

Table of Contents

Preface	7
Introduction.....	7
SWIG resources	7
About this manual.....	8
Credits.....	8
What's new?	9
Bug reports	9
SWIG is free	9
Introduction	10
What is SWIG?.....	10
Life before SWIG	10
Life after SWIG	11
The SWIG package.....	11
A SWIG example	12
C syntax, but not a C compiler	16
Non-intrusive interface building.....	17
Hands off code generation	17
Event driven C programming	17
Automatic documentation generation.....	18
Summary.....	18
SWIG for Windows and Macintosh	18
Scripting Languages	21
The two language view of the world.....	21
How does a scripting language talk to C?.....	22
Building scripting language extensions	26
Shared libraries and dynamic loading.....	27
SWIG Basics	29
Running SWIG	29
Simple C functions, variables, and constants	31
Pointers and complex objects	34
Getting down to business	37
Structures, unions, and object oriented C programming.....	42
C++ support	48
Objective-C.....	55
Conditional compilation	59
Code Insertion.....	61
A general interface building strategy	63

Multiple files and the SWIG library	68
The %include directive	68
The %extern directive	68
The %import directive	69
Including files on the command line	69
The SWIG library	69
Library example	70
Creating Library Files	70
Working with library files	71
Static initialization of multiple modules	73
More about the SWIG library	73
Documentation System	74
Introduction	74
How it works	74
Choosing a documentation format	75
Function usage and argument names	75
Titles, sections, and subsections	75
Formatting	76
Adding Additional Text	79
Disabling all documentation	80
An Example	80
ASCII Documentation	86
HTML Documentation	86
LaTeX Documentation	88
C++ Support	89
The Final Word?	89
Pointers, Constraints, and Typemaps	90
Introduction	90
The SWIG Pointer Library	90
Introduction to typemaps	93
Managing input and output parameters	94
Applying constraints to input values	97
Writing new typemaps	98
Common typemap methods	102
Writing typemap code	104
Typemaps for handling arrays	105
Typemaps and the SWIG Library	107
Implementing constraints with typemaps	107
Typemap examples	108
How to break everything with a typemap	108
Typemaps and the future	108

Exception Handling 109

The %except directive.	109
Handling exceptions in C code.	109
Exception handling with longjmp().	110
Handling C++ exceptions	111
Defining different exception handlers	112
Using The SWIG exception library	113
Debugging and other interesting uses for %except.	114
More Examples.	114

SWIG and Perl5 115

Preliminaries	115
Building Perl Extensions under Windows 95/NT.	118
Modules, packages, and classes	120
Basic Perl interface	120
A simple Perl example	123
Accessing arrays and other strange objects	127
Implementing methods in Perl	130
Shadow classes	131
Getting serious	133
Wrapping C libraries and other packages.	138
Building a Perl5 interface to MATLAB	138
Handling output values (the easy way).	142
Exception handling	143
Remapping datatypes with typemaps	144
The gory details on shadow classes	153
Where to go from here?	159

SWIG and Python 160

Preliminaries	160
Building Python Extensions under Windows 95/NT	162
The low-level Python/C interface.	164
Python shadow classes	168
About the Examples	170
Solving a simple heat-equation.	170
Wrapping a C library	178
Putting it all together.	188
Exception handling	190
Remapping C datatypes with typemaps	193
Implementing C callback functions in Python	203
Other odds and ends	206
The gory details of shadow classes.	207

SWIG and Tcl	215
Preliminaries	215
Building Tcl/Tk Extensions under Windows 95/NT	218
Basic Tcl Interface	220
The object oriented interface	223
About the examples.	226
Binary trees in Tcl.	226
Building C/C++ data structures with Tk.	231
Accessing arrays	233
Building a simple OpenGL module	234
Exception handling	238
Typemaps	239
Configuration management with SWIG	251
Building new kinds of Tcl interfaces (in Tcl).	257
Extending the Tcl Netscape Plugin.	260
Tcl8.0 features.	262
Advanced Topics	263
Creating multi-module packages	263
Dynamic Loading of C++ modules	267
Inside the SWIG type-checker	268
Extending SWIG	271
Introduction.	271
Compiling a SWIG extension	272
SWIG output	273
The Language class (simple version)	273
A tour of SWIG datatypes.	279
Typemaps (from C).	286
File management.	288
Naming Services	289
Code Generation Functions.	289
Writing a Real Language Module.	290
C++ Processing	304
Documentation Processing	306
The Future of SWIG	309
Index	310