Introduction to Abaqus Scripting

Agenda

• 4 Days of Training
  • DAY 1:
    • Overview of Scripting in Abaqus
    • Introduction to the Python Core Language – part 1
  • DAY 2:
    • Introduction to Abaqus Scripting Interface
  • DAY 3:
    • Introduction to the Python Core Language – part 2
  • DAY 4:
    • Making effective use of the Abaqus Scripting Interface
Course Objectives

• This advanced seminar will introduce you to:
  • The *Abaqus Scripting Interface (ASI)*
  • The core functionality of the Python language.

• Objectives
  • Help students to develop a high level understanding of the Abaqus scripting capabilities.
  • Organize and present the technical details of Python and the Abaqus Scripting Interface.
  • Expose the strengths and weaknesses of Abaqus scripting.
  • Encourage the student to use scripting in new ways.

Course Objectives

• What is not covered:
  • This advanced seminar will *not* address the details that are necessary to write scripts that affect the Graphical User Interface (GUI).
  • Separate training material is available for GUI scripting.
  • If you are interested in GUI scripting, contact your SIMULIA representative.
SIMULIA

• SIMULIA is the Dassault Systèmes brand that delivers a scalable portfolio of Realistic Simulation solutions including
  • The Abaqus product suite for Unified FEA
  • Multiphysics solutions for insight into challenging engineering problems
  • Lifecycle management solutions for managing simulation data, processes, and intellectual property

• Headquartered in Providence, RI, USA
  • R&D centers in Providence and in Velizy, France

• Global network of regional offices and distributors

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What is Abaqus FEA?

- Suite of finite element analysis modules
## Revision Status

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Overview of Scripting in Abaqus

Lecture 1

Agenda

• Overview
• Examples
• Terminology
• Languages for customizing Abaqus
  • Workshop 1 - Creating a basic Abaqus script
Introduction to the Python Core Language (Part 1)

Lecture 2

Overview

• High Level Description of the Language
• Running Python
  • Workshop 2 - Running Python
• Lexical Conventions and Syntax
• Objects
  • Workshop 3 (optional) - Investigating Python Objects
• Data Types
• Operators and Expressions
  • Workshop 4 (optional) - Python types, operators, and expressions
• Control Flow
• Functions
  • Workshop 5 - Defining a function for a series calculations
• Namespaces
• Common Issues for New Users
• Modules
  • Workshop 6 - Modules
Overview

- Abaqus Architecture
- Abaqus Scripting Interface Basics
  - Workshop 7 - Creating a Macro
- Abaqus Object Model Basics
- The Session Object
  - Workshop 8 - Working with the Session Object
- The Mdb Object
- The Odb Object
  - Workshop 9 - Working with the ODB object
- Abaqus Data Types
- Abaqus Modules
- Setting Abaqus Defaults
  - Workshop 10 - Setting Abaqus Defaults
- Getting Input Interactively
  - Workshop 11 - Getting Input Interactively
- Parameter Studies
  - Workshop 12 (optional) – Using the Parametric Scripting File
- Miscellaneous
Overview

- More on Running Python
- More on Data Types
- More Common Issues for New Users
- More on Operators and Expressions
  - Workshop 13 – Practice Using a Few More Python Basics
- More on Control Flow
  - Workshop 14 (optional) – Working with Exceptions
- Debugging Scripts
- Abaqus PDE
- More on functions
- More on modules
  - Workshop 15 (optional) – A Brief Look at the Numeric Module
- String Processing
- Input and Output
  - Workshop 16 – Input and Output
- Built-in Tools
- Manipulating Programs
- Python Packages
- Object Oriented Programming
- Python classes
  - Workshop 17 (optional) – Classes
- Special Method Attributes
  - Workshop 18 (optional) – Special Method Attributes
Overview

- More on the Odb Object
  - Workshop 19 - Linear Superposition of Results
- Object Model Interrogation
  - Workshop 20 – Object Model Interrogation
- Writing to the Odb
  - Workshop 21 - Writing to the ODB
- Callback Functions
  - Workshop 22 - Monitoring a Job
- Plug-ins
  - Workshop 23 - Creating kernel and GUI scripts
- Custom Data
- Scripting Ideas for Productivity
  - Workshop 24 - Basic Scripting Style Considerations
- Common Issues for New Users
- Not So Common Issues for New Users
- Working with the Keyword Block Object
  - Workshop 25 (optional) - Working with the Keyword Block Object
- C++ Instead of Python
- GUI Customization Issues