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Google Cloud Software Development Kit (SDK) for .NET

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Agenda

Topic
What is Google Cloud SDK for .NET?.
Most common use cases.
How to set up your environment.
API Reference.

Agenda

Topic
Code examples with guidance for the Google Cloud SDK for .NET.
Additional code examples for the Google Cloud SDK for .NET.
GitHub repositories.
C# code samples with Google Cloud SDK for .NET.

Google Cloud Platform .NET Cloud Client Libraries

Key features and components of the Google Cloud SDK for .NET

1. **Google Cloud Client Libraries**: provides idiomatic .NET client libraries for different Google Cloud services. These libraries abstract the low-level details of interacting with Google Cloud APIs.

2. **Cloud Tools for Visual Studio**: to manage Google Cloud resources, deploy applications to the cloud, and debug their applications directly within the IDE.

3. **Authentication and Authorization**: The SDK provides authentication and authorization mechanisms to securely access Google Cloud services.

4. **Deployment and Management**: It offers tools and APIs to package and deploy your applications, manage your cloud resources, and monitor their performance.

5. **Testing and Emulation**: for testing and emulating Google Cloud services locally, allowing you to develop and test your applications without incurring costs or relying on a live cloud environment. This helps streamline the development and testing process.

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How to create a Google Cloud Free Tier account

1. Create a gmail account. https://support.google.com/mail/answer/56256?hl=en
2. Set your payment info (credit card data, paypal,… or other).
3. Open an incognito Chrome window and login in Google Cloud.
4. Login in Google Cloud. https://console.cloud.google.com/
5. Activate the free tier subscription.
6. First sample: create a new Bucket (for storing data).

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Setting up a .NET development environment

1. **Install your IDE**: Visual Studio or VS Code.
https://visualstudio.microsoft.com/
https://code.visualstudio.com/download

2. **Create a Google Cloud project**. Create a Google Cloud project to run your apps. Google Cloud projects form the basis for creating, enabling, and using all Google Cloud services.

3. **Authentication**. Your .NET app must authenticate itself to use Google Cloud APIs. You use Application Default Credentials (ADC), which let you provide credentials for either local development or in a production environment.

For information about setting up ADC, see Provide credentials to Application Default Credentials. For general information about authentication, see Authentication at Google.

https://cloud.google.com/dotnet/docs/setup?hl=en

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Set up Application Default Credentials (ADC)
https://cloud.google.com/docs/authentication/provide-credentials-adc#local-dev

1. **Install "gcloud CLI"** https://cloud.google.com/sdk/docs/install?hl=en

2. **Create your credential file** (run the command):

gcloud auth application-default login

This method stores your credentials in a file on your file system. Any user with access to your file system can use those credentials. When you no longer need these credentials, you should revoke them:

gcloud auth application-default revoke

User credentials might not work for some methods and APIs, such as the *Cloud Translation API* or the *Cloud Vision API*, without extra parameters or configuration. See Troubleshooting your ADC setup.

https://cloud.google.com/dotnet/docs/setup?hl=en

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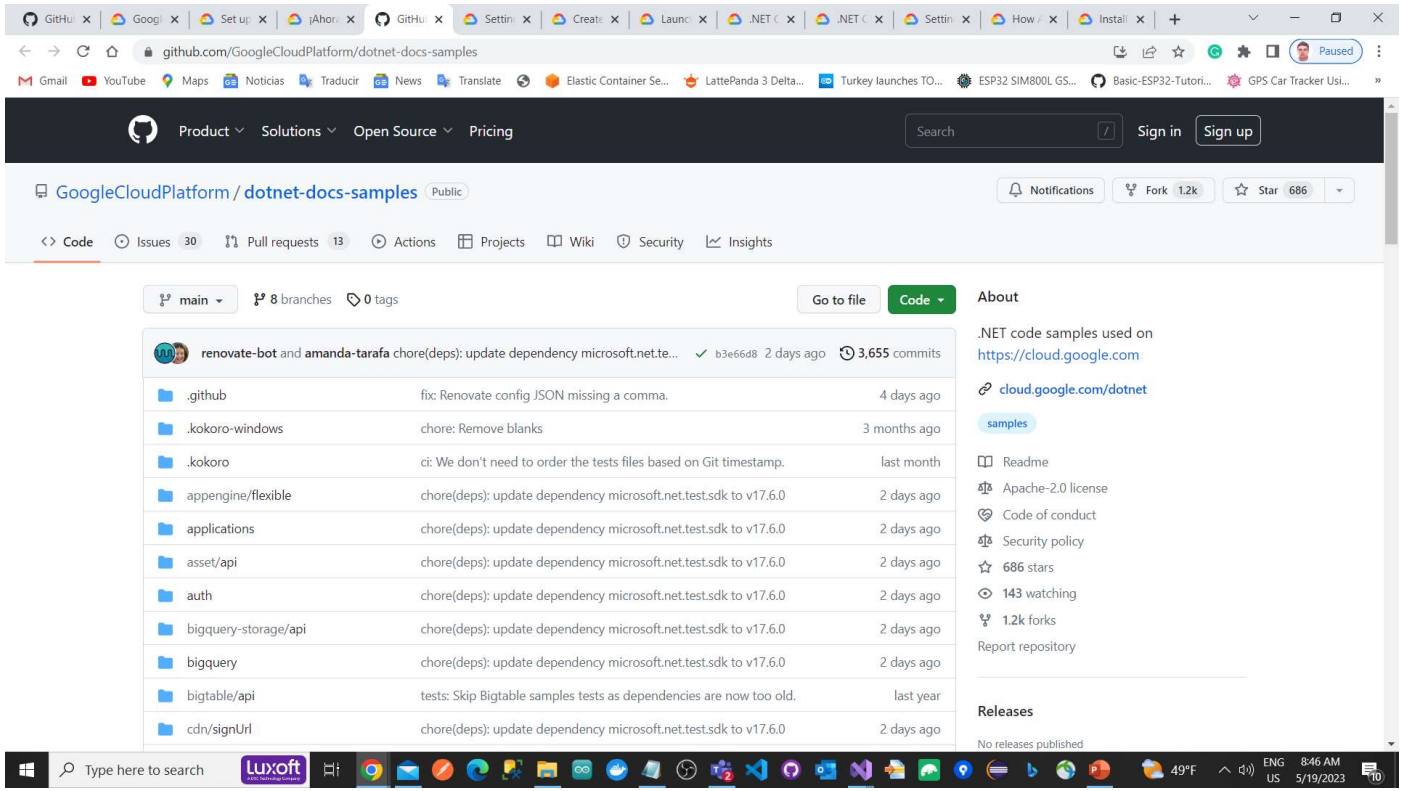

https://github.com/GoogleCloudPlatform/dotnet-docs-samples

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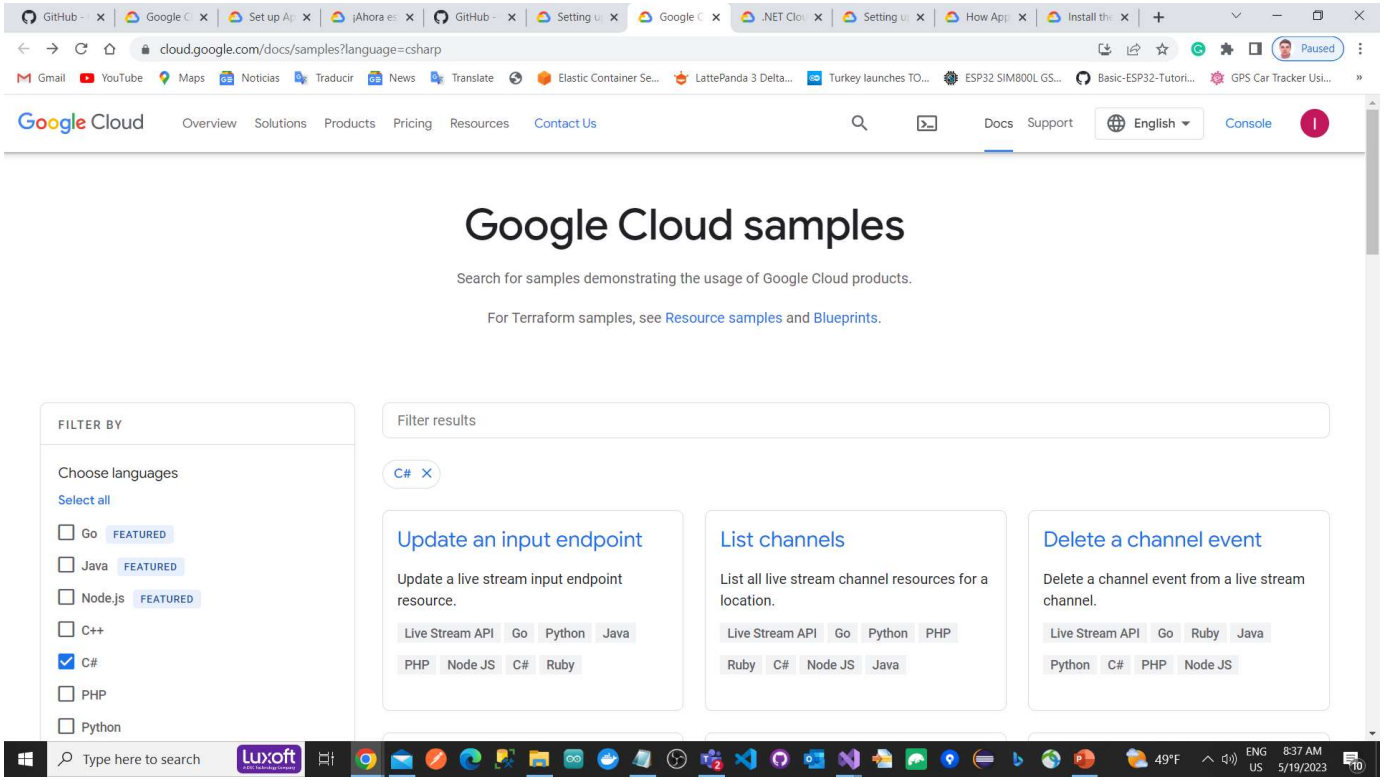

https://cloud.google.com/docs/samples?language=csharp

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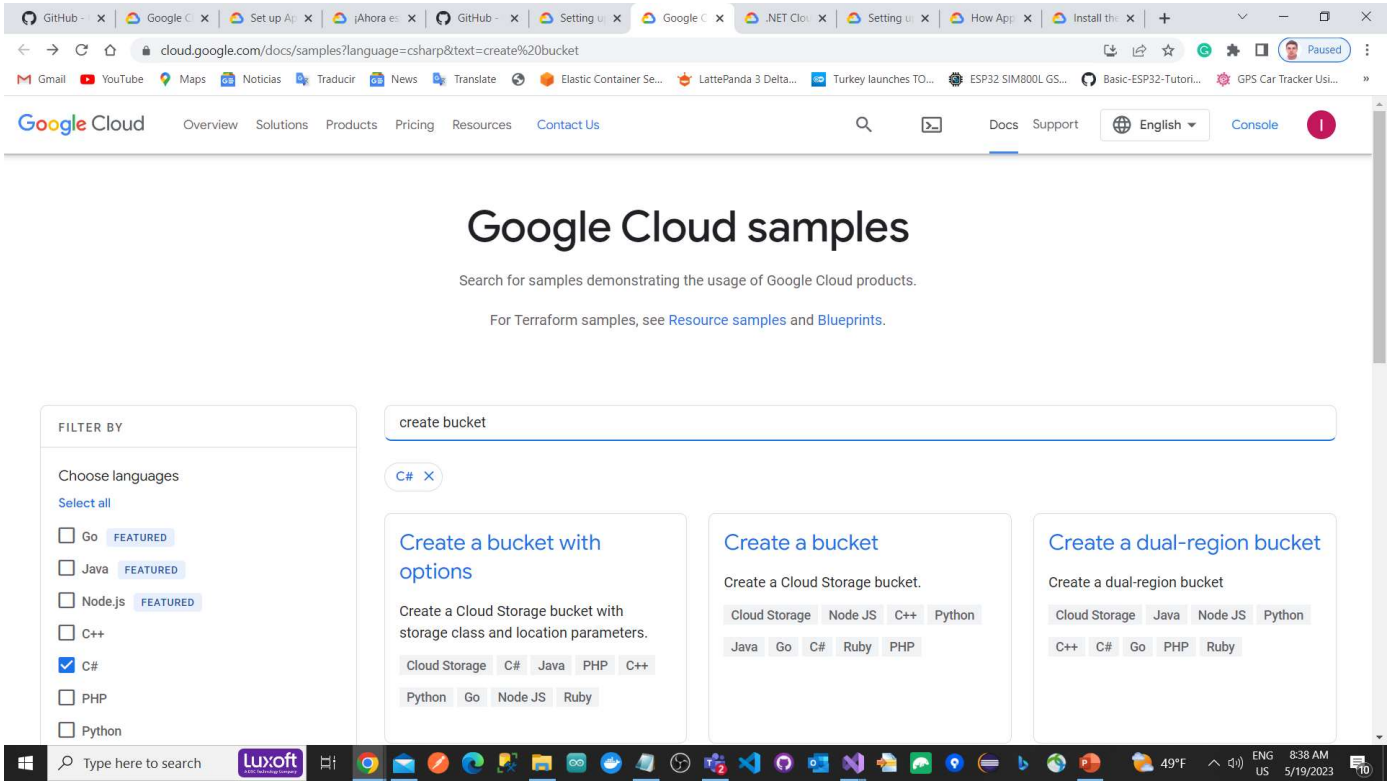

https://cloud.google.com/docs/samples?language=csharp&text=create%20bucket

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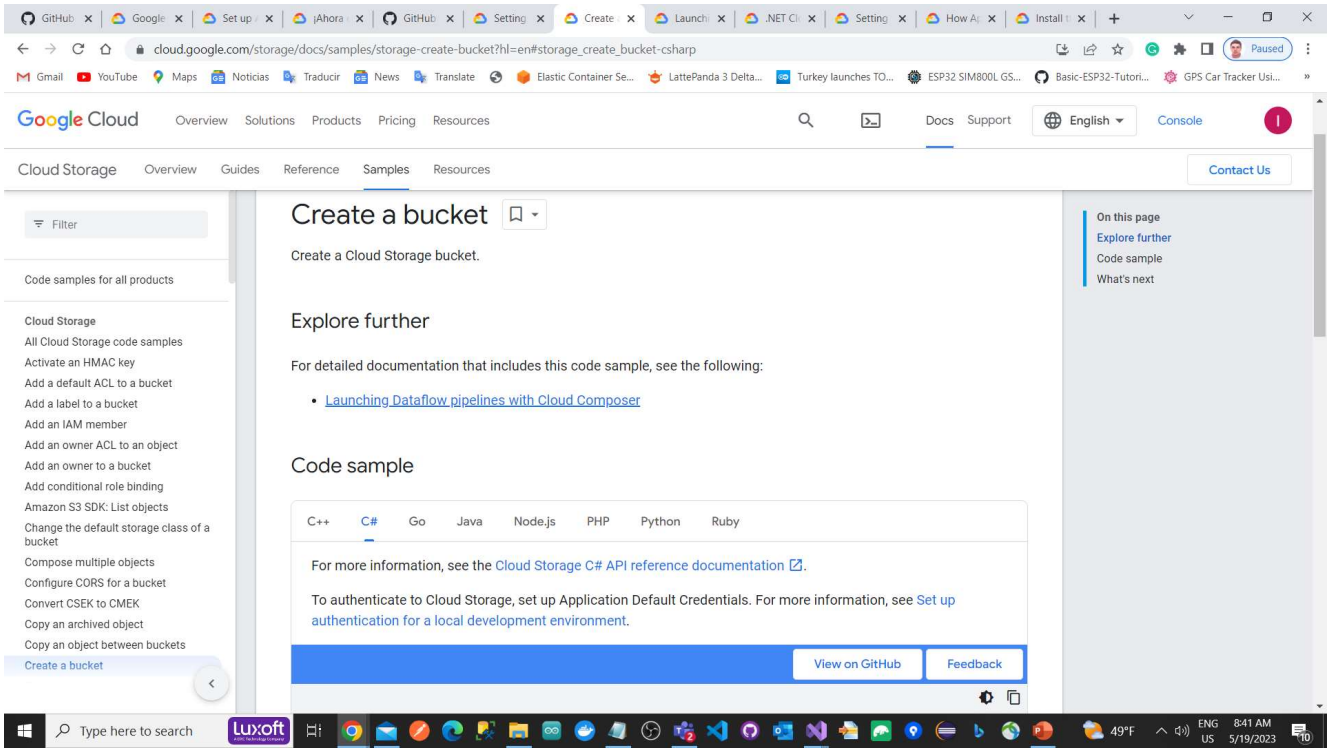

https://cloud.google.com/storage/docs/samples/storage-create-bucket?hl=en#storage_create_bucket-csharp

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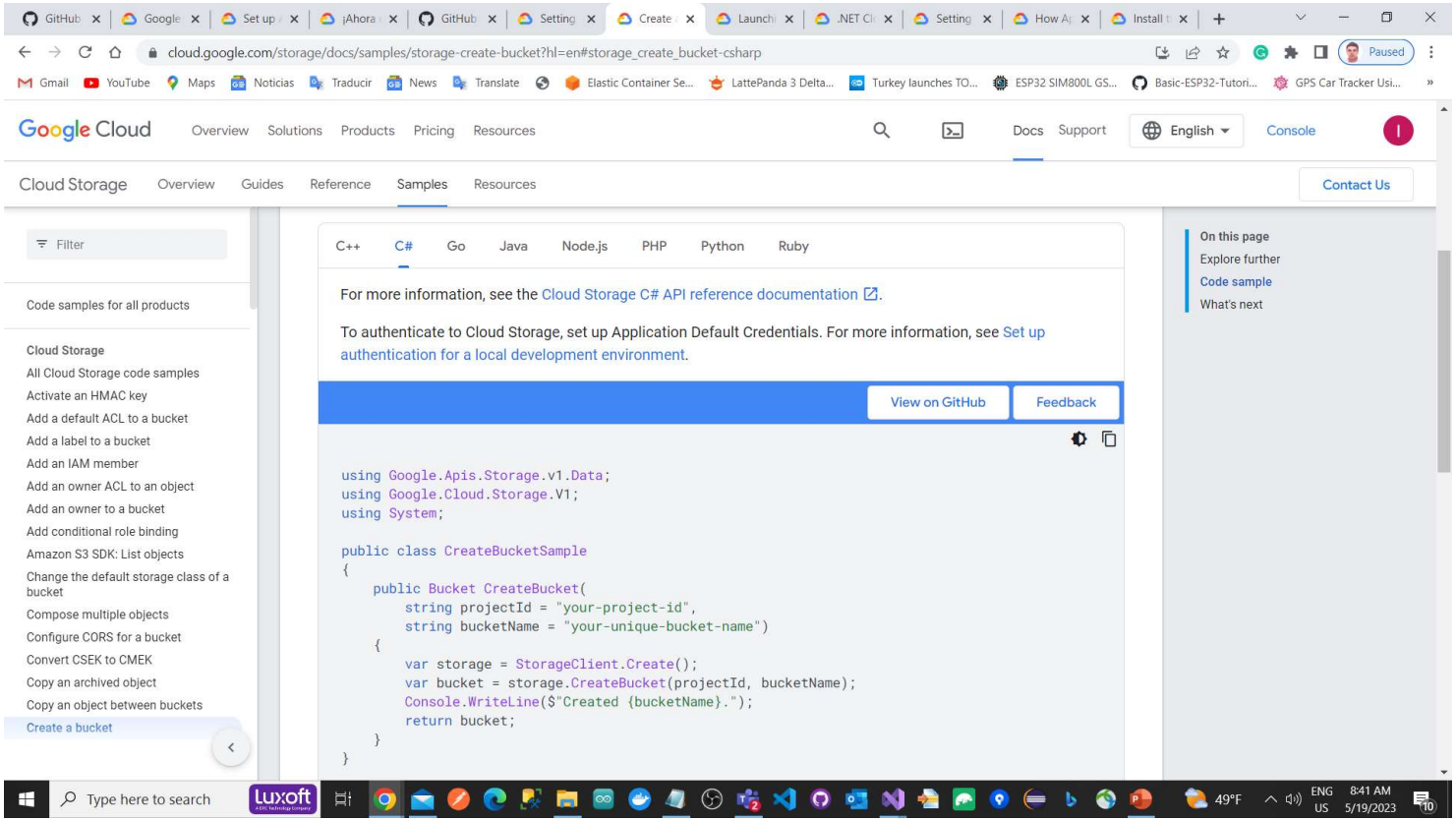

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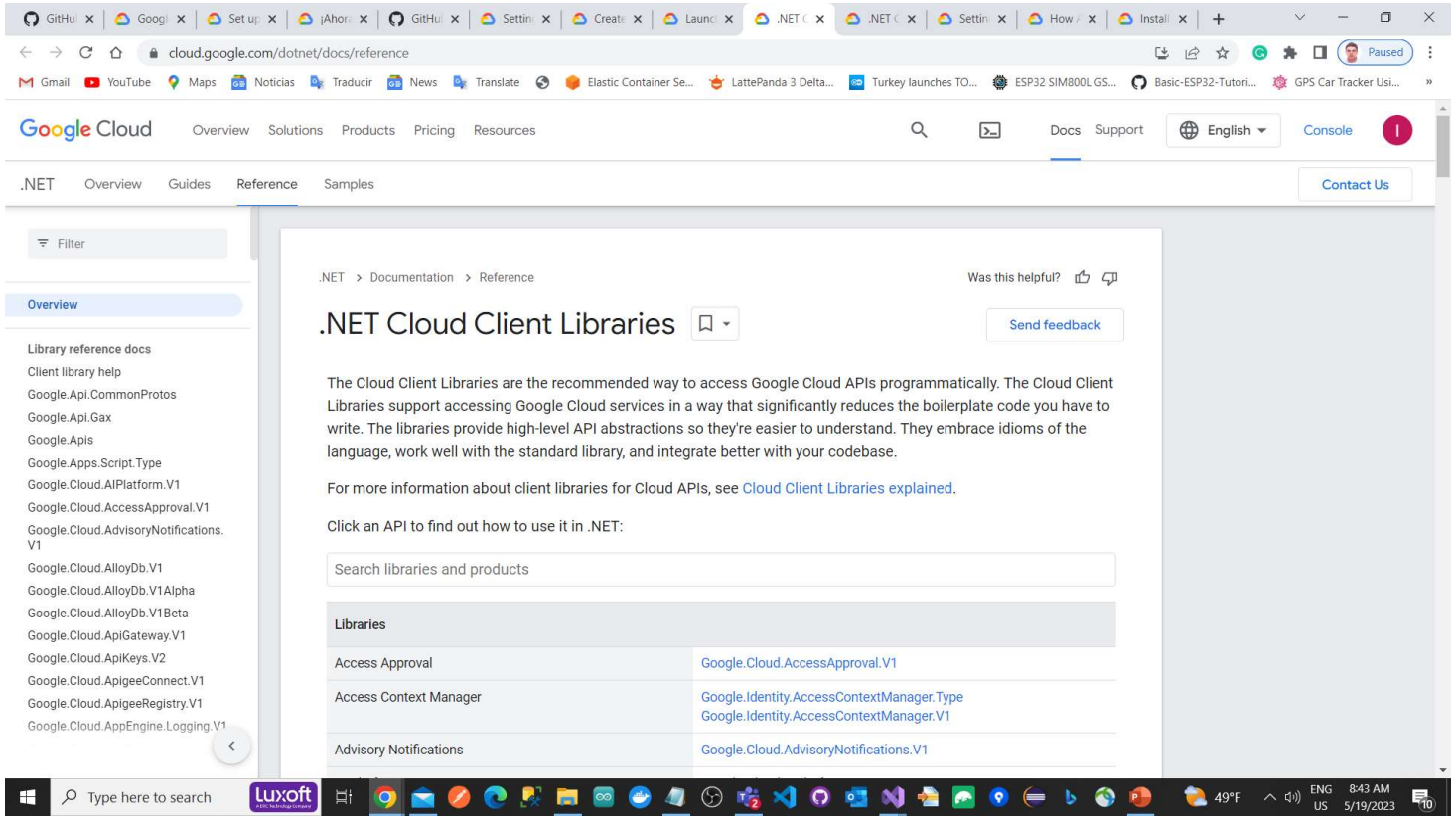
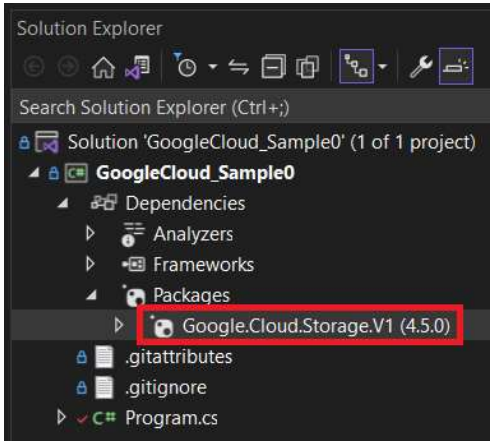


https://cloud.google.com/dotnet/docs/reference

Google Cloud Platform .NET Cloud Client Libraries

Buckets

```
using Google.Apis.Storage.v1.Data;
using Google.Cloud.Storage.V1;

string projectId = "focus-cache-387205";
string bucketName = "luiscocoenriquezsegundo";
string localPath = "C://NetChapterArticles.txt";
string objectName = "NetChapterArticles.txt";

//-----------------------------------------------------------------------------
//Create Bucket
//-----------------------------------------------------------------------------
var storage = StorageClient.Create();
var bucket = storage.CreateBucket(projectId, bucketName);
Console.WriteLine($"Created {bucketName}.");
//-----------------------------------------------------------------------------
//List Buckets
//-----------------------------------------------------------------------------
//var storage = StorageClient.Create();
var bucketsluis = storage.ListBuckets(projectId);
Console.WriteLine("Buckets:");
foreach (var bucketluis in bucketsluis)
{
    Console.WriteLine(bucketluis.Name);
}
//-----------------------------------------------------------------------------
//File Upload
//-----------------------------------------------------------------------------
using var fileStream = File.OpenRead(localPath);
storage.UploadObject(bucketName, objectName, null, fileStream);
Console.WriteLine($"Uploaded {objectName}.");
```



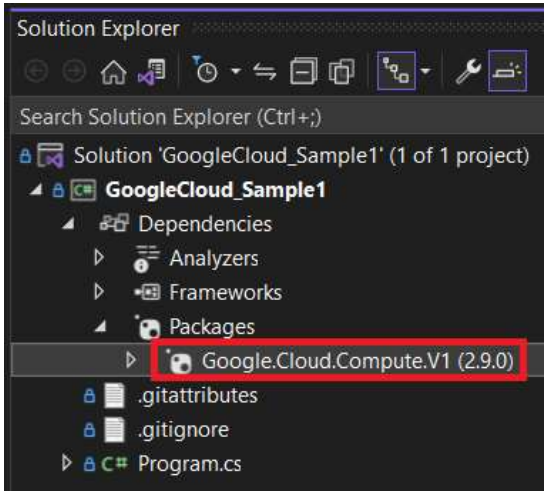

```
//-----------------------------------------------------------------------------
//File Download
//-----------------------------------------------------------------------------
string downloadlocalpath = "C:\\New folder\\DownloadedFile.txt";
using var outputFile = File.OpenWrite(downloadlocalpath);
storage.DownloadObject(bucketName, objectName, outputFile);
Console.WriteLine($"Downloaded {objectName} to {localPath}.");
//-----------------------------------------------------------------------------
//List Files
//-----------------------------------------------------------------------------
var storageObjects = storage.ListObjects(bucketName);
Console.WriteLine($"Files in bucket {bucketName}:");
foreach (var storageObject in storageObjects)
{
    Console.WriteLine(storageObject.Name);
}
```

Google Cloud Platform .NET Cloud Client Libraries

Creating a Virtual Machine

```
using Google.Cloud.Compute.V1;

string projectId = "focus-cache-387205";
string zone = "europe-southwest1-a";
string machineName = "luis-test-machine";
string machineType = "e2-micro";
string diskImage = "projects/debian-cloud/global/images/family/debian-10";
long diskSizeGb = 10;
string networkName = "default";

Instance instance = new Instance
{
    Name = machineName,
    MachineType = $"zones/{zone}/machineTypes/{machineType}",
    Disks =
            {
                new AttachedDisk
                {
                    AutoDelete = true,
                    Boot = true,
                    Type = ComputeEnumConstants.AttachedDisk.Type.Persistent,
                    InitializeParams = new AttachedDiskInitializeParams
                    {
                        SourceImage = diskImage,
                        DiskSizeGb = diskSizeGb
                    }
                }
            },
    NetworkInterfaces = { new NetworkInterface { Name = networkName } }
};
```

```
InstancesClient client = await InstancesClient.CreateAsync();
var instanceCreation = await client.InsertAsync(projectId, zone, instance);
await instanceCreation.PollUntilCompletedAsync();
```

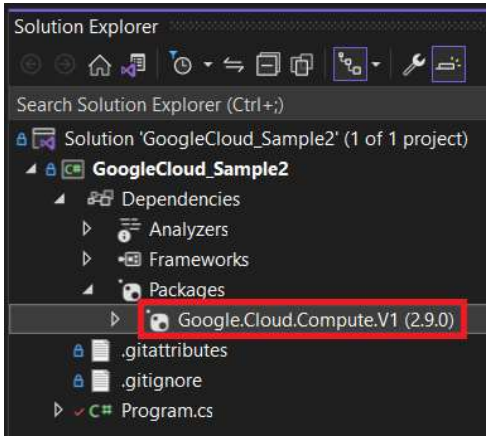


Google Cloud Platform .NET Cloud Client Libraries

Deleting a Virtual Machine

```
using Google.Api;
using Google.Cloud.Compute.V1;

string projectId = "focus-cache-387205";
string zone = "europe-southwest1-a";
string machineName = "luis-test-machine";

InstancesClient client = await InstancesClient.CreateAsync();

// Stop the VM instance before deleting it.
var stopRequest = new StopInstanceRequest
{
    Project = projectId,
    Zone = zone,
    Instance = machineName
};

await client.StopAsync(stopRequest);
```

```
// Start the VM instance before deleting it.
//var startRequest = new StartInstanceRequest
//{
//    Project = projectId,
//    Zone = zone,
//    Instance = machineName
//};

//await client.StartAsync(startRequest);

// Make the request to delete a VM instance.
var instanceDeletion = await client.DeleteAsync(projectId, zone, machineName);

//Wait for the operation to complete using client-side polling.
await instanceDeletion.PollUntilCompletedAsync();
```



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Listing Virtual Machines

```
using Google.Cloud.Compute.V1;

string projectId = "focus-cache-387205";

InstancesClient client = await InstancesClient.CreateAsync();
IList<Instance> allInstances = new List<Instance>();

// Make the request to list all VM instances in a project.
await foreach (var instancesByZone in client.AggregatedListAsync(projectId))
{
    Console.WriteLine($"Instances for zone: {instancesByZone.Key}");
    foreach (var instance in instancesByZone.Value.Instances)
    {
        Console.WriteLine($"-- Name: {instance.Name}");
        allInstances.Add(instance);
    }
}
```

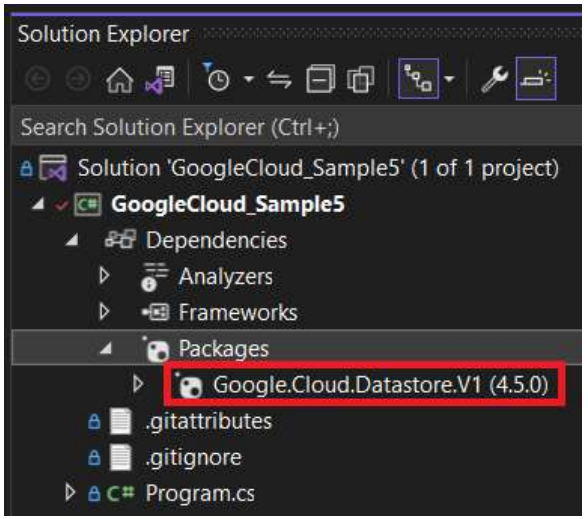
Listing Virtual Machines Types

```
using Google.Cloud.Compute.V1;

MachineTypesClient machineTypesClient = MachineTypesClient.Create();
ImagesClient imagesClient = ImagesClient.Create();

// List machine types
var machineTypesList = machineTypesClient.List(new ListMachineTypesRequest
{
    Project = "focus-cache-387205",
    Zone = "europe-southwest1-a"
});

Console.WriteLine("Machine Types:");
foreach (MachineType machineType in machineTypesList)
{
    Console.WriteLine($"- {machineType.Name}");
}

Console.WriteLine();
```

Google Cloud Platform .NET Cloud Client Libraries

Datastore

```
using Google.Cloud.Datastore.V1;

string projectId = "focus-cache-387205";

DatastoreDb db = DatastoreDb.Create(projectId);

string kind = "Task";
string name = "sampletask1";

KeyFactory keyFactory = db.CreateKeyFactory(kind);
Key key = keyFactory.CreateKey(name);

var task = new Entity
{
    Key = key,
    ["description"] = "Buy milk"
};
using (DatastoreTransaction transaction = db.BeginTransaction())
{
    // Saves the task
    transaction.Upsert(task);
    transaction.Commit();

    Console.WriteLine($"Saved {task.Key.Path[0].Name}: {(string)task["description"]}");
}
```

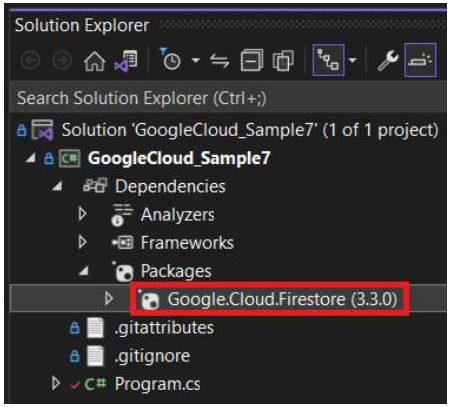


Google Cloud Platform .NET Cloud Client Libraries

Firestore

```
using Google.Cloud.Firestore;

string project = "focus-cache-387205";

AddData1(project).Wait();
RetrieveAllDocuments(project).Wait();

void InitializeProjectId(string project)
{
    FirestoreDb db = FirestoreDb.Create(project);
    Console.WriteLine("Created Cloud Firestore client with project ID: {0}",
project);
}

async Task AddData1(string project)
{
    FirestoreDb db = FirestoreDb.Create(project);
    DocumentReference docRef = db.Collection("users").Document("alovelace");
    Dictionary<string, object> user = new Dictionary<string, object>
            {
                { "First", "Ada" },
                { "Last", "Lovelace" },
                { "Born", 1815 }
            };
    await docRef.SetAsync(user);
    Console.WriteLine("Added data to the alovelace document in the users
collection.");
}
```

```
async Task RetrieveAllDocuments(string project)
{
    FirestoreDb db = FirestoreDb.Create(project);
    CollectionReference usersRef = db.Collection("users");
    QuerySnapshot snapshot = await usersRef.GetSnapshotAsync();
    foreach (DocumentSnapshot document in snapshot.Documents)
    {
        Console.WriteLine("User: {0}", document.Id);
        Dictionary<string, object> documentDictionary = document.ToDictionary();
        Console.WriteLine("First: {0}", documentDictionary["First"]);
        if (documentDictionary.ContainsKey("Middle"))
        {
            Console.WriteLine("Middle: {0}", documentDictionary["Middle"]);
        }
        Console.WriteLine("Last: {0}", documentDictionary["Last"]);
        Console.WriteLine("Born: {0}", documentDictionary["Born"]);
        Console.WriteLine();
    }
}
```



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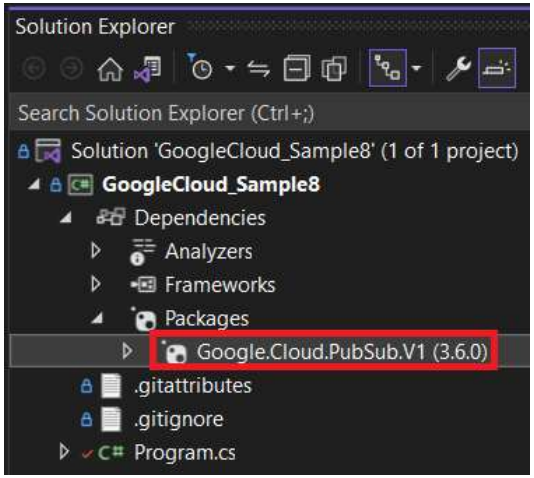
Google Cloud Platform .NET Cloud Client Libraries

Pub/Sub

```
using Google.Cloud.PubSub.V1;
using Grpc.Core;

string projectId = "focus-cache-387205";
string topicId = "luis-topic-1";
string subscriptionId = "subscription-first";

//Create a topic
PublisherServiceApiClient publisher = PublisherServiceApiClient.Create();
var topicName = TopicName.FromProjectTopic(projectId, topicId);
Topic topic = null;

try
{
    topic = publisher.CreateTopic(topicName);
    Console.WriteLine($"Topic {topic.Name} created.");
}
catch (RpcException e) when (e.Status.StatusCode == StatusCode.AlreadyExists)
{
    Console.WriteLine($"Topic {topicName} already exists.");
}
```

```
//Create a Subscription for the topic
SubscriberServiceApiClient subscriber = SubscriberServiceApiClient.Create();

SubscriptionName subscriptionName =
SubscriptionName.FromProjectSubscription(projectId, subscriptionId);
Subscription subscription = null;

try
{
    subscription = subscriber.CreateSubscription(subscriptionName, topicName,
                   pushConfig: null, ackDeadlineSeconds: 60);
}
catch (RpcException e) when (e.Status.StatusCode == StatusCode.AlreadyExists)
{
    // Already exists.  That's fine.
}
```



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Pub/Sub

```
//Publish messages to the above created topic

PublisherClient publisher1 = await PublisherClient.CreateAsync(topicName);

int publishedMessageCount = 0;

List<string> messageTexts = new List<string>();
messageTexts.Add("First message");
messageTexts.Add("Second message");
messageTexts.Add("Third message");
messageTexts.Add("Fourth message");
messageTexts.Add("Fifth message");

var publishTasks = messageTexts.Select(async text =>
{
    try
    {
        string message = await publisher1.PublishAsync(text);
        Console.WriteLine($"Published message {message}");
        Interlocked.Increment(ref publishedMessageCount);
    }
    catch (Exception exception)
    {
        Console.WriteLine($"An error ocurred when publishing message {text}: {exception.Message}");
    }
});
await Task.WhenAll(publishTasks);
```

Google Cloud Platform .NET Cloud Client Libraries

Pub/Sub

```
int messages_Count_received = PullMessagesSync(projectId, subscriptionId, true);

int PullMessagesSync(string projectId, string subscriptionId, bool acknowledge)
{
    SubscriptionName subscriptionName = SubscriptionName.FromProjectSubscription(projectId, subscriptionId);
    SubscriberServiceApiClient subscriberClient = SubscriberServiceApiClient.Create();
    int messageCount = 0;
    try
    {
        // Pull messages from server,
        PullResponse response = subscriberClient.Pull(subscriptionName, maxMessages: 20);
        foreach (ReceivedMessage msg in response.ReceivedMessages)
        {
            string text = System.Text.Encoding.UTF8.GetString(msg.Message.Data.ToArray());
            Console.WriteLine($"Message {msg.Message.MessageId}: {text}");
            Interlocked.Increment(ref messageCount);
        }
        if (acknowledge && messageCount > 0)
        {
            subscriberClient.Acknowledge(subscriptionName, response.ReceivedMessages.Select(msg => msg.AckId));
        }
    }
    catch (RpcException ex) when (ex.Status.StatusCode == StatusCode.Unavailable)
    {
        // UNAVAILABLE due to too many concurrent pull requests pending for the given subscription.
    }
    return messageCount;
}
```

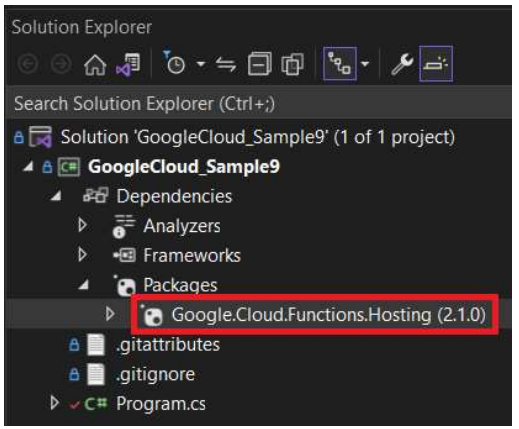
Google Cloud Platform .NET Cloud Client Libraries

Functions

```
using Google.Cloud.Functions.Framework;
using Microsoft.AspNetCore.Http;

namespace HelloWorld;

public class Function : IHttpFunction
{
    public async Task HandleAsync(HttpContext context)
    {
        await context.Response.WriteAsync("Hello World!");
    }
}
```



https://cloud.google.com/functions/docs/concepts/overview

Google Cloud Platform .NET Cloud Client Libraries

Functions

```
using CloudNative.CloudEvents;
using Google.Cloud.Functions.Framework;
using Google.Events.Protobuf.Cloud.Storage.V1;
using Microsoft.Extensions.Logging;
using System.Threading;
using System.Threading.Tasks;

namespace HelloGcs;

 /// <summary>
 /// Example Cloud Storage-triggered function.
 /// This function can process any event from Cloud Storage.
 /// </summary>
public class Function : ICloudEventFunction<StorageObjectData>
{
    private readonly ILogger _logger;

    public Function(ILogger<Function> logger) =>
        _logger = logger;

    public Task HandleAsync(CloudEvent cloudEvent, StorageObjectData data, CancellationToken cancellationToken)
    {
        _logger.LogInformation("Event: {event}", cloudEvent.Id);
        _logger.LogInformation("Event Type: {type}", cloudEvent.Type);
        _logger.LogInformation("Bucket: {bucket}", data.Bucket);
        _logger.LogInformation("File: {file}", data.Name);
        _logger.LogInformation("Metageneration: {metageneration}", data.Metageneration);
        _logger.LogInformation("Created: {created:s}", data.TimeCreated?.ToDateTimeOffset());
        _logger.LogInformation("Updated: {updated:s}", data.Updated?.ToDateTimeOffset());
        return Task.CompletedTask;
    }
}
```

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