



SCHOOL OF COMPUTING AND ENGINEERING SCIENCES  
BACHELOR OF SCIENCE IN BUSINESS INFORMATION TECHNOLOGY  
END OF SEMESTER EXAMINATION –SPECIAL EXAMS

BBT 3101: APPLICATION PROGRAMMING FOR THE INTERNET

DATE: 4<sup>th</sup> August 2022

Time: 2 Hours

**Instructions**

1. This examination consists of **FIVE** questions.
2. Answer **Question ONE (COMPULSORY)** and any other **TWO** questions.

**Question ONE (30 marks) (COMPLUSORY)**

- a. Write the code for a web service **books.php** that outputs **JSON data** about books available at a book store in a **particular category**. This service should take a **GET parameter** named **category** and search a **database table** for all books in that category.

Your PHP code will read a data from a table name **books\_table**. The table has the following attributes **name | author | category | date | price**

Name	Author	Category	Date	Price
21 Burgers for the 21st Century	Stuart Reges	cooking	2010	75.00
Harry Potter and the Sorcerer's Stone	J.K. Rowling	children	1998	19.99

- i. Write code that will be used to **connect PHP** to a **MYSQL** database **(4 marks)**

ii. Write an **SQL query** that will be used to fetch books from the database based on category **(3 marks)**

iii. Write code that will be used to encode the SQL results in **JSON format** and display as follows: **(5 marks)**

```
{ "book_id":"1",  
  "book_name":"21 Burgers for the 21st Century",  
  "author":"Stuart Reges",  
  "category":"cooking",  
  "date":"2011-12-14",  
  "price":"75" }
```

iv. Write the URL that will be used by the books Web service to perform the GET request. The category selected is “cooking”.**(3 marks)**

b. Suppose that there is a web service named *weather.php* , located on your web server in the same directory as your code. This service outputs XML data describing daily high temperatures in degree Fahrenheit. The XML data is as follows:

```
<?xml version="1.0" encoding="UTF-8"?>  
<temperatures>  
  <city name="Nairobi">  
    <high>70</high>  
    <high>67</high>  
    <high>63</high>  
  </city>  
  
  <city name="Kisumu">  
    <high>79</high>  
    <high>73</high>  
    <high>68</high>  
    <high>72</high>  
  </city>  
  ...  
</temperatures>
```

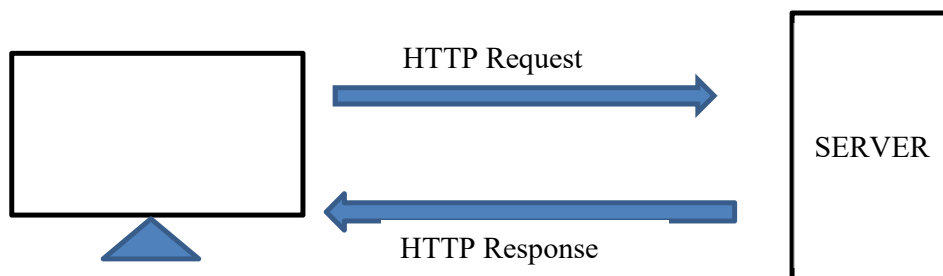
The relevant HTML code is as follows:

```
<h1>Weather Forecast for Kenyan Cities</h1>  
<ul id="forecast"></ul>
```

- i. Write Ajax JavaScript code to contact the web service (using a GET request), and load its XML data. This code should run when the web page loads. Assume the XML data is saved on a page *temperature.xml* (5 marks)
- ii. Write AJAX/JavaScript code to display names of the cities as an **unordered list** .The names will be fetched from the XML data . The list should appear as shown below . (6 marks )
- Kisumu
  - Nairobi
- c. Consider a parent class **Person** that declares an abstract method **greeting( )** that has a type hint of string and a real method **say\_hello( ) ;**
- i. Write code to represent the abstract class **Person** (4 marks)

## Question TWO (15 marks)

- a. Consider the following diagram that shows a client-server communication. Data is exchanged between client and server using a HTTP Request and HTTP Response message



- i. A HTTP request message is divide into three parts. Identify and explain what these parts contain. (3 marks)
- b. Consider the following specifications of a HTTP Request:

This request sends data to the server  
It accepts text/html data  
The data will be sent using Mozilla Browser  
The content to be sent is a multipart/form-data  
The size of the content is 345

- i. Show how the HTTP request with the above specifications will appear in the header **(3 marks)**
- c. After sending a HTTP Request the HTTP response is usually returned with a status code and status text. Describe the 5 common categories of status codes that are usually returned. **(5 marks)**
- d. Consider the following HTTP Request Lines.

```
GET/ home.html HTTP/1.1  
POST/index.html HTTP/1.1  
DELETE/query.html HTTP/1.1
```

- i. Identify the parts of a HTTP Request Line **(1 mark)**
- ii. The request lines above tell the server what kind of action the client expects. For each of the request line, describe what action the server will take **( 3 marks)**

### **Question THREE (15 marks)**

- a. JSON data format has been used by APIs to exchange data between applications. What are some of the advantages of JSON that makes it suitable for use? **(3 marks)**
- b. Consider the following API with an example output of what the URL contains.

<https://api.openbrewerydb.org/breweries>

```
[
  ...
  {
    id: 299,
    name: "Almanac Beer Company",
    brewery_type: "micro",
    street: "651B W Tower Ave",
    address_2: null,
    address_3: null,
    city: "Alameda",
    state: "California",
    county_province: null,
    postal_code: "94501-5047",
    country: "United States",
    longitude: "-122.306283180899",
    latitude: "37.7834497667258",
    phone: "4159326531",
    website_url: "http://almanacbeer.com",
    updated_at: "2018-08-23T23:24:11.758Z",
    created_at: "2018-08-23T23:24:11.758Z"
  },
  ...
]
```

- i. Using the XMLHttpRequest, make an API call to the link that will fetch the data from the URL above, and display it on the console window when the page loads  
( 5 marks)
- ii. The data fetched in a(i) above is in text format. Write code to convert the data from text format to JSON format  
( 2 marks)

iii. After converting it in JSON format above, the data will be displayed as follows.

```
▶ 0: {id: '10-56-brewing-company-knox', name: '10-56 Brewing Company', brewery_type: 'micro', street: '400 E
▶ 1: {id: '10-barrel-brewing-co-bend-1', name: '10 Barrel Brewing Co', brewery_type: 'large', street: '6297E
▶ 2: {id: '10-barrel-brewing-co-bend-2', name: '10 Barrel Brewing Co', brewery_type: 'large', street: '1135
▶ 3: {id: '10-barrel-brewing-co-bend-pub-bend', name: '10 Barrel Brewing Co - Bend Pub', brewery_type: 'lar
▶ 4: {id: '10-barrel-brewing-co-boise-boise', name: '10 Barrel Brewing Co - Boise', brewery_type: 'large',
▶ 5: {id: '10-barrel-brewing-co-denver-denver', name: '10 Barrel Brewing Co - Denver', brewery_type: 'large
▶ 6: {id: '10-barrel-brewing-co-portland', name: '10 Barrel Brewing Co', brewery_type: 'large', street: '14
```

Write code that will loop through the JSON data and display the values in a table, as shown below:  
(5 marks)

id	Name	Brewery_type
10-56-brewing-company-knox	10-56 Brewing Company	Micro
10-barrel-brewing-co-bend-1	10 Barrel Brewing Co	Large

#### Question FOUR (15 marks)

- a. What is the purpose of a constructor function? **(2 marks)**
- b. Consider a shop that sells multiple products. Each product has a **name** and a **price**. There is a method named **update\_price** that is used to update the prices of a product given its **name**.
- i. Write code to create a **PHP class** that represents the Product entity with the properties and methods **(4 marks)**
- ii. Create two child classes named shirt and dress that inherits from the Product class **(3 marks)**
- iii. Create an object of the Shirt class that accesses the **update\_price** method and updates the price of the Shirt from 100 to Ksh 200. **(2 marks)**
- c. Overriding is a concept in Object Oriented Programming.
- i. Define the concept of Overriding in PHP **(2 marks)**
- ii. Using the Product class created above, write code to show the concept of overriding. **(2 marks)**

#### Question FIVE (15 marks)

- a. Different applications exchange data using standard specified data formats. Identify the two common data formats used in exchange of data **(1 mark)**
- i) Explain the key differences between the REST and SOAP web service calling and parameter passing conventions. **(4 marks)**
- b. Suppose you are creating an online e-commerce API system with customers and orders as resources. Define the steps you will follow to create an API to access these resources. **(5 marks)**
- c. RESTful Contracts provides access to resources via URI paths. To use RESTful Contracts, your application will make HTTP requests to RESTful Contracts' URIs.

Suppose a client creates an order using your ordering service to request for an item (eg coffee), show the HTTP request to the service URI, that will be needed to create this order.  
(*Make necessary assumptions*) **(5 marks)**