

Functions and Types

Spoken Tutorial Project
<http://spoken-tutorial.org>

National Mission on Education through ICT
<http://sakshat.ac.in>

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Learning Objectives

In this tutorial, we are going to learn how to:

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- ▶ **define a function**

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In this tutorial, we are going to learn how to:

- ▶ define a function
- ▶ use **algorithm**



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- ▶ define a function
- ▶ use **algorithm**
- ▶ define a type



System Requirements

- ▶ **OpenModelica 1.9.2**

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- ▶ **Any OS: Linux, Windows, Mac OS X or FOSSEE OS on ARM**

Prerequisites

- ▶ **Knowledge of class definition in Modelica**

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- ▶ Knowledge of functions in any programming language
- ▶ Prerequisite tutorials are mentioned on our website

www.spoken-tutorial.org

- ▶ **specialized class that can take input and return output**

function

- ▶ specialized class that can take input and return output
- ▶ contains **algorithm** section



function

- ▶ specialized class that can take input and return output
- ▶ contains **algorithm** section
- ▶ cannot contain equations

function

- ▶ specialized class that can take input and return output
- ▶ contains **algorithm** section
- ▶ cannot contain equations
- ▶ cannot be simulated

Syntax of function

```
function name_of_function  
// Variable declarations //  
algorithm  
// Assignment statements //  
end name_of_function;
```

Problem Statement

Write a function 'polynomialEvaluator' which

- ▶ **takes 'x' as input**

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Write a function 'polynomialEvaluator' which

- ▶ takes 'x' as input
- ▶ returns

$$f(x) = a * x^2 + b * x + c$$

where a=1, b=2, c=1 as output



- ▶ **Modelica syntax element to enable procedural programming**

algorithm

- ▶ **Modelica syntax element to enable procedural programming**
- ▶ **Only assignment statements are allowed**

algorithm

- ▶ **Modelica syntax element to enable procedural programming**
- ▶ **Only assignment statements are allowed**
- ▶ **Assignment statements use ' $:=$ ' instead of ' $=$ '**

algorithm

- ▶ **Modelica syntax element to enable procedural programming**
- ▶ **Only assignment statements are allowed**
- ▶ **Assignment statements use ‘:=’ instead of ‘=’**
- ▶ **Data flows in assignment statements from right to left**



Restrictions on functions

- ▶ use of **der()** invalid



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- ▶ use of **der()** invalid
- ▶ use of **time** variable not allowed

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Restrictions on functions

- ▶ use of **der()** invalid
- ▶ use of **time** variable not allowed
- ▶ use of **when** statements not allowed
- ▶ not more than one **algorithm** section



Restrictions on functions

- ▶ use of **der()** invalid
- ▶ use of **time** variable not allowed
- ▶ use of **when** statements not allowed
- ▶ not more than one **algorithm** section
- ▶ models cannot be passed as arguments

- ▶ **specialized class to define custom data types**

type

- ▶ specialized class to define custom data types
- ▶ Eg: `type Velocity = Real(unit = "m/s")`

- ▶ specialized class to define custom data types
- ▶ Eg: `type Velocity = Real(unit = "m/s")`
- ▶ attributes of Modelica data types can be changed accordingly

Assignment

Breach the restrictions on functions and observe the errors produced.



About the Spoken Tutorial Project

- ▶ Watch the video available at http://spoken-tutorial.org/What_is_a_Spoken_Tutorial
- ▶ It summarises the Spoken Tutorial project

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- ▶ If you do not have good bandwidth, you can download and watch it



Spoken Tutorial Workshops

The Spoken Tutorial Project Team

- ▶ Conducts workshops using spoken tutorials
- ▶ Gives certificates to those who pass an online test
- ▶ For more details, please write to contact@spoken-tutorial.org

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 them.

Please visit <http://forums.spoken-tutorial.org/>



Textbook Companion Project

- ▶ **The FOSSEE team coordinates coding of solved examples of popular books**
- ▶ **We give honorarium and certificate to those who do this**

For more details, please visit this site:

<http://OM.fossee.in/Textbook-Companion-Project>



Lab Migration Project

- ▶ **The FOSSEE team helps migrate commercial simulator labs to OpenModelica**
- ▶ **We give honorarium and certificates to those who do this**

For more details, please visit this site:

<http://OM.fossee.in/lab-migration-project>



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- ▶ More information on this Mission is available at <http://spoken-tutorial.org/NMEICT-Intro>



Thanks!

<http://openmodelica.org>