



# C++

## Programming Step-by-Step

Asadullah Shah



IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

# **C++ PROGRAMMING: STEP BY STEP**

---

**Editors**

Asadullah Shah



**IIUM Press**

Published by:  
IIUM Press  
International Islamic University Malaysia

First Edition, 2011  
©IIUM Press, IIUM

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without any prior written permission of the publisher.

Perpustakaan Negara Malaysia

Cataloguing-in-Publication Data

Bibliography p.  
Includes Index  
ISBN

ISBN: 978-967-418-090-4

Member of Majlis Penerbitan Ilmiah Malaysia · MAPIM  
(Malaysian Scholarly Publishing Council)

Printed by :  
**IIUM PRINTING SDN. BHD.**  
No. 1, Jalan Industri Batu Caves 1/3  
**Taman Perindustrian Batu Caves**  
Batu Caves Centre Point  
68100 Batu Caves  
Selangor Darul Ehsan

# CONTENTS

---

<b>DEDICATION</b>	iii
<b>PREFACE</b>	viii
<b>ACKNOWLEDGEMENT</b>	ix
<b>1. INTRODUCTION</b>	
<i>Asadullah Shah and Assadullah Shaikh</i> .....	1
<b>2. ARITHMETIC EXPRESSIONS AND DATA TYPES IN C++</b>	
<i>Asadullah Shah and Assadullah Shaikh</i> .....	5
<b>3. SENDING THE OUTPUT TO A PRINT FILE</b>	
<i>Asadullah Shah and Assadullah Shaikh</i> .....	11
<b>4. DECISION MAKING: IF-ELSE STATEMENTS AND RELATIONAL OPERATORS</b>	
<i>Asadullah Shah and Assadullah Shaikh</i> .....	17
<b>5. LOGICAL OPERATORS AND SWITCH STATEMENTS</b>	
<i>Asadullah Shah and Assadullah Shaikh</i> .....	25
<b>6. REVIEW, SUMMARY &amp; BUILDING SKILL</b>	
<i>Asadullah Shah and Khamran Khowaza</i> .....	33
<b>7. ITERATIVE STRUCTURES</b>	
<i>Asadullah Shah and Khamran Khowaza</i> .....	39

<b>8. THE FOR LOOP</b>	
<i>Asadullah Shah and Khamran Khowaza</i> .....	49
<b>9. THE DO-WHILE LOOP</b>	
<i>Asadullah Shah and Khamran Khowaza</i> .....	55
<b>10. REVIEW OF VARIABLES, FORMATTING</b>	
<i>Asadullah Shah and Khamran Khowaza</i> .....	59
<b>11. REVIEW OF ITERATIVE STRUCTURES</b>	
<i>Asadullah Shah and Sumbul Khowaza</i> .....	63
<b>12. POST-TEST AND NESTED LOOPS</b>	
<i>Asadullah Shah and Sumbul Khowaza</i> .....	73
<b>13. FUNCTIONS</b>	
<i>Asadullah Shah and Sumbul Khowaza</i> .....	83
<b>14. CALL-BY-VALUE AND REFERENCE</b>	
<i>Asadullah Shah and Sumbul Khowaza</i> .....	91
<b>15. MORE ON FUNCTIONS</b>	
<i>Asadullah Shah and Sumbul Khowaza</i> .....	99
<b>16. STRUCTURES (STRUCT) AND FILES</b>	
<i>Asadullah Shah and Muniba Shaikh</i> .....	111
<b>17. ARRAYS</b>	
<i>Asadullah Shah and Muniba Shaikh</i> .....	119
<b>18. EXERCISE OF ARRAY</b>	
<i>Asadullah Shah and Muniba Shaikh</i> .....	127

<b>19. READ DATA FROM A FILE</b>	
<i>Asadullah Shah and Mumiba Shaikh</i> .....	137
<b>20. OBJECT ORIENTED PROGRAMMING</b>	
<i>Asadullah Shah and Mumiba Shaikh</i> .....	143
<b>21. SELECTION SORTING</b>	
<i>Asadullah Shah and Syed Ifihar Ali</i> .....	153
<b>22. BUBBLE SORT ALGORITHM</b>	
<i>Asadullah Shah and Syed Ifihar Ali</i> .....	161
<b>23. REVIEW OF ARRAYS</b>	
<i>Asadullah Shah and Syed Ifihar Ali</i> .....	167
<b>24. LINEAR SEARCHING</b>	
<i>Asadullah Shah and Syed Ifihar Ali</i> .....	179
<b>25. BINARY SEARCH</b>	
<i>Asadullah Shah and Syed Ifihar Ali</i> .....	189
<b>26. VECTOR CLASS</b>	
<i>Asadullah Shah and Ejaz Ahmed</i> .....	199
<b>27. POINTERS</b>	
<i>Asadullah Shah and Ejaz Ahmed</i> .....	203
<b>28. FUNCTION POINTERS</b>	
<i>Asadullah Shah and Ejaz Ahmed</i> .....	213
<b>29. POLYMORPHISM AND VIRTUAL FUNCTIONS</b>	
<i>Asadullah Shah and Ejaz Ahmed</i> .....	219

<b>30. C++ REFERENCES</b>	
<i>Asadullah Shah and Ejaz Ahmed</i> .....	223
<b>31. CONST CORRECTNESS</b>	
<i>Asadullah Shah and Osama Mahfooz</i> .....	229
<b>32. MORE ON CONST KEYWORDS</b>	
<i>Asadullah Shah and Osama Mahfooz</i> .....	235
<b>33. GOTO STATEMENT</b>	
<i>Asadullah Shah and Osama Mahfooz</i> .....	241
<b>34. HANDLING ERRORS IN C++</b>	
<i>Asadullah Shah and Osama Mahfooz</i> .....	249
<b>35. STATIC: THE MULTIPURPOSE KEYWORD</b>	
<i>Asadullah Shah and Osama Mahfooz</i> .....	253

# 10. REVIEW OF VARIABLES, FORMATTING

---

Asadullah Shah and Khamran Khowaza  
Department of Computer Science, Faculty of Information and  
Communication Technology, International Islamic University Malaysia,  
Malaysia

## Abstract

The variables are names assigned to data types, each variable once declared within a program is assigned to a memory space. Some variables might occupy less space than others. All variables are equally important and computer programs once make use of these variables stick to their types throughout the program executions.

## 10.1 Variables

A variable is a name assigned to the first byte of the memory to store a value. During compilation the compiler reserve required memory for each variable. For some variables the compiler may reserve more than one byte to store a value. This is why a type is always associated with a variable. For example in a 16-bit processor 2 bytes are used to store an integer, 4 bytes for floats, 8 bytes for double, and 1 byte for character and bool. The size of memory can be determined by the operator **sizeof**.

For example, **cout << sizeof(x)**; if x is an float, 4 bytes will be reserved and for an integer 2 bytes are displayed.

Variable types can be signed or unsigned. For example, in a signed integer variable the range of values are -32,768 to +32,767. In an unsigned integer this range is from 0 to 65,535. Float and double are real numbers and contain fractional parts of the number, the difference among them is their precision.