

## CS465: Scripting Languages and Databases - Quizzes for Exam 2

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### Quiz 10-6: B+ Trees and Extendible Hashing

A B+-tree may only have keys in its interior nodes as opposed to both keys and record information.

True

Which type of file structure are we most likely to use to physically organize a file on its clustering key?

- Extendible Hash Table
- **B+-Tree**
- B-Tree
- Heap

Which type of file structure are we most likely to use to represent a secondary index?

- **Extendible Hash Table**
- B+-Tree
- B-Tree
- Heap

When making an access through a secondary index, what is the maximum number of disk accesses we try to limit ourselves to in retrieving the disk block that contains the desired data. Count 1 disk access for each access to an index block and the final access to disk block containing the desired data.

- 0
- 1
- **2**
- 3

In a B+-tree, if there are  $N$  records and each bucket can hold up to  $M$  keys, what is the worst case number of disk accesses required to access a leaf block, assuming that  $N$  is quite large?

- 1
- 2
- $\log_2(N+M)$
- **$\log_{(M/2)} N$**
- $\log_M N$
- $\log_{N/2} M$
- $N$

- M

## Quiz-10-8: Scripting Language Intro and Perl Intro

What is the purpose of the diamond operator (<>) in Perl?

- create a list
- perform a function call
- perform regular expression matching
- **get input from either stdin or an input file**

What niche was Perl designed to fill?

- Client side scripting
- Server side scripting
- **data extraction for report generation**
- gui development

In Perl, variables must start with a special character indicating their type. Match the following types of variable with the special characters that denote these types of variables.

- scalar variable: \$
- array variable: @
- hash table (associative array): %

Which of the following language features are typically found in a scripting language?

- Highly optimized compilers
- **Interpretation of the program**
- Assembly language escapes to the kernel for efficient systems programming
- **Regular expressions for pattern matching of strings**
- **Built-in support for high-level data structures including lists and hash tables**
- Mandatory typed variable declarations to facilitate type checking
- **Flexible dynamic typing so that variables can assume different types of values at different points in the program**
- Programmer controlled memory allocation and de-allocation for finer-grained control over data structures.

What is the primary goal of a scripting language?

- Allow programmers to write a program that runs as quickly as possible, even if the programmer has to take a significant amount of time to write, test, and debug the program.
- **Allow programmers to write a program as quickly as possible, even if it sacrifices machine efficiency.**
- Allow programmers to create "write-once, read-never" programs
- Allow programmers to write multi-threaded kernels for operating system development

## Quiz-10-20-Perl-Control-Structs-And-Reg-Exp-Intro

*	0 or more occurrences of the pattern
^	the string must begin with this pattern
?	an optional pattern (i.e., 0 or 1 occurrences of the pattern)
()	captures the substring that matches the pattern enclosed in parentheses
.	matches any character but the \n character
\w	matches any alphanumeric character, which is defined as upper or lower case letters, the digits 0-9, and the underscore (_) character.

Which of the following regular expressions will match a date that has the form mm-dd-yyyy where the date and the month can be either a single digit or two digits, and the year must be 4 digits. For example, 1-3-2014, 2-14-2014, and 10-14-1995 are all valid dates. Don't worry about ensuring that the month is between 1 and 12 or that the day is between 1 and 31. Hence 00-0-1495 is acceptable, as is 45-59-3968. The regular pattern should not match any string that does not adhere to the above specification. Hence 1-213-1964 is unacceptable, as is 1-3-64.

- `\d\d?\-\d\d?\-\d\d\d\d`
- `\d{1,2}\-\d{1,2}\-\d{4}`
- `dd-dd-dddd`
- `[0-9][0-9]?-[0-9][0-9]?-[0-9][0-9][0-9][0-9]`
- `\d+\-\d+\-\d{4}`
- `\d\d*\-\d\d*\-\d\d\d\d`

Suppose I want to write a conditional in Perl that operates as follows:

1. if the temperature is less than 32, print "it's snowing"
2. if the temperature is between 32 and 212, print "it's raining"
3. otherwise print "it's steaming"

Which of the following conditional statements achieves this task?

- ```
if ($temperature < 32) {
    print("it's snowing\n");
}
elsif ($temperature < 212 ) {
    print("it's raining\n");
}
else {
    print("it's steaming\n");
}
```

- ```
if ($temperature < 32) {
    print("it's snowing\n");
}
else if ($temperature < 212 ) {
    print("it's raining\n");
}
else {
    print("it's steaming\n");
}
```
- ```
if ($temperature < 32) {
    print("it's snowing\n");
}
elif ($temperature < 212 ) {
    print("it's raining\n");
}
else {
    print("it's steaming\n");
}
```
- ```
switch ($temperature) {
    case < 32: print("it's snowing\n");
    case < 212: print("it's raining\n");
    default: print("it's steaming\n");
}
```

The following loop construct in Perl allows the user to directly specify the condition that should cause a loop to exit, rather than having to express it indirectly by inverting the exit condition. For example, if I want to exit when the user enters -1, I could write:

`? (data == -1) { loop body }`

rather than

`while (data != -1) { loop body }`

where `?` is the name of the loop keyword I want you to select.

- `break`
- `foreach`
- `until`
- `exit`

**What is the purpose of the foreach loop construct in Perl?**

- It simulates the counting loop for construct provided by C and C++
- **It iterates through the elements of a list**
- It is a limited form of the C/C++ counting loop that iterates through a range of numbers, such as 2 to 8

- It allows the user to list a series of conditions and enters the loop body if any one of those conditions is true

## Quiz-10-22-Perl-Regular-Expressions

I want to write a perl script that checks a C++ program and prints out all instances of calls to the system command. You may assume that a call to the system command has the form "system('cmd')" where cmd can be any combination of white space, characters, and digits (you may use the . character to do your matching of characters in cmd). For example, if I have the program:

```
#include <iostream> using namespace std;

int main() { system('ls -l');

execute('hello brad'); system('cd /home/users/bvz/'); print('bye bye');
print('no no');
system('g++ -o test test.cpp'); return 0;
}
```

then I want my perl script to output:

```
system('ls -l')
system('cd /home/users/bvz/') system('g++ -o test test.cpp')
```

Assuming that I have read the complete program into a string called \$program, which of the following Perl fragments will print the system commands in \$program as shown above?

- while (\$program =~ /(system\(.\*\))/g) { print ("\$1\n");  
}
- while (\$program =~ /system('.\*?')/g) { print ("\$1\n");  
}
- while (\$program =~ /(system\('.\*?\))/g) { print ("\$1\n");  
}
- foreach (\$cmd, /(system\('.\*?\))/g, \$program) { print ("\$cmd\n");  
}

I want to read a file that contains lines of the form:

```
lastname | firstname | age
```

You may assume that there is no leading or trailing whitespace but there may be whitespace before and after the | character. Which of the following Perl scripts will successfully read lines with this format from stdin and output them in the format:

firstname lastname age

with any whitespace before and after the | character stripped away. For example, the lines

vander zanden | brad | 51 tang |yifan marie| 42 horse| charlie the wonder|10

should be output as

brad vander zanden 51 yifan marie tang 42

charlie the wonder horse 10

Remember that | is normally a special character in Perl. You may assume that the age is one or more digits and that the names are upper/lowercase letters and spaces. However, the pattern does not have to type check the values in each field. It is okay if the script simply breaks the line into three fields, strips the leading and trailing whitespace before the | character, and prints the fields in the order shown.

- ```
while (chomp($line = <>)) {
    ($lastname, $firstname, $age) = split(/\s*\|s*/, $line); print "$firstname $lastname
    $age\n";
}
```
- ```
$text = join("", <STDIN>);
while ($text =~ /^[A-Za-z ]*\|s*\|s*( [A-Za-z ]*)\|s*\|s*(.*)$/mg) {
    print "$2 $1 $3\n"; }
```
- ```
$text = join("", <STDIN>);
while ($text =~ /^[A-Za-z ]*\|s*\|s*( [A-Za-z ]*)\|s*\|s*(.*)$/g) {
    print "$2 $1 $3\n"; }
```
- ```
while (chomp($line = <>)) {
    ($lastname, $firstname, $age) = split(/\s\|s/, $line); print "$firstname $lastname $age\n";
}
```
- ```
while (chomp($line = <>)) {
    ($lastname, $firstname, $age) = split(/\|/, $line); print "$firstname $lastname $age\n";
}
```
- ```
while (chomp($line = <>)) {
    ($lastname, $firstname, $age) = split('|', $line); print "$firstname $lastname $age\n";
}
```

- ```

}

● while (chomp($text = <STDIN>)) {
  $text =~ /(?(?<lastname>[A-Za-z ]*?)\s*\s*(?(?<firstname>[A-Za-z
  ]*?)\s*\s*(?<age>\d+)); print "${firstname} ${lastname} ${age}\n";

}

● while ($line = <>) {
  ($lastname, $firstname, $age) = split(/\s*\s*/, $line); print "$firstname $lastname
  $age\n";
}

```

## Quiz-10-27-Perl-Functions-Files-And-Sorting

If you want your program to die from a user error, which of the following statements would you normally use to terminate the program?

- die "weight must be a number: \$!\n";
- die "weight must be a number: \$!";
- die "weight must be a number";
- die "weight must be a number\n";

Assuming we want the normal alphanumeric comparison, the following statement will sort the lines in stdin into ascending order:

```
sort(<STDIN>);
```

TRUE

Beginning with Perl Version 5.6, which of the following statements will open a file for output, assuming that the filename is in a variable called \$filename?

- open(INFO, ">", \$filename);
- INFO = open(\$filename, ">");  
open(INFO, "w", \$filename);
- INFO = open(\$filename, "w");  
open(INFO, "<\$filename");
- open(INFO, ">\$filename");
- open(INFO, "<", \$filename);
- INFO = open(\$filename, "<");

Which of the following statements about Perl functions are true? Select all that apply.

- Perl assumes that any variable you use in a function is a global variable, even if it is the first time the variable has been defined anywhere in the program
- You must pass arrays and hash tables to functions using references if you intend to use them as arrays and hash tables in the function

- You must use a return statement to return a value from a Perl function
- You do not explicitly list the function's parameters in the function's declaration. For example, if the function has two parameters, you would write:  

```
sub min { ... }
```

rather than  

```
sub min(a, b) { ... }
```
- It is illegal to pass arrays and hash tables as arguments to functions. For example, you may not write `min(@x)` as a function call.

Feedback:

1. It is fine to pass an array or hash table as an argument to a function, but it won't behave as you might expect, since the values will get flattened into a list of scalar arguments.
2. A return statement is the preferred way to return values from a perl function because it makes the code easier to read, but you are allowed to omit the return statement, in which case Perl returns the value of the last expression executed in the function.

Which of the following commands will correctly sort an array of numbers in ascending order?

- `sort {$a <=> $b} @numbers;`
- `sort(@numbers);`
- `sort(@numbers, {$a <=> $b});`
- `sort {$a cmp $b} @numbers;`

The Perl sort function is an in-place sort function that alters its argument. For example, when `sort(@lines)` is finished, `@lines` will have been modified so that it is in sorted order.  
**False**

Feedback:

`sort` returns a **new** list that is sorted, and leaves the original argument unchanged. Hence if you want `@lines` to end up sorted, you must write:

```
@lines = sort(@lines);
```

## Quiz-10-29-Perl-OO-Modules

Which Perl data structure is typically used to represent objects (i.e., instances of classes, not classes themselves) in Perl?

- packages
- hash tables
- arrays

- modules

**What is the purpose of the bless command in Perl's object system?**

- It associates a reference, which is usually a reference to a hash, with a class, thus identifying the object as an instance of that class
- It associates a package with a module, thus identifying the package as an instance of that module
- It associates a subclass with a class, thus allowing methods not defined in the subclass to be located in the superclass
- It is the command used in place of a constructor to create a new object.

**If I want to create a class named Color in Perl, which of the following commands should I use to start the class definition?**

- class Color;
- module Color;
- package Color;
- hash Color;

**Does Perl allow multiple constructors for the same class?**

- No, only one constructor is permitted per class
- Yes, as in C++ and Java, you can overload the name of the class with multiple constructor definitions.
- Yes, you provide multiple definitions of the "new" operator.
- Yes, but each constructor must have a different name, such as new and makeColor.

**Suppose you have the following constructor declaration for the class Color:**

```
sub new {
    my ($class, $red, $green, $blue) = @_;
    my $self = {};
    bless($self, $class); # associate the reference with the package
    $self->{red} = $red;
    $self->{green} = $green;
    $self->{blue} = $blue;
    return $self;
}
```

**Which of the following statements will create a new instance of Color?**

- \$x = Color(25, 86, 17);
- \$x = new Color(25, 86, 17);
- \$x = new("Color", 25, 86, 17);
- \$x = Color->new(25, 86, 17);

**If I want to create a class named Rectangle which is a subclass of GraphicalObject, which of the following sets of commands will properly set up the inheritance hierarchy between Rectangle and GraphicalObject?**

- **package Rectangle;**  
**use base("GraphicalObject");**
- package Rectangle;  
isa GraphicalObject;
- package Rectangle;  
derives GraphicalObject;
- **package Rectangle;**  
**require GraphicalObject;**  
**@ISA = ("GraphicalObject");**
- class Rectangle : GraphicalObject;
- class Rectangle extends GraphicalObject;

Suppose I have a package named Math that includes the following statements:

```
@EXPORT = ("sqrt", "pow", "abs");
```

```
@EXPORT_OK = ("cos", "sin", "tan");
```

If I want to import the functions sqrt, pow, abs, cos, and tan, which of the following statements should I use?

- use Math + qw(cos tan);
- **use Math qw(:DEFAULT cos tan);**
- use Math qw(:EXPORT, :EXPORT\_OK - sin);
- use Math(sqrt, pow, abs, cos, tan);

Which of the following statements are true of Perl modules/packages?

- By convention, the name of the package/module should start with a lowercase letter
- **The file defining the package/module must end with an expression that returns a true value.**
- **They should be stored in files that end with the .pm suffix**
- packages/modules do not hide their variables or functions from an importing program. In other words, all functions and variables in a package/module are public and accessible.
- **packages that are meant to be libraries of functions are typically called modules**
- packages are always classes
- **The name of the file must match the name of the package/module**
- They use Perl's @ISA class to export functions and variables

Feedback:

1. By convention the names of packages and modules start with an uppercase letter
2. The Exporter class provides support for exporting functions. Variables should typically not be exported. @ISA is not a class but a keyword that sets up a subclass-superclass relationship.
3. Classes are always packages, but packages do not have to be classes
4. By default everything in a package/module is private, not public, and anything you want to export must be listed in either the @EXPORT or @EXPORT\_OK arrays. Classes turn

all functions into public functions, but a regular package/module hides its functions by default.

### Quiz-11-3: PHP Basics

Suppose in a php script I want to type check a phone number that is stored in \$phone to ensure that it has the format ddd-ddd-dddd where d is a digit from 0-9. Which of the following statements should I write?

- `if ($phone =~ /\d{3}-\d{3}-\d{4}$/) { ... }`
- `if ($phone == "\d{3}-\d{3}-\d{4}") { ... }`
- `if ($phone matches "/\d{3}-\d{3}-\d{4}$/") {...}`
- `if (preg_match("/^\d{3}-\d{3}-\d{4}$/", $phone)) { ... }`

Which of the following features are supported by PHP?

- Interpolation of variable values into strings. For example, if \$a = 20, and the string is "a = \$a", then the resulting string will be "a = 20".
- PHP provides a Perl-like diamond operator that allows input to be read from stdin using the notation:  
`while (line = trim(<>)) { ... }`
- PHP provides both numerically indexed and associative arrays
- A php variable that is assigned a value in one "code island" in a php script may have its value retrieved by a statement in a subsequent php "code island". In other words, variables remain in scope for the entire file.
- The asort function allows the programmer to provide a comparison function to control how two elements of an array are compared.
- print statements the entire contents of an array, with each element separated by a space. For example, if \$nums is an array containing the elements (3, 6, 9), then:  
`print $nums;`  
will print  
3 6 9
- As in Perl, variables introduced in a function are assumed to be global unless they are explicitly declared as local.
- PHP provides a foreach construct that allows the programmer to iterate through the key-value pairs of a hash table by providing a pair of loop variables, with the key in each key-value pair being assigned to one variable and the value being assigned to the other variable. The loop construct looks like:  
`foreach ($names as $name=>$salary) { ... }`
- switch statements may use either numbers or strings, as opposed to C/C++ which only allow numbers or chars.
- An entire file may be read into a string using a command named `file_get_contents`.

What happens when I type the url "http://web.eecs.utk.edu/~bvz/foo.php" into a web browser?

- The web browser transmits the file to a server, the server executes the .php script to generate an .html page and transmits the page back to the browser, and the browser displays the generated .html page.
- The web browser executes the .php script on the client's machine, the client's machine generates a .html page and transmits the page back to the browser, and the browser displays the generated .html page.
- The web browser executes the .php script in the browser's own virtual machine, thus generating a .html page that the browser can then display.
- An error message gets printed because only .html files can be interpreted by a web browser.

**What innovation was introduced in PHP that makes it useful for server side scripting?**

- It introduced regular expressions, which make it easier to specify patterns that should be found in strings.
- It prohibits any kind of file manipulation which makes it safe for running in browsers.
- It may be embedded within html code in order to generate dynamically-created web pages.
- It provides map/reduce operators that make it possible to coordinate multiple servers working on the same script.

## Quiz-11-5-XHTML-Forms

**If you want to allow an automated program, such as a web crawler, or a user to be able to run a script by typing a URL into a browser, what action should you use for the submit action?**

- Request
- Post
- Send
- Get

**Under which of the following conditions should you use Post rather than Get as the submission method for a PHP script?**

- The number of bytes in the form content that gets submitted to the script (i.e., the keyword-value pairs) is extremely large.
- You want to force a person to go through a web page in order to access the script
- The script is going to modify a database on the server.
- Speed is of the essence in running the script and post will result in a faster turnaround time
- The form data to be submitted to the server contains textual data as opposed to only numeric data.
- The server does not have a CGI gateway

**For each of the following input situations, select the widget that would be most appropriate for collecting that input.**

- A zip code: **Textbox**
- A choice of the main ingredient to include in a burrito. The choices include pork, chicken, beef, steak, and veggies. The choices are mutually exclusive. **Radio buttons**
- Which US state a person lives in. **Menu**
- A choice of toppings for a burrito. The choices are cheese, guacamole, lettuce, sour cream, tomatos, and onions. The choices are not mutually exclusive. **Check boxes**
- The city in which a person lives. Assume that the city could be any city in the US. **Textbox**
- The type of driver's license being applied for. The choices are truck, motorcycle, scooter, and auto. The choices are mutually exclusive. **Radio buttons**
- The library branch from which a book should be picked up. There are 20 branches from which to choose. **Menu**
- A person's gender. **Radio buttons**

**What is the average number of items that an adult can store in working memory?**

- **7, plus or minus 2 (i.e., 5-9)**
- 20, plus or minus 5 (i.e., 15-25)
- 10, plus or minus 2 (i.e., 8-12)
- 3, plus or minus 2 (i.e, 1-5)

**Why is the size of working memory so important in organizing items into lists?**

- If a person sees a list, they can always store it immediately in working memory. If the size of working memory is small, they will respond faster than if the size of working memory is large. Essentially the response rate is linear in the size of working memory.
- **If a person sees a list, they can instantly store all items in the list in working memory if the number of elements in the list is smaller than the size of their working memory and immediately know which item they wish to select. If the size of the list is greater than the size of working memory, then they must linearly scan the list to find the item they are looking for. So if the list is less than the size of working memory, the person can perform the operation in  $O(1)$  time, but if the list is greater than the size of working memory, the person must perform the operation in  $O(n)$  time.**
- The size of working memory determines how many elements of the list the person can permanently remember. If the size of working memory is greater than the size of the list, the person will permanently remember all of the list, whereas if the size of the list is greater than the size of working memory, the person will permanently remember only half of the list.
- If the size of working memory is  $n$  elements, then the size of the list should be at most the square root of  $n$ . Since working memory requires square root "cells" to remember one item on the list, a list of size  $\sqrt{n}$  will require  $n$  "cells" in working memory and hence will fit completely in working memory. Each item in the list can then be accessed in  $\sqrt{n}$  time, which is faster than linearly scanning the list.

## Quiz-11-10-PHP-Form-Handling

If a cookie is to be sent from a PHP script to a client, where should the call to create the cookie appear in the script?

- **At the beginning of the script, before any output is generated.**
- Anywhere in the script is fine
- At the end of script, after all the output has been generated
- Immediately after the <body> tag has been generated.

In order to use PHP session variables that have been previously created by an earlier PHP script in the web session, what must be done at the start of the PHP script?

- Cookies must be enabled
- The session array must be imported using the "import session" command
- The session variables must be individually imported by naming them in an import command. For example:  
import \$toppings, \$size, \$name
- **The session\_start() function must be called to initialize the session array**

If you want to insert a code fragment into an sql database that has been received from a browser, which of the following PHP commands should you use to treat the string so that the sql insert command does not get prematurely terminated or confused by the content of the code fragment?

- htmlspecialchars
- striptags
- **addslashes**
- htmlentities

Feedback: addslashes will put backslashes in front of special characters such as ' and " that are commonly found in programs and which would prematurely terminate an sql insert query if they were not escaped with the \ character.

What are the advantages of cookies over session variables?

- They allow client-side scripts to access the data, as well as server side scripts.
- They allow more session data to be stored because they are stored on the server rather than the client and hence are subject to the server's size limitations rather than the browser's size limitations.
- They prevent hackers from corrupting the data that is sent to the server
- **They allow multiple servers to handle the same web session**
- **They can be preserved between web sessions, which means that the user can close their web browser, re-open it, and the data will still be available.**
- They only have to be transmitted once per web session rather than with each page request

If I want to send multiple selections from a menu or a set of checkboxes to a PHP script, how must I write the name attribute in the form? Assume that the name of the form element is "toppings".

- name="toppings";
- name="toppings:multiple";
- name="toppings[]";
- name="toppings[multiple]";

In a PHP script, how can I retrieve the value of a form element named "zipcode" if the form has been transmitted using the post method?

- \$a = \$POST['zipcode'];
- \$a = \$\_POST['zipcode'];
- \$a = \$FORM['zipcode', 'POST'];
- \$a = decode('zipcode', 'POST');

An attack on a web-site in which a hacker inserts malicious html code into web pages being viewed by other users of the site is called:

- a cross-site scripting attack
- an sql injection attack
- an html injection attack
- a web-site vulnerability attack

## Quiz-11-12-PHP-SQL-XML

Which of the following are advantages of prepared SQL queries in PHP?

- They reduce the amount of data traffic between the server and the client
- They speculatively pre-fetch results from the SQL database so that data is potentially already cached in the server's memory when it is needed.
- They provide a way to cache database results on the client side so that repetitive queries can be answered without sending the query to the server.
- They execute faster because the query is pre-optimized by the query optimizer
- They prevent cross-site scripting attacks
- They make it more difficult to carry out injection attacks against the database

Response Feedback:

1. Prepared SQL queries help prevent sql injection attacks but have nothing to do with cross-site scripting attacks, which are html-based, not database-based.
2. Prepared SQL queries cache the compiled version of the query but they do not cache results from queries on either the server or the client and they do not speculatively pre-fetch data from the database.

Which of the following PHP commands will execute a query that retrieves a person's name and birthdate from a relation named Personnel where the name of the person to be retrieved is stored in a variable named \$employeeName?

- `$result = mysqli_exec("select name, age from Personnel where name = $employeeName");`
- `["name", "age"] = mysqli_query("select * from Personnel where name = $employeeName");`
- `$result = mysqli_query("select", ["name", "age"], "Personnel", "name = $employeeName");`
- `$result = mysqli_query("select name, age from Personnel where name = $employeeName");`

### What is the purpose of XML?

- To provide a human-readable means of describing and structuring data using mark-up tags
- To provide an efficient, binary encoding of data using mark-up tags
- To describe the structure of a document and how it should be rendered to a browser using mark-up tags
- To describe how to render a document in different formats, such as html, pdf, and simple text using mark-up tags

### For each of the following scenarios, select the most appropriate XML parser.

- The program needs to modify the structure of the XML document. **DOM parser**
- The program needs to read an XML document describing artists and the albums they have created into memory and for each artist compute the average sales for their albums. The document is small enough to fit in memory and no alterations are required to the document. **simpleXML parser**
- The XML document is too large to fit completely in memory. **Expat parser**
- The program needs to create a new XML document for scratch. **DOM parser**

### Which of the following statements are true of a well-formed XML document?

- **There is a single top-level root element**
- Mark-up tags are not allowed to have attributes.
- **Every tag is terminated by a / tag of the same name**
- There may be no entity codes in the data
- Data and elements may not be nested within the same element. In other words, a markup element may have data or may have sub-elements, but may not have both.
- **The data can be represented and manipulated as a hierarchical tree in a program**
- Every element with the same name (e.g., artist, date) must have exactly the same structure.
- Tags can be nested in random order and can be closed in any order.

### For each of the following scenarios, select whether XML or a relational database would provide the superior implementation.

- The data must be human-readable. **XML**
- Efficiency is of the utmost importance in processing queries against the data. **Relational database**

- The data is well-structured with no variation between records. **Relational database**
- The data needs to be read into memory and manipulated as a tree. You may assume that the data is small enough to fit completely in memory. **XML**

## Quiz-11-17-Javascript-Intro

1. Which of the following features were omitted from the **original** design of Javascript, thus making it difficult to use for general purpose computing?  
**Answers:**
  - Ability to read/write files
  - Console output (stdout)
  - Console input (stdin)
2. What are the two primary ways that a javascript program running in a web browser obtains input?  
**Answers:**
  - A prompt function that pops up a dialog box asking for input
  - A form on a web page
3. What is the problem with using Javascript's document.write function to modify the content of a web page?  
**Answer: It destroys the existing content on the web page**
4. If a programmer wants to use a dictionary in Javascript, what should the programmer create?  
**Answer: An object**
5. In Javascript, how do you make object A inherit from object B?  
**Answer: A.prototype = B**
6. In what ways does a prototype-instance model differ from a class-instance model?  
**Answers:**
  - All prototypes are themselves objects.
  - Prototypes allow web interfaces to be rapidly changed without shutting down the web-site and recompiling it.
  - Properties can be dynamically added or deleted from any prototype object.
  - Properties can be dynamically added or deleted from any instance object.

## Quiz-11-19: Javascript/HTML DOM

Suppose I have the following fragment of html markup code:

```
<p id="p2">I want new content</p>
```

and I have stored the dom node representing the paragraph in a javascript variable named "element". Which of the following javascript statements will change the content of the paragraph to read "The quick brown fox jumped the fence."? Select all answers that would work.

- `element.innerHTML = "The quick brown fox jumped the fence."`
- `element.firstChild.nodeValue = "The quick brown fox jumped the fence.";`
- `element.firstChild.content = "The quick brown fox jumped the fence.";`
- `element.firstChild = "The quick brown fox jumped the fence.";`

- `element = "The quick brown fox jumped the fence.";`
- `element.content = "The quick brown fox jumped the fence.";`

**A Javascript DOM object is created for each web page loaded into a browser. What is contained in the Javascript DOM object?**

- A hash table of cookies for the web page
- **A tree constructed from the web markup elements in the web page**
- A hash table that contains key/value pairs where the keys are the tags in the html document and the values are the contents of those tags
- A hash table that contains key/value pairs where the keys are the ids associated with the tags in the html document and the values are the contents of those tags.

**Suppose that a web page contains the following fragment of html markup:**

```
<p id="fox">The quick brown fox jumped the fence.</p>
```

**Which of the following javascript code fragments can be used to modify the dom to change the color of the paragraph to red?**

- `document.fox.color = "red";`
- `document.getElementById("fox").color = "red";`
- **`document.getElementById("fox").style.color = "red";`**
- `document.fox.style.color = "red";`

**Suppose I have the following html fragment:**

```
<div id="d1">
  <p id="opening">Hi Brad!</p>
  <p id="closing">Bye Brad!</p>
</div>
```

**I want to add a new paragraph between "Hi Brad!" and "Bye Brad!" that reads "How are you doing?". The new paragraph should have the id "greeting". Which of the following javascript code fragments will insert this new paragraph into the dom?**

- **`var para = document.createElement("p");`  
`var node = document.createTextNode("How are you doing?");`  
`para.appendChild(node);`  
`para.id = "greeting";`  
`var element = document.getElementById("closing");`  
`var div = document.getElementById("d1");`  
`div.insertBefore(para,element);`**
- `var para = document.createElement("p");`  
`para.textContent = document.createTextNode("How are you doing?");`  
`para.id = "greeting";`  
`var element = document.getElementById("closing");`  
`element.insertBefore(para);`

- ```
var para = "<p id='greeting'>How are you doing?</p>";
var element = document.getElementById("closing");
var div = document.getElementById("d1");
div.insertBefore(para,element);
```
- ```
var para = document.createElement("p", "id=greeting");
var node = document.createTextNode("How are you doing?");
para.appendChild(node);
var element = document.getElementById("closing");
element.insertBefore(para);
```

## **Quiz-11-24: JavaScript Forms and Regular Expressions**

1. An event that occurs as a result of a user interaction with a form element is called:

**Answer: An action event**

2. If the programmer wants a function to be called whenever the user has finished modifying the string in a text box, which event should the programmer attach the function to?

**Answer: onchange**

3. If you want an explanatory string to appear in a pop-up box when the mouse hovers over a form element, to which attribute in the form element should the string be assigned?

**Answer: title**

4. Suppose I wish to validate that a user has entered a zip code that is either exactly 5 digits or 5 digits, followed by a dash, followed by 4 digits (e.g., 37996 and 37996-0103 would be valid zip codes). Which of the following javascript statements should I use to perform this validation? Assume that the html for the form element looks as follows:

```
<form name="address">
zip code: <input type="text" name="zipcode" />
</form>
```

**Answer: `/^\d{5}(-\d{4})?$/!.test(document.address.zipcode.value);`**

5. Suppose I have the following partial html form fragment:

```
<form name="invoice">
total: <input type="text" name="total"/>
sales tax: <input type="text" name="tax"/>
</form>
```

Which of the following javascript code fragments will correctly compute the sales tax for the form?

**Answers:**

- taxAmount = document.forms['invoice'].total.value \* document.forms['invoice'].tax.value;
- taxAmount = document.invoice.total.value \* document.invoice.tax.value;
- with(document.invoice) { taxAmount = total.value \* tax.value;}

6. Suppose I have the following form fragment:

```
<form name="Settings">
  <input type='radio' name='font' value='times' /> Times <br/>
  <input type='radio' name='font' value='courier' /> Courier <br/>
  <input type='radio' name='font' value='helvetica' /> Helvetica<br/>
</form>
```

Which of the following javascript code fragments is the *simplest* code fragment that will correctly assign the value of the current font selection to the variable fontValue?

**Answer: fontValue = document.Settings.font.value;**

**Other Choices:**

- fontValue = document.Settings.value;
  - with (document.Settings) {
    - for (index in font) {
      - if (font[index].checked) {
        - fontValue = font[index].value;
- fontValue = document.Settings.font.checked.value;

## Quiz-12-1: Ajax

1. What is the name of the object provided by most web browsers that allows you to make an Ajax request?

**Answer: XMLHttpRequest**

2. If the server wishes to return its information to the client in a format that will allow the information to be easily converted to a Javascript object (i.e., associative array), which format should it use to transmit the information.

**Answer: JSON format**

3. Which of the following problems with updating content on a web page was AJAX designed to solve?

**Answer:**

- The browser would freeze until the server responded with a new page.
- The loss of the state information of javascript variables when a new page was loaded
- Bandwidth and latency issues caused by having to transmit an entire page of information.

4. Which event gets triggered by the server when it responds to an ajax request?

**Answer: onreadystatechange**

5. Suppose a client wants to send an ajax request that will call invoice.php, that will post parameters using the GET action, and will post the following key-value pairs as parameters (the first item is the key and the second item is the javascript variable holding the value):

- name: item
- quantity: qty

Assuming that the variable ajaxreq points to an ajax request object, which of the following javascript code fragments will correctly initialize the request object and send it to the server?

**Answer:**

```
parameters = "name=" + item + "&quantity=" + qty;  
ajaxreq.open("GET", "invoice.php?" + parameters);  
ajaxreq.send(null);
```

6. Suppose I want to send an ajax request from the client to the server that invokes the script "map.php". The request should use the POST action. You may assume that the parameters to the call are stored in a javascript variable named parameters. Assuming that the variable ajaxreq points to an ajax request object, which of the following javascript code fragments will correctly initialize and send the request to the server?

**Answer:**

```
ajaxreq.open("POST", "map.php");  
ajaxreq.setRequestHeader("Content-type", "application/x-www-form-urlencoded");  
ajaxreq.send(parameters);
```