MAN T&EC

The Manchester and North HPC Training and Education Centre

The Application Visualisation System (AVS)

An advanced course

1 Overview

AVS is a system which allows users to visualise their data by constructing applications from a series of software components called modules. This course is designed for the user with some basic experience of AVS including knowledge of the network editor to create networks of modules. The course covers extensively the topic of creating AVS modules to incorporate your own application code into the system. This can range from embedding simulation codes to implementing visualisation techniques and each class of module is covered in the course. The C programming language is used for the practical exercises. It is of one days duration, consisting of a number of theoretical and practical sessions to support each topic.

The course has been developed by the Manchester and North High Performance Computing Training and Education Centre (MAN T&EC) and is based on an earlier version produced by Manchester Computing Centre (MCC) for the UK Advisory Group on Computer Graphics (AGOCG).

2 Target Audience

Those interested in learning how to create AVS modules to incorporate your own application code into the system.

3 Skills required

Basic Unix and C programming experience. The Introductory AVS Course, which is also developed by MAN T&EC, fulfils the prerequisite for necessary AVS experience.

4 Skills gained

- The AVS datatypes and module structure
- Using the module generator to build modules
- Compiling and debugging modules
- Importing and manipulating arrays of data
- Creating geometric objects
- Creating Unstructured Cell Data structures

- Coroutines

5 Materials provided

- Course introduction, syllabus and overview
- Overhead masters
- Overhead overview for students
- Student workbook
- Modules and data files for the advanced course

6 Course Syllabus

6.1 Overview of writing module (75 minutes)

- Basic scheme
- Overview of a modules structure
- Subroutines and coroutines
- Description and compute function
- The module generator
- Exercise 1 (Chapter 2 of the Student Workbook)
- Makefiles and debugging AVS modules

6.2 The AVS field data (90 minutes)

- AVS datatypes
- Using the AVS field data type
- Describing the data
    - Dimensions
    - Mapping methods (uniform, rectilinear and irregular)
    - The data elements
- AVS field: C structure
    - Allocating fields
    - Using the C structure
    - Other allocation functions
- Accessing the C structure
    - MACROS and subroutines
    - Accessing the data
    - Accessing the coordinates
- AVS errors and detection
- Exercises 2 and 3 (Chapter 3 and 4 of the Student Workbook)
- Optional Exercise 7 and 8 (Chapter 8 and 9 of he Student Workbook)

6.3 The AVS geometry datatype (60 minutes)

- GEOM primitives
- AVS and GEOM objects
- AVS GEOM edit lists
- Creating objects
  - Filters
  - Modules
  - C code to create an object
- Hints and tips for GEOM datatype
- Exercise 4 (Chapter 5 of the Student Workbook)

6.4 Unstructured Cell Data (UCD) (20 minutes)

- An example UCD structure
- Creating UCD
- Using read_ucd
- An example UCD file
- Writing a UCD module
- Exercise 5 (Chapter 6 of the Student Workbook)

6.5 Coroutines (30 minutes)

- Recap on coroutines
- Coroutine structure
- Skeleton coroutine
- Exercise 6 (Chapter 7 of the Student Workbook)

6.6 Closing comments (5 minutes)