

Game Design Document

Overview

Game: City Destroyer!

Team: The Playwrights

Team members:

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Overview of Game:

Description: City Destroyer! is a turn-based strategy game in which two players (human vs human or human vs computer) take turns destroying either a row or a column of buildings on the game board. The objective of the game is to be the player that destroys the last standing building on the game board.

Genre: City Destroyer! is a sequential strategy game inspired by the Combinatorial Mathematical game Eatcake.

Background Story: As a human player in City Destroyer! you must face against several different computers of various artificial intelligence capabilities. They can have special abilities to make the game more difficult. Monsters and aliens are the main opponents that one will encounter.

Art Design: All art used in this game is going to be home made. We have a dedicated subteam of members working on creating and designing all characters and characteristics that will be used on the game.

Technical Platform: This game will be written in Python using the Pygame library. Due to this, we will be targeting Windows, Mac, and Linux computers since they can run python scripts directly.

Game Specification

Rules and Mechanics

City Destroyer is a strategy game between two opponents with the ultimate goal being to destroy the last building on the board. It is an adaptation of the combinatorial game Eatcake. The game takes place in a 2-dimensional board of size (MxN). The opponents will be on adjacent sides playing against each other.

a. Starting the Game:

- i. The player will start the game by selecting either single player mode or multiplayer mode
 1. Multiplayer mode allows two players to play the game at the same time against each other on the same computer.
 2. Multiplayer mode will also allow one to create a network game and play against another opponent over the Internet.
 3. Single player mode allows one player to play the game in level mode against boss levels to try and unlock more levels, achievements, and characters to play with.
- ii. The player will choose a character to play with.
 1. In multiplayer mode this will let both players pick their character.
 - a. They can both be the same character if they choose to be.
 - b. They can only choose from the set of characters the player has unlocked themselves.
 2. In single player mode the player will select their character at the beginning of each boss mode.
 - a. At the start of single player mode the player will only have the one main character to choose from
 - b. After defeating boss levels the player will gain more characters that they can select to play.
 - c. Players can change their character through the main menu portal if they want to change
 - i. If they don't want to change, the character will stay the same throughout gameplay
- iii. In multiplayer mode the players will also pick their board layout.
 1. They can choose from four different layouts
 - a. Easy
 - b. Medium
 - c. Hard

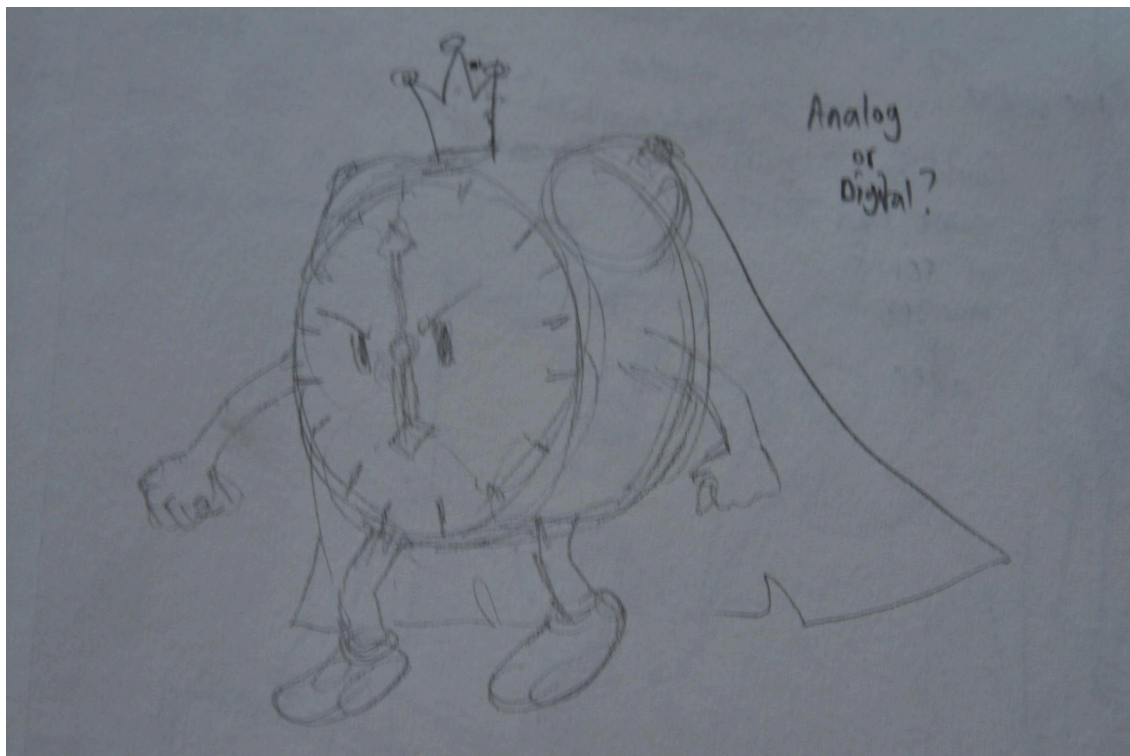
- d. Extreme
- iv. Before the game starts a player is assigned to be either the columns or the rows.
 - 1. This will change based on the level and boss they are playing against.
- v. The columns will be player 1 and the rows will be player 2.
 - 1. In multiplayer mode the players will be able to choose who is player 1 and who is player 2
 - 2. In single player mode the player will be automatically assigned his/her position
- b. Playing the Game:
 - i. Players will alternate turns until the game is over and there are no turns left.
 - ii. To play, a player will pick a row and column for their move to start
 - 1. Player 1 will move from up to down in the column
 - 2. Player 2 will move from left to right in the row
 - iii. Players do not have to have their move start at the beginning of the row/column
 - iv. Players can not forfeit their turn, they must make a move that eliminates at least one piece of the city each turn.
- c. Characters and Special Abilities:
 - i. The main player will start off with no special abilities
 - ii. Once other characters are won the player can play as those characters
 - iii. Different characters have different abilities
 - 1. Abilities can affect the way a player:
 - a. Moves
 - b. Strength of hits to the city pieces
 - c. Defensive abilities such as adding city pieces
 - iv. Characters can only use their special ability once every three moves
 - v. The different characters and their personal abilities will be described in the Characters section below.
- d. Board:
 - i. Layout:
 - 1. In single player mode the layouts will be different for each level
 - a. The board will vary throughout the levels, being an MxN sized board
 - b. The layout of the city pieces on the board will vary from level to level

2. In Multiplayer mode there will be four different layouts the players can choose from
 - a. For each of these board settings the layout will be randomly placed tiles with varying levels of difficulty of the board
 - i. Easy
 1. Only wood pieces
 2. Smaller board
 - ii. Medium
 1. Mostly metal pieces with a few wood pieces
 2. Larger board
 - iii. Hard
 1. Mostly metal with a few xxx pieces and a few wood pieces
 2. Larger board
 - iv. Extreme
 1. Mostly xxx pieces with a few metal pieces and a few wood pieces
 2. Larger board
 - ii. There will be three different types of city pieces, each with increasing difficulty to knock down
 1. glass: one hit
 2. wood: two hits
 3. metal: three hits
- e. Points:
 - i. Ways to earn points:
 1. Winning a game
 2. For each piece of city knocked down
 - ii. Points do not determine winning status of the game
 - iii. Points can be used to buy extra power ups
 - iv. Points will show up on a leaderboard screen so players can see where they rank amongst their friends.
- f. Ending the Game:
 - i. The goal of the game is to be the player to knock the last piece of the city down
 - ii. If the player achieves the goal then they win the game:
 1. In Single player mode the player will unlock the next level to play
 2. in multiplayer mode the game is over and the players can play again with different characters or layouts.

Below is what the rules for selecting the type and number of skills that the player can use for each specific game

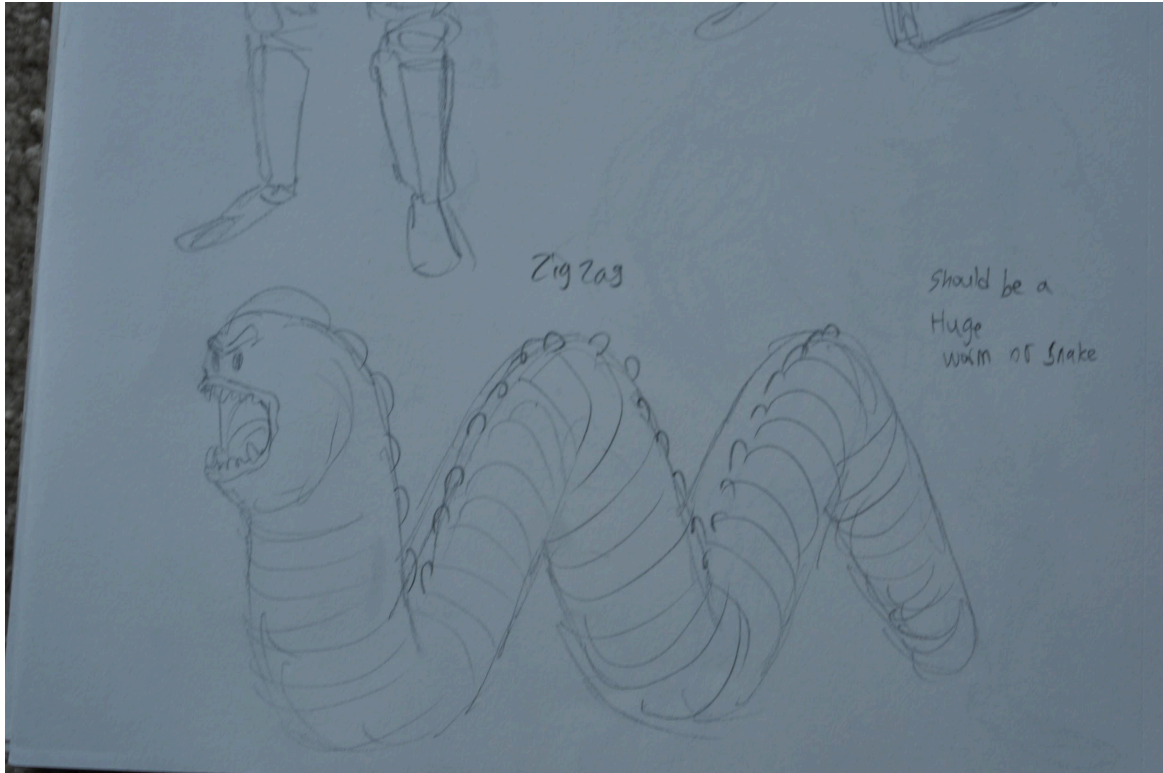


Artwork and User Interface



Time Master

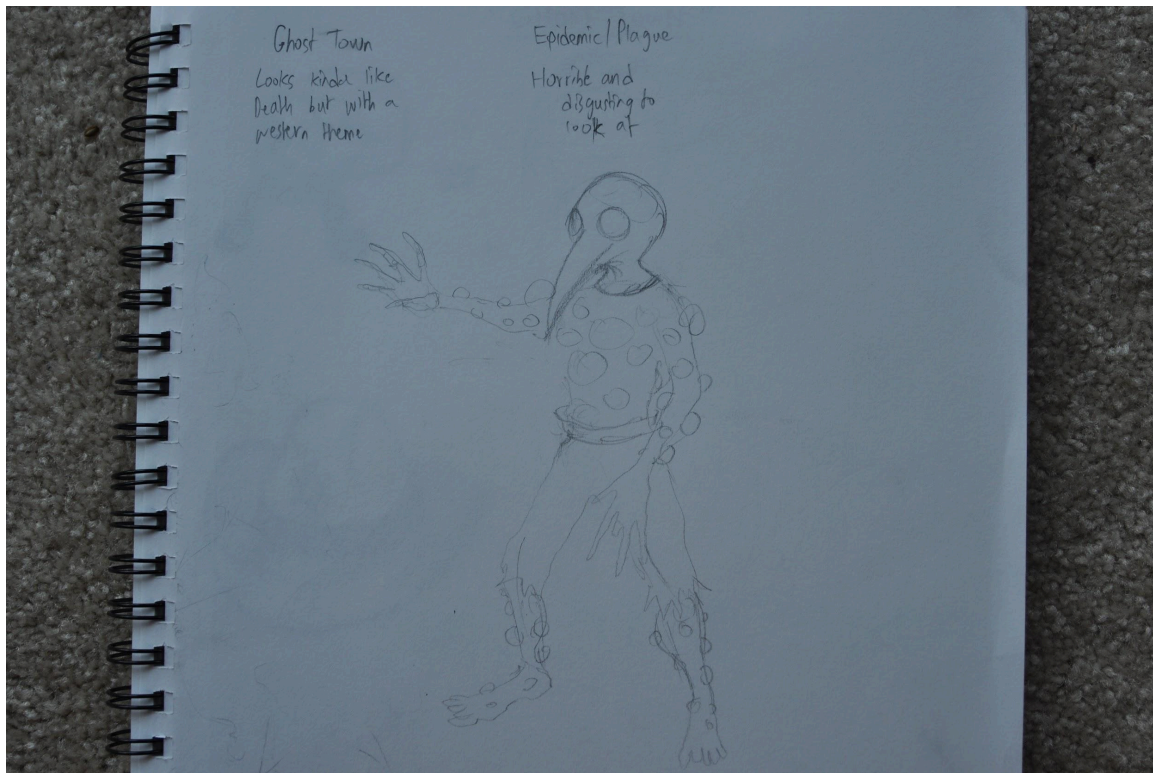
Some kind of living clock that is able to control time as it wants to. A very dangerous enemy that is able to gradually weaken and destroy blocks



Zig-Zag

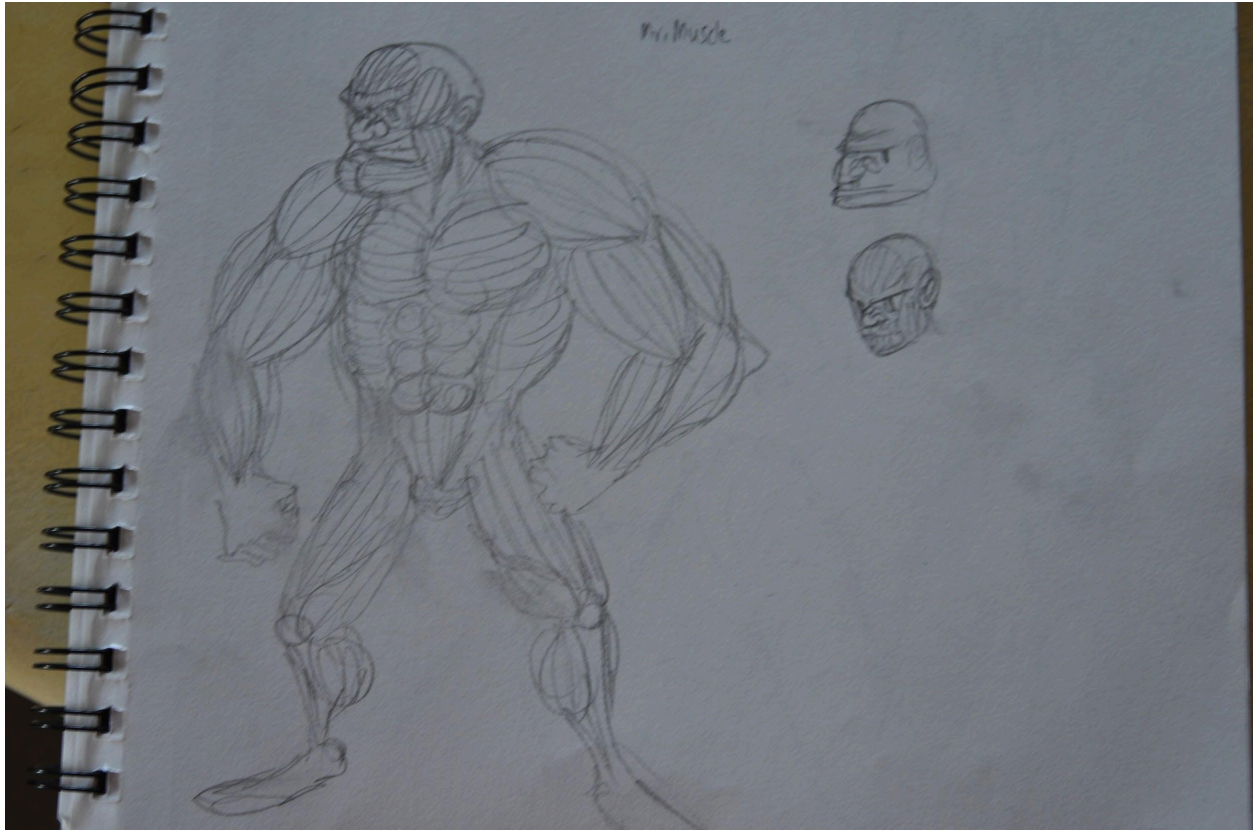
A monstrous worm that spends most of its life deep underground. Recently, it decided to cause a lot of havoc by coming to the surface. It was drawn by the lure of food and the chance to cause a lot of destruction. It is known for being able to

move in a zig-zag pattern that gives it its name.



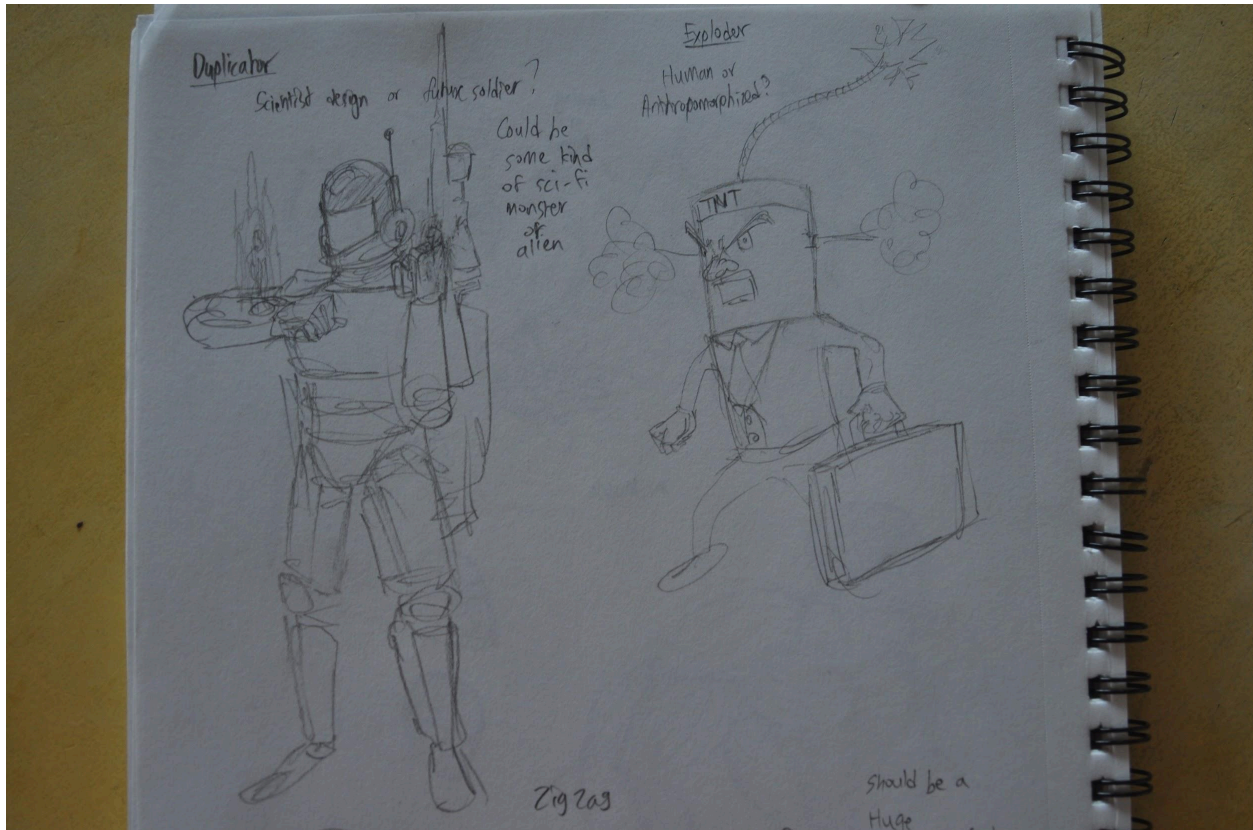
Plague

A vile creature that was likely engineered in a lab by some crazy mad scientist. It is made up of all sorts of disgusting diseases and mutations, and like time master, it is able to gradually wear away at blocks, destroying them over time.



Mr.Muscle

A freak accident turned a local bodybuilder into a hulking freak of nature with no skin and a horrible attitude. The lack of skin earned him his name of “Mr.Muscle”. Ever since his accident, Mr.Muscle has become a recluse who hates all people who have skins and is very eager to kill innocents and destroy their property.



Duplicator

An alien super soldier who was sent by its people to scout out new land to conquer. The duplicator is ruthless in its mission and is very good at making copies of itself that can fight alongside it, meaning that it doesn't need a team to fight with it.

Explosion

A mild mannered businessman who has gone through too much stuff in his life and finally reached breaking point. Somehow his head turned into a stick of dynamite, and whenever he gets too angry, explosions tend to happen around him.



Ghost Town

A malicious spirit who is the embodiment of the death of people and the cities they live in. It travels from place to place, leaving destruction and ruins in its wake.

Gameplay and Balance

1. Main game board
 - a. Presented as a M x n board
 - b. Player interacts with it primarily by left clicking. Right clicking gives more detail about that particular block, such as remaining health left and what type of building it is.
2. Turn based game
 - a. 2 player game so it alternates between computer (or network player) and main player.
 - b. During each turn, a player chooses a row or column to destroy
 - i. One player destroys by rows and the other one destroys by columns.
 - ii. It is not important which player has which orientation.

- iii. City buildings are destroyed sequentially until the monster hits an empty cell. Then destroying stops.
- 3. Winning the Game
 - a. To win the game, you must be the last player to make a move on the game board.
 - b. every move affects the end result and outcome of which player gets to make the last move.

Music and Sound

- 1. We will create as much of the soundtrack as we can.
 - a. Ominous theme that brings about curiosity and excitement.
- 2. Sound effects
 - a. Many sounds of destruction and decay when buildings are destroyed and are collapsing
 - b. Sounds from characters
 - i. Growls
 - ii. Grunts
 - iii. Chittering
 - iv. Scratching
 - v. Screaming
 - vi. Roaring

Background Story

The player is fighting against aliens, the bosses, to destroy cities. As the player beats the bosses and conquers the cities, he/she gains the special abilities that the boss had. Only one can rule the world. The aliens or you?

Characters

The player will play as the main character. As the game goes on the player will unlock more levels and beat more bosses. Once the player beats a boss level then the player

will have that boss' special power unlocked in the character list that the player can choose from. The player can pick a different player with a special ability to play as for each level. The different characters are "skins" to the main character. The other characters act as the main character except for when their special ability is activated. The special abilities can only be used once every three turns.

- a. The different character the main player can play as:
 - i. Main Character
 - 1. No special abilities
 - 2. Does one damage to city pieces
 - ii. Earthquake
 - 1. When activated adds an extra row/column of wood city pieces
 - 2. When not activated, moves as main character
 - 3. Does one damage to city pieces
 - iii. Thunder
 - 1. When activated does two damage to row/column selected and one damage to the rows/columns surrounding the move
 - 2. When not activated, moves as main character
 - 3. Does one damage to city pieces
 - iv. Lightning
 - 1. When activated moves in a diz/zag pattern in the row/column selected
 - 2. When not activated, moves as main character
 - 3. Does one damage to city pieces
 - v. Volcano
 - 1. When activated does two damage to the first piece of the move and one damage to the remaining pieces in the move
 - 2. When not activated, moves as main character
 - 3. Does one damage to city pieces
 - vi. Bomb
 - 1. When activated does not move in straight line
 - a. Does one damage to the 8 surrounding pieces of the first move
 - 2. When not activated moves as main character

For player character selection:

There will be a collection of characters with various specialities for the player to choose from. Some of the characters will be the NPC the player encounters in game.

Defeating a boss unlocks it and adds the boss into playable characters.

e.g. might looks like ...



Levels

In single player mode the player can play the different levels. Each level is against a boss that increases in difficulty. The player has to beat the boss at each level four times to beat the level. The boss increases the difficulty each round. Each boss has a special ability that they can use in the game. Once a player beats a level then they unlocked a special ability and the player can now use that ability in gameplay if they want to. As the levels go on they get harder and more difficult. The board will increase in number of pieces, size, and depth. Currently there will be 20 levels to the game.

1. Level 1 - 4
 - a. Play against computer main character
 - i. Computer levels 1 and 2

- ii. No special abilities
 - b. Unlocks lightning special ability
- 2. Level 5 - 8
 - a. Play against Explosion
 - i. Computer levels 1, 2, and 3
 - ii. Can move as a bomb and remove the surrounding pieces of selected move
 - b. Unlocks bomb special ability
- 3. Level 9 - 12
 - a. Play against Architect
 - i. Computer levels 2 and 3
 - ii. Can build new rows/columns
 - b. Unlocks Earthquake special ability
- 4. Level 13 - 16
 - a. Play against Time Warp
 - i. Computer levels 2, 3, and 4
 - ii. Can limit players move time to 5 seconds for 3 consecutive turns
 - b. Unlocks lightning special ability
- 5. Level 17 - 20
 - a. Play against Duplicator
 - i. Computer levels 3 and 4
 - ii. Can take two turns in a row
 - b. Unlocks thunder special ability

e.g.



Scripts

1. Level 1-4

Beginning

Computer main character: So you want to play against me? The best player ever in City Destroyer? I have four intelligence levels of increasing difficulty for you to play against and I doubt you'll be able to get through all four.

Player: Bring it on! I will crush you!

After defeating the computer

Computer main character: Looks like you are quite the worthy adversary. I wonder how you'll face up against the next monster. Even I don't dare approach him!

Player: Looks like I just unlocked the lightning ability. I wonder if I get a new ability every time I defeat an opponent?

2. Level 5-8

Explosion: Boom boom. What do you think you're doing here?

Player: Main computer tells me that you're the next one to defeat. I want to be the best City Destroyer ever!

Explosion: Good luck with that. I bet you've never heard of my special ability: I can explode blocks of buildings all at once and disregard the row/column rule! I can make your life a living nightmare.

Player: Oh yeah, well I have a new lightning ability that I can use. I'm not too sure how it works yet, but I'm sure it'll be a good utility in my arsenal of techniques and abilities.

3. Level 9-12

Architect: So you think you've got the hang of this game, eh? Wait till you see what I can do with my special ability! Just when you think you've got a good strategy going on, I can mess you up completely by constructing buildings where I please.

Player: I've got my own ability to show off too! I can explode clumps of whatever buildings I want. I bet we'll be matched up quite nicely. **smirk**

4. Level 13-16

Time Warp: How did you get this far? No one ever gets to this level! I will make every move your worst nightmare. Actually, you might not move at all!... Since my special ability is to limit all moves to 5 seconds for 3 consecutive turns.

Player: Bring it on!

5. Level 17-20

Duplicator: No way. An actual player to play against? No one has made it here in years. I hope I'm not too rusty... Oh wait, I'm not. There's a reason I'm the final boss and I will not be defeated easily.

Cut Scenes:

Beginning:

- The cut scene will show the bosses trying to take over the city and the main character coming to the rescue. Then the cut scene will pan out and show the player how to play the game in a mini short 4x4 board so the player will know what the goal is. This tutorial will be on a small board so that it does not take too long to go through.

Middle:

- The cut scenes in the middle will be after a player has unlocked a new special ability. The cut scene will be a brief pop up that shows the new ability and it's special movements.

End:

- At the end of the game if the player wins then we will have a cut scene that shows the main character locking all of the bosses in jail.

Artificial Intelligence:

Bosses:

- a. Each boss will have a special power as they play against the main player, known as special abilities.
 - i. Explosion
 1. Can place a bomb in the field and it will knock each of the surrounding pieces down
 - ii. Architect
 1. Will build a new row/column in the place selected
 - iii. Time Warp
 1. Limits the other player's move time to 5 seconds for the next 3 turns
 2. Player forfeits their move if they can not make one in time
 - iv. Duplicator
 1. Can take two turns in a row
- b. The special powers have a cool down period of 3 turns.
- c. Each boss will have 4 different playing AIs
 - i. The player must beat all four AIs in order to beat the boss and gain their special ability

Technical Specs:

Programming Languages	The primary programming language we are using to implement this game is Python. *Team has decided to switch from Javascript to python because we have more solid mastery of it, thus we can focus on ensuring the quality of the game.
Libraries	PyGame
Target Platform	The game is web-based so it is supposed to run on any platform that supports Python.
Data Structures	2D Array for our game board
Algorithms	A*, Shortest path, Cost-functions, ADDITIONAL: ML techniques
Version Control	The project will be saved on bitbucket as we implement it.
Back Up Plan	Bitbutcket and our own personal backups will be made on local computers. We may possibly even integrate Dropbox and use their revision history as well.

Schedule and Personnel:

Individual Weekly Schedule (these are for personal planning)					
Week	Allison	Helio	Jonathan	Vishal	Xueyi
6	Set up the basic layout for the board, grid, buttons, etc.	Set up back-end data structures for board and characters	Read about socket.io and node.js	Research sprite making and photoshop techniques for making textures	Implement the system framework - set up classes & customize data structures
7	Scan and add the	Start AI implementat	Implement basic packet	Finish tiles/textures	Implement the basic

	characters to the board	ion for low level bosses, simple search algorithms to be implemented	and message sending in our code	for block bases, as well as variants, windows, roofs, and doors	operations, including key mapping, make sure the first level is playable(even without cut scenes etc)
8	Refine board layout and add details to the visuals	Integrate AI with character implementations giving AI a face, help design communication in multiplayer mode	design communication in multiplayer mode	design characters and have base sprites for most characters	Implement the other levels using the first level as a template
9	Refine visuals. Add extras if time permits	Continue implementation of integrating AI with characters, help refine multiplayer gameplay over the network	refine multiplayer gameplay over the network	make animation frames for each characters as well as effects of damage on blocks	Make sure each level is playable by end of this week. Debug and make sure levels transit successfully.
10	Work on cut scenes and animation.	Refine character AI work, tune-up any faulty AI algorithms, clean up character art	if time permits, allow network opponents to send chat messages to each other	finish up any remaining tasks, see if there is anything else to work on	Add more extensive features given time available.

Weekly Sprints - Pre-Week-6 - Current! (sprints are task oriented) (move the task to their corresponding section according to the status)			
To Do (the task list, be specific. Include the members assigned to the task)	In Progress (work that we started)	QA (Quality Assurance, work that is basically done but waiting for others to improve)	Done (ready for submit!)
Complete the architectural design of the game, including the architectural pattern, the exact data structure and classes to use.	Complete personal weekly schedule - (All) Plan weekly sprints - (All)	Refine game mechanics and design Make a list of desired AIs	Complete the codecademy javascript class - (All) Complete the design document draft - (All) *Complete the background story - background story mode is put off for now, we will focus on implementing the levels and add stories if time permits when the game is working.

Weekly Sprints - Week 6			
To Do	In Progress	QA	Done
Try to implement a framework of the game	Create the characters based on the sketches(Vishal)		Set up bitbucket, git, and version control

Set up the classes and their dependencies Make a list of programming tasks and let people sign up	Play with Pygame(ALL) Get familiar with Helio's code(ALL)		Everyone installed pygame and python 3.x Scheduled group meeting times for this week.
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Weekly Sprints - Week 7			
To Do	In Progress	QA	Done
Implement more on the game framework Implement the template for Als			

Weekly Sprints - Week 8			
To Do	In Progress	QA	Done

Weekly Sprints - Week 9			
To Do	In Progress	QA	Done

Weekly Sprints - Week 10			
To Do	In Progress	QA	Done