What are Data Requirements?

- Def:- Data requirements refer to the specific types, sources, formats, and qualities of data that are necessary to perform a successful analysis

- Importance of Data Requirements
  1) Modeling
  2) Improved Data Quality
  3) Efficient Data Collection

Types of Data

- Structured
  Def:-Structured data is organized data stored in rows and columns format
  Ex..
  SQL, Excel

- Unstructured
  Def:- Unstructured data is messy data that doesn’t fit in tables
  Ex…
  - Images
  - Video
  - Audio

What is a Feature/Variable?

Features (or Attributes):

- Examples: Age, income, product , location, Temperature, sales

Variables:

A variable is a specific feature

Type

Dependent (Target) Variable: The outcome you're trying to predict or explain

(e.g., sales)

Independent (Predictor) Variables: Features that are used to predict the dependent variable (e.g., age, temperature)

Quantitative Data

- Numerical data used for calculations

Examples: Age, salary, temperature

Qualitative Data

Descriptive data

Examples: Gender, occupation, feedback

Categorical Data

- Nominal: No order (e.g. color)
- Ordinal: order (e.g. rating scale)

Numerical Data

Discrete: Countable (e.g. number of items)
Continuous: Any value (e.g. height)

Sources of Data

- **Internal Systems**
  Ex…
    1) CRM
    2) ERP
- **External API**
- Ex…
    1) OpenWeather API
    2) Google Maps API
- **Sensors and Logs**
- Ex…
    1)IoT Sensors

Web Scraping Tools

- BeautifulSoup

Python Libraries

Data Manipulation

- Pandas, NumPy, Scikit-learn

Visualization Tools

- Matplotlib, Seaborn, Plotly

Deep Learning Frameworks

- TensorFlow, PyTorch

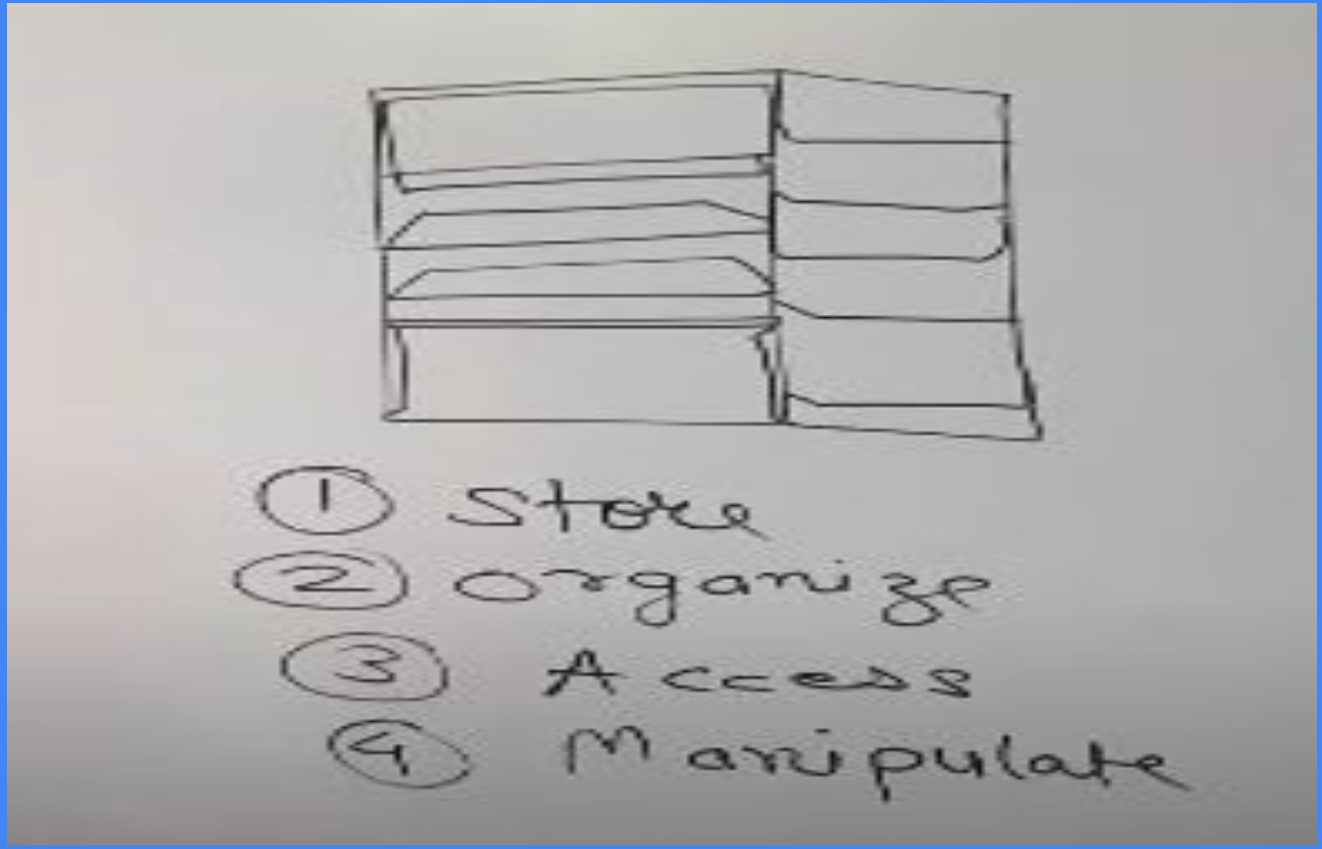
NLP Libraries

NLTK

What Are Data Structures?

- **Definition of Data Structure:-** A data structure is a way to store data
- **Definition of Algorithm:-**Algorithms is about how to solve different problems

Data Structure



What is an Array?

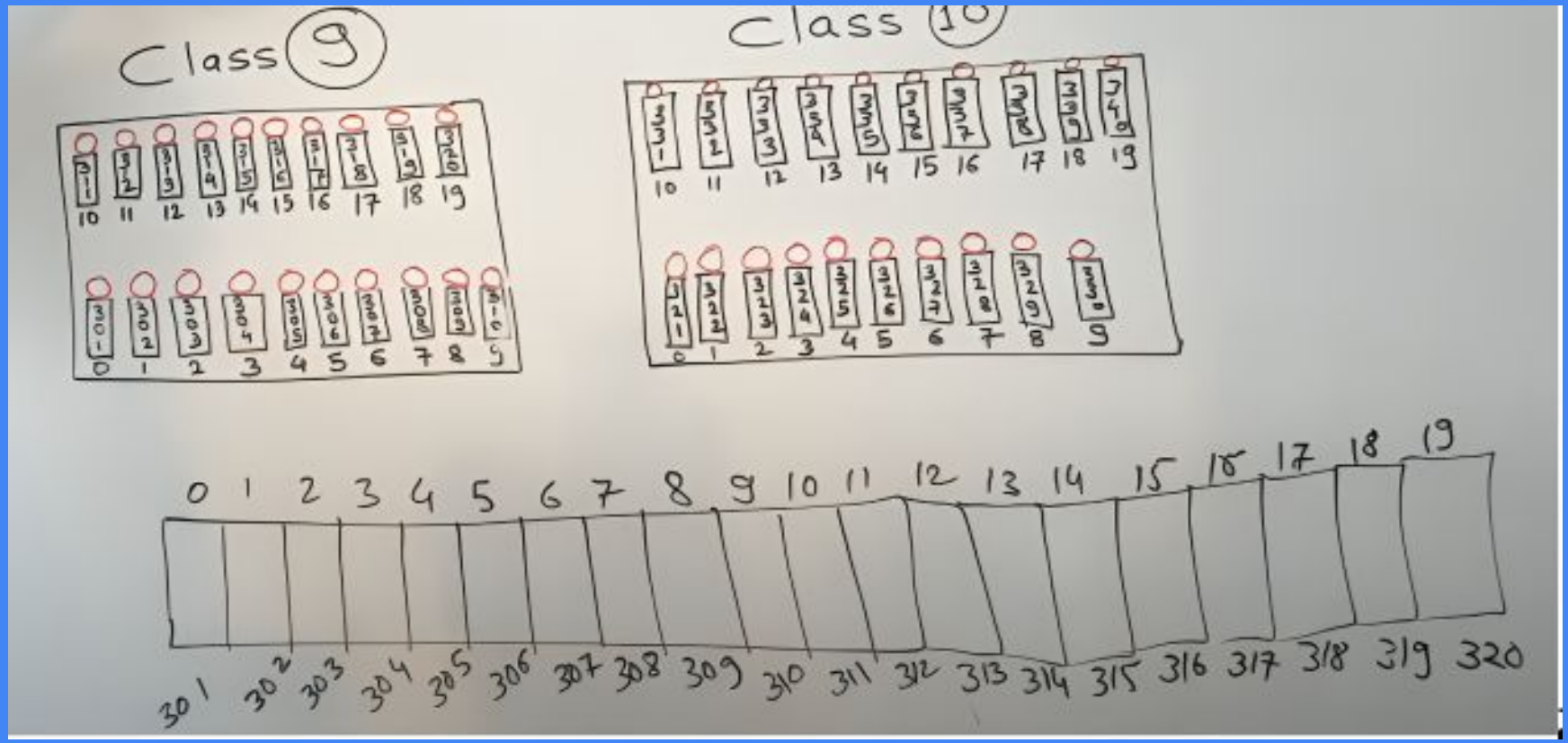
Definition:- An array is like a row of boxes, where each box stores a value (like a number, name, etc.), and all boxes are the same size and shape

Ex….

Imagine an egg carton with 12 slots

- Each slot = one position in the array
- All eggs (values) are the same type

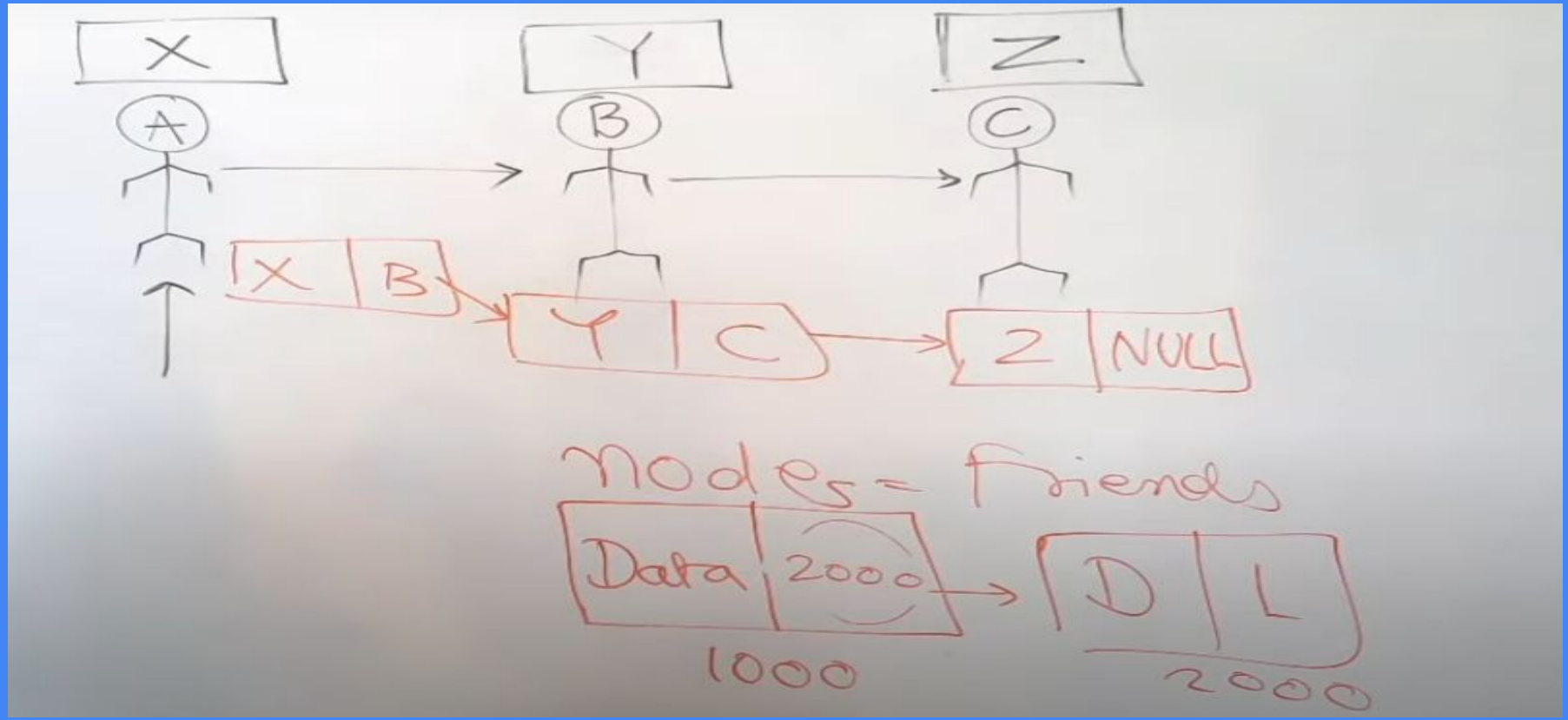
Array


Class 9
Class 10
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320

Linked Lists: Definition

Definition:-A Linked List is like a chain of people, where each person holds some information and a link to the next person in the chain

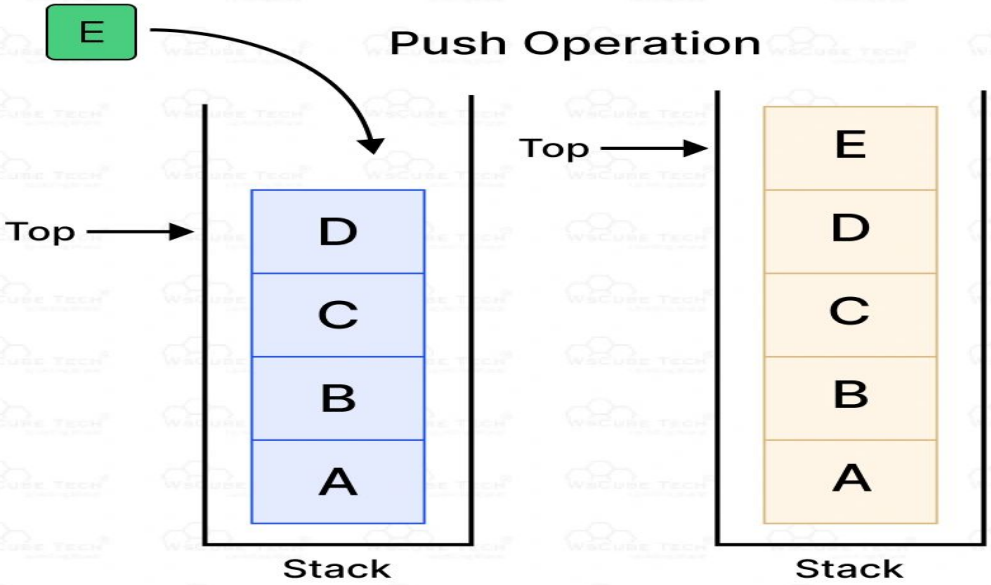
Linked List



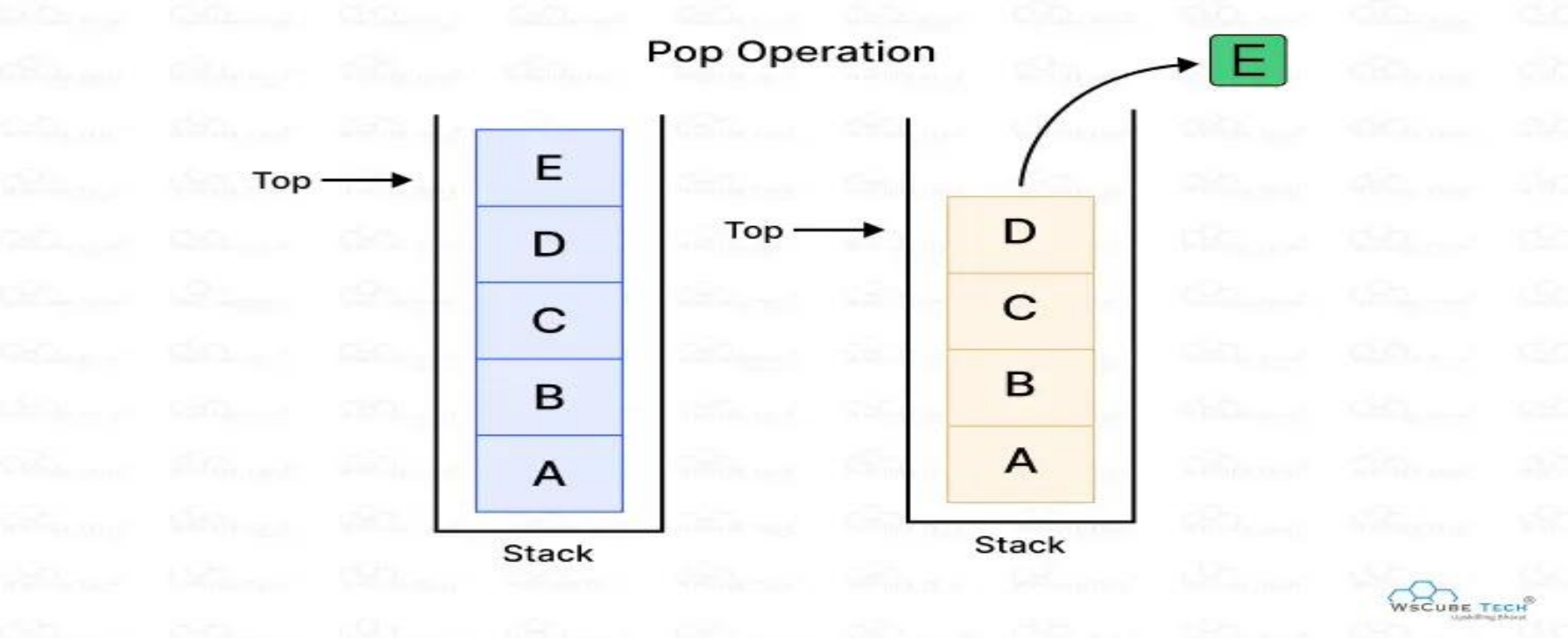
Stack

- **Definition:-**A stack is a data structure that can hold many elements
- **Terminology**
  Add something = **Push**
  Remove something = **Pop**
- **Type**
  1) **LIFO**

Push Operation



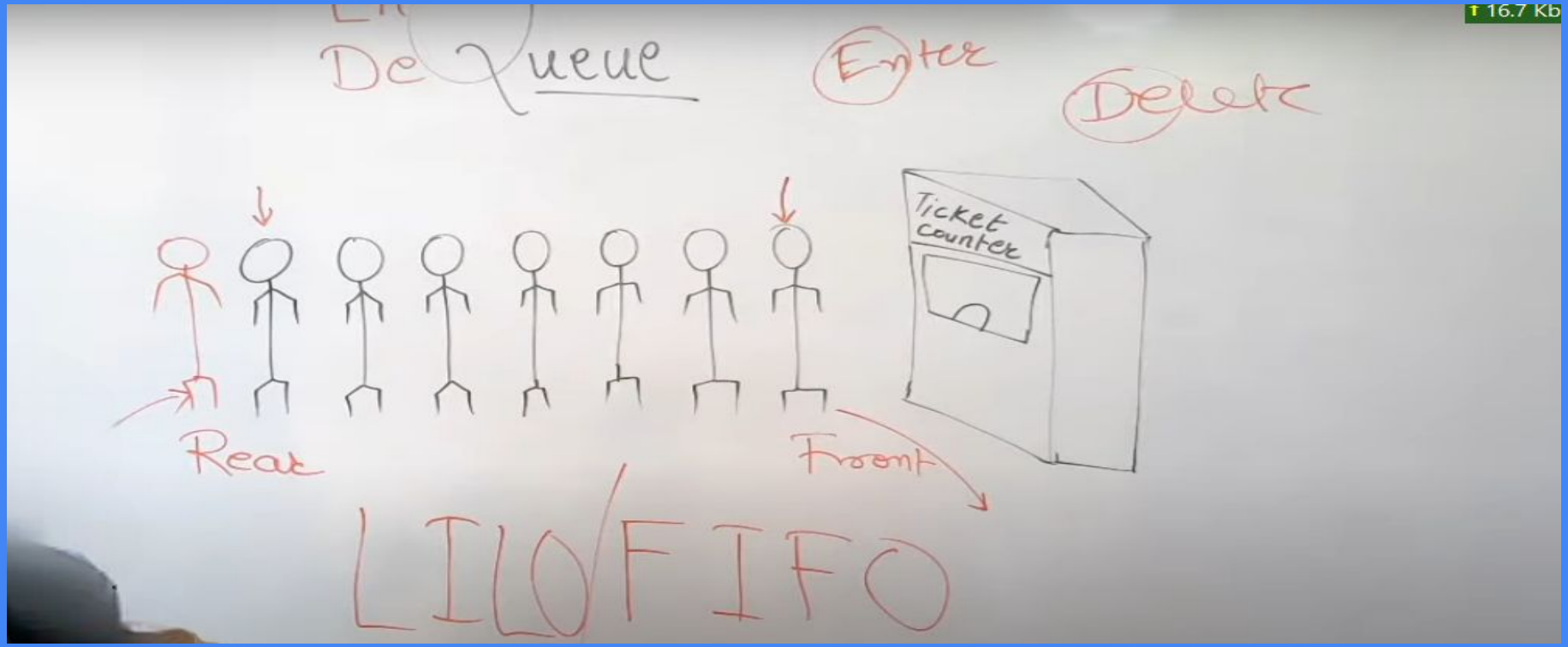
Pop Operation



Queues: Definition

- **Definition:**-A queue is like a line of people waiting — like at a bus stop, ATM, or movie ticket counter
- **Terminology**
  Enqueue – Add something to the end of the queue
  Dequeue – Remove something from the front of the queue
- **Type**
  LILO/FIFO

Queue



Applications in Software

- Compilers, Operating Systems