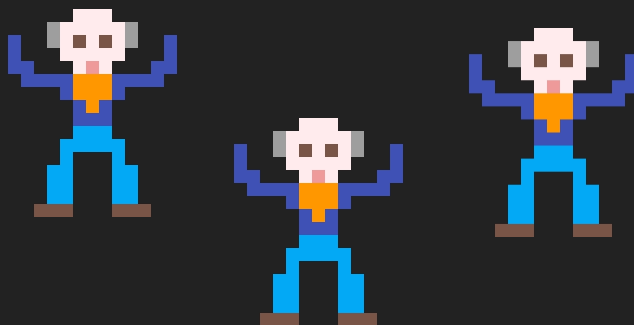# Be **Ready** to Present Your Progress!

Let's Discuss!

Random Generation
vs.
Procedural Generation

Let's Discuss!

Those of you who made "endless" runner prototypes:

Where there random or procedural or mixed?
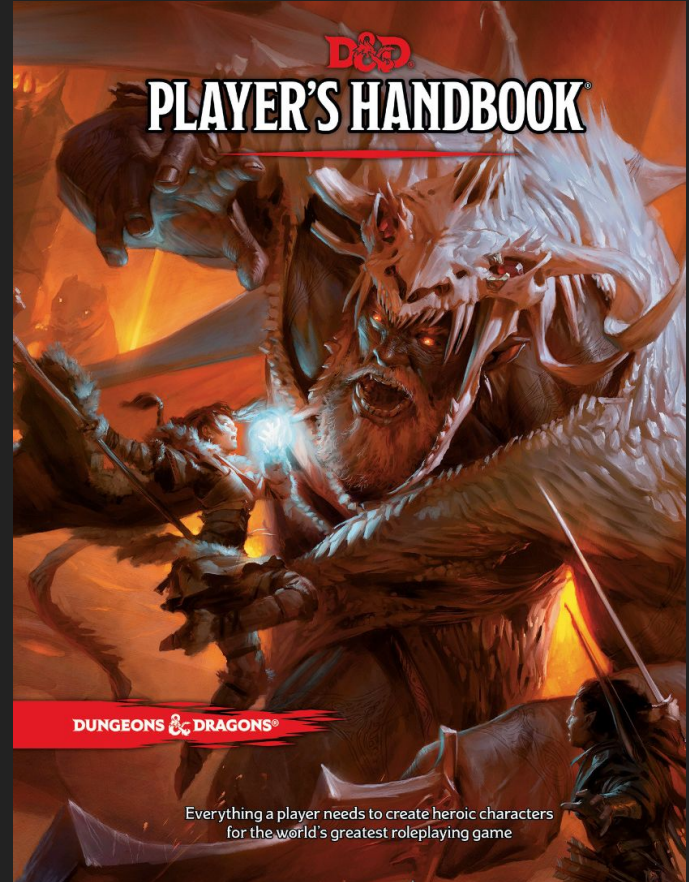
Random Generation

Dungeons and Dragons

(random encounters)

Dungeons and Dragons

Paper based game

Everything is in your head

Dice… lots and lots of dice!

Illrigger Table III: Followers

Dice roll	Type of follower
01-08	1-10 thieves of 1st level
09-14	1-8 thieves of 1st-2nd level
15-19	1-6 thieves of 1st-4th level
20-23	1-4 thieves of 2nd-5th level
24-26	1-2 thieves of 3rd-6th level
27-28	1 thief of 4th-7th level
29-31	1-4 assassins of 1st-2nd level
32	1 assassin of 3rd-6th level
33-35	1-6 magic-users of 1st level
36-37	1-4 magic-users of 1st-2nd level
38	1-2 magic-users of 2nd-5th level
39-40	1-2 illusionists of 1st-2nd level
41	1 illusionist of 2nd-4th level
42-46	1-6 clerics of 1st-4th level
47-49	1-3 clerics of 2nd-5th level
50-51	1-2 clerics of 4th-7th level
52	1 cleric of 5th-8th level
53	1-2 cloistered clerics[1] of 1st-4th level
54-61	4-40 0-level men-at-arms of 1-6 hp each
62-67	1-10 fighters of 1st level
68-72	1-8 fighters of 1st-4th level
73-76	1-6 fighters of 2nd-5th level
77-79	1-4 fighters of 3rd-6th level
80-81	1-2 fighters of 4th-7th level
82	1 cavalier of 1st-6th level
83-84	1 hellcat or hell hound
85	6-24 mites
86	1 penanggalan
87	20-200 duergar plus females and young
88	20-200 orcs plus females and young
89	30-300 goblins plus females and young
90	10-100 hobgoblins plus females and young
91	1 blue dragon
92	1 ghost
93	1 spectre
94	1 wight
95	1 wraith
96	2 manticore
97	1-8 fire giants plus females and young
98	1-4 NPCs of any lawful evil class or subclass
99	special (see subtable on next page)

d100	Encounter
18–20	1d3 winged kobolds with 1d6 kobolds
21–25	The partially eaten carcass of a mammoth, from which 1d4 weeks of rations can be harvested
26–29	2d8 hunters (tribal warriors)
30–35	1 half-ogre
36–40	Single-file tracks in the snow that stop abruptly
41–45	1d3 ice mephits
46–50	1 brown bear
51–53	1d6 + 1 orcs
54–55	1 polar bear
56–57	1d6 scouts
58–60	1 saber-toothed tiger
61–65	A frozen pond with a jagged hole in the ice that appears recently made
66–68	1 berserker
69–70	1 ogre
71–72	1 griffon
73–75	1 druid
76–80	3d4 refugees (commoners) fleeing from orcs
81	1d3 veterans
82	1d4 orogs
83	2 brown bears
84	1 orc Eye of Gruumsh with 2d8 orcs
85	1d3 winter wolves
86–87	1d4 yetis
88	1 half-ogre
89	1d3 manticores
90	1 bandit captain with 2d6 bandits
91	1 revenant
92–93	1 troll
94–95	1 werebear
96–97	1 young remorhaz
98	1 mammoth
99	1 young white dragon
00	1 frost giant

Really Bad Chess

really
bad
chess

chess with totally random pieces
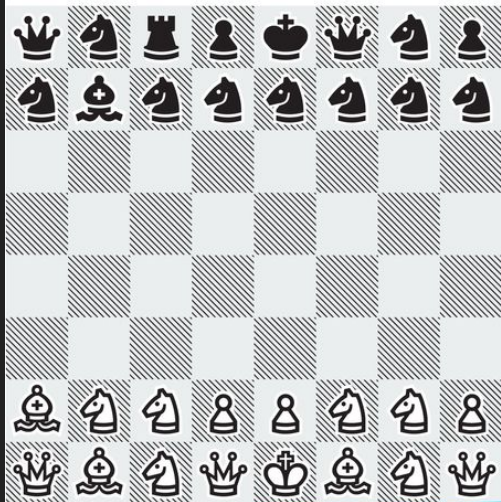
For everyone who quit playing chess
(and everyone who loves playing chess)

ranked

rank: 65

But this board...
looks a little tougher.

Cross Platform Random Number Generator

Quintet

Example Json:

```
"title": "Asteroid Field",
"locationType": "neutral",
"respawn": true,
"universeSeed": 2021
```

Just need to send 1 number to other players to generate entire scenes!

Procedural Generation

Random Seed (multiplatform)

```
// How to use CustomRandom.cs (in class resources folder)

customRandom = new CustomRandom(seed);


whatever = RandomRange(1, 10);


int RandomRange(int min, int max)
{
    var r = customRandom.NextDouble();
    var range = (max - min); // exlusive
    var rand = (int)((double)range * r);
    return rand + min;
}
```

No Man's Sky

"18 quintillion planets"

(sounds like 2^64 to me)

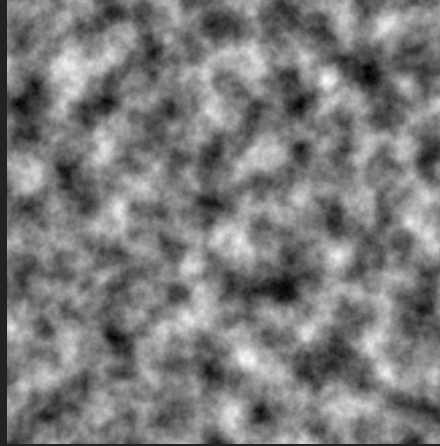Trivia: This datatype in C is called a "unsigned long long"
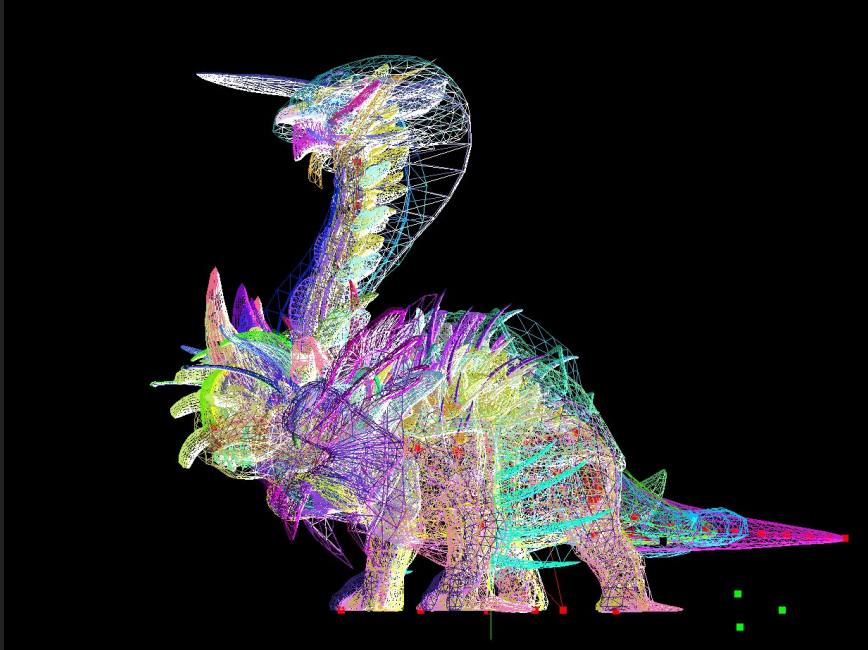
Minecraft

(perlin noise)
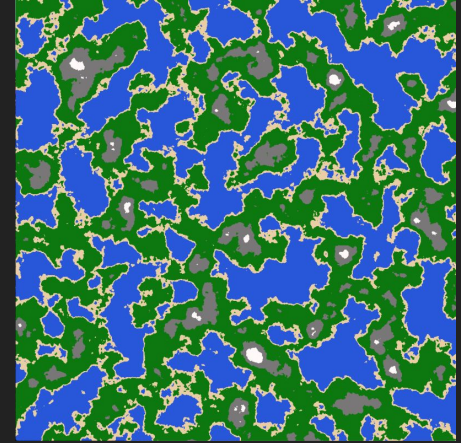
"Perlin noise is a type of gradient noise developed by Ken Perlin in 1983 as a result of his frustration with the "machine-like" look of computer graphics at the time."
- https://en.wikipedia.org/wiki/Perlin_noise

https://www.youtube.com/watch?v=IKB1hWWedMk

https://www.youtube.com/watch?v=bG0uEXV6aHQ

https://catlikecoding.com/unity/tutorials/noise-derivatives/

Diablo 3

(other Diablo games did this too)

Diablo 3

Diablo 3

Diablo 3

Spelunky

Spelunky

Spelunky

New Levels Every Time
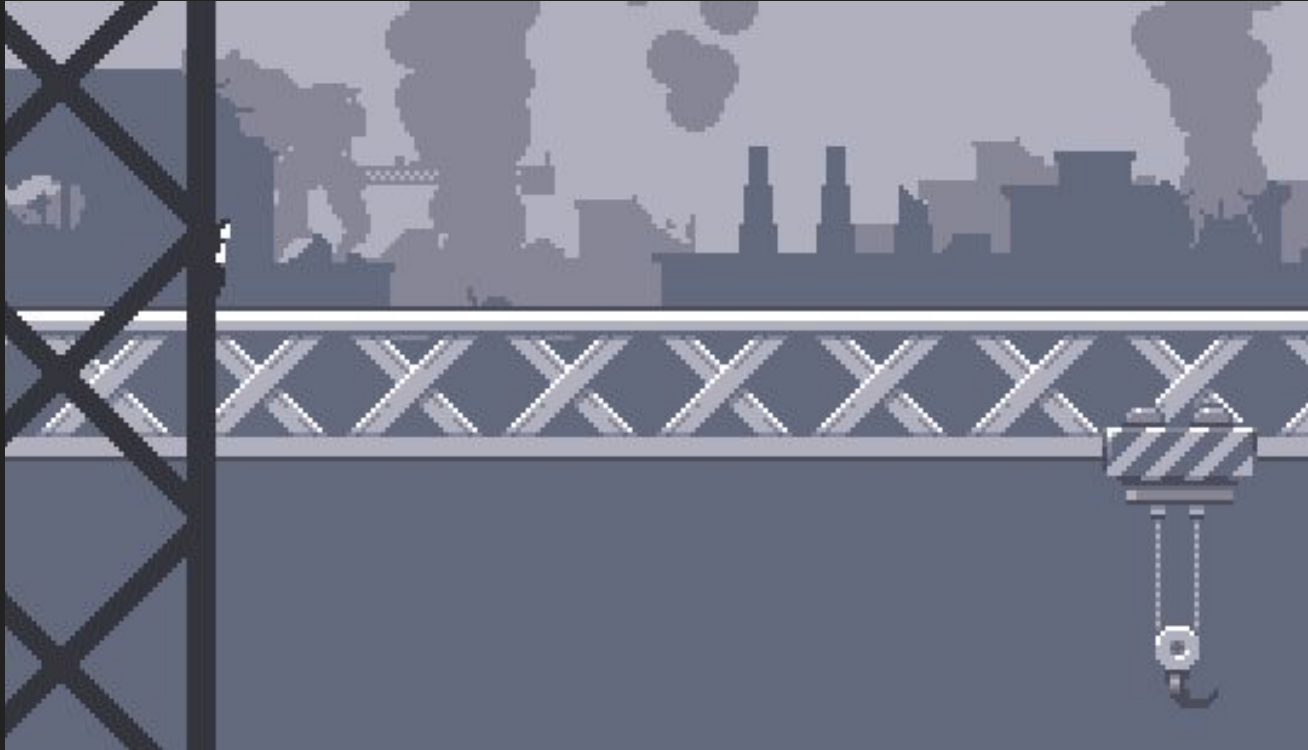
Based on "Rooms"

Lots of Replayability

Level Generation in Spelunky

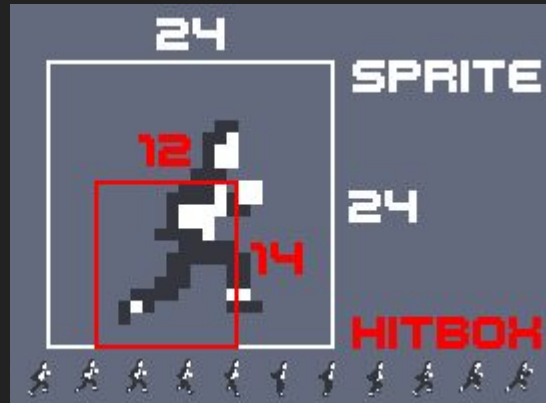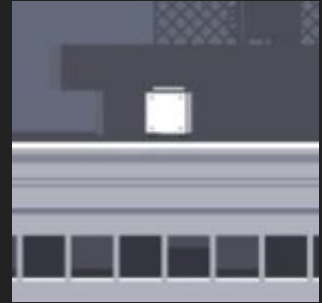http://tinysubversions.com/spelunkyGen/

Canabalt

(endless runner)

Canabalt

Canabalt

Character at **far left** to give player time to react.

Calculations are done to make sure all jumps are possible!

Obstacles on rooftops.

Keep Going!

Continue working on your group project!