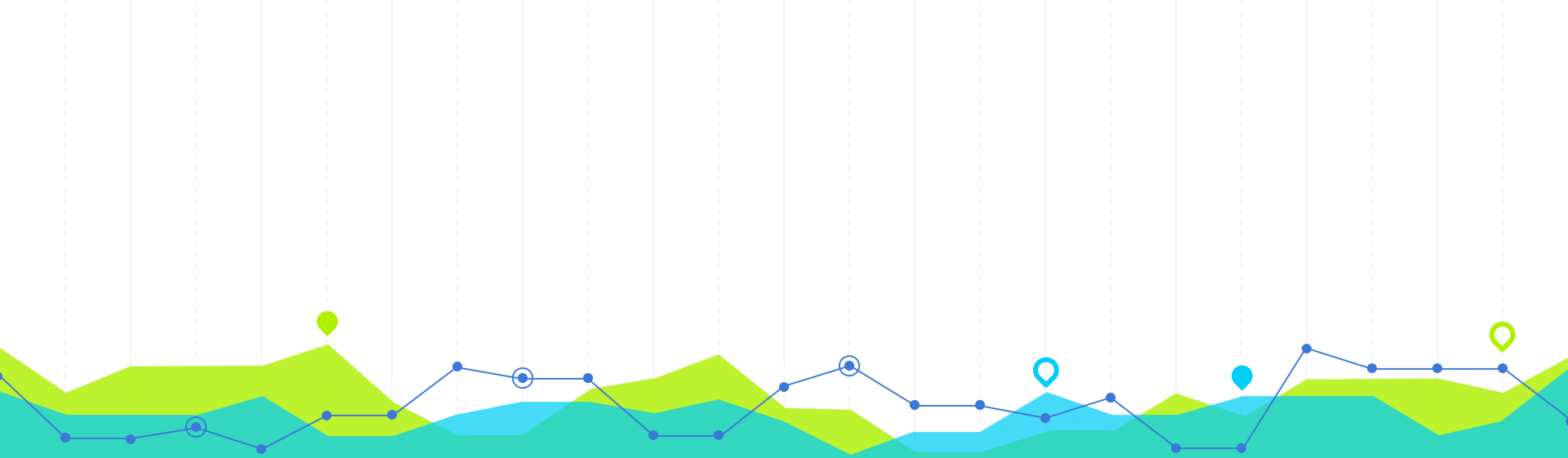


# AN EXPLORATION OF PROCEDURAL GENERATION

by reed mclean

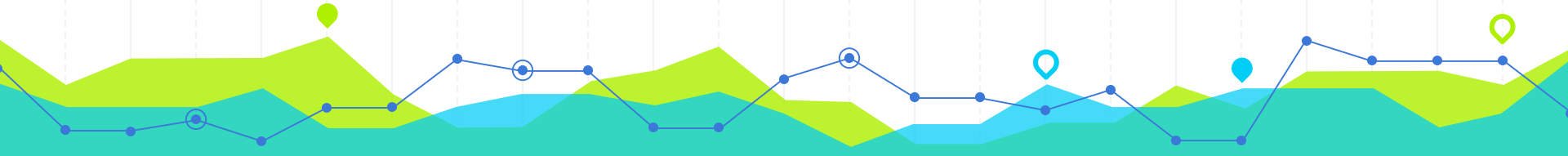


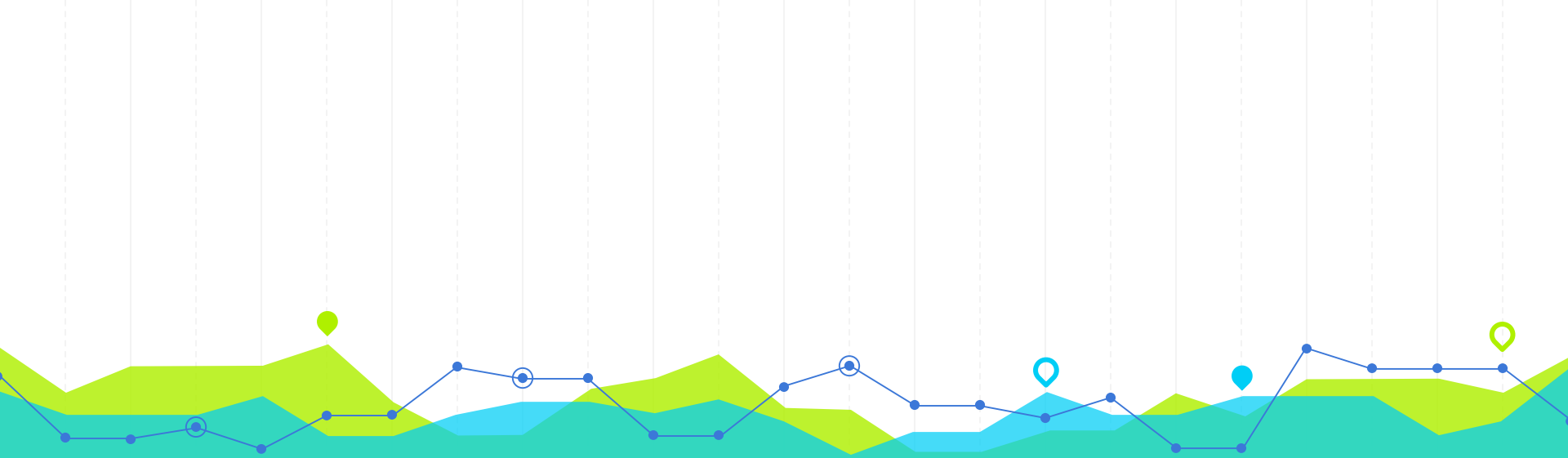
# PROCEDURAL GENERATION

What is that?

“

Procedural generation is the practice  
of creating game elements  
algorithmically as opposed to  
manually.

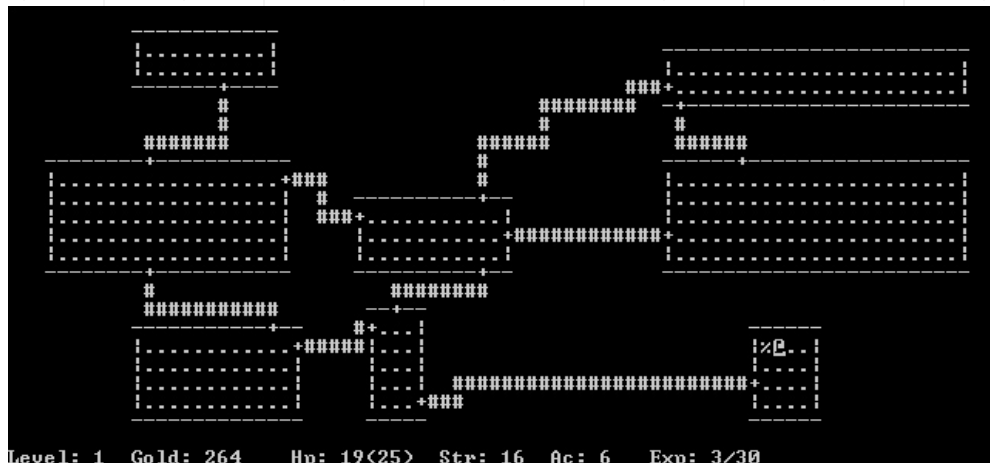
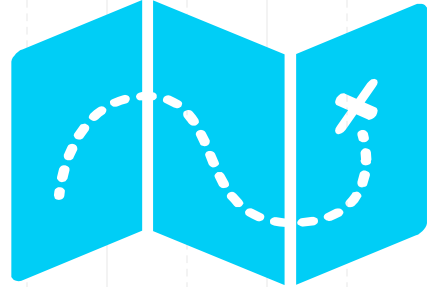




# PROCEDURAL GENERATION

Who did that?

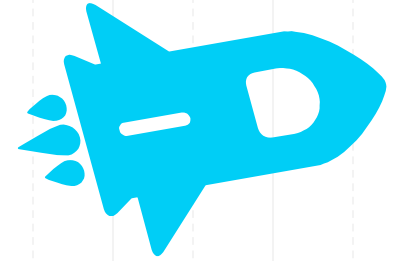
# ROGUE (1980)



- ASCII graphics
- Dungeon crawler
- Randomly generated levels
- Inspired by Colossal Cave and D&D



# ELITE (1984)



- Used seed based generation
  - More than 2000 planets
- Names
- Descriptions
- Positioning
- Economies

# THE ELDER SCROLLS: ARENA (1994)



- ◉ Huge world  
6 million square miles
- ◉ Important locations were manually created

# SPORE (2008)



- Entire species
- Solar systems
- Economies





# MINECRAFT (2011)



- ◉ Almost a million km<sup>2</sup>
- ◉ NPC spawning also generated

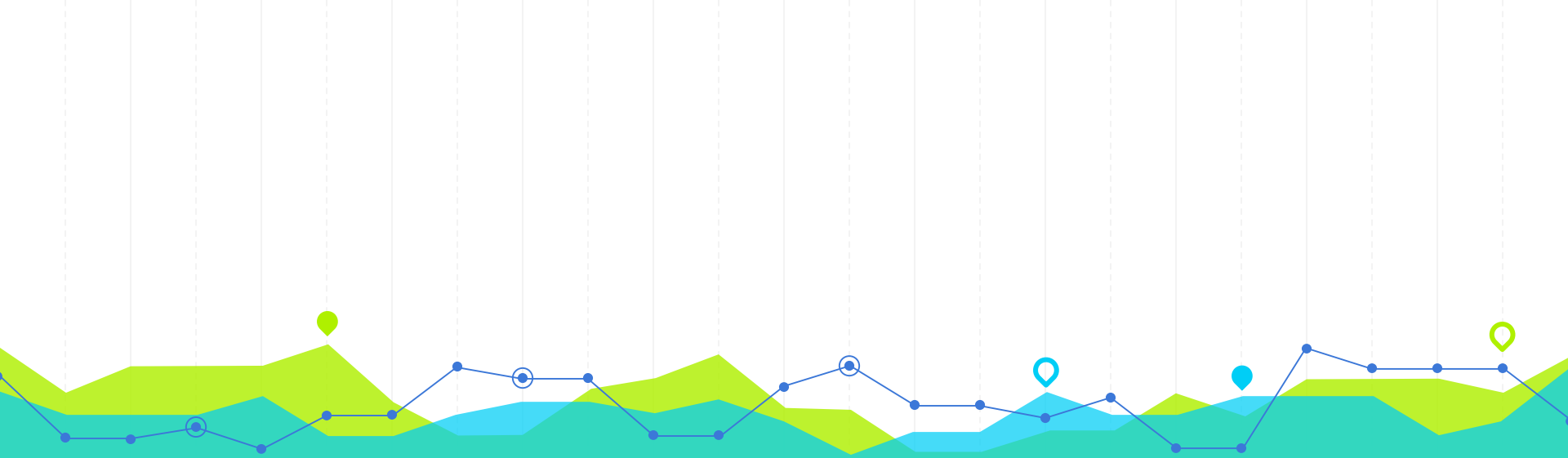


# LORD OF THE RINGS



- ◉ MASSIVE
- ◉ Used for large-scale warfare





# PROCEDURAL GENERATION

Why do that?

# WHY USE PROCEDURAL GENERATION?

- ◉ Resource restrictions
- ◉ Content generation
- ◉ User experience



# WHY USE PROCEDURAL GENERATION?

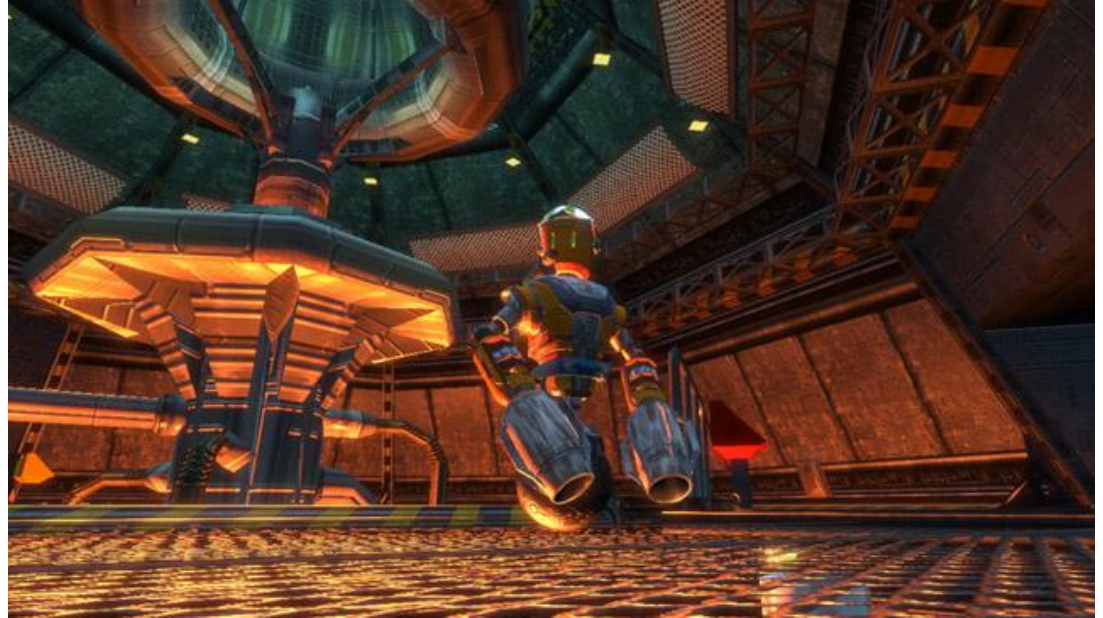
- ◉ Resource restrictions
- ◉ Content generation
- ◉ User experience





# RESOURCE RESTRICTIONS

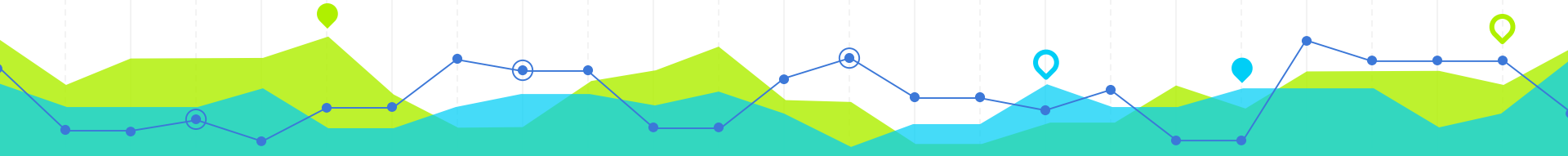
- ◉ Textures
- ◉ Maps
- ◉ NPCs
- ◉ Loot



Roboblitz (2006)

# WHY USE PROCEDURAL GENERATION?

- ◉ Resource restrictions
- ◉ Content generation
- ◉ User experience





# CONTENT GENERATION

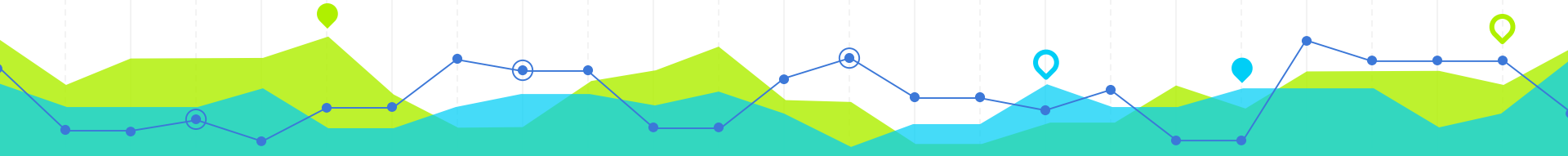
- ◉ Cheaper
- ◉ Faster
- ◉ Easier
- ◉ Groovier



Elder Scrolls IV: Oblivion (2006)

# WHY USE PROCEDURAL GENERATION?

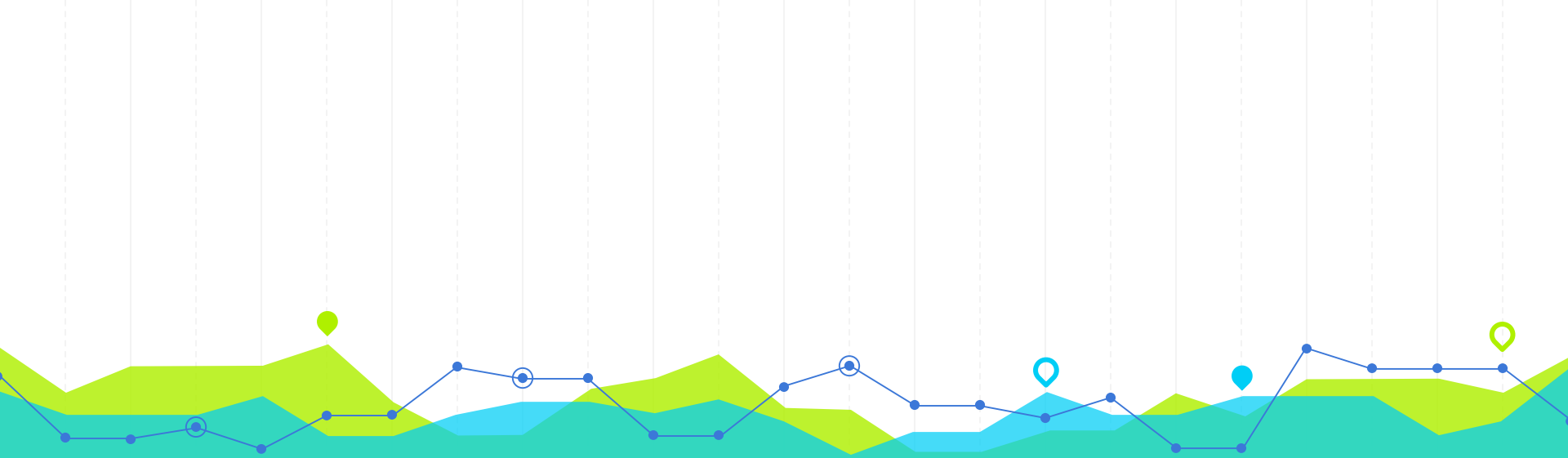
- ◉ Resource restrictions
- ◉ Content generation
- ◉ User experience



# USER EXPERIENCE

- ◉ Unpredictability
- ◉ Replayability
- ◉ More fun





# PROCEDURAL GENERATION

I did that



# “THE ADVENTURES OF” + PLAYER.NAME

(I've got 99  
problems and a witch  
ain't one)

# TEXT BASED

In memory of Zork (and Zork II)

# DUNGEON CRAWLER

In memory of Rogue



It's pretty cool



# “THE ADVENTURES OF ” + PLAYER.NAME

## GENERATED CONTENT

### Walk Around

- Player details
- Map
- Area descriptions

### Pick Up Stuff

- Weapon types
- Potion types
- Loot descriptions

### Hit People

- NPC generation
- NPC behaviors



# CHALLENGES

- ◉ **Natural Language Processing**
  - ◉ **Difficulty Scaling**

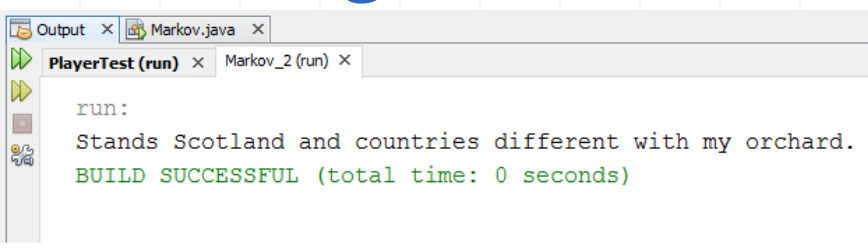




# NATURAL LANGUAGE

- ◉ Markov Chain

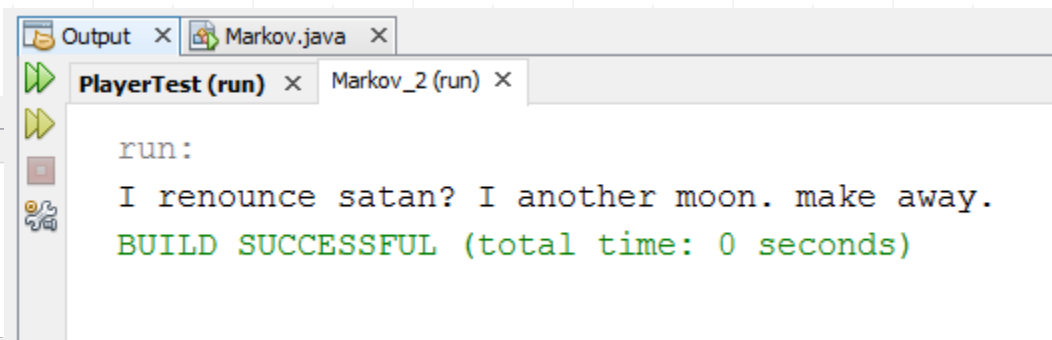
- ◉ Parsing



Output x Markov.java x

PlayerTest (run) x Markov\_2 (run) x

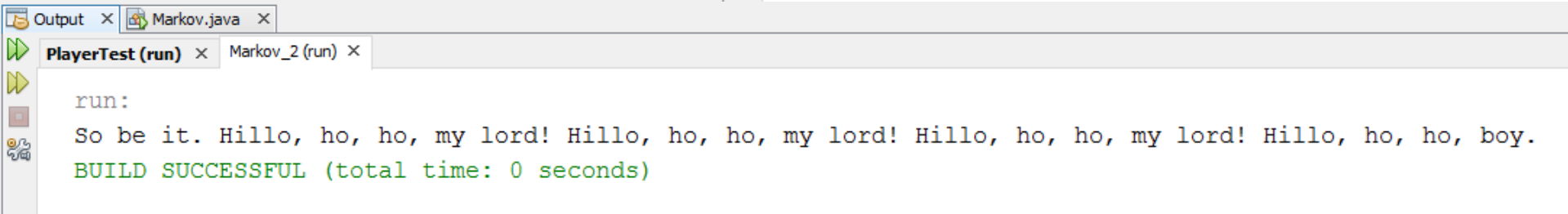
```
run:
Stands Scotland and countries different with my orchard.
BUILD SUCCESSFUL (total time: 0 seconds)
```



Output x Markov.java x

PlayerTest (run) x Markov\_2 (run) x

```
run:
I renounce satan? I another moon. make away.
BUILD SUCCESSFUL (total time: 0 seconds)
```



Output x Markov.java x

PlayerTest (run) x Markov\_2 (run) x

```
run:
So be it. Hillo, ho, ho, my lord! Hillo, ho, ho, my lord! Hillo, ho, ho, my lord! Hillo, ho, ho, boy.
BUILD SUCCESSFUL (total time: 0 seconds)
```

# CHALLENGES

○ Natural Language Processing

○ Difficulty Scaling



# DEMO



# THANKS!

