Survive from Scratch

# Summary

Survive from Scratch is a 3D open-world RPG including NPCs, Monsters, skills, crafting, building, and a demon lord.

The primary focus of the game is fighting, but building and talking to NPCs should be enjoyable.

Plans to make the game multiplayer have been delayed because multiplayer would take a long time to implement and would not be very helpful if there are less than 100 global players.

Characters shall have a smart AI and can help you fight as NPC friends or fight you as NPC enemies.

This game shall have boss fights and challenges to give progression.

The main goal of the game is to beat the demon lord, which requires collecting keys from beating the four towers to unlock.

# Definitions

Character: A player, NPC, enemy, or other virtual thing representing a life form

NPC: Non-player character, usually refers to a non-enemy

Enemy: an NPC that tends to attack the player

Ally: a character who is in the same party or otherwise considered a friend in battle

Level: a smallish (compared to the normal world) place that the player fights enemies to advance in a tower. Depending on context, level could also mean the experience level of a character.

Tower: a collection of levels progressively getting harder

# World

This section describes the world, geography, and setting of the game.

## Setting

The game takes place in a fantasy world with approximately medieval technology but also magic.

## Main World

The main world is the primary, “normal” place that the player can wander around in.

It should be possible to walk from any place in the main world to any other place (within reason).

### Places

The main world has many places such as villages, plains, and forests.

## Towers

Towers are like dungeons with multiple levels. Towers have more enemies and loot than the main world.

### Levels

Towers have levels. Levels are like mini worlds.

When entering a tower for the first time, level 1 of that tower is unlocked. To unlock the next level, the player must beat certain enemies in the current level. After unlocking a level, it can be teleported to (e.g., after unlocking level 10 of a tower, you do not need to beat levels 1-9 again each time you want to travel to level 10).

## Teleportation

The player can teleport between teleport locations. Teleport locations exist all over the main world, but also exist in other places, such as towers. Teleport locations in the main world generally are unlocked by default and accessible via the map menu, but teleport locations in towers are activated through the tower menu and are only unlocked when that tower’s level is unlocked.

# Items

This section describes the items in the game.

Items are things that can be obtained by the player or NPCs. For example, a stick or axe can be picked up by the player and is an item, but a tree or house cannot and is not an item.

## Inventory

The *user* has a main inventory and a crafting inventory. The *player character* has a hotbar inventory. Some NPCs might have inventories as well. Items can be stored in an inventory. The main inventory is large enough for many items; the hotbar inventory allows quick equipping of items on the player. The crafting inventory temporarily holds input items for crafting and returns all items to the main inventory when the crafting menu is closed.

## Crafting

The player can craft items using the crafting menu.

Recipes dictate what input items can produce what resulting items.

# Combat

This section describes the combat and skills of the game.

## Skills

### Usable Skills

Usable Skills are skills that can be cast or used. For example, swinging a sword and casting a spell are both Usable Skills. Increasing the character’s hp by 10% is an Ability Skill, not a Usable Skill.

### Ability Skills

Ability Skills increase the user’s stats, such as hp or attack. Ability Skills can increase the player’s attack using only specific damage types, e.g. the strength skill only increases attack/damage when using a physical attack.

## Stats

Everything that can be killed has stats.

### HP

“Hit Points” or “Health Points” are a measure of how much damage a character can take before dying. Taking damage uses up HP. If HP <= 0, the character dies.

### MP

“Mana Points” or “Magic Points” are a measure of how much magic or spiritual power/energy a character has. Casting spells typically uses up MP.

### ATK

“Attack” is a measure of how much damage a character deals.

## Modifiers

Modifiers affect the stats of a character.

### Use

Modifiers can be applied by equipment or ability skills to a character.

### Typed Modifiers

Most modifiers, such as modifiers to hp, are “untyped modifiers”. However, modifiers to atk and armor depend on the type of damage being dealt/received. For example, a skill might increase only physical damage dealt, having no effect on magic damage dealt.

### Formula

A single modifier is applied to only one of hp, mp, atk, etc. It cannot be applied to both hp and mp etc, instead, 2 modifiers would be used.

#### Preadd

This value is added to the number before other calculations

#### Premult

The number after preadd is multiplied by (1 + value)

#### Postadd

This value is added to the number after premult

#### Postmult

The number after postadd, after everything, is multiplied by (1 + value)

## Weapons

Some items can deal damage when the player uses a physical attack skill. These items are considered weapons. Sticks and logs are considered weapons because they can deal damage, even though they are not conventional weapons.

## Armor

Armor is used to block incoming damage. The modifiers of all armor pieces equipped are all applied at once (i.e. all preadds applied, then all premults applied, etc), starting with an armor value of 0. Armor modifiers are typed modifiers, so the effective armor depends on the type of damage being received.

# Characters

This section describes the functioning of characters in the game.

# UI

This section describes the User Interface (the menus, icons, etc.) of the game.

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# Features

## Fighting

Characters can fight each other using skills

Unlike many fighting games, the attacks are not turn based, but more physics based. If a character attacks with a sword, the character that they are attacking might run back to dodge. Using a skill does not always guarantee hitting an enemy, even if the enemy was within range when the skill started.

### Armor

armorValue depends on the type of attack, etc. Currently it is equal to the armor of the same type of the attack. E.g. if an armor that has 5 slash def and 20 blunt def is attacked by a 20 dmg slash attack, an armor value of 5 is used.

RESIST\_EXPONENT\_BASE = 2;

dmgMult = 1 – (RESIST\_EXPONENT\_BASE) ^ (-damage / armorValue);

damage taken = damage \* dmgMult;

using this formula, dmgMult is the same for 10 armor vs 15 attack and 20 armor vs 30 attack.

This formula allows very small dmg attacks to still do something and keeps armor somewhat effective vs high attacks.

## Environments

There should be many environments with different aesthetics and rules.

### Urban

Cities and towns. These places should have buildings and relatively high safety.

## Adventuring

Players can explore new environments.

## Party

NPCs can be part of a party. Nested parties are a possibility (a party can join another party without merging and losing hierarchy)

NPCs in a party might heal party members more than a random NPC. NPCs in a party won’t attack party members.

Party member stats can be seen. An NPC might choose to heal a party member with lower hp first. An NPC might choose to buff the attack of the party member with the highest attack for a greater effect.

## Crafting

Characters can craft items.

### Mechanics

#### Time

crafting takes time, depending on the skill of the character

#### Materials

Crafting an item usually takes materials

## Building

Characters can place placeable items.

Unlike many fighting/adventuring games, the player should be able to build detailed buildings. Rather than placing a whole building down, the player could place individual planks or wall pieces, etc. in a configuration to make a house.

## NPCs

### Aggro

Algorithm to check if aggression “aggro” should be towards a certain character.

Characters are hostile towards other characters with certain traits, friendly to certain traits, and neutral to everything else. If a character is hostile towards another character, it will attack. If it is neutral, it will only attack if attacked by that character. If it is friendly, it will never attack that character, but will attack any character whom it “sees” attack that character as well as support and heal that character.

### Enemies

Enemies are NPCs that are configured to tend towards hostility and attacking.

## Never ending

The game will not have a definitive “win” and thus will continue forever. Just like Minecraft, there could be great boss fights, but the game continues.

## Stats

Stats effect the performance of characters. Some skills or crafting could be limited to only characters with certain stats.

### Health

Die if reaches 0.

### Mana, etc.

Used for skills etc.

### Attack

Used to calculate the damage dealt.

### Armor

Used to reduce dmg taken.

### Intelligence

#### Fighting decisions

NPCs with higher intelligence should fight better. E.g. an NPC with 0 intelligence would randomly move and use skills (without even targeting an enemy). Very low intelligence might make an NPC randomly target enemies and use skills. Low intelligence would consider strength differences. Higher intelligence should consider enemy strength, hp, etc.

#### Best Fighting decisions

These are the fighting decisions that a character with infinite intelligence should make.

* Finish off weaker enemies
* Attack enemies who are currently attacking or about to attack an ally
* Keep distance from enemies if a ranged attack can be used instead
* Budget mana etc. in case the battle will last
* Buff allies who will receive the most benefit
* Use skills effectively (e.g. AOE skills should hit many enemies)

#### Worst Fighting Decisions

These are mistakes that low intelligence characters should make

* Attacking enemies that are too strong
* Not keeping distance
* Attacking when enemies are out of the attack range
* Using skills randomly, perhaps even healing an enemy
* Not helping when an ally is in trouble