Password Generator

Secure Passwords Made Easy | by Janani

```
import secrets
```

Why Do We Need This?

The Problem: Weak passwords like "123456" or "password" are the easiest way for hackers to breach your accounts. Humans are predictable and bad at being random.

The Solution: This tool uses Python's cryptographic strength to generate unpredictable, complex passwords that are mathematically nearly impossible to guess.

The Science: What is Entropy?

Length

The number of characters in your password. Longer is exponentially stronger.

Variety

Using Mix of Upper, Lower, Numbers, and Symbols increases the "pool" size.

Strength

Measured in "bits".
> 80 bits is considered **Very Strong**.

Algorithm Step 1: Gathering Ingredients

User Input

The program asks for the desired length (between 8 and 128).

Selection

User toggles "Yes/No" for Uppercase, Lowercase, Digits, and Symbols.

Validation

The code ensures at least one character type is selected before proceeding.

```
# Example Concept
pool = string.ascii_lowercase + string.digits
```

Step 2: Constructing the Pool

Think of the pool as the "master list" of allowed characters. We build it step-by-step using string concatenation based on your choices.

- **Initialization:** Start with an empty string: pool = ""
- **Check Lowercase:** If yes, append a-z to pool.
- **Check Digits:** If yes, append 0-9 to pool.
- **Final Result:** A massive string like

Step 3: The Lottery

Now comes the magic. We don't just pick randomly; we use secrets.choice().

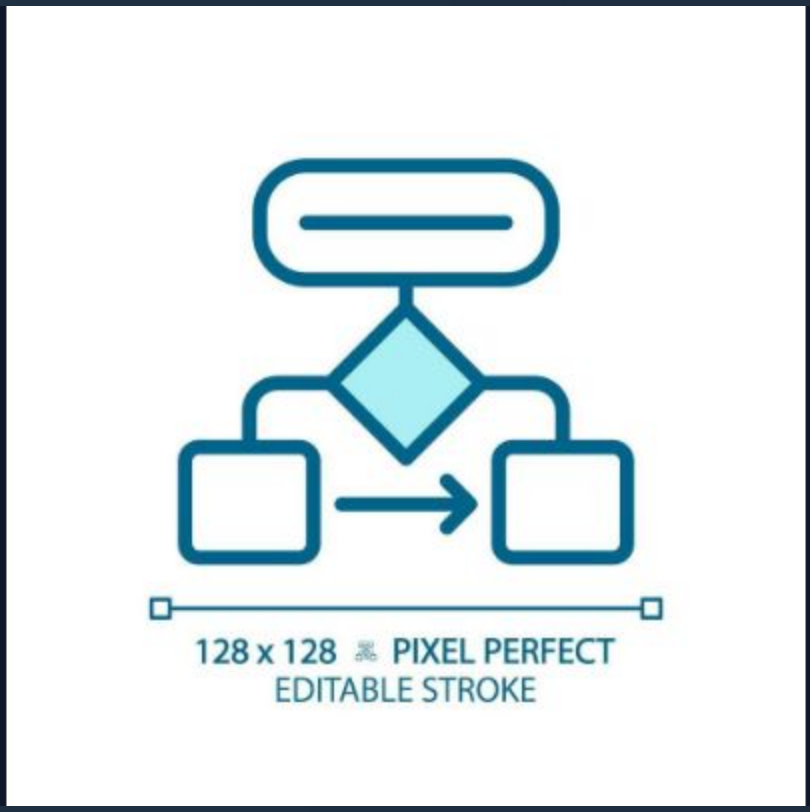
This isn't like rolling standard dice. It uses the operating system's strongest source of randomness (CSPRNG) to pick a character from the pool.

It repeats this process length times to build your final password string.

Flowchart: Setup Phase

The Logic Flow

- **Start:** Display Theme & Welcome.
- **Input:** Get Length (Validate 8-128).
- **Decision:** Ask for Char Types (y/n).
- **Check:** Is Pool Empty? If yes, Error. If no, Proceed.



Flowchart: The Generation Loop

🔄 The Loop

For *i* from 0 to *length*:

Pick random char from Pool

Append to Password

🧮 The Analysis

Calculate Entropy:

$$E = L \times \log_2 N$$

Determines Strength (Weak to Very Strong).

Thank You