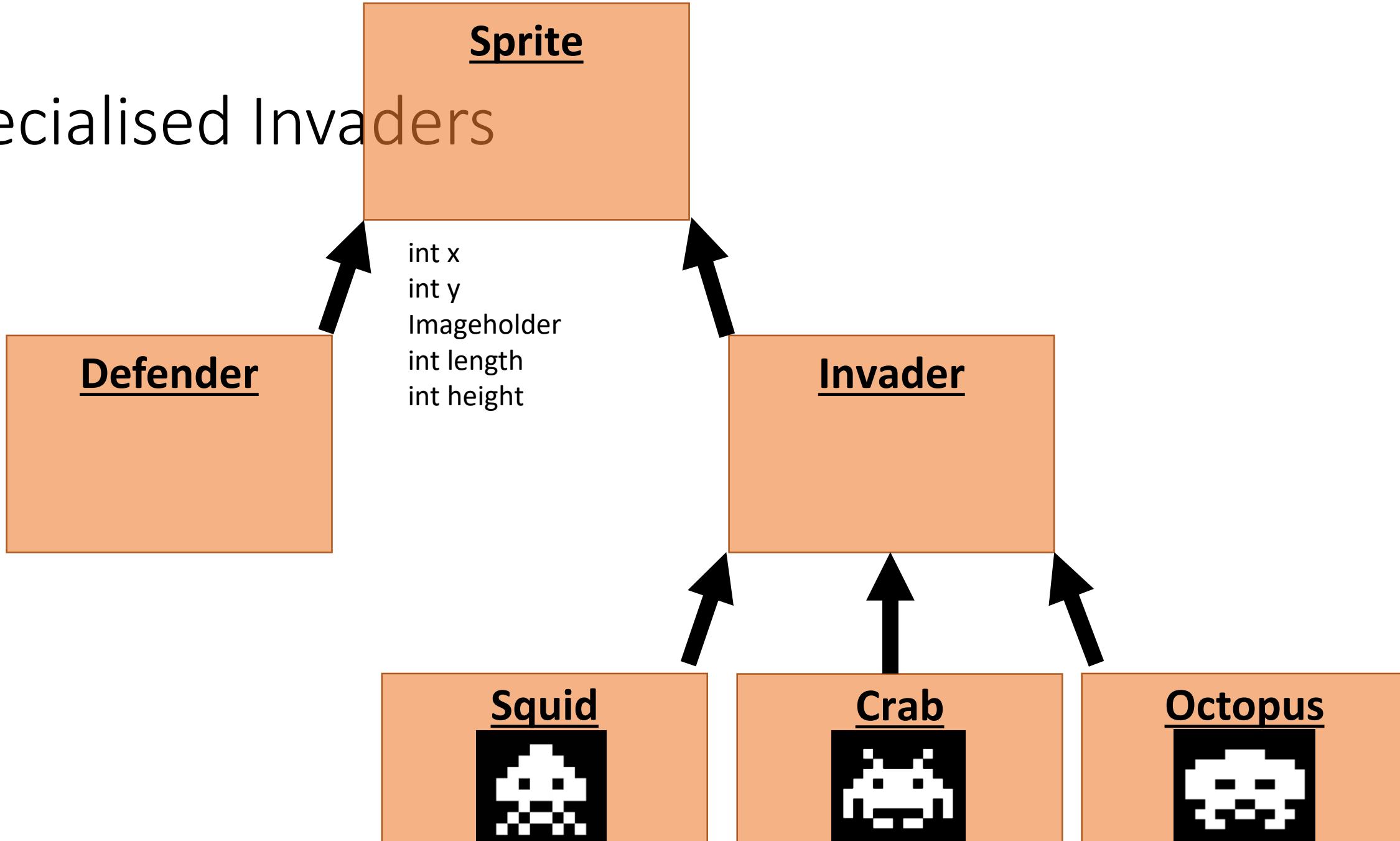
Parent:

Invader

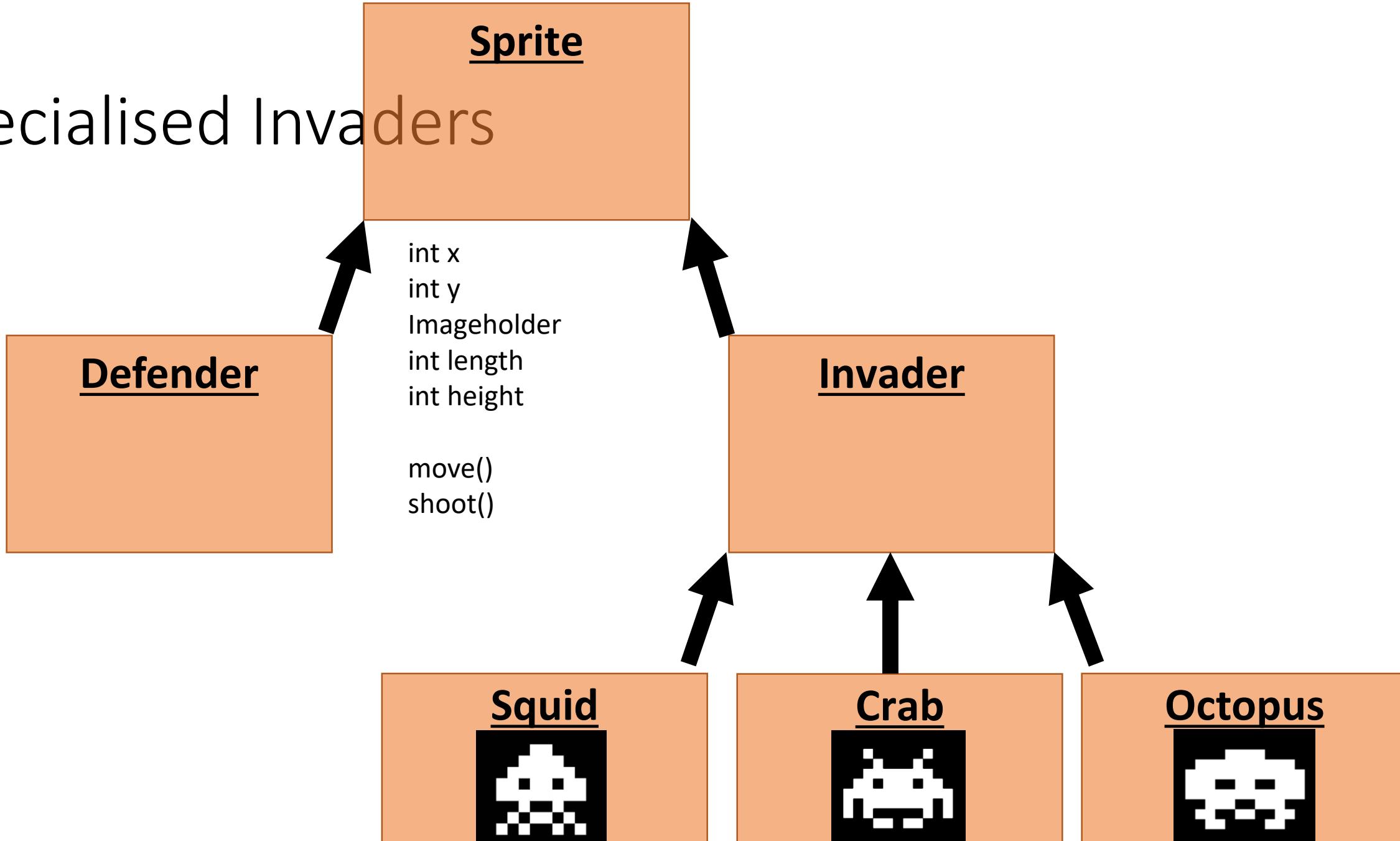
Children:



# Specialised Invaders



# Specialised Invaders



# Sequence Diagram

---

# Sequence

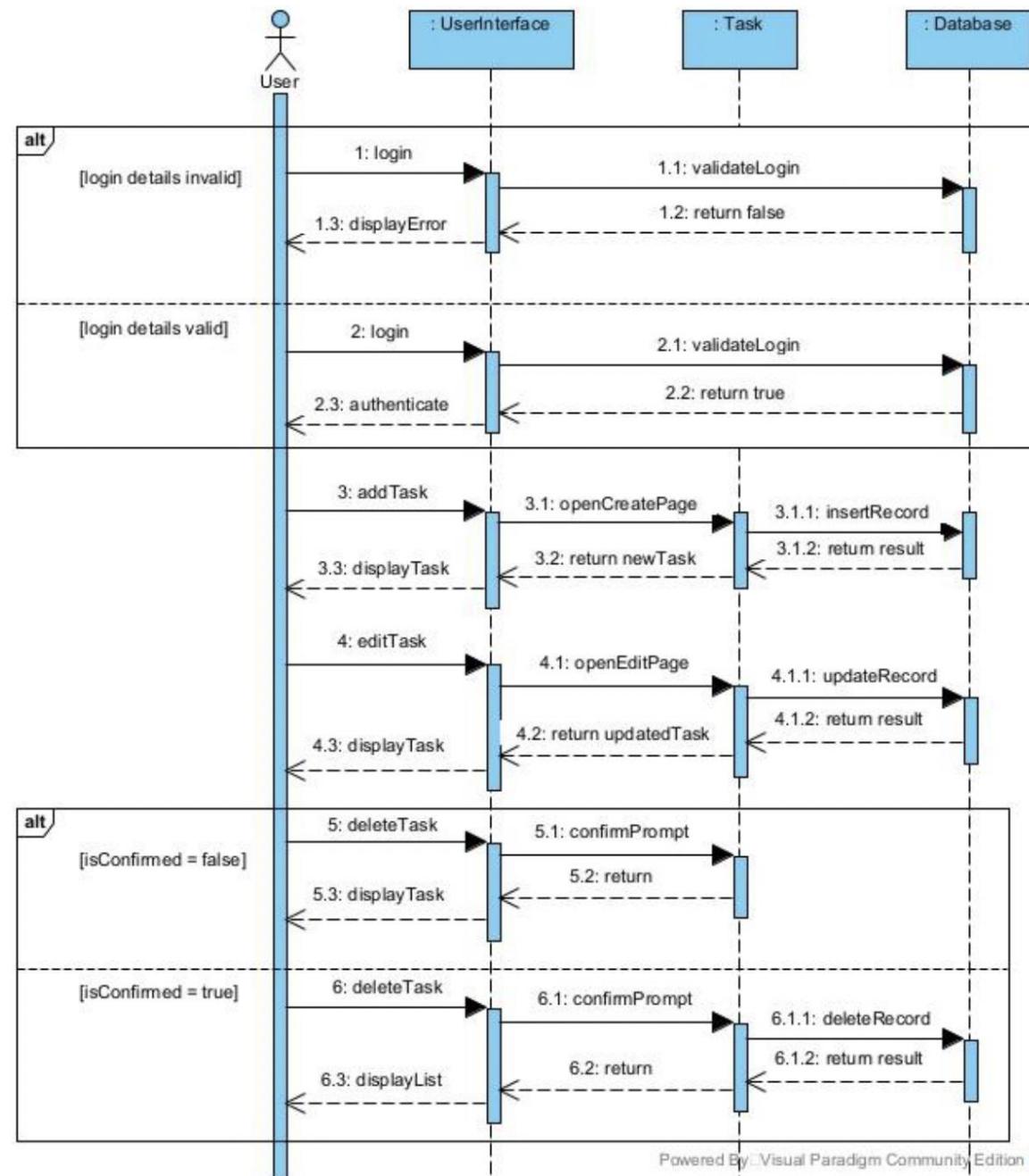
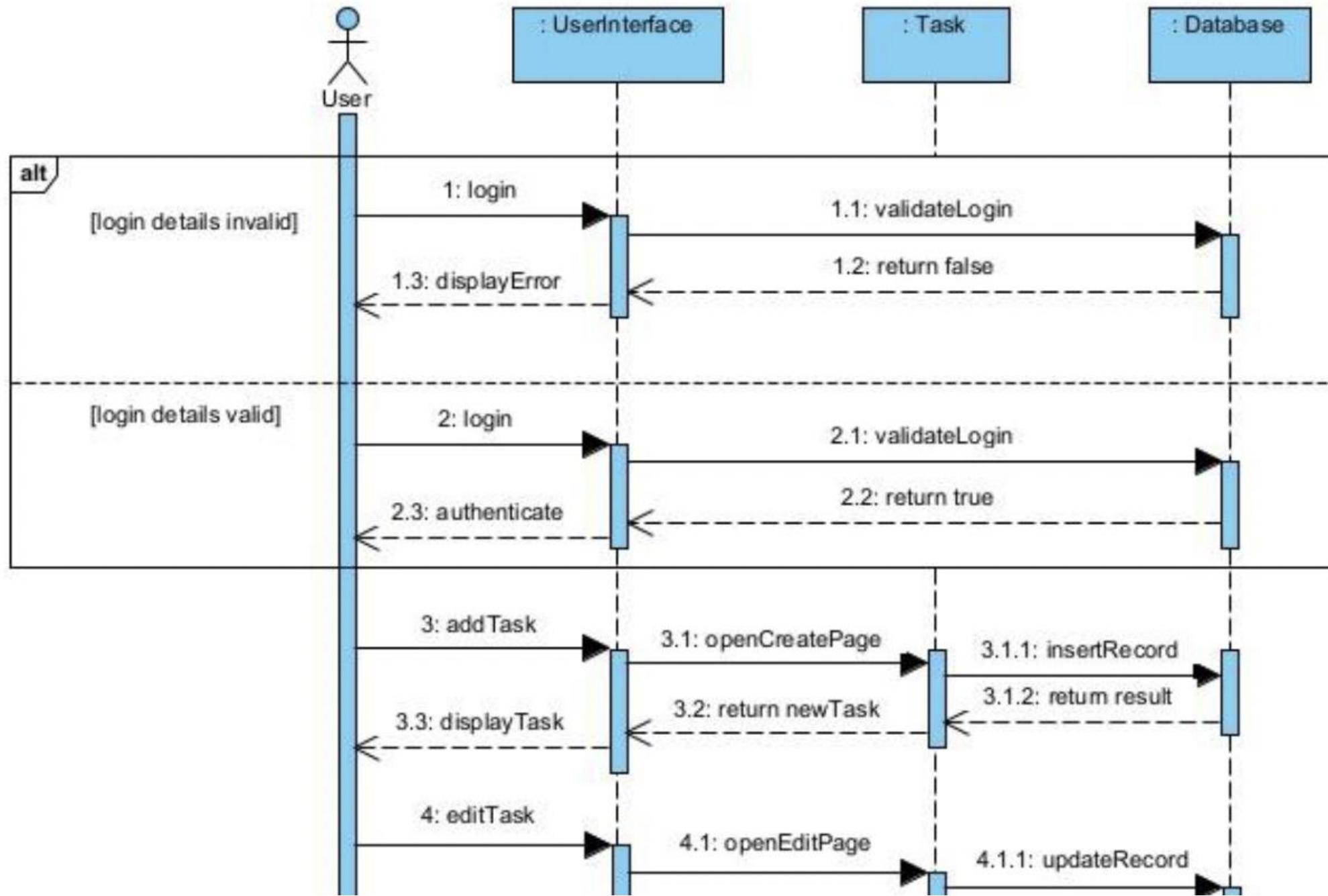


Figure 22 - Task Management [Sequence Diagram]



ERD



# Entity-R

UserTask	
ID	integer(10)
UserID	varchar(25)
Name	varchar(60)
Priority	integer(1)
DueDate	date(8)
Reminder	date(8)
Description	varchar(350)
IsComplete	binary(1)

Visual Paradigm data types converted to C# data types:

varchar -> String

binary -> Boolean

date -> DateTime

UserID will be a foreign key linked to the auto-generated AspNetRoles table in Visual Studio  
Priority attribute will use an enumeration as its type in the application

# User Experience

---



# Make it easy

## Easy to use

Good usability, short learning curve and efficiency to perform tasks

## The importance of the first contact

It sets the tone of the experience and will dictate whether or not users continue to use the product

## There is no single rule

The interface design is directly conditioned by the users who are going to use it and by the context



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Dec. 31, 1935.

C. B. DARROW

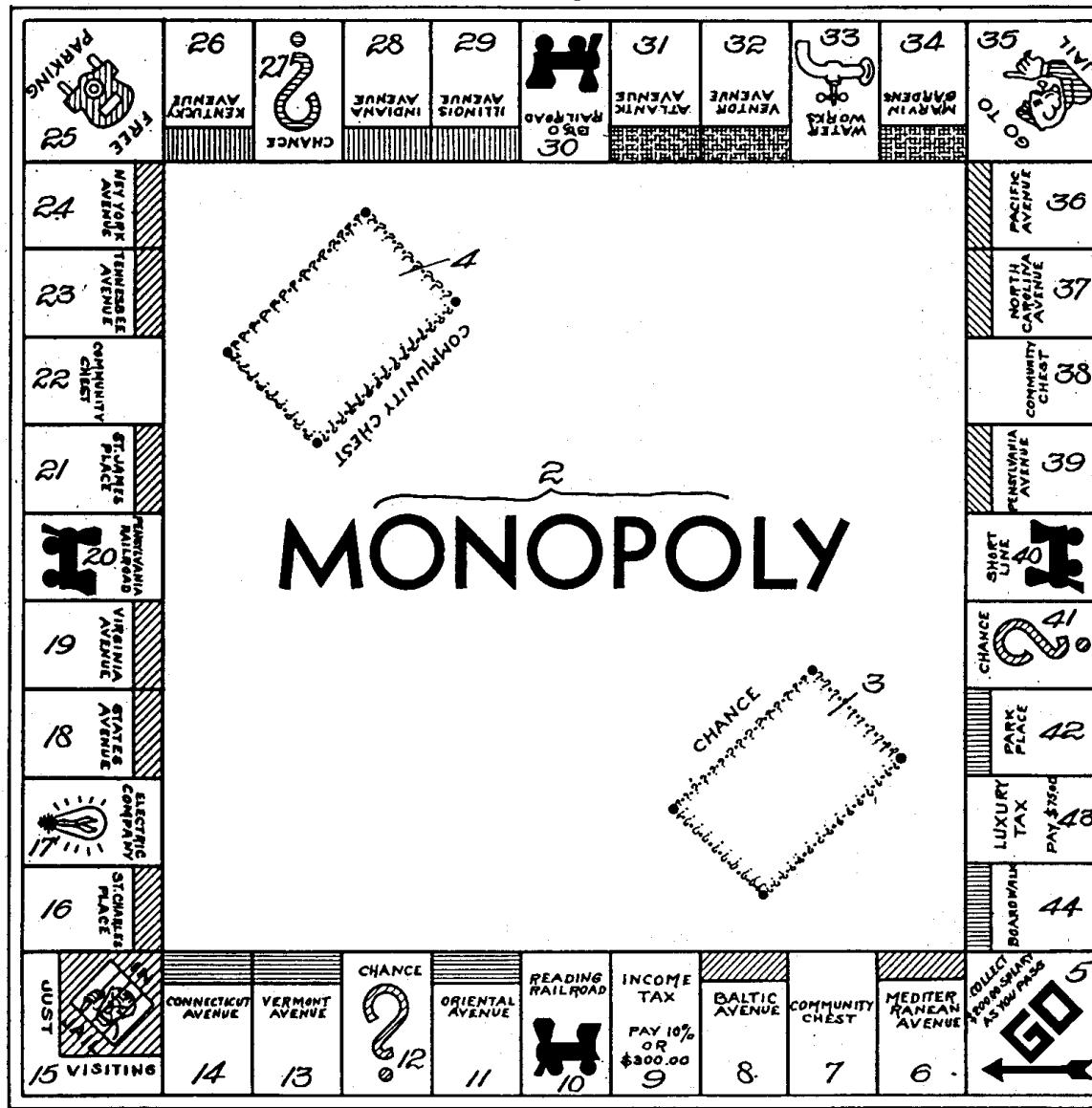
2,026,082

BOARD GAME APPARATUS

Filed Aug. 31, 1935

7 Sheets-Sheet 1

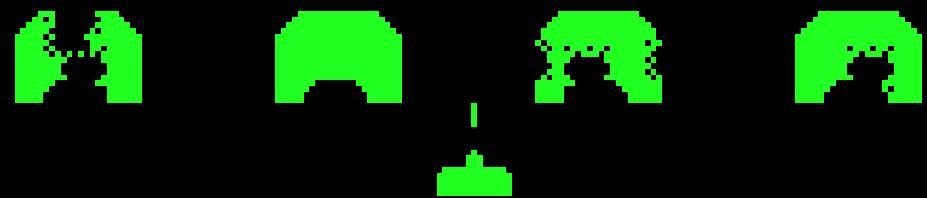
Fig. 1.



SCORE<1> HI-SCORE SCORE<2>

0070

0880



3



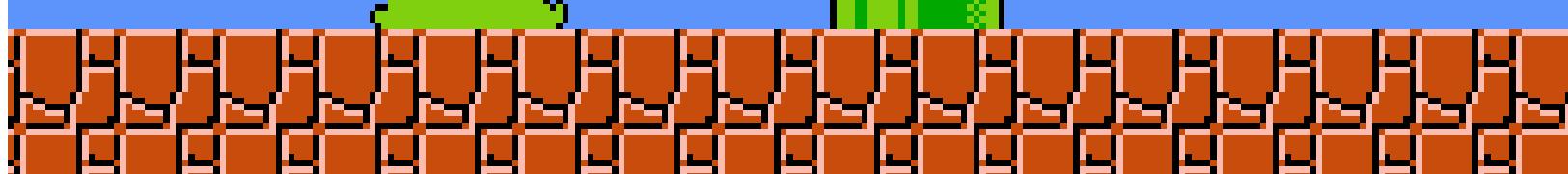
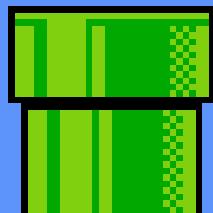
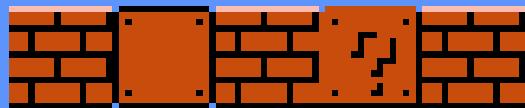
CREDIT 00

MARIO  
001300

0x01

WORLD  
1-1

TIME  
380

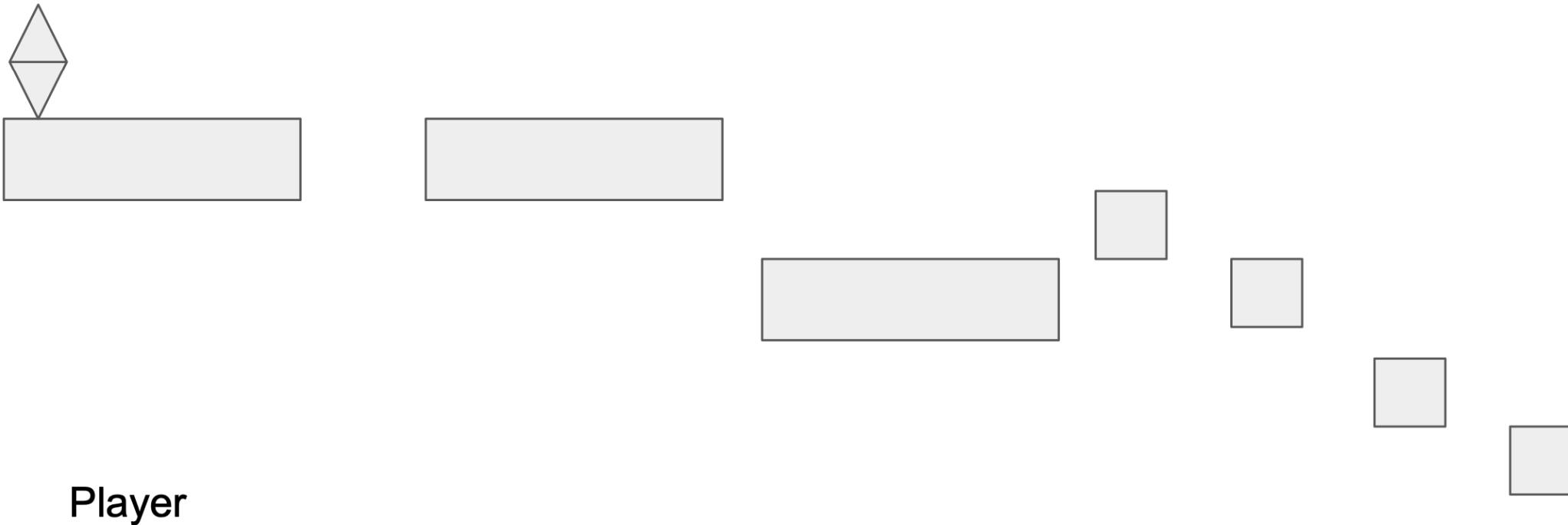


# Level Design

---

# Basic mapping.

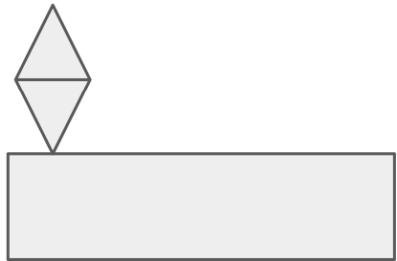
End



Player

# Basic mapping.

End

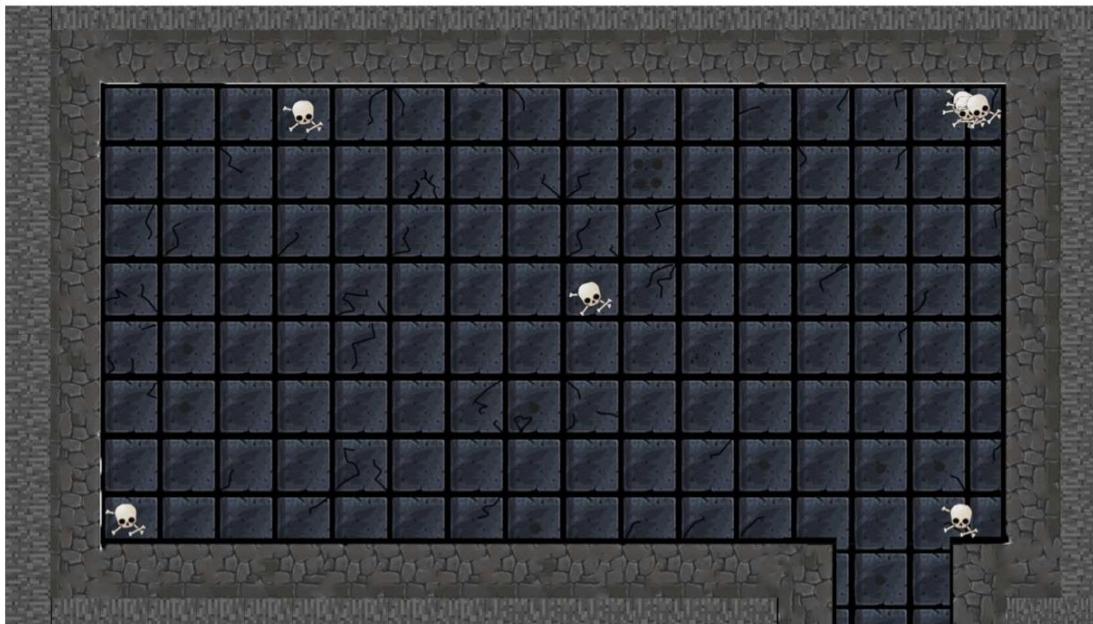


Player

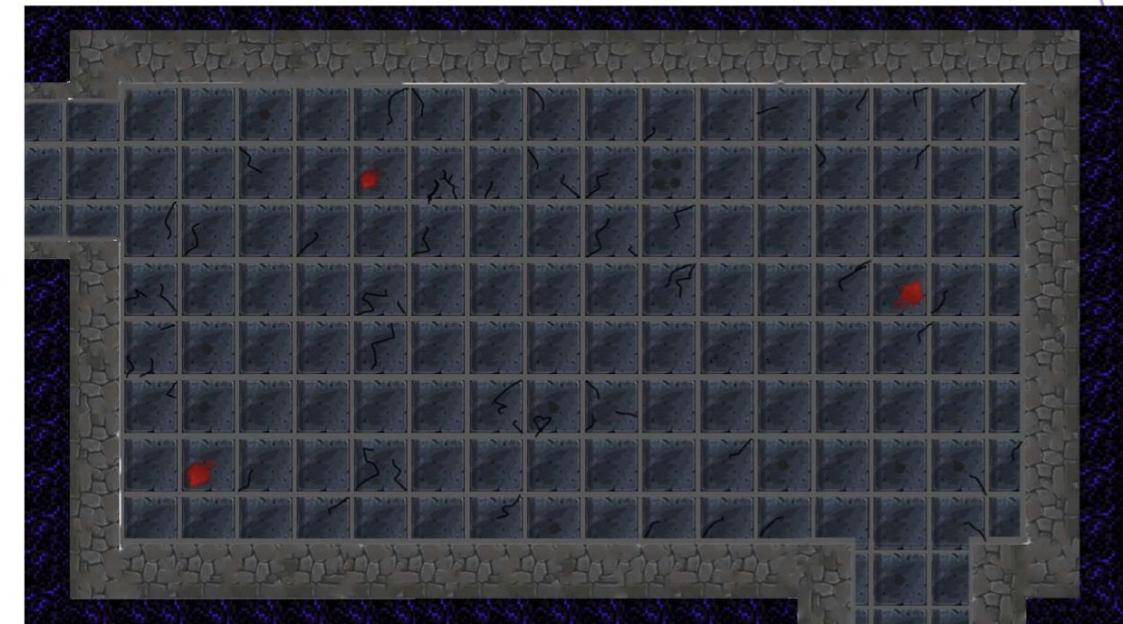


# *WORLDS / LEVELS*

Level 1



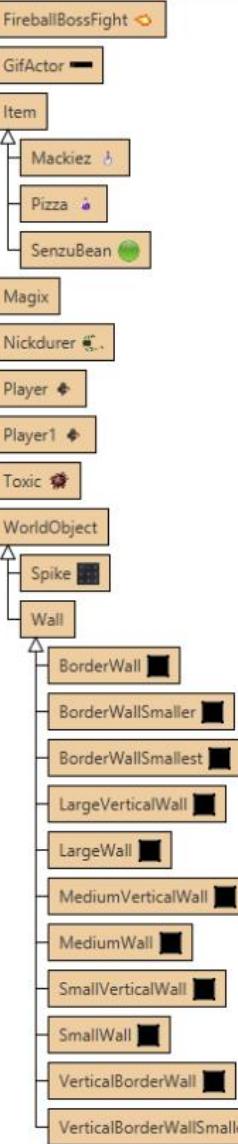
Level 2

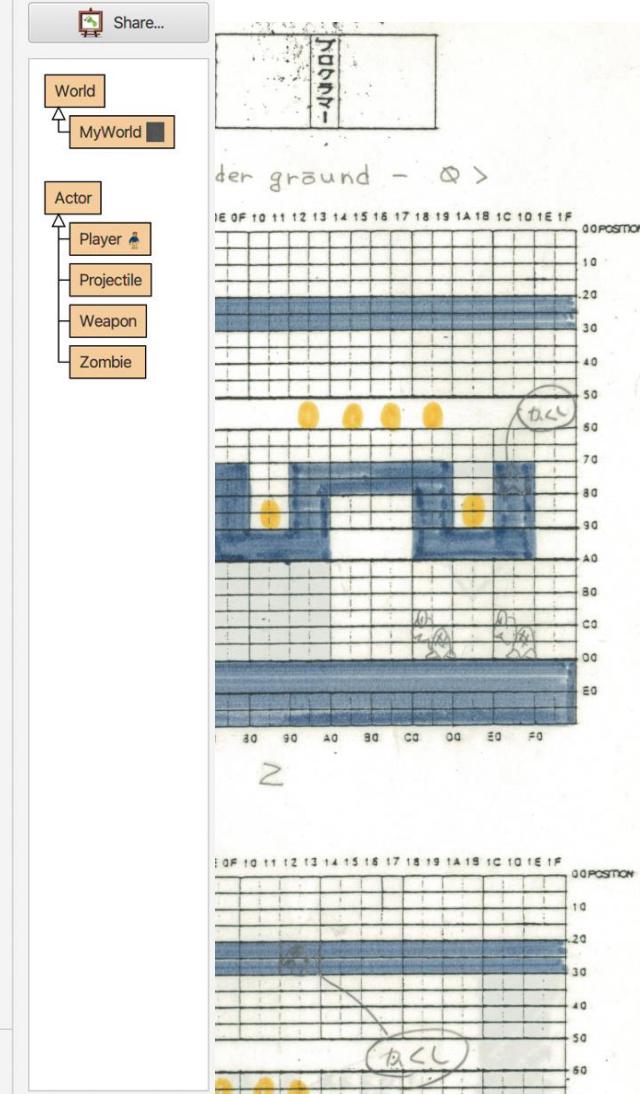
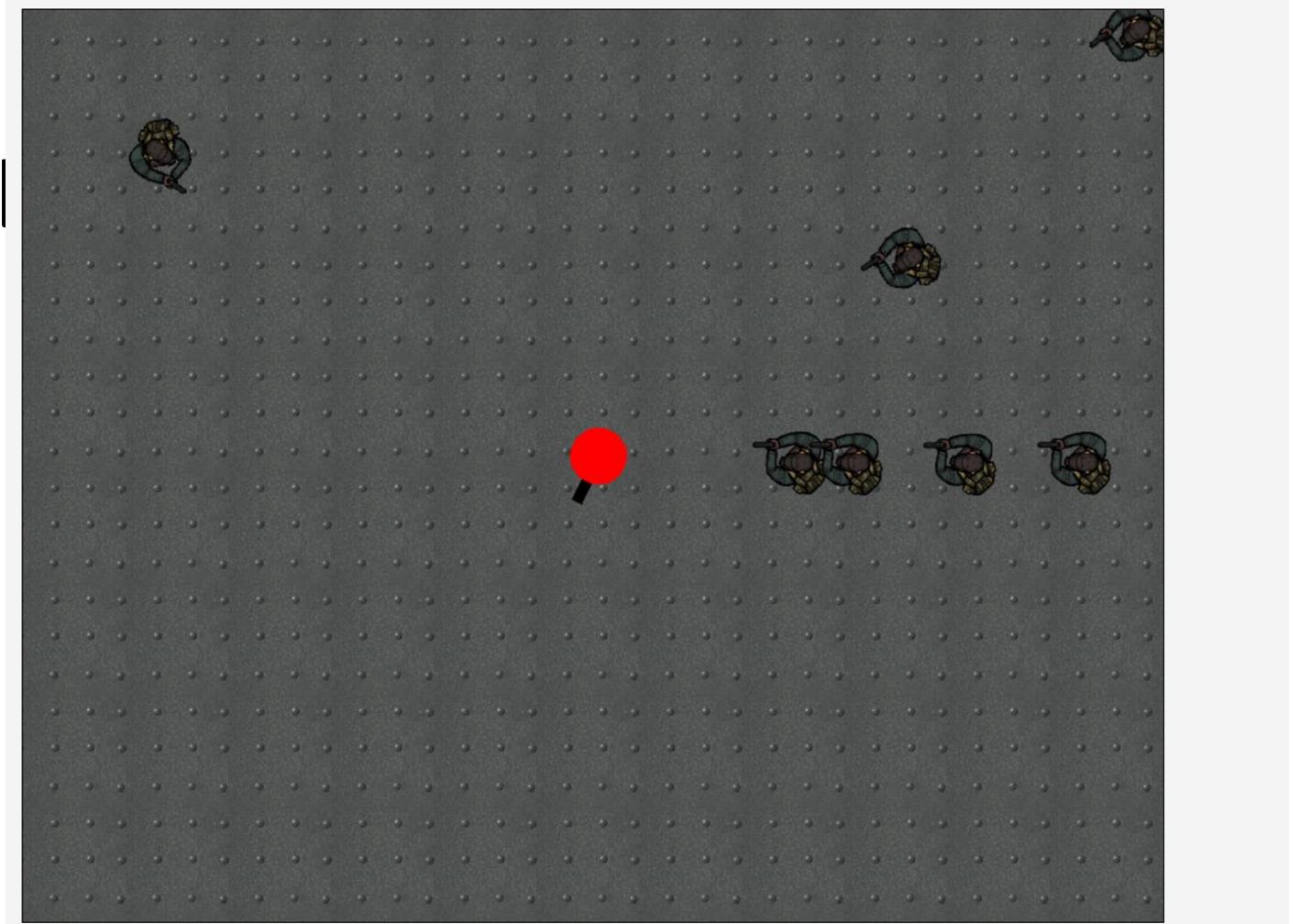


World Subclasses

Share...

Magix: 0

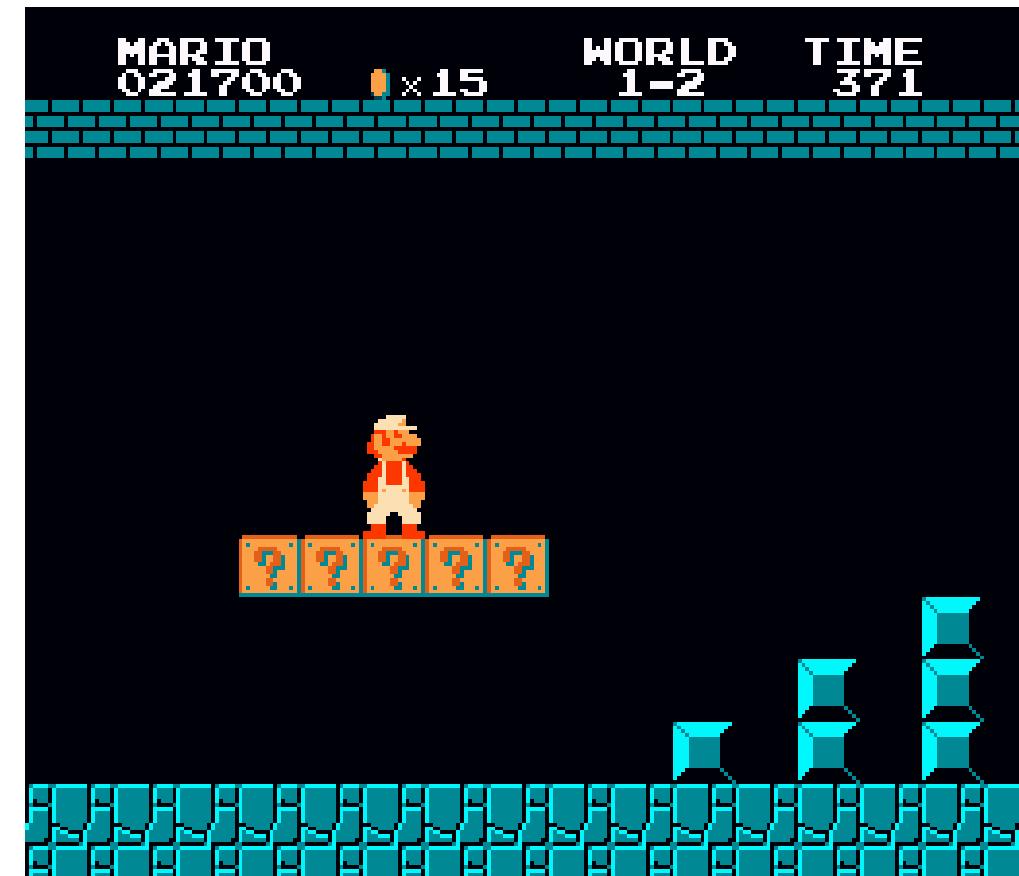
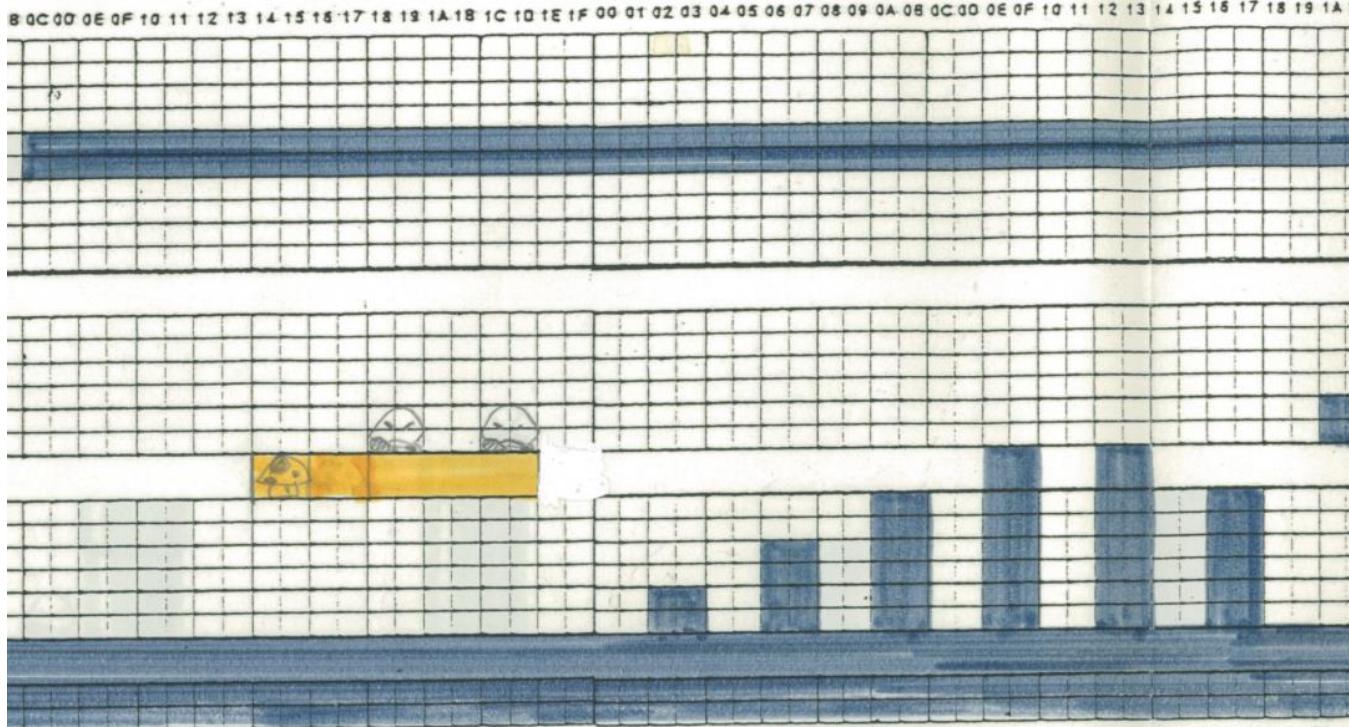


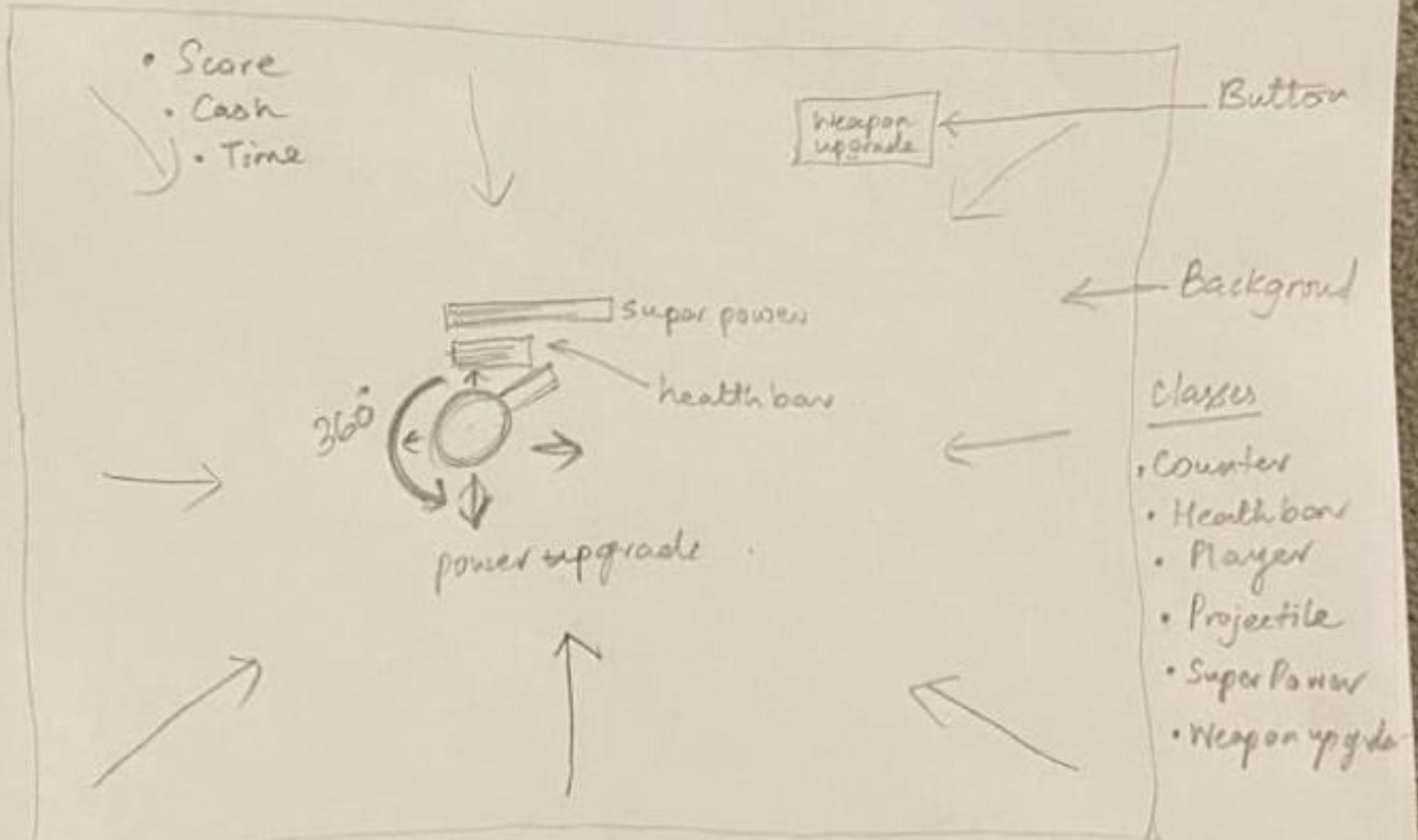


BG1	2000H	8
BG2	2400H	
BG3	2800H	T
BG4	2C00H	
5	4	7
6		

## BG PLANNING SHEET

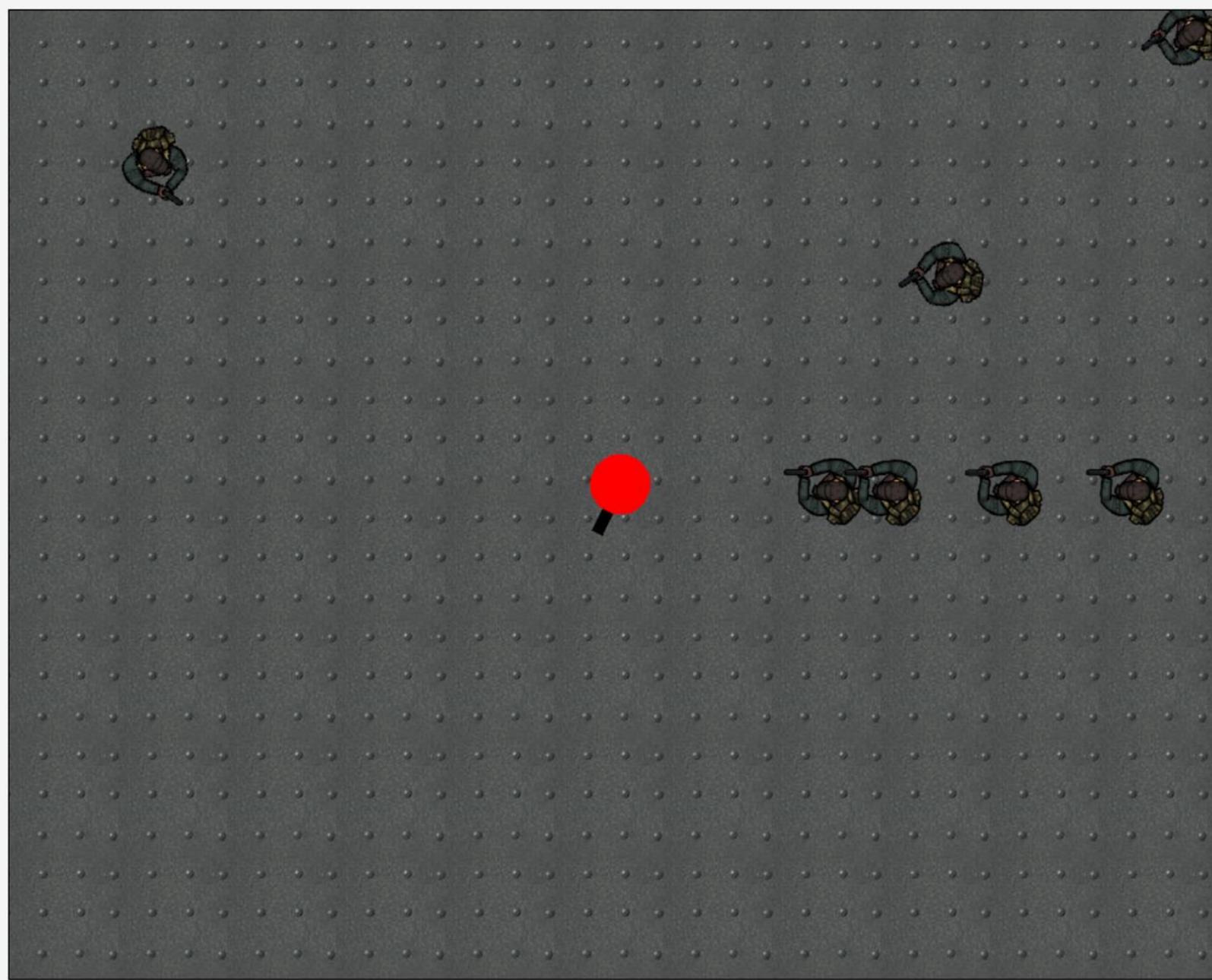
MEMO: W1 - 2 ① 150



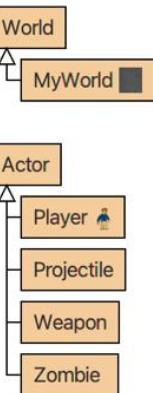


Ⓛ Background music  
 Ⓛ Gun shoot

Ⓛ 360° rotation  
 ✖ WASD Keys



Share...



> Act

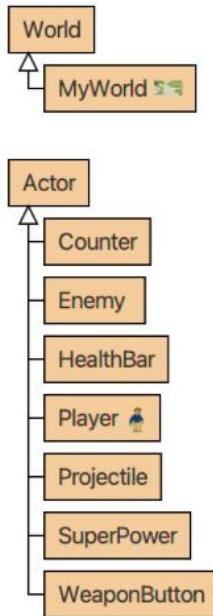
▶ Run

↻ Reset

Speed:

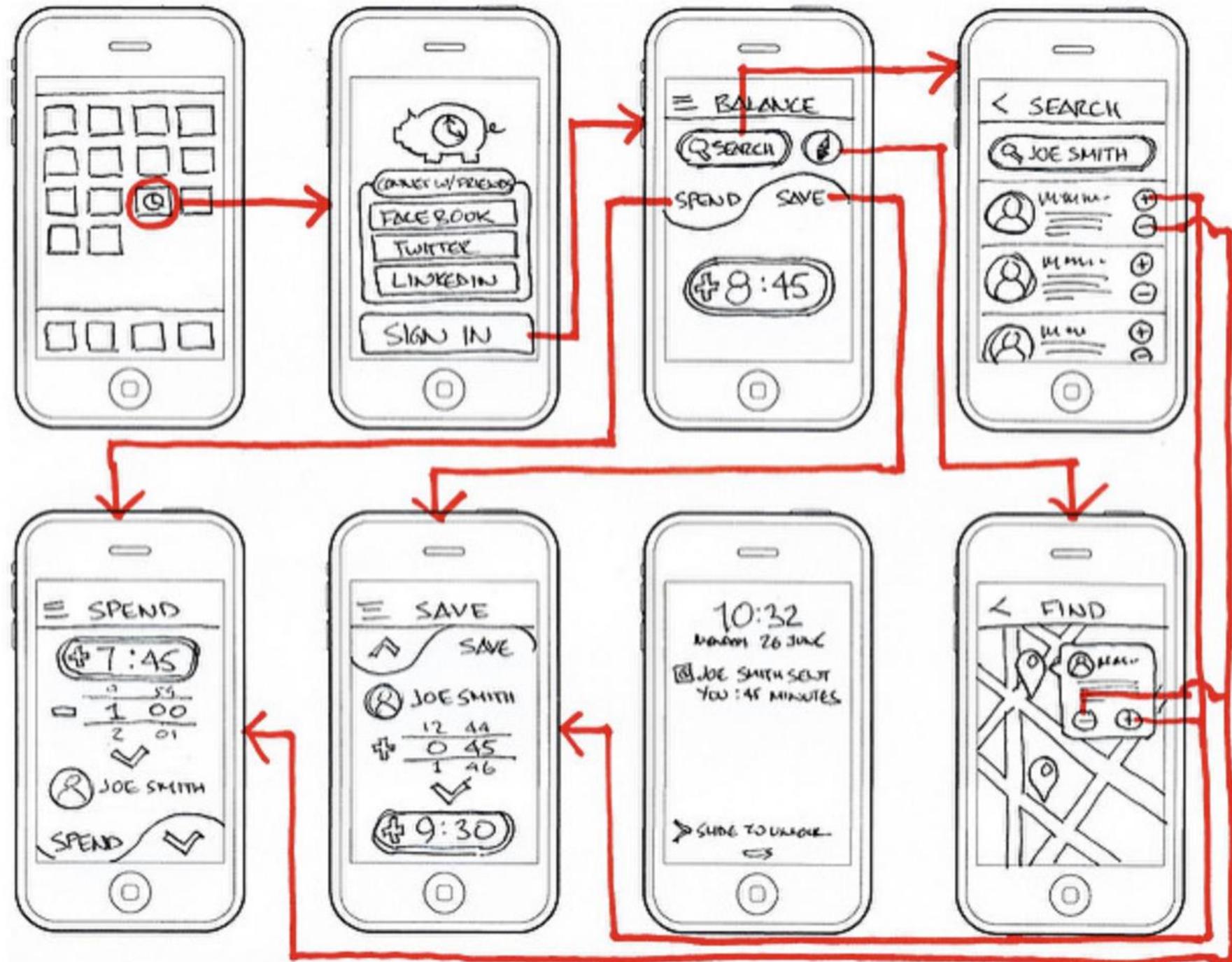


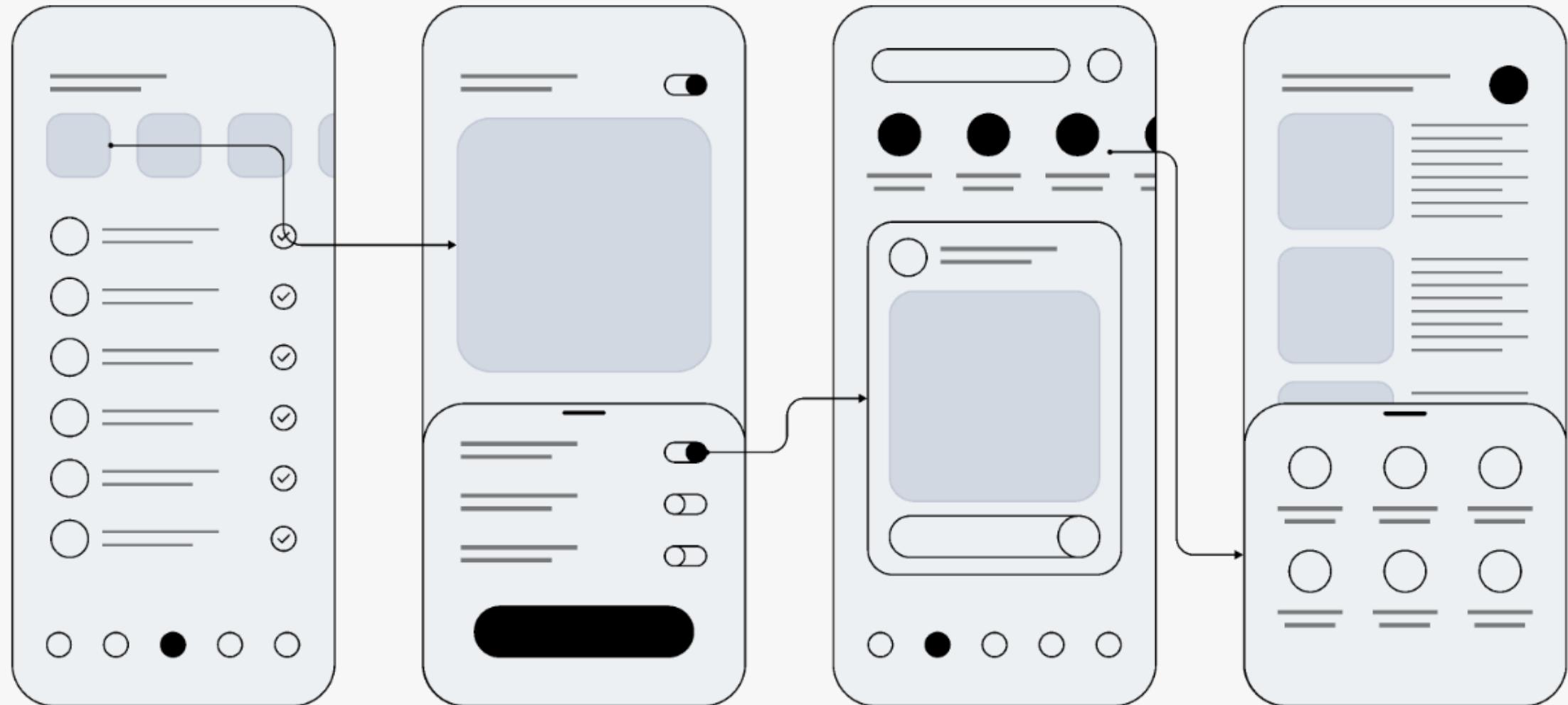
Share...

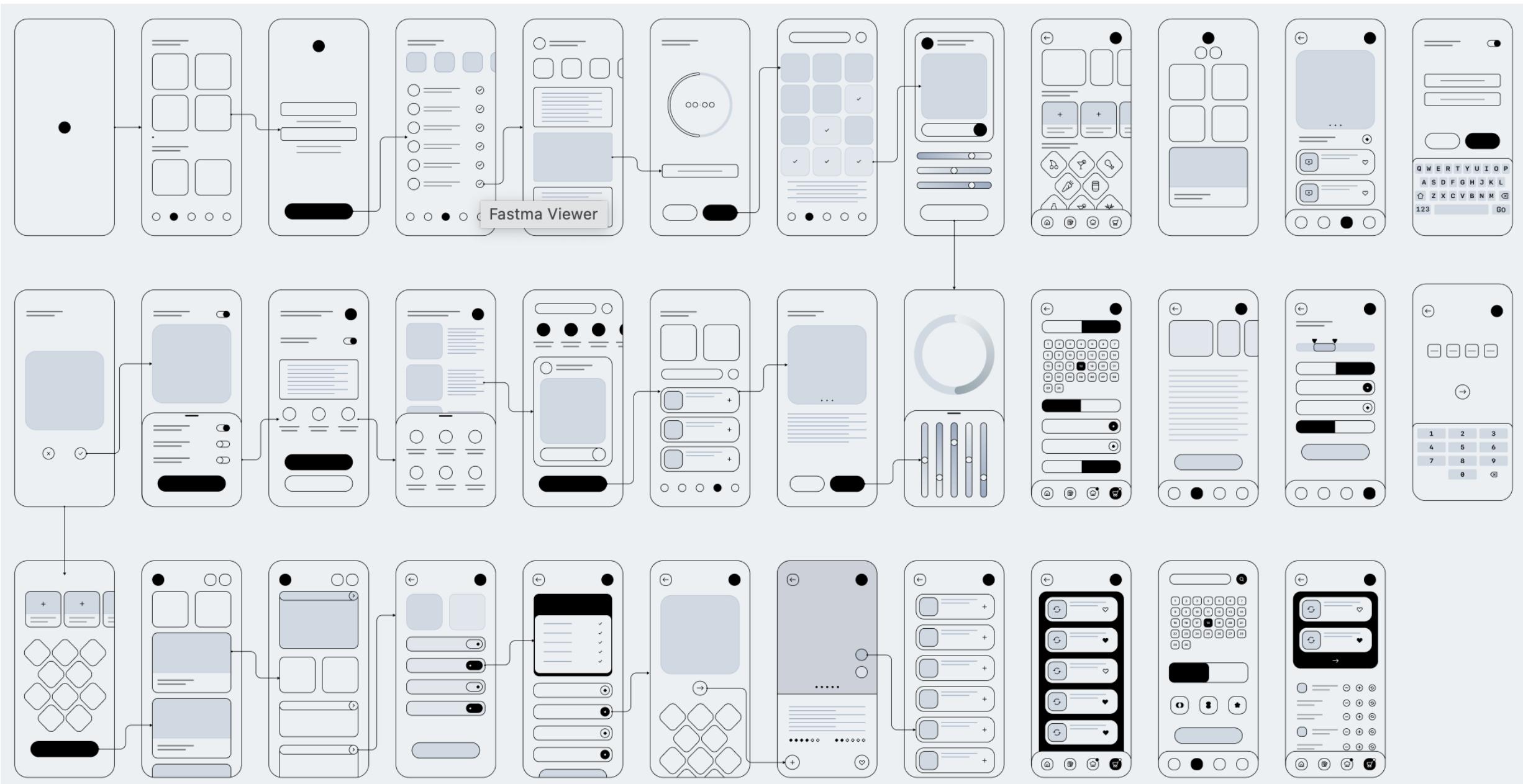


# Wireframing

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The wireframe illustrates the 'My List' page interface. At the top, there's a header bar with 'My List' and three circular icons. Below it is a navigation bar with back, forward, and refresh buttons, and a URL field showing 'https://www.default.com'. The main content area has a title 'Task Tracker' and tabs for 'My List', 'Calendar', and 'Account'. A prominent blue button labeled 'Add Task' is located on the left. Below it are search and sort controls. The task list displays three items:

- Complete homework [Priority: High]  Due 15 Dec 2022
- Revise for exam [Priority: High]  Due 28 February 2023
- Submit assignment [Priority: High] 23 May 2023 ← ↑  Due 30 May 2023  
Submit assignment for the Data Analysis module. See assignment brief for more details.  
Edit Task Delete Task

Annotations provide additional context:

- A callout for the first task states: "Reminder has been set for this task and will display a notification on the specified date".
- A callout for the third task states: "Red for high priority tasks, yellow for moderate priority, green for low priority. For completed tasks, this will be set to grey for no priority".

At the bottom, the footer reads: Jason Huggins (22021121) | CO699

Figure 8 – “My List” Page [Sample Colour Scheme; Refined Wireframe]

The screenshot shows a web browser window titled "My List - Task Tracker". The URL in the address bar is "localhost:44353/UserTasks/Index". The page header includes links for "Task Tracker", "My List", and "Calendar". Below the header, the main content area has a title "My List". It features a blue "Add Task" button, a search bar with a "Search" input field and a "Submit" button, and a table listing tasks. The first task in the table is "Complete assignment" with a due date of "Due 15/02/2023", priority "High", and status "Completed". It includes "Edit" and "Delete" buttons. At the bottom left, there is a link to "Privacy". The footer contains the text "Jason Huggins (22021121) | CO699 Project".

<input type="checkbox"/> Completed	Due 15/02/2023
Complete assignment See assignment brief for more details.	Priority: High

[Privacy](#)

Jason Huggins (22021121) | CO699 Project

Figure 26 - Current Design for “My List” Page

# Storyboarding

---

*Guest Story*



*Host Story*

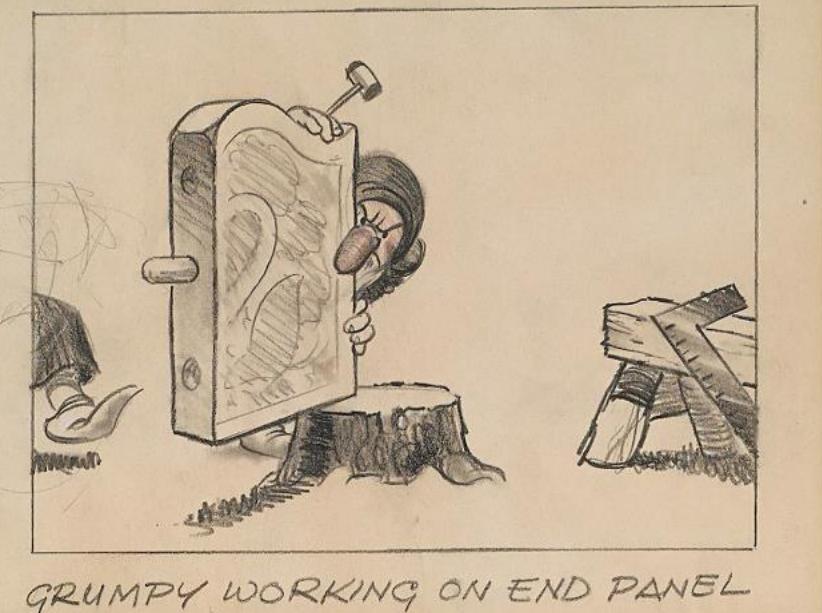


QUICK STUDIES

# How Airbnb Used Storyboards to Understand the Customer Experience

Literally seeing how your customer interacts with your organization can provide new insights into better user experiences, business opportunities, and team priorities.

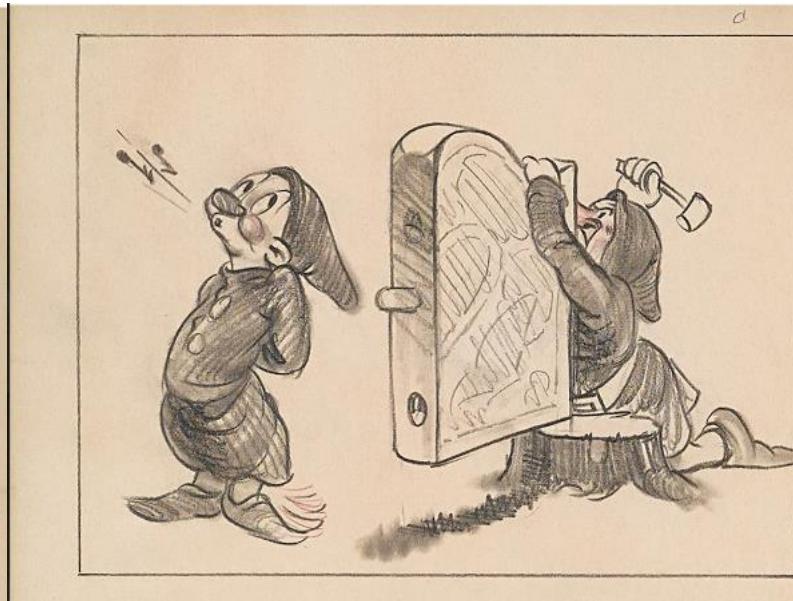
1 MIN READ



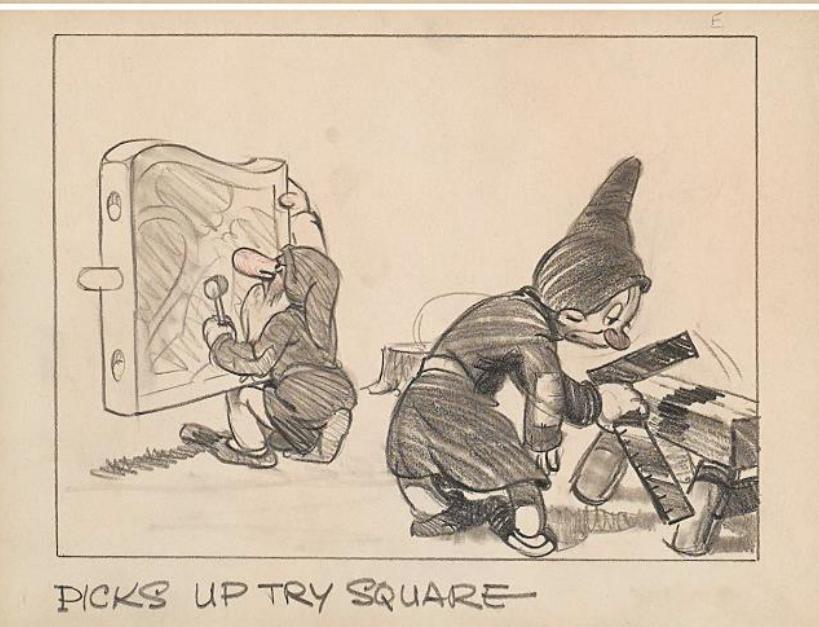
GRUMPY WORKING ON END PANEL



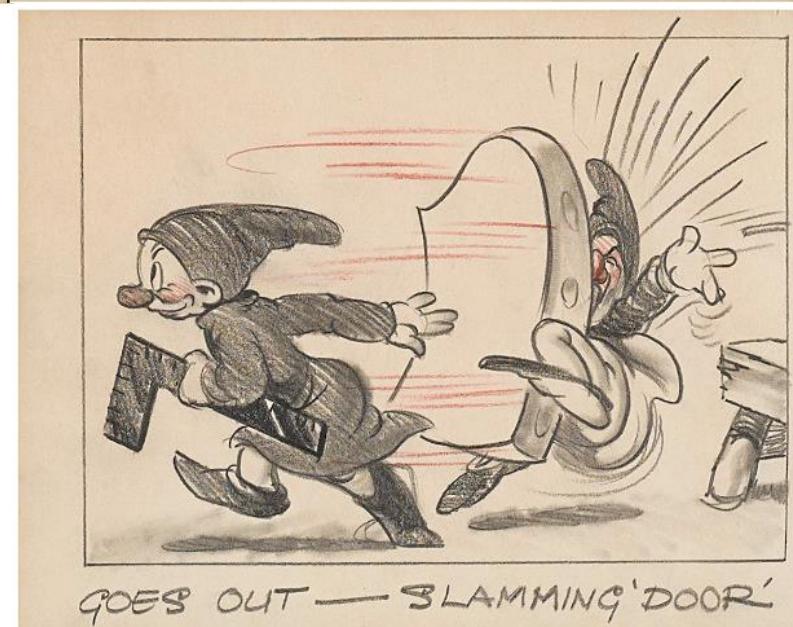
DOPNEY MISTAKES PANEL FOR DOOR



IMPATIENT — GOES THROUGH "DOOR"



PICKS UP TRY SQUARE



GOES OUT — SLAMMING 'DOOR'

A few years back, Brian Chesky, CEO of Airbnb was reading the biography of Walt Disney, and was inspired by Disney's creation of a storyboard to produce his first feature film, Snow White. Airbnb then created their own storyboards, imagining and illustrating what their guests and hosts experience while using their service. The practice has two benefits:

- 1 **It's a visual way to better understand your customers' experiences.** As Chesky notes, "As opposed to working out of a spreadsheet or a Google Doc, this is us creating characters and starting to understand the personality of these characters..."
- 2 **It allows you to imagine even the smallest details.** By mapping out your customer's journey, you can better identify potential pain points and anticipate their emerging needs.

These storyboards identified a missing link between Airbnb's website and the real-life customer experience. As a result, Airbnb shifted their focus to optimizing their now widely utilized mobile platform.

# STORYBOARD



- MAKES NOTE OF SUPPLIES  
NEEDED ON CLIPBOARD
- PHYSICAL INVENTORY

# PERSONA:

CORPORATE BUYER,  
JAMES



- SELECTS ITEMS FROM  
FAVORITES LIST
- USES DESKTOP & SUPPLY  
LIST AS TOOL

# SCENARIO:

REPLENISH OFFICE SUPPLIES



- RECEIVES SHIPMENT WINDOW  
W/ ORDER SUBMISSION
- SETS PLAN FOR RESTOCK



Sees commercial



downloads app



Places Order



Hunger continues



estimated pick  
up time given in  
the app



DRIVES TO  
RESTAURANT



Take  
Our  
SU'

complet  
Survey



e-coupon  
in inbox



food

PERSONA: James

SCENARIO: Replenish Office Supplies

- ① James takes a physical inventory of the supply closet and notes items needed on clipboard.



Peeved



focused

- ② James creates an order by picking items from favorites list via his office desktop computer. Checks off items on clipboard.

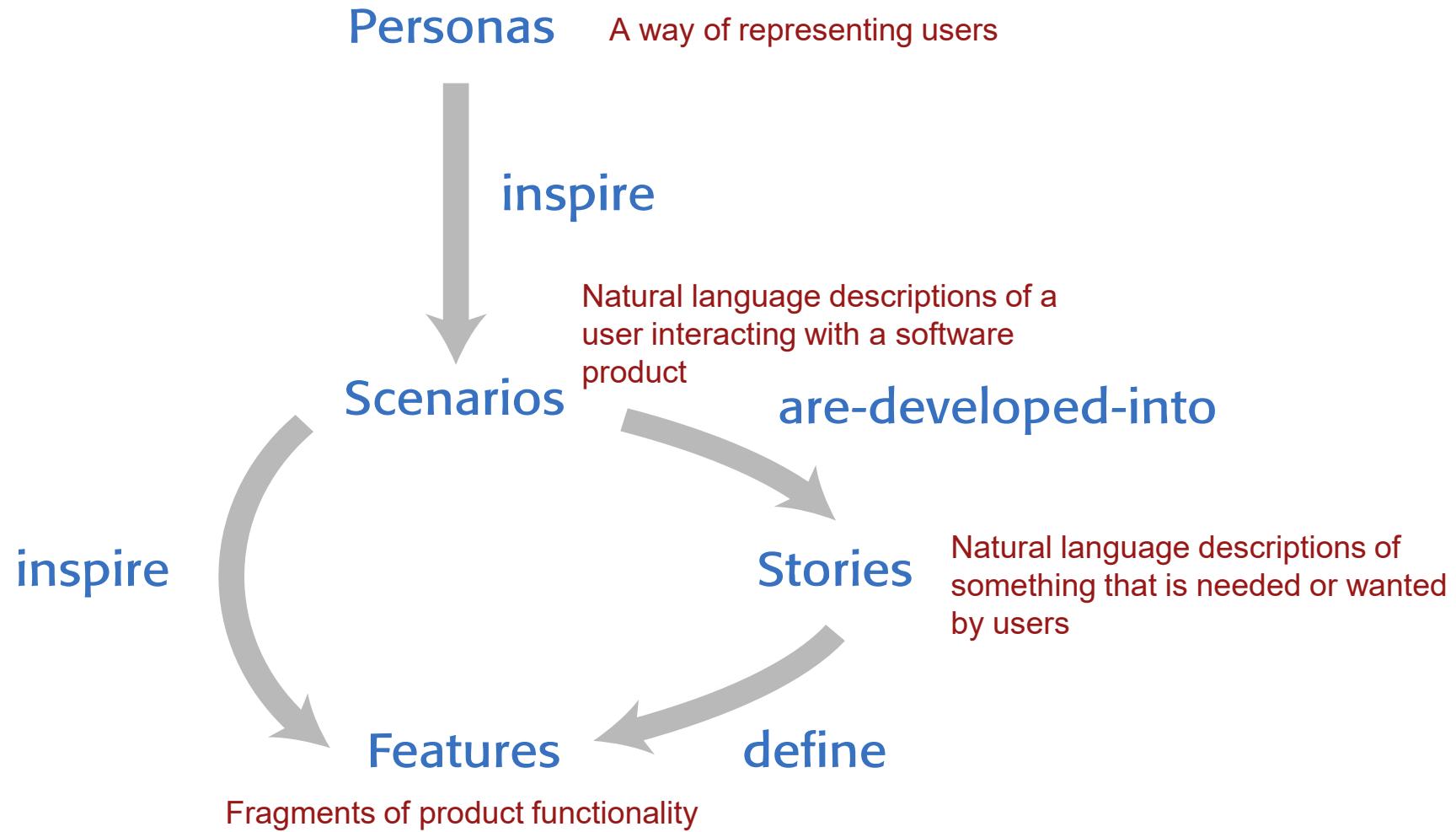


- ③ James adds the shipment arrival date to calendar from confirmation message.



done!

# Personas, Scenarios, Features



# Feature identification

- Your aim in the initial stage of product design should be to create a list of features that define your product.
- A feature is a way of allowing users to access and use your product's functionality so the feature list defines the overall functionality of the system.

# Feature derivation

- Features can be identified directly from the product vision or from scenarios.
- You can highlight phrases in narrative description to identify features to be included in the software.
  - You should think about the features needed to support user actions, identified by active verbs, such as use and choose.

# Scenario

- Jack is a primary school teacher in Ullapool, teaching P6 pupils. He has decided that a class project should be focused around the local fishing industry, looking at the history, development and economic impact of fishing.
- As part of this, students are asked to gather and share reminiscences from relatives, use newspaper archives and collect old photographs related to fishing and fishing communities in the area. ***Students use an iLearn wiki*** to gather together fishing stories and ***SCRAN (a history archive) to access newspaper archives and photographs***. However, Jack also needs a photo-sharing site as he wants ***pupils to take and comment on each others' photos*** and to ***upload scans of old photographs*** that they may have in their families. He needs to be able to moderate posts with photos before they are shared, because pre-teen children can't understand copyright and privacy issues.
- Jack sends ***an email to a primary school teachers' group***, which he is a member of to see if anyone can recommend an appropriate system. Two teachers reply and both suggest that he uses KidsTakePics, a photo-sharing site that allows teachers to check and moderate content. As KidsTakePics ***is not integrated with the iLearn authentication service***, he sets up a teacher and a class account with KidsTakePics.
- ***He uses the the iLearn setup service to add KidsTakePics to the services seen by the students*** in his class so that when they log in, they can immediately use the system to upload photos from their phones and class computers.

# Scenario

## Features from Jack's scenario

- A wiki for group writing.
- Access to the SCRAN history archive. This is a shared national resource that provides access to historical newspaper and magazine articles for schools and universities.
- Features to set up and access an email group.
- A feature to integrate applications with the iLearn authentication service.