CTU training solutions

CAREER SUCCESS STARTS AT CTU

CTU training solutions

0861 100 395 | www.ctutraining.co.za | enquiry@ctutraining.co.za

<table>
<tr><td colspan="10">Faculty of Information Technology</td></tr>
<tr><td rowspan="5">I declare that I am familiar with, and will abide to the Examination rules of CTU<br><br>_____<br>Signature</td><td colspan="9">SUBJECT NAME: ADVANCED DESIGN PATTERN<br>SUBJECT CODE: ADP631</td></tr>
<tr><td colspan="4">Formative Assessment 2<br>Duration:<br>Date:<br>Total Marks: 100<br>Total pages: 8</td><td colspan="5">Examiner: Mr. Gerhard L<br>Moderator: Mr. Isaac L</td></tr>
<tr><td colspan="9">Student number</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="4">Surname:</td><td colspan="3">Initials:</td><td>/</td><td>%</td></tr>
</table>

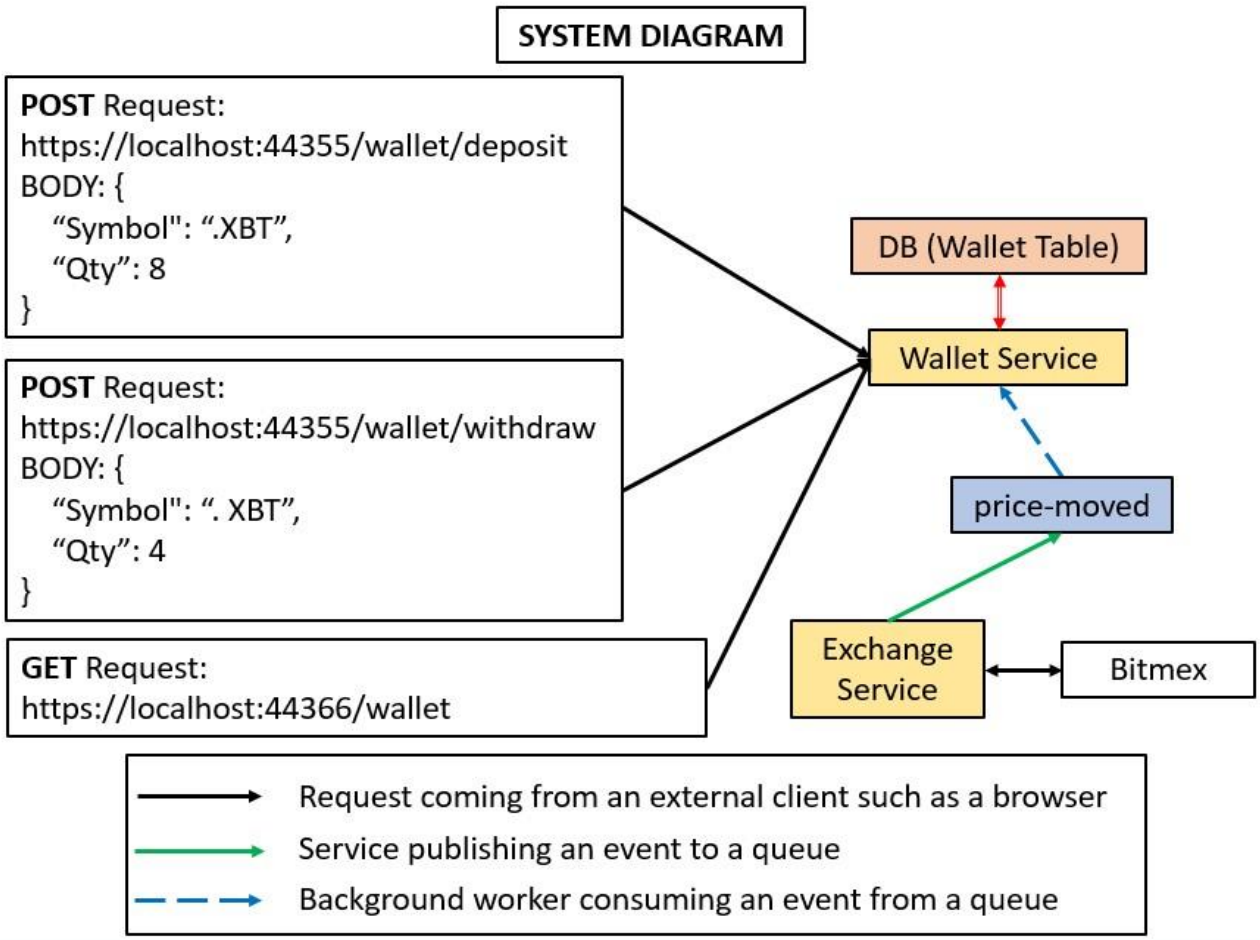
**Instructions:**

- Recall to keep a copy of all submitted assignments.
- All work must be typed using Microsoft Word and convert the word document to PDF before uploading to COLCampus.
- Kindly note that you will be evaluated on your writing skills in all your assignments.
- Negative marking will be applied if you are found guilty of plagiarism, poor writing skills or if you have applied incorrect or insufficient referencing.
- Each assignment must include a cover page, table of contents and full bibliography, based on Harvard referencing style.
- Students are not allowed to offer their work for sale or to purchase the work of other students. This includes the use of professional assignment writers. If this should happen, CTU training Solutions reserves the right not to accept future submissions from a student.
- Spelling, style, fonts, font size, line spacing

    - Please copy the questions onto your answer sheet (single space the questions), and make sure to use numbers to indicate the answers to each question.
    - Always use a spell checker before you submit assignments! We reserve the right to deduct point for each obvious misspelling.
    - Always double-space your answers.
    - Please use Arial (or Calibri (Body)), 12 points as the font for your assignments. Certain fonts have been known not to come across in the PDF files.
    - Use only black or blue font face colors. Do not use red!

**Question 1** **100 MARKS**

You have been requested to write two services – Wallet and Exchange – which will be used to monitor and manage the following crypto coins, based on their prices on the ***Bitmex exchange***: Bitcoin, Ethereum and Cardano.



**INSTRUCTIONS**

1. Similar to a previous Group Activity, create **containers for SQL Server and RabbitMQ**.

2. The **Exchange service** has no public endpoints and therefore cannot be accessed from a browser. The service must contain a background worker that:

   2.1 Connects with the Bitmex exchange every 5 seconds to retrieve the data of ALL the crypto coins hosted on the exchange, plus their latest prices (refer to the console app below for example code).

   2.2 Extract the prices of Bitcoin, Ethereum and Cardano from the data, using the following symbols (note the full stops in front of the symbols):

   Bitcoin: .XBT

   Ethereum: .BETH

   Cardano: .BADAT

   2.3 Compare the prices of these three coins with the previous set of prices, obtained 5 seconds earlier (you can store the previous prices in a variable or in a DB table).

   If the price of the coin **increased** by 0.001% compared to the previous price, send a message to the **price-moved** RabbitMq queue containing the word "**up**".

   If the price of the coin **decreased** by 0.001% compared to the previous price, send a message to the **price-moved** RabbitMQ queue containing the word "**down**".

**Note:** Amend the above percentages as needed - to ensure that a message is posted at least once a minute.

3. The **Wallet service** must expose three public endpoints (refer to the system diagram). These endpoints must enable the user to:

   **3.1 Deposit crypto** – stipulating both the symbol and the quantity.

   3.1.1 Only Bitcoin, Ethereum and Cardano may be kept in the wallet.

   3.1.2 Create a table in SQL Server to store the transactions for these coins. The table schema must include at least datetime, symbol, transaction_type and quantity columns.
   All transactions must be stored in this table and their combined quantity values should represent the latest balance for a specific coin (refer example transaction table below).

   3.2 **Withdraw crypto** - stipulating both the symbol and the quantity.

   3.2.1 Prevent users from withdrawing more crypto than the wallet contains.

3.3 Get a **list of all the balances** in the wallet.

**Note:** You do **not** need to concern yourself with logins, multiple users or storing data for different users.

4. In addition to the above endpoints, the **Wallet service** must have a **BackgroundService** that monitors the **price-moved** queue on RabbitMQ.

If the price went "**up**", add a transaction to the DB table that represents a 10% **increase** in the quantity for that coin (first work out the balance and then add a transaction that represents +10% of that balance).

If the price went "**down**", add a transaction to the DB table that represents a 10% **decrease** in the quantity for that coin (first work out the balance and then add a transaction that represents -10% of that balance).

**Example Transaction Table**

| DateTime | Symbol | Transaction_Type | Qty |
|---|---|---|---|
| 6/6/2021 13:15 | .BETH | Deposit | 5 |
| 6/6/2021 13:17 | .XBT | Deposit | 8 |
| 6/6/2021 13:18 | .XBT | Up | 0.8 |
| 6/6/2021 13:28 | .XBT | Up | 0.88 |
| 6/6/2021 13:33 | .BETH | Down | -0.5 |
| 6/6/2021 13:35 | .XBT | Up | 0.968 |
| 6/6/2021 13:37 | .XBT | Withdraw | -4 |
| 6/6/2021 13:39 | .BADAT | Deposit | 15 |

**After the above transactions have been created, the balances should be:**

Bitcoin: .XBT > 5.68

Ethereum: .BETH > 4.5

Cardano: .BADAT > 15

**Note:** In normal circumstances, price fluctuations on the exchange should not influence your wallet, but we do it here for exercise.

## Example Console App – Connecting to the Bitmex exchange

```
using Newtonsoft.Json;
using System;
using System.Collections.Generic;
using System.Net.Http;

// Request all the current prices on the Bitmex exchange
namespace CryptoExchangeTest
{
    class Program
    {
        static async System.Threading.Tasks.Task Main(string[] args)
        {
            using (var client = new HttpClient())
            {
                // Get the response from the exchange. To view the raw response, copy the below URL
to a browser.
                HttpResponseMessage response = await
client.GetAsync("https://www.bitmex.com/api/v1/trade/bucketed?binSize=1m&partial=true&count=100&reve
rse=true");

                if (response.IsSuccessStatusCode)
                {
                    // Convert the response to a List of SymbolDetailsDto objects
                    var cryptoData = JsonConvert.DeserializeObject<List<SymbolDetailsDto>>(await
response.Content.ReadAsStringAsync());

                    // Display all crypto objects
                    foreach (SymbolDetailsDto symbolDetail in cryptoData)
                    {
                        Console.WriteLine("Symbol is {0} and current price is US${1}",
symbolDetail.symbol, symbolDetail.close);
                    }
                }
                else
                {
                    Console.WriteLine("Invalid Response");
                }
            }
        }

    public class SymbolDetailsDto
    {
        public DateTime timestamp { get; set; }
        public string symbol { get; set; }
        public float open { get; set; }
        public float high { get; set; }
        public float low { get; set; }
        public float close { get; set; }
        public int trades { get; set; }
        public int volume { get; set; }
        public float? vwap { get; set; }
        public int lastSize { get; set; }
        public int turnover { get; set; }
        public float homeNotional { get; set; }
        public float foreignNotional { get; set; }
    }
}
```

## Completed Declaration of Authenticity

I _____ hereby
(FULL NAME)

declare that the contents of this assignment _____ is entirely my own work except for the following documents: (List the documents and page numbers of work in this portfolio that were generated in a group)

| Activity | Date |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |

Signature: _____ Date: _____