## **Guide to Back-End Development**

## **1. Python Basics**

* Download Pycharm Community edition using the following link.

[Pycharm for Linux](https://www.jetbrains.com/pycharm/download/#section=linux)

* Review basic Python syntax and commands and implement them in PyCharm.

[Python Basics](https://www.w3schools.com/python/default.asp)

* **\*\*(Optional)** Following is the link for a quick guide to PyCharm.

[Pycharm Tutorial](https://realpython.com/pycharm-guide/)

## **2. Python Advanced**

* **Logging and Log Levels**

This tutorial explains the basics of logging, logging levels, Python’s logging module, and how to use it and format the logs.

[Logging and Log levels in python](https://realpython.com/python-logging/)

* **Named Tuples**

This tutorial explains what are named tuples in python, how to use them, the different features of named tuples, and how they are different from simple tuples and other data structures in python.

[Python Named Tuples](https://realpython.com/python-namedtuple/)

* **Asynchronous Programming**

This tutorial explains how to do asynchronous programming in python using the asyncio module and how to use the async and await keywords that are used to define coroutines in Python.

[Python AsyncIO](https://realpython.com/async-io-python/)

* **Threading and Multithreading**

This article covers the basics of threading and multithreading in Python. Just like multiprocessing, multithreading is a way of achieving multitasking.

[Multithreading in Python](https://www.geeksforgeeks.org/multithreading-python-set-1/)

* **Processing and Multiprocessing**

This article is a brief yet concise introduction to multiprocessing in Python.

[Multiprocessing in Python](https://www.geeksforgeeks.org/multiprocessing-python-set-1/)

* **Object-Oriented Programming Python**

[Python Object Oriented Programming](https://pynative.com/python/object-oriented-programming/)

**3. REST API**

The following short video tutorial will explain the basics of Rest API’s and different HTTP methods.

[REST API's (6 minutes)](https://www.youtube.com/watch?v=SLwpqD8n3d0&list=LL&index=1)

**4. JSON**

JSON is a syntax for storing and exchanging data. JSON is text, written with JavaScript object notation. The following tutorial will explain the basics of how to handle JSON data in Python.

[Python Json Tutorial](https://www.w3schools.com/python/python_json.asp)

**5. GraphQL**

## **6. Flask Framework**

* **Tutorial**

Flask is a web application framework in Python. This tutorial gives a basic overview of Flask, how to set up the environment, how to define routes, how to request objects using the Flask request module, and how to make Rest API’s. Just go through the basics and ignore the databases for now.

[Flask Tutorial](https://www.tutorialspoint.com/flask/index.htm)

## **7. FAST Framework**

## **8. PostgreSQL**

* **Installation**

This tutorial will help you download and install PostgreSQL and pgAdmin on Ubuntu 20.04. Just follow the steps provided in the link below.

[PostgreSQL and pgAdmin installation Ubuntu](https://www.tecmint.com/install-postgresql-and-pgadmin-in-ubuntu/)

* **Raw Queries**

PostgreSQL is a powerful, open-source object-relational database system. This tutorial will explain the basics of PostgreSQL, like how to create a database, how to create tables, and how to write raw queries.

[PostgreSQL Tutorial](https://www.tutorialspoint.com/postgresql/index.htm)

* **SQLAlchemy (ORM Python)**

Flask-SQLAlchemy is an Object Relational Mapper and a Flask extension that adds support for SQLAlchemy to the Flask application. This tutorial will explain how to connect to a Postgres database using Flask-SQLAlchemy and perform CRUD operations on the database.

[SQLAlchemy Tutorial](https://pythonbasics.org/flask-sqlalchemy/)

## **9. MongoDB**

* **Installation**

Thefollowing documentation describes the step-by-step procedure to download and install MongoDB on Ubuntu. Follow the steps in the below link and setup MongoDB. The second link is for the installation of MongoDB GUI client which allows you to interact with your MongoDB using a GUI.

[MongoDB installation Ubuntu](https://docs.mongodb.com/manual/tutorial/install-mongodb-on-ubuntu/)

[MongoDB GUI Client Compass](https://www.mongodb.com/try/download/compass)

* **Raw Queries**

MongoDB is an open-source document database and leading NoSQL database. MongoDB stores data in JSON-like documents, which makes the database very flexible and scalable. The following tutorial explains how to implement raw queries in MongoDB. Just learn the basics and don’t go into much detail.

[MongoDB Tutorial](https://www.tutorialspoint.com/mongodb/index.htm)

* **Pymongo**

pymongo is a Python module that lets you connect with MongoDB and implement raw queries more easily in python. The following tutorial goes through the basics of pymongo.

[Pymongo Tutorial](https://www.w3schools.com/python/python_mongodb_getstarted.asp)

* **Mongoengine (ORM Python)**

Flask-mongoengine is an Object Relational Mapper for MongoDB. This tutorial will explain how to connect to a MongoDB using Flask-mongoengine and perform CRUD operations on the database.

[Mongoengine Tutorial](https://pythonbasics.org/flask-mongodb/)

## **10. Redis**

Redis is an open-source, in-memory data structure store, used as a database, cache, and message broker. Redis provides data structures such as strings, hashes, lists, sets etc.

* **Installation**

[Redis Installation Ubuntu](https://www.digitalocean.com/community/tutorials/how-to-install-and-secure-redis-on-ubuntu-20-04)

* **Tutorial**

[Redis Crash Course Tutorial](https://www.youtube.com/watch?v=Hbt56gFj998&list=LL&index=1&t=13s)

[Redis with Python | Redis Documentation Center](https://docs.redis.com/latest/rs/references/client_references/client_python/)

## **11. Elastic Search**

Elasticsearch is a distributed, open-source search and analytics engine. Elasticsearch allows you to store, search, and analyze huge volumes of data quickly and in near real-time and give back answers in milliseconds. It’s able to achieve fast search responses because instead of searching the text directly, it searches an index. It uses a structure based on documents instead of tables and schemas and comes with extensive REST APIs for storing and searching the data.

* **Installation**

[Elastic Search Installation Ubuntu](https://www.digitalocean.com/community/tutorials/how-to-install-and-configure-elasticsearch-on-ubuntu-20-04)

* **Tutorial**

[Elasticsearch Tutorial for Beginners](https://www.youtube.com/watch?v=kjN7mV5POXc&t=275s)

[Python Elasticsearch Client](https://elasticsearch-py.readthedocs.io/en/v7.15.2/)

## **12. RabbitMQ**

* **Installation**

The following link gives you all the steps to setup RabbitMQ on Ubuntu 20.04. Just follow the steps for Ubuntu as provided in the tutorial.

[RabbitMQ installation Ubuntu](https://attacomsian.com/blog/install-rabbitmq-macos-ubuntu)

* **Tutorial**

RabbitMQ is a message broker, it accepts and forwards messages. The following tutorial gives a brief introduction to RabbitMQ and how to interact with it in Python.

[RabbitMQ tutorial - "Hello world!"](https://www.rabbitmq.com/tutorials/tutorial-one-python.html)

## **13. Kafka**

* **Installation**

The following link gives you all the steps to setup Kafka on Ubuntu 20.04. Just follow the steps provided in the tutorial.

[Kafka Installation Ubuntu](https://tecadmin.net/how-to-install-apache-kafka-on-ubuntu-20-04/)

* **Tutorial**

The following tutorial explains how to interact with Kafka in Python using the kafka-python module. Just write a simple producer and consumer script provided in the tutorial to send and receive messages.

[kafka-python](https://kafka-python.readthedocs.io/en/master/)

## **14. GIT**

The following video tutorial will explain the basic GIT infrastructure, how GIT works, and how to use different GIT commands.

[Git Tutorial for Beginners: Learn Git in 1 Hour](https://www.youtube.com/watch?v=8JJ101D3knE)

## **15. Docker**

This video tutorial gives a brief explanation of what is Docker, what are docker containers, and a simple demo project to see docker in practice.

[Docker Tutorial for Beginners [FULL COURSE in 3 Hours]](https://www.youtube.com/watch?v=3c-iBn73dDE&list=LL&index=3&t=325s)

## **16. Kubernetes**

This video tutorial gives a brief explanation of what Kubernetes is, its architecture, kubectl, Minikube, yaml file, etc. Ingress and a simple demo project to see Kubernetes in practice.

[Kubernetes Tutorial for Beginners [FULL COURSE in 4 Hours]](https://www.youtube.com/watch?v=X48VuDVv0do&list=LL&index=5&t=7735s)

## **17. Google Cloud Platform**

* **Tutorial**

[Google Cloud Platform Essentials - YouTube](https://www.youtube.com/playlist?list=PLIivdWyY5sqKh1gDR0WpP9iIOY00IE0xL)

[Google Cloud Drawing Board - YouTube](https://www.youtube.com/playlist?list=PLIivdWyY5sqI4e7TGsuIDBCIh0Vm-nbvK)

[GCloud SDK, K8s & Docker](https://docs.google.com/document/d/1M-UfHRebCb3hBadNsRCCG7RlznEax4MtjH-_H_1n0PM/edit)

## **18. Cyber Security Terms**

* Cyber Attacks
* Malware
* Viruses
* Cyber Kill Chain
* Hashes (MD5, SHA56, SHA1, SHA512)
* Threat Actors - the hacker group
* IOCs (indicators of compromise)
* Artifacts
* Rules (SNORT, YARA, SIGMA, SURICATA, BALE)
* Firewalls
* IDS IPS
* SIEM
* SOAR
* Advisory
* Encryption (Symmetric and Asymmetric)
* Threat Campaigns
* Strikes and attacks (breach and attack simulation)
* Risk Management
* Security Risk