Advanced C Programming Language

Course Description:

C is a general-purpose high level language that was originally developed by Dennis Ritchie for the Unix operating system. It was first implemented on the Digital Equipment Corporation PDP-11 computer in 1972. C has now become a widely used professional language for various reasons.

- Easy to learn
- Structured language
- It produces efficient programs.
- It can handle low-level activities.
- It can be compiled on a variety of computers.

Course Objectives:

- To impart adequate knowledge on the need of programming languages and problem solving techniques.
- To develop programming skills using the fundamentals and basics of C Language.
- To enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.
- To teach the issues in file organization and the usage of file systems.
- To develop programming skills using the fundamentals and basics of C language.
- To impart the knowledge about pointers which is the backbone of effective memory handling
- To study the advantages of user defined data type which provides flexibility for application development

Course Outline

1. Introduction to programming
2. Fundamentals of C language
3. Control Statements
4. Loop Control Structures in C
5. Arrays
6. String Manipulation
7. Functions
8. Structure , Union& Pointers
9. File handling

Career Opportunities:

1. C language is the base of many languages. It is used for compiler design in many companies
2. Companies who work on embedded programming or any system programming C language is required.
3. Virtually all OS kernels are in C, so that gives you Apple (OSX, iOS), Oracle (Solaris), Microsoft (Windows), Cisco (IOS), and of course many companies that work on some flavor of Linux, including Android (IBM, Intel, Red Hat, Samsung, Novell, TI, Google, Broadcom, Nokia, Oracle, and even Microsoft).
4. All embedded system programs, all device drivers are written in C language.
5. Some distributed systems, databases, and the like are written in C. MySQL, for instance, though it also has C++ now, still contains piles of plain C. Companies working on that include Oracle and Percona. Memcache is also in C.
6. C is typically used for writing operating system (see Linux).

Python Programming Language

Python is a widely used general-purpose, high level programming language. It was initially designed by Guido van Rossum in 1991 and developed by Python Software Foundation. It was mainly developed for emphasis on code readability, and its syntax allows programmers to express concepts in fewer lines of code.

Python is a programming language that lets you work quickly and integrate systems more efficiently.

Course Objective: The learning objectives of this course are:

- To understand why Python is a useful scripting language for developers.
- To learn how to design and program Python applications.
- To learn how to use lists, tuples, and dictionaries in Python programs.
- To learn how to identify Python object types.
- To define the structure and components of a Python program.
- To learn how to write loops and decision statements in Python.
- To learn how to write functions and pass arguments in Python.
- To learn how to build and package Python modules for reusability.
- To learn how to read and write files in Python.
- To learn how to design object-oriented programs with Python classes.
- To learn how to use exception handling in Python applications for error handling.

Course Outline

1. Introduction
2. Conditional Statements, Looping, Control Statements 3.
3. String Manipulation 4.
4. Collections(Lists, Tuples, Dictionaries)
5. Functions
6. Modules/Packages
7. Exception Handling
8. OOPs concept
9. Regular expressions
10. Database
11. GUI Programming

Career Opportunities in Python

- Software Engineer
- Python Developer
- Research Analyst
- Data Analyst
- Data Scientist
- Software Developer

Java (Core + Advance)

COURSE OBJECTIVES

At the end of this course, the student should be able to:

- Proficiency in Java concepts and ability to work on IDE
- Develop Projects.
- I believe that developers have a role to play in this story, by helping to accelerate the evolution of IT from isolated systems to collaborative development.
- It is embedded in many of the world's important IT systems and is in a good position to play a part in future innovation.
- The best part about Java is, its eco-system is self-sustaining, from mobility to middleware, it impacts everything and will continue to make a big impact in future too.

COURSE OUTLINE

SECTION I: CORE JAVA CONCEPTS

Introduction to Java, Iteration statements (Loops) and Jump Statements, Methods - Importance, Array, Class, Class Inheritance, Methods Overriding, Overloading, Abstract Class and Methods, Interfaces, Packages and Access Control, Final, static and others, Object Oriented Concepts - Revisited

SECTION II: ADVANCE JAVA CONCEPTS

Exceptions and Exception handling, Multithreaded Programming, Database Programming with JDBC

PROJECTS:
- Simple Calculator
- Record of students
- Record of Faculty.
- Web Application
- GUI
- Home page
- Working with Structured Data & Unstructured Data

CARRIER OPPORTUNITIES:

Java has started a new era for IT sector. There are several unbelievable products and many services born by using Java. Java developers/programmers have a vast role in transforming the IT market. Java impacts everything from the mobility (i.e. Android) to the middleware (i.e. Hadoop) and hence has an evolving future.
As a career for Java developers/programmers, anyone can consider following job roles.

- Web developer
- Application developer
- EJB programmer
- Software developer
- Tester
- Graphic designer
- A professional teacher in Java

BIG DATA

What is Big Data?

There is no place where Big Data does not exist. The curiosity about what is Big Data has been soaring in the past few years. Forbes reports that every minute, users watch *4.15 million YouTube videos*, send *456,000 tweets* on Twitter, post *46,740 photos* on Instagram and there are *510,000 comments* posted and *293,000 statuses* updated on Facebook!

Just imagine the huge chunk of data that is produced with such activities. This constant creation of data using social media, business applications, telecom and various other domains is leading to the formation of Big Data.

Big Data refers to the large amounts of data which is pouring in from various data sources and has different formats. Even previously there was huge data which were being stored in databases, but because of the varied nature of this Data, the traditional relational database systems are incapable of handling this Data. Big Data is much more than a collection of datasets with different formats; it is an important asset which can be used to obtain enumerable benefits.

The three different formats of big data are:

1. *Structured:* Organised data format with a fixed schema. Ex: RDBMS
2. *Semi-Structured:* Partially organised data which does not have a fixed format. Ex: XML, JSON
3. *Unstructured:* Unorganised data with an unknown schema. Ex: Audio, video files etc.

Following are the characteristics associated with Big Data:

I. Validity: correctness of data
II. Variability: dynamic behaviour
III. Volatility: tendency to change in time
IV. Vulnerability: vulnerable to breach or attacks
V. Visualization: visualizing meaningful usage of data

Basically, Big Data Analytics is largely used by companies to facilitate their growth and development. This majorly involves applying various data mining algorithms on the given set of data, which will then aid them in better decision making.

There are multiple tools for processing Big Data such as *Hadoop*, *Pig*, *Hive*, *Cassandra*, *Spark*, *Kafka*, etc. depending upon the requirement of the organisation.

Scope of Big Data

- *Numerous Job opportunities***:** The career opportunities pertaining to the field of Big data include, Big Data Analyst, Big Data Engineer, Big Data solution architect etc. According

to IBM, 59% of all Data Science and Analytics (DSA) job demand is in Finance and Insurance, Professional Services, and IT.

- **Rising demand for Analytics Professional:** An article by Forbes reveals that "IBM predicts demand for Data Scientists will soar by 28%". By 2020, the number of jobs for all US data professionals will increase by 364,000 openings to 2,720,000 according to IBM.
- **Salary Aspects:** Forbes reported that employers are willing to pay a premium of $8,736 above median bachelor's and graduate-level salaries, with successful applicants earning a starting salary of $80,265
- **Adoption of Big Data analytics:** Immense growth in the usage of big data analysis across the world.

Topics Covered in Big Data:-

- Introduction of Big Data
- Case for Hadoop Ecosystem
- Hadoop Installation
- Planning Your Hadoop Cluster:-The Hadoop Distributed File System (Hdfs)
- MapReduce
- MapReduce with Example
- Developing a MapReduce Application
- MapReduce Types & Formats
- Apache Pig
- Hive
- Introuction to Hbase
- Apache Spark
- PySpark Basics
- Aggregating Data with Pair Rdds

Job Opportunities & Meeting the Skill Gap:

The demand for Analytics skill is going up steadily but there is a huge deficit on the supply side. This is happening globally and is not restricted to any part of geography. In spite of Big Data Analytics being a 'Hot' job, there is still a large number of unfilled jobs across the globe due to shortage of required skill. A McKinsey Global Institute study states that the US will face a shortage of about 190,000 data scientists and 1.5 million managers and analysts who can understand and make decisions using Big Data by 2018.

India currently has the highest concentration of analytics globally. According to Srikanth Velamakanni, co-founder and CEO of Fractal Analytics, there are two types of talent deficits: Data Scientists, who can perform analytics and Analytics Consultant, who can understand and use data.

The talent supply for this job title, especially Data Scientists is extremely scarce and the demand is huge.

<u>Job Titles and Type of Analytics:</u>
From a career point of view, there are so many options available, in terms of domain as well as nature of job. Since Analytics is utilized in varied fields, there are numerous job titles for one to choose from.

- Big Data Analytics Business Consultant
- Big Data Analytics Architect
- Big Data Engineer
- Big Data Solution Architect
- Big Data Analyst
- Analytics Associate
- Business Intelligence and Analytics Consultant
- Metrics and Analytics Specialist

Machine Learning (Value Added Cource)

COURSE OBJECTIVES

- To compare and contrast pros and cons of various machine learning techniques and to get an insight of when to apply a particular machine learning approach.
- To mathematically analyse various machine learning approaches and paradigms.
- Distinguish between, supervised, unsupervised and semi-supervised learning.
- Apply the appropriate machine learning strategy for any given problem.

COURSE OUTLINE

- Scientific Computing with Python - Numerical Python (NumPy)
- Data Analysis Workflow in Python using Pandas
- Introduction to Sklearn Library & Functions
- Data Manipulation in Python
- Visualization in Python(matplotlib)
- Data preprocessing
- Basic concepts of Machine Learning
- KNN concept and implementation
- Linear Regression
- Support Vector Machine
- Naïve Bayes Algorithm
- Image processing
- Artificial Neural Networks with Case Study

CARRER OPPORTUNITIES
- Machine Learning Engineer
- Data Engineer/Data Architect
- Data Analyst
- Data Scientist