# Chapter 2

**Data Design and Implementation**

2.1 Different Views of Data

What Do We Mean by Data?

Data Abstraction

Data Structures

Abstract Data Type Operator Categories

2.2 Abstraction and Built-In Types

Records

Logical Level

Application Level

Implementation Level

One-Dimensional Arrays

Logical Level

Application Level

Implementation Level

Two-Dimensional Arrays

Logical Level

Application Level

Implementation Level

2.3 Higher-Level Abstraction and the C++ Class Type

Class Specification

Class Implementation

Member Functions with Object Parameters

Difference Between Classes and Structs

2.4 Object-Oriented Programming

Concepts

Inheritance

Polymorphism

C11 Constructs for OOP

Composition

Deriving One Class from Another

Virtual Methods

2.5 Constructs for Program Verification

Exceptions

try-catch and throw Statements

Standard Library Exceptions

Namespaces

Creating a Namespace

Access to Identifiers in a Namespace

Rules for Using the Namespace std

2.6 Comparison of Algorithms

Big-O

Common Orders of Magnitude

Example 1: Sum of Consecutive Integers

Example 2: Finding a Number in a Phone Book

Summary

Exercises