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An example randomly-generated map from (an older version of) my code. Percent signs (%) represent boulders and mountains. Carrots (ˆ) represent tree and forests. Hashes (#) are roads. Cs and Ms are Pokémon Centers and Pokémarts (buildings), respectively. Colons (:) are long grass and periods (.) are clearings. The *at* symbol (@) is the player character (PC), and letters are non-player characters (NPCs), neither of which are part of this assignment.

COM S 327, Spring 2024
Programming Project 1.01
Terrain Generation

It's time to start developing our Pokémon-inspired game. We'll begin by generating terrain. Some details are specified below, but generating a good-looking map is largely a matter of taste.

Because it's so much a matter of taste, you may decide how you want your map to look and come up with your own heuristics to generate that look. Things to keep in mind are playability and realism. Yeah, it's a fantasy game where we catch monsters in tall grass, but that doesn't mean there's no realism! Paths that are too straight are probably unrealistic; after all, the world is full of rocks, streams, hills and trees.

Your terrain generator should be written with an eye toward extensibility. Remember that you will be adding functionality on top of this next week, and for the rest of the semester. For this step, you generate a map, draw it on the standard output, and exit. Here are the requirements:
- All code is in C.
- The map measures 80 units in the x (horizontal) direction and 21 units in the y (vertical) direction. A standard terminal is 80×24, and limiting the map to 21 rows leaves three rows for text, things like gameplay messages and player status, which come later.
- At least two paths pass through your map, one oriented N-S, the other E-W; these will intersect somewhere in your map. Additional paths are acceptable according to your taste. Paths are represented using hashes ('#').

- Your map should have a Pokémon Center and a Pokémart, Represented by one or more 'C' and 'M', respectively. I make my Pokémon Centers and Pokémarts 2×2.[1]
- Your Pokémon Center and Pokémart, should be reachable from the path without having to go through tall grass.
- Your map should contain at least two regions of tall grass (represented with colons)
- Your map should contain at least one region of water (represented with tildes)
- The outermost cells of the map are immovable boulders (represented using percent signs), except that there is one exit on each border. Your N-S path goes between the top and bottom exit, while the E-W path goes between the left and right exits.[2]
- Your map should contain at least two clearings (regions of short grass). Clearings are represented using periods.
- Other option terrain includes rocks and boulders ('%'), trees ('^'), and whatever else you think would be interesting.

My approach involves randomly choosing a handful of "seed" locations for the various region types, then "growing" those seeds until the regions contact each other. Once the whole map has been filled, I favor region borders for path placement. To make the space more interesting, in addition to the required regions given above, I sprinkle boulders and trees around the map after regions have been placed.

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[1] If you're unfamiliar with Pokémon games, the Pokémon Center is a medical facility where you take your Pokémon for healing and the Pokémart is a Pokémon convenience store. We'll implement the functionality of these facilities in a later assignment.

[2] In a future assignment, we will add the ability to move out of the first map into an adjoining map through any of the exits. In the new map, you will enter through the old map's exit; thus the position of this exit must be maintained in order to go back where you came from. For this reason, it's probably best to generate exits before generating paths!