# Developing Scilab Toolbox for calling external C libraries

**Spoken Tutorial Project**
**https://spoken-tutorial.org**
**National Mission on Education through ICT**

**http://sakshat.ac.in**

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**In this tutorial, we will learn-**

# Learning Objectives

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▶ **To add an external C library to a Scilab Toolbox.**

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▶ **To build and load a Scilab Toolbox**

# System Requirements

- **Ubuntu Linux OS version 19.10**

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- **Scilab version 6.0.2**

# Prerequisites

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► **https://spoken-tutorial.org/**

# Code files

- **Scilab6-Test-Toolbox-master.zip**
- **external-library.zip**

# Scilab6-Test-Toolbox-master

► **It is a Scilab Toolbox.**

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▶ **Toolbox name:** `test_toolbox`

▶ **Purpose: To demonstrate how to add an external C library**

# Scilab6-Test-Toolbox-master

▶ **Contains** add **and** multiply **function**

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▶ **The** `multiply` **function is implemented as an external library**

▶ **The toolbox only has source code**

# Scilab6-Test-Toolbox-master

- **The toolbox only has source code**
- **Compiled version of external library is missing**

- ▶ **The toolbox only has source code**
- ▶ **Compiled version of external library is missing**
- ▶ **Recall that the** `multiply` **function is external library**

► **On linux, external library is compiled into a shared object file**

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► **We call the shared object file as a `.so` file**

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▶ **We call the shared object file as a** `.so` **file**

▶ **The** `.so` **file has to be provided via a directory named as** `thirdparty`

# Scilab6-Test-Toolbox-master

- ► **On linux, external library is compiled into a shared object file**
- ► **We call the shared object file as a `.so` file**
- ► **The `.so` file has to be provided via a directory named as `thirdparty`**
- ► **The corresponding header files must also be provided**

► **The** `run.sh` **file is a shell script**

# Shell script to compile C code

- **The** `run.sh` **file is a shell script**
- **Contains commands to compile** `mul.c` **file into a** `.so` **file**

# Shell script to compile C code

▶ **The** `run.sh` **file is a shell script**

▶ **Contains commands to compile** `mul.c` **file into a** `.so` **file**

▶ **Copies the** `.so` **file and header file to a directory named as** `thirdparty`

# Library compilation process

► **Differes from OS to OS**

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► **Differes from OS to OS**

► **Depends on the targeted external library.**

► **May require make, cmake, etc.**

# Library compilation process

▶ **Additional compiler and linker flags may be needed**

▶ **Crucial in compiling libraries correctly**

# Scilab Toolbox Gateway functions

► **Interface to communicate with the library**

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- ▶ **Interface to communicate with the library**
- ▶ **Every new function requires a separate gateway function**
- ▶ **Gateway functions are CPP files inside the** `sci_gateway/cpp` **directory**

# Scilab Toolbox Gateway functions

► **Make use of Scilab-C API**

► **https://help.scilab.org/ docs/6.1.0/en_US/api_scilab.html**

► **Comments represent help content**

# Toolbox function help

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▶ **Comments have to be in a set format**

# Toolbox function help

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- **Variations lead to failure in generating help content**

# Toolbox function help

- **Comments represent help content**
- **Comments have to be in a set format**
- **Variations lead to failure in generating help content**
- **https://help.scilab.org/ docs/6.1.0/en_US/help_from_sci.html**

# Toolbox function help: few tips

► **Do not make spelling mistakes**

► **Keywords are used in generating help content**

# Toolbox function help: few tips

- **Comment out empty/blank lines**
- **Edits are not appearing? delete**
  - **All contents inside the directory**
    `help/en_US/scilab_en_US_help/`
  - **All XML files inside the directory**
    `help/en_US/`

# Summary

In this tutorial, we learnt:

- ► To add an external C library to a Scilab Toolbox.

- ► To build and load a Scilab Toolbox

# Forum to answer questions

► **Do you have questions in this Spoken Tutorial?**

► **Choose the minute and second where you have the question.**

► **Explain your question briefly.**

► **Someone from the FOSSEE team will answer**

**https://forums.spoken-tutorial.org/**

# FOSSEE Forum

▶ **Please post your queries on Scilab in the FOSSEE forum.**
**https://forums.fossee.in/**

# Textbook Companion project

▶ **The FOSSEE team coordinates the Textbook Companion project.**

▶ **Contributors will receive** `Certificates` **and** `Honorarium`**.**

▶ **For more details, please visit:** **https://scilab.in/ Textbook_Companion_Project**

# Lab Migration

▶ **The FOSSEE team coordinates the Lab Migration project.**

▶ **For more details, please visit: https://scilab.in/ Lab_Migration_Project**

# Acknowledgements

- **Spoken Tutorial Project is funded by NMEICT, MHRD, Govt. of India.**

- **For more details, visit this website.**
  **https://spoken-tutorial.org/**

# THANK YOU!