



L8 - Python

Programming with the Python Language

Objectives

- Master the Python language basics
 - Modular approach
 - Object Oriented features
 - Exception mechanism
- Understand the specifics of the Python interpreter

Course environment

- Printed course material (in English).
- One PC for two trainees.
- Documentation and exercise solutions on CDROM.

Prerequisites

- There is no specific prerequisites

Target Audience

- Any embedded systems engineer or technician with the above prerequisites.

Course Outline

First Day

Python overview

- History
- Installing Python
- The Python interpreter
- The Python command line

Python language basics

- Comments and instructions
- Variables, data and assignment
 - Identifiers and keywords
 - Basic types
- Expressions and operators
 - Arithmetic operators
 - Relational operators
 - Choice operators
- Simple input/output
- Data structures
 - Sequences
 - Dictionaries

- Sets

Python program structure

- Complex instructions
 - Instruction sequences
 - Conditions and switches
 - Loops and iterators
- Functions and procedures
 - Parameters
 - Local and global variables
 - Default parameter values
 - Calling functions
- Name spaces
- Modules
 - Creating modules
 - Importing functions from modules

Second Day

Advanced data structures

- Character strings
 - Indexing and slicing
 - Concatenation and repetition
 - Unicode strings
 - Converting strings
 - Formatting
 - Character strings and byte strings
 - Lists
 - Advanced slicing
 - Insertion and extraction
 - List operations
 - List copy
- Tuples
- Dictionaries
 - Creating a dictionary
 - Dictionary operations
 - Keys and data types

Object oriented programming

- Overview
 - Classes and instances
 - Attributes and operations
 - Relations and links
 - Inheritance and polymorphism
- Rationale
 - Divide and conquer
 - The encapsulation paradigm
 - Modularity and security
- Advantages
 - Increased security
 - Incremental development
 - Code reuse

Python as an Object Oriented Language

- Python class design
 - Everything is an object
- Defining classes
 - Instance and class attributes
 - Static and instance methods
 - Constructors

Third Day

Exceptions

- Exceptions and errors
 - Error types
 - Exception types
 - Assertions
- Handling exceptions
 - Try blocks
 - Except (catch) blocks
 - Getting information about the exception
 - The finally block
- Raising exceptions
- The with statement

Input-Output

- User interaction
 - Writing to the terminal
 - Reading from the terminal
- Files
- Persistent objects
 - Explicit serializing with repr
 - Implicit serializing with pickle

Graphical interfaces in Python

- A lot of graphic toolkits
 - PyQt
 - PyGTK
 - wxPython
 - Tkinter
- Graphical object programming with Tkinter
 - Event-driven programming
 - The Tkinter widgets
 - Widget layout
 - Drawing graphics on a canvas
 - Creating a custom widget

Fourth Day

The Python standard library

- The standard modules
 - sys
 - logging

- urllib and json
- Network programming
 - Sockets
 - Client and server programs
- Multithread programming
 - Creation de threads
 - Sharing data and mutual exclusion
 - Synchronisation and communication

Advanced language features

- Advanced functions
 - Returning multiple values
 - Getting list or tuple parameters
- The special (`__xxxx__`) methods and attributes
- Metaclasses
- Callable objects
- Containers
 - Creating a container
 - Indexing a container
 - Iterating through a container
- New numeric types
- Dynamic programming
 - Functions creating new functions (lambda)
 - Executing and evaluating character string