DevOpsSchool
Lets Learn, Share & Practice DevOps

Day - 1

Introduction to Quantum Computing

- **Introduction**
  - Introduction
  - What is Quantum computing
  - Characteristics of a computational system

- **Mathematic for quantum computing**
  - Understanding complex numbers part 1
  - Understanding complex numbers part 2
  - Mathematics for quantum computing Part 1
  - Mathematics for quantum computing Part 2
  - Mathematics for quantum computing Part 3
  - Mathematics for quantum computing Part 4
  - Mathematics for quantum computing Part 5
  - The concept of Qubit part 1
  - The concept of Qubit part 2

- **Quantum Computing algorithms**
  - Introduction to different types of quantum computing algorithms
  - Quantum computing algorithms part 1
  - Quantum computing algorithms part 2
  - Quantum computing algorithms part 3

- **Programming Part**
  - Introduction to Microsoft Q#
  - Setting up everything
  - Basic Microsoft Q# operations part 1
  - Basic Microsoft Q# operations part 2
  - Basic Microsoft Q# operations part 3
  - Basic Microsoft Q# operations part 4
  - Conclusion

Quantum Computing: The Big Picture

- **Course Overview**
  - Course Overview
- **Introduction**
  - Introduction
- **What Is Quantum Computing?**
  - Introduction
  - Overview
  - Classical Computing Fundamental Unit
  - Quantum Computing Fundamental Unit
  - Light Switch Analogy
  - Traversing a Maze Example
  - Scaling Classical and Quantum Computers
  - Summary
- **Possibilities of Quantum Computing**
  - Introduction
  - Applications in Finance
  - Applications in Cryptography
  - Applications in Medicine
  - Commonality of Quantum Solvable Problems
  - Summary
- **Getting Involved Today**
  - Intro
  - State Of Quantum
  - Available Tools
  - Summary

Quantum Computing for Beginners

- **Introduction to Quantum Computing**
  - Course Introduction
  - Classical Computing Vs. Quantum Computing
  - Quantum Computing and Its Application
  - Classical Computing & Quantum Tunneling
- **Bit vs Qubit, Superposition & Measurements**
  - Classical Bits and Gates
  - Qubit or Quantum Bit & State Notations
  - Quantum Physics, Superposition & Mathematical Model
  - Qubit Measurements
- **Math Refresher for Quantum Computing**
  - Complex Number Basics
  - Algebra of Complex Numbers
  - Complex Number Conjugates & Divisions
  - Matrix Addition, Subtraction & Multiplication
  - Matrix Transpose & Conjugate Transpose
- **Experience IBM Quantum Computer**
  - IBM Quantum Experience 1

    IBM Quantum Experience 2
- **Quantum Gates, Bloch Sphare & Qubit Manipulation**
  - Quantum Gates
  - Bloch Sphere Representation
  - Paulli Gates
  - Hadamard Gate
  - CNOT Gate
  - CCNOT Gate - Toffoli
  - Quantum Gate Properties
  - Test on Quantum Gates
- **Quantum Entanglement & Teleportation**
  - Quantum Entanglement
  - Bell State (Entanglement)
  - Quantum Teleportation Explained
  - No-Cloning Theorem
- **Quantum Algorithms & Quantum Cryptography**
  - Quantum Algorithms & Deutsch-Jozsa
  - Shor's and Grover's Algorithms
  - Quantum Cryptography
  - More Lectures to Come
- **Conclusion**
  - Books and Resources
  - Conclusion

Day - 2

Quantum Computing: Getting Started with Q#

- **Course Overview**
  - Course Overview
- **Getting Started with the Microsoft Quantum Development Kit**
  - Introduction
  - Quantum Refresher
  - Intro to QDK
  - First Quantum Project
  - Summary
- **Quantum Phenomena: Superposition**
  - Intro Overview
  - What Is Superposition Real World?
  - What Is Superposition Quantum World?
  - Why Is Superposition Important?
  - Demo: Superposition
  - Summary
- **Quantum Phenomena: Entanglement**
  - Intro Overview
  - What Is Superposition Real World?
  - What Is Superposition Quantum World?
  - Why Is Superposition Important?
  - Demo: Superposition
  - Summary
- **Quantum Phenomena: Teleportation**
  - Intro Overview
  - Alice and Bob
  - What Is Teleportation?
  - Why Is Teleportation Important?
  - Demo: Teleportation
  - Summary
- **Exploring Additional Quantum Algorithms**
  - Intro Overview
  - What Are Quantum Algorithms?
  - How Are Quantum Algorithms Designed?
  - Demo: Additional Algorithms
  - Summary