# **GNU Octave (version 5.1.0)**

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If you have trouble installing Octave.

How to configure, compile and install Octave.

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- <u>Uitoggletool Properties</u>:

#### **Advanced Plotting**

- Colors:
- Line Styles:
- Marker Styles:
- · Callbacks:
- Application-defined Data:
- Object Groups:
- Transform Groups:
- Graphics Toolkits:

## **Object Groups**

- <u>Data Sources in Object Groups</u>:
- · Area Series:
- Bar Series:
- Contour Groups:
- Error Bar Series:
- Line Series:
- Quiver Group:
- Scatter Group:
- Stair Group:
- Stem Series:
- Surface Group:

## **Graphics Toolkits**

• Customizing Toolkit Behavior:

## **Matrix Manipulation**

- Finding Elements and Checking Conditions:
- Rearranging Matrices:
- Special Utility Matrices:
- Famous Matrices:

#### Arithmetic

- Exponents and Logarithms:
- Complex Arithmetic:
- <u>Trigonometry</u>:
- Sums and Products:
- Utility Functions:

- Special Functions:
- Rational Approximations:
- Coordinate Transformations:
- Mathematical Constants:

## Linear Algebra

- Techniques Used for Linear Algebra:
- Basic Matrix Functions:
- Matrix Factorizations:
- Functions of a Matrix:
- Specialized Solvers:

#### **Vectorization and Faster Code Execution**

- Basic Vectorization:
- Broadcasting:
- Function Application:
- · Accumulation:
- JIT Compiler.
- Miscellaneous Techniques:
- Examples:

## **Nonlinear Equations**

- Solvers:
- Minimizers:

# **Diagonal and Permutation Matrices**

- <u>Basic Usage</u>:
- Matrix Algebra:
- Function Support:
- Example Code:
- Zeros Treatment:

#### **Basic Usage**

- Creating Diagonal Matrices:
- Creating Permutation Matrices:
- Explicit and Implicit Conversions:

Matrix Algebra

Basic techniques for code optimization
Broadcasting operations
Applying functions to arrays, cells, and structs
Accumulation functions
Just-In-Time Compiler for loops
Other techniques for speeding up code

Creation and Manipulation of Diagonal/Permutation Matrices Linear Algebra with Diagonal/Permutation Matrices

Functions That Are Aware of These Matrices Examples of Usage Differences in Treatment of Zero Elements

- Expressions Involving Diagonal Matrices:
- Expressions Involving Permutation Matrices:

## **Function Support**

- <u>Diagonal Matrix Functions</u>:
- Permutation Matrix Functions:

#### **Sparse Matrices**

- Basics:
- Sparse Linear Algebra:
- Iterative Techniques:
- Real Life Example:

#### Basics

- Storage of Sparse Matrices:
- Creating Sparse Matrices:
- Information:
- Operators and Functions:

#### **Operators and Functions**

- Sparse Functions:
- Return Types of Operators and Functions:
- Mathematical Considerations:

#### **Numerical Integration**

- Functions of One Variable:
- Orthogonal Collocation:
- Functions of Multiple Variables:

# **Differential Equations**

- Ordinary Differential Equations:
- <u>Differential-Algebraic Equations</u>:

## **Ordinary Differential Equations**

Matlab-compatible solvers:

#### **Optimization**

Creation and Manipulation of Sparse Matrices Linear Algebra on Sparse Matrices Iterative Techniques Using Sparse Matrices

- Linear Programming:
- Quadratic Programming:
- Nonlinear Programming:
- Linear Least Squares:

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- Descriptive Statistics:
- Statistics on Sliding Windows of Data:
- Basic Statistical Functions:
- Correlation and Regression Analysis:
- Distributions:
- Random Number Generation:

#### Sets

• Set Operations:

## **Polynomial Manipulations**

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- Finding Roots:
- Products of Polynomials:
- Derivatives / Integrals / Transforms:
- Polynomial Interpolation:
- Miscellaneous Functions:

#### Interpolation

- One-dimensional Interpolation:
- Multi-dimensional Interpolation:

#### Geometry

- <u>Delaunay Triangulation</u>:
- · Voronoi Diagrams:
- Convex Hull:
- Interpolation on Scattered Data:

## **Delaunay Triangulation**

- Plotting the Triangulation:
- Identifying Points in Triangulation:

## **Image Processing**

- Loading and Saving Images:
- Displaying Images:
- Representing Images:
- Plotting on top of Images:
- Color Conversion:

#### **Audio Processing**

- Audio File Utilities:
- Audio Device Information:
- Audio Player:
- Audio Recorder:
- Audio Data Processing:

## **Audio Player**

- Playback:
- Player Properties:

#### **Audio Recorder**

- Recording:
- Data Retrieval:
- Recorder Properties:

## **Object Oriented Programming**

- Creating a Class:
- · Class Methods:
- Indexing Objects:
- Overloading Objects:
- Inheritance and Aggregation:

## **Indexing Objects**

- Defining Indexing And Indexed Assignment:
- Indexed Assignment Optimization:

## **Overloading Objects**

- Function Overloading:
- Operator Overloading:

# Precedence of Objects:

## **GUI Development**

- I/O Dialogs:
- Progress Bar:
- <u>UI Elements</u>:
- **GUI Utility Functions**:
- User-Defined Preferences:

## **System Utilities**

- Timing Utilities:
- Filesystem Utilities:
- File Archiving Utilities:
- Networking Utilities:
- Controlling Subprocesses:
- Process ID Information:
- Environment Variables:
- Current Working Directory:
- Password Database Functions:
- Group Database Functions:
- System Information:
- Hashing Functions:

## **Networking Utilities**

- FTP Objects:
- URL Manipulation:
- Base64 and Binary Data Transmission:

#### **Packages**

- Installing and Removing Packages:
- Using Packages:
- Administrating Packages:
- Creating Packages:

## **Creating Packages**

- The DESCRIPTION File:
- The INDEX File:
- PKG\_ADD and PKG\_DEL Directives:
- Missing Components:

#### **External Code Interface**

- Oct-Files:
- Mex-Files:
- Standalone Programs:
- Java Interface:

#### **Oct-Files**

- Getting Started with Oct-Files:
- Matrices and Arrays in Oct-Files:
- Character Strings in Oct-Files:
- Cell Arrays in Oct-Files:
- Structures in Oct-Files:
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- Accessing Global Variables in Oct-Files:
- Calling Octave Functions from Oct-Files:
- Calling External Code from Oct-Files:
- Allocating Local Memory in Oct-Files:
- Input Parameter Checking in Oct-Files:
- Exception and Error Handling in Oct-Files:
- <u>Documentation and Testing of Oct-Files</u>:

#### **Sparse Matrices in Oct-Files**

- Array and Sparse Class Differences:
- Creating Sparse Matrices in Oct-Files:
- <u>Using Sparse Matrices in Oct-Files</u>:

#### **Mex-Files**

- Getting Started with Mex-Files:
- Working with Matrices and Arrays in Mex-Files:
- Character Strings in Mex-Files:
- Cell Arrays with Mex-Files:
- Structures with Mex-Files:
- Sparse Matrices with Mex-Files:
- Calling Other Functions in Mex-Files:

#### Java Interface

- Making Java Classes Available:
- · How to use Java from within Octave:

- Set up the JVM:
- Java Interface Functions:

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- Test Functions:
- <u>Demonstration Functions</u>:

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Actual Bugs:

Bugs we will fix later.

- Reporting Bugs:
- How To Get Help with Octave:
- How to Distinguish Between Octave and Matlab:

## **Reporting Bugs**

- Bug Criteria:
- Bug Tracker:
- Bug Reporting:
- Sending Patches:

Where to submit your bug report.

How to report a bug effectively.

How to send a patch for Octave.

#### Installation

- Build Dependencies:
- Running Configure and Make:
- Compiling Octave with 64-bit Indexing:
- Installation Problems:

## **Build Dependencies**

- Obtaining the Dependencies Automatically:
- Build Tools:
- External Packages:

#### **Grammar and Parser**

- Keywords:
- Parser:

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