Assumptions

Milestone 1 + 2

Precondition:
- loadGame should not be called before saveGame

Position:
- Definition of adjacent: 8 cells that surround the entity in the center
  1 2 3
  4 p 5
  7 8 9

- Definition of cardinally adjacent: 4 cells (basically north, east, south, west) that surround the entity in the center
    1
  2 p 3
    4

- Assumption of our layer system:
    - Assume **Static entities** will always be in layer: 0
    - Assume **Boulder** will always be in layer: 1
    - Assume **Collectible entities** are in layer: 2
    - Assume **Moving entities** (mercenary, zombie toast, spider) will always be in layer: 3
        - Only one moving entity per layer
    - Assume **Player** will always be the highest layer: 4

- Position layout:
    - For each cell, the y-axis is inverted while the x-axis stays as normal
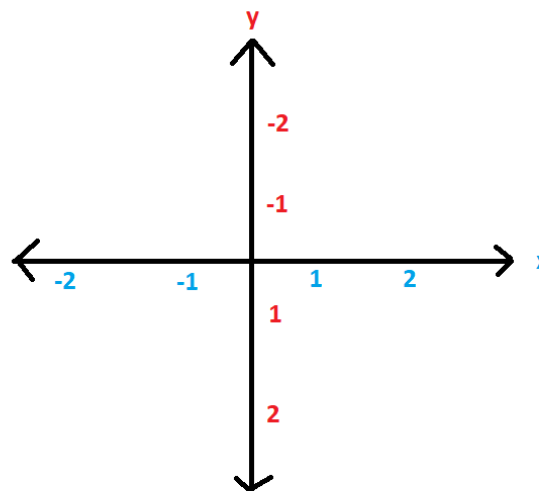
Game Design:

- Movements can be wasted
    - E.g. player can walk into a wall (which does not change the position of the player) but a tick will still be performed
- Only one item can be used per tick
- Every entity that is considered as equipment (sword, shield, bow, arrow) will automatically be applied to the player as soon as it is picked up/given
- For any occurrence of building a buildable entity, all the entities that are used to build it will be removed from the inventory/game
- There are no set "boundaries" of a map, wall entities will act as boundaries in the outer faces of the map
- In **Peaceful** game mode, zombie toast spawners will still spawn zombie toasts at the specified number of ticks, but the spawned zombie toasts will not attack the player
    - The player can however choose to attack the zombie toasts
- If the dungeon map doesn't give a goal, an **exit** goal will be given

Static Entity:

- Zombie Toast Spawner
    - Will spawn zombies at a random adjacent cell
    - If player has a damage over 1, it can destroy the spawner (having damage over 1 indicates there's a weapon equipped)
    - A player interacting with a spawner to destroy: it will not use up the durability of the weapon
- Portal
    - If there are static entities that surround the adjacent cell of a corresponding portal, the player will **not be teleported** and a tick will be performed.
    - All portal entities in a JSON map should have a colour field to determine the pairs of portals
    - If there is a portal entity in a JSON map with **no** colour field, the portal **will not** be loaded into the dungeon
- Door_open (a door that has been unlocked with a key)
    - Does not require an attribute for the key id anymore
    - Key id refers to a specific id of a key that corresponds to a door
- Swamp Tile
    - When an entity walks in the tile, that counts as 1 tick already
    - If the entity spawns onto the tile, that counts as 1 tick already

Moving Entity:

- Mercenary
    - Mercenaries will not be able to teleport via portals
    - Mercenaries will use Dijkstra's algorithm to find the shortest path to reach the player
    - Bribed mercenaries (ally state) will help players with battling other moving entities **regardless of how far** they are from the player
    - If the player is invincible, the mercenary will stay still according to the spec. *- "They constantly move towards the character, stopping if they cannot move any closer."*
    - If the mercenary entity has armour, the armour effect (reduce incoming damage by 50%) will not be applied to the mercenary
    - Spawns every 25 ticks if there are any enemies on the map
- Zombie Toast
    - If the zombie toast entity has armour, the armour effect (reduce incoming damage by 50%) will not be applied to the zombie toast entity
    - Zombie toast cannot move the boulder

Collectable & Buildable Entity:

- For all collectable and buildable entities, having more than one of the same entity will not have a "stacking effect"
    - E.g. if the player picks up two swords, the player's damage will still be doubled not quadrupled
    - Thus, more than one of the same buildable entity can be built, but the effects will not stack
- Armour and the One Ring will have a drop chance of:
    - Armour: 100% if the enemy entity has an armour
    - The One Ring: 10% for every enemy entity
- Bomb
    - If placed, placed at the same cell as Player
    - Bomb explosion radius is **adjacent cells** only
    - The bomb is able to destroy **all** entities **excluding**:
        - Player
        - Exit
        - Portal
        - Zombie Toast Spawner
        - Door
- Building of Shield
    - In the case that the player has 2 woods **and** a key **and** a treasure, usage of treasure will be a priority
- Building of Sceptre
    - Two arrows are higher usage priority than one wood as wood is used in more recipes

- Treasure is a higher usage priority than key
- Potion
    - Consumption of potion
        - Only one type of potion can be consumed until the potion's duration runs out
    - Duration of potion
        - Invisibility & Invincibility potions will have a duration of 10 ticks
        - Health Potion is instant
    - Usage of potion
        - Health Potion will not be consumed if the player's health is full

- The table below shows whether the collectable entities are spawned via loadGame or not
- The player can build multiple bows and shields BUT effects will not stack

Collectibles	Is spawned
Treasure	Yes
Key	Yes
Health potion	Yes
Invincibility Potion	Yes
Invisibility Potion	Yes
Wood	Yes
Arrow	Yes
Bomb	Yes
Sword	Yes
Armour	No
The One Ring	No
Shield	No

- The table below has the type of collectable/buildable entity and their effects on the player, as well as their durability

Entity	Effect	Durability
Sword	Doubles the player's damage	6
Bow	Player attacks once more	3
Shield	Assumption: Halves incoming damage?	5
Armour	Halves the incoming damage	8

Battle:

- The table below has the basic attributes for all entities that encounter a battle

Entity	Health	Damage	No. tick till dead
Player	10	1	N/A
Spider	1	10	1
ZombieToast	5	5	5
Mercenary	10	1	7

- The player can only battle one entity at a time
    - E.g. if a player is in battle with a zombie toast and a mercenary entity moves towards the player, the mercenary cannot enter the same cell as the occurring battle, it will wait in a cardinally adjacent cell
- If the player is invincible, the durability of the equipment does not degrade

Milestone 3

Collectable & Buildable Entity:

- Sun Stone
  - When a player interacts with a mercenary/assassin to bribe - if the player currently holds both treasure and a sunstone, the use of sunstone will be prioritised as it will not get used up during the bribing process

- Sceptre
  - If the player has 2 sunstones, the player does not need a key or treasure to build a sceptre

- Midnight Armour
  - If the player attempts to build midnight armour when a zombie toast is in the dungeon, it will throw InvalidActionException

- M3 Buildables + Anduril
  - Do not have durability
  - Anduril has a 10% drop rate after any victory battle

Moving Entity + Battle:

- Assassin
  - Bribe range is same as mercenary, max 2 cells away
  - ⅛ chance an assassin will spawn instead of a mercenary
- Hydra
  - Spawns randomly
- The table below has the basic attributes for all entities that encounter a battle

Entity	Health	Damage	No. tick till dead (Base state)
Player	10	1	N/A
Assassin	30	5	One-shots player
Hydra	30	5	One-shots player