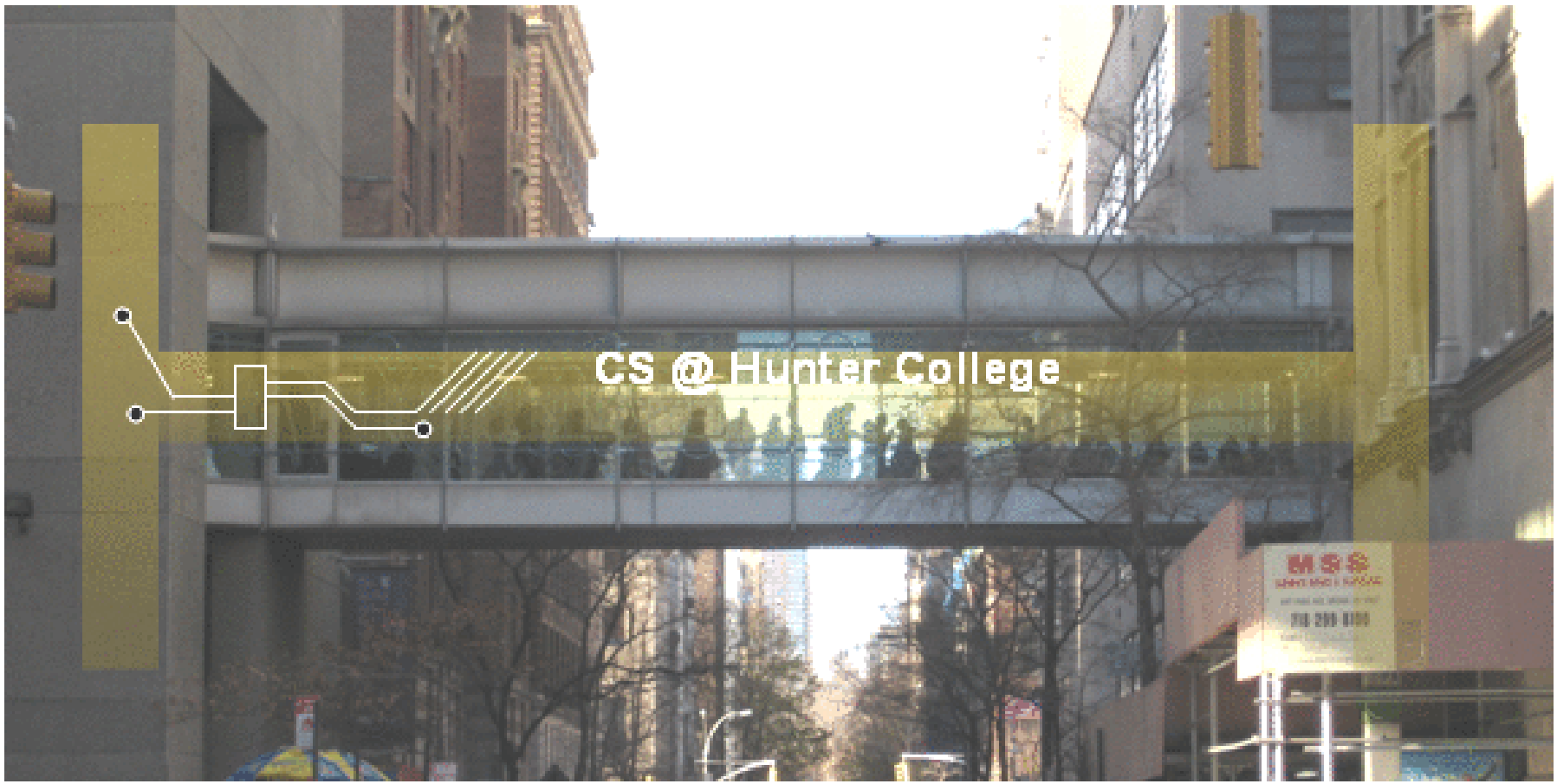
# CSci 127: Introduction to Computer Science




hunter.cuny.edu/csci

# Announcements

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  - **Drop-in tutoring (Tu/W 1p - 2p)**

# Today's Topics

- Recap: Folium
- Indefinite loops
- Design Patterns: Max (Min)
- Design Challenge

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- **Recap: Folium**
- Indefinite loops
- Design Patterns: Max (Min)
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# Challenge:

*What does this code do?*

```
import folium
import pandas as pd

cuny = pd.read_csv('cunyLocations.csv')
mapCUNY = folium.Map(location=[40.75, -74.125])

for index,row in cuny.iterrows():
    lat = row["Latitude"]
    lon = row["Longitude"]
    name = row["Campus"]
    if row["College or Institution Type"] == "Senior Colleges":
        collegeIcon = folium.Icon(color="purple")
    else:
        collegeIcon = folium.Icon(color="blue")
    newMarker = folium.Marker([lat, lon], popup=name, icon=collegeIcon)
    newMarker.add_to(mapCUNY)

mapCUNY.save(outfile='cunyLocationsSenior.html')
```

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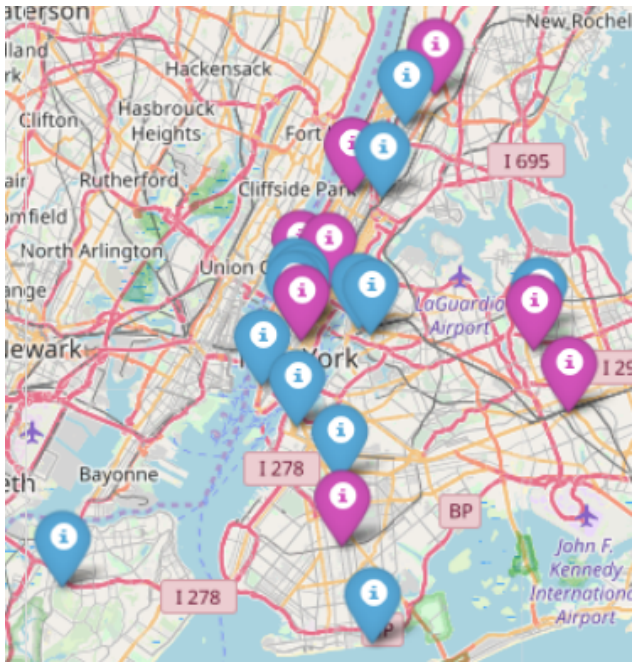

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*Write code.* → *Run program.* → *Open .html in browser.*

# Today's Topics

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- **Indefinite loops**
- Design Patterns: Max (Min)
- Design Challenge

# Challenge:

- Write a function that asks a user for number after 2000 but before 2018. The function should repeatedly ask the user for a number until they enter one within the range and return the number.

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def getYear():
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    while num <= 2000 or num >= 2018:



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# Coding

- Write a function that asks a user for number after 2000 but before 2018. The function should repeatedly ask the user for a number until they enter one within the range and return the number.

```
def getYear():
    num = 0
    while num <= 2000 or num >= 2018:
        num = int(input('Enter a number > 2000 & < 2018'))

    return(num)
```

# Indefinite Loops

```
#Spring 2012 Final Exam, #8

nums = [1,4,0,6,5,2,9,8,12]
print(nums)
i=0
while i < len(nums)-1:
    if nums[i] < nums[i+1]:
        nums[i], nums[i+1] = nums[i+1], nums[i]
    i=i+1

print(nums)
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# Indefinite Loops

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- Could execute the body of the loop zero times, 10 times, infinite number of times.

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- Indefinite loops repeat as long as the condition is true.
- Could execute the body of the loop zero times, 10 times, infinite number of times.
- The condition determines how many times.
- Very useful for checking input, simulations, and games.

# Indefinite Loops

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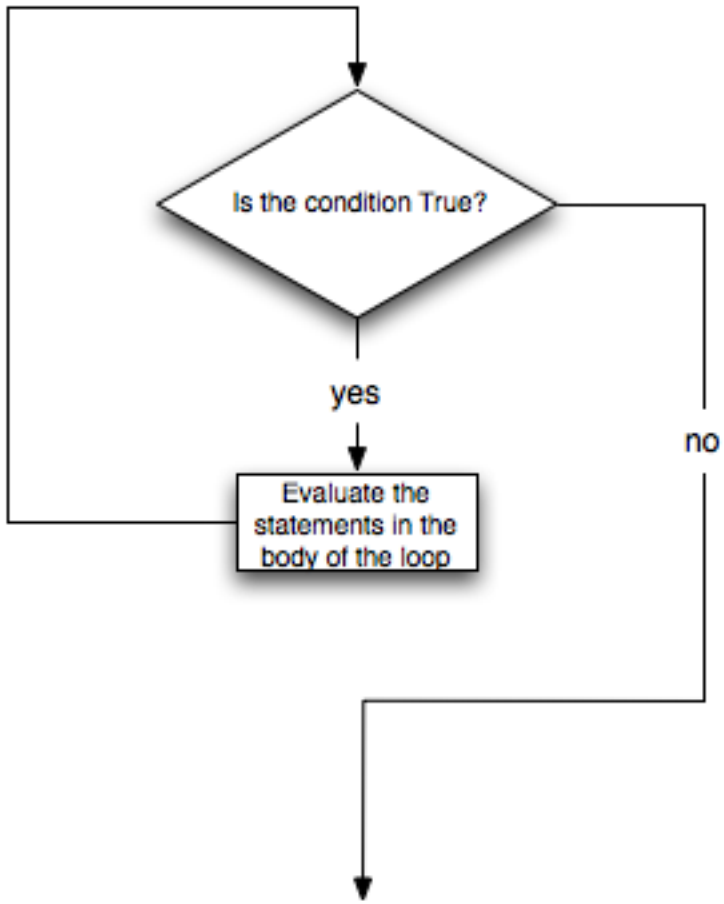

# Challenge

*Predict what this code does:*

```
#Random search
import turtle
import random
tess = turtle.Turtle()
tess.color('steelBlue')
tess.shape('turtle')
tess.penup()
#Start off screen:
tess.goto(-250,-250)
#Remember:  abs(x) < 25 means absolute value: -25 < x < 25
while abs(tess.xcor()) > 25 or abs(tess.ycor()) > 25:
  x = random.randrange(-200,200)
  y = random.randrange(-200,200)
  tess.goto(x,y)
  tess.stamp()
  print(tess.xcor(), tess.ycor())
print('Found the center!')
```

# Trinket Demo

```
#Random search
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(Demo with `trinket`)

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- Recap: Folium
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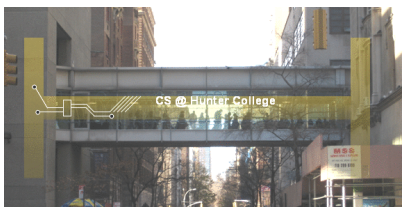
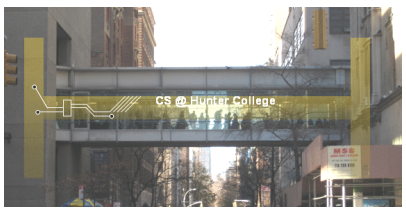
- **Design Patterns: Max (Min)**
- Design Challenge

# Design Patterns




- A **design pattern** is a standard algorithm or approach for solving a common problem.

# Design Patterns

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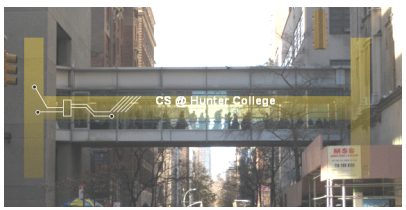


- A **design pattern** is a standard algorithm or approach for solving a common problem.
- The pattern is independent of the programming language.
- Can think of as a master recipe, with variations for different situations.

# Challenge:

*Predict what the code will do:*

```
nums = [1,4,10,6,5,42,9,8,12]

maxNum = 0
for n in nums:
    if n > maxNum:
        maxNum = n
print('The max is', maxNum)
```

# Python Tutor

```
nums = [1,4,10,6,5,42,9,8,12]

maxNum = 0
for n in nums:
    if n > maxNum:
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print('The max is', maxNum)
```

(Demo with pythonTutor)

# Max Design Pattern

- Set a variable to the smallest value.

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- Set a variable to the smallest value.
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- Set a variable to the smallest value.
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- Set a variable to the smallest value.
- Loop through the list,
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- Print/return the largest number found.

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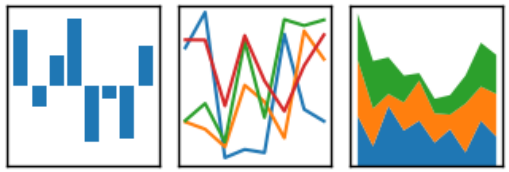
- Set a variable to the smallest value.
- Loop through the list,
- If the current number is larger, update your variable.
- Print/return the largest number found.
- Similar idea works for finding the minimum value.

# Pandas: Minimum Values

pandas

$y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$



- In Pandas, lovely built-in functions:

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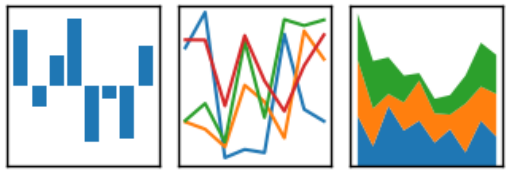

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  - `df.sort_values('First Name')` and
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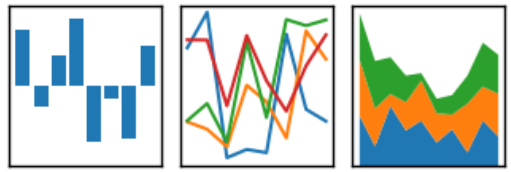

- In Pandas, lovely built-in functions:
  - `df.sort_values('First Name')` and
  - `df['First Name'].min()`
- What if you don't have a CSV and DataFrame, or data not ordered?

# Design Question: Find first alphabetically

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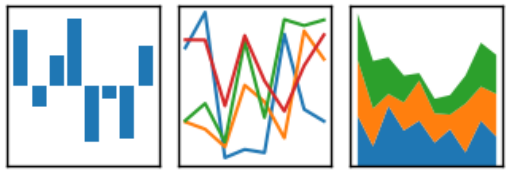

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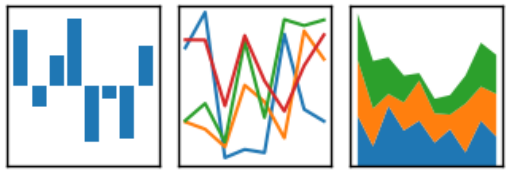

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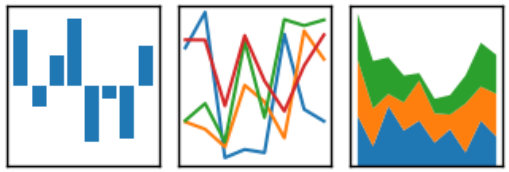

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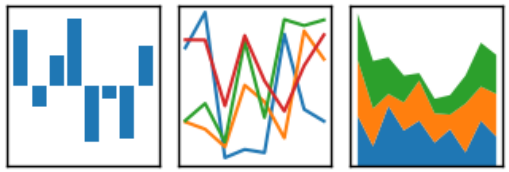

- What if you don't have a CSV and DataFrame, or data not ordered?
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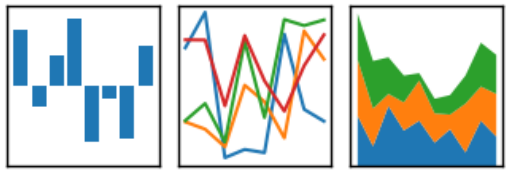

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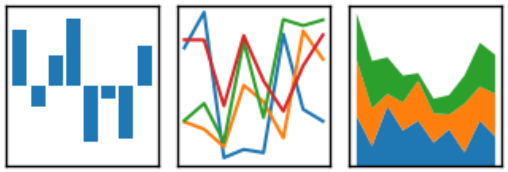

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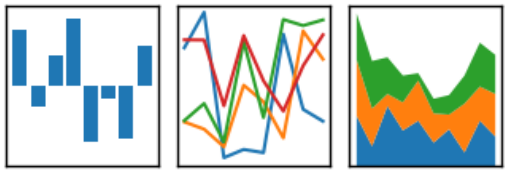

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    - ★ Compare X to your variable.
    - ★ If better, update your variable to be X.
  - Print/return X.

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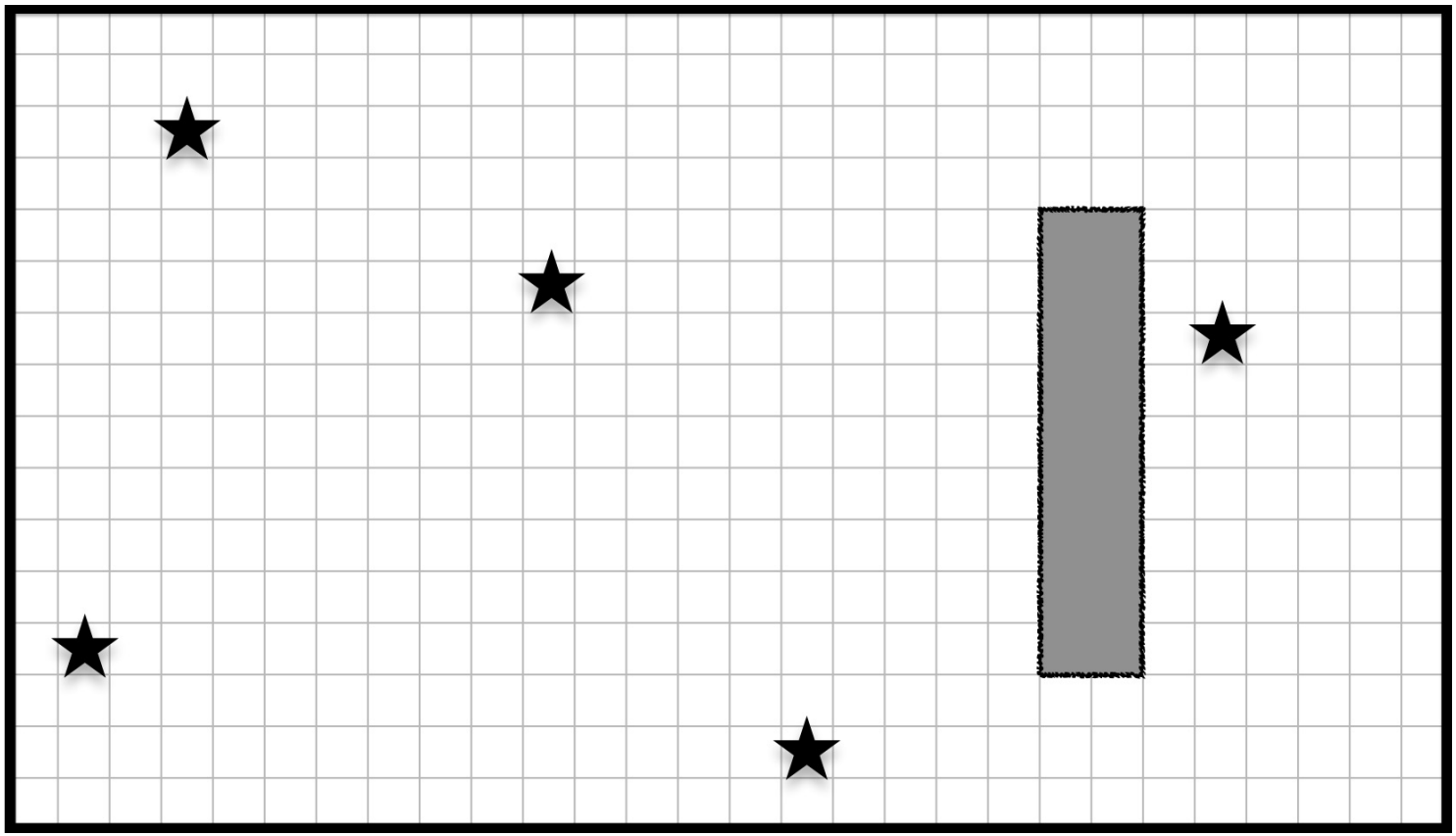
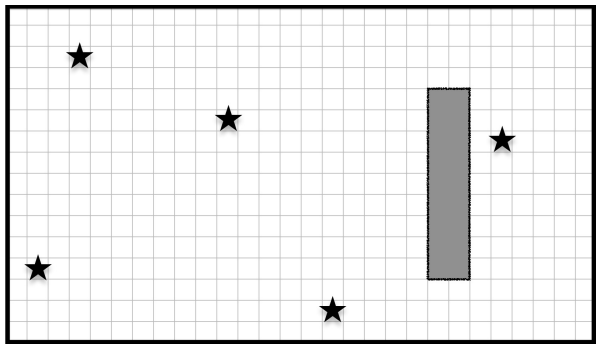
- **Design Challenge**

# Design Challenge

Collect all five stars (locations randomly generated):

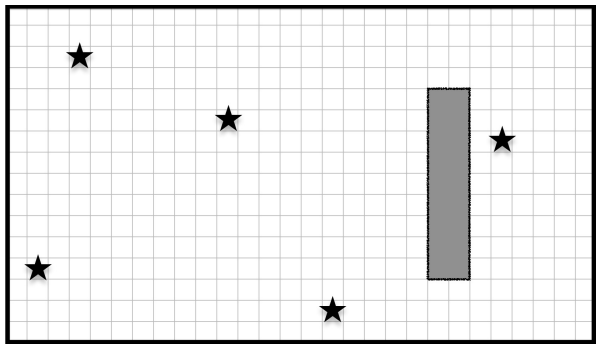


# Design Challenge



- Possible approaches:

# Design Challenge



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  - Randomly wander until all 5 collected, or

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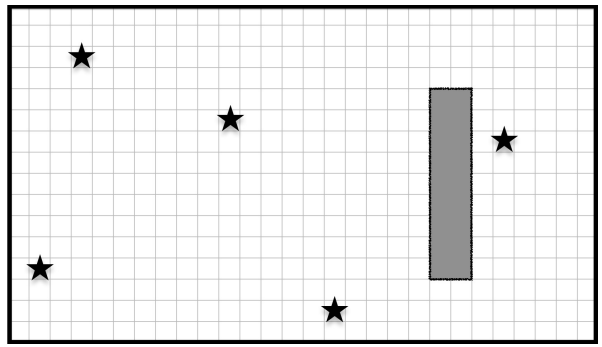

- Possible approaches:
  - Randomly wander until all 5 collected, or
  - Start in one corner, and systematically visit every point.

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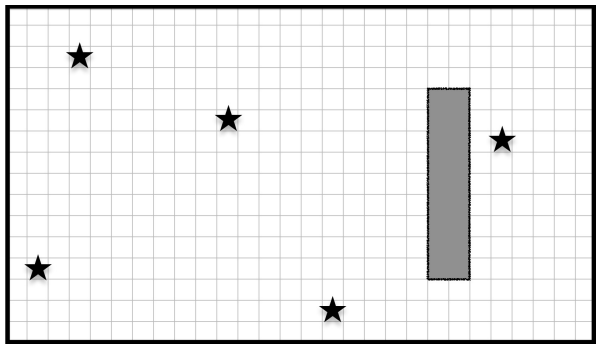
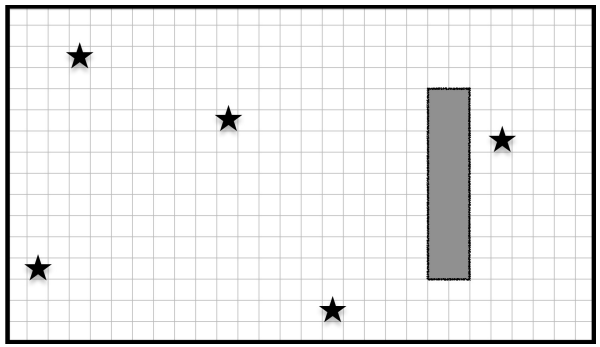


- Possible approaches:
  - Randomly wander until all 5 collected, or
  - Start in one corner, and systematically visit every point.
- **Input:** The map of the 'world.'

# Design Challenge



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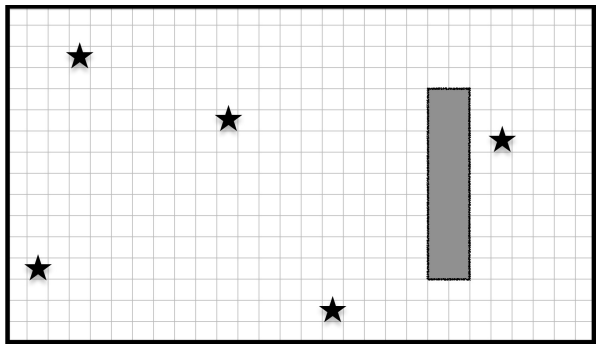

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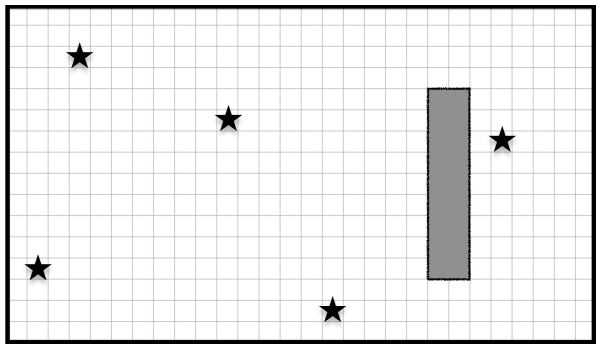

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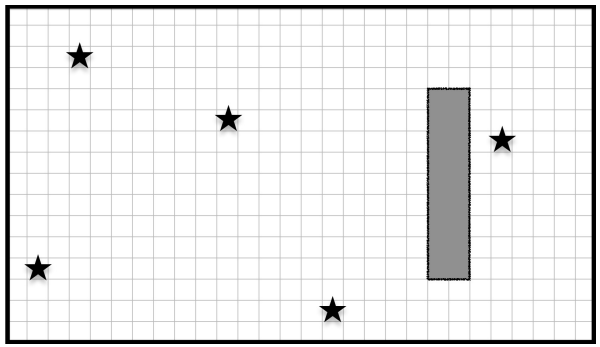

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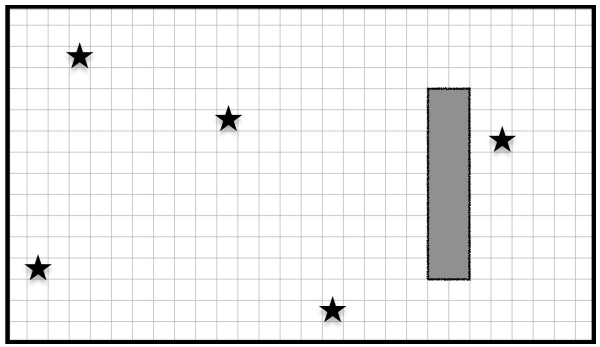

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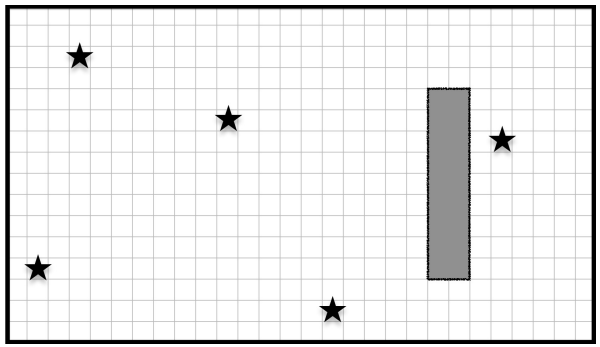

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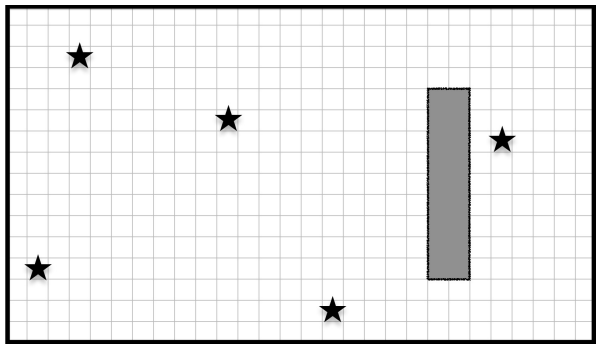

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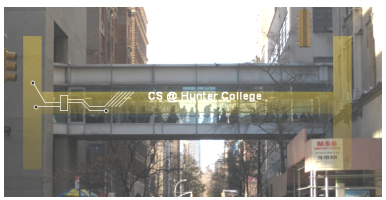
# Recap

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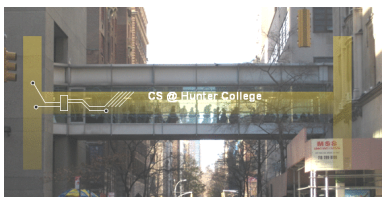


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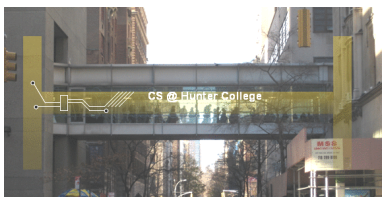


- Quick recap of a Python library, `Folium` for creating interactive HTML maps.
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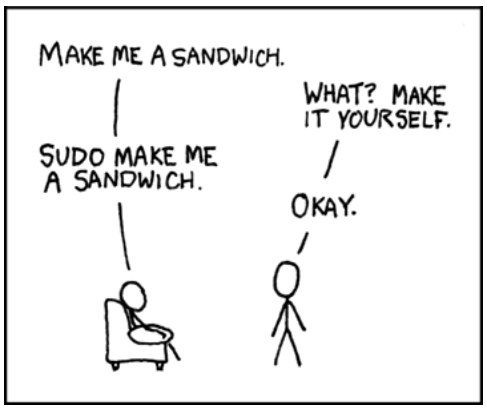
- Introduced the max design pattern.

# Final Exam Prep: UNIX




xkcd 149

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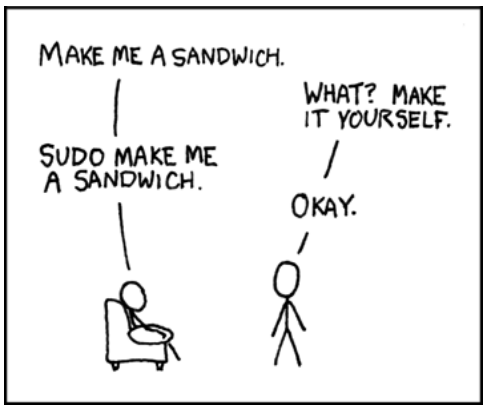


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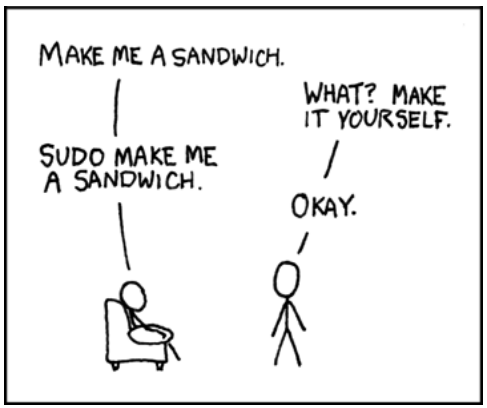


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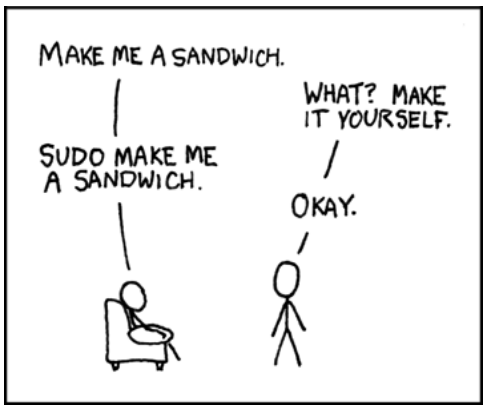


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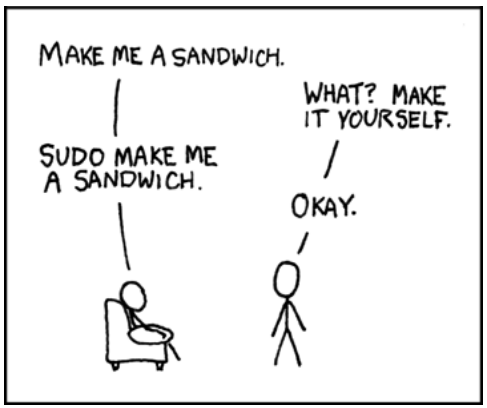


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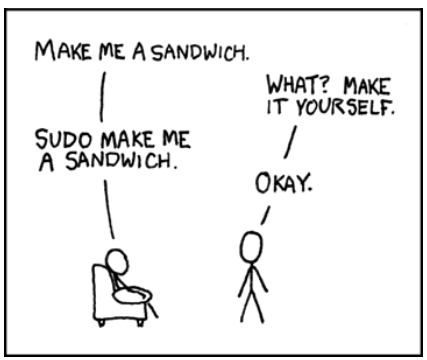


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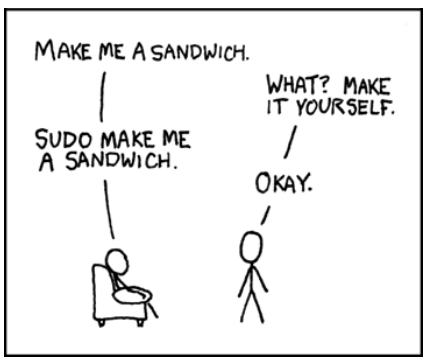


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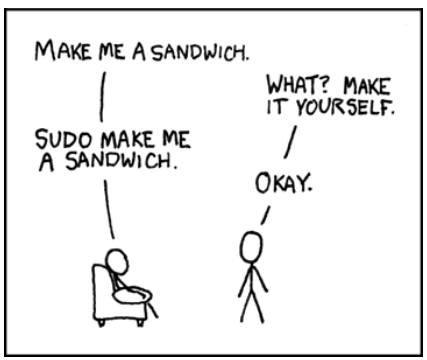


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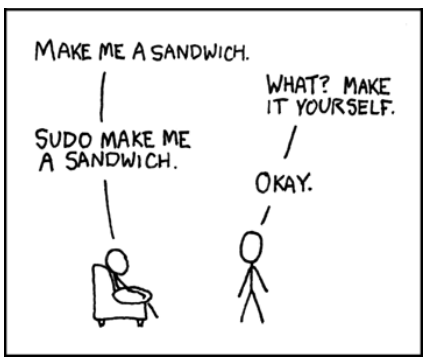


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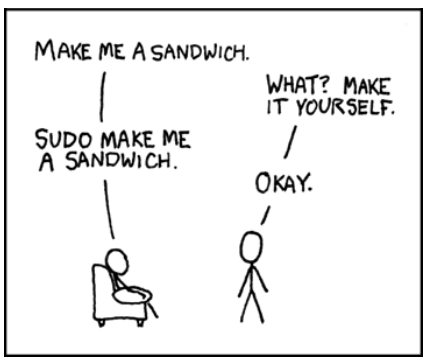


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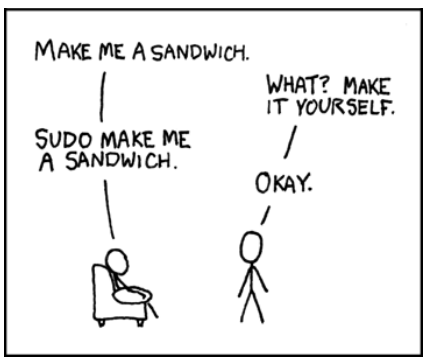


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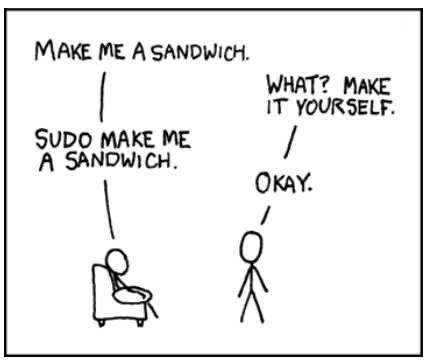


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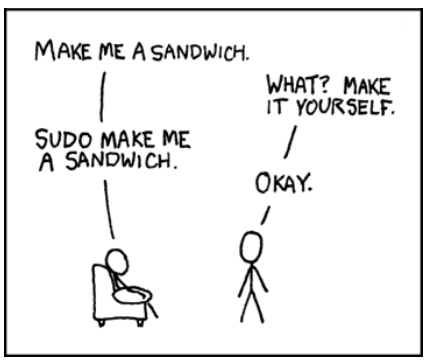


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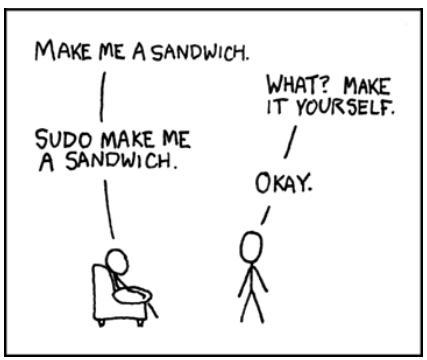


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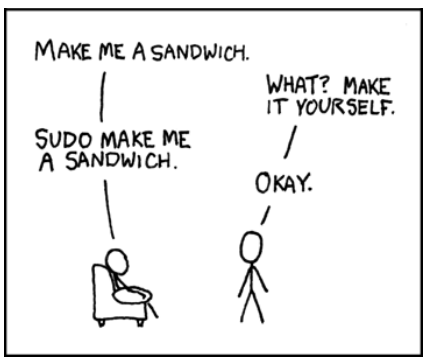


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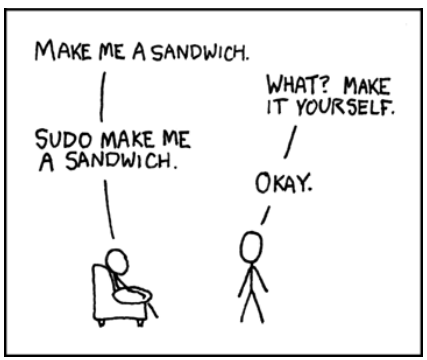


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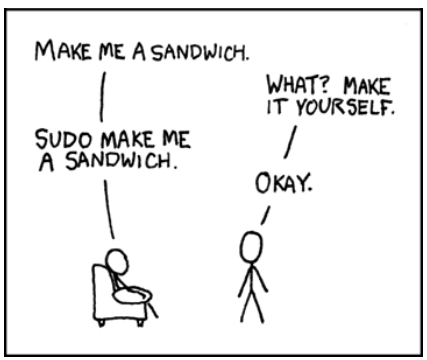


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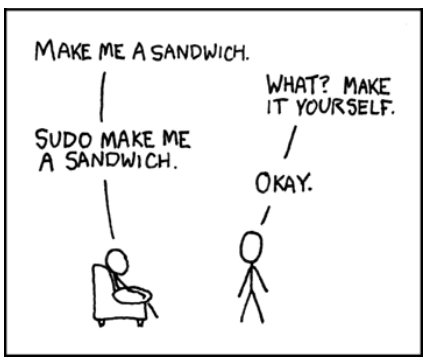


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