

Squirrel Standard Library 2.0

Alberto Demichelis

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Chapter 1. Introduction

The squirrel standard libraries consist in a set of modules implemented in C++. While are not essential for the language, they provide a set of useful services that are commonly used by a wide range of applications(file I/O, regular expressions, etc...), plus they offer a foundation for developing additional libraries.

All libraries are implemented through the squirrel API and the ANSI C runtime library. The modules are organized in the following way:

- I/O : input and output
- blob : binary buffers manipulation
- math : basic mathematical routines
- system : system access function
- string : string formatting and manipulation

The libraries can be registered independently,except for the IO library that depends from the bloblib.

Chapter 2. The Input/Output library

the input lib implements basic input/output routines.

Squirrel API

Global symbols

dofile(path, [raiseerror]);

compiles a squirrel script or loads a precompiled one and executes it. returns the value returned by the script or null if no value is returned. if the optional parameter 'raiseerror' is true, the compiler error handler is invoked in case of a syntax error. If raiseerror is omitted or set to false, the compiler error handler is not invoked.

loadfile(path, [raiseerror]);

compiles a squirrel script or loads a precompiled one and returns it as a function. if the optional parameter 'raiseerror' is true, the compiler error handler is invoked in case of a syntax error. If raiseerror is omitted or set to false, the compiler error handler is not invoked.

stderr

File object bound on the os *standard error* stream

stdin

File object bound on the os *standard input* stream

stdout

File object bound on the os *standard output* stream

File class

The file object is bla bla bla

eos();

returns a non null value if the read/write pointer is at the end of the stream.

flush();

flushes the stream. return a value != null if succeeded, otherwise returns null

len();

returns the length of the stream

readblob(size);

read n bytes from the stream and returns them as blob

readn(type);

reads a number from the stream according to the type parameter. *type* can have the following values:

'i'	32bits number	returns an integer
's'	16bits signed integer	returns an integer
'w'	16bits unsigned integer	returns an integer
'c'	8bits signed integer	returns an integer
'b'	8bits unsigned integer	returns an integer
'f'	32bits float	returns an float
'd'	64bits float	returns an float

readstr(size, [encoding]);

reads n characters from the stream and returns it as string. if *encoding* is omitted the function read an 8bit string. *encoding* can have the following values:

'a'	8bits character string
'u'	16bits character string

seek(seek, [origin]);

Moves the read/write pointer to a specified location. *offset* indicates the number of bytes from *origin*. *origin* can be 'b' beginning of the stream, 'c' current location or 'e' end of the stream. If origin is omitted the parameter is defaulted as 'b'(beginning of the stream).

tell();

returns read/write pointer absolute position

writeblob(blob);

writes a blob in the stream

writen(n, type);

writes a number in the stream formatted according to the type pameter. *type* can have the following values:

'i'	32bits number
's'	16bits signed integer
'w'	16bits unsigned integer
'c'	8bits signed integer
'b'	8bits unsigned integer
'f'	32bits float
'd'	64bits float

writestr(str, [encoding]);

writes a string in the stream *str* is the string that as to be written, *encoding* is and optional parameter that can have the following values:

'a'	8bits character string
'u'	16bits character string

if *encoding* is omitted the default value is 'a'.

C API

Initialization

sqstd_register_iolib

```
SQRESULT sqstd_register_iolib(HSQUIRRELM v);
```

initialize and register the io library in the given VM.

parameters:

HSQUIRRELM v the target VM

return: an SQRESULT

remarks: The function aspects a table on top of the stack where to register the global library functions.

File object

<code>sqstd_createfile</code>

```
SQRESULT sqstd_createfile(HSQUIRRELM v, SQFILE file, SQBool own);
```

creates a file object bound to the SQFILE passed as parameter and pushes it in the stack

parameters:

HSQUIRRELM v the target VM

SQFILE file the stream that will be rapresented by the file object

SQBool own if different true the stream will be automatically closed when the newly create file object is destroyed.

return: an SQRESULT

<code>sqstd_getfile</code>

```
SQRESULT sqstd_getfile(HSQUIRRELM v, int idx, SQFILE * file);
```

retrieve the pointer of a stream handle from an arbitrary position in the stack.

parameters:

HSQUIRRELM v the target VM

int idx and index in the stack

*SQFILE * file* A pointer to a SQFILE handle that will store the result

return: an SQRESULT

Script loading and serialization

sqstd_loadfile

SQRESULT **sqstd_loadfile**(HSQUIRRELVm v, const SQChar * filename, SQBool printerror);

compiles a squirrel script or loads a precompiled one and pushes it as closure in the stack.

parameters:

<i>HSQUIRRELVm v</i>	the target VM
<i>const SQChar * filename</i>	path of the script that has to be loaded
<i>SQBool printerror</i>	if true the compiler error handler will be called if a error occurs.

return: an SQRESULT

sqstd_dofile

SQRESULT **sqstd_dofile**(HSQUIRRELVm v, const SQChar * filename, SQBool retval, SQBool printerror);

Compiles a squirrel script or loads a precompiled one and executes it. Optionally pushes the return value of the executed script in the stack.

parameters:

<i>HSQUIRRELVm v</i>	the target VM
<i>const SQChar * filename</i>	path of the script that has to be loaded
<i>SQBool retval</i>	if true the function will push the return value of the executed script in the stack.
<i>SQBool printerror</i>	if true the compiler error handler will be called if a error occurs.

return: an SQRESULT

remarks: the function expects a table on top of the stack that will be used as 'this' for the execution of the script. The 'this' parameter is left untouched in the stack.

eg.

```
sq_pushroottable(v); //push the root table(were the globals of the script are)
sqstd_dofile(v, _SC("test.nut"), SQFalse, SQTrue); // also prints syntax errors
```

sqstd_writeclosuretofile

SQRESULT **sqstd_writeclosuretofile**(HSQUIRRELVm v, const SQChar * filename);

serializes the closure at the top position in the stack as bytecode in the file specified by the parameter filename. If a file with the same name already exists, it will be overwritten.

parameters:

<i>HSQUIRRELV</i> <i>v</i>	the target VM
<i>const SQChar * filename</i>	path of the script that has to be loaded

return: an SQRESULT

Chapter 3. The Blob library

The blob library implements binary data manipulations routines. The library is based on blob objects that represent a buffer of arbitrary binary data.

Squirrel API

Global symbols

blob(size);

returns a new instance of a blob class of the specified size in bytes

castf2i(f);

casts a float to a int

casti2f(n);

casts a int to a float

swap2(n);

swap the byte order of a number (like it would be a 16bits integer)

swap4(n);

swap the byte order of an integer

swapfloat(f);

swaps the byteorder of a float

The blob class

The blob object is a buffer of arbitrary binary data. The object behaves like a file stream, it has a read/write pointer and it automatically grows if data is written out of his boundary. A blob can also be accessed byte by byte through the [] operator.

eos();

returns a non null value if the read/write pointer is at the end of the stream.

flush();

flushes the stream. return a value != null if succeeded, otherwise returns null

len();

returns the lenght of the stream

readblob(size);

read n bytes from the stream and returns them as blob

readn(type);

reads a number from the stream according to the type parameter. *type* can have the following values:

'i'	32bits number	returns an integer
's'	16bits signed integer	returns an integer
'w'	16bits unsigned integer	returns an integer
'c'	8bits signed integer	returns an integer
'b'	8bits unsigned integer	returns an integer
'f'	32bits float	returns a float
'd'	64bits float	returns a float

readstr(size, [encoding]);

reads *n* characters from the stream and returns it as string. if *encoding* is omitted the function reads an 8bit string. *encoding* can have the following values:

'a'	8bits character string
'u'	16bits character string

resize(size);

resizes the blob to the specified *size*

seek(seek, [origin]);

Moves the read/write pointer to a specified location. *offset* indicates the number of bytes from *origin*. *origin* can be 'b' beginning of the stream, 'c' current location or 'e' end of the stream. If origin is omitted the parameter is defaulted as 'b'(beginning of the stream).

swap2();

swaps the byte order of the blob content as it would be an array of 16bits integers

swap4();

swaps the byte order of the blob content as it would be an array of 32bits integers

tell();

returns read/write pointer absolute position

writeblob(blob);

writes a blob in the stream

writen(n, type);

writes a number in the stream formatted according to the type parameter. *type* can have the following values:

'i'	32bits number
's'	16bits signed integer
'w'	16bits unsigned integer
'c'	8bits signed integer
'b'	8bits unsigned integer
'f'	32bits float
'd'	64bits float

writestr(str, [encoding]);

writes a string in the stream *str* is the string that is to be written, *encoding* is an optional parameter

that can have the following values:

'a'	8bits character string
'u'	16bits character string

if *encoding* is omitted the default value is 'a'.

C API

Initialization

`sqstd_register_bloblib`

```
SQRESULT sqstd_register_bloblib(HSQUIRRELV v);
```

initialize and register the blob library in the given VM.

parameters:

HSQUIRRELV v the target VM

return: an SQRESULT

remarks: The function aspects a table on top of the stack where to register the global library functions.

Blob object

`sqstd_getblob`

```
SQRESULT sqstd_getblob(HSQUIRRELV v, int idx, SQUserPointer * ptr);
```

retrieve the pointer of a blob's payload from an arbitrary position in the stack.

parameters:

HSQUIRRELV v the target VM

int idx and index in the stack

*SQUserPointer * ptr* A pointer to the userpointer that will point to the blob's payload

return: an SQRESULT

`sqstd_getblobsize`

```
int sqstd_getblobsize(HSQUIRRELV v, int idx);
```

retrieve the size of a blob's payload from an arbitrary position in the stack.

parameters:

HSQUIRRELVm *v* the target VM
int *idx* and index in the stack

return: the size of the blob at *idx* position

<code>sqstd_createblob</code>

```
SQUserPointer sqstd_createblob(HSQUIRRELVm v, int size);
```

creates a blob with the given payload size and pushes it in the stack.

parameters:

HSQUIRRELVm *v* the target VM
int *size* the size of the blob payload that has to be created

return: a pointer to the newly created blob payload

Chapter 4. The Math library

the math lib provides basic mathematic routines. The library mimics the C runtime library implementation.

Squirrel API

Global symbols

abs(*x*) ;

returns the absolute value of *x* as integer

acos(*x*) ;

returns the arccosine of *x*

asin(*x*) ;

returns the arcsine of *x*

atan(*x*) ;

returns the arctangent of *x*

atan2(*x*, *y*) ;

returns the arctangent of *y/x*.

ceil(*x*) ;

returns a float value representing the smallest integer that is greater than or equal to *x*

cos(*x*) ;

returns the cosine of *x*

exp(*x*) ;

returns the exponential value of the float parameter *x*

fabs(*x*) ;

returns the absolute value of *x* as float

floor(*x*) ;

returns a float value representing the largest integer that is less than or equal to *x*

log(*x*) ;

returns the natural logarithm of *x*

log10(*x*) ;

returns the logarithm base-10 of *x*

pow(*x*, *y*) ;

returns x raised to the power of y .

rand() ;

returns a pseudorandom integer in the range 0 to RAND_MAX

sin(x) ;

returns the sine of x

sqrt(x) ;

returns the square root of x

srand(seed) ;

sets the starting point for generating a series of pseudorandom integers

tan(x) ;

returns the tangent of x

PI

The numeric constant pi (3.141592) is the ratio of the circumference of a circle to its diameter

RAND_MAX

the maximum value that can be returned by the rand() function

C API

Initialization

sqstd_register_mathlib

SQRESULT **sqstd_register_mathlib**(HSQUIRRELV v) ;

initialize and register the math library in the given VM.

parameters:

HSQUIRRELV v the target VM

return: an SQRESULT

remarks: The function aspects a table on top of the stack where to register the global library functions.

Chapter 5. The System library

The system library exposes operating system facilities like environment variables, date time manipulation etc..

Squirrel API

Global symbols

clock() ;

returns a float representing the number of seconds elapsed since the start of the process

date([*time*], [*format*]);

returns a table containing a date/time splitted in the slots:

<i>sec</i>	Seconds after minute (0 - 59).
<i>min</i>	Minutes after hour (0 - 59).
<i>hour</i>	Hours since midnight (0 - 23).
<i>day</i>	Day of month (1 - 31).
<i>month</i>	Month (0 - 11; January = 0).
<i>year</i>	Year (current year).
<i>wday</i>	Day of week (0 - 6; Sunday = 0).
<i>yday</i>	Day of year (0 - 365; January 1 = 0).

if *time* is omitted the current time is used.

if *format* can be 'l' local time or 'u' UTC time, if omitted is defaulted as 'l'(local time).

getenv(*varaname*) ;

Returns a string containing the value of the environment variable *varname*

remove(*path*) ;

deletes the file specified by *path*

rename(*oldname*, *newname*) ;

renames the file or directory specified by *oldname* to the name given by *newname*

system(*cmd*) ;

executes the string *cmd* through the os command interpreter.

time() ;

returns the number of seconds elapsed since midnight 00:00:00, January 1, 1970.

the result of this function can be formatted through the faunction *date*

C API

Initialization

<code>sqstd_register_systemlib</code>

`SQRESULT sqstd_register_systemlib(HSQIRRELVM v);`

initialize and register the system library in the given VM.

parameters:

HSQIRRELVM v the target VM

return: an `SQRESULT`

remarks: The function aspects a table on top of the stack where to register the global library functions.

Chapter 6. The String library

the string lib implements string formatting and regular expression matching routines.

Squirrel API

Global symbols

format(formatstr, ...);

Returns a string formatted according *formatstr* and the optional parameters following it. The format string follows the same rules as the `printf` family of standard C functions(the "*" is not supported).

eg.
sq> print(format("%s %d 0x%02X\n","this is a test :",123,10));
this is a test : 123 0x0A

regexp(pattern);

compiles a regular expression pattern and returns it as a new regexp class instance.

<code>\</code>	Quote the next metacharacter
<code>^</code>	Match the beginning of the string
<code>.</code>	Match any character
<code>\$</code>	Match the end of the string
<code> </code>	Alternation
<code>(subexp)</code>	Grouping (creates a capture)
<code>(?:subexp)</code>	No Capture Grouping (no capture)
<code>[]</code>	Character class

GREEDY CLOSURES.

<code>*</code>	Match 0 or more times
<code>+</code>	Match 1 or more times
<code>?</code>	Match 1 or 0 times
<code>{n}</code>	Match exactly n times
<code>{n,}</code>	Match at least n times
<code>{n,m}</code>	Match at least n but not more than m times

ESCAPE CHARACTERS.

<code>\t</code>	tab (HT, TAB)
<code>\n</code>	newline (LF, NL)
<code>\r</code>	return (CR)
<code>\f</code>	form feed (FF)

PREDEFINED CLASSES.

<code>\l</code>	lowercase next char
-----------------	---------------------

<code>\u</code>	uppercase next char
<code>\a</code>	letters
<code>\A</code>	non letters
<code>\w</code>	alphanumeric <code>[_0-9a-zA-Z]</code>
<code>\W</code>	non alphanumeric <code>[^_0-9a-zA-Z]</code>
<code>\s</code>	space
<code>\S</code>	non space
<code>\d</code>	digits
<code>\D</code>	non nondigits
<code>\x</code>	exadecimal digits
<code>\X</code>	non hexadecimal digits
<code>\c</code>	control charactrs
<code>\C</code>	non control charactrs
<code>\p</code>	punctuation
<code>\P</code>	non punctuation
<code>\b</code>	word boundary
<code>\B</code>	non word boundary

Regex class

The `regexp` object represent a precompiled regular experssion pattern. The object is created trough the function `regexp()`.

capture(*str*, [*start*]);

returns an array of tables containing two indexs("begin" and "end")of the first match of the regular expression in the string *str*. An array entry is created for each captured sub expressions. If no match occurs returns null. The search starts from the index *start* of the string, if *start* is omitted the search starts from the beginning of the string.

the first element of the returned array(index 0) always contains the complete match.

```
local ex = regexp(@"(\d+) ([a-zA-Z]+)(\p)");
local string = "stuff 123 Test;";
local res = ex.capture(string);
foreach(i,val in res)
{
    print(format("match number[%02d] %s\n",
                i,string.slice(val.begin,val.end))); //prints "Test"
}

...
will print
match number[00] 123 Test;
match number[01] 123
match number[02] Test
match number[03] ;
```

match(*str*);

returns a value different than null if the regular expression matches the string *str*, otherwise returns null.

search(*str*, [*start*]);

returns a table containing two indexes("begin" and "end") of the first match of the regular expression in the string *str*, otherwise if no match occurs returns null. The search starts from the index *start* of the string, if *start* is omitted the search starts from the beginning of the string.

```
local ex = regexp("[a-zA-Z]+");
local string = "123 Test;";
local res = ex.search(string);
print(string.slice(res.begin,res.end)); //prints "Test"
```

C API

Initialization

sqstd_register_stringlib

SQRESULT **sqstd_register_stringlib**(HSQUIRRELVM *v*);

initialize and register the string library in the given VM.

parameters:

HSQUIRRELVM v the target VM

return: an SQRESULT

remarks: The function aspects a table on top of the stack where to register the global library functions.

Regular Expressions

sqstd_rex_compile

SQRex * **sqstd_rex_compile**(const SQChar * pattern, const SQChar ** error);

compiles an expression and returns a pointer to the compiled version. in case of failure returns NULL. The returned object has to be deleted through the function sqstd_rex_free().

parameters:

*const SQChar * pattern* a pointer to a zero terminated string containing the pattern that has to be compiled.

*const SQChar ** error* a pointer to a string pointer that will be set with an error string in case of failure.

return: a pointer to the compiled pattern

sqstd_rex_free

```
void sqstd_rex_free(SQRex * exp);
```

deletes a expression structure created with sqstd_rex_compile()

parameters:

*SQRex * exp* the expression structure that has to be deleted

sqstd_rex_match

```
SQBool sqstd_rex_match(SQRex * exp, const SQChar * text);
```

returns SQTrue if the string specified in the parameter text is an exact match of the expression, otherwise returns SQFalse.

parameters:

*SQRex * exp* the compiled expression

*const SQChar * text* the string that has to be tested

return: SQTrue if successful otherwise SQFalse

sqstd_rex_search

```
SQBool sqstd_rex_search(SQRex * exp, const SQChar * text, const SQChar  
** out_begin, const SQChar ** out_end);
```

searches the first match of the expressin in the string specified in the parameter text. if the match is found returns SQTrue and the sets out_begin to the beginning of the match and out_end at the end of the match; otherwise returns SQFalse.

parameters:

*SQRex * exp* the compiled expression

*const SQChar * text* the string that has to be tested

*const SQChar
** out_begin* a pointer to a string pointer that will be set with
the beginning of the match

*const SQChar ** out_end* a pointer to a string pointer that will be set with
the end of the match

return: SQTrue if successful otherwise SQFalse

sqstd_rex_searchrange

```
SQBool sqstd_rex_searchrange(SQRex * exp, const SQChar * text_begin,
const SQChar * text_end, const SQChar ** out_begin, const SQChar
** out_end);
```

searches the first match of the expresin in the string delimited by the parameter text_begin and text_end. if the match is found returns SQTrue and the sets out_begin to the beginning of the match and out_end at the end of the match; otherwise returns SQFalse.

parameters:

<i>SQRex * exp</i>	the compiled expression
<i>const SQChar * text_begin</i>	a pointer to the beginnning of the string that has to be tested
<i>const SQChar * text_end</i>	a pointer to the end of the string that has to be tested
<i>const SQChar ** out_begin</i>	a pointer to a string pointer that will be set with the beginning of the match
<i>const SQChar ** out_end</i>	a pointer to a string pointer that will be set with the end of the match

return: an SQRESULT

sqstd_rex_getsubexpcount

```
int sqstd_rex_getsubexpcount(SQRex * exp);
```

returns the number of sub expressions matched by the expression

parameters:

<i>SQRex * exp</i>	the compiled expression
--------------------	-------------------------

return: the number of sub expressions matched by the expression

sqstd_rex_getsubexp

```
int sqstd_rex_getsubexp(SQRex * exp, int n, SQRexMatch * subexp);
```

retrieve the begin and and pointer to the length of the sub expression indexed by n. The result is passed through the struct SQRexMatch.

parameters:

<i>SQRex * exp</i>	the compiled expression
<i>int n</i>	the index of the submatch(0 is the complete match)
<i>SQRexMatch * subexp</i>	a pointer to structure that will store the result

return: the function returns `SQTrue` if `n` is valid index otherwise `SQFalse`.

Chapter 7. The Aux library

The aux library implements default handlers for compiler and runtime errors and a stack dumping.

C API

Error handling

`sqstd_seterrorhandlers`

```
void sqstd_seterrorhandlers(HSQUIRRELVM v);
```

initialize compiler and runtime error handlers, the handlers use the print function set through(sq_setprintfunc) to output the error.

parameters:

HSQUIRRELVM v the target VM

`sqstd_printcallstack`

```
void sqstd_printcallstack(HSQUIRRELVM v);
```

print the call stack and stack contents.the function uses the print function set through(sq_setprintfunc) to output the stack dump.

parameters:

HSQUIRRELVM v the target VM

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