

Loxodon Framework TextFormatting

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release v2.6.0

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Developed by Clark

Requires Unity 2021.3 or higher.

This is a text formatting plugin modified based on the official C# library. By extending the AppendFormat function of StringBuilder, it aims to avoid garbage collection (GC) when concatenating strings or converting numbers to strings. This optimization is particularly beneficial in scenarios with high-performance requirements.

Furthermore, the plugin extends Unity's Unity GUI (UGUI) by introducing two new text controls: TemplateText and FormattableText. These controls support the data binding features of MVVM, allowing the binding of ViewModel or value-type objects to the controls. This approach eliminates the need for boxing and unboxing of value-type objects, thus maximizing the optimization of garbage collection (GC).

It's worth noting that using the controls TemplateTextMeshPro or FormattableTextMeshProUGUI from Loxodon.Framework.TextMeshPro can further reduce garbage collection (GC), achieving a completely GC-free update of the game view.

Installation

Install via OpenUPM (recommended)

[OpenUPM](#) can automatically manage dependencies, it is recommended to use it to install the framework.

Requires [nodejs](#)'s npm and openupm-cli, if not installed please install them first.

```
# Install openupm-cli, please ignore if it is already installed.
npm install -g openupm-cli

#Go to the root directory of your project
cd F:/workspace/New Unity Project

#Install loxodon-framework-textformatting
openupm add com.vovgou.loxodon-framework-textformatting
```

Install via Packages/manifest.json

Modify the Packages/manifest.json file in your project, add the third-party repository ["package.openupm.com"](https://package.openupm.com)'s configuration and add "com.vovgou.loxodon-framework-textformatting" in the "dependencies" node.

Installing the framework in this way does not require nodejs and openm-cli.

```
{
  "dependencies": {
    ...
    "com.vovgou.loxodon-framework-textformatting": "2.6.2"
  },
  "scopedRegistries": [
    {
      "name": "package.openupm.com",
      "url": "https://package.openupm.com",
      "scopes": [
        "com.vovgou",
        "com.openupm"
      ]
    }
  ]
}
```

Quick Start

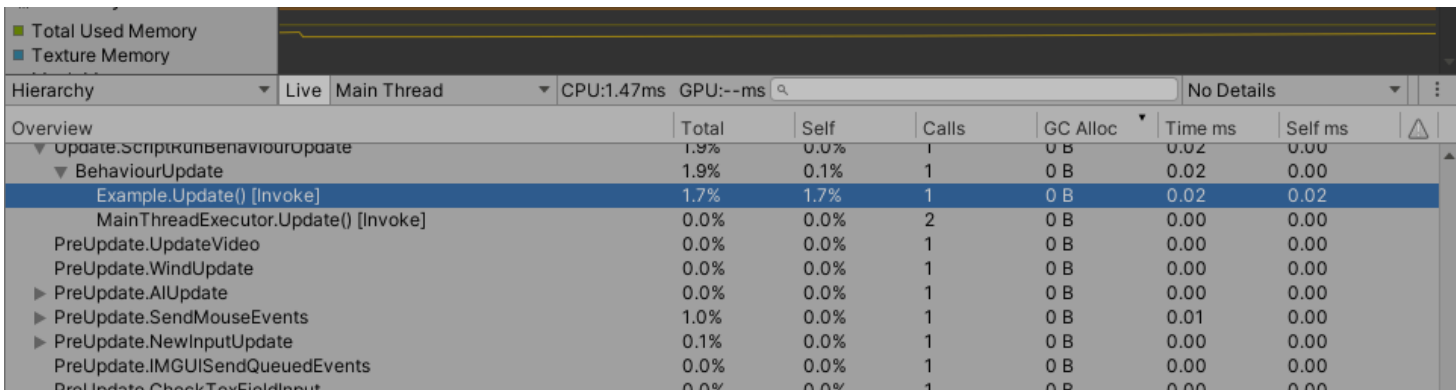
StringBuilder.AppendFormat

This plugin enhances the `AppendFormat<>()` function of `StringBuilder`. It provides support for multiple generic parameters of different types or generic array parameters. When these parameters are of numeric types, `DateTime`, or `TimeSpan`, using them to concatenate strings eliminates the need for value type boxing or unboxing. Consequently, converting numeric types to `String` during string concatenation does not generate garbage collection (GC). See the example below for usage details.

```

using System;
using System.Text;
using UnityEngine;
using Loxodon.Framework.TextFormatting;//make sure to first import the required namespace
public class Example : MonoBehaviour
{
    StringBuilder builder = new StringBuilder();
    void Update()
    {
        builder.Clear();
        builder.AppendFormat<DateTime,int>("Now:{0:yyyy-MM-dd HH:mm:ss} Frame:{0:D6}", DateTime.
        builder.AppendFormat<float>("{0:f2}", Time.realtimeSinceStartup);
    }
}

```



The screenshot shows the Unity Hierarchy window with the 'Overview' tab selected. The 'Hierarchy' dropdown is set to 'Live' and 'Main Thread'. The CPU usage is 1.47ms and GPU usage is --ms. The 'No Details' dropdown is selected. The table below shows the performance of the 'Example.Update() [Invoke]' method.

Method	Total	Self	Calls	GC Alloc	Time ms	Self ms
Update.ScriptRunBehaviourUpdate	1.9%	0.0%	1	0 B	0.02	0.00
BehaviourUpdate	1.9%	0.1%	1	0 B	0.02	0.00
Example.Update() [Invoke]	1.7%	1.7%	1	0 B	0.02	0.02
MainThreadExecutor.Update() [Invoke]	0.0%	0.0%	2	0 B	0.00	0.00
PreUpdate.UpdateVideo	0.0%	0.0%	1	0 B	0.00	0.00
PreUpdate.WindUpdate	0.0%	0.0%	1	0 B	0.00	0.00
PreUpdate.AIUpdate	0.0%	0.0%	1	0 B	0.00	0.00
PreUpdate.SendMouseEvents	1.0%	0.0%	1	0 B	0.01	0.00
PreUpdate.NewInputUpdate	0.1%	0.0%	1	0 B	0.00	0.00
PreUpdate.IMGUI.SendQueuedEvents	0.0%	0.0%	1	0 B	0.00	0.00
PreUpdate.CheckTextFieldInput	0.0%	0.0%	1	0 B	0.00	0.00

FormattableText

This control extends `UnityEngine.UI.Text`, providing support for string formatting and data binding. The `AsParameters<>()` function of the `FormattableText` control can be used to convert to a set of generic parameters, supporting 1-4 different parameters or a generic array. It enables binding with `ViewModel`. With this plugin, string and array concatenation are garbage collection (GC)-free. However, due to the `Text` component's requirement for a string and its limited support for string assignment, there is GC allocation when calling `StringBuilder.ToString()`. (It is recommended to install the `Loxodon.Framework.TextMeshPro` plugin and use `FormattableTextMeshProUGUI` instead of `FormattableText` for a completely GC-free experience.)

Usage 1: Utilize the `FormattableText.AsParameters<DateTime, int>()` method to obtain a parameter set of `GenericParameters<DateTime, int>`, then bind it to the view model.

```

public class TemplateTextAndFormattableTextExample : MonoBehaviour
{
    public FormattableText paramBinding1;

    private ExampleViewModel viewModel;

    private void Start()
    {
        ApplicationContext context = Context.GetApplicationContext();
        IServiceContainer container = context.GetContainer();
        BindingServiceBundle bundle = new BindingServiceBundle(context.GetContainer());
        bundle.Start();

        BindingSet<TemplateTextAndFormattableTextExample, ExampleViewModel> bindingSet = this.Cr

        //Create a parameter collection using the AsParameters<P1, P2, ...>()
        //format:The format is identical to the formatting parameters of string.Format(). For ex
        bindingSet.Bind(paramBinding1.AsParameters<DateTime, int>()).For(v => v.Parameter1).To(v
        bindingSet.Bind(paramBinding1.AsParameters<DateTime, int>()).For(v => v.Parameter2).To(v

        bindingSet.Build();

        this.viewModel = new ExampleViewModel();
        this.viewModel.Time = DateTime.Now;
        this.viewModel.FrameCount = 1;
        this.SetDataContext(this.viewModel);
    }
}

```

Usage 2: In the script FormattableTextExample, define a variable of type GenericParameters<DateTime, int> as a parameter set. In the UnityEditor, drag and drop the FormattableText onto the property paramBinding1 in the script shown below. Subsequently, bind it to the view model.

```

public class FormattableTextExample : MonoBehaviour
{
    public GenericParameters<DateTime,int> paramBinding1;

    private ExampleViewModel viewModel;

    private void Start()
    {
        ApplicationContext context = Context.GetApplicationContext();
        IServiceContainer container = context.GetContainer();
        BindingServiceBundle bundle = new BindingServiceBundle(context.GetContainer());
        bundle.Start();

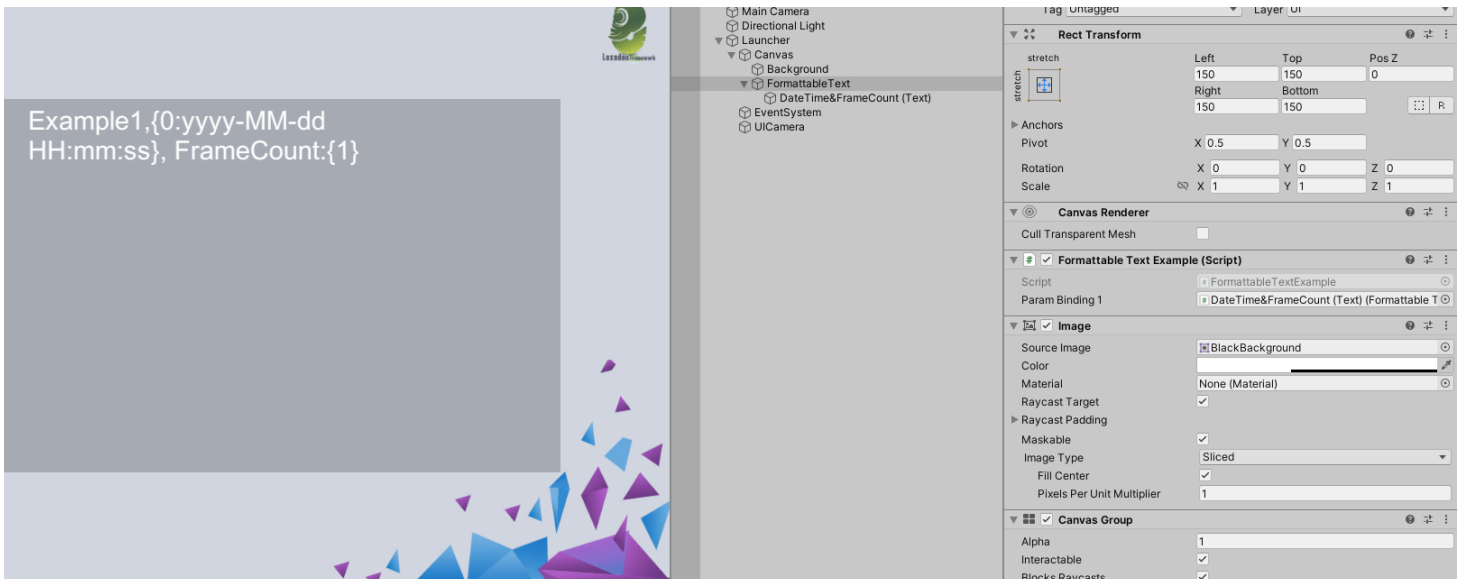
        BindingSet<FormattableTextExample, ExampleViewModel> bindingSet = this.CreateBindingSet<

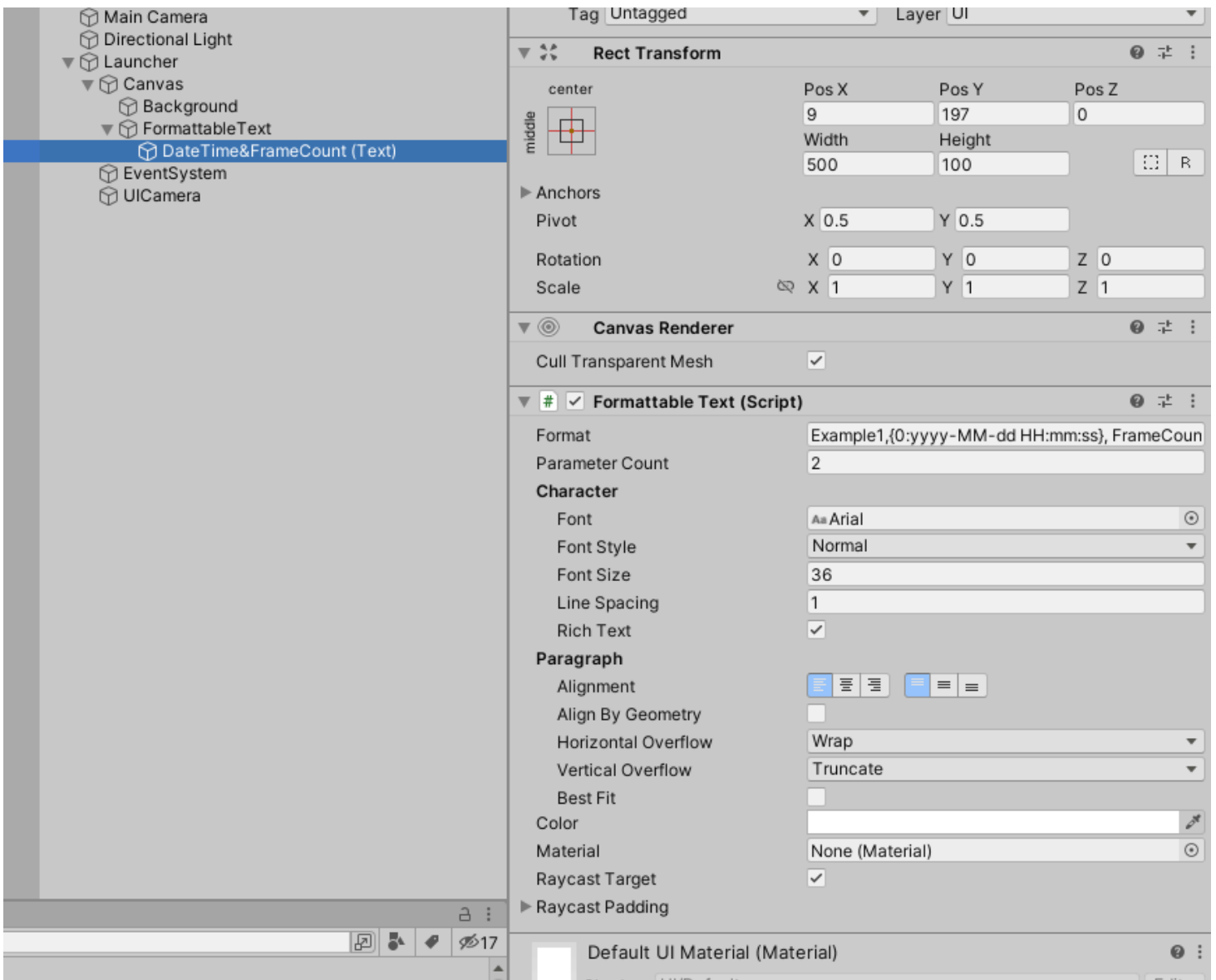
        //format:The format is identical to the formatting parameters of string.Format(). For ex
        bindingSet.Bind(paramBinding1).For(v => v.Parameter1).To(vm => vm.Time);
        bindingSet.Bind(paramBinding1).For(v => v.Parameter2).To(vm => vm.FrameCount);

        bindingSet.Build();

        this.viewModel = new ExampleViewModel();
        this.viewModel.Time = DateTime.Now;
        this.viewModel.FrameCount = 1;
        this.SetDataContext(this.viewModel);
    }
}

```





TemplateText

This control surpasses the capabilities of a formatted text control, providing enhanced functionality and ease of use. It supports binding a ViewModel object or sub-object to the `TemplateText.Data` property. The template control comes equipped with built-in path resolution and data binding features, allowing automatic binding of properties from the Data object using the text template.

Template Format: Template, Frame: {FrameCount:D6}, Health: {Hero.Health:D4}, AttackDamage: {Hero.AttackDamage}, Armor: {Hero.Armor}

Here, `FrameCount` and `Hero` are properties bound to the Data object, while `Health`, `AttackDamage`, and `Armor` are properties of the `Hero` object. The `D6` after `FrameCount` represents a numeric format parameter for frame count.

Similar to the previous case, garbage collection (GC) occurs only when calling `StringBuilder.ToString()`. (It is recommended to install `Loxodon.Framework.TextMeshPro` and use `TemplateTextMeshProUGUI` instead of `TemplateText` for a completely GC-free experience.)

```

public class TemplateTextAndFormattableTextExample : MonoBehaviour
{
    public TemplateText template;

    private ExampleViewModel viewModel;

    private void Start()
    {
        ApplicationContext context = Context.GetApplicationContext();
        IServiceContainer container = context.GetContainer();
        BindingServiceBundle bundle = new BindingServiceBundle(context.GetContainer());
        bundle.Start();

        BindingSet<TemplateTextAndFormattableTextExample, ExampleViewModel> bindingSet = this.Cr

        bindingSet.Bind(template).For(v => v.Template).To(vm => vm.Template);//The Template prop
        bindingSet.Bind(template).For(v => v.Data).To(vm => vm);
        bindingSet.Build();

        this.viewModel = new ExampleViewModel();
        this.viewModel.Template = "Template,Frame:{FrameCount:D6},Health:{Hero.Health:D4} Attack
        this.viewModel.Time = DateTime.Now;
        this.viewModel.TimeSpan = TimeSpan.FromSeconds(0);
        this.viewModel.Hero = new Hero();
        this.SetDataContext(this.viewModel);
    }
}

public class ExampleViewModel : ObservableObject
{
    private DateTime time;
    private TimeSpan timeSpan;
    private string template;
    private int frameCount;
    private Hero hero;
    public DateTime Time
    {
        get { return this.time; }
        set { this.Set(ref time, value); }
    }

    public TimeSpan TimeSpan
    {
        get { return this.timeSpan; }
        set { this.Set(ref timeSpan, value); }
    }

    public int FrameCount
    {
        get { return this.frameCount; }
        set { this.Set(ref frameCount, value); }
    }
}

```



```

    }

    public string Template
    {
        get { return this.template; }
        set { this.Set(ref template, value); }
    }

    public Hero Hero
    {
        get { return this.hero; }
        set { this.Set(ref hero, value); }
    }
}

public class Hero : ObservableObject
{
    private float attackSpeed = 95.5f;
    private float moveSpeed = 2.4f;
    private int health = 100;
    private int attackDamage = 20;
    private int armor = 30;

    public float AttackSpeed
    {
        get { return this.attackSpeed; }
        set { this.Set(ref attackSpeed, value); }
    }

    public float MoveSpeed
    {
        get { return this.moveSpeed; }
        set { this.Set(ref moveSpeed, value); }
    }

    public int Health
    {
        get { return this.health; }
        set { this.Set(ref health, value); }
    }

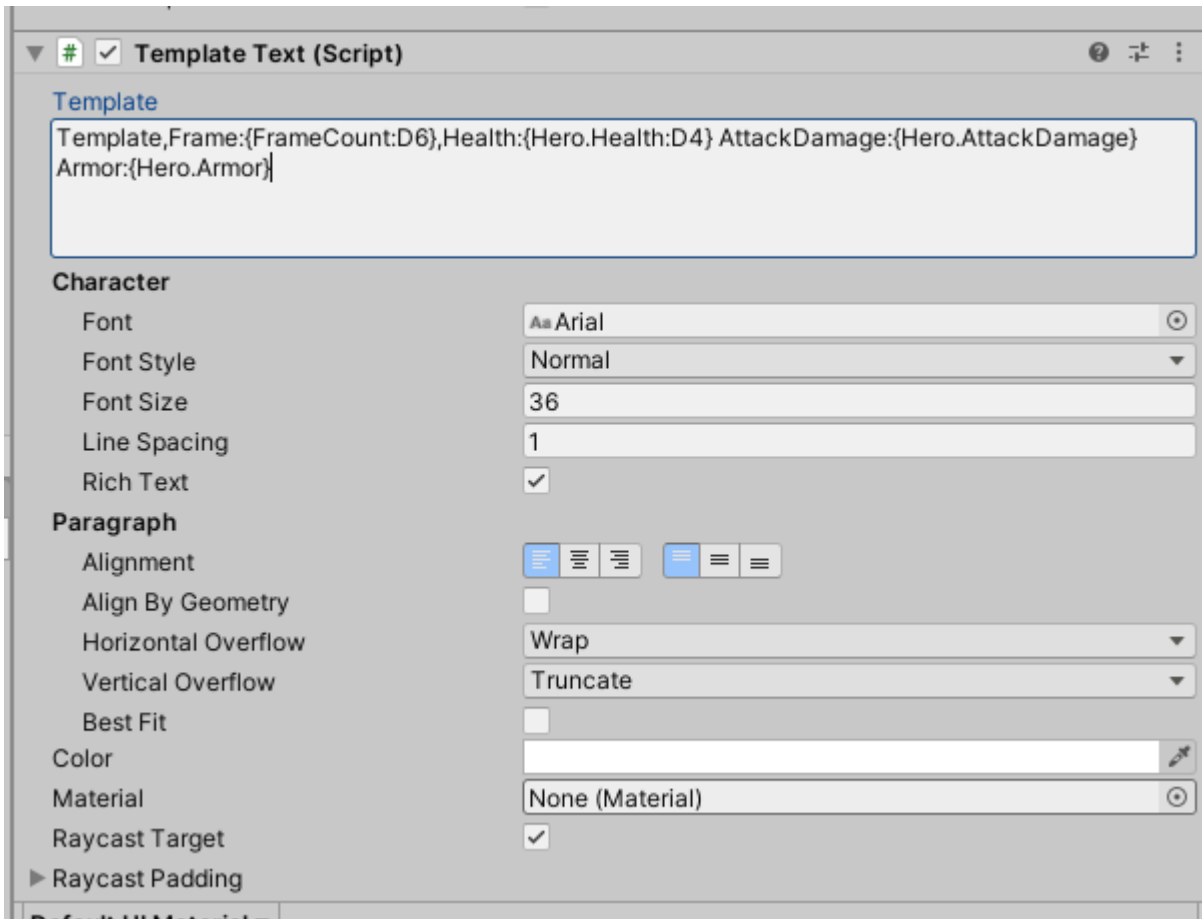
    public int AttackDamage
    {
        get { return this.attackDamage; }
        set { this.Set(ref attackDamage, value); }
    }

    public int Armor
    {
        get { return this.armor; }
        set { this.Set(ref armor, value); }
    }
}

```

}

}



Contact Us

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