

Python Programming

Unit 06 – Lecture 03: Pandas Basics (Series and DataFrame)

Tofik Ali

School of Computer Science, UPES Dehradun

February 14, 2026

Repository: <https://github.com/tali7c/Python-Programming>

Quick Links

Core Concepts

Demo

Interactive

Summary

Agenda

1 Core Concepts

2 Demo

3 Interactive

4 Summary

Learning Outcomes

- Explain what Pandas is used for

Learning Outcomes

- Explain what Pandas is used for
- Create and manipulate Series and DataFrames

Learning Outcomes

- Explain what Pandas is used for
- Create and manipulate Series and DataFrames
- Use `head()`, `tail()`, column selection, and basic iteration

Learning Outcomes

- Explain what Pandas is used for
- Create and manipulate Series and DataFrames
- Use `head()`, `tail()`, column selection, and basic iteration
- Perform vectorized operations on columns

Why Pandas?

- Works with tabular data (like Excel/CSV)

Why Pandas?

- Works with tabular data (like Excel/CSV)
- Powerful cleaning and transformation functions

Why Pandas?

- Works with tabular data (like Excel/CSV)
- Powerful cleaning and transformation functions
- Easy grouping/aggregation and missing value handling

Series and DataFrame

- **Series:** 1D labeled array

Series and DataFrame

- **Series:** 1D labeled array
- **DataFrame:** 2D table with labeled columns

Create a DataFrame

```
import pandas as pd

df = pd.DataFrame({
    "name": ["Asha", "Bilal", "Charu"],
    "marks": [88, 76, 91]
})
```

Useful Methods

- `df.head(n)`, `df.tail(n)`

Useful Methods

- `df.head(n), df.tail(n)`
- `df.info(), df.describe()`

Useful Methods

- `df.head(n), df.tail(n)`
- `df.info(), df.describe()`
- Select a column: `df["marks"]`

Add/Delete Columns

```
df["cgpa"] = df["marks"] / 10  
del df["cgpa"]
```

Vectorized Operations

- Column math applies element-wise (fast)

```
df["marks_plus_5"] = df["marks"] + 5  
df["passed"] = df["marks"] >= 50
```

Demo: Series + DataFrame Operations

- File: `demo/pandas_basics_demo.py`

Demo: Series + DataFrame Operations

- File: `demo/pandas_basics_demo.py`
- Shows:

Demo: Series + DataFrame Operations

- File: `demo/pandas_basics_demo.py`
- Shows:
 - creating Series/DataFrame

Demo: Series + DataFrame Operations

- File: `demo/pandas_basics_demo.py`
- Shows:
 - creating Series/DataFrame
 - head/tail

Demo: Series + DataFrame Operations

- File: `demo/pandas_basics_demo.py`
- Shows:
 - creating Series/DataFrame
 - head/tail
 - selecting and adding columns

Demo: Series + DataFrame Operations

- File: `demo/pandas_basics_demo.py`
- Shows:
 - creating Series/DataFrame
 - head/tail
 - selecting and adding columns
 - basic boolean filtering

Checkpoint 1

Question: What is the difference between Series and DataFrame?

Checkpoint 2

Question: How do you select the "marks" column from a DataFrame?

Think-Pair-Share

Discuss:

- Why are vectorized operations preferred over loops in Pandas?

Key Takeaways

- Pandas simplifies tabular data handling

Key Takeaways

- Pandas simplifies tabular data handling
- Series is 1D; DataFrame is 2D

Key Takeaways

- Pandas simplifies tabular data handling
- Series is 1D; DataFrame is 2D
- Column operations are vectorized and efficient

Exit Question

Write one line to create a new column "cgpa" from "marks".