

Master Object-Oriented Programming with Fortran 90/95: A Comprehensive Guide

Fortran 90/95 is a powerful and versatile programming language renowned for its efficiency and precision in scientific and engineering applications. Embracing the object-oriented paradigm, Fortran 90/95 empowers developers to build robust, maintainable, and reusable code.

In this comprehensive article, we delve into the world of object-oriented programming in Fortran 90/95. We'll explore its key concepts, syntax, and practical examples, providing you with a thorough understanding of how to harness the power of object-oriented programming in your Fortran projects.



Object-Oriented Programming Language : FORTRAN 90/95 by E. C. Akaligwo

★★★★★ 5 out of 5

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Screen Reader	: Supported
Enhanced typesetting	: Enabled
Print length	: 47 pages
Lending	: Enabled

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Object-Oriented Programming Concepts

Object-oriented programming (OOP) is a programming paradigm that revolves around the notion of objects. An object is a self-contained entity that encapsulates data and behavior, representing a real-world concept.

OOP offers several key benefits, including:

- **Encapsulation:** Objects bundle data and methods into a single unit, hiding internal details from other parts of the program.
- **Abstraction:** Objects represent real-world entities, providing a simplified and intuitive way to model complex systems.
- **Inheritance:** Objects can inherit properties and behaviors from parent classes, promoting code reuse and extensibility.
- **Polymorphism:** Objects can override or redefine methods inherited from parent classes, enabling flexible and customizable behavior.

Object-Oriented Programming in Fortran 90/95

Fortran 90/95 introduces significant enhancements that support object-oriented programming, including:

- **Derived Data Types:** Allow for the definition of user-defined data types that encapsulate data and methods.
- **Derived Type Extensibility:** Derived data types can be extended and modified, enabling the creation of hierarchical object structures.
- **Pointers:** Provide dynamic memory management and enable the creation of complex data structures such as linked lists and binary trees.

Fortran 90/95 Syntax for Object-Oriented Programming

Fortran 90/95 introduces the following syntax for object-oriented programming:

- **TYPE:** Declares a derived data type that defines the structure and behavior of objects.
- **END TYPE:** Terminates the definition of a derived data type.
- **CONTAINS:** Encapsulates data and methods within a derived data type.
- **PROCEDURE, ELEMENTAL:** Declares a method or procedure associated with a derived data type.
- **ALLOCATE:** Allocates memory for an object instance.
- **DEALLOCATE:** Releases memory associated with an object instance.

Practical Examples of Object-Oriented Programming in Fortran 90/95

Let's explore some practical examples to illustrate object-oriented programming in Fortran 90/95:

1. Defining a Simple Class:

```
TYPE circle REAL :: radius, circumference END TYPE
```

2. Creating an Object Instance:

```
TYPE(circle) :: myCircle ALLOCATE(myCircle) myCircle%radius = 5.0
myCircle%circumference = 2.0 * PI * myCircle%radius
```

3. Overriding a Method:

```
TYPE, EXTENDS(circle) :: subclass PROCEDURE :: getArea =>
myGetArea END TYPE SUBROUTINE myGetArea(this, area)
```

```
CLASS(subclass) :: this REAL :: area area = PI * THIS%radius^2 END  
SUBROUTINE myGetArea
```

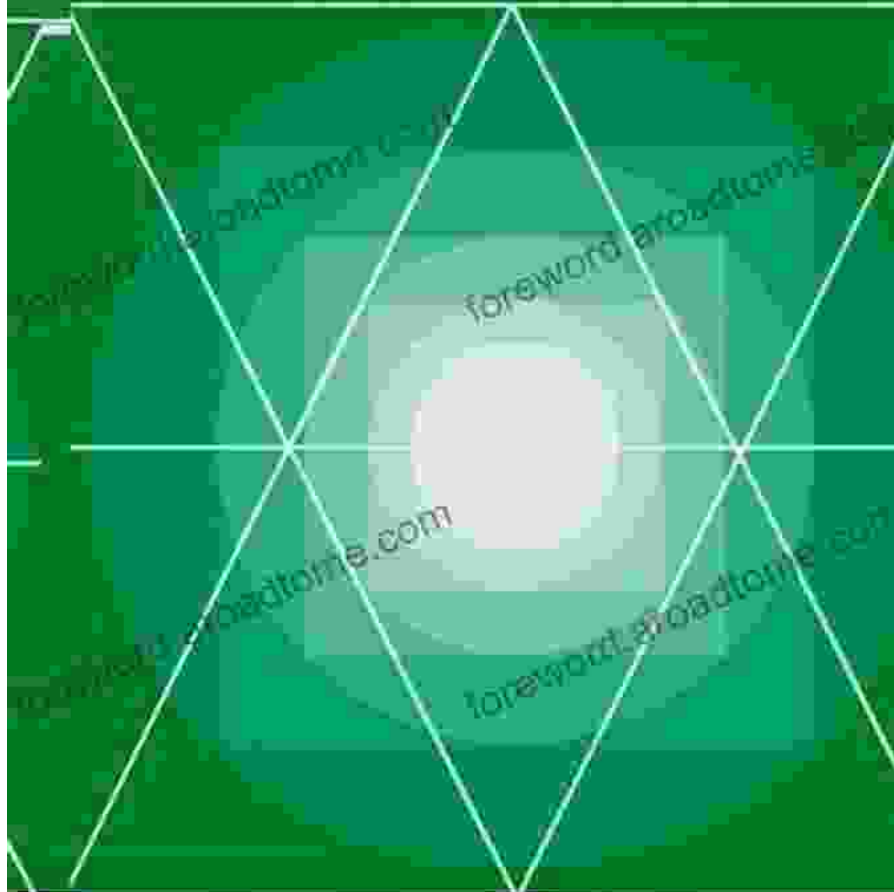
Object-oriented programming in Fortran 90/95 empowers developers to create robust, maintainable, and reusable code. By embracing OOP concepts and leveraging the powerful syntax provided by Fortran 90/95, you can unlock the full potential of your Fortran applications.

Acquire the In-Depth Knowledge You Need:

Delve deeper into object-oriented programming in Fortran 90/95 with the comprehensive book, "Object-Oriented Programming Language Fortran 90 95 Akaligwo." This authoritative guide provides a step-by-step approach to mastering OOP in Fortran, equipping you with the skills and knowledge to tackle complex programming challenges.

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MPI_Type_indexed

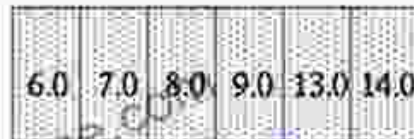
count = 2; blocklengths[0] = 4; blocklengths[1] = 2;
displacements[0] = 5; displacements[1] = 12;



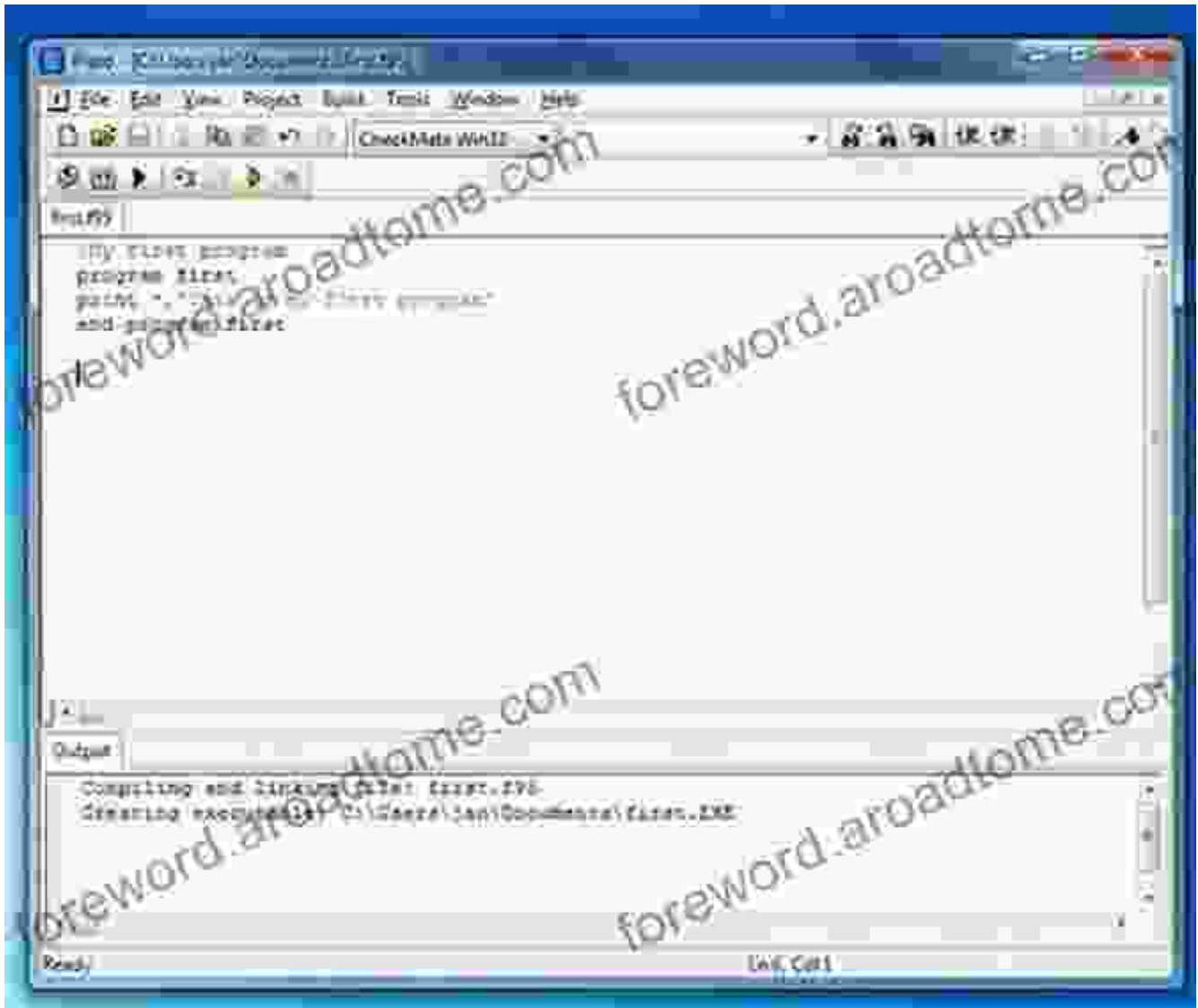
a[16]

```
MPI_Type_indexed(count, blocklengths, displacements, MPI_FLOAT, &indextype);
```

```
MPI_Send(&a, 1, indextype, dest, tag, comm);
```



1 element of
indextype



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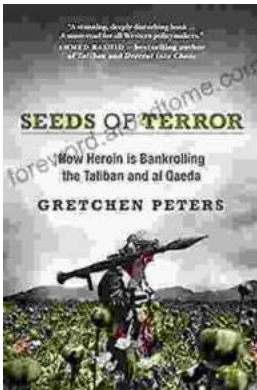
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