SEDNOVE

Sncode/Extenso

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Course #1

- What you will see in this course:
  - Introduction about Extenso
  - Sednove
  - Extenso – Sncode
  - Architecture
  - Sncode programming

About this course

- Introduction to programming in Sncode
- Goal: Enable non-programmers to learn how to program, in particular with Sncode and Extenso
- What you will learn:
    - Sncode
    - Extenso
    - HTML
    - CSS
    - Javascript
    - Jquery
    - Ajax
    - Websocket
    - WebRTC

What you will need for this course

- HTML
  - https://www.youtube.com/watch?v=BvJYXl2ywUE
  - https://www.youtube.com/watch?v=PypMN-yui4Y
  - https://www.youtube.com/watch?v=1rbo_HHt5nw
  - https://www.youtube.com/watch?v=bFvjE4ZRtSE
- CSS / Bootstrap
  - https://www.youtube.com/watch?v=-qfEOE4vtxE
  - https://www.youtube.com/watch?v=1PnVor36_40
- Javascript
  - https://www.youtube.com/watch?v=cmIkfezTnBE&list=PL9dbBb7Ml9bXwgPTH5STNGEQNQNeCDXdu

What you will need for this course

- jQuery
  - https://www.youtube.com/watch?v=hMxGhHNOkCU
- JSON
  - https://www.youtube.com/watch?v=iiADhChRriM)
- SQL MariaDB/Mysql
  - https://www.youtube.com/watch?v=p3qvj9hO_Bo
- REGEX : Regular Expression
  - https://www.youtube.com/watch?v=rhzKDrUiJVk
- Git
  - https://www.youtube.com/watch?v=IHaTbJPdB-s
- And programming experience in a language...

What you **may** need for this course

- Linux (CentOS). Basic Command line interface (CLI)
  - https://www.youtube.com/watch?v=5jIIOkA0NpI
- Apache configuration
  - https://www.youtube.com/watch?v=rCr3-YlL5S8
- C programming
  - cmake / make / gcc
- Websockets

About this course

- keep your personnal question for later with me directly
- this is an introduction course not an advanced course.
- the course is recorded
- if you have a question, please raise your hand first
- you will need a headphones to speak

Sednove

- Founded in 1997 by Chantal Bilodeau and Pierre Laplante
- Web and mobile applications development
- Technological development
- Branding
- Design

Platinum

- Founded in 1995.
- Software developped in FoxPro
- Front Desk component only until 2000 (scheudle, patient file, transactioons and reports)
- EHR module in 2000 (doctor notes, patient flow with check in and calling patients to the room)
- in USA and around the world since 2002
- Need to move to the cloud to integrate new tools

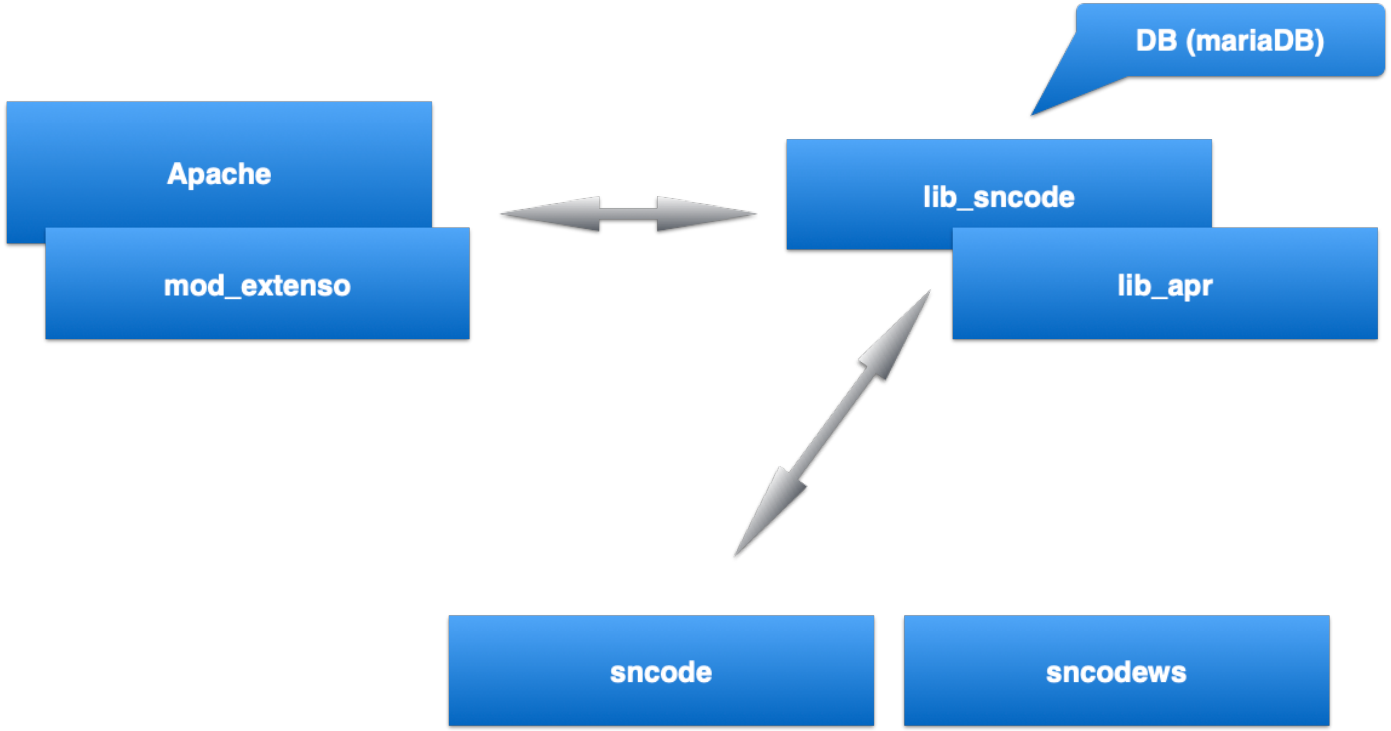
Extenso / Sncode

- Extenso : Clients and programmers interface
- Sncode : Programming language

Sednove's tools

- slack
- clickup
- uxpin
- gecko
- email
  - laplante@sednove.com
- Phone
  - 514-945-1779 (also whatsapp)

Architecture of Extenso



What is different about Extenso ?

- Dynamic / static
- Compile language
- Security with virtual machine
- Grid manager
- Style manager
- Modules manager
- Database manager
- Git/Gitlab managment of modules

Sncode

- Key concepts:
  - Sncode is a compiled language
  - Uses a virtual machine to execute code
  - Rich and extensible library
  - External modules
  - Simple syntax for non programmer
  - Power-full for professional programmer

compile, virtual machine etc.

- Interpreted language, PHP, Ruby
- Compile language : C
- Virtual machine : Java, C#, Sncode
- JIT : Just in Time
- Assembler
- Machine code

Sncode concepts

- File with extention .sn are compile and execute
- File with extension .snc are file already compiled in binary
- Convention use in the naming of site:

  https://ssnode.sednove.com for the staging version
  https://sncode.sednove.com for the production version

Sncode concepts #2

- staging require a login to modify the site
- Production deployment (or publishing) is the process of copying the file from staging to production
- Directory for staging is /staging
- Directory for html is /html

Sncode

- In a page everything that is not between {{ and }} is print as-is
- {{ Start Sncode
- }} End Sncode
- All text outside of Sncode is returned to the browser without being parsed

IDE

- Introduction to IDE in Extenso
- How to execute a program:
  - In staging : https://ssncode.sednove.com/ex.sn
  - In html : https://sncode.sednove.com/ex.sn

Simple example

- <html>
  <body>
  <h1>{{ "Date is "; datetime(); }}</h1>
  </body>
  </html>

Exercices

- Exercice #1 : try to reproduce the previous example.
  - Create a file in /staging/ex1.sn
  - Execute it with the URL https://ssncode.sednove.com/ex1
- Exercice #2 Only display the time not the date

  PS : https://extenso.live
- PS #2 https://getbootstrap.com/docs/4.5/getting-started/introduction/

Sncode's documentation

- All documentation under https://extenso.live
- https://module.sednove.com
- Man pages under Linux:

  man sql

Sncode's types

- Integer : `{{ a = 5 ; }}`
- Double : `{{ a = 3.1415 ; }}`
- Array : `{{ a = [ 1, 2.0, "3.1415" ]; }}`
- Boolean : `{{  a = true; }}`
- Null : `{{ a = null ; }}`
- Undefined : `{{ a = undefined ; }}`
- Associative Array / Hash array / Context :
  `{{ a = { "x" : 1.5, "y" : 2.0 } ; }}`
- `a.type()` will return the type of variable a

Integer

- Try This program:

```
{{
      a = 5;
      b = a / 2;
      "b = "; b;
      type(b);
}}
```

Operators

- By order of priority:
  - +, - ,
  - *, /,
  - ** (power), % (modulo)
- Try:

```
2 + 3 * 4 ** 2 => 50
```

- Use () to modify the order:

```
((2 + 3) * 4 ) ** 2 => 400
```

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Course #2

- What we have seen so far:
  - Extenso presentation
  - How to use IDE
  - Sncode's type
  - Structure of directory in Extenso

Integer / float

- Try this program:

```
{{
   a = 5;
   b = a / 2.0;
   "b = "; b;
   type(b);
}}
```

Function printf

- printf : print formatted
- `printf("Number = %05d", 10);`
- d : use to print integer
- Try
  - `printf("%7d", 10); a=printf("%x", 10); a;`
  - `printf("%-10s", a); printf("%10.4f", 10.2);`
  - `printf("%010.4f", 10.2); printf("%+010.4f", 10.2);`
  - `printf("%+10.4f", 10.2); printf("%10.1f", 5.17);`
- f : float, s : space, x : hexadecimal

Floating point number

- Example:

```
a = 1.123456789;
a;
```

- By default sncode use: `printf("%.8f", number)`
- According to Wikipedia:

"In computing, **floating-point arithmetic** (**FP**) is arithmetic using formulaic representation of real numbers as an approximation to support a trade-off between range and precision."

Floating point number

- Floating point number are represented as double in C
- Try:

```
{{ printf("%.20f", 0.1+0.2);}}
```

- Check:

https://docs.python.org/3/tutorial/floatingpoint.html

https://doc.lagout.org/science/0_Computer%20Science/3_Theory/Handbook%20of%20Floating%20Point%20Arithmetic.pdf

Floating point number

- Try this program:

```
a = 1/5;
b = 1/5.0;
c = 1.0/5;
"a="; a; ", b="; b; ",c ="; c;
```

Floating point number

- Try:

```
a = 48.0 * atan(1.0/49.0) +128.0 *
      atan(1.0/57.0) -
      20.0 * atan(1.0/239.0) + 48.0 *
      atan(1.0/110443.0);

  printf("%.25f", a);
```

Floting point number comparaison

- Floating point comparaison : operator ==
- try:

```
a=0.15+0.15; // 0.30000000000155
b=0.1+0.2;   // 0.30000000000144
a==b;
```

- return !

```
false
```

Floating point number

```
function compare(a,b)
    //!code Minimal function to compare FPN to 0.0001
    if a==b then
        return true;
    endif

    if abs(abs(a) - abs(b)) < 0.001 then
        return true;
    endif
    return false;
endf
a = 0.15+0.15; b = 0.1 + 0.2; a==b; compare(a,b);
```

Comparaison operators

- < : less than
- > : greater than
- <= : less or equal
- >= : greater or uqual
- <=> : compare 1⇔2; 2⇔1;
- != : not equal

FPN example

```
if 1 == 2 then
     "Oh la la something is wrong here";
else
     "Ok 1 is not equal to 2";
endif
```

FPN compare with string

- String are automatically convert to double

```
a = "0.0001";
b = 0.0001;
if a == b then
    "a is equal to b";
else
    "a is not equal to b";
endif
```

- Test:

```
if "0" == 0 then "true"; else "false"; endif
```

Comparaison operator

- If we do:

```
a = 5 < 6; a;
```

- a is a boolean : true or false

```
if a then "true part"; else "false part"; endif
```

- If we do:

```
a = 1;
if a then "true part"; else "false part"; endif
```

- 1 is true and 0 is false

The art of programming... part #1

- Good indentation
- Use good meaningful variable name :english, lower case, no plural _
- Use comment:
  - `/* ... */`
  - `/*`
  - `...`
  - `...`
  - `*/`
  - `// comment`
  - `# comment`

Comparaison operator : <=>

- Use to compare 2 numbers
- Return
  - -1 if left then
  - 0 if equal
  - 1 if greater than
- Example using a new statement : switch

```
a = 60;
b = 5;
switch a <=> b do
```

Comparaison operator : <=>

- Use to compare 2 numbers
- Return
  - -1 if left then
  - 0 if equal
  - 1 if greater than
- Example using a new statement : switch

```
a = 60;
b = 5;
switch a <=> b do
```

Comparaison operator : <=>

- Use to compare 2 numbers
- Return
  - -1 if left then
  - 0 if equal
  - 1 if greater than
- Example using a new statement : switch

```
a = 60;
b = 5;
switch a <=> b do
```

Comparaison operator : <=>

```
case -1:
    "a is lower than b";
    endc

case 0:
    "a is equal to b";
    endc

case 1:
    "a is greater than b";
    endc

default:
    "Ohh la system error";
    endc
ends
```

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Course #3

- What we have seen in course #2
  - Floating point number
  - Comparaison operators
  - Comments

Boolean

- 2 values: true or false
- Examples:

```
a = true;  b = false;
a != b;
a == b;
a < b;
a > b;
```

String

- A string variable is created using quote or double quote
- Example:

```
a = "Pierre";
a;
a= 'Pierre';
a;
```

- Why single quote or double quote ?

String : double vs single quote

- Double quote support escape sequence
- Ascii characters : `a = "Pier\x43\x44";` return PierCD;
  - 43 is hex value of character C
  - 44 is hex value of character D
- UTF-8 characters: `a = "\ucf80 = 3.1415"; a;`
  return π = 3.1415
- Complete list of utf-8 character:

  http://www.fileformat.info/info/charset/UTF-8/list.htm?start=1024

String : escape sequences

- `\\ : display \`
- `\n : newline`
- `\a : alert beep bell`
- `\b : backspace`
- `\t : tab`
- `\r : carriage return`
- `\v : vertical tab`
- `\o : octal number`
- `\f : Formfeed Page Break`
- `\' ou \" : Display ' or "`

String : when " and ' are not enough

- q(....) : quote is (and)
  - `q( x='"\t );`
- dq((...)) : quotes are 2 characters ((and))
  - `dq([ x='"\t ]);`
- qq(...) : double quote are (and)
  - `qq( x='"\t );`
- dqq((...)) : double quotes are 2 characters ((and))
  - dqq((x='"\t));

String : quote and double quotes

- You can also use the following characters:
- /, #, @, !, $, %, ?, &, \
  - `q/abc/;`
- (and),[and], { and }, < and >
  - `q(abc);`
- /, #, @, !, $, %, ?, &, \ follow by any characters for 2 characters (which in this case is not really clear)
  - `dq/edghe/;`

String comparaison

- `a = "001"; b = "1";`

  `a == b; // will convert a and b to double before doing the comparaison`

  or try

  `a eq b;` // string are compare case sentitive
- Sncode knows that a is a string and b is string or convert them
- `type(a); type(b);`

String comparaison operators

- eq : equal(==)
- ne: not equal (!=)
- lt : less than (<)
- le : less or equal (<=)
- gt : greater than (>)
- ge : greater or equal (ge)
- st : start
- ns : not start
- cmp : compare (⇔)

String comparaison st and ns

- Can you figure out what is the use of st and ns ?

String comparaison st and ns

- st stands for start with
- ns stands for not start with
- Example:

```
a = "/usr/local/website/plv1/staging/tmp";
a st "/usr/local"; // true
a st "usr/local"; // false
a ns "usr/local"; // true
```

String comparaison and date

- SQL usually return date in the military format:
  - YYYY-MM-DD HH:MM:SS
- String comparaison can then be used to compare date and time

```
a = "2020-12-14 18:32:33";
a lt "2020-12-15 19:19:19"; // return true
```

String and sub-string

- You can use the [] operator to get substring of a string:

```
a = "Pierre Laplante";

a[0:5];      // return Pierr
a[1:5];      // return ierr
a[:5];       // return Pierr
a[5];        // return e
a[7:];       // return Laplante
a[:-2];      // return Pierre Laplan
a[-4:-2];    // return an
```

String operator

- To concatenate 2 string use the operator .+

```
a = "pierre " .+ "laplante";
a; // return pierre laplante
b = "pierre " .+ 35;
b; // return pierre 35
```

String exercice

- Write a program to reverse the string a="pierre"; b
- `length(string)` return the length of a string

```
name = "Etienne";

b = name[6:7];
b = b .+ name[5:6]; // b .+= name[5:6] a = 7; a+= 7;
b = b .+ name[4:5];
b = b .+ name[3:4];
b = b .+ name[2:3];
b = b .+ name[1:2];
b = b .+ name[0:1];
```

String reverse

```
a = "pierre laplante";
b = "";
len = length(a);
for(i=0; i<len; ++i) do
    b = a[i:i+1] .+ b;
endfor
b;
```

String functions : **strinatcmp**

- **strinatcmp** - Case insensitive string comparisons using a "natural order" algorithm.
- Natural order means that rather than solely comparing single character code values, strings are ordered in a natural way. For example, the string "hello10" is considered greater than the string "hello2" even though the first numeric character in "hello10" actually has a smaller character value than the corresponding character in "hello2". However, since 10 is greater than 2, strnatcmp will put "hello10" after "hello2".
- `strinatcmp("hello10","hello2"); // return 1`

String functions : addslashes

- Escape the following characters:
  single or double quote, the backslash and the null character.
- `addslashes("\\\"'"); // return \\\\\"\'`

String functions : base64_encode/decode

- **base64_encode**(data,modified) Encodes data with MIME base64
- if modified is false then the caracter set supported are ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz0123456789:-
- If modified is true then the character set supported are ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz0123456789+/
- `base64_encode("Pierre Laplante",true);`
  - `return UGllcnJlIExhcGxhbnRl`

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Course #4

- What we have seen in course #3
  - Boolean
  - String
  - Sring functions
  - String operators

String function : cgidata parse POST/GET and command line arguments

- **cgidata**(parse_get : true|false, parse_post : true|false, conflict : replace|array|keep|join, join : "join string", callback : "…", postmax : integer, disable_upload : true|false, directory : "directory upload", fileconflict : "overwrite | rename | error", maxsize : 456, extention : "jpg,png,gif", ct : "format/gif, image/jpeg", "file parameter" : { directory : "directory upload to overwrite default directory upload", url : "url….", fileconflict : "overwrite|rename|error", maxsize : 456, ct : …, extention : …}, esc_cgidata:bool)

POST VS GET

- POST: data enclosed in the body of the request message
  - Usually use in a form

```
<form method="POST">
      <input name="pierre">
</form>
```

- GET: data is within the query string

https://sncode.sednove.com/index.sn?a=b&c=d

HTTP : methods

- From https://en.wikipedia.org/wiki/Hypertext_Transfer_Protocol
  - GET
  - HEAD
  - POST
  - PUT
  - DELETE
  - TRACE
  - CONNECT
  - PATCH

Form Example for cgidata

- https://sncode.sednove.com/method.sn
- Source : https://sncode.sednove.com/method_src.html
- Form example:

```
<form method="POST" action="?">
    <input type="text name="email">
    <button type="submit">Submit</button>
</form>
```

Form example for CGIDATA

- Method specify how the data will be transfert
  - POST
  - GET
- Action specify which page will be called ? stand for the current page
- input specify an input of some sort
  - type="text" specify a text input
  - name="email" specify the name of the field
- button of type submit specify that when the user click, the form is submitted to the action using the specified method

Using cgidata in Sncode

- the function cgidata() read the data from the form and put it in a JSON format
- JSON format ? Who is JSON ?

JSON : Javascript Object Notation

- https://www.json.org/json-en.html
- **JSON** (JavaScript Object Notation) is a lightweight data-interchange format
- It is also 2 types in Sncode:
  - array : list of elements
  - associative array, hashor context: list of name elements
  - element can be any types

Sncode array

- An array is initialise with the following code:

```
a = [
   true,                          // A boolean
   "string",                      // A string
   1,                             // An integer
   1.1,                           // A float
   [1,2],                         // An array
   { "x" :1, "y" : [1, 2] }       // An hash array
]; a;
[true,"string",1,1.1,[1,2],{"x":1,"y":[1,2]}]
```

Array

- Another way to initialize an array:

```
a = [];              // empty array
a = array(5);        // array with 5 elements null
a;
[null,null,null,null,null]

a[0] = "value";
```

Array

- Accessing elements of an array

```
a = [true,"string",1,1,[1,2],{"x":1,"y":[1,2]}];
a[0];                // return true, the first element
a[length(a)-1];      // return the last element
a[-2]; " ";          // return [1,2]
a[1:3]; " ";         // return ["string",1]
a[-3:-2]; " ";       // return [1]
```

array update

- Assignation:

```
a = [1,2,3,4,5];
a[2] = 5;
a[-1] = 10;
a;
// return [1,2,5,4,10]
```

- But you cannot use range in assignation
  - a[2:3] = 6; // will generate an error at execution
- How can you do this? There is a function call splice for that

array function : splice

- splice(array, start, length, elements...);
- Example:

```
a = [1,2,3,4,5];
splice(a,1,2,6,8,10);     // return [1,6,8,10,4,5]
splice(a, 2, 2);          // return [1,2,5]
splice(a,-3, 2);          // return [1,2,5]
```

Array functions : first / top

- Return first/top element of an array

```
a = [1,2,3,4,5];
top(a);                    // return 1
first(a);                  // return 1
```

array functions : last/tail and pop

- Return the last element of an array
- Function last and tail are the same

```
a = [1,2,3,4,5];
a.last();              // return 5
```

last(a);

- Remove the last element of an array and return it

```
a.pop(); a;            // return 5 [1,2,3,4]
```

array functions : join

- Join elements of an array and return a string
- You have to specify the separator
- Example:

```
a = [1,2,3,4,5];
a.join(","); // return 1,2,3,4,5 join(a, ";")l
```

- split can be use to split a string in a array:

```
split("1,2,3,4,5",","); // return [1,2,3,4,5]
split("pierre",""); // return ["p","i","e","r","r","e"]
```

Array function : reverse

- reverse an array
- Exercice:
  - Using the functions you have learn, write a small function to reverse a string

```
function reverse_str(str)

   return new_str;
endf

reverse_str("pierre"); // erreip
```

Array functions : push

- Push an element on top of array

```
a = [1,2,3];
push(a,5); a; // return [1,2,3,5];
```

- push will increase the size of the array (double the memory allocated)
- array have 2 sizes:
  - Real size
  - Memory allocated
- Increasing the size of an array imply the copy of the array

Array function : array

- array(10) will create an array with 10 position initialize with null
- [null,null,null,null,null,null,null,null,null,null];
- It's better to create the initial array with the correct size than to increment the array.
- array in sncode are real array
- indexing an array in sncode is really fast
- It's not an hash array which is less performant
- Adding an element to an array is like creating a new array with size+1

Array functions : range

- Generate an integer array with the range provided. Containing arithmetic progressions.
- **range(**stop);
- **range(**start,stop[, step]);
- range(10); **return** [0,1,2,3,4,5,6,7,8,9]
- range(10,20,2); **return** [10,12,14,16,18]

```
for i in range(10,20,2) do
      i; " ";
endfor // return 10 12 14 16 18
```

Array functions : shift

- Remove first element from array and return it.
- **shift**(array)

```
a = [1,2,3,4,5];
shift(a); a; // return 1 [2,3,4,5]

for i in a do
     i;
endfor
```

Array functions : array_search

- Searches the array for a given value and returns the first corresponding key if successful
- **array_search(**array, needle);
- The comparaison is based on the type of needle

```
a = [1,2,3,4.0,5, "abc", true, [1,2]];
a.array_search(3);        // return 2
a.array_search(33);       // return -1
a.array_search(4);        // return -1
a.array_search(4.0);      // return 3
```

Array functions : array_search

```
a = [1,2,[3,2],{ "x" :1, "y" : "abc" } ,5];

a.array_search([3,2]);                    // return 2
a.array_search([3,2.0]);                  // return -1
a.array_search({"x":1,"y":"abc"});        // return 3
a.array_search({"x":1.0,"y":"abc"});      // return -1
```

```
a.array_search({"y":"abc", "x" : 1});
```

Array functions : contains

- Same as array_search but return true or false

```
a = [1,2,[3,2],{ "x" :1, "y" : "abc" } ,5];

a.contains([3,2]);                  // return true
a.contains([3,2.0]);                // return false
a.contains({"x":1,"y":"abc"});      // return true
a.contains({"x":1.0,"y":"abc"});    // return false
```

Array functions : sort

- Sort an array using quick sort

```
sort([1.5,5,2,98,32,7,2,5]); // return
[1.5,2,2,5,5,7,32,98]
a = [1.5,5,2,98,32,7,2,5];
sort(a); a; // return a new array but a is not affected
// return [1.5,2,2,5,5,7,32,98][1.5,5,2,98,32,7,2,5]
```

- Sort float: `sort(sort:3, [1.1, 0.1, 1.3]);`
- Sort string: `sort(sort:1,['gt','ab', 'ba', 'cd']);`

sort functions

- bubble sort
- merge sort
- quick sort
- heap sort
- shell sort
- intro sort
- ....
- https://en.wikipedia.org/wiki/Sorting_algorithm

Array function : sort

- If parameter is not specify sort will check the type of element 0 of the array and use it to select function

```
 a = [1,2,3];
 function f(a,b)
     usera = sql(single: true, "select username from sn_users where uid = '?'", a);
     userb = sql(single: true, "select username from sn_users where uid = '?'", b);
     return usera.rows.username cmp userb.rows.username;
endf

sort(sort:2, fname: "f", a); // return [2,3,1]
```

Array function : exercice

```
function reverse_string(str)
   new_str = join(reverse(split(str, "")),"");
   return new_str;
endf

reverse_string("pierre");
```

Array function : exercise

- Write a sort function:

```
function mysort(arr)
  ...
  return new_arr;
endf


mysort([93,8,2,6]);
a = build_random_array();
a;
mysort(a);
```

```
function build_random_array()
  a = random(min:1,max:10,
    init:true);
  arr = array(a);

  for(i=0;i<a;++i) do
    arr[i] = 50 -
       random(min:0,max:100);
  endfor

  return arr;
endf
```

SEDNOVE

Sncode/Extenso

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Course #5

- What we have seen in course #4
  - POST vs GET
  - Function cgidata
  - Array and array functions

Hash / associative / context array

- In computer science, an **associative array**, **map**, **symbol table**, or **dictionary** is an abstract data type composed of a collection of (key, value) pairs, such that each possible key appears at most once in the collection.
- Based on JSON structure
- https://www.json.org/json-en.html
- Example:

```
a = { "x" : [1,2], "pi" : 3.1415 };
```

Hash array

- If we have:

```
a = { "x" : [1,2], "pi" : 3.1415 };
a.x; // return [1,2]
a.pi; // return 3.1415
a{"x"}; //return [1,2]
a{"p" .+ "i"}; // return 3.1415
a.x[0]; // return 1 a{"x"}[0];
a.x[1]; // return 2 a{"x"}[1];
```

Hash array

- If we have:

```
a = { "x & y" : [1,2], "pi" : 3.1415 };
a.x & y; does not work but
a{"x & y"}; will return [1,2]
a{"p & l"} = { "p" : 1, "l" : 56 };
a; will return

{"x & y":[1,2],"pi":3.1415,"p & l":{"l":56,"p":1}}
```

JSON / Hash array

- Hash array and JSON are completely compatible in Sncode
- With javascript you can do:

```
{{ a = { "x" : [1, 2] }; }}
<script>
  let a = {{ a }};
  console.log(a);
</script>
```

Hash functions : clearctx

- clearctx : Clears everything in a context.

```
a = { "x" : 1 };
clearctx(a);
a; // return {}
```

hash functions : deletectx

- Delete an entry in a context.

```
a = { "x":1,"y":2};
deletectx(a,"x");
a; // return {"y":2}
```

Hash functions : **exist**

- Check if an element exist in a context.

```
a = { "pi" : 1 };
a.exist("pi"); // return true
a.exist("PI"); // return false
a.exist('pi') exist(a,'pi')

if a.pierre != undefined then "ok"; endif
a;
```

hash functions : keys

- Return an array of the keys of the hash array

```
a = { "x":1, "y":2};
keys(a); // return ["x", "y"];
```

- This can be use to loop in the hash array:

```
a = { "x":1, "y":2};
for k in sort(keys(a)) do
  k; "="; a{k}; " ";
endfor
// return y=2 x=1
```

Hash array : Note about the order

- Keys in hash array do not have an order.

```
a = { "x" : 1, "y" : 2 };
keys(a); might return
[ "x", "y" ] or [ "y", "x"]
```

Hash functions : values

- **values** - Returns the list of values of a context.

```
a = { "x" :1, "y" : 2};
values(a); // return [1,2]
```

Hash functions : both

- **both** - Returns the list of keys and values of a context.

```
a = {"x" : 1, "y" : 2};
both(a); // return
[{"key":"y","value":2},{"key":"x","value":1}]
for i in both(a) do
  i.key; "="; i.value;
endfor
// return x=1y=2
```