

# Coarrays on HPC: A Path to Parallel Discrete Event Simulation?

Daniel Topa

December 21, 2024

## Abstract

Coarrays are a tool to help Fortran programmers write efficient parallel code. The idea is to place the onus of the intricacies of parallel communication onto the compiler writers, leaving programmers to focus on scientific computation and methods. This paper addresses basic questions of how methods for parallel discrete event simulation might be expressed on HPC using coarrays.

## Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
1.1	Overview of the Problem . . . . .	1
1.2	The Promise of Coarrays . . . . .	1
1.3	Objectives . . . . .	2
1.4	Methodology . . . . .	2
<b>2</b>	<b>Introduction</b>	<b>2</b>
2.1	The Promise of Coarrays . . . . .	2
2.2	B . . . . .	2
2.3	C . . . . .	2
	<b>References</b>	<b>2</b>

## 1 Introduction

### 1.1 Overview of the Problem

This subsection provides a detailed description of the problem or challenge being addressed in this project.

### 1.2 The Promise of Coarrays

Portability of performance. Can a human do better? References: [5, 6], ([3, 1, 2]) as well as the invaluable language reference guide [4].

### 1.3 Objectives

This subsection outlines the main objectives of the project, including key research goals or development targets.

### 1.4 Methodology

This subsection describes the methodology or approach taken to address the problem and achieve the objectives.

## 2 Introduction

### 2.1 The Promise of Coarrays

### 2.2 B

Second subsection.

### 2.3 C

Third subsection.

## References

- 1 Norman S Clerman and Walter Spector. *Modern Fortran: Style and Usage*. Cambridge University Press, 2011.
- 2 Richard J. Hanson and Tim Hopkins. *Numerical Computing with Modern Fortran*. Philadelphia, PA: Society for Industrial and Applied Mathematics, 2013. DOI: 10.1137/1.9781611973129.
- 3 Arjen Markus. *Modern Fortran in practice*. Cambridge University Press, 2012.
- 4 Michael Metcalf et al. *Modern Fortran Explained: Incorporating Fortran 2023*. Oxford University Press, 2024.
- 5 Robert W Numrich. *Parallel programming with co-arrays*. Chapman and Hall/CRC, 2018.
- 6 Subrata Ray. *Fortran 2018 with Parallel Programming*. Chapman and Hall/CRC, 2019.