Game Design Document (GDD)
Algorithmic Inventory Sorter

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Key Notes

- These days, GDD's tend to be shorter, not longer. Challenge yourself to explain features concisely, use visuals, and leave some parts open to the team, sometimes less details are better, especially if the scope of your game is large (No one wants to read a 100 pages long GDD).
- Pictures are worth a thousand words.
- Make this as you visualize your game: Even if it doesn't feel like you'll be able to gather a full team to take on all the necessary tasks, plan as if you have a full team, afterwards you can scale it to size and prioritize elements. If you feel like you want a feature like that in your game, put it in here.
- If one of the sections doesn't make sense for your game, feel free to delete it from the final document or use "Not applicable".
- Make sure the final version is coherent; re-read it several times and send it to friends first. If other people understand it with a simple read, then you're doing great.
- Have fun!

Contents

1 Introduction

Important! Some terms like queue and queueing algorithm, among others, have been used in an arbitrary way to make this document more understandable.

A Github repo is already up with information regarding the development of this project. `https://github.com/frankoldfield/algorithmic-inventory-sorter`

1.1 Scope of the document

This document is intended for anyone involved in the production of the video game or any related products such as research papers or podcast episodes.

1.2 Elevator pitch

This Serious Game will be intended to be used as a learning tool in undergraduate courses where students learn about queuing algorithms, alternative to traditional methods, hoping to have a higher engagement and knowledge retention than these.

2 Game Overview

2.1 Game concept

The players will have to solve puzzle-like simulations. In each level they will have one or more incoming queues of objects, a set of instructions to sort the objects on their way out, and a set of outgoing queues.

The main objective is that the players learn about queuing algorithms while enjoying the game and showing an improved learning progress compared to more traditional means. For this, it is important that the **level of difficulty is well suited and not arbitrary for each user**.

2.2 Audience

The people who'll play the game are undergraduate students from degrees like computer science. Some will play this game as a part of a test study, to figure out the impact on their knowledge, and others will play this game as part of the learning process in lessons related to queuing algorithms. They will be 18 years or older.

2.3 Genre

Simulator / Puzzle solving.

2.4 Setting

The game takes place in a post apocalyptic world, after a climate disaster, but some special chapters may take place in other fictional environments.

2.5 Game structure

The player will move through levels, if there is enough time, I have thought about making a small city builder, where each building is a level, when you complete a level, you will unlock the next building.

2.6 Player

The game will be singleplayer.

2.7 Game flow summary

The player can:

- Select level.
- See information about level.
- Start level.
- Reset level.
- Exit level.
- Walk or run.
- Jump.
- Interact with NPC.
- Grab object.
- Drop object.
- Grab queue history object.
- Place queue history object.

2.8 Look & Feel

We want the game to be fairly simple, the goal is to make it feel a bit like Portal but less technical/cold, with a warmer feel.

3 Gameplay

3.1 Objectives

The main objective for the player is beating all the levels and completing the reconstruction of Sorting Street. Secondary objective is completing all the levels in the hardest difficulty.

3.2 Progression

Completing a level will unlock the next one.

3.2.1 Challenge structure

Each level will have different difficulty settings, these are supposed to be chosen depending on the results of a previously run test, to determine pre-existent knowledge of the user.

3.3 Play flow

Players will have to view a short video explaining the queuing algorithm they will be using before starting a level.

3.4 Difficulty

The difficulty of the levels will affect on the number of queues and objects to sort, as well as the queuing algorithm to be used. The game will have 3 or 4 levels of difficulty.

4 Mechanics

4.1 Rules

The player can't modify any assets from the game, he can only move the objects it has to queue and interact with other assets, in a determined way.

4.2 Game universe

The game will manage input queues and the objects that will come out of them without the user noticing anything, and will also keep the objects the user puts into the output queue in order, in case the user wants to alter the order after making a mistake.

4.3 Physics

Realistic physics. The only remarkable thing to mention is that the user levitates (in reality it's just that his character is floating, it can't fly or move vertically if it doesn't jump)

4.4 Queueing history

This asset allows the player to visualize the order they have introduced the objects into the output queue in, and change it after making any mistakes.

4.5 Auxiliary desk

This desk acts as a buffer, it allows the player to store objects and reorder them without putting them into the output queue, for example, in a LIFO queueing algorithm, the player will have to put every object on this desk, and then start putting them into the output queue in reverse order.

4.6 Economy

If we choose to have an economy, the player will gain currency when completing levels, the harder they are and the higher the difficulty setting is set to, the bigger the reward will be. They would be able to spend the currency on appearance assets (Different colours or skins for their character)

4.7 Character movement

The player can move around every location, some will have visible barriers (Every level, and Sortica Headquarters), and others will have invisible barriers (Sorting Street).

4.8 Player interaction

The player can interact with the helper NPC at all times. In Sorting Street, the player will be able to select the level they want to play, or read information about it. During levels, they will be able to interact with the objects they have to sort, with the queues, and with other elements such as the auxiliary desk and the queuing history board.

4.8.1 Game menus

A brief mention on how the game menus work and what options are available to the player. Add a sketch to the description.

Main Menu option 1

Before developing Sortica Headquarters, first, simpler option.

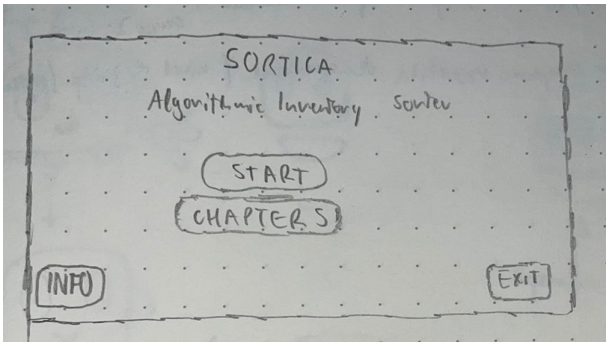


Figure 1: Main Menu option 1

Main Menu option 2

Before implementing Sortica Headquarters, second, more aesthetic option.

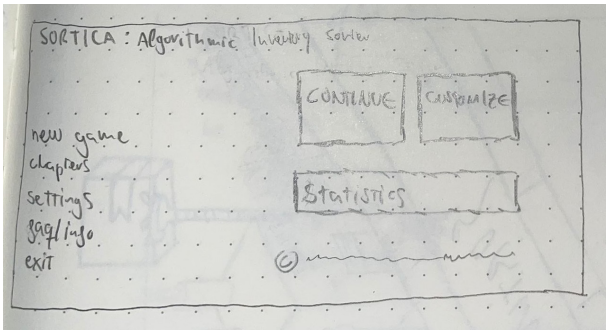


Figure 2: Main Menu option 2

Settings menu

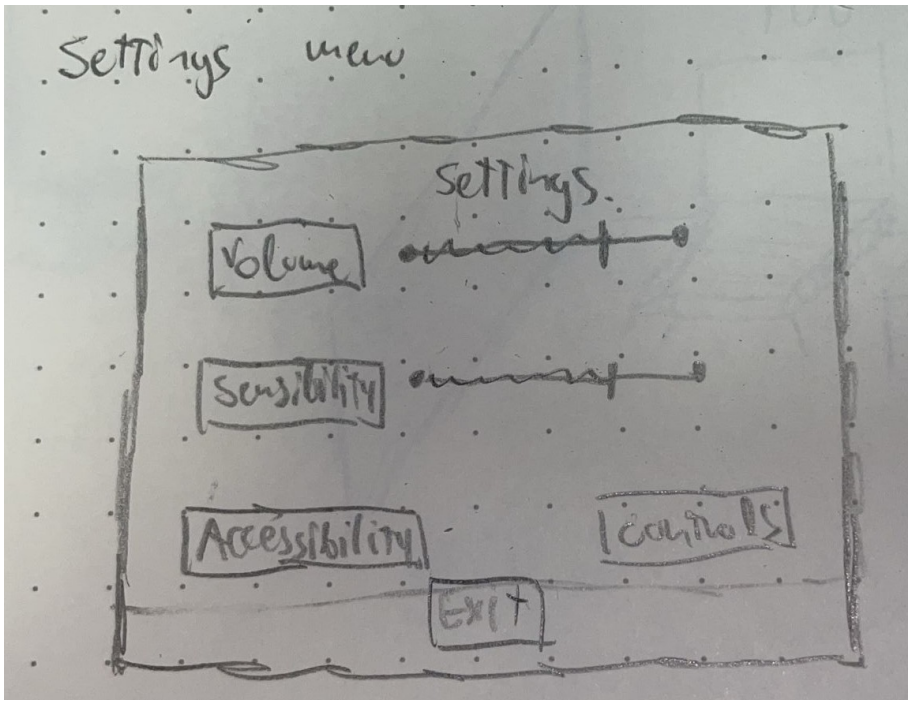


Figure 3: Settings Menu

Accessibility menu

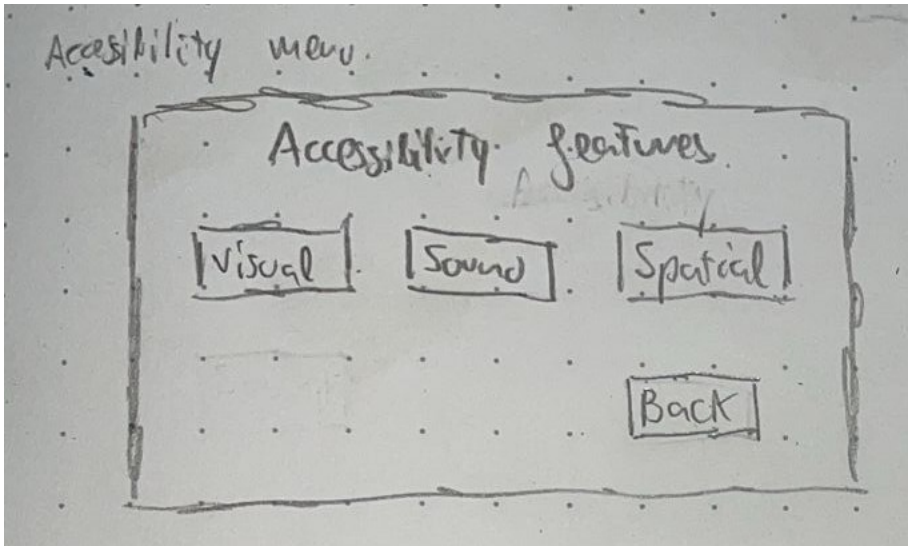


Figure 4: Accessibility Menu

Control menu

Typical controls menu, we can make modifications for accessibility, still have to look into this.

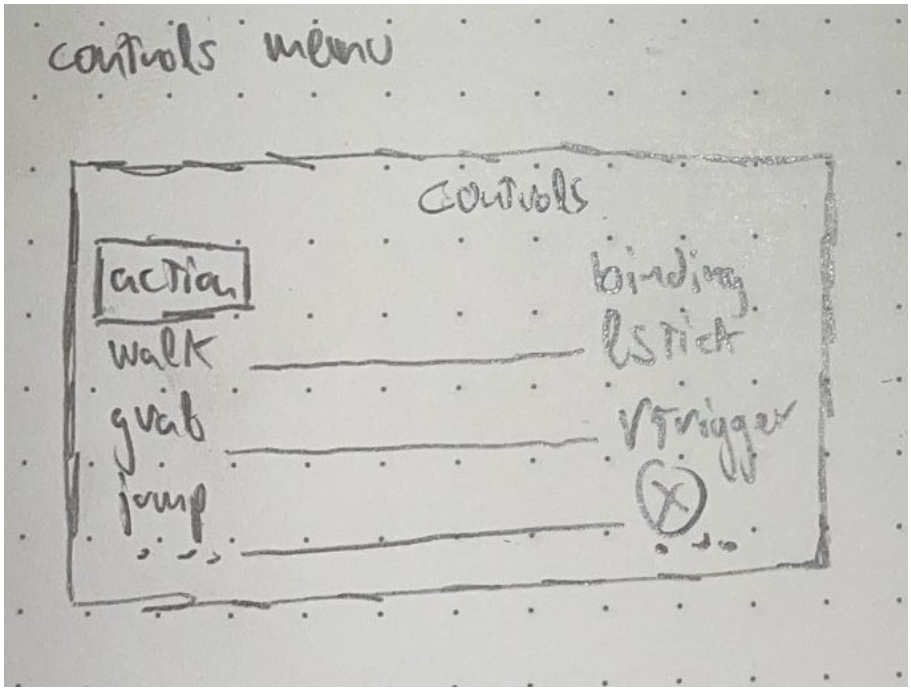


Figure 5: Controls Menu

4.8.2 Saving

Every time the player completes or exits a level the game will save automatically.

4.8.3 Game options •

The player will be able to use any of the implemented accessibility measures, they will also be allowed to change sensibility and sound volume. The player will be allowed to change the controller bindings to allow for better accessibility. **These still need discussing.**

Visual accessibility features

- Disable complex models (everything turns into basic models)
- Colour filters for colour blindness

Auditory accessibility features

- Disable sounds
- Sound queues signaling next step

Spatial accessibility features

Motor accessibility features

- Controls personalization.

4.9 Assets

Still have to discuss sounds.

4.9.1 Player/Characters

- Player model
- Player textures
- Player animation/movement
- Helper model
- Helper texture
- Helper animation/movement
- Chef model
- Chef texture
- Chef animation/movement

4.9.2 Sortica Headquarters

- Room model
- Terminal model
- Terminal texture
- Panel model
- Panel texture
- Portal model
- Portal texture
- Wall/Flooring/Ceiling textures

4.9.3 Sorting Street

- Street texture
- Sky texture
- Factory model
- Factory texture
- Pastry shop model
- Pastry shop texture
- Warehouse model
- Warehouse texture
- Restaurant model
- Restaurant texture
- Fence model
- Fence texture
- Bush model
- Bush texture

4.9.4 Levels

Test

- Simple Queue model
- Simple Queue texture
- Simple box model
- Simple box texture
- Simple board model
- Simple board texture
- Simple table model
- Simple table texture

Factory

- Factory Queue texture
- Metal rods model
- Metal rods material
- Factory board texture
- Factory table texture

Pastry shop

- Pastry Shop Furnace Queue model
- Pastry Shop Furnace Queue texture
- Pastry model
- Pastry texture
- Pastry Shop board texture
- Pastry Shop table texture

Warehouse

- Warehouse Queue texture
- Warehouse box texture
- Warehouse board texture
- Warehouse table texture
- Warehouse truck model
- Warehouse truck texture

Restaurant

- Restaurant Queue texture
- Appetizer Model
- Appetizer texture
- Main Course Model
- Main Course texture
- Appetizer Model
- Appetizer texture
- Restaurant board texture
- Restaurant table texture
- Restaurant door model
- Restaurant door texture

5 Graphics and audio

5.1 Visual system

It is a 3D minimalistic game. One of the reasons why it is minimalistic is to reduce distractions.

5.1.1 Player camera

First person view.

5.1.2 Landscape

Landscape will only be actually applicable in Sorting Street, it will be an infinite street towards both ends of the street, and a cloudy sky.

5.2 Interface

5.2.1 Game HUD

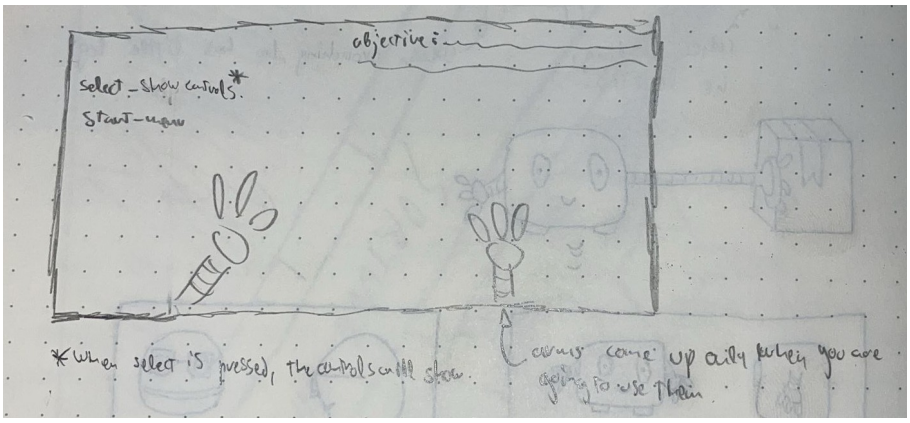


Figure 6: Basic user hud

When pressing select (placeholder) the controls will show on screen. When pressing start (placeholder), the pause menu will pop up.

5.3 Audio system

5.3.1 Game music

If the game has any music, it will be background, relaxing music, we need to avoid complex music to reduce distractions and disorientation.

5.3.2 Audio look & feel

We want the audio to feel simple and robotic, yet a bit comical. Again, it can't be distracting, there shouldn't be any strong noises.

6 Story and narrative

6.1 Backstory

This backstory is told by our robot coworker. The world is set in a post apocalyptic setting caused by an environmental disaster.

6.2 Main plot

We are part of a restoration crew at Sortica INC. Our goal is to restore sorting street, by optimizing the way the restored businesses/buildings manage their processes (applying queuing algorithms).

6.2.1 Plot progression

The supporting character will inform us of how the completion of each level has impacted the restoration of Sorting Street.

6.3 Cutscenes

We will have cutscenes that explain the algorithms that will be used in each level.

7 Characters

7.1 Main character - Sortie

His full name is Levitating Sorting Restoration Robot version 13.9.2.

7.1.1 Backstory

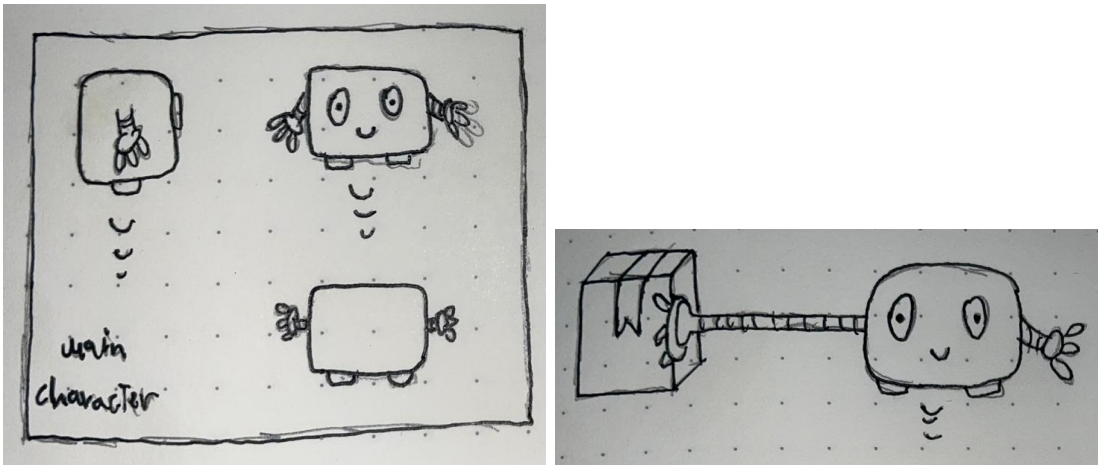
The main character (You) is a robot from a restoration crew, whose goal is to restore the buildings in sorting street.

7.1.2 Personality

The main character doesn't talk too much, he has a naive personality, and just smiles and nods at everything he is told to do.

7.1.3 Appearance

Small rounded rectangular prism, with stretching arms and little legs. When the character is crouching, he has little legs, when he isn't, he levitates.



(a) (b)

Figure 7: (a) Sortie - Views (b) Sortie - Arm extended

7.1.4 Abilities

He can levitate, and grab objects from afar with its extendable arms.

7.1.5 Relationships

He is new to the job, other employees treat him just as a regular new employee.

7.2 Supporting character - Rollie/Roller/Scrollie

His full name is Rolling Sorting Restoration Robot version 5.9.

7.2.1 Backstory

The supporting character is in this case an older model of restoration robot, he is now retired of his restoration duties and is dedicated to instructing and teaching newer models.

7.2.2 Personality

He is more apathetic than the main character, he takes his job very seriously.

7.2.3 Appearance

Sphere with eyes, glasses, and mouth.

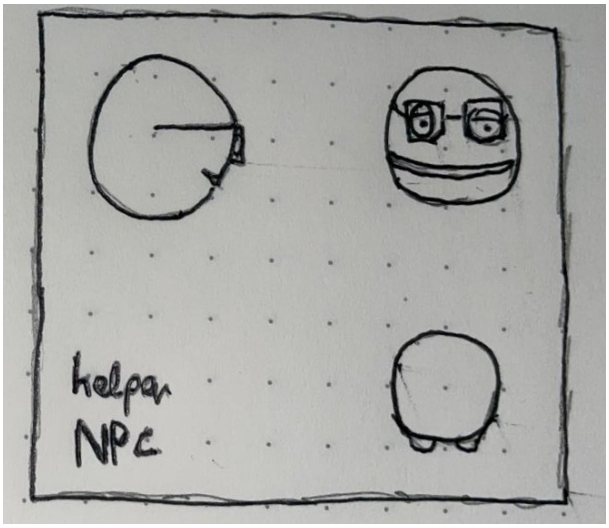


Figure 8: Rollie - Model views

7.2.4 Abilities

He rolls and he teleports, he is omnipresent.

7.2.5 Relationships

He is the supervisor of the main character.

8 Game world

8.1 Look & Feel of the world

8.2 Locations

8.2.1 Sorting Street

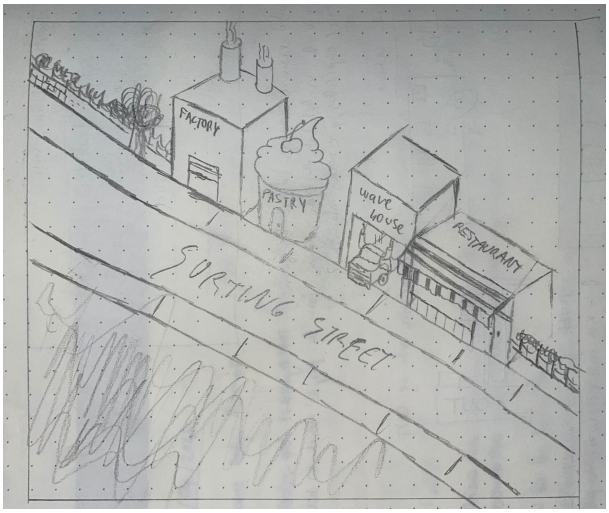


Figure 9: Sorting Street

Connection to the plot

Main location, this is the street the player will have to restore, in this street, each building located in Sorting Street is a level.

8.2.2 Sortica Headquarters

This location acts like a main menu, here, the player can choose between going to Sorting Street, viewing old videos, replay specific levels, or going to the appearance store (TBD).

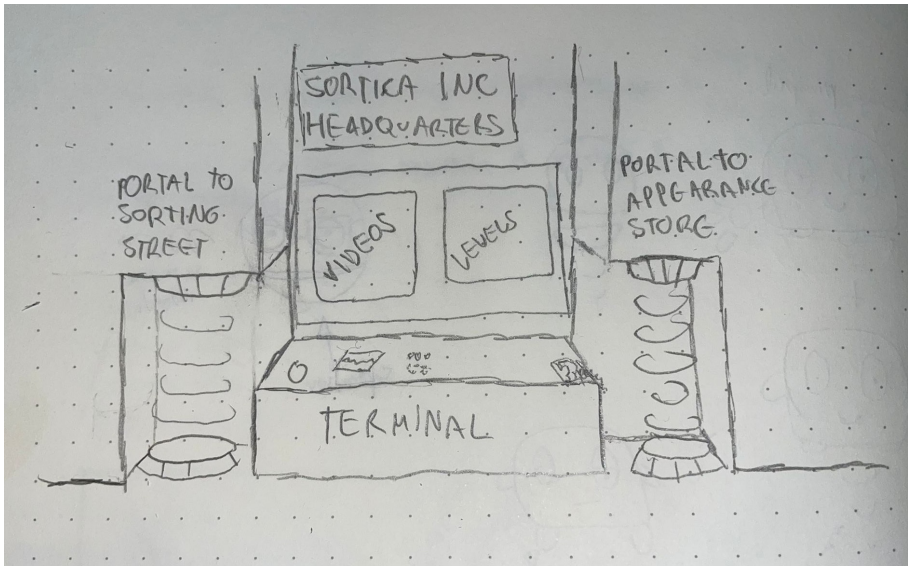


Figure 10: Sortica Headquarters

Connection to the plot

The headquarters of the restoration company.

8.3 Levels

Just as each one of their names say, briefly describe the levels of the game (If there's any). Add sketches of each level to the description.

The levels will follow the same structure, this facilitates design, reproducibility and escalation.

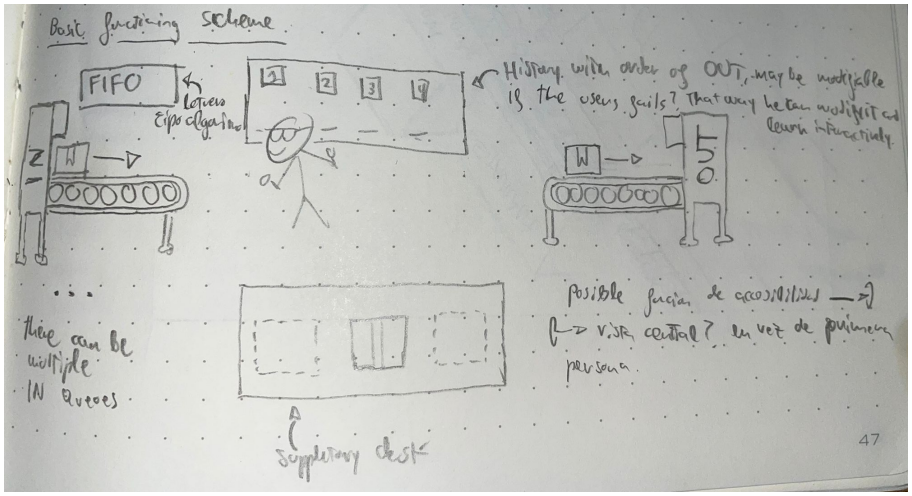


Figure 11: Basic Level Design

8.3.1 Tutorial level

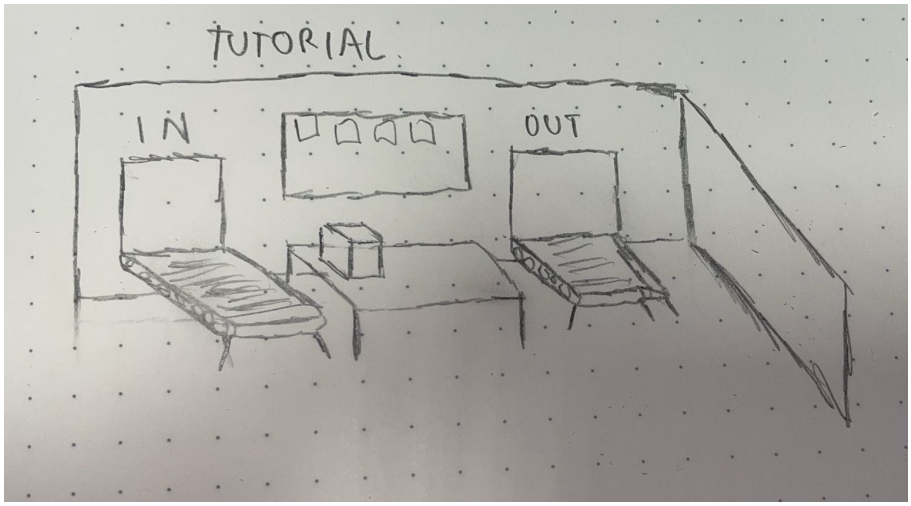


Figure 12: Level 0 - Tutorial

- Queuing Algorithm: FIFO
- Input queues: 1
- Output queues: 1

8.3.2 Main levels

Factory

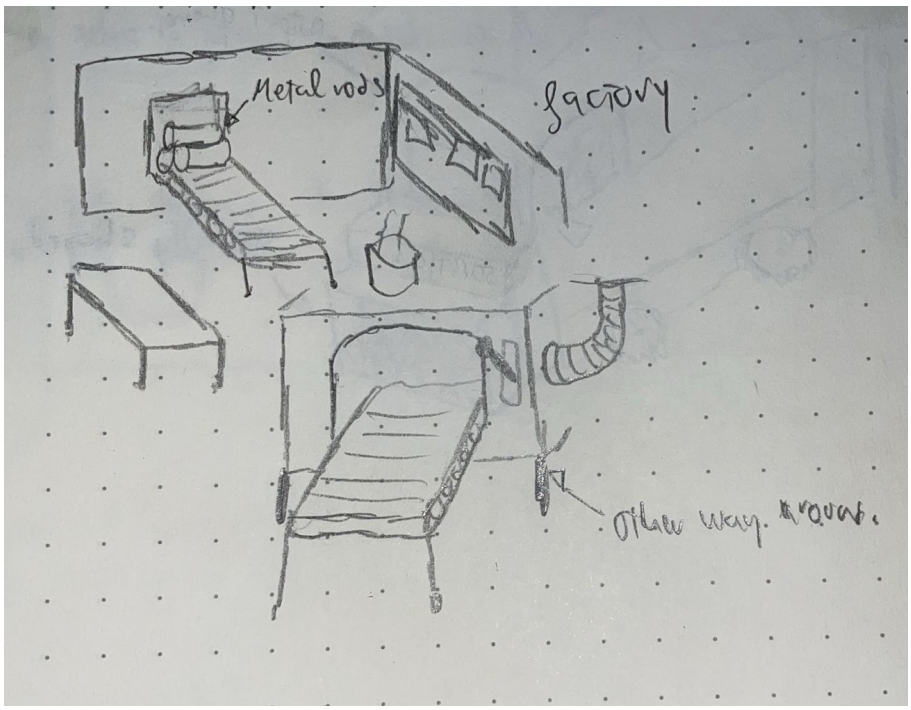


Figure 13: Level 1 - Factory

- Queuing Algorithm: LIFO (Explanation could be they want to retain newer customers with lower fabrication times)
- Input queues: 1
- Output queues: 1

Pastry shop

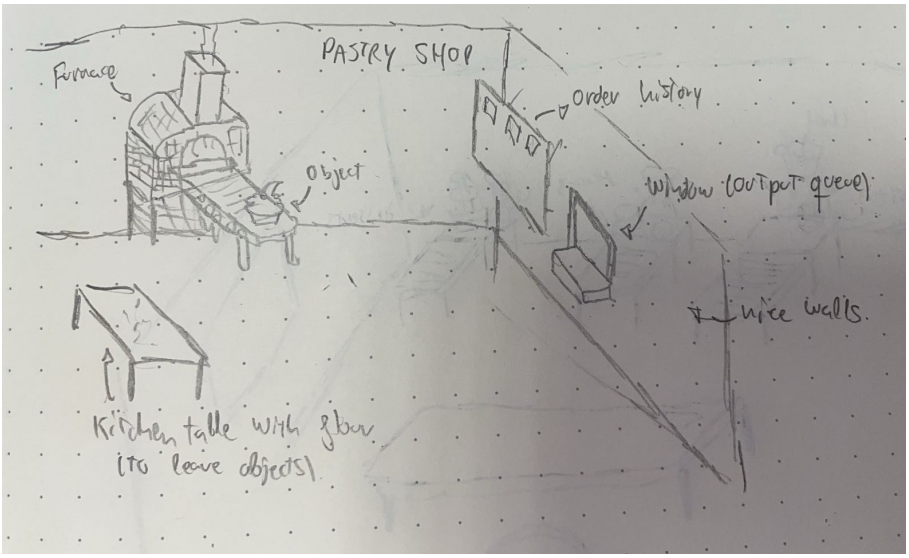


Figure 14: Level 2 - Pastry Shop

- Queuing Algorithm: FIFO
- Input queues: 1
- Output queues: 1

Delivery warehouse

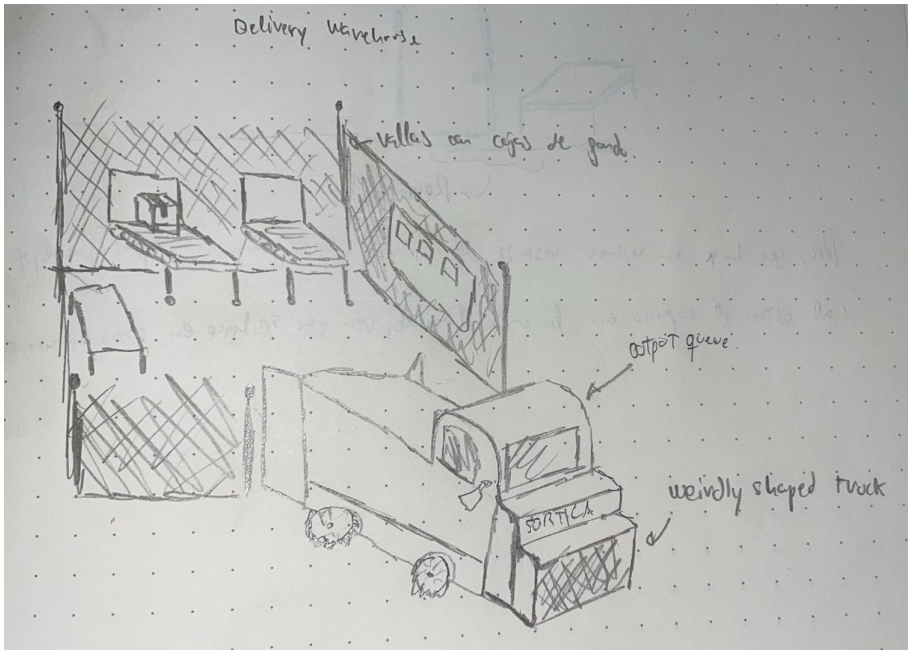


Figure 15: Level 3 - Warehouse

- Queuing Algorithm: FIFO with multiple queues with different priorities.
- Input queues: 2 (Premium user and normal user)
- Output queues: 1

Restaurant

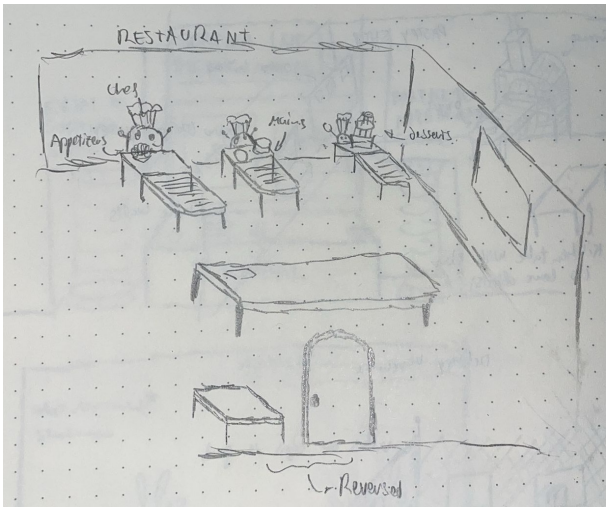


Figure 16: Level 4 - Restaurant

- Queuing Algorithm: FIFO, weighted (time) priority algorithm

- Input queues: 3 (Appetizers, main courses, desserts)
- Output queues: 1 (The harder difficulty can have 2 output queues, one for take-out, and one for dine in)