Linkar Suite


# *Create mobile Apps with Xamarin and MV using Linkar 2.0*

# *WITH OR WITHOUT WEB SERVICE*

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*by Kosday Solutions*

kosday solutions

# Create mobile Apps with Xamarin and MV using Linkar 2.0 WITH OR WITHOUT WEB SERVICE

We are going to develop a simple app with Xamarin that will read data from an MV file and display it on a mobile device. This app can run in IOS and Android.

The connection can be carried out in two different ways:

- Using a **REST WEB SERVICE** that will receive the app requests, using Linkar, requests will be placed with the MV database and the data obtained will be sent back to the mobile device (you can read the HowTo on creating web services with Linkar on https://www.kosday.com/blog/how-to-web-service-with-linkar)
- Using a **DIRECT CONNECTION** with the Linkar Server. The mobile device will connect directly with Linkar Server. No need to use a Web Service.

  **What do you need to create the web services:**

  - **Linkar** (the lite free version is enough)
  - An MV database (D3, jBase, QM, Unidata or Universe)
  - Visual Studio 2017.
  - Xamarin (https://docs.microsoft.com/en-us/xamarin/cross-platform/get-started/installation/windows)
  - The LinkarClientMono.dll library (for the direct connection)

Let's open Visual Studio. We are going to create a new "Mobile App" project:

*File → New → Cross-Platform → Mobile.app → Xamarin.Forms*

Let's name the project and the solution **LinkarDemoApp**.

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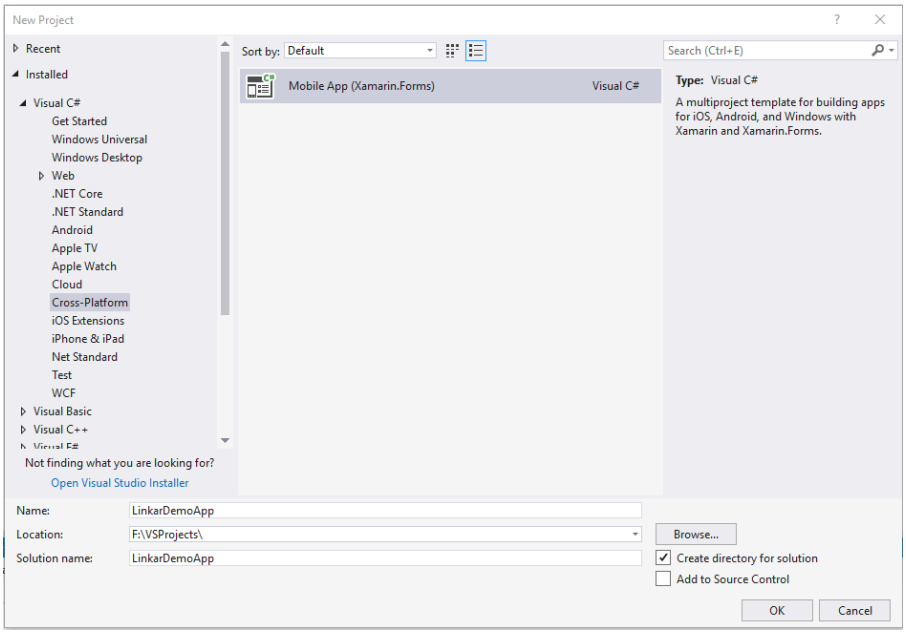
# WITH OR WITHOUT WEB SERVICE



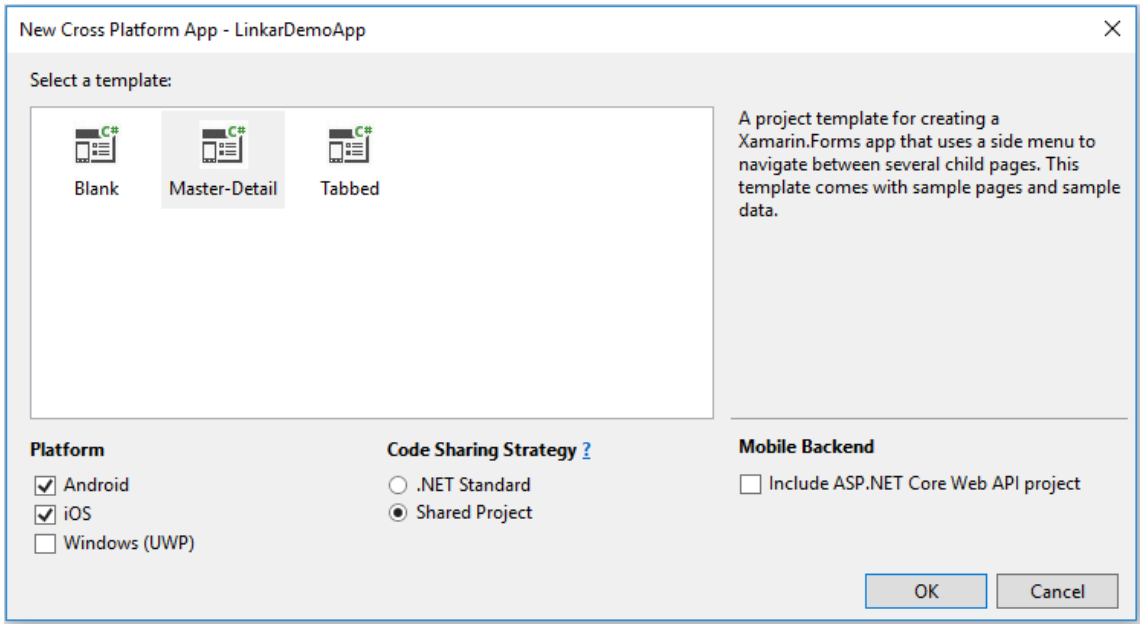

Let's choose the *Master-Detail* template (then we can work on the code example)

Let' choose *Android* and *iOS* as the destination *Platform*.

Let's choose *Shared Project* as *Code Sharing Strategy*.

Do not select *Mobile Backend*. You can see a complete sample of Backend on this link.

# Create mobile Apps with Xamarin and MV using Linkar 2.0
# WITH OR WITHOUT WEB SERVICE

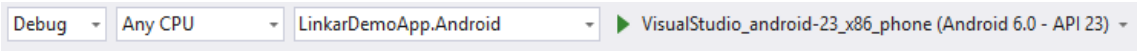



This will generate 3 projects:

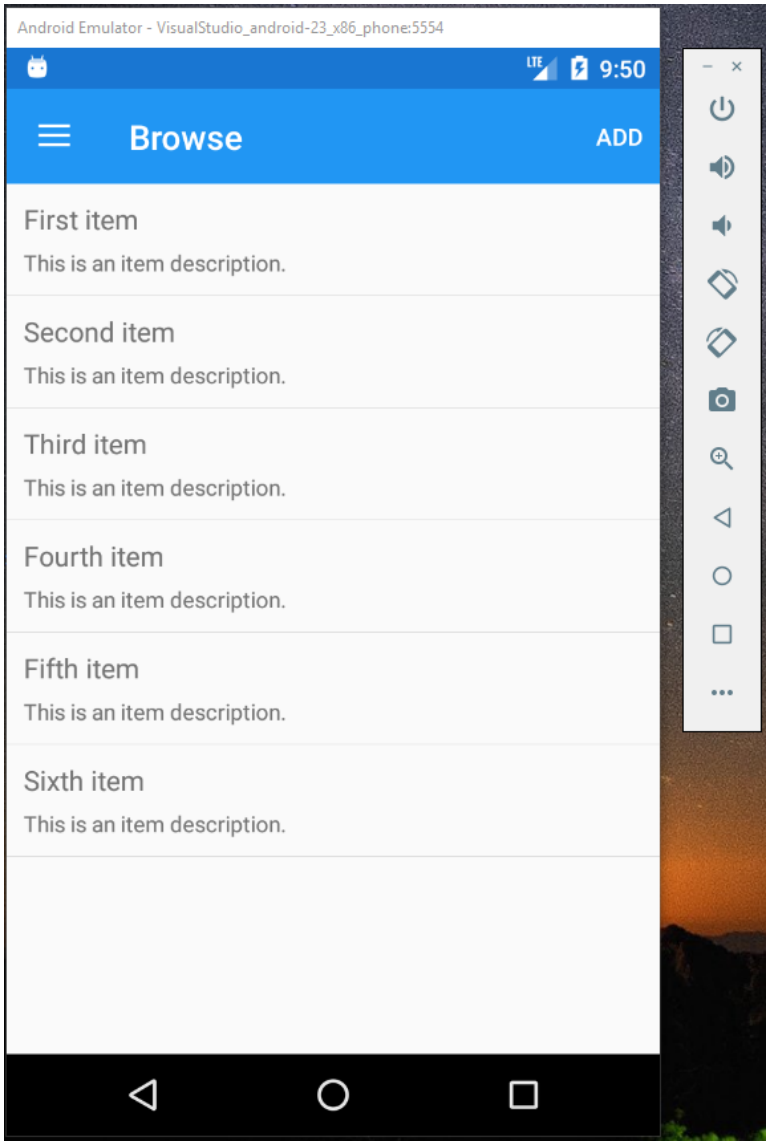
- LinkarDemoApp: Here we will insert most of the code and the app screens.
- LinkarDemoApp.Android: Here we find the pure Android elements (AndroidManifest, MainActivity) and resources (icons, images ...)
- LinkarDemoApp.IOS: Here we find the pure iOS elements (Info.plist) and resources (icons, images ...)

We are going to use a Windows PC for this development. For ease, we are going to use LinkarDemoApp.Android as the start project. This will allow us to use the Android Emulator for testing purposes.

As we have used the template,  we now have a basic app that we can run and test.

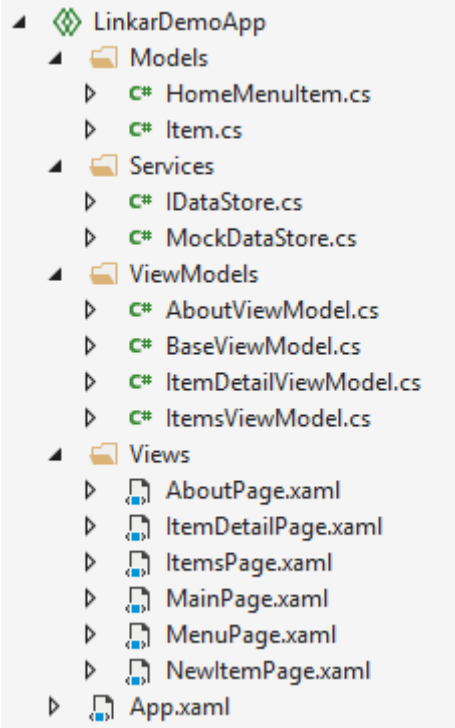


# Create mobile Apps with Xamarin and MV using Linkar 2.0
# WITH OR WITHOUT WEB SERVICE




Let's explain the LinkarDemoApp project structure.

# Create mobile Apps with Xamarin and MV using Linkar 2.0
# WITH OR WITHOUT WEB SERVICE




This template uses the MVVM (Model-View-View-Model) model. If you want to know more about this visit:

https://docs.microsoft.com/en-us/xamarin/xamarin-forms/enterprise-application-patterns/mvvm

The App document is the entry point for shared code and will be call from the Android and iOs projects.

We will define  the device events and the styles to be used in the different app views on it. For more details take a look at:

https://docs.microsoft.com/en-us/dotnet/api/xamarin.forms.application?view=xamarin-forms

In the *Services* folder, there is a local example on how code must be written to perform the different actions that will be call from the *ViewModels*.

There are two different ways to call Linkar Functions and work with the MV database.

# Create mobile Apps with Xamarin and MV using Linkar 2.0
# WITH OR WITHOUT WEB SERVICE

1. **WEB SERVICE** (Backend):

This type of connection implies that we have a *web service* between the app and Linkar Server. For instance, if we want an Item List for an MV file we will call the *GetItems* method (HTTP/HTTPS) stated in the web service that will use Linkar Client to select the file items, this returns them and sends them to the app. You can read the HowTo on creating web services with Linkar on https://www.kosday.com/blog/how-to-web-service-with-linkar in our blog.

This is a Class that calls a service from the app:

```
using System.Collections.Generic;
using System.Net.Http;
using System.Text;
using System.Threading.Tasks;
using Newtonsoft.Json;
using Sample.Models;

namespace Sample.Services
{
public class ItemDataStore
{
HttpClient client;
IEnumerable<Item> items;

public ItemDataStore()
{
client = new HttpClient();
client.BaseAddress = new Uri($"{App.servicesUrl}/");
items = new List<Item>();
}

public async Task<IEnumerable<Item>> GetItemsAsync(bool forceRefresh = false)
{
if (forceRefresh)
{
var json = await client.GetStringAsync($"api/Sample/GetItems);
items = await Task.Run(() =>
JsonConvert.DeserializeObject<IEnumerable<Item>>(json));
}

return items;
}

public async Task<Item> GetItemAsync(string id)
{
if (id != null)
{
```

# Create mobile Apps with Xamarin and MV using Linkar 2.0 WITH OR WITHOUT WEB SERVICE

```
var json = await client.GetStringAsync($"api/Sample/GetItem?id=" + id);
return await Task.Run(() => JsonConvert.DeserializeObject<Item>(json));
}

return null;
}
}
}
```

## 2. DIRECT CONNECTION WITH LINKAR

This connection uses the LinkarClient MONO library. Then the app interacts with the Linkar Server directly.

First of all we must add the *LinkarClientMono.dll* library to **references** in *LinkarDemoApp.Android* and *LinkarDemoApp.iOS* projects.

Now we must add the ***using*** clauses in all the classes where we will need the client.

```
using LinkarClient;
using LinkarCommon;
```

We also must declare the Linkar Client. In order to use it in different classes we will declare it as a static variable in ***App.xaml.cs*** file.

```
public static LinkarClt linkarClt = new LinkarClt();
```

We will also implement a new function in order to control the *LinkarClient exceptions* that may occur. This is done in the same ***App.xaml.cs*** file:

```
public static string GetException(Exception ex)
{
string msg = "";
if (ex.GetType() == typeof(LkException))
{
LkException lkex = (LkException)ex;
msg = "LINKAR EXCEPTION ERROR";
if (lkex.ErrorCode == LkException.ERRORCODE.C0003)
msg += "\r\nERROR CODE: " + lkex.ErrorCode +
"\r\nERROR MESSAGE: " + lkex.ErrorMessage +
"\r\nInternal ERROR CODE: " + lkex.InternalCode +
"\r\nInternal ERROR MESSAGE: " + lkex.InternalMessage;
else
msg += "\r\nERROR CODE: " + lkex.ErrorCode +
```

# Create mobile Apps with Xamarin and MV using Linkar 2.0
# WITH OR WITHOUT WEB SERVICE

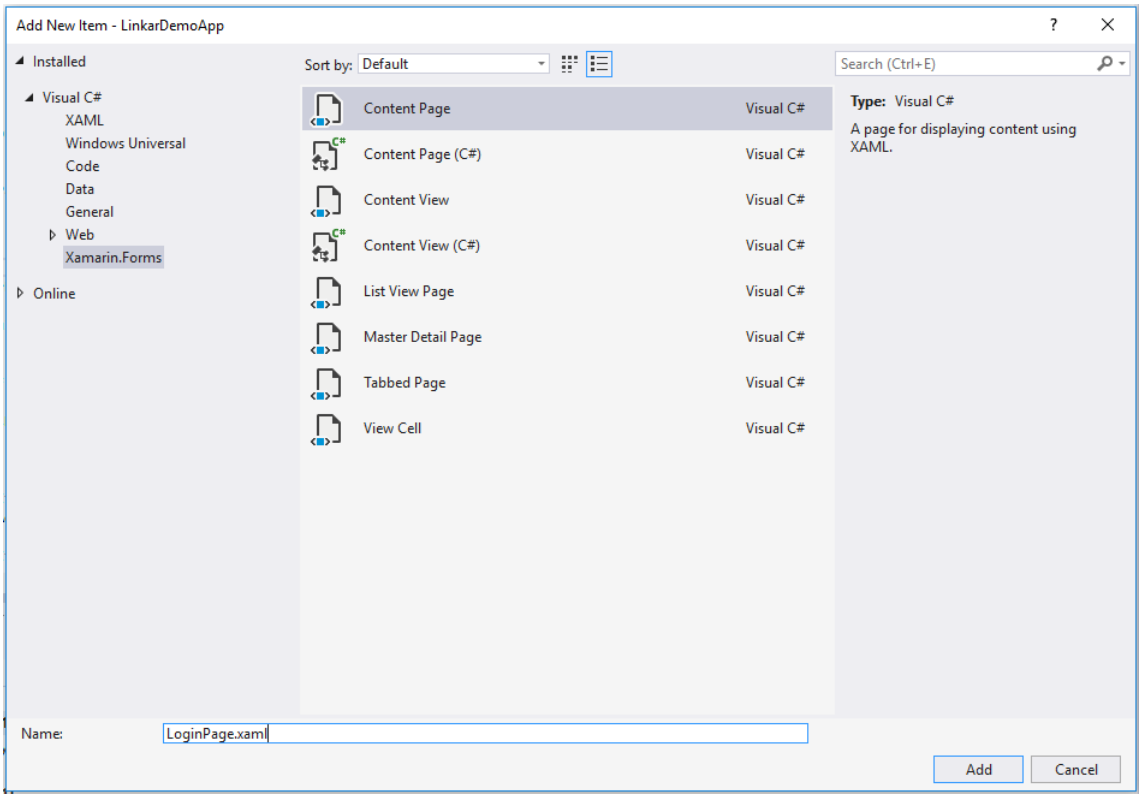
```
"\r\nERROR MESSAGE: " + lkex.ErrorMessage;
}
else if (ex.GetType() == typeof(System.Net.Sockets.SocketException))
{
System.Net.Sockets.SocketException soex = (System.Net.Sockets.SocketException)ex;
msg = "SOCKET EXCEPTION ERROR\r\n" + soex.Message;
}
else
{
msg = "EXCEPTION ERROR\r\n" + ex.Message;
}

return msg;
}
}
```

Let's create a new cover page. This page will be shown before the data.

We must right click on:

**Views Add -> New Item …**



# Create mobile Apps with Xamarin and MV using Linkar 2.0
# WITH OR WITHOUT WEB SERVICE

And add a **Content Page**.

Now the created code is changed with this:

LoginPage.xaml

```
<?xml version="1.0" encoding="utf-8" ?>
<ContentPage xmlns="http://xamarin.com/schemas/2014/forms"
xmlns:x="http://schemas.microsoft.com/winfx/2009/xaml"
x:Class="LinkarDemoApp.Views.LoginPage">

<ContentPage.Resources>
<ResourceDictionary>
<Color x:Key="Primary">#2196F3</Color>
<Color x:Key="Accent">#cce8fe</Color>
<Color x:Key="LightTextColor">#999999</Color>
</ResourceDictionary>
</ContentPage.Resources>

<ContentPage.Content>
<Grid AbsoluteLayout.LayoutBounds="0,0,1,1"
AbsoluteLayout.LayoutFlags="All"
VerticalOptions="FillAndExpand"
HorizontalOptions="FillAndExpand">
<Grid.RowDefinitions>
<RowDefinition Height="Auto" />
<RowDefinition Height="*" />
</Grid.RowDefinitions>
<StackLayout BackgroundColor="{StaticResource Accent}"
VerticalOptions="FillAndExpand" HorizontalOptions="Fill">
<StackLayout Orientation="Horizontal" HorizontalOptions="Center"
VerticalOptions="Center">
<ContentView Padding="0,30,0,20" VerticalOptions="FillAndExpand">
<Image Source="linkar_logo.png" VerticalOptions="Center" HeightRequest="64" />
</ContentView>
</StackLayout>
</StackLayout>
<ScrollView Grid.Row="1">
<StackLayout Orientation="Vertical" Padding="16,10,16,10" Spacing="10" >
<Label >
<Label.FormattedText>
<FormattedString>
<FormattedString.Spans>
<Span Text="This app shows Linkar functionality and performance. Our focus is not
to show you how to make pretty interfaces or how to program." />
</FormattedString.Spans>
</FormattedString>
</Label.FormattedText>
</Label>
<Label>
<Label.FormattedText>
```

# Create mobile Apps with Xamarin and MV using Linkar 2.0
# WITH OR WITHOUT WEB SERVICE

```
<FormattedString>
<FormattedString.Spans>
<Span Text="This app uses Xamarin and a Linkar Server web service." />
</FormattedString.Spans>
</FormattedString>
</Label.FormattedText>
</Label>
<Label>
<Label.FormattedText>
<FormattedString>
<FormattedString.Spans>
<Span Text="You have all the source code in our web in the Linkar Demos folder.
Take a look at it and discover how easy it is." />
</FormattedString.Spans>
</FormattedString>
</Label.FormattedText>
</Label>
<Button Text="Login" Clicked="Button_Clicked" TextColor="White"
BackgroundColor="{StaticResource Primary}" HeightRequest="40"/>
</StackLayout>
</ScrollView>
</Grid>
</ContentPage.Content>
</ContentPage>
```

LoginPage.xaml.cs

```
using LinkarDemoApp.ViewModels;
using System;
using System.Threading.Tasks;

using Xamarin.Forms;
using Xamarin.Forms.Xaml;

namespace LinkarDemoApp.Views
{
[XamlCompilation(XamlCompilationOptions.Compile)]
public partial class LoginPage : ContentPage
{
LoginViewModel viewModel;

public LoginPage()
{
InitializeComponent();
NavigationPage.SetHasNavigationBar(this, false);  // Hide nav bar

BindingContext = viewModel = new LoginViewModel();
}

async void Button_Clicked(object sender, EventArgs e)
{
await LoginAsync();
```

# Create mobile Apps with Xamarin and MV using Linkar 2.0
# WITH OR WITHOUT WEB SERVICE

```
}

public async Task LoginAsync()
{
CredentialsOptions credentialsOptions = new CredentialsOptions("127.0.0.1",
"DEMOEP", 11300, "demo", "demo1234");
try
{
await Task.Run(() => {
App.linkarClt.Login(credentialsOptions);
App.Current.MainPage = new MainPage();
});
}
catch (Exception ex)
{
await this.DisplayAlert("ERROR", App.GetException(ex), "OK");
}
}
}
}
```

Change the **`CredentialsOptions`** line with yours.

As we do not use any data capture, nor data binding of that information, we do not need *Model*, nor *ViewModel* structures. Only the *button* code will be used as seen in the example. For a complete Login form you will need all the structure. If the Login is correct we will now navigate to the *MainPage*.

Let's go back to the ***App.xaml.cs*** file and change the constructor of the start app page with our Login page:

```
public App()
{
InitializeComponent();
MainPage = new LoginPage();
}
```

Now, let's change the *Item.cs* model in order to populate the *LK.ITEMS file* data from the LINKAR_DEMO account in MV.

```
public class Item
{
public string Id { get; set; }
```

# Create mobile Apps with Xamarin and MV using Linkar 2.0 WITH OR WITHOUT WEB SERVICE

```
public string Description { get; set; }
public double Stock { get; set; }
}
```

After this change, we must also make small changes in *Views* and *ViewModels*:

We must replace ***NewItemPage.xaml.cs*** constructor with this new code:

```
public NewItemPage()
{
InitializeComponent();

Item = new Item
{
Stock = 0,
Description = "This is an item description."
};

BindingContext = this;
}
```

We must also replace the ***ItemDetailPage.xaml.cs*** constructor with:

```
public ItemDetailPage()
{
InitializeComponent();

var item = new Item
{
Stock = 0,
Description = "This is an item description."
};

viewModel = new ItemDetailViewModel(item);
BindingContext = viewModel;
}
```

And the ***ItemDetailViewModel.cs*** constructor with:

```
public ItemDetailViewModel(Item item = null)
```

# Create mobile Apps with Xamarin and MV using Linkar 2.0
# WITH OR WITHOUT WEB SERVICE

```
{
Title = item?.Description;
Item = item;
}
```

In the *XAML Views* (***ItemsPage.xaml, ItemDetailPage.xaml y NewItemPage.xaml***) we must just change the references found for **Text property** with **Stock property**, for instance:

```
<Label Text="Stock:" FontSize="Medium" />
<Label Text="{Binding Item.Stock}" FontSize="Small"/>
```

Next step will be to modify the ***MockDataStore.cs*** file that is in the *Services* folder in order to obtain the item list from the Linkar Server. First modify the constructor to take out the fixed data that the screen shows and then add the ***using*** clauses for Linkar:

```
public MockDataStore()
{
items = new List<Item>();
}
```

Now we will modify the ***GetItemsAsync*** method in the same file. We use this method to obtain data from Linkar:

```
public async Task<IEnumerable<Item>> GetItemsAsync(bool forceRefresh = false)
        {

            if (forceRefresh)
            {
                items = null;
                try
                {

                    string lkstring = App.linkarClt.Select_Text("LK.ITEMS", "", "BY
CODE", "", "", new SelectOptions(false, false, 10, 1, true), DATAFORMAT_TYPE.MV, "",
0);

                    if (!string.IsNullOrEmpty(lkstring))
                    {
                        char delimiter = ASCII_Chars.FS_chr;
                        char delimiterThisList = DBMV_Mark.AM;
```

# Create mobile Apps with Xamarin and MV using Linkar 2.0
# WITH OR WITHOUT WEB SERVICE

```
                        String recordIds = "";
                        String records = "";
                        String recordCalculateds = "";
                        String[] parts = lkstring.Split(delimiter);
                        if (parts.Length >= 1)
                        {
                            String[] ThisList = parts[0].Split(delimiterThisList);
                            int numElements = ThisList.Length;
                            for (int i = 1; i < numElements; i++)
                            {
                                if (ThisList[i].Equals("RECORD_ID"))
                                {
                                    recordIds = parts[i];
                                }
                                if (ThisList[i].Equals("RECORD"))
                                {
                                    records = parts[i];
                                }
                                if (ThisList[i].Equals("CALCULATED"))
                                {
                                    recordCalculateds = parts[i];
                                }
                            }
                        }

                        //Fill all the records with response data
                        String[] lstids = recordIds.Split(ASCII_Chars.RS_chr);
                        String[] lstregs = records.Split(ASCII_Chars.RS_chr);
                        String[] lstcalcs =
recordCalculateds.Split(ASCII_Chars.RS_chr);

                        items = new List<Item>();

                        for (int i = 0; i < lstids.Length; i++)
                        {
                            Item record = new Item();
                            if (recordCalculateds != null && recordCalculateds !=
"")
                            {
                                record = LkItem.GetRecord(lstids[i], lstregs[i],
lstcalcs[i]);
                            }
                            else
                                record = LkItem.GetRecord(lstids[i], lstregs[i],
"");

                            items.Add(record);
                        }
                    }
                }
                catch (Exception ex)
                {
                    string error = App.GetException(ex);
```

# Create mobile Apps with Xamarin and MV using Linkar 2.0 WITH OR WITHOUT WEB SERVICE

```
                    await
Xamarin.Forms.Application.Current.MainPage.DisplayAlert("ERROR", error, "OK");
                }
            }

            return items;
               }
```

We are only using one of the Linkar functions output types. Please consult all download Linkar help documentation on:
https://www.kosday.com/Manuals/en_WEB_LINKAR/index.html

Finally we need to add a ***GetRecord*** method. We will use it to populate each Item of our list assigning the value that the function returns to each property class.

```
private Item GetRecord(string recordID, string record, string recordCalculated)

{

Item item = new Item();

//Create empty record

string[] reg = new string[2];

for (int j = 0; j < reg.Length; j++)

reg[j] = "";


//Fill the record

if (record != null && record != "")

{

string[] aux = record.Split(DBMV_Mark.AM);

for (int j = 0; j < aux.Length; j++)

reg[j] = aux[j];

}


//Create empty calculated record
```

# Create mobile Apps with Xamarin and MV using Linkar 2.0
# WITH OR WITHOUT WEB SERVICE

```
string[] regI = new string[0];
for (int k = 0; k < regI.Length; k++)
regI[k] = "";

//Fill the calculated record
if (recordCalculated != null && recordCalculated != "")
{
string[] auxI = recordCalculated.Split(DBMV_Mark.AM);
int k = 0;
for (; k < auxI.Length; k++)
regI[k] = auxI[k];
}

//Fill the record ID property
item.Id = recordID;
if (record == null || record == "")
return null;

//Fill the class properties
item.Description = LinkarDataTypes.GetAlpha(reg[0]);
item.Stock = LinkarDataTypes.GetDecimal(reg[1]);
return item;
}
```

# Create mobile Apps with Xamarin and MV using Linkar 2.0
# WITH OR WITHOUT WEB SERVICE

This is only a small example on how you can create a mobile app with Visual Studio and Linkar, which logins to the Linkar Server, executes a Select and prints the data on the mobile device.

For a much more complete example please download the "Linkar Demos" folder from https://www.kosday.com/Product/Download/7 , and open the LinkarViewFilesDirect folder within the compressed sources.zip file.

You also can download the app from the **Google Store** or **Apple Store** and run it in your device.

The focus of this app is not to show a complex, pretty mobile app, it is just to show you how easy is to use Linkar to create mobiles app with MV databases.

**Android:**

https://play.google.com/store/apps/details?id=com.kosday.LinkarViewFiles&hl=es_419

**iOS:**

https://itunes.apple.com/us/app/linkar-vf/id1447620240?mt=8

# Thanks

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