

Real-Time Stock Market Trend Window Using XPath and Html Agility Pack

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Research Article

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Abstract

Background

The real-time stock market involves capturing, processing, and providing data in a light and efficient way. Several methods for getting stock market data have been utilized with limited functions. In developing countries such as Iraq, exchange shops and satellite channels do not have a reliable method for getting stock market prices in Iraqi dinars. In this paper, I try to solve the issue by proposing an accurate Real-Time Stock Market Trend Window Using XPath and Html Agility Pack. The trend window shows stock prices of metals, energy, and currencies simultaneously in Iraqi dinars and in three different languages.

Methods

XPath, which stands for XML Path Language, and Html Agility Pack are used for bringing real-time stock market data into a stock market window. The trend window is designed by using C# for its front-end and back-end designs and SQL Server for its data warehouse.

Results

Currencies, metals, and energy prices are displayed simultaneously in a stock market trend window. Every ten seconds, the trend window is refreshing to show the latest prices.

Conclusion

The window shows the currencies, metals, and energy prices continuously in Iraqi dinars and in three different languages. It can be used in developing countries by Stock traders, satellite channels, and anyone who needs or is interested to know the prices of the stock markets. Future research might include more improvements to the trend window to have extra features.

1. Introduction

Currently, the demand for the real-time stock market has increased enormously. It plays a vital role in modern trading and it provides a suitable time for buying and selling stock[1], [2]. Nowadays, many websites and applications are providing stock market prices. Investing.com is one of the top and best websites for giving stock market prices[3]. It has real-time data, financial tools, breaking news, and analysis in 44 global languages. Tradingview.com is also another top website for stock, forex, and crypto trade and it has applications for desktop, mobile, and tables[4]. [5] developed an android mobile application for stock prediction using a machine learning linear regression model. They get stock data from the yahoo finance website but the app did not show any information for the stock market. Besides, several websites related to stock prices have been created in Iraq. For example; Cbi.iq is a governmental

bank of Iraq and its website shows dollar to dinar prices daily [6], Smartraderiraq shows only local currencies across the Kurdistan Region of Iraq daily [7]. Moreover, taifib.iq is a Taif bank in Iraq. This bank has up-to-date exchange tool from the dollar to Iraqi dinars. However, it does not include information about stock market.

It is worth meaning that I have extensively searched in the literature, but there are many articles related to this research. The above mentioned references are stock markets which lack of features as; they do not contain real-time currencies, metals, and energy prices in Iraqi dinars and their interfaces are complex and it is difficult to find what you want. They do not solve the problem faced by local exchange shops and satellite channels. Local exchange shops get the dollar to dinar prices from banks every day and they will give it to satellite channels. The price is used to get other currencies and prices of metals and energy at Iraqi dinars. This process is time-consuming and not efficient.

In this research, I propose a real-time stock market trend window using XPath and Html Agility Pack. The window gets dollar to dinar price from Taif bank's exchange tool; simultaneously the window gets foreign currencies, metals, and energy prices from investing.com automatically.

At the same time, it calculates the prices of currencies, energy, and metals. The window shows the stock market prices in three different languages and updates them every ten seconds. This will help anyone in the market to know the price of the stock markets continuously.

2. Materials And Methods

Ethical approval and informed consent forms were not required for this research because it is a development of the Stock Market trend window.

2.1 General Overview

The overview of the system, as illustrated in figure 1, consists of three parts; the stock market trend window from the left, Taif bank from the top-right, and investing.com from the bottom-right. The stock market window is the entry of the system for the user. The user can access it through the Internet with a computer device. The trend window gets dollar to dinars price from altaif bank. After that, it gets foreign currencies, metals, and energy from investing.com through the XPath method. Then the trend window calculates currencies, metals, and energy prices in Iraqi dinars and it saves all in SQL Server Database. Lastly, it shows the results continuously in the window.

2.2 XPath and Html Agility Pack

2.1.1 XPath

It is a language for pointing to different parts of HTML and XML documents. It has about 200 built-in methods, methods for node manipulation, numeric values, date and time comparison, booleans, string values, sequence manipulation, and much more[8]–[10]. Here I use it for finding the value of currencies,

metals, and energy on the investing.com website. Figure 2, shows how to get a value of EUR to USD using XPath.

2.1.2 Html Agility Pack

HAP is “an HTML parser written in C# to read/write DOM and supports plain XPATH or XSLT”[11]. It has HTML selectors to select HTML node from HTML page. I have used this to get the value of EUR to USD in the following steps:

- 1- Copied XPath of EUR to USD from HTML page of investing currency page.
- 2- HtmlWeb and HtmlDocument classes of the HtmlAgilityPack package are used to load investing currency page URL.
3. Then DocumentNode and SelectNodes methods of the HtmlAgilityPack package is used to get the value of EUR to USD from the XPath

These steps are shown in below C# codes.

```
HtmlAgilityPack.HtmlWeb web = new HtmlAgilityPack.HtmlWeb();  
  
HtmlAgilityPack.HtmlDocument doc = web.Load(url:investing.com currencies page);  
  
doc.DocumentNode.SelectNodes("//*[@id=\\\"pair_1\\\"]/td[3]")
```

2.3 Design

SQL Server and C# Programming Language have been used for data warehouse and designing of the stock market trend window [12]. The data warehouse of the window has been saved in two SQL Server tables one for dollar to dinar and the other one for values of currencies, metals, and energy, as it is illustrated in figure 3.

Moreover, Stock Market Window has been designed by using the C# programming language. Three C# windows forms have been used, one for English, one for Arabic and the other one for Kurdish languages, as are shown in figure 4, figure 5 and figure 6 respectively. Buttons, text boxes, and labels have been used to display the results of the real-time stock market.

3. Results

The stock market trend window has been created in three different languages: English, Arabic, and Kurdish. Each of them is showing real-time stock market prices of currencies, metals, and energy.

Both Figs. 7 and 8, show the results of the real-time stock market in seconds 13 and 23 respectively. Firstly, the stock market window got the Dollar to Iraqi dinar price from Taif bank. Secondly, the price is used for calculating currencies, metals, and energy, which have been taken from the investing.com

website. As it can be seen, the prices of the UK pound, Onsa-Platinum, Brent, and Texas Oil have been decreased in Fig. 8 as compared to Fig. 7. Whereas, Turkish Lira, Gold-24, Gold-21, Gold-18, Onsa-Gold, and Onsa-Silver prices have increased in Fig. 8 as compared to Fig. 7. Euro, Iranian Riyal, Saudi Riyal, and Natural Gas prices have been unchanged in Fig. 8 as compared to Fig. 7. Gold-24, Gold-21, and Gold-18 are more common in Iraq and the middle east, these prices are obtained by the following equations.

Gold-24, a Mithqal Gold-24 =

```
(float)((goldprice) / 31.1034768)*5*(float.Parse(txtDollartoDinar.Text.Trim()) / 100);
```

The above equation gets Onsa-Gold then changes it to a gram of Gold by dividing it on 31.10 and changes it to a Mithqal Gold-24 by multiplying to 5.

Lastly, its price changed to a Mithqal of Gold-24 in Iraqi dinars.

Gold-21, a Mithqal Gold-21 =

```
(float)((goldprice * 0.875) / 31.1034768)*5*(float.Parse(txtDollartoDinar.Text.Trim()) / 100);
```

The above equation gets Onsa-Gold then multiplied by 0.875 because only 0.875 of a Mithqal Gold-21 is Gold. Then, changes it to a gram of Gold by dividing it on 31.10 and changes it to a Mithqal Gold-24 by multiplying to 5. Lastly, its price is changed to a Mithqal of Gold-21 in Iraqi dinars.

Gold-18, a Misqal Gold-18 =

```
(float)((goldprice * 0.75) / 31.1034768)*5*(float.Parse(txtDollartoDinar.Text.Trim()) / 100);
```

The above equation gets Onsa-Gold then multiplies by 0.75 because only 0.75 of a Mithqal Gold-18 is Gold. Then, changes it to a gram of Gold by dividing it on 31.10 and changes it to a Mithqal Gold-18 by multiplying to 5. Lastly, its price is changed to a Mithqal of Gold-18 in Iraqi dinars.

The real-time stock market window of the Arabic and Kurdish languages are shown in Figs. 9, 10, 11 and 12.

These figures show the same results as the English version of the window. Some values have been increased, and some of them have been decreased, while the rest of them have remained unchanged. Moreover, the prices are continuously updated in the English, Arabic and Kurdish windows every 10 seconds.

4. Discussion

In this paper, a real-time stock market trend window has been proposed. Results of this research show that currencies, metals, and energy prices can be obtained every 10 seconds. With the classic method, exchange shops and satellite channels should call banks to get the prices of dollars to Iraqi dinars every

day and calculate the prices of other currencies, metals, and energy by themselves. As it is obvious, stock market prices are changing in seconds so the prices in the market are not precise and sometimes they cause serious problems. Consequently, exchange shops and satellite channels can use this stock market window to obtain currencies, metals, and energy prices every 10 seconds. Thus, It facilitates the process not only for stock traders but also for anyone who needs or is interested to know the prices.

Investing and tradingview websites have real-time data, stock, forex, and breaking news features. They have more features than my stock market trend window. But, the stock market trend window is simple, easy to use, and shows currencies, metals, and energy prices in Iraqi dinars and in three different languages. The stock market trend window refreshes all prices every 10 seconds. However, its interface needs improvement for increasing and decreasing prices.

Despite these, there are not any real-time tools available to know the stock market prices in Iraqi dinars. Hopefully, this stock market trend window can be used to know currencies, metals, and energy prices in Iraqi dinars and in three different languages. The trend window can be adapted to show stock market prices in more languages and currencies. Future research might improvements of the trend window to support all international currencies, metals, and energy, as well. The trend window can be developed to web and mobile applications with extra features.

5. Conclusion

In this research, a real-time stock market trend window has been proposed. The window shows the currencies, metals, and energy prices in three different languages continuously. Stock traders, satellite channels, and anyone who needs or is interested to know the prices of the stock markets can use the window to see the real-time prices of stock markets in Iraqi dinars. Also, it can be used by developing countries. Currently, Mobile and Web versions of the window are under development and they will be available soon. Future research might include more improvements to the trend window to have extra features.

Declarations

- Ethical Approval and Consent to participate

The author declares no conflict of interest.

- Human and Animal Ethics

Not applicable

- Consent for publication

Not applicable

- Availability of supporting data

Not applicable

- Competing interests

Not Competing interests

- Funding

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- Authors' contributions

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- Authors' information

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Figures

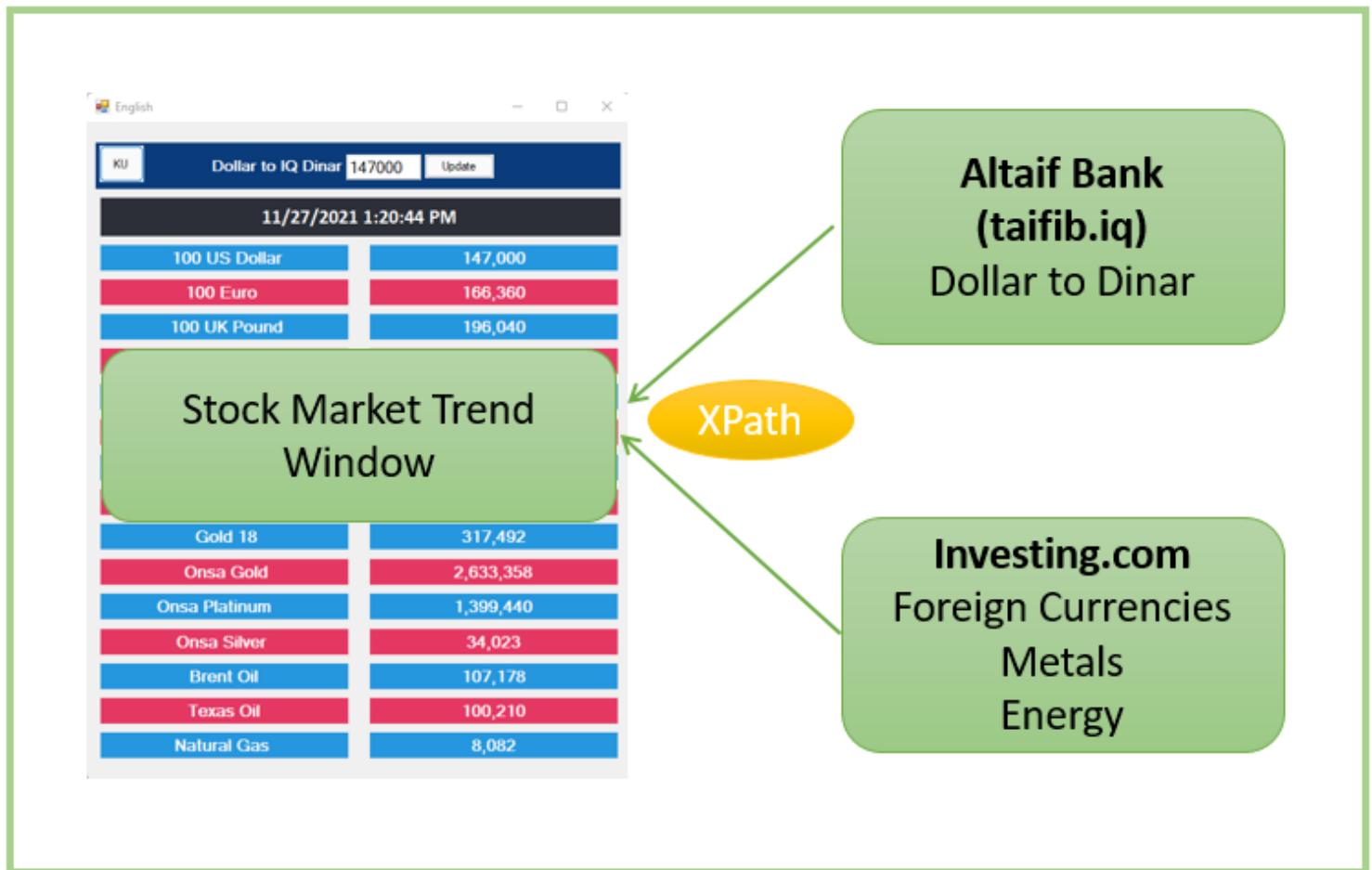


Figure 1

The overview of the system

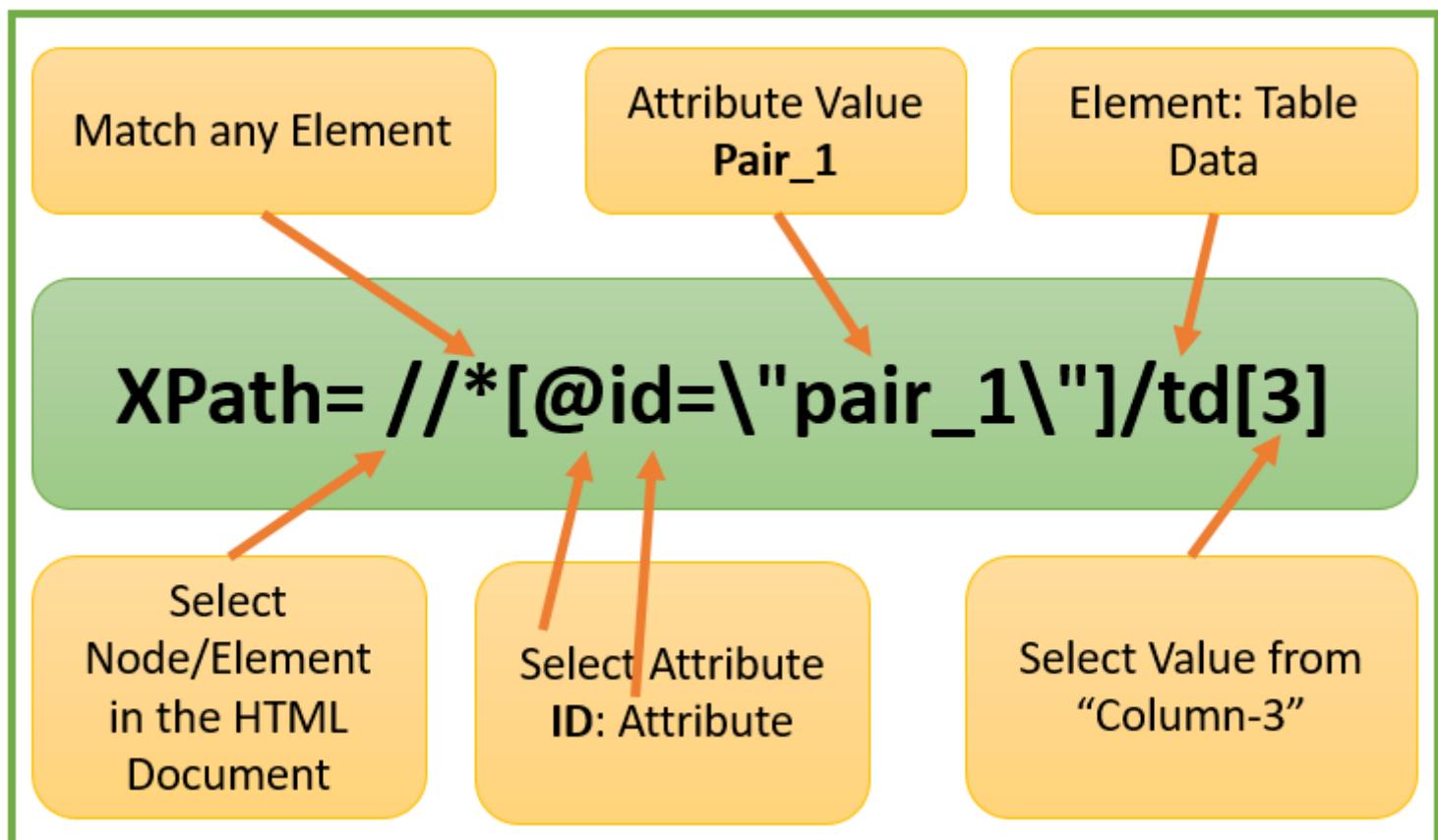


Figure 2

An example of XPath to select a value of EUR to USD from table data in HTML Page

Dollar_ToDinar		Stock_Market	
id		id	
Iraqi_Dinar		name	
Iranina_Riyal		price	
		lan	

Figure 3

Stock Market Data Warehouse Tables

KU	Dollar to IQ Dinar 148000	Update
11/29/2021 12:09:47 AM		
100 US Dollar	148,000	
100 Euro	167,270	
100 UK Pound	197,181	
1000 Iranian Riyal	1	
100 Turkish Lira	11,965	
100 Saudi Riyal	39,460	
Gold 24	425,417	
Gold 21	372,240	
Gold 18	319,063	
Onsa Gold	2,646,388	
Onsa Platinum	1,408,960	
Onsa Silver	34,240	
Brent Oil	105,953	
Texas Oil	100,892	
Natural Gas	8,137	

Figure 4

The English Version of the Stock Market Window

The screenshot shows a software interface for currency conversion. At the top, there are language buttons for EN and KU, followed by a date and time indicator (12/2/2021 11:12:43 PM). The main title is 'الدولار مقابل الدينار' (Dollar vs. Dinar). Below the title, the exchange rate is displayed as '148150' with the label 'مائة دولار امريكي'. The table lists 15 currency/metal pairs with their exchange rates:

Currency/Metal	Rate
مائة دولار امريكي	148,150
مائة يورو	167,366
مائة جنيه	196,951
آلاف ريال ايراني	1
مائة ليرة تركية	10,835
مائة ريال سعودي	39,491
الذهب 24	421,145
الذهب 21	368,502
الذهب 18	315,859
اونسا الذهب	2,619,811
اونسا بلاتينيوم	1,381,869
اونسا فضة	33,193
نفط برنت	103,898
نفط تكساس	99,186
غاز طبيعي	6,080

Figure 5

The Arabic Version of the Stock Market Window

EN	گۆربىن	148000	دولار بۆ دينار
11/29/2021 12:10:33 AM			
148,000	سەد دوپلارى ئەمريکى		
167,255	سەد يۈرقۈ		
197,181	سەد پاوهن		
1	ھزار تەهن		
11,965	سەد لىرە ئوركى		
39,460	سەد رىانى سعودى		
425,417	ئالتۇون عەيبارە 24		
372,240	ئالتۇون عەيبارە 21		
319,063	ئالتۇون عەيبارە 18		
2,646,388	يەك ئۆنسە ئالتۇون		
1,408,960	يەك ئۆنسە پلاتىن		
34,240	يەك ئۆنسە زىو		
105,953	نەوتى بىرىنت		
100,892	نەوتى تەكساس		
8,137	گازى سروشى		

Figure 6

The Kurdish Version of the Stock Market Window

The screenshot shows a window titled "Dollar to IQ Dinar 148000" with a "Update" button. Below the title bar is a timestamp: "11/30/2021 2:08:13 PM". The main content is a table comparing the value of 100 US Dollars against other currencies and commodities. The table has two columns: the left column lists the currency/commodity name, and the right column lists its value relative to 100 US Dollars.

100 US Dollar	148,000
100 Euro	168,158
100 UK Pound	197,581
1000 Iranian Riyal	1
100 Turkish Lira	11,277
100 Saudi Riyal	39,451
Gold 24	427,677
Gold 21	374,218
Gold 18	320,758
Onsa Gold	2,660,448
Onsa Platinum	1,397,564
Onsa Silver	33,880
Brent Oil	105,465
Texas Oil	100,758
Natural Gas	6,937

Figure 7

results in 2:08:13 time

The application window has a title bar with 'English' and standard window controls. The main area shows a header 'Dollar to IQ Dinar 148000' with an 'Update' button, a timestamp '11/30/2021 2:08:23 PM', and a list of currency and commodity prices.

100 US Dollar	148,000
100 Euro	168,158
100 UK Pound	197,566
1000 Iranian Rial	1
100 Turkish Lira	11,294
100 Saudi Riyal	39,451
Gold 24	427,701
Gold 21	374,239
Gold 18	320,776
Onsa Gold	2,660,596
Onsa Platinum	1,397,490
Onsa Silver	33,885
Brent Oil	105,420
Texas Oil	100,729
Natural Gas	6,937

Figure 8

results in 2:08:23 time

Arabic

EN	KU	تحديث	148150	الدولار مقابل الدينار
12/2/2021 11:12:43 PM				
148,150				مائة دولار أمريكي
167,366				مائة يورو
196,951				مائة جنيه
1				ألف ريال ايراني
10,835				مائة ليرة تركية
39,491				مائة ريال سعودي
421,145				الذهب 24
368,502				الذهب 21
315,859				الذهب 18
2,619,811				اونسا الذهب
1,381,869				اونسا بلاتينيوم
33,193				اونسا فضة
103,898				نقط بربت
99,186				نقط تكساس
6,080				غاز طبيعي

Figure 9

results in 11:12:43 time

Arabic

الدولار مقابل الدينار

تحديث 148150

EN KU

12/2/2021 11:13:01 PM

148,150	مائة دولار امريكي
167,395	مائة يورو
196,981	مائة جنيه
1	آلاف ريال ايراني
10,835	مائة ليرة تركية
39,491	مائة ريال سعودي
421,192	الذهب 24
368,543	الذهب 21
315,894	الذهب 18
2,620,107	اونسا الذهب
1,382,017	اونسا بلاتينيوم
33,196	اونسا فضة
103,898	نفط برنت
99,201	نفط تكساس
6,079	غاز طبيعي

Figure 10

results in 11:13:01 time

The screenshot shows a software interface for currency conversion. At the top, there are language buttons for "EN" and "Kurdish". The title bar displays "148000" and "دولار بۆ دینار" (Dollar to Dinar). Below the title bar, the date and time are shown as "11/30/2021 1:58:47 PM". The main content area consists of two columns of currency pairs, each with a value on the left and its name in Kurdish on the right.

148,000	سەد دۆلاری ئەمریکي
168,158	سەد يۈرۈ
197,610	سەد پاون
1	ھەزار تەمن
11,327	سەد لىرەي توركى
39,447	سەد رىالى سعودى
427,856	نالتۇن عەيارە 24
374,374	نالتۇن عەيارە 21
320,892	نالتۇن عەيارە 18
2,661,558	يەك ئۆنسە نالتۇن
1,397,120	يەك ئۆنسە پلاتين
33,895	يەك ئۆنسە زېو
105,036	نەوتى بىرىنت
100,403	نەوتى تەكساس
6,885	گازى سروشى

Figure 11

results in 1:58:47 time

The screenshot shows a software interface for currency conversion. At the top, there are language buttons for "EN" and "Kurdish". The title bar displays "Kurdish" and the exchange rate "148000 دۆلار بۆ دینار". Below this, the date and time are shown as "11/30/2021 1:59:17 PM". The main content area consists of two columns of currency pairs, each with a value and its name in Kurdish.

Value	Currency Name (Kurdish)
148,000	سەد دۆلاری ئەمریکى
168,173	سەد يۈرۈ
197,640	سەد پاوهن
1	ھەزار تەنە
11,325	سەد لىرە ئوركى
39,447	سەد رىالى سعودى
427,868	ناڭتونن عەيارە 24
374,384	ناڭتونن عەيارە 21
320,901	ناڭتونن عەيارە 18
2,661,632	يەك ئۇنىسە ناڭتونن
1,397,120	يەك ئۇنىسە پلاتين
33,895	يەك ئۇنىسە زېو
104,976	نەوتى بىرىنت
100,359	نەوتى ئەكساس
6,885	گازى سروشى

Figure 12

results in 2:59:17 time