PROGRAMMING IN MODERN C++

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PRE-REQUISITES : Programming & Data Structure (mandatory), Programming in C (optional). Design and Analysis of Algorithms (optional)

INDUSTRIES APPLICABLE TO : Programming in C++ is so fundamental that all companies dealing with systems as well as application development (including web, IoT, embedded systems) have a need for the same. These include –Microsoft, Samsung, Xerox, Yahoo, Oracle, Google, IBM, TCS, Infosys, Amazon, Flipkart, etc. This course would help industry developers to be up-to-date with the advances in C++ so that they can remain at the state-of-the-art

COURSE OUTLINE :
There has been a continual debate on which programming language/s to learn, to use. As the latest TIOBE Programming Community Index for August 2021 indicates – C (13%), Python (12%), C++ (7%), Java (10%), and C#(5%) together control nearly half the programming activities worldwide. Further, C Programming Language Family (C, C++, C#, Objective C etc.) dominate more than 25% of activities. Hence, learning C++ is important as one learns about the entire family, about Object-Oriented Programming and gets a solid foundation to also migrate to Java and Python as needed. C++ is the mother of most general purpose of languages. It is multi-paradigm encompassing procedural, object-oriented, generic, and even functional programming. C++ has primarily been the systems language till C++03 which punches efficiency of the code with the efficacy of OOP. Then, why should I learn it if my primary focus is on applications? This is where the recent updates of C++, namely, C++11 and several later offer excellent depths and flexibility for C++ that no language can match. These extensions attempt to alleviate some of the long-standing shortcomings for C++ including porous resource management, error-prone pointer handling, expression semantics, and better readability. The present course builds up on the knowledge of C programming and basic data structure (array, list, stack, queue etc.) to create a strong familiarity with C++98 / C++03. Besides the constructs, syntax and semantics of C++ (over C), we also focus on various idioms of C++ and attempt to go to depth with every C++ feature justifying and illustrating them with several examples and assignment problems. On the way, we illustrate various OOP concepts. The course also covers important advances in C++11 and later released features

ABOUT INSTRUCTOR :
Prof. Partha Pratim Das received his BTech, MTech and PhD degrees in 1984, 1985 and 1988 respectively from IIT Kharagpur. He served as a faculty in Department of Computer Science and Engineering, IIT Kharagpur from 1988 to 1998. In 1998, he joined Alumnus Software Ltd as a Business Development Manager. From 2001 to 2011, he worked for Interra Systems, Inc. as a Senior Director and headed its Kolkata Center. In 2011, he joined back to Department of Computer Science and Engineering, IIT Kharagpur as Professor. Dr. Das has also served as a Visiting Professor with Institute of Radio Physics and Electronics, Calcutta University from 2003 to 2013.

Prof. Das is currently the Head of Rajendra Mishra School of Engineering Entrepreneurship, the Professor-inCharge of the upcoming Research Park of IIT Kharagpur at Rajarhat, Kolkata, and the Joint Principal Investigator of National Digital Library of India project of MHRD.

Prof. Das has taught several courses in Computer Science including Software Engineering, Object-Oriented Systems, Programming and Data Structure, Compiler Design, Design and Analysis of Algorithms, Information System Design, Database Management Systems, Computational Geometry, Principles of Programming Languages, Embedded Systems, and Image Processing. Jointly with 2 others, he has also offered a course on Introduction to Design of Algorithms under the T10KT program of NME-ICT, MHRD (https://www.facebook.com/t10kt.algorithms/) to nearly 7000 teachers. Further, Dr. Das has been offering Programming in C++ and Object-Oriented Analysis and Design in NPTEL-NOC. Both courses are regularly attended by thousands of students.

Prof. Das has published over 40 technical papers in international journals in areas of Digital Geometry, Image Processing, Parallel Computing and Knowledge-based Systems. In 2013 he has co-authored a research monograph titled Digital Geometry in Image Processing (CRC Press). His current interests include Human-Computer Interactions, Computer Analysis of Indian Classical Dance, Object-Oriented Systems Analysis and Design, Software Engineering, Compiler Technology, and Technology Enabled Learning. Dr. Das is a member of Association of Computing Machinery (ACM), The Institute of Electrical and Electronics Engineers (IEEE), and Indian Unit for Pattern Recognition and Artificial Intelligence (IUPRAI).

COURSE PLAN:

Week 1: Programming in C++ is Fun.
Week 2: C++ as Better C.
Week 3: OOP in C++.
Week 4: OOP in C++.
Week 5: Inheritance.
Week 6: Polymorphism.
Week 7: Type Casting.
Week 8: Exceptions and Templates.
Week 9: Streams and STL.
Week 10: Modern C++.
Week 11: Lambda and Concurrency.
Week 12: Move, Rvalue and STL Containers.