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Unit 1: Mixed-Precision: Introduction

Software Outlook

The [Software Outlook Project](#) is funded as part of the [Computational Science Centre for Research Communities \(CoSeC\)](#). Its aim is to provide the UK's Collaborative Computational Projects (CCPs) and High-End Computing Consortia (HECs) with the knowledge and skills to maintain the world-leading status of their scientific software. We achieve this by evaluating new programming tools, libraries and techniques; demonstrating how specific methodologies can be applied to existing applications; developing comprehensive training packages.

Course Objectives

- Understand floating-point numbers and how different precisions are stored on digital computers;
- Learn how precision of floating-point number can affect
 - computational speed;
 - energy consumption;
 - accuracy of computation;
- Develop an understanding of the mathematical considerations required when developing mixed-precision code;
- Develop an understanding of how code structure can affect the suitability of whether a code will perform well when using mixed-precision.

Prerequisites

- Experience in scientific programming

Course Outline

- Unit 1: Introduction to course
- Unit 2: Introduction to floating-point numbers
- Unit 3: Single vs double precision: computational speed and energy consumption
- Unit 4: Single vs double precision: accuracy of floating-point arithmetic
- Unit 5: Mathematical considerations for mixed-precision codes
- Unit 6: Code structure considerations for mixed-precision codes
- Unit 7: Conclusions